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IN THE

Supreme Court of the United States

October Term, ~~1940~~ ~~[illegible]~~ 1954

STATE OF WISCONSIN, STATE OF
MINNESOTA, STATE OF OHIO and
STATE OF PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 4
Original

JOINT ABSTRACT OF RECORD

VOLUME I

TESTIMONY

Filed April 30, 1941

The Gilman Press — Madison, Wis.

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FOREWORD

While petitioner and respondents have endeavored, for the convenience of the court, to set out in this Joint Abstract of Record the respective portions of the transcript, record and exhibits in these causes which are deemed material for consideration of the issues involved herein, petitioner and respondents have agreed that this Joint Abstract of Record filed herein shall not be construed as barring reference to a consideration of any other evidence appearing in the record which inadvertently may have been omitted from this Abstract of Record.

This Joint Abstract in narrative form of the testimony of the witnesses is not in chronological order nor arranged in accordance with the transcript of the Record, but is grouped according to the nature and character of the evidence. Each witness' testimony has been followed to its conclusion although the witness' testimony may not so appear in the original transcript.

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Part One

TECHNICAL AND SCIENTIFIC EVIDENCE

IN THE

Supreme Court of the United States

October Term, 1940

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 4 Original

JOINT ABSTRACT OF RECORD

VOLUME I

Page of Record

HORACE P. RAMEY, duly sworn for Defendants,
Direct Examination by Mr. Clausen.

9 Reside Chicago, Illinois; graduated from high school,
10 Carlisle, Kentucky; two years literary work, Kentucky State University; then four years Civil Engineering, University of Michigan, graduating 1907. Later, Degree Civil Engineer, 1917, from University of Michigan. Worked for Sanitary District since 1907, as rod man,

computer, instrument man, assistant engineer, resident engineer, division engineer, acting chief engineer 1922, assistant chief engineer since January 1, 1923; worked on surveys and construction 1907 to 1910 of Lockport Power House; worked on construction of Lockport Power House 1907; on surveys and construction of North Shore Channel 1908 through 1910; construction of eight-track bridge 1909; designed Calumet-Sag Channel; in charge of maintenance and operation of works of Sanitary District 1912-1920; made economic studies 1921 leading to outline of present sewage treatment program; since July 1925 in charge of all design work of Sanitary District.

11 The 442 square miles of area in the Sanitary District of Chicago is divided into four projects for purposes of sewage treatment (North Side project, Calumet project, West Side project, Southwest Side project).

The North Side project covers 115 square miles, north of Fullerton Avenue, Chicago, to the north line of Cook County, and from Lake Michigan to the watershed between the Des Plaines and Chicago Rivers. This project consists of a sewage treatment plant, located at Howard Avenue and the North Shore Channel and about 39 miles of intercepting sewers, extending south from Glencoe through the North Shore towns and Evanston to the treatment plant and extending north from Fullerton Avenue to the treatment
12 plant. The treatment plant is of the activated sludge type and at present serves a sewered area of 82.5 square miles. The treated effluent is discharged into the North Shore Channel and the waste sludge from the plant is pumped through a 14-inch pine line,

17.5 miles long, to the Southwest Treatment Works for disposal. This treatment plant was placed in partial service October 3, 1928 and in complete operation June 28, 1930. The plant was originally designed for an average flow of 175 M.G.D. and in May 1937 by the addition of 12 new final settling tanks, this average capacity was increased to 250 M.G.D. At this plant, sewage passes through bar screens, with 4-inch 13 openings, is then pumped up 36 feet; then passes through grit chambers; then through bar screens with 5/8 inch openings, then through preliminary settling tanks (detention period 20 minutes); then through aeration tanks (detention period 5 hours); then through final settling tanks where the activated sludge is settled out and from which the effluent passes to the North Shore Channel. Approximately 20 per cent of the activated sludge taken from the final settling tanks is added to the fresh sewage just before it is passed into the aeration tanks. The remaining activated sludge (waste sludge) is combined with the sludge collected from the preliminary settling tanks and pumped through the 14-inch pipe line to the Southwest Treatment Works. Air for the aeration of sewage in the aeration tanks is provided by electrically driven blower units, compressing the air to 7.75 pounds per square inch. All the pumping units and other mechanisms in this plant are electrically driven.

14 The Calumet Sewage Treatment Project covers an area of 95 square miles, south of 87th Street, in Chicago, to 159th Street and from the Indiana State line west to Kedzie Avenue. This project covers the Calu-

met industrial district and the municipalities immediately
south of Chicago. The project consists of the
Calumet Sewage Treatment Plant of the activated
15 sludge type and about 42 miles of intercepting sewers,
draining a sewered area of 42.6 square miles. The
collecting sewers lead to the plant from the 95th Street
pumping station on the Calumet River from Harvey,
from Calumet City, and from Blue Island. This plant
was placed in service December 3, 1935, and was designed
for an average flow of 136 M.G.D. with a maximum
of 200 M.G.D. At this plant the sewage passes
through rack screens with 4-inch openings; is then
pumped up 33 feet; then passes through bar screens
16 with 5/8-inch openings; then through preliminary settling
tanks (detention period 10 minutes); then after
dosing with returned activated sludge passes through
aeration tanks (detention period 5 hours); then through
final settling tanks where the activated sludge is settled
and from which the effluent passes to the Calumet-Sag
Channel. Approximately 20 per cent of the
activated sludge is added to the raw sewage before
aeration. The remaining activated sludge (waste
sludge) is combined with the sludge from the preliminary
settling tanks; it is dosed with ferric chloride
17 and dewatered to about 80 per cent moisture on
vacuum filters; then broken up and mixed with predried
sludge, the mixture placed in flash dryers, in
which it is dried down to 6 per cent moisture; and
this final dried material is then burned in a furnace
which provides the heat for drying. This dried sludge
can be used as a fertilizer. When dried sludge is re-

moved for sale as a fertilizer the heat for drying is supplied by the combustion of fuel oil.

The West Side Sewage Treatment Project covers
18 an area of about 40 square miles, in Chicago, between
Fullerton Avenue and Taylor Street, and between
Lake Michigan and Cicero Avenue. This includes
the "Loop" district of Chicago. This project
consists of the West Side Sewage Treatment Works,
at Laramie Avenue and 39th Street, and 22.2 miles of
intercepting sewers paralleling both sides of the Chicago
River and the northwest side of the Drainage
Canal, leading from Fullerton Avenue, southwest to
the treatment works. The West Side Sewage Treatment
Plant was designed for an average flow of 472
M.G.D., with a maximum of 700 M.G.D. The plant consists
principally of three batteries of Imhoff tanks for
the sedimentation of sewage and the digestion of sludge.
Battery A of the Imhoff tanks was placed in service
June 2, 1930; Battery B on July 14, 1930; Battery C
19 on April 29, 1935. At this plant the sewage passes
through rack screens with 4-inch openings; is then
pumped up 61 feet; then passes through bar screens
with 1-inch openings; then passes through skimming
tanks, from which the surface flow passes to the Imhoff
tanks (Detention period 2 hours, Batteries A and B; 1
hour, Battery C) where the sludge is settled from the
sewage and digested and from which the effluent passes
to the Main Channel. The underflow from the skimming
tanks is diverted to grit chambers where the grit is
settled out and from which the flow is passed to the
Imhoff tanks. The grit is collected and hauled for final
disposal to a spoil pile. The solids settled from the

sewage in the Imhoff tanks pass down into the digestion
20 compartment of these tanks and remain until thoroughly digested. The digested sludge is drawn out under favorable weather conditions and placed on sludge drying beds from which after suitable drying it is stripped by machines and hauled away to the waste sludge dump.

The Southwest Sewage Treatment Project covers an area of about 192 square miles, between 87th Street and Taylor Street, in Chicago, and west from Lake Michigan, to include the Summit-Clearing industrial district. This project also includes the towns in the Des Plaines River Valley from Riverside, north to Des Plaines. At one time, this Des Plaines Valley was served by a separate treatment plant at Maywood but this plant was abandoned October 15, 1931 and the flow from it then absorbed in the West Side project, and to be ultimately absorbed in the Southwest Side project.

21 The West-Southwest Treatment Works now serve a sewered area of 125 square miles drained by 67 miles of intercepting sewers. The sewage treatment plant is of the activated sludge type, was originally designed for an average flow of 400 M.G.D. with a maximum of 600 M.G.D. This plant, as presently constructed, has been designated the "Southwest Side Treatment Plant" for treatment of sewage from the southwest area, including Packingtown and the Stockyards. This plant is to be extended to provide final treatment for the West Side sewage and as a consequence is designated the "West-Southwest Sewage Treatment Works". The Southwest Side Plant was placed in partial service May 23, 1939 when sewage was pumped from the West Side

intercepting sewer. The activated sludge was started
June 9, 1939 and by June 27, 1939 the first battery
of aeration tanks was in service. Dewatering and incineration
of sludge began August 7, 1939 and the first
part of the plant has operated continuously since August
28, 1939. The Southwest intercepting sewer was
placed in service September 7, 1939, draining sewage
from an area west of Western Avenue. The remaining
part of this sewer system, including the Racine Avenue
Pumping Station ,was placed in service March 20,
22 1940. At the Southwest Plant, the sewage passes
through bar screens, with 2-inch openings; is then
pumped up 45 feet; then passes through preliminary
settling tanks (detention period 34 minutes); then
through aeration tanks (detention period 5 hours)
then through final settling tanks where the activated
sludge is settled and from which the effluent passes to
the Main Channel. Approximately 20 per cent of the
activated sludge (return sludge) is mixed with the
raw sewage just before it enters the aeration tanks. The
remaining sludge (waste sludge) is passed to concentration
tanks where it is mixed with sludge from the preliminary
settling tanks, also, with waste sludge which
23 has been pumped from the North Side Treatment Plant.
The main sewage pumps are steam turbine driven and
air for aeration of sewage and other plant uses is produced
by steam turbine driven blowers which compress
the air to a pressure of 7.75 pounds per square
inch. The waste sludge for concentration in the sludge
concentration tanks is conditioned with ferric chloride
and dewatered to about 80 per cent moisture on vacuum
filters. This dewatered sludge is mixed with pre-dried

sludge and the mixture placed in an enclosed flash
24 dryer and dried down to about 6 per cent moisture.
This dried sludge is then burned in furnaces under the
boilers which produce steam for the pumping and blower
units, or the dried sludge can be removed from the
system and sold as a fertilizer base. When sludge is
sold as a fertilizer, approximately one-half ton of coal
is required to furnish heat for drying one-ton of sludge.

25 Illinois Exhibit No. 6 was received in evidence. This exhibit is a tabulation showing the completed work on the sewage treatment construction program of The Sanitary District of Chicago up to December 1, 1938, in the amount of $159,795,331.70.

26-29 Illinois Exhibit No. 7 was received in evidence, being a tabulation of the expenditures of the Sanitary District on sewage treatment construction from December 1, 1938 to June 1, 1940, in the amount of $5,311,188.12.

30 Regarding the Southwest Side Project and the West-
Southwest Treatment Plant: In the reports made to
the Supreme Court the cost figures for Southwest Side
project include only the cost of sewers on the southwest
area and the Racine Avenue Pumping Station,
which is a part of the sewer system. The West Side
Project includes the West Side sewers as well as the
West Side Treatment Plant. The West-Southwest Plant,
shown on such tabulations, includes the activated
sludge sewage treatment plant, which has formerly
31 been referred to as the "Southwest Side Plant". This
has been given the hyphenated name "West-Southwest
Side Sewage Treatment Plant", because ultimately it
will provide complete treatment for the Southwest Side
sewage and also provide final treatment for the West

Side sewage. At the present time, only Southwest Side sewage is being treated at the West-Southwest Plant.

I have prepared an estimate of cost of future work of sewage treatment construction after June 1, 1940.
32-33 This amounts to $12,969,092 and is shown on Illinois Exhibit No. 9. This future work consists of $912,192 remaining unpaid on 27 existing contracts and of $12,056,900 of estimated future work. The 27 contracts
34-40 are actual commitments, most of which are well under way. The future work is divided into certain prospective contracts. These future estimates are based on the best judgment of the engineering department of the Sanitary District and on its past experience in constructing work of similar nature. The future work consists principally of $10,554,900 for construction and equipment sufficient to increase the capacity of the West-Southwest Treatment Works so that it will be able to handle 900 M.G.D. of sewage, of which sewage 600 M.G.D. would be given complete treatment and 300 M.G.D. would be effluent from the West Side Sewage Treatment Plant, which is to be given secondary or final treatment in the West-Southwest Plant.

41 The Sanitary District has available at present sufficient resources to pay for approximately 90 per cent of this construction work. On June 1, 1940, the Sanitary District had cash, or equivalent, in its funds for construction of $1,308,942; then, in addition, the Sanitary District on June 27, 1940 sold bonds in the amount of $5,000,000; after the sale of these bonds the Sanitary District had $2,455,000 of unencumbered debt incurring capacity and on July 1, 1940 redeemed $3,000,000 of bonds, after which there was $5,455,000 of unencum-

bered debt incurring capacity in addition to the $6,308,942 cash on hand June 1 and cash from bonds sold June 27, 1940. This should cover all the construction work which can be done up into 1942.

42 The bonding capacity of the Sanitary District is five per cent of the assessed valuation of the property within the Sanitary District. At the present time, there is about $5,400,000 of unencumbered capacity and bonds are being redeemed at about the rate of $5,000,000 per year, so that if the assessed valuation of property of the Sanitary District should remain approximately the same in 1941 and 1942 as at present, there should be available about $5,000,000 additional each year to carry on the work.

43 At present, the Sanitary District has approximately $6,308,000 cash on hand and a bonding capacity of approximately $5,400,000 in addition, or total resources of approximately $11,700,000 to date. This additional
44 future construction work will cost approximately $13,000,000 so we lack only about $2,000,000 today of enough money to complete this future construction, assuming that all these funds can be used for this purpose. There is a possibility of other liabilities against the Sanitary
45 District, a judgment, for instance. The Sanitary District is now engaged in patent litigation; is being sued for the infringement of certain patents. Approximately $5,000,000 of bonds are being retired each year by the use of taxes collected for the redemption of bonds and when $5,000,000 of bonds are retired it then becomes possible to resell such an amount of bonds. At the present time the Sanitary District has outstanding
46 $110,000,000 of bonds. The Sanitary District has ap-

proximately $6,000,000 in cash for construction at present and in addition has an unencumbered debt incurring capacity of about $5,000,000. This relates to future construction of approximately $13,000,000 which will take about 2-½ years from now to complete. During that period of 2-½ years, the Sanitary District will have the benefit of additional debt incurring capacity over and above the approximately present $11,000,000 when and as bonds are redeemed and if the assessed valuation
47 is not reduced, and in another 2 years, on the present assessed valuation, the Sanitary District would have an additional $10,000,000 which would increase potentially the present set-up to about $21,000,000, for performing approximately $13,000,000 worth of work. I base my statement that it will take until December 31, 1942 to complete this work on my experience with past work of this kind. This work is being placed under contract as fast as possible, contracts are being let for the mechanical equipment which goes into this plant addition; plans are being drawn for additional final settling tanks, for an extension to the present pump and blower house, for an extension to the sludge incineration building. It will take four or five months before any plans can be
48 out for those buildings. Contracts can be let for these buildings early in 1941 but no work can start until the spring of 1941 since it is concrete construction on which work cannot be reasonably done in freezing weather. I do not believe that work can start actually on the tanks or the buildings until April 1941 and know from past experience it will take two full working seasons to do the physical work which is necessary in that program. This proposed extension of the West-Southwest

Plant has been approved by the "PWA Review Board". Practically all the construction work which the Sanitary District has done in the past six or seven years has been done under agreement with the Public Works Administration, through which the Sanitary District was able to sell $42,000,000 of its bonds and obtain in addi-
49-53 tion thereto a grant of $16,000,000, and under this agreement the Public Works Administrator appointed a Review Board to review all the plans made by the Sanitary District from January 1934 down to date.

One of the projects under the PWA Agreement just mentioned was a project which provided for certain experimental work on the West Side sewage. Since this experimentation was a PWA project, it was necessary to report results to this PWA Review Board, even though there was no PWA agreement regarding the future construction which might result therefrom. These experiments were made on several processes of sewage treatment, including chemical precipitation, activated sludge, the Guggenheim process, two filter processes, and although the experimental work was finished in 1939 the formal report showing the results of such work was not compiled until April 1940. The experimental work itself was a PWA project and the cost of experimental work was paid out of PWA funds and the PWA Review Board suggested the studies that should be made so it was necessary to report the results to this Review Board. A formal report of something like 150 pages and certain recommendations were submitted to this PWA Board in April 1940, and this PWA Review Board approved the recommendations made by the Sanitary District engineering department, regarding this report, and recommended that the Sanitary District proceed to construct facilities for giving final treatment to West Side sewage by activated sludge, as recommended in that report.

53 I have prepared a table showing the flow in the Main Drainage Channel of the Sanitary District, yearly av-
54 erages, 1930 to 1940. These records are in the semiannual reports made to the Supreme Court up to December 1938 and to such figures I have added figures for the other two years. These figures of flow are shown in Illinois Exhibit No. 11.

55-58 I have compiled a tabulation showing the flow in the Main Drainage Channel, by months, for the year 1939. These figures are compiled from records of flow from the Main Channel at Lockport and from other records kept by the Sanitary District in the ordinary course of business and as reported monthly to the United States District Engineer at Chicago. Such figures for flow by months during the year 1939 are shown in Illinois Exhibit No. 12.

59-60 The PWA Review Board was appointed early in April 1934 by Mr. Ickes, the Administrator of the Federal Emergency Administration of Public Works. This Review Board was appointed at that time to review plans and specifications prepared by The Sanitary District of Chicago for certain sewage treatment works and made a report to Mr. Ickes in April 1934.

The Sanitary District of Chicago in May 1934 filed a special report with the Supreme Court, indicating that the Sanitary District intended to modify the order of procedure in its sewage treatment construction program and was going to proceed at once with the con-

struction of the Southwest Sewage Treatment Works because the PWA's Review Board had so recommended and directed in its report, made to Mr. Ickes in April 1934. The Sanitary District transmitted this PWA Review Board report to the Supreme Court as a part of the special report which the Sanitary District filed with the Court in May 1934. The PWA Review Board recommended, in its report of April 1934, that instead of going ahead with complete treatment facilities for the West Side sewage at that time, the Sanitary District delay that work and study what method could best be used for secondary treatmnet of the West Side sewage and spend the funds on hand for complete treatment facilities for the Southwest sewage. The Sanitary District
61 proceeded along those lines and during the years following made certain experiments to determine the best method of supplementing the West Side treatment plant. After those experiments had been made, the Sanitary District, in April 1940, made a report to the PWA Review Board on such tests. The PWA Review Board then studied this report and recommended that the Sanitary District adopt activated sludge for secondary treatment of the West Side sewage so it was April 1940 before the PWA Review Board made a recommendation as to the type and character of treatment which should be used to supplement the existing treatment of sewage from the West Side plant.

62 Illinois Exhibit No. 13 was received in evidence. This exhibit is a tabulation of flow in the Main Drainage Channel, monthly averages for the months of January to May, inclusive, 1940.

63 The Board of Trustees of The Sanitary District of Chicago, in June 1940, approved the construction program as recommended by the PWA Review Board (in connection with the report made to it April 1940.) The Sanitary District of Chicago sold $5,000,000 of bonds June 27, 1940. The money received for these bonds can be used on the $900,000 of contract work in force and for other work now being placed under contract. One of these contracts for tightening the Government breakwater in connection with the Chicago River Con-
64 trol Works will cost around $200,000. Another contract for which bids are advertised to be received the latter part of July is a contract for additional blowers for the West-Southwest Plant. This work may cost around $500,000. The interest rate on this last bond issue of the Sanitary District was 2-½ per cent but there was a premium of $107,000 on the $5,000,000 bond issue, that is, the bonds were sold at par plus a premium of $107,000. That money is now on deposit and with the $1,300,000 in the construction fund as of the first of June 1940,
65-66 the resources on hand for construction are $6,300,000. The Sanitary District has something over $6,300,000 cash on hand at present, resulting from the cash on hand June 1, 1940 and the sale of $5,000,000 of bonds on June 27, 1940. In addition to that the Sanitary District had $2,400,000 of unused bonding capacity after June 27th and then the Sanitary District redeemed $3,000,000 of bonds on the first of July 1940, bringing the unused bonding capacity up to $5,400,000. This figure in addition to the $6,300,000 cash on hand brings the total resources of the Sanitary District for construction purposes up to above $11,000,000.

67-
69 Discussion by the Master and Counsel.

70 The $5,000,000 of bonds sold by the Sanitary District, June 27, 1940, were for the following purposes:

Calumet Project	$ 150,000
North Side Project	250,000
Southwest Side Sewers	490,300
West-Southwest Sewage Treatment Works	3,909,700
Chicago River Controlling Works	200,000

The total flow from the Main Drainage Channel during June 1940 averaged 2866 c.f.s.; inflow from the Des Plaines River was 53 c.f.s.; domestic pumpage of the Chicago metropolitan area, 1662 c.f.s.; net diversion from Lake Michigan, 1161 c.f.s.

71 On May 16, 1940, The Sanitary District of Chicago filed an application with the Public Works Administration requesting that $5,598,200 be added to the resources in the existing agreement between the Sanitary District and the PWA, in order to carry out this amount of construction at the West-Southwest Sewage Treatment Plant. This application for an amendment to the present PWA agreement is still pending. The purpose of such an application to the WPA is to save money for the local taxpayers since under the PWA agreement the Sanitary District receives a grant of 30 per cent of the cost of labor and material, and under this request the PWA is asked for a total grant of $19,000,000 in place of the grant of $16,692,000 under the present PWA agreement. This would enable the Sanitary
72 District to carry on additional construction work to the extent of this increase in the grant of $2,308,000. This report of the PWA Review Board, made April 30,

1934, to Mr. Ickes, Administrator of the Federal Emergency Administration of Public Works, was filed with the Supreme Court in May 1934, in connection with this case now under consideration.

73 Pages 15, 16, 17, 44, 45, 46 and 47 of this PWA Review Board report were received in evidence as Illinois Exhibit No. 14. Said exhibit appears in the record of these hearings, pages 73 to 83.

83-84 The supplemental report of the Sanitary District, filed with the Supreme Court of the United States, May 23, 1934, in particular page 4 of said report, was received in evidence as Illinois Exhibit No. 15. Illinois Exhibit No. 15 appears in the record of these hearings, pages 84 to 92, inclusive.

93-94 The report of the Engineering Department of The Sanitary District of Chicago, dated April 16, 1940, regarding additions to the Southwest Side Sewage Treatment Works, and also supplemental treatment for the West Side sewage, originally submitted to the Chief Engineer of The Sanitary District of Chicago, and by him transmitted to Joshua D'Esposito, Resident Projects Engineer of the Public Works Administration, and in turn, transmitted by D'Esposito to the PWA Review Board, was received in evidence as Illinois Exhibit No. 16. This report appears in the record of these proceedings, pages 95 to 110, inclusive.

111 The PWA Review Board, after studying the Sanitary District report of April 16, 1940, made a report to Joshua D'Esposito, Resident Projects Engineer, PWA, May 3, 1940, in which it was recommended that certain construction be undertaken to increase the capacity of the West-Southwest Sewage Treatment Works and to pro-

vide secondary treatment for the West Side sewage. This report of the PWA Review Board was received in evidence as Illinois Exhibit No. 17 and appears in the record of these proceedings, pages 112 to 117. The letter from Joshua D'Esposito, Resident Projects Engineer, PWA, transmitting a copy of the PWA Review Board report of May 3, 1940, to Ross A. Woodhull, President of The Sanitary District of Chicago, was received in evidence as Illinois Exhibit No. 18, and appears in the record of these proceedings, pages 118 to 119.

119-122 Certified copies of certificates from Michael J. Flynn, County Clerk of Cook County, Illinois, showing the assessed values of property in the Sanitary District for the years 1937, 1938 and 1939, were received in evidence as Illinois Exhibits No. 19-A, 19-B and 19-C, and appear on pages 119 to 122 in the record of these proceedings.

122-123 In regard to the financial status (for construction purposes) of the Sanitary District, for the years 1937, 1938 and 1939, etc., the Sanitary District had:

Date	Debt Incurring Capacity	Based on Assessed Valuation	Bonds Outstanding
Jan. 2, 1937	$119,915,555	1935	$133,322,390
Jan. 2, 1938	115,732,909	1936	124,992,890
Jan. 2, 1939	122,861,672	1937	117,484,390
Nov. 1, 1939	115,430,278	1938	114,484,390
Jan. 2, 1940	115,430,278	1938	111,489,390
May 1, 1940	121,375,552	1939	111,488,390

These figures given as of May 1st indicate that May 1940 was the first time for the past three years that the bonds outstanding were substantially less than the debt

incurring capacity. This came about because of the increase in the assessed value of the property within the Sanitary District for the year 1939, which figures became official April 15, 1940. In the years 1937 and 1938
124 the outstanding bonds either exceeded the bonding capacity or were not substantially less. In 1939 the debt incurring capacity was almost $1,000,000 more than the bonds outstanding and in 1940 this difference became about $4,000,000. These figures do not take into account contractual obligations of the Sanitary District, which amount to about $2,500,000. The figures of May 1, 1940 indicate the difference between the debt incurring ca-
125 pacity and the outstanding bonds of practically $10,000,000, and with $2,500,000 of contractual obligations that left resources available for construction of approximately $7,500,000. This figure was further increased by the retirement of $3,000,000 of bonds on July 1, 1940.

126 The permit, under which the Sanitary District diverts water from Lake Michigan, authorizes a diversion of 1500 c.f.s., annual average, from the Great Lakes-St. Lawrence watershed. This includes the run-off from the Chicago and Calumet Rivers, which amounts to approximately 500 c.f.s., annual average. This leaves about 1000 c.f.s. which can be diverted directly from Lake Michigan. In budgeting the flow, we determine at the first of each month what flow should be produced in the Main Drainage Canal for that month and in doing so set up a certain amount for so-called "storm reserve" to take care of storm water. In the month of June, 1940, we budgeted a certain amount of flow and figured there would be normal rainfall whereas in the month of June 1940, the rainfall was actually 1.31 inches, which

was about half the normal rainfall, so that in the month of June not as much as half of the storm reserve was used. If the rainfall had been normal, the flow from Lake Michigan, including the rainfall as diversion,
127 would have been about 1300 or 1400 c.f.s. The 1500 c.f.s. permitted from the Lake Michigan watershed is a net figure. The total discharge from the end of the Channel at Lockport is measured. A credit is then taken for domestic pumpage in Chicago and for inflow from the Des Plaines River and after these credits are taken, the remainder is the net diversion, which cannot be more than 1500 c.f.s., annual average. The figure of approximately 1161 c.f.s. on the tabulation for the month of June would correspond with 1461 c.f.s. for the period January 1 to May 31, 1940, shown in Illinois Exhibit No. 13. This 1161 c.f.s. would correspond to the 1698 c.f.s. for the month of May; 1437 for the month of April; 1578 for the month of March; 1228 for the month of
128-130 February; and 1364 for the month of January, all as shown on Illinois Exhibit No. 13.

The rainfall is charged as a part of this 1500 c.f.s., annual average diversion, even though it is not water directly from Lake Michigan, it is water which is tributary to Lake Michigan. It is necessary to average up by the end of the year at 1500 c.f.s., or less, but since rainfall is so uncertain sometimes we have saved up a little too much in the early part of the year. There have been other times when we haven't saved quite enough and have had to cut the flow down very low in the latter part of December to average out.

1409 When the diversion of water from Lake Michigan
was reduced to 1,500 c.f.s. in January 1939, we started
to budget the flow very carefully. I have prepared a
tabulation showing the planned flow and the actual
discharge of water from the Main Channel at Lockport
1410 for the years 1938, 1939 and 1940. This was introduced
as Illinois Exhibit No. 40. On this exhibit, under the
heading "Planned Flow", column one indicates the total
flow as planned at the beginning of each of the
years 1939 and 1940. Column two shows this flow as
revised from month to month. Column three, marked
"Storm Reserve", shows the estimated amount of storm
run off. Column four indicates the average dry weather
flow as planned. The canal is operated with a flow corresponidng
to the planned average dry weather flow and
this condition is not changed except when it is necessary
to increase the flow to carry off storm run-off. In
1411 the table there are three columns under "Actual Flow".
Column seven, "Actual Dry Weather Flow", does not
differ greatly from column four, "Planned Average Dry
Weather Flow". Column six, "Storm Run-off", does
vary from column three, "Storm Reserve", because
actual storm run-off has not followed the normal estimate
in the past two years. Column five is the actual
average monthly flow. In February 1939 it was planned
to flow 2,400 c.f.s. of dry weather flow and 400 c.f.s. was
estimated for storm reserve, making a total of 2,800
c.f.s. It can be noticed that the actual average dry
weather flow, on days not affected by storm run-off,
was 2,430 c.f.s. It can be noticed that actual storm

run-off was 1,559 c.f.s. so it became necessary to flow a total of 3,989 c.f.s. in that month. That was one month when the storm run-off exceeded normal. It also exceeded the normal in March 1939.

An opposite case is shown in the month of June 1940; In that month, it was planned to flow 2,800 c.f.s. dry weather flow, with an allowance of 400 c.f.s. for storm run-off, making a total flow of 3,200 c.f.s. The actual average dry weather flow was 2,746 c.f.s., not much different from the 2,800 c.f.s. planned. The storm run-
1412 off was only 130 c.f.s. instead of the 400 c.f.s. planned,
so the total actual flow became only 2,876 c.f.s.

From this exhibit it can be noticed that by October 1939 the actual storm run-off had been very much less than the planned storm reserve so it was safe in October to increase the original budget of total flow from 2,900 c.f.s. to 3,100 c.f.s. Then, in November, it was increased from 2,800 c.f.s. to 2,900 c.f.s. There was no storm run-off in November and considerable storm reserve was accumulated, hence in December, it was possible to plan a total flow of 3,500 c.f.s. and the actual flow was 3,469 c.f.s.

Now, you notice in February, March, April, May, 1939, we planned an average dry weather flow of about 2400 c.f.s., and our average dry weather flow in the days not affected by storm run-off, that is, the actual flow, was 2430 c.f.s., in February, 2476 in March, 2417 in April, 2263 in May.

Now, that is about as low dry flow as is safe, when you consider that the domestic water pumpage and the inflow from the Des Plaines Valley amounts to about 1600 c.f.s., or perhaps 1650. and when you consider

that the average run-off of the Chicago and Calumet
1413 Rivers amounts to about 550 c.f.s., you have a total flow of around 2100 c.f.s., exclusive of diversion, so when we planned a flow of 2400 c.f.s., that means we planned to take only 300 c.f.s. out of Lake Michigan.

Now, the Calumet River is still open, that is, it has an open connection with Lake Michigan. The Chicago River has a so-called tight connection, on account of the Chicago River Control Works, but with this 300 c.f.s. coming in from the lake through a channel which is 20 feet deep and 200 feet wide, or 4,000 square feet, the velocity is less than a tenth of a foot a second. In other words, there is practically no slope from the lake, and it would take very little surplus water running into the river from land to reverse that flow, so we have never felt that it was safe to operate the canal with a lower dry weather flow than 2400 c.f.s.

1414 During storms there are times when water runs off the land into the Chicago and Calumet Rivers in quantities as high as 10,000 to 12,000 c.f.s. If the discharge at Lockport was not increased to draw this water from the Chicago River to Lockport, the water would flow into Lake Michigan. With the flow as at the present time, there is a slope or drop of approximately six inches between Lake Michigan and Lockport. To flow 10,000 c.f.s. through the Canal, which 10,000 c.f.s. may come from an ordinarily heavy rain, a slope of seven feet between Lake Michigan and Lockport is needed. It is obvious that if a water level at the Lockport end of the Canal was not lowered, the storm waters running into the Calumet and Chicago Rivers near the lake would raise the level of those rivers and cause flow into the lake. This can be prevented in the case of the Chicago River because of the control works at the mouth of the River, but not in the case of the Calumet River. While in the case of the Chicago River, there is a limit. The level of the Chicago River cannot be permitted to rise too high or there would be flooding of basements in the Chicago area.

1415 In the latter part of January, I testified that the Sanitary District had 27 contracts in force, the uncompleted work on which was estimated at $912,000. Since that time, six of these contracts have been completed; ten other contracts have been let; and $518,000 has been expended. Three of the new contracts are major contracts in our future sewage treatment construction program.

Illinois Exhibit No. 41 was received in evidence. This exhibit shows profiles of the water surface in the Chicago River and Drainage Canal.

1416 It shows that in June 1940, with an average flow of 2876 c.f.s., the water surface slope dropped from 0.78 c.c.d. at the mouth of the Chicago River to -1.25 at Lockport. In other words, there was a drop of about six inches between Chicago and Lockport to produce a flow of 2876 c.f.s.

Another profile shownig a discharge of 10,140 c.f.s. on September 1, 1927, shows the water surface at the lake in Chicago at approximately the same elevation as in June 1940. In other words, it required a drop of 7.2 feet to produce a flow of 10,000 c.f.s.

The 10 contracts I mentioned before as having been recently let are a part of a supplementary construction program amounting to about $12,000,000, of which $10,-

000,000 of work is for additional complete treatment fa-
1417 cilities for the West Side sewage, to be built at the Southwest Side Plant. Of the three important contracts mentioned, one was for additional pumps at the Racine Avenue Pumping Station, to cost $90,570. Another contract was for 3 blower units at the West Southwest Sewage Treatment Works, to cost $544,300, and the other major item was a contract for making watertight the breakwater in the Chicago Harbor, which is part of the Chicago River Control Works. The contract price on this work is $119,710. The work of constructing the supplementary treatment facilities is proceeding with reasonable diligence.

1418 Illinois Exhibits Nos. 42 and 43 were received in evidence, being a record of daily discharge at Lockport, for the years 1939 and 1940, and a record of half hourly discharge at Lockport on the 15th day of each month, for the years 1939 and 1940. In these tabulations (Exhibits Nos. 42 and 43) there are certain half-hour periods where the discharge increases approximately 1600 c.f.s. over the preceding half-hour periods. One instance is in the column for January 15, 1939, at 10 P. M. This increase is probably due to lockage. A flow of about 1600 c.f.s. for half an hour is required to fill the Lockport lock. There are several places in these tables where the discharge will vary in a half hour from the preceding half hour about 1600 c.f.s., or in multiples of 1600 c.f.s., and the reason for this is the water used for lockage.

HORACE P. RAMEY—Cross Examination

1531 As Assistant Chief Engineer of The Sanitary District of Chicago, I have a lot to do with the supervision of the engineering department and I have charge of all design work. I have very little to do with construction or with operation.

I was a witness in the previous hearings before the Special Master, now Chief Justice of the United States Supreme Court. I was also a witness in the previous hearings before Special Master Edward F. McClennen.

1532 I have assisted in the preparation of the semi-annual reports of the Sanitary District to the Supreme Court; also, assisted in the preparation of the supplemental report relative to modification in sequence of the construction program, filed with the Supreme Court May 23, 1934.

In previous testimony in these hearings, I introduced tables bringing the costs on the sewage treatment construction program up to June 1, 1940; from the figures previously reported to the Supreme Court of costs to
1533 December 1, 1938. The figures of expenditures for sewage treatment plants and facilities from 1930 through 1938 were reported in the semi-annual reports to the Supreme Court. These figures as compiled by Mr. Naujoks were: For 1930, \$5,339,377; 1931, \$4,686,717; 1932, \$705,469; 1933, \$424,801; 1934, \$6,755,594; 1935, \$11,214,353; 1936, \$16,344,921; 1937, \$14,940,266; 1938, \$9,570,986; 1939, \$4,177,748; a total of a little more than \$74,000,000 through 1939.

Q. In the petition of the State of Illinois, page five, the statement appears: "It is estimated that the cost of said works", meaning complete sewage treatment facilities at the West Side Works, "will not exceed $9,000,000, and the estimated time for the physical construction of said complete treatment for the West Side treatment works will be two working seasons."

1534 Q. Now, this will bring the total construction cost for the completion of the sewage treatment construction program of the Sanitary District to slightly in excess of $83,000,000?

A. The record shows that prior to April 21, 1930 the Sanitary District had spent $89,812,847.25, and I assume that the figures of $74,000,000 that you have put in are in addition to that $89,000,000.

Q. My question referred to the total cost since the entry of the decree of April 21, 1930.

A. Oh, that is approximately right, based on this statement that it is estimated that the cost of said work shall not exceed nine million, but later we put in a fairly close estimate of those works at the West Side Plant of $10,555,000.

The estimate of $10,555,000 was prepared in April 1940. The other figures (for $9,000,000) were compiled in either October or November 1939.

1535 In the 1929 hearings, we submitted a future construction program of $176,166,000.00. I would not say that we were nearly $100,000,000 off on our estimates at that time. Those estimates were made as of 1928, using 1928 costs, figuring an Imhoff tank and trickling filter plant for the West Side, figuring an Imhoff tank and trickling filter plant for the Southwest Side, together
1536 with the necessary right-of-way for the Southwest Side, and before the processes of incinerating sludge

was developed. The estimates were on the high side but I wounld not say quite as much as $50,000,000. The reasons for accomplishing this work for figures less than the estimated prices were explained in the reports to the Supreme Court. Contracts were let during the depression for about 25 per cent less than the figures we had estimated; also, we effected certain economies by developing the process of incinerating sludge. In the report to the Court of January 1, 1933, it was estimated that there would be a saving of $9,775,000 by the adop-
1537 tion of the incineration process. We saved on the construction of practically all the sewers built from 1930 on, but particularly for 1933. The amounts are all stated in the reports to the Supreme Court. In testifying before Special Master McClennen, in 1933, I introduced a chart, dated September 10, 1930, showing construction costs for the complete sewage treatment program of The Sanitary District of Chicago, from September 10, 1930 to December 31, 1938, in which the total cost
1538 was estimated at $174,043,000. In that tabulation the cost of the Chicago River control works was estimated at $4,000,000. These controlling works actually cost about $2,800,000 but this was for a different type of construction. The estimate of $4,000,000 was made in 1929 and was not changed in the table dated 1932 and introduced at the hearings in 1933.

1539 I furnished the representatives of the State of Illinois with the figure of $9,000,000 for additional work required at the West Side Plant and assisted in the preparation of the petition of the State, in which this figure was used. I testified in these hearings that the estimated additional cost of construction work at the West

Side plant after June 1, 1940 was $10,969,900. In the final semi-annual report to the Supreme Court, the estimated cost of future work on the Calumet project after December 1, 1938 was shown as $302,000. Illinois Exhibit No. 7 in these hearings shows that between December 1, 1938 and June 1, 1940, $626,869.03 was expended on this project, and Illinois Exhibit No. 9 shows that future expenditures after June 1, 1940 on the Calu-
1540 met project are estimated at $723,920. In the final semi-annual report to the Supreme Court, the future work on the North Side project, after December 1, 1938, was estimated at $290,000. Illinois Exhibit No. 7 in these hearings indicates that between December 1, 1938 and June 1940, there had been expended $235,836.16 on this project. In Illinois Exhibit No. 9, the future work after June 1, 1940 is estimated at $483,219.00. Illinois
1541 Exhibit No. 10 shows the items for which the future estimates were made.

Q. Mr. Clausen: You might shorten this record a lot, Mr. Naujoks. If it is the same identical kind of work that he estimated on then or estimated on later, then we will get somewhere, but just what he estimated back three or four years ago, that isn't in the record. This isn't cross-examination of any testimony I brought out.

The Master: I don't think he would be limited to examining this witness, who is an important officer of the Sanitary District, to matters brought out in direct examination. He might, perhaps, have to put him on for cross-examination; under the new rules he can cross-examine any officer of an opposing party freely, even if he never be directly examined, without being bound by it, so I don't think the objection that it was not

brought out in direct examination is important. I should suppose that it was proper cross-examination to show that estimates are, perhaps, not accurate. It may be unnecessary time if it is all in the reports to the Supreme Court already, and in your brief you could list
1542 those figures and these figures. After all, the figures are there and maybe we could save time by having the witness check up the figures in his answer. I thought originally when you began that it might save time to let him make the summaries now instead of having to get it out of these earlier reports, but I doubt if we are making any time. All you are questioning him about is, did you say this at that time and is it this now? You could put all of that in a brief, unless the witness would like an opportunity to explain why the figures are different. It would be desirable to let him have that opportunity to explain. That is what you are trying to do, Mr. Naujoks?

Mr. Naujoks: I have given him an opportunity to explain. He has explained or attempted to explain.

A. Oh, no; I had no chance to explain.

1543 Q. Do you wish to explain?

A. You cited the fact that there was a certain estimate as of December 1, 1938 for the Calumet Treatment Plant, and that we had expended certain money and still today there was an estimated future expenditure of $723,920. Now, $610,000 of that is for a project for taking some of the sewage from the Southwest Side area over to the Calumet Treatment Plant. It is work which could be omitted, but it probably will be desirable to do this work and take some of the load off the

Southwest Plant, and it is in my estimate of future work as of today.

On the North Side project, I have an item in here for $200,000 for Golf and Glenview sewers, which was omitted from the future work in the report to the Court in 1938 because it is so-called non-essential work. It has nothing to do with the diversion, but it is a sanitary improvement that will be carried out sometime within the next year, I expect.

1544 Another item which we deducted from the estimates of essential sewage treatment work as in the report to the Court in 1938 was something like $15,000,000 for the construction of the South Side sewers. That is not essential sewage treatment work, because it doesn't effect the diversion in any way, but it was in the original $176,000,000 program. It hasn't been done yet, but it is things such as that that make estimates of 1940 differ from estimates of 1930 or '38.

The Master: Have you a tabulation, Mr. Naujoks, of the differences in estimates?

Mr. Naujoks: Some of them, yes.

The Master: Because it would make it much easier, I think, to follow them if you had a summary of them and didn't have to construct them by reading, perhaps, 25 or 30 pages of examination.

A: This brief says, "It was estimated that the cost of said works will not exceed $9,000,000", and the estimated time—those are round figures. The actual estimate of all the items of work were made three or four months later. It came out $10,500,000. I am not surprised at that difference.

1545 I do not know the amount of air used at the North Side Sewage Treatment Works when the plant was first placed in service in 1928. I would say that an allowance of 1.25 cubic feet of air per gallon of sewage was about right as of 1926 but not as of 1940. The plant was not opened in 1926; it was placed in service in 1928 but it was designed prior to the time it was built. I do not know what the nitrates and nitrites were in the effluent from the North Side plant.

1546 The Sanitary District is redeeming bonds at the rate of about $5,000,000 per year right now and if the assessed valuations of property do not become lower, the Sanitary District will come into bonding capacity to the extent that bonds are redeemed. Right now the surplus (difference between bonding capacity and outstanding bonds) is something like $10,000,000. I do not have the figures of the amount of money available for operating purposes for the year 1939. I will get such figures for the years 1939, 1940 and 1941.

1547 I will also produce the Sanitary District Budget Report for 1939 and 1940 and an estimate of the operating revenue for 1941.

1548 Since more operating revenue, estimated at $6,000,000 in taxes per year plus other income, was needed when the Southwest Side plant went into service, the Sanitary District of Chicago, in 1939, requested the Illinois Legislature to pass a pegged levy statute, authorizing the Sanitary District to levy corporate taxes of
1549 $6,000,000 per year. The other income results from sale of sludge converted into fertilizer, sale of power, etc. Since January, 1939, the Sanitary District has not been able to generate sufficient power for its own needs

at the Lockport Power Plant and has had to purchase additional power. In the 1940 Sanitary District budget, there was an item of $1,000,000 for the purchase of power. The Sanitary District is still under contract to fur-
1550 nish the City of Chicago with power. This is an indefinite contract as to time but it could be cancelled by either side on proper notice. The Sanitary District purchases power from the Public Service Company of Northern Illinois and uses it for its own needs and sells some to the City and the Park District.

In 1939, the Illinois Legislature passed a pegged levy statute, authorizing the Sanitary District of Chicago to levy corporate taxes of $5,500,000 for the years 1940,
1551 1941, 1942 and 1943. Then, subsequent to the passage of that Act, the Legislature amended the revenue section of the Sanitary District statute for another purpose and recited the original tax rate. This inadvertently nullified the pegged levy act. Later, in 1940, the Legislature passed an act authorizing a pegged levy of $5,000,000 for two years, 1940 and 1941. Under this act, the corporate taxes of the Sanitary District cannot be less than $5,000,000.

1552 The Master: Is the general purpose of this examination to show the resources of the Sanitary District?

Mr. Naujoks: Well, no. Among other things, yes, but there are other purposes too. One purpose is to show that they requested six million dollars which they have to have for efficient operation of the Sanitary District, and the State of Illinois cut them down to five million dollars. In other words, they are a million short on what they require for operating purposes.

The Master: Well, there is really no issue presented here as to the insufficient resources at this time. They have got abundant resources, haven't they, today, for all they are planning to do? That is the impression I received from the previous testimony, and I would like to be corrected if I am thinking wrong; but I got the impression that with the money on hand and the money
1553 which they had authority to borrow and would, from time to time, be able to borrow as they take up bonds, that they are really in a strong financial position, and the only reason they are claiming they need time is not because they haven't got money, but because they say that it is physically impossible to get these contracts let and these plants constructed. Now, I may be entirely wrong in the impressions I have up to now, but it might be useful to correct me now.

Mr. Naujoks: Yes, sir, I am going to. If the Master, please, they have sufficient money for capital expenditures for the completion and construction of the program which they have outlined and require to provide complete treatment which the Supreme Court imposes on the district and the State of Illinois in the decree of April 20, 1930, as amended, but they haven't sufficient funds for operating purposes. In other words, they can't use their bonding money for operating expenses, and for that reason we contend—are going to contend—that they aren't operating a lot of the plants as efficiently, and that one of the remedial measures would be for the State to produce more money, among other things, as Mr. Pearse testified this morning, so that they could have more air at these aeration tanks, which would give them a higher degree of B.O.D. removal.

1554 The Master: Well, has there been any testimony before me to the effect that they can't operate the plants efficiently because they haven't got enough money?

Mr. Naujoks: Yes, Mr. Pearse so testified this morning.

The Master: Well, I didn't get that impression.

Mr. Clausen: No, you didn't testify to that, did you, Mr. Pearse?

The Master: I may not have followed what he said. I didn't understand that they were making any contention that they couldn't operate effectively now for lack of money.

Mr. Naujoks: Well, we have a right to show that, if that is the fact.

The Master: No such issue is raised by the pleadings, as I recall, but I should think the first thing for you to show is that they weren't operating efficiently. Then, if they wanted to explain their failure to operate efficiently by claiming that they didn't have money enough, then you would come back and show that that was the fault of Illinois, if that needs any proof, because I would have said offhand, after the Supreme Court's decision on Mr. McClennen's report, that it is quite clear that
1555 the Supreme Court won't accept as an excuse that they haven't got enough money, because the Supreme Court said in 1935 that it was up to Illinois to give them the money; and I don't believe that the Supreme Court would seriously consider now any defense claim for relief based upon failure of money. Therefore, while I don't want to shut you off and will not in any way, I am a little cloudy in my mind as to the importance of testimony as to their financial resources, either (a)

they are adequate, as I thought they were, or (b) they are inadequate and they can't complain that they are inadequate. Either from (a) standpoint or (b) standpoint the testimnoy as to their financial resources would be immaterial.

It would be, I think, material to show that their plants aren't being efficiently operated fully, but that is not a question of financial resources as far as the fact of efficiency is concerned; that doesn't depend upon financial resources. They are either efficiently operated, or they are not, and finances would only be a reason for their being inefficiently operated, if they are inefficiently operated.

Well, you proceed. I just thought I would think aloud a little bit and perhaps help myself and perhaps help you.

1555
to
1558 The population increment for 10 years' growth
(1930 to 1940) in the Calumet area used by the Sanitary District in the reports to the Supreme Court was
45.6 per cent. The population increment for the years
1559 1930 to 1940 on the North Side area is not in the
record. These increments were on a statement submitted to Mr. Naujoks originally and he did not want me
to use them so I left them out when I testified.

The Master: In the Sanitary District's reports to the Supreme Court, or in the statements and testimony given in previous hearings, certain estimates were made as to expected population increase in certain districts.

Mr. Naujoks: Right.

The Master: Now, those estimates are not shown by anything in the record of this hearing, or anything 1560 on file in the Supreme Court so far, is that correct?

Mr. Naujoks: I believe that is right. That is correct.

The Master: They are not on file so far.

Mr. Naujoks: Let me explain it this way: The actual figures reported to the Supreme Court for the future, for the ten-year period 1930 to 1940, as to population growth by districts in the Sanitary District, have been filed with the Supreme Court.

The figures I wish to put in the record now are the percentage population increase which are not in the record anywhere as percentages.

The Master: Well, could they not be figured out by anyone who read the figures that are in the record? I mean, couldn't I see myself what percentages there were if I took the time to figure them out?

Mr. Naujoks: That is right. It would take time.

The Master: Couldn't you figure it out for me in a brief and I could ask opposing counsel to admit either that they were right or say where they were wrong. That, I think, would save us time, because if your basic figures are in the record already and this is just a matter 1561 of calculation from that, you could do the calculating in your brief and make your argument upon it, and, of course, I can take judicial notice of the 1940 census figures and you can put them in your brief, and then your opponents will either have to challenge the correctness of your figures or admit them. If they challenge the correctness of them, I suppose I would have to figure them out myself, anyhow.

Mr. Naujoks: I thought it would be simpler to put them in this way and then we would have them.

A: I would rather put these figures in from my own census estimates, the ones I have been working from. I think they are right.

Mr. Naujoks: We can get together on this.

A: Suppose I tabulate the thing.

The Master: Your purpose, I take it, is to show that they assume that there would be increases in the population which the last census would show has not taken place.

Mr. Naujoks: Yes, that is right. Now, that has an effect, among other things, upon—

The Master: Upon the program.

Mr. Naujoks: Upon the remedial measures, too; upon the amount that they can treat, and things of that type.

1562 In the semi-annual report to the Supreme Court, the percentage of sewage treatment at the North Side and Calumet plants used in the tables in those reports was given as 85 per cent. This 85 per cent was an estimate of the treatment of the total sewage on the whole area on an annual average basis, although on the sewage actually going through the North Side Plant the treatment was better than 90 per cent. The percentage of sewage treatment used for the West Side plant in the
1563 reports to the Court was 33 per cent although the sewage that actually passed through the West Side plant was treated to an extent better than 50 per cent (actually 53 per cent). I cannot make a close estimate of the amount of sewage from the West Side area which was untreated during 1939. The relation

between the 53 per cent and the 33 per cent was my best estimate. The sewage that was untreated on the North Side and Calumet areas through the years to 1938 was that sewage which might be termed street wash and waste not carried to the treatment plants, and, also, some sewage which was not intercepted on those areas.

1564 The difference between the 85 per cent used in the reports to the Court and the 90 per cent actual treatment of the sewage which went through the plants was intended to cover the storm flow of sewage and other sewage which got into the channels untreated. None of the wastes of the Corn Products Company passed through a treatment plant of the Sanitary District,
1565 but the process under which these wastes were reclaimed was discovered by Sanitary District chemists while experimenting on a method to treat the Corn Products wastes. In the reports to the Supreme Court, the statement was made that these wastes have been greatly reduced as a result of certain experimental work initiated by the Sanitary District. The reports to the Court do not show that the Sanitary District treated those wastes but that there was a reduction in the amount of Corn Products wastes. In the petition to the Supreme Court, filed by the State of Illinois, in 1940, the percentage of treatment estimated for the
1566 North Side, Calumet and Southwest Side plants was estimated at 85 per cent and the population estimates were based on the 1930 census.

1567 The maximum figure of 7,325 c.f.s. shown for discharge from the Lockport Power House at four o'clock on February 15, 1939, is about 1,600 c.f.s. higher than

any other figure on that chart and is apparently due to the filling of the lock during that half hour. Other differences on this chart (Illinois Exhibit No. 43) are not so great. We set a certain figure for the average low water flow and the half hourly figures vary from that average if there happens to be a lockage, although a lockage does not change the daily average very much. The figures also vary if there happens to be a necessity to run off storm flow. We allow something like a 10 per cent variation between maximum and minimum, or between night and day flow, for the convenience of
1568 the operators at the Lockport Power Plant. The variation in the record of March 15, 1939 appears to me as if it was caused by rainfall run-off. The variation between 1,900 c.f.s. and 3,200 c.f.s. on January 15, 1939 was probably to obtain more power during the night hours. The one night reading 4,800 c.f.s., though, was obviously caused by a lockage. The heavy flows during March must have been due to run-off of precipitation.

HORACE P. RAMEY—Cross Examination.

1571 Mr. Clausen: The Sanitary District of Chicago is authorized by statute to levy an annual corporate (operating) tax of fifteen cents (15c) on each one hundred dollars of assessed valuation of the taxable property within its corporate limits. (Chap. 42, Sec. 12, Para. 332, page 1335, Illinois Revised Statutes 1939, State Bar Assn. Ed.)

The assessed valuation of the property within the Sanitary District declined from approximately $4,400,000,000 in 1928 to approximately $2,400,000,000 in 1939, so that the corporate tax levied in 1928 of approximately $6,500,000 declined to approximately $3,800,000 in 1939.

1572 In view of the increased operating cost due to bringing into operation new treatment facilities, the regular session of the 61st General Assembly in 1939 amended the Sanitary District Act and authorized the Sanitary District to levy a tax not to exceed $5,500,000 for corporate purposes for the years 1940 to 1943, inclusive. This was known as the "Pegged Levy Act".

Unfortunately, at the same session of the legislature, that is, in 1939, at the closing day, after the passage of the Pegged Levy Act, the legislature again amended the same section of the Sanitary District Act for other purposes and inadvertently omitted reference to the pegged levy provisions, and this wasn't discovered until after adjournment. Our Supreme Court has held that the last amendment controlled, so it nullified the pegged levy provisions so that the Sanitary District was again restricted to the fifteen-cent rate, which would probably reduce it to about $3,600,000.

The Governor of Illinois called a special session of the legislature to correct this situation, to meet on April 30, 1940, and limited the call to such purpose, to a pegged levy of $5,000,000 for the years 1940 to 1943, inclusive. House Bill No. 19, accordingly, was presented to the General Assembly with an emergency clause
1573 and was passed by both houses and approved by the Governor on May 31, 1940, as found in the Illinois

Revised Statutes, 1940 Supplement State Bar Association Edition, Chapter 43, Paragraph 332, page 23.

The Master: Mr. Clausen, how did the assessments go down by years prior to '39? Have you got information, or could you have that made up for me? You stated that the assessments went down from $4,400,000,000 in 1928 to $2,400,000,000 in 1939, and I would like, if possible, to have a statement of the assessments by years from '28 to '39, to show whether this decline had not taken place, to some extent at least, in the years prior to '39.

Mr. Clausen: Oh, yes. I will furnish that. That was during the depression period.

The Master: It was a gradual decline, I imagine. If you have the file—

Mr. Clausen: Yes.

Mr. Naujoks: If the Master please, I think the record should also show that the valuations as given here are not at the true value, but that they are debased to 37 per cent in accordance with the rule adopted by the local assessors and the Board of Equalization.

The Master: All assessments in this area are based
1574 upon 30 per cent of full value?

Mr. Naujoks: They are bebased to that figure.

Mr. Clausen: I think I can put in those assessed valuations by the County Clerk. Remember those certified copies, whatever it was. I will put them in as exhibits.

Mr. Naujoks: Yes, but I just wanted the records to show those were the debased figures, not the true value.

The Master: Approved by the State Board of Equalization.

Mr. Naujoks: That is right.

The Master: Which is authorized by law to fix the true valuations of which assessments shall be made, is that correct?

Mr. Naujoks: I am not certain we will agree with that. At any rate, the Board of Equalization approves it.

The Master: I assume there must be a legal basis for it.

Mr. Clausen: There is.

Q: Mr. Ramey, will you explain the differences in your estimates of construction cost as presented to the Special Master in these cases in 1929 and again in 1933, and the figures on cost of work completed and 1575 estimates of cost for future work as presented by you at the present hearings?

A: In the hearings in 1929, certain estimates were presented to the court, and on those figures the condition of the construction program on April 21, 1930, was as follows:

Work completed	$ 81,917,603
Work under contract	11,473,683
Future work	176,166,000
Total:	$269,557,286

That was the total program.

In the report to the Supreme Court of January 1, 1933, page 11, the statement was made:

> "In the semi-annual report to the Court of January 1, 1932, pages 9 to 10, attention was called to

> the fact that contracts were being let at prices far below those estimated in the program submitted to the Supreme Court. The total saving in this respect to date has amounted to $5,330,000. That in some twenty contracts, works estimated in the original program to cost $19,834,000, had been let for $14,514,000. This has been due in large measure to contracts being let during the business depression. A part of it is due to the inevitable change in plan certain to happen in a project of this magnitude.
>
> "In order that the work already accomplished may appear more accurately in relation to the future work to be done, a revised estimate is sub-
> 1576 mitted herewith in which proper account has been taken of reasonably reduced construction cost which probably will prevail up to the end of 1938, and in which more definite information as to the amount of sewage to be treated at the various plants has been given due consideration."

As a result of that, the total of $14,662,375 was subtracted from the total program, that figure being made up of the $5,330,000 of savings on contracts let and $9,332,375 reduction by re-estimate.

In the report to the Supreme Court of July 1, 1933, page 2, the statement was made that because of the adoption of the incineration process the figure of $9,775,000 was eliminated. An amount of $6,000,000 was eliminated from the estimate for miscellaneous plants and sewers. That appears on page 3 of this same report of July 1, 1933.

On page 11 of the report to the Supreme Court of
1577 July 1, 1933, a total of $17,000,000 is eliminated from

the program because of the combination of the West Side and Southwest Side Plants on the one area, and on that same page a reduction of $965,844 because of re-estimate of the program. These figures make a total of $33,740,844 eliminated as reported to the court on July 1, 1933.

In the report to the Supreme Court of January 1, 1935, page 13, because the PWA Review Board had recommended that the Southwest Intercepting Sewer and the Southwest Treatment Plant be built at less capacity than had been originally estimated, a figure of $7,525,000 was eliminated.

In the report to the Supreme Court of July 1, 1935, page 11, an item of $2,463,000 is eliminated because of savings on contracts let, and a figure of $1,073,000 eliminated by a re-estimate of the program. Those two figures total $3,536,000 eliminated in the report of July 1, 1935.

In the report to the court of January 1, 1936, page 16, is this statement:

> "After the execution of the latest agreement with the Public Works Administration dated September 1578 21, 1935, estimates on the entire future construction program were revised and reduced by $7,736,000. The principal items entering into this reduction were $1,500,000 of contingency items eliminated from estimates on Calumet and West Side Treatment Plants; $4,636,000 taken from the West-Southwest Treatment Plant estimate, figuring ultimate capacity at 1,000 m.g.d. instead of 1,200 m.g.d. as previously done: also for omission of power recovery plant; $701,000 saved on letting of contracts one and four of the Southwest Side

> Intercepting Sewer, and $499,000 cut from the estimate of cost of the proposed South Side Sewers."

In the report to the Supreme Court of July 1, 1936, page 10, there is a reduction in the program of $401,000 because of re-estimating.

In the report to the Supreme Court of July 1, 1937, page 9, there is a reduction in the estimate of future work of $1,514,000, the major part of which is made up of an item of $950,000 eliminated from the estimate of miscellaneous plants and sewers.

In the report to the Supreme Court of July 1, 1937, pages 10 and 11, is this statement:

> "At this time, eighteen months in advance of the
> 1579 date of the ultimate reduction in the diversion of water from Lake Michigan under the decree of the court of April 21, 1930, it is proper to submit a revised estimate of the cost of the essential construction work remaining to be performed. The original program outlined in 1938 contained many items which have been materially altered during the course of the past nine years. It also contained some items which, in the light of present-day knowledge of the art of sewage treatment and of the growth of the community, could have been omitted.
>
> "In 1928, near the close of an era of prosperity and a period of rapid growth of the community, certain items were included as essential items which now are known to be not essential. This change in conditions has been brought about partly by natural causes and partly because of the recent prolonged depression. Items were included for a number of sewers in outlying sections suburban

to Chicago which are not yet necessary and probably will not be needed till after 1940, because there has been little building in these communities for the past six years, and there is no prospect for a revival of building in the near future. For this reason the following sewers can now be eliminated from the program:

"The Calumet area, the Westerly Section of the
1580 Blue Island Intercepting Sewer, $510,000; California Avenue-Oak Forest Sewer, $1,000,000; the Evergreen Park Sewer, $580,000.

"On the North Side: the Howard Street Sewer, $2,000,000; the North Shore Intercepting Sewer, $550,000. Those figures total $4,640,000;

"The extension of the North Side Sewage Treatment Plant, estimated to cost $1,200,000, probably will not be required until 1945 or later. The lessening of the period of detention of the sewage in the tanks for aeration has greatly increased the capacity of this portion of the plant. Thus, with the addition of more final settling tanks now under construction, this plant will have sufficient capacity for the next few years.

"The contingent item for miscellaneous plants and sewers reduced to a million dollars at the time of the last semi-annual report to the court can now be eliminated. The item of $15,000,000 for South Side sewers and an item of $1,100,000 for that portion of the Racine Avenue Pumping Station required to handle the discharge of these sewers must be deferred until some future time because of financial necessity. The postponement
1581 of this work will not affect the reduction in diversion of water from Lake Michigan. The proposed new South Side Sewers comprise a very important sanitary improvement, but their construction

> would not bring any additional sewage under treatment. The items eliminated from the program of essential construction work at this time and postponed until some future date have been estimated to cost $22,940,000."

In a subsequent report to the Court of July 1, 1938, page 7, it can be noticed that the construction program was reduced $380,000 by re-estimate; and on January 1, 1939, page 9, of the report to the Supreme Court, a similar reduction of $2,497,000.

All these reductions mentioned total $94,932,219. Subtracting that figure from the total as submitted at the 1928 hearings leaves a total on January 1, 1939 of $174,625,000. In the report to the Supreme Court of January 1, 1939, the total program figures $174,255,000, a difference of $370,000, which has apparently been lost somewhere in my rough check-up of these estimates.

Now, yesterday I was asked why the Calumet project when reported to the court January 1, 1939, that there was $302,000 of future work, and in these hearings we stated that between December 1, 1938 and
1582 June 1, 1930 we had spent $626,869, or $324,869 more than the estimated future work as reported to the court on January 1, 1939, and reported the future work as of June 1, 1940 was $723,920, or a total of $1,048,789 added to the program.

The explanation for that is that some of the items which were eliminated, or deferred, as mentioned in the report to the court of July 1, 1937, have now been replaced. We are undertaking to do some of those items. Most of them as WPA projects. The Calumet project, for instance—one item which was deferred was the Evergreen Park sewer. We have been doing that. Also, a part of that contingent item of $1,500,000 on the Calumet Treatment Plant and West Side Treatment Plant—several items of work on that plant are now being done as WPA projects. The same statement can apply to the North Side Treatment Works.

In the report to the court of 1937 we took $2,000,000 out of the estimate because of a postponement of construction of the Howard Street Sewer. We now plan to build a portion of that sewer. This portion is known as the Golf and Glen View Sewers. That is $200,000 worth of work as submitted in these hearings. Also certain of the additions to the North Side Plant which we had planned in 1937 to defer because of financial 1583 needs, we are now doing as WPA projects.

Another question was asked about why we furnished the representatives of the State with a figure of $9,000,000 for the extension of the West Side Plant in November, 1939, and in April, 1940 gave an estimate for $10,550,000 plus.

Well, one item that is in the April, 1940 figures and not in the November, 1939 figures is $440,000 for fertilizer plant; and the other difference is made up because of a detailed estimate made on the sludge drying plant which we didn't have back in 1939. That figure of $9,000,000 was a round preliminary estimate.

The difference between the figures compiled in November, 1939 and April, 1940 would not be $1,580,000 but would be $1,980,000, because the estimate for the 1584 fertilizer plant is in the figure of $10,554,900. The figure for total future contracts is $10,554,900. The total for the 10 contracts in force is $415,000, the grant

total being $10,969,900. Of the figure of approximately $74,000,000, spent on the construction program from April 21, 1930 to the end of 1939, all of the funds were
1585 furnished by The Sanitary District of Chicago, except $16,692,000, which came as a grant from the Public Works Administration.

Referring to Illinois Exhibit 43, entitled: "Main Channel Half Hour Discharge at Lockport on the 15th Day of Each Month for the Year 1939," the figures for flow include the water which goes through the wheels of the Lockport Power House; includes lockage, leakage, flow over the dam, and, also, about 35 c.f.s. which is taken from the Canal above Lockport by the Texas Company, and some other industrial plants and returned to the Canal below the Power House. Approximately 90 per cent, or a trifle more, of the total flow is passed through the water wheels of the Lockport Power House.

1586 The difference in flow between the daylight hours and during the night hours is due to the power generation at night but the variation between day flow and the night flow is not 100 per cent. The changes in flow during certain hours of the day indicate that the flow is varied for power purposes but other things are more important than power. Whenever it is necessary to run
1587 off flood water, this takes precedence; also, lockage takes precedence over power. In July, 1940, for instance, there is not very much difference. Right now we are operating with a flow around 2,800 c.f.s. average low flow and we permit the operators at the Power House to increase the flow to 3300 or 3400 c.f.s. during the night.

Referring to January 15, 1939, at 9:30 P. M. on Exhibit No. 43, the discharge is 3259 c.f.s.; at 10:30 P. M., the figure is 4852 c.f.s. This difference represents water
1588 used for lockage. Then from 10:30 P. M. to 6:30 A. M., the flow averaged 3270 c.f.s., and during the day hours thereafter, the average was approximately 1900 c.f.s. The reason for that was that 1900 c.f.s. was used for generation of power throughout the day and 3200 c.f.s. throughout the night.

1589 The Sanitary District of Chicago owns and operates the Lockport Power House. There are seven water turbines installed in this plant; five of these turbines will use 1667 c.f.s. each; then, there are two new units which will use more water but offhand, I don't recall the maximum discharge capacity of those units. I will check this up and furnish the figures. The total discharge capacity of all the units in the power house is well above 10,000 c.f.s. If the diversion should be increased to 5000 c.f.s., a goodly portion of the additional 3500 c.f.s. would run through the water wheels at Lockport and be used for the development of power.

1590 In 1938 the power generated at Lockport was about 130,000,000 kilowatt hours; in 1939 it was about 70,000,000 kilowatt hours; that power is worth about .5 of a cent per kilowatt hour.

1591 The figures on Illinois Exhibit No. 42 are figures of discharge from the end of the Channel at Lockport, and as an average they will represent flow through the channel, but the flow can be stopped absolutely at Lockport for a few minutes without interfering with the flow of the Chicago River. Where a minimum discharge of 456 c.f.s. is shown on this exhibit as a half-hour reading of discharge, the low reading is probably due to the fact that the transmission line from the power house had failed, or something of that nature. These figures of discharge from the end of the Channel represent flow through the Channel only as averages of long periods of time. In these figures can be found maximum discharges as high as 19,000 c.f.s. yet it is a physical impossibility to flow that amount of water through the channel.

1592 It would be unsafe to reduce the flow in the Chicago River to 323 c.f.s. at any time but it would not be unsafe to reduce the instantaneous discharge at Lockport to such a figure for only a few minutes.

In Illinois Exhibit No. 9, the estimated expenditure on the Chicago River Controlling Works was listed at $200,000. A contract for this work was awarded for $119,710. The construction will cost $15,000 or $20,000 more than this because of engineering costs and other overhead. The engineer's estimate on this contract was about $160,000 and the low bid was $119,710.

1593 As of December 1, 1938, the available funds of the Sanitary District unpledged for construction costs was a very small amount. On January 2, 1939, the Sanitary District had a debt incurring capacity of $122,961,672; outstanding bonds amounted to $117,484,390. There is a difference of about $5,000,000 in these figures but the contract obligations were approximately $3,000,000 so that left about $2,000,000 of debt incurring capacity. At that time, the Sanitary District did not have sufficient funds to complete the entire construction program.

In the report to the Supreme Court of January 1, 1939, on page 9, the future work was estimated at $14,000,000; the cash on hand in the PWA accounts was $3,700,000, leaving essential work to the extent of more than $10,000,000 to be financed from other sources and the Sanitary District then had about $3,000,000 resources for this.

1594 The State of Illinois did not contribute any money towards the construction of works by the Sanitary District. The Sanitary District did not make application to the State of Illinois to provide such funds.

The population equivalent of the Corn Products wastes was included in all the tables referring to actual sewage treatment in service in the semi-annual reports of the Sanitary District to the Supreme Court.

1595 The change in flow through the Drainage Canal from daylight hours to night hours changes the slope in the Canal very slightly, something like an inch and a half, or possibly 2 inches. It is certainly not a fact that this difference would be measured in feet and not in inches.

1595

1596 In the reports to the Court, copies of which were furnished to representatives of the complainant lake states, the exact status of the sewage treatment construction program was reported, and it must have been obvious from those reports that the program as contemplated at the time of the decree of the Court would not be completed in its entirety by December 1, 1938.

No particular reference was made to the statement in the supplementary report to the Court on May 23, 1940, page 6, "The defendants further respectfully represent that this change in the sequence of procedure recommended by the Engineering Board of Review and by the defendants will not retard but, in the opinion of the defendants and in that of the Engineering Board of Review, will improve conditions and expedite the performance of the decree". This is a true statement because the change in sequence of procedure did actually expedite the work and more work was done because of that change than would have been done if the change had not been made.

1597 As the difference between "would expedite the work", and "would expedite the performance of the decree". I assume that the construction of these works was in performance of the decree.

1598 One place where it should have been obvious to the Court or to the opposing lake states that the Sanitary District would not be able to fully complete the sewage treatment construction program by 1938 is in the report to the Court of January 1, 1937, page 9, where there is an estimate of $64,000,000 of future work, and this paragraph:

> "Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935 with the Federal Emergency Administration of Public Works are definitely allocated to projects in this future work estimated to cost $23,445,000. Approximately $2,500,000 of funds obtained from
> 1599 the P. W. A. are not now definitely allocated but may be used for some of this future work. This leaves work estimated at $38,213,000 to be financed from other sources."

and at that time the Sanitary District had no funds for construction work. I think it should have been apparent to the Court and to the opposing lake states that the entire sewage treatment construction program couldn't then be completed in accordance with the Supreme Court decree, as amended.

We did not at that time make any request of the State of Illinois to furnish the funds. We were doing all the work which was physically possible for an organization such as the Sanitary District to do. We were doing construction work at that time at the rate of about $15,000,000 per year. I do not know what the resources of the State of Illinois were at that period.

Q: Now, Mr. Ramey, when was the decision made
1600 not to complete the West Side Sewage Treatment
Plant in accordance with the decree, and by whom was
that decision made?

The Master: I would like to ask counsel if the Supreme Court hasn't in effect decided that no adequate excuse has been shown by the State of Illinois for not completing these works, and I would also like to ask counsel if the order of reference to me does not extend to any inquiry on that subject.

Mr. Clausen: Not only that, the decree doesn't provide anything with respect to construction work.

The Master: It is simply provided that the diversion should be cut down to the rates indicated.

Mr. Clausen: That is right.

The Master: Now, as I read the opinion of the Supreme Court last April, it is a finding, a declaration by the Supreme Court that no adequate excuse has been shown by the State of Illinois, and in the reference

to me there is no provision that I should consider testimony as to whether there was an adequate excuse or whether there was not, and whether more money should have been provided or whether it should not, whether the Sanitary District should have been able to carry on a larger program than it did or whether it should not. There is nothing in the order of refer-
1601 ence that I see that directs me to inquire into those matters, and my impression would have been that the Supreme Court has reached a determination already that no adequate excuse has been shown and that the only point left open to me is, as stated in the order of reference, whether there is any menace to health, and, if so, what could be done about it. I may be mistaken in my impressions. As I have repeatedly said, I don't want to shut counsel off from any proof they desire to make, within very broad limits, but if counsel for Illinois themselves do not take exceptions to the view that I have stated, I should not think that counsel for the opposing states would undertake to extend the scope of the inquiry.

Mr. Cohan: Just as a matter of record, doesn't the record as it stands now contain a voluminous amount of facts and figures put in by the State of Illinois?

The Master: Yes, I think it does. No objection, I think, however, was made to the introduction of those facts and figures.

Mr. Cohan: I am not quite sure about that. I think at the very beginning there was.

The Master: There was a general reservation.

Mr. Naujoks: That is right. We agreed to reserve our objections and later go over the transcript and file 1602 formal motions to strike and so forth.

Mr. Clausen: I might say a lot of that was furnished at your request, however.

Mr. Wallenstein: Not only that, it goes to the question of whether or not there could be any other ameliorating means or remedies to clear this condition, the third point in your order of reference.

The Master: Well, proceed, gentlemen.

The amount of rainfall necessary to cause storm water in sewers of the Sanitary District to by-pass to the Sanitary Canal depends on circumstances. Most of the sewers are designed to handle 50 per cent in excess of the 1960 dry weather flow. That means actually that they will carry about twice the average dry weather flow as of today, but some of the sewers, in particular, those near the River in the Loop district, are designed to take twice the dry weather flow. They will take all the storm flow except that from major storms. A lot depends on the condition of the ground and on how the rain falls. If the ground is frozen and there is ice on the ground and a warm rain occurs in 1603 the winter, the sewers will by-pass to the River with very little rainfall. With a dry summer condition, much more rainfall is required. The average concentration time of the average drainage area in Chicago is about three hours, but the concentration time in the Loop district is about 20 minutes. I do not know how many hours a year on an average storm water will overflow from the sewers into the Chicago River.

1604 Mr. Pearse can give better information with reference to the untreated or partially treated sewage from the Indiana communities which finds its way into the Calumet River.

I am not familiar with the use of chlorine as an agency for the prevention or reduction of odors and for sterilizing bacteria.

We provided aeration chambers, or cascades, at the outfall sewer of the Southwest Side Plant to introduce additional oxygen into the effluent. I believe that similar cascades were provided at certain places in the
1605 North Side Plant for the same purpose. The purpose of this is to help stabilize the B.O.D. in the effluent which is discharged into the Canal. If water is flower over the dam it would pick up more oxygen than if it flows through water wheels. Water passing through water wheels has not as much chance of picking up oxygen as it has if flowing over an open dam. Flow
1606 over an open dam would add some oxygen to the water. I have made no figures on the amount of oxygen which could be introduced into water at Lockport if this water was passed over aeration cascades. A large percentage of the dry weather flow from the West Side Imhoff tanks could be put through the Southwest Treatment Plant for a short detention period. This should reduce the B.O.D. in the effluent which is discharged into the Canal. We have made some figures along this line. It would take about a year to construct a sewer between these plants to effect such treatment. No contracts have been let for such a sewer but preliminary plans have been drawn.

1607 All the contracts for the completion of the West-Southwest project have not been let. The plans and specifications have not all been drawn. We are working on them. We plan to build the same type of aeration tanks that are now in service at the Southwest Side Plant and possibly the same type of final settling tanks. We have let contracts for three blowers with a much larger capacity than the present blowers. The new sludge drying plant will not be much different from the plant now in service, although many things in it will be modified but there will be no entirely new
1608 idea in this plant. We are planning the construction of the additional facilities in a manner to prevent any interruption in the operating of the present facilities.

There was a break down due to the cracking of a pipe in the sludge line from the North Side Treatment Works to the Southwest Side Treatment Plant on July 6, 1940. This happened on Saturday morning and was not fixed until late Monday.

If all of the sludge of the Sanitary District not made into fertilizer or placed on spoil banks should be disposed of on land, it would ameliorate conditions in the Canal but it would make a mess somewhere else wherever that sludge was lagooned.

1609 Dr. Mohlman can give better information than I can regarding the chlorinating of sludge in order to prevent odors.

The budget report of the Sanitary District for 1940, referring to the Glenview Sewage Treatment Works, states: "During the warm months the practice of chlorinating the Imhoff tank effluent before application to the trickling filters to prevent odors was continued".

This same budget report, with reference to the Morton Grove Plant, states: "The Imhoff tank effluent was chlorinated during the warm months to prevent odor nuisance".

1610 At the Southwest Sewage Treatment Works, the effluent that is used for condensing purposes is chlorinated to prevent the growth of algae in our condenser tubes.

The largest amount of sewage flow from the West Side area which has been put through the Southwest Side Plant for treatment appears in the monthly records of operation of this plant.

I have not read the letter of Dr. Buswell, regarding chemical process for supplemental treatment at the West Side Treatment Works and have no comment to make on it. I presume his statement was considered by the PWA Review Board.

1611

1612 The report prepared in the Engineering Department of the Sanitary District in April 1940 and submitted to the PWA Review Board states, on page 9: that the effluent from an Imhoff tank plant had a B.O.D. of 57 and that the effluent from Imhoff tanks plus chemical precipitation had a B.O.D. of 36 and that the effluent from
1613 an activated sludge plant had a B.O.D. of 10. If the B.O.D. in the effluent from the West Side Works should be reduced from the present 57 to 36 by the addition of chemical treatment this would ameliorate conditions in the Sanitary Canal and Brandon Road Pool but it would not ameliorate conditions as much as installing activated sludge and reducing the B.O.D. to 10. I do not know about the other communities, state institu-

tions and industries above Joliet contributing to conditions in the Canal and Brandon Road Pool. Dr. Mohlman has testified to these things.

1614 I stated that preliminary plans had been prepared for the sewer from the West Side Plant to the Southwest Side Plant. The approximate size of this sewer has been determined but detail contract plans have not yet been started. We expect to get started on these detail plans so that contracts can be let during the coming winter so that this sewer could be
1615 completed by the fall of 1941. I don't recall the estimated cost of this sewer offhand. It is in the neighborhood of $400,000. It is included in the item "Conduits, Tunnels," etc., for future contracts under the West-Southwest Side Sewage Treatment Plant, totaling $757,600.

If at the Southwest Side Plant the water now used through the condensers should be passed over cascade areas directly into the Canal the result would be to stop the operation of the blower plant and generator plant. The use of municipal water for condensing purposes would be too expensive. The use of water from the Canal for this purpose would require the construction of a large pumping plant. This would be physically possible but not feasible.

1616 The effluent from the Southwest Side Treatment Plant is used for condensing purposes. It is flowed by gravity through the condensers and to the Canal. If Canal water were used, it would be necessary to pump that water from the Canal up in order to force it through the condensers. The use of water from the municipal water supply would be very costly.

All these things were considered when the Southwest Side Plant was designed.

It would be possible to construct a sewer from the West Side Plant to the Southwest Side Plant by the summer of 1941 but this might slow up some other things which are more important.

1617 The present capacity of the Southwest Plant is large enough to care for a considerable portion of the dry weather flow of the West Side Works. This connecting sewer is a part of our ultimate plans.

It has not yet been definitely decided whether the effluent from the West Side Plant will be run into the present aeration tanks or into the new battery of aeration tanks, which is to be constructed.

If the Brandon Road Pool were restored to the condition that existed prior to 1933, that is, if the rapid section of the Des Plaines River were restored, the water would be re-aerated more than at present.

1618 It would also be re-aerated flowing over the Jackson Street dam, which, of course, would have to be rebuilt.

Dr. Mohlman can answer much better than I can both as to the effect and the cost of chlorinating the effluent of all the sewage treatment plants. Such chlorination of treatment plant effluent would probably ameliorate conditions in the Canal and Brandon Road Pool.

If the entire water supply of the City of Chicago should be metered, no doubt the water use would be reduced. That would have the effect of increasing the pumping capacity and the aeration tank capacity of the sewage treatment plants. It would have no effect whatever on the sludge handling capacity because the same amount of solids would be in the sewage in any case.

1619 The water for domestic use is pumped directly from Lake Michigan. The City of Chicago can take any amount of this water it desires. The only incentive to be economical in the use of water is the cost of pumping it. I think about 60 to 70 per cent of the water is metered but Mr. Pearse will furnish figures on this matter. As I understand it, all the water used by industries, hotels, and apartment buildings is metered, but there is a considerable area in the residential
1620 districts where there are no meters ,as yet. If metering were made universal, it would reduce the amount of water taken out of Lake Michigan for domestic purposes. This would not increase the amount of water available for the waterway. The Sanitary District can divert 1500 c.f.s. annual average from the Lake Michigan watershed, exclusive of domestic pumpage. Any domestic pumpage is in addition to this 1500 c.f.s. The reduction in the quantity of domestic pumpage would result in a little more treatment plant capacity, a little more detention time in the aeration tanks, but I
1621 think the effect would be very slight. It would also increase the capacity of the sewers. Chicago uses a larger amount of water than any other City its size. It uses a considerable amount of water per capita, more per capita than Milwaukee. I think the figure for Chicago is about 250 gallons per capita per day. If all the City water in Chicago should be metered, this would reduce the amount of water going through the Lockport Power Plant slightly.

1622 It would be possible to provide aeration cascades at Lockport or other places in the Sanitary Canal but I don't know as to the feasibility of this. There are ways of adding oxygen, that is either air or oxygen, without cascades. One way is in the manner in which air is added to the aeration tanks, that is to blow air into the water. A cascade is a little waterfall.

1623 If all the sources of pollution above Joliet, including the various communities, state institutions, private industries, and the Sanitary District of Chicago, were eliminated by having all raw sewage treated locally, this would ameliorate conditions in the Brandon Road Pool.

It would be possible to shut down the water wheels at Lockport and provide cascades without interfering with navigation. The construction of such cascades would probably cost more than introducing oxygen into the water in some other manner. I have not estimated the cost of such construction for use over
1624 a 2-year period. If it should be intended to construct such cascades and destroy the power plant, it might be cheaper to aerate the water in some other fashion, by blowing air through it for instance. There are no facilities for such procedure at present. Cascades could be built along the Des Plaines River near the present Stony Sluice Gates but at that point there is available less than 10 feet of fall compared to the
1625 38 feet of fall at the Lockport Power House. I do not know what the cost would be for the construction of a cascade at the Stony Sluice Gates near Lock-
1626 port. If details are furnished of what is desired in

the way of cascades, I will make an estimate of cost of constructing same.

The two new generators were installed in the Power House at Lockport about 1935; one of them is used regularly; sometimes two are used; in addition there are five old units in this plant.

HORACE P. RAMEY—Cross Examination.

1803-1805 Mr. Naujoks requested Ramey to figure the elapsed time for flow down the Sanitary Canal from Damen Avenue to Summit, then to Lockport, and then to Brandon Road Pool, under conditions as of January 1939, with a flow of 2911 c.f.s.; also, with a flow of 4227 c.f.s., under average conditions as existing in June 1939; also, 7891 c.f.s., under conditions as of January 1939.

Q: * * * * and also figure out the elapsed time of flow down the canal and waterway through Brandon Road Pool for each of the distances from Damen Avenue to Summit, second, from Summit to Lockport, and,
1806 third, from Lockport to the outlet of the Brandon Road Pool, with a flow of 19,064 cubic second feet under average conditions existing in June, 1939?

A: You mean, 19064?

Q: Right. That is the maximum flow during that time.

A. Well, that can't be done. You can't flow that quantity through the waterway.

Q: Well, whatever the flow was down the canal.

A: Well, the flow through the canal —

Q: Under the maximum conditions, so that where you had a flow of 19,064 at Lockport—

A: This table indicates that there was a discharge from the end of the canal at Lockport of 19,064 cubic feet per second.

Q: Yes.

A: That doesn't indicate that there was a flow of that much through the drainage canal.

Q: Not all the way through, that is correct.

A: Because it is impossible.

Q: That is right.

A: Well, now what is it you want?

Q: What is the maximum capacity of the canal?

A: For continuous flow?

Q: For continuous flow.

1807 A: Oh, somewhere around 11,000 c.f.s.

Q: Well, then we will take the maximum flow in March, 1939, with a flow of 9311 cubic second feet, and will you give me the elapsed time of flow down the canal through Brandon Road Pool for the three distances from Damen Avenue to Summit, from Summit to Lockport, and from Lockport to the outlet of Brandon Road Pool?

1808 The P.W.A. Review Board first notified the Sanitary District of its approval of the Sanitary District report of April 1940, regarding the additional treatment facilities for West Side sewage by the activated sludge method on or about May 3, 1940. The amount of money which will be spent for this future construction work, including present contract obligations is about $12,000,000.

1809 As to the progress on construction of this work, we have let a contract for blower equipment, have advertised one construction contract, are working on plans for the substructure of the blower house and incineration plant, are working on specifications for the drying equipment, that is, the boilers and other mechanical equipment which have to do with the drying of sludge. We have considered it wise to place the mechanical equipment under contract as quickly as possible because it takes the longest time to fabri-
1810 cate and deliver such machinery. We have not yet completed the final detail plans for all of the concrete work. It will require up until the end of next summer (1941) for such plans. We draw up construction plans in sufficient detail for taking bids, then after the work has been placed under contract and as the contract is being carried out, we furnish more detail construction plans. Such plans are required all during the construction period. We hope to get the substructure of the pump and blower house and of the incineration building under contract by next spring (1941) so that actual construction on the concrete and masonry work can start as soon as the construction season opens. We are taking bids within the next two or three weeks on one construction job for a tunnel which will pass from the present sludge drying building, southerly under the site of the future incineration building to the track south of the future building, so that we can get sludge out of the present building without interference with the construction of the new building, so that the new construc-

tion will not cause any interruption with the operation of the present plant.

1811 We began preparation of the actual contract plans and specifications within three or four days after notice of approval by the P.W.A. Review Board. We had previously done a considerable amount of preliminary work and of course much of the work was in such shape that we could proceed at once on contract plans. I doubt if much of the new work at the Southwest Side Plant will be ready to place in service by the end of 1941, so that by the end of 1941 we will not be in a much better position with reference to the treatment of the West Side sewage than we are today.

1812 It was in 1934 that the P.W.A. Review Board suggested that experiments be made to determine the best method of supplementing the treatment of the West Side sewage. These experiments were made under the direction of Dr. Mohlman and men from the Division of Operation.

1813 The contract price for electricity sold by the Sanitary District to the City of Chicago is 8-1/2 mills per KW Hour, or 0.85 of a cent per KW Hour. The average price paid by the Sanitary District to the Public Service Company of Northern Illinois for electricity during the year 1939 was slightly less than 8 mills per KW Hour. In 1939 the Sanitary District of Chicago generated about 70,000,000 KW Hours of elec-
1814 tricity at Lockport; and about 7,000,000 KW Hours at the Southwest Treatment Plant as a by-product of the sludge drying process. The Sanitary District also purchased about 133,000,000 KW Hours from the

Public Service Company in 1939. In this year (1939) the Sanitary District used for its treatment plants, etc., about 82,000,000 KW Hours of electricity; sold the City of Chicago and the Park District about 123,000,000 KW Hours; absorbed a loss in transmission and also current used by the Electrical Division in distribution of 5,500,000 KW Hours. The three figures of use of the energy and the three figures of the source of this electricity will balance at about 211,000,000 KW Hours. The figures for the year 1940 are not yet completed but apparently they will be about the same as for 1939, except that the current generated at the Southwest Sewage Treatment Plant will be about twice what it was in 1939 because there was only six months operation in that year.

1815 Regarding the request for elapsed time for flow from Damen Avenue to the Brandon Road dam, I will assume that average flow past any given point is desired and will neglect the fact that the current is faster in one part of the stream and slower in others. We have made many flow tests in the Canal and most of this data was used in the original hearings in
1816 this case. We have made no flow tests recently to determine the elapsed time of flow through the channel. We made flow tests throughout the years from 1912 to 1926 but haven't conducted any experiments of that nature since. The elapsed time will be com-
1817 puted from data we have on hand. In such computations the fact that sludge may have been deposited in the channels in some places will be ignored.

2217 I was asked to compute the time of flow in the Chicago River and Main Channel from Damen Avenue to Brandon Road under certain conditions. The results can best be shown as an exhibit.

2218 Ramey Exhibits No. 1 and No. 2 were received in evidence.

2219 Ramey Exhibit No. 1 shows:

Date	Quantity	Time of Flow Damen Ave. to Brandon Road Dam
January 1939	2910 c.f.s.	112 hrs. 31 min.
June 1939	4227 "	81 " 0 "
June 1939	7891 "	40 " 0 "
June 1939	8311 "	38.5 " 0 "

Lake Michigan Elevation—1.15

Ramey Exhibit No. 2 shows:

Quantity	Time of Flow Damen Ave. to Brandon Road Dam
2200 c.f.s.	166 hrs. 8 min.
2800 "	118 " 8 "
10000 "	31 " 35 "

Lake Michigan Elevation—0.60

2221 The population increments used in the report to the Supreme Court for the ten years, 1930 to 1940, were

Calumet Project	45.6 per cent
North Side Project	34.0 "
West Side Project	8.6 "
Southwest Side Project	21.4 "

The total discharge capacity of all the water wheel units in the Lockport Power House is 12,633 c.f.s. There are two new units, installed in 1935, in this power plant which have a discharge capacity of 2,150 c.f.s. each, or a total of 4,300 c.f.s. There are five old units in this power plant (three installed in 1908; one in 1911; and one about 1914) with a discharge capacity of 1,667 c.f.s. each, or a total of 8,333 c.f.s.

2222-2223 We do not have the 1940 population figures by districts on the various sewage treatment areas. All that is now available is the newspaper statement showing that the population of Illinois, as a whole, increased 3.2 per cent from 1930 to 1940. Figures for the City of Chicago show an increase of 8,118, or .2 of one per cent, in 10 years. The 1940 census figures show that the following municipalities in Cook County either gained or lost the following amounts from 1930 to 1940:

Municipality	Lost	Gained	Per Cent (Lost or Gained)
Blue Island	115		.7 of one per cent
Calumet City		437	3.6 per cent
Cicero	2164		3.2 ”
Elmwood Park		2409	21.4 ”
Evanston		1781	2.8 ”
Forest Park		248	1.7 ”
Harvey		1489	9.1 ”
La Grange		313	3.1 ”
Maywood		754	2.9 ”
Melrose Park		173	1.6 ”
Oak Park		1614	2.5 ”
Park Ridge		1606	15.4 ”
Wilmette		1739	11.4 ”
Winnetka		206	1.7 ”

The 1940 census figure for Cook County shows an increase of 67,208, or 1.7 per cent, from 1930 to 1940. The Sanitary District is all within Cook County and 2224 is almost as large as Cook County. The population of the Sanitary District for 1930 was 3,880,000. The population for Cook County in 1930 was 3,982,123, and for 1940, 4,049,331.

HORACE P. RAMEY—Cross Examination

3825 The electricity developed during the 10-day period of the flow test in the Main Channel from Noon, December 2, to Noon, December 12, 1940, by reason of the additional diversion of water, amounted to 2,516,570 kilowatt hours.

3826 This is the excess amount over what would have been developed under ordinary conditions and if a value of .5 of one cent per kilowatt hour is used this additional power would be worth $12,500.

The sludge lagoon constructed within the past three months at the West Side Sewage Treatment Works is approximately 2800 feet long and 450 feet wide. The levies around the lagoon are about 8 feet high and there are several cross levies in the lagoon dividing it into different pools so that one pool can be filled 3827 with sludge at a time. This lagoon will handle the excess sludge from the West Side Imhoff tanks for about one year, that is, the sludge produced by that plant in addition to the amount of sludge which can be handled on the present sand drying beds. No definite plans have been made for additional lagoons for handling sludge during 1942 but we have a tentative project for additional sludge lagoons west of the Lyons-Summit Road Bridge. Such lagoons would involve the construction of a pipe line from the West Side Plant to the site of the lagoon and the installation of a pump. This project will not be needed in any case for a year. Its construction depends on developments as to the absolute need for it.

In connection with the power developed at Lockport during the 10-day test, the average head on the water wheels during this test was approximately 30.4 feet compared to an average head of 39.0 feet prior to that date. The water used by the two new units
3828 in the Lockport Power House during the 10-day test
was about 4500 c.f.s. for both units and the overall efficiency of these units is approximately 86 per cent. The remainder of the flow was used through the older units at the Lockport Power House, all of which have been in service for about 30 years. These old units have an overall efficiency of from 68 to 70 per cent. The use of these heads and these efficiencies will show why the increase in power does not vary directly with the increase in the flow. The Sanitary District purchases power at the point of use in Chicago for slightly less than .8 of one cent per kilowatt hour. Since power from Lockport must be transmitted to Chicago and is subject to line loss and other losses before it gets to the point of use is one reason why I have assigned a value of .5 of one cent per kilowatt hour for the value of power at Lockport. The two figures (.5 of one cent at Lockport and .8 of one cent at Chicago, are really consistent.

3829 The excess power developed during this 10-day flow test probably save the Sanitary District from buying a certain amount of power. The purchase price of electricity to the Sanitary District has been slightly less than eight mills per kilowatt hour but the District absorbs the losses in transmission and distribution so that I believe the power which is passed on to the City of Chicago at a price of 8-1/2 mills per kilowatt hour costs just about as much as is received from the City for it. The delivery point of power is at various points in Chicago and not at Lockport.

3830 I will furnish for the record the figure of approximate cost of the sludge lagoon recently constructed. We do not use any chlorine in such lagoons. Only well digested sludge is placed in sludge lagoons and there is not much if any odor to this sludge.

Mr. Pearse: The Sanitary District owns approximately 500 acres of land at the West-Southwest Side Sewage Treatment Works but west of Harlem Avenue along the Main Channel between this Channel and the Des Plaines River the District owns 1500 to 2000 acres.

3831 A: That is the site of these future sludge lagoons if we build them. This site of the future lagoons, if built, is 3 to 4 miles southwest of the Southwest Treatment Plant. This land is in a remote area between the Des Plaines River and the Main Channel and no people live within at least a quarter of a mile of any of this land. The West Side and the Southwest Side Plants are built in a neighborhood which

is sparsely settled at present but which will probably
3832 build up. This site for the future sludge lagoons, if built, is in a neighborhood which will never build up. The sludge lagoon recently built is immediately west of Battery B of the West Side Imhoff tanks and north of Battery B of the southwest area tanks.

When a lagoon is filled with sludge it is put out of further use for a long period of time, maybe 4 or 5 years. The sludge is pumped into a lagoon to a depth
3833 of about 6 feet and left to gradually decompose and dry out. The sludge which is to be put into lagoons is the same material which is placed on the sludge drying beds. Lagoons are cheaper than sludge drying beds and are just a makeshift. The sludge drying beds can be used over and over. They have sand underneath and a system of drains so that water can drain out of the sludge and there is a certain amount of evaporation from the sludge. The sludge is moist, perhaps 98 per cent moisture when it is placed on the drying beds and in the course of a week or 10 days under favorable conditions it dries out to a moisture content of about 80 per cent and then can be scraped off.

3834 In a lagoon there is no way for the water to drain from the bottom but there is evaporation and a certain amount of settling of solids to the bottom but there is also rainfall which probably offsets most of the evaporation.

The capacity of the West Side Plant is about 470 million gallons per day but I made no computations as to the acres of lagoons which would be needed if it was proposed to lagoon all the sludge from this plant. Mr. Pearse will furnish figures as to the amount of sludge which will be produced from 100 million gallons per day of sewage.

3835 The present lagoon occupies about 30 acres. This lagoon was constructed by scraping dirt out of the body of the lagoon to build up a levy around it and cross levies across the lagoon.

Cross Examination

3836 I do not know exactly how much the City of Chicago still owes the Sanitary District for power furnished. I think it is somewhere in the neighborhood of $4,000,000. The Sanitary District has judgments for practically all of this. The Sanitary District furnishes about $700,000 worth of power per year and at the present time is receiving from the City a little more than the value of power being furnished. The judgments are collectable when and as the City can pay them and a good part of the money currently received is on the payment of judgments. It will take a number of years before these judgments are all paid.

Examination by the Master.

3837 The accumulation of these judgments, approximately $4,000,000, started back about 1925. I think the amount decreased slightly in 1940. Since 1933 I know that the amount due the Sanitary District from the City of Chicago for power has decreased materially and in recent years the general tendency has been to decrease the amount slightly.

Cross Examination.

The amount of judgments was greater in 1933 but I cannot state how much.

3838 I think that the Sanitary District is breaking even or practically even in purchasing power at .8 of one cent per kilowatt hour and selling it to the City of Chicago at 0.85 cent per kilowatt hour.

Examination by the Master.

The difference between .5 of a cent per kilowatt hour at Lockport and .8 of a cent in Chicago is what
3839 I allowed for costs of transmission and other losses. These figures are consistent.

3840 In connection with the 10-day flow test, I know what Mr. Andrew has testified to and my data checks or practically checks what Andrew has furnished.

Redirect Examination.

The sludge lagoon built at the West Side Works is for use next summer (1941). In this climate we do not dispose of sludge from Imhoff tanks in the winter time.

Examination by the Master.

The digestion of sludge either slows up or stops during cold weather so that Imhoff tanks are designed
3841 with sufficient capacity to retain all the sludge that

is settled out of the sewage over approximately a 4-month winter period and then with the return of warmer weather in the spring that sludge will digest and it is not placed on sludge drying beds or in a lagoon until it has digested so this lagoon will not be used until May, or perhaps June, 1941. At any rate, about May 1941 this lagoon will afford a method of disposal of sludge which has not previously been
3842 available. Mr. Pearse will furnish information as to the quantity. Also as to the cost of these lagoons.

Redirect Examination.

This lagoon is only for the sludge from the West Side Imhoff tanks. We do not propose to lagoon any activated sludge.

In connection with the 10-day flow test, there was considerable additional cost to the Sanitary District for a large force of men, for work 24 hours per day, under Dr. Mohlman, for an engineer and photographer, checking over conditions in the Illinois Valley because of possible damages, and because of other regular employees taken from their regular work.

Examination by the Master.

3843 Ramey Exhibit No. 3 and Ramey Exhibit No. 4 were received in evidence.

3844 Is Ramey Exhibit No. 3.

3845 Is Ramey Exhibit No. 4.

3846 Ramey Exhibit No. 3 is a map of Brandon Road Pool between McDonough Street, Joliet, and Brandon

Road Dam; showing at Station 38+91 a cross section of the Brandon Road Pool, at which section current meter measurements were made December 9, 1940. This map is traced from Andrew Exhibit No. 6 and another similar map. The distance from McDonough Street to Brandon Road Dam is about 6200 feet, or about a mile and a quarter. On this Exhibit is an arrow indicating the direction of the wind which was
3847 a moderate wind of about 14 miles per hour on December 9, 1940, slightly southwest, that is, this was the velocity of the wind at Chicago on that day. This Exhibit shows in a dotted line, beginning at McDonough Street and extending south, the path of a rod float, 15 feet long, placed vertically in the Channel at McDonough Street. This float drifted to the westerly bank of the pool at station 52+69. Another dotted line, beginning at the center of the stream at station 52+69 indicates the path of another float tube, 10 feet long, placed vertically in the water about the center of the stream at station 52+69. This tube drifted to the west bank of the pool at station 38+91. Obviously the wind blowing against the top 10 to 15 inches of these tubes immersed in the water 10 to 15 feet deep offset the downstream effect of the current and caused them to drift to the shore. The broken line on the Exhibit, extending from McDonough Street to Brandon Road lock, is the approximate center line of the stream or the sailing line. It is the line of the current.

3848 The 15 foot float tube referred to is 15 feet long below the water surface and an additional 15 inches long above the water surface; the 10 foot float tube is 10 feet submerged with an additional 10 inches above the water.

Ramey Exhibit No. 4 is a cross section of Brandon Road Pool at Station 38+91. This Exhibit shows in a full line the soundings of the Brandon Road Pool at this cross section, as determined by the United
3849 States Engineers in 1939, that is, soundings made with a 10-pound weight. This Exhibit shows in a dotted line the soundings made December 9, 1940 with a 30-pound weight on a current meter. The note on the Exhibit says, "30-pound weight on current meter stopped but would settle gradually into the sludge". The difference between the solid line and the broken line indicates fill in the pool between 1939 and December 9, 1940. At other points on the cross section are dots indicated by "X", being points at which current meter observations are made. These measurements were in every case made at .4 of the depth of the water measured down from the water surface,
3850 that is, .4 of the depth of the water at that point. The total depth was measured from the water surface down to the point where the current meter weight stopped. It should be approximately the same result as that obtained by the U. S. Engineers using a 10-inch disc, with a 10-pound weight, which was allowed to settle. In this case, the current meter had a 30-pound weight and the point indicated on the Exhibit is where the weight would stop but before it was allowed to settle into the sludge. So the figures should be about the same. These current meter measurements were made at .4 of the depth below the surface at various points across the stream. At two places

near the middle of the stream, measurements were made at .6 of the depth below the surface, as well as at the .4 point. Averaging all these velocities and applying the proper percentage of correction gives an average velocity over this entire cross section of
3851 approximately .53 of a foot per second, which compares with Mr. Andrew's average of .55 of a foot per second. The minimum velocity, as shown on Ramey Exhibit No. 4, was .27 per second near the east bank. The maximum velocity was 1.33 feet per second at the .4 depth point near the center of the stream. Station 450 on Ramey Exhibit No. 4 is near the sailing line shown on Ramey Exhibit No. 3. This is at a point at which the nearest indicated velocity on Ramey Exhibit No. 4 on the right hand side is 0.74 and on the left hand side is an average of 1.01. We have no velocity figures at the outlet of the gates from Brandon Road Pool but I know that the velocity over
3852 the dam must have been very high. The velocities of water in the Brandon Road Pool are probably a third or a fourth of the velocities in the Main Channel above Lockport under normal conditions.

I believe that this 10-day experimental flow did not result in scouring out the Brandon Road Pool because of the tremendous quantity of material scoured out of the Main Channel above the Pool and not scoured out as quickly as had been hoped. If all the material above Lockport had been scoured out within the first five or six days of the test, leaving the water going into the Pool during the last four days of the test relatively clear, such water might have taken more material out of Brandon Road Pool. The ten-

dency towards the clearing up of the water at Lockport is shown in Mohlman's report. Suspended solids in the water during the latter days of the test were diminishing at Lockport, whereas in the water com-
3853 ing out of Brandon Road Pool such solids were not diminishing greatly. I think that this is one element that was over estimated. I do not think that the sludge that went into the upper end of the Pool carried through the Pool as well, perhaps, as we had hoped. However, when 21,000 tons of sludge were carried from the Pool there was some beneficial effect on the system (from Chicago to Brandon Road Dam) as a whole. This experiment has removed 21,000 tons of material that was previously between these points and the situation between Chicago and Brandon Road has been improved to that extent although the situation in Brandon Road Pool is worse than it was.

Cross Examination.

3854 I would say that as a result of this 10-day test, the Chicago River and the Main Channel of the Sanitary District to McDonough Street Bridge should be relatively clean and that lake water entering the Main Channel will not have as much dissolved oxygen absorbed from it by sludge deposits in the Main Channel in 1941, as well as the case in 1940, and assuming that there is enough water to supply the oxygen demand of the treatment plant effluent the lake water would reach Brandon Road Pool in relatively better condition in the summer of 1941 than in previous summers. I would say that the worst sludge deposits are now concentrated in an area about 5000 feet long by 1400 feet wide, as compared to being spread over a distance of 30 miles previously. I would hate to say that there is no sludge in any part of the system even now, although I think that the rest of the system is relatively clean.

3855 As a result of this 10-day test, a considerable amount of B.O.D. has been removed from the Canal system from Chicago to Brandon Road and in my opinion that is helpful.

Redirect Examination.

This statement is based, more or less, on the report
3856 of Dr. Mohlman, and when I say "relatively clean", I mean that some sludge has been removed from the Main Channel but whether or not there is any more and to what extent there is sludge in the Main Channel, I don't presume to testify as to any exact figures but I think what I have said is consistent with what Mohlman's report shows.

Recross Examination.

Illinois Exhibits Nos. 10-D, 10-E, and 10-F were received in evidence. These exhibts bring down to date the data shown on Illinois Exhibits Nos. 10-A, 10-B and 10-C. Said exhibits are shown, pages 3857 to 3860.

Examination by the Master.

3861 The normal level of Brandon Road Pool is elevation 539 feet above sea level. In order to induce the flow of 10,000 c.f.s. the pool had to be lowered about one-half foot, or to an elevation of 538.5 feet at Brandon Road.

On Saturday, December 7, 1940, between 10:00 o'clock A. M. and Noon, the water level at Brandon Road Dam was lowered an additional one foot and that level was maintained until Midnight, December 8. Then, the level was brought up to 538.5, so that the lowering of the pool over that week-end amounted to one foot. The amount of this lowering was determined by the United States Engineers. I called Mr.
3862 Andrew, of the U. S. Engineering Department, on Thursday, December 5, 1940, and asked him to lower the pool at least four feet for 24 hours over the week-end, Saturday and Sunday, December 7 and 8. I asked Mr. Andrew to consider this a formal request for lowering of the pool and on Friday, December 6, I again called Mr. Andrew and he informed me that he had instructed his men at Brandon Road to lower the pool a foot and a half below normal, beginning Saturday noon. He did not think it proper to order a further lowering; that Government employees would do the lowering, and this was as far as he had any authority to go under the circumstances. He indicated that there were objections from the Government standpoint to further lowering but did not tell me what they were. I transmitted this information to Mr. Clausen and I think he embodied it in a letter to the Spe-

3863 cial Master. I talked to Mr. Andrew about operating the levels of this Pool on December 2 and 3, but my first definited and specific request for a lowering was made on December 5. If the level of the pool had been lowered about 4 or 5 feet, I do not believe the results would have differed greatly from those actually obtained. I think that the velocities in the Pool would have been decreased in direct proportion to the diminishing of the cross section by such lowering but when a velocity of approximately .5 feet per second is increased about 25 or 30 per cent, there is still not sufficient velocity to do much good. There is certainly not a scouring velocity and while there might have been comparatively small amount more of sludge carried out of the pool, I don't think the difference would have been great.

Recross Examination.

3864 Such a difference could be checked by taking the number of tons moved on any one day and if that amount were increased it might go up to a thousand tons more than was moved but I doubt it.

In order to create velocities sufficient to scour that pool, I think the velocities would have had to be treb-
3865 led of quadrupled. The pool would have had to be lowered to a point where it would have been possible
3866 to get an average velocity of about 1-1/2 feet per second. The increased velocity due to lowering of the pool level of 5 feet would have transported some more material but I don't know how much and I don't

think anyone does but it would have increased the
3867 transport of material slightly. In order to have effected a substantially different result, it would have been necessary to lower the pool to an amount sufficient to obtain a velocity well over one foot per second and that means lowering the pool something like 10 or 12 feet. I don't think that the lowering of this pool a foot made much difference and I don't think that if it had been lowered 5 feet it would have made any substantial difference. I am not sure that the extra or additional material moved during the 36 hours of lowering was caused directly by that lowering.

Master's Examination.

3868 To have lowered the pool 10 feet would have absolutely blocked navigation in the upper end of the Brandon Road Pool, in fact, a lowering of 5 feet would stop 9-foot navigation.

Recross Examination.

With a flow of 10,000 c.f.s. going through Brandon Road Pool, the more that the pool level was lowered the less would be the material which would settle in the pool. When there is a velocity of one-half foot per second certain solids in the water will settle and that was the average velocity in the pool at elevation 538.5, which elevation is half a foot below the normal level.

Examination by the Master.

3869 A velocity of 1 3 feet per second was observed at .4 of the distance down from the surface of the water to the center of the stream. At other places in the stream at the .4 depth point, different velocities were observed but the average velocity over the whole cross section was about .5 foot per second, in my computations and also in those of Mr. Andrew.

3870 Recross Examination.

If the depth of water was 20 feet and the current meter observations were made at .4 depth point, the current meter was 8 feet down below the surface. I don't think any material was transported by the water over near the bank where there was a velocity of .2 or .3 or .4 ft. per second. I think that all the material which was transported was transported by the water out in the center of the stream moving at a higher velocity. Nobody is sure of this. It is all a matter of conjecture.

3871 The velocity of water through this pool varies in direct proportion to the decrease in the cross section. Mr. Clausen is going to introduce data regarding the water intakes in the Brandon Road Pool.

July, 1940, at Chicago.

LANGDON PEARSE, on behalf of Petitioner.

Direct Examination by Mr. Clausen.

131 I am the Sanitary Engineer of the Sanitary District. I was graduated from Harvard College with degree of A.B. in 1899, and from the Massachusetts Institute of Technology in 1901, B.S. in Civil Engineering, and in 1902 received M.S. degree in Sanitary Science. My

experience has covered as Assistant Engineer: On the Charles River Dam Commission in 1902; On the Com-
132 mission on Additional Water Supply, New York City, in 1903; Augusta (Maine) Water District in 1904; Water supply investigation for Jersey City and Cleveland in 1904. In 1904-1907, was Assistant Engineer on the Improved Water and Sewage Work at Columbus, Ohio. In 1907 and 1908 was Assistant Engineer on Filtration with the Peoples Water Company in Oakland, California.

From February, 1909 to date have been with the Sanitary District, and since 1919 have been the Sanitary Engineer in charge of sanitary investigations and sanitary engineering work. I have also been employed from time to time as a consultant by various cities in Illinois on sewage treatment.

133 I have appeared as a witness in this case in 1927, 1929, and 1933. I was employed by the State of New Jersey in connection with the litigation over the taking of Delaware River water by the State of New York, and by the State of Connecticut in connection with the taking of the Ware River water by the State of Massachusetts.

At present am Sanitary Engineer for the Sanitary District, without any other engineering connections.

I understand the Illinois Waterway to comprehend the waterway from Lake Michigan to the Mississippi River.

134 I am informed on the sanitary condition of the Illinois Waterway, through a special division with chemical laboratories along the Waterway, and confer daily with Dr. Mohlman, our Director of Laboratories.

135 I directed the design of the North Side Works, the Des Plaines, and the old Calumet Works, and have served as a consultant on the design of the West Side, Southwest, and Calumet Works.

I have prepared data from the daily operating record of the sewage treatment works of the Sanitary District to show monthly averages of the 5-day B.O.D. and the suspended matter, as well as the removal thereof. The term B.O.D. comprehends the 5-day bio-
136 chemical oxygen demand, which indicates the extent of organic pollution, as measured by the oxygen required in parts per million to satisfy the 5-day demand.

137- The tabulation is offered for the North Side Works
148 from 1929 to May, 1940, inclusive (Illinois Exh. 20).
149 These tables show monthly averages, enumerating the flow in million gallons daily, the 5-day B.O.D. of the raw sewage entering the plant; the 5-day B.O.D. of the effluent as discharged to the North Shore Channel; the percentage reduction in the operation of the plant; the dissolved oxygen in the final tanks and in the effluent or the outfall since 1934, in parts per million. The suspended solids are shown in the raw sewage entering the plant and in the effluent, with the percentage reduction.

The North Side Works went into operation on October 3, 1928; the records in 1928 are inconsequential
150 as the plant was tuning up.

The North Branch Pumping Station was placed in operation on June 28, 1930. At that time the North Side Works received practically its entire load.

151 The new Calumet Sewage Treatment Works was

actually put in operation on December 3, 1935, pumping sewage through the preliminary tanks. The aera-tanks went into service on December 16, 1935.

152-156 The monthly operating averages are shown from January, 1936 through May, 1940, in Illinois Exh. 21.

157 The West Side Treatment Works went into service with Battery A on June 2, 1930. The second Battery B was put in on June 14, 1930. Battery C went into service on April 29, 1935.

158-168 The monthly operating averages are shown in Illinois Exh. 22.

169 Pumping began at the Southwest Works on May 23, 1939, with the preliminary tanks in use. On June 9, the activated sludge plant started with the first battery and was gradually put into complete service on June 27, 1939. The second battery was put into half service on September 6, 1939, and in full service Oc-
170-171 tober 26, 1939. The monthly operating averages are shown from May 1, 1939 through May, 1940 in Illinois Exh. 23.

172 At the North Side Works, the efficiency is high, as shown by the monthly averages in 1938, 1939, and 1940.

172 The B.O.D. removal during the summer months has averaged 93 to 95 per cent. The excess sludge is piped to the Southwest Works. Through 1939, practically all North Side sludge was discharged into the Main Channel at Stickney because of lack of capacity for sludge handling in the Southwest Works. The operation of the Calumet Works is handicapped by certain industrial wastes, chefly acid pickling liquor and paint waste. Continuous attention has been given to in-

creasing its efficiency. The efficiency of B.O.D. removal has increased from 83.5 per cent in 1936 to 87
173 per cent in 1939. The efficiency at the West Side Works in removing the 5-day B.O.D. and the suspended matter has been high for a sedimentation plant, ranging from 40.2 to 63 per cent on yearly averages from 1936 to 1939 inclusive. Higher removals have been attained during the summer months, with monthly averages up to 56 to 58 per cent on the 5-day B.O.D. and 61 to 70 per cent on the suspended matter. Ample digestion space for the West Side solids has been available since 1935. The sludge drying beds are adequate for digested sludge from the West Side area.

At the Southwest Works, the tuning-up period was still in force on July 12, 1940. A tuning-up period is necessary to iron out operating and structural difficulties and to train some 370 men. More blowing capacity is required, as was anticipated at the begin-
174 ning of construction, but could not be done because of lack of funds.

174 The Calumet Works has consistently been unable to produce results as good as the North Side because of industrial wastes which interfer with the bacterial processes. Such wastes are being eliminated at the factory by removal from the sewers, as in the case of iron wastes, or through change of factory procedure.

At the West Side Works from year to year since 1931, the results have varied. Monthly averages of B.O.D. removal have ranged from 28.8 to 63.5 per cent from June to September inclusive, from 1931 to 1940. The removal of B.O.D. has ranged from 40.7 to 53.7

per cent on yearly averages. In the last five years the lowest monthly removal during June to September inclusive was 44.4 per cent.

175 Since 1931, the yearly average removal of suspended solids has ranged from 40.2 to 63 per cent. On monthly averages, the removal of suspended matter has ranged from 45.7 to 77.1 per cent during June to September inclusive, from 1931 to 1939. During the last five years, the lowest monthly average removal during June to September inclusive was 46.7 per cent.

Chemical treatment comprehends the addition of chemicals, such as ferric chloride, ferric sulphate, lime or variations or combinations of various chemicals to sewage with suitable mixing, followed by a period for coagulation and settling. The procedure is used frequently to increase the removal of suspended matter
176 and B.O.D. Chemical treatment is not new but has been practiced for over 70 years. The application of chemical treatment to the West Side Works would not double the removal of B.O.D. and suspended solids. In many months the removal actually obtained by plain sedimentation was over 50 per cent. During the period from June to September, 1931 to 1939 inclusive, a total of 36 months, in only 9 months was the removal of B.O.D. below 50 per cent, and in only 5 months of the suspended matter. In the same four-months period in 1939, the removal of B.O.D. ranged from 56.2 to 58.8 per cent, and of suspended matter, 61.8 to 70.2 per cent. Tests run by the Sanitary District on chemical treatment show only a very slight betterment over plain sedimentation.

At the Southwest Works pumping sewage began from the West Side intercepting sewer on May 23, 1939, 177 through the preliminary tanks. Activated sludge treatment began on June 9, 1939. The first battery of activated sludge went into service on June 27, 1939. The dewatering and incineration of solids began on August 7, 1939, and has been in continuous operation ever since, except for certain units taken out for alterations or repairs. Two units are in service (July 12, 1940) and two are under repair and should be in service within 30 days. Changes have been necessitated in the steaming capacity of the boilers because the drying system is combined with the generation of steam for running the turbines on the pumps and blowers.

In starting a large sewage works like the Southwest 178 Works, a tuning-up period is necessary, to adjust and correct apparatus and train the operating crew. The apparatus must be tested completely, and its efficiency determined. The Southwest Works is a very unusual and novel plant, because of the method of heat-drying and incineration of solids. This was originated and developed by the mechanical engineering forces of the Sanitary District.

179 The Calumet plant went into operation first, handling 30 tons of dry solids per day, but it only incinerated sludge and had no boilers. In the Southwest Works, the steam generating capacity has to be balanced with the drying capacity, as well as with the feed of ferric chloride, feed of cake, and other details. The Southwest Works is the largest sewage works of its kind in the world. Intensive training of the operat-

ing personnel and drafting of instructions for operating to meet contingencies and emergencies are necessary. A tuning-up period of at least a year is necessary and under our conditions somewhat longer at such a development period.

180 The million gallons of sewage given complete treatment and that given preliminary settling is shown on the Illinois Exh. 22. At present (July 12, 1940) all the flow is going through the aeration tanks. The preliminary sludge is pumped over to the West Side Imhoff tanks for digestion. The North Side sludge is mixed with the excess activated sludge from the Southwest Works. Most of this is dewatered, heat-dried, and sold as raw material for fertilizer. The balance is discharged into the Main Channel (as of July, 1940). In May, 1940, 2,000 tons of dry solids were discharged to the Main Channel from the Southwest Works, or approximately 17 per cent of the suspended solids in the sewage of the Sanitary District.

181 No sludge has ever been discharged from the West Side Works to the Main Channel. The Sanitary District has steadily increased the removal of solids from the sewage. The Des Plaines River and the old Calumet plants are not in the present picture, as the Des Plaines River plant was shut down in October 13, 1931, and the Calumet Imhoff plant was shut down
182- on September 15, 1935. The record from 1929 to
183 1940 (first 5 months) shows an increase from 54.1 to 393.5 tons per day (Illinois Exh. 24, 26).

Upon the completion of the Sanitary District program, between 475 and 500 tons will be removed daily, depending upon the state of the population and industry and the efficiency of the plants.

184 The Sanitary District has increased the amount of
186 sewage treated from 67.9 million gallons per day in 1928 to an average of 826 million gallons per day during the first five months of 1940 (Illinois Exh. 25).
188 This is shown graphically in Illinois Exh. 26. The
189 sharp increases in gallonage treated are due to the starting of new plants, such as the North Side on October 3, 1928; the West Side in 1930; and the Southwest in 1939. From 1938 to 1940, there is an increase of nearly 40 per cent.

190 For the past five years, the plan has been shaped to run the Southwest Works to capacity, diverting West Side sewage to it during dry weather, and putting excess storm flow into the West Side Imhoff tanks from the Southwest sewage system. The Sanitary District has recognized the need for additional treatment to supplement the West Side Imhoff tanks for many years. Consideration was given at the time of the tank design. A plan was submitted to the P.W.A. in 1933 for handling the Southwest sewage and the West Side effluent in a combined plant of 1,000 mil-
191 lion gallon per day capacity. The P.W.A. Board indicated it was better to build the activated sludge plant for the Southwest and thereby get the largest amount of gallonage under treatment in the shortest time. The determination of how best to supplement the West Side Works was delayed by the P.W.A. Review Board until the Southwest Works were under contract. The Board also recommended large scale tests to determine whether any combination of Imhoff tank treat-

ment and chemical treatment, with or without filtration, would be sufficient, and also the preparation of estimates of cost. The advisability of chemical treatment to supplement the West Side Works was before the Sanitary District prior to 1934. The decision was to concentrate on the Southwest Works and then take
192 up the experimental procedures. In this the P.W.A. Board and the Sanitary District agreed. Procedures were studied from 1936 to 1939 for supplementing the West Side Works, including the activated sludge process with short period aeration, chemical precipitation, filtration on fine grained filters (Laughlin or magnetite), aeration with iron salts (Guggenheim), and high-rate trickling filters, both single stage (Halvorson type) and two stage (Jenks type).

193 Plans were drawn in 1936 for the chemical treatment tests, to include mixing and coagulation tanks, and chemical dosing apparatus; the arrangement of an Imhoff tank unit for parallel tests on the chemically treated sewage and the settled sewage; the behavior of sludge digestion; and the effect of filtration (Laughlin) on settled and chemically treated sewage. This went into service in September, 1937, and operated for a year. The results of these tests indicated that chemical precipitation made a very slight improvement in the quality of the West Side effluent.

The field tests were supplemented by estimates because there was no question but what the activated sludge process produced a higher grade effluent than the chemical treatment would. Detailed estimates were made on two schemes for activated sludge, on chemical precipitation, and on the filtration with fine

grained filters of the plain settled effluent and chemi-
194 cal precipitation effluent. Aeration with iron salts and high rate trickling filters were too expensive for the results obtained. Filtration on fine grained filters was also too costly for the relatively small benefit. This comparison of the various alternatives narrowed the field to activated sludge and chemical treatment. But these two procedures were not equivalent in the work performed. The choice was determined by the degree of effluent required to preserve at least three parts per million of dissolved oxygen in the Des Plaines and Illinois Rivers. The maintenance of freedom from odor in the absence of sludge banks requires the pres-
195 ence of some dissolved oxygen. The margin of safety between complete de-oxygenation and the presence of appreciable dissolved oxygen cannot be estimated in the operation of treatment works so as to make it possible to adjust the dilution so that one or two parts per million of dissolved oxygen will always be present. To maintain a factor of safety in preventing nuisance, a minimum of three parts per million of dissolved oxygen is required. To protect fish life, three parts per million of dissolved oxygen is a minimum. Some authorities recommend five.

In maintaining the Illinois Waterway, a number of factors are beyond the control of the Sanitary District, such as the cessation of reaeration at dams by the development of water power. Such reaeration is of value
196 in the self-purification of the Waterway. The effect of an ice sheet on reaeration is not definitely known. Our early data, running back to 1919, indicates that in severe winters more flow may be required than in

normal summer conditions. Luckily, extreme winters occur but seldom. The diversion may be changed. The possibility of any further reduction appears remote. The growth of population and industry within the area of the Sanitary District are both a factor. The requirements laid down for stream conditions by authorities having jurisdiction thereover may change. At present the power of regulation rests in the State of Illinois. In the near future control may be given also to a Federal authority. The general trend of regulation points to more rigorous standards for the sanitary conditions of waterways than was the case ten to twenty years ago. The necessity for budgeting the diversion from Lake Michigan to offset the storm run-offs cuts down the effective allowed diversion.
197 Such budgeting means that for at least six months a diversion between 800 and 1000 c.f.s. may be in use. In general, this has reduced the flow from Lake Michigan during the warmer months of the years at a time when the dissolved oxygen content of the lake water is lowest. That is the time when the most dissolved oxygen is needed, aside from the occasional heavy ice sheet.

The oxygen balance in the Upper Illinois Waterway requires a high degree of treatment at the West Side Works. Based on a diversion of 800 c.f.s. with 500 m.g.d. passing through the Southwest Works and receiving activated sludge treatment, a treatment is required at the West Side Works greater than 82 per cent for the 400 m.g.d. passing through the works. Supplemental treatment for the West Side Works is required, making an overall purification of 90 per cent or better to maintain three parts per million of dissolved oxygen at Lockport.

197 Seasonal effects are important, both as to the amount of dissolved oxygen which can be introduced into the canal system by the diversion and the temperature of the lake water and effluents and mixtures
198 thereof, in so far as temperature affects the rate of satisfaction of B.O.D. The temperature of Lake Michigan varies from 32 degrees Fahr. in winter to 72 degrees Fahr. in summer. The dissolved oxygen content varies from 14.6 parts per million in winter to 8.8 parts per million in summer. The temperature of the Lake water and effluents and mixtures thereof affects the rate of satisfaction of B.O.D., the rate being slower at lower temperatures. Aside from the effect of the ice sheet over the waterway, such seasonal occurrences point to the need of the greatest reduction in B.O.D. during the summer months. This corresponds in general with the periods of lower diversions.

199 The Activated Sludge plant was chosen for supplementing the West Side Works because a high-grade effluent was required, such as only an activated sludge plant can deliver, with an effluent containing only 10 parts per million of B.O.D. or less.

The treatment by the various procedures produce an effluent containing a residual B.O.D. as follows:

Procedure	Residual B.O.D. p.p.m.
Imhoff tank	57
Imhoff plus chemical precipitation	36
Activated sludge	10

The treatment by various procedures produces a removal of B.O.D. and suspended solids as follows:

West-Southwest plus West	Per Cent Removal	
	B.O.D.	Susp. Solids
Activated plus Imhoff	73.7	76.7
Activated plus Chemical Precipitation	81.7	81.9
Activated plus Activated	91.6	91.5

200 The activated sludge process offers a possibility of
revenue from the sale of heat-dried activated sludge,
perhaps $4.00 a ton after paying for fuel, or $78,000.
Labor cost for chemical precipitation on 400 million
gallons of West Side effluent per day is $39,000 greater
than for activated sludge in a year. Both may fluctu-
201 ate. The cost of coal and chemicals is $205,000 higher
for chemical precipitation than for activated sludge
in a year. There is more risk of fluctuating costs in
chemical precipitation than in activated sludge.

In making a comparison of construction cost estimates of activated sludge and chemical precipitation, the two schemes basically are of different accomplishment. The plans proposed at the time the estimates were made included the increase in the capacity of the Southwest Works to 500 million gallons per day on an activated sludge basis.

202 The first costs for a complete setup are as follows:

Procedure for Addition to West Side	Extension Southwest Works to 500 m.g.d.	Extension West Side to 400 m.g.d.	Total for 900 m.g.d.
Activated Sludge	$3,879,800	$5,869,000	$9,749,700
Chemical Precipitation	3,879,800	1,300,500	5,180,300

Comparison on the basis of adding sufficient activated sludge treatment to produce a 5-day B.O.D. discharge equal to that derived from treating 400 m.g.d. by chemical treatment, indicates a capacity of 180 m.g.d. is required for activated sludge. The first cost is changed for the activated sludge extension of the West Side as follows:

Extension of West Side	Capacity m.g.d.	Cost
Activated Sludge	180	$3,662,000
Chemical Precipitation	400	1,300,500

This would materially reduce the annual cost of activated sludge, were a lower degree of treatment satis-
203 factory for the extention of the West Side Works. The total annual costs of the complete setup are practically the same, as follows:

Procedure for Addition to West Side	Extension Southwest Works to 500 m.g.d.	Extension West Side to 400 m.g.d.	Total for 900 m.g.d.
Activated Sludge	$579,400	$569,200	$1,148,600
Chemical Precipitation	579,400	555,800	1,135,200

These figures show no credit for the sale of heat-dried sludge for fertilizer, which is estimated to exceed $78,000.

The cost of extension of the Southwest Works by activated sludge to 500 m.g.d. is the same for both alternatives.

204 If the total annual cost be corrected to a West Side activated sludge extension producing the same B.O.D.

as for chemical precipitation, the annual cost is as follows:

Procedure for Addition to West Side	Extension Southwest Works to 500 m.g.d.	Extension West Side	Total
Activated Sludge	$579,400	$320,600	$900,000*
Chemical Precipitation	579,400	555,800	1,135,200**

* For 680 m.g.d. ** For 900 m.g.d.

No credit is shown for the sale of heat-dried sludge as fertilizer.

The activated sludge altenative is advantageous in
financing, as it keeps down the operating costs and thus
reduces the corporate tax levy. The proposed works will
205 relieve the conditions in the Brandon Pool. The works
can be built by the end of 1942. A site is available on the
501 acres now owned in Stickney, upon which the exist-
ing West Side and Southwest Works are located. Condi-
tions in the Illinois Waterway were very unsatisfactory
in 1939 and 1940. During July, August and September,
1939, the dissolved oxygen in the Main Channel at Dam-
en Avenue was exhausted for the first time in 40 years.
At Summit, the dissolved oxygen was absent for six
months and practically exhausted for eight months. At
206 Lockport, the dissolved oxygen was exhausted for six
months and was below two parts per million for four
months beside. The Joliet Pool was in bad shape, with
marked gasification and, at times, scum formation.
Conditions in the Illinois Waterway from Lockport to
Brandon Road were worse in 1939-1940 than in 1938,
207 after the cut in the diversion. No temporary measures

are available which can be quickly applied to obviate the conditions in the Brandon Road Pool other than an increased diversion.

Conditions improved somewhat in 1940 by reason of the additional treatment in the Southwest Works and the prevention of sludge from entering the Channel. These conditions will continue to improve as the Southwest Works are brought up to capacity and the West Side supplemental works are built.

208 The decrease in the B.O.D. reduction at the Southwest plant in April and May, 1940, as compared to January and February, 1940, was due to certain conditions in the plant which were being corrected. The operating efficiency got out of gear. In July, 1940, the pumping was about 350 m.g.d., of which 250 m.g.d. received complete treatment.

209 Conditions since 1939 have improved in the Waterway. Gasification from sludge deposits will decrease. There is a double demand from sludge deposits, partly from sludge coming contemporaneously and partly from past deposits, particularly during the winter.

210 The improvement in conditions should be reflected by the increase in gallonage treated in 1939 and 1940. We have insisted that the plants remove the solids and treat as much liquid as possible. The operating force is doing its best to perform under these orders. The diversion limitation became effective on December 31, 1938. The removal of solids is a table which indicates the effectiveness of treatment.

The repairs to the drying apparatus and the additional filters now under contract will also help keep sludge from being wasted to the Main Channel. There

has always been a heavy deposit of sludge above the Power House from the Power House to the old controlling works. In 1909, from 6 to 8 feet of deposits were measured on the racks of the Power House. The wide area and lowered velocities tends to deposit solids. There have always been some sludge deposits in Bran-
212 don Pool since the gates in the dam were closed in 1933. The dams at Brandon Road, and to some extent at Dresden Island, retain sludge in the upper part of the Illinois Waterway. The capacity of the Pool is approximately 150 million cubic feet. The Pool is about 4 miles long and from 600 to 1000 feet wide. The width
213 varies from around 200 to 400 feet to a maximum of about 1400 feet just above the dam. Brandon Road Dam is the first dam below Lockport Power House and Joliet. From the Power House to Brandon Dam is 5.1 miles.
214 Sundays, holidays, and industrial depressions affect the condition of the Waterway. The sewage is weaker over Saturday and Sunday and stronger during the middle of the week, where industrial wastes are a factor.

The time of flow between Chicago and Lockport and Brandon Road Dam is considerable. From Chicago to Lockport is now a flow time of about 2-½ days. Hence the effect of what happened in Chicago today is seen at Lockport two and one-half days later. At the time of the Master's visit on Monday, July 8, 1940, the con-
215 dition reflected a more or less general holiday from Thursday through Sunday. This year Lake Michigan warmed up more slowly. Conditions have been much worse at Joliet.

216 Sludge deposits persist for several years, and the effect of a sludge deposit in a stream may last more than two years, perhaps two and one-half to three years. As the plants are completed, with their sludge handling devices, there is less sludge going down the Channel.

217 I have urged for more than two years that the Southwest Works be completed and the West Side Works supplemented at the quickest possible opportunity, with appropriate treatment serviceable for permanent use. There is no value in seeking temporary alleviations of minor importance that cost a large sum of money. I know of nothing that would produce the same results that we ought to have to cure the conditions that existed, except to suggest that diversion would be the quickest way and probably the most satisfactory. The 5,000 second feet annual average diversion would be sufficient to make conditions in the Brandon Pool that would not cause difficulty. I have not examined the case sufficiently to determine whether or not a much lower flow would be satisfactory. I believe 5,000 second feet
218 would be highly desirable, particularly during the summer months, when the greatest gasification occurs. This would relatively improve the position over what it was when 5,000 second feet was allowed, but as a citizen I feel the citizens of Joliet are entitled to better conditions than existed since the pool was closed and the sludge has been accumulating. The treatment was not in service soon enough to prevent conditions which are not proper. Everybody has realized we were doing our utmost to build our plants within our resources and

also doing our best to operate the plants to the greatest advantage.

221-223 The summary of the yearly averages of the operating results at the North Side Works for 1929 to May, 1940 is shown in Illinois Exh. 27.

224-225 The summary of the yearly averages of the operating results at the Calumet Sewage Treatment Works is shown for 1936 to May, 1940 in Illinois Exh. 28.

226-227 The summary of the yearly average of the operating results at the West Side Sewage Treatment Works is shown for 1931 to May, 1940 in Illinois Exh. 29.

LANGDON PEARSE:

Direct examination by Mr. Clausen.

1433 The significance of the various headings on the tables in Illinois Exh. 20 (Rec. 137) is as follows: The tables for the North Side Works show for each month in the respective years the daily average data, for the years 1929 to 1940 inclusive—first, the flows in million gallons per day, abbreviated as m.g.d.; next, the 5-day B.O.D. for the raw sewage entering the works and the effluent discharged to the North Shore Channel, in parts per million and the per cent reduction caused by the treatment; next, the dissolved oxygen in parts per million in the effluent at the final settling tanks and also at the outfall where it enters the North Shore Channel; and, finally, the suspended solids in parts per million in the raw sewage and effluent and the reduction in per cent caused by the treatment. In each year, except 1940,

the average for each column of results is shown at
1434 the bottom of the table. This average is the daily
average for each respective year.

Supplemental table for the year 1940, showing the
data for June and July, was introduced for the North
1435 Side Works, Illinois Exh. 44. Illinois Exhibit 44 in-
1436 cludes the material shown in Illinois Exh. 20. The
same general headings are used in Illinois Exh. 21 as
in Exh. 20.

1437 A supplemental table for the Calumet Works, in-
1438 cluding June and July, 1940, was introduced as Illinois
Exh. 45.

1439 The same general headings are used in Illinois Exh.
1440 22 as in Exh. 21, but no dissolved oxygen is given.

A supplemental table for the West Side Works, in-
1441 cluding June and July, 1940, was introduced as Illi-
nois Exh. 46.

1442 Illinois Exh. 46 covers the year 1940 through July,
for the Southwest Works, including Illinois Exh. 22.
The general headings in Illinois Exh. 23 are similar to
those in Illinois Exh. 20. The average of each column,
however, as shown, is for only 6 months.

1443-1444 Illinois Exh. 47 covers all of Illinois Exh. 23
1445 and also through July and August, 1940.

In the transcript (Rec. 180) with reference to the proportion of the sewage solids of the Sanitary District, I meant 17 per cent of the suspended solids in the raw sewage.

1446 Supplementing Illinois Exh. 24, the daily average
for the first seven months of 1940 of the tons of dry
solids removed per day calculated from the removal of
suspended soldis in the respective plants was:

Plant	Tons per Day
Calumet (new)	30.2
North Side	106.6
Southwest	187.5
West Side	73.1
Total West-Southwest	260.6
GRAND TOTAL	397.4

The saturation value of dissolved oxygen in water at 72 deg. Fahr. is 8.8 parts per million (Rec. 198).

Referring to Illinois Exh. 27, the daily average for the first seven months in 1940, as compared with the first five months, at the North Side Works were:

1447 Daily Averages

Determination	Months	
	7	5
M.g.d.	191	190.5
Effluent: in p.p.m.		
B.O.D.	7.7	8.4
Suspended Solids	11.7	13.0
Per Cent Reduction:		
B.O.D.	94.04	94
Suspended Solids	91.9	91

At the Calumet Works, the daily averages were:

Determination	Months	
	7	5
M.g.d.	66.4	66.3
Effluent: in p.p.m.		
B.O.D.	8.86	9.0
Suspended Solids	11.9	12.0
1448 Per Cent Reduction		
B.O.D.	91.4	91.5
Suspended Solids	90.2	90.2

At the West Side Works, the daily averages were:

Determination	Months 7	Months 5
M.g.d.	339	307.1
Effluent: in p.p.m.		
B.O.D.	66	67
Suspended Solids	75.6	76
Per Cent Reduction		
B.O.D.	48	46.4
Suspended Solids	54.7	52.7

1448-1449 The amount of air used in the various plants
1450 of the Sanitary District is shown in Illinois Exh. 48.
1451 I showed the results at the North Side from 1930 on, as the early record was not for complete operation. The results in 1929 were of no great significance for this picture. At Calumet, the few days of activated sludge in December, 1935, were omitted. The figures given in Illinois Exh. 48 are for air in decimals of a cubic foot per gallon of sewage. The average for the year is shown, except that in 1940 at the North Side and Calumet the average of seven months is given, whereas at the Southwest it is for six months in 1939 and in 1940.

1452 The estimated flow of sewage, with the amount
1453 treated and untreated is shown in Illinois Exh. 49 for
1454 the years 1930 to 1940 inclusive. The total pumpage is built up as the sum of the pumpage of the Des Planes River watershed, the municipalities within the District not served by Chicago and the City of Chicago. The
1455 first figure in the third column should be "1097," not "1099." The sewage flow is assumed to be substantially
1456 the same as the water pumpage. Under sewage treated

are given the actual flows from the plant records, as in Illinois Exh. 26, except that in 1940 the 7-month average is used. The figure of 878 m.g.d. given for 1940 is misleading, in that the treated flow rose from 696 m.g.d. in January to 1032 m.g.d. in May and fell to 988 m.g.d.
1457 in July. The estimated flow of sewage in the Sanitary District at present (September, 1940) is approximately 1070 million gallons daily. Of this, about 82 m.g.d. is untreated. The untreated sewage was steadily reduced throughout the first seven months of 1940. Part of the untreated flow is from the Kostner Avenue sewer area on the West Side. The connection therefrom to the Sanitary District interceptor is under construction. The balance if accounted for by other miscellaneous flows from Clearing, Argo, parts of Blue Island, Posen, Oak Forest Institution, Evergreen Park, Mt. Greenwood, and other small situations. The figure of 82 m.g.d. is current, say July, if you prefer. It may vary from
1458 month to month. It is about 8 per cent of the total.

1458-1459 To supplement Illinois Exh. 24, the dry solids removed over seven months average daily—

Plant	Tons per 24 Hours
Calumet, new	30.2
North Side	106.6
Southwest	187.5
West Side	73.1
TOTAL	397.4

1460-1461 Illinois Exh. 50 shows the yearly record of sludge and grit removed at the sewage treatment works from 1929 to 1940, except that in 1940 only seven months were used. The sludge is calculated from the actual volume removed, knowing the per cent of solids.

No sludge has been discharged to the channels of
the Sanitary District from the West Side Plant at any
time. From the Calumet Works there was sludge discharged
in 1936, 1937, and 1938 during the tuning-up
of the sludge handling equipment. From 1929 to 1939
inclusive, most of the sludge piped from the North
Side Works was emptied into the Main Channel at
Stickney. This sludge included the excess activated
sludge and the sludge from the preliminary settling
1462 tanks at the North Side Works. Its water content
varied from about 99.8 to 98.9 and is usually over 98.5,
and very watery. At first but little sludge was run
into the West Side Works for digestion, but in 1931 and
1932 a considerable portion, around 25 per cent, was run
in, but ownig to its volume, the digestion capacity available
proved inadequate. From 1933 to 1935, only 14
per cent of the North Side sludge entered the West
Side plant. During 1936, through 1937, less than 8 per
cent. In 1938, only 2-½ per cent. In 1939 and 1940, one
per cent or less entered the West Side Works.

1463 The tonnage in Illinois Exh. 50, column 8, represents
the sludge caught in the plant. It shoots up rapidly in
1939, with the plant going into service. The last column
represents the tonnage discharged to the channels of
The Sanitary District. The discharge was greater in
1939 than theretofore. The table shows what is retained
1464 in the plants and what was lost. There was a substantial
reduction in the sludge to the channel in 1940, compared
with 1939. There will be a more substantial reduction
when the new filters are in service at the
Southwest Works.

1465 In Illinois Exh. 49, in 1939, the last column shows 377 m.g.d. That represents untreated sewage. The 53,970 tons shown in Illinois Exh. 50 for the year 1939 comes from the 670 m.g.d. of sewage, shown under sewage treated, because that tonnage is the excess which we were unable to dispose of on land. The figures 377 and 53,970 cannot be added, because the latter is tons per year and the former is million gallons per day. They are different units.

1466 To the 377 m.g.d. of sewage would be added the average daily volume in gallons per day of the 53,970 tons per year.

1467-1468 Illinois Exh. 51 shows the amount of sludge discharged to the channel in tons per year for 1929 to 1939, and for 7 months in 1940.

1469 The table shows the disposition of the North Side sludge, and the sludge to the channels of the Sanitary District. The tonnage to the channel from 1929 to May 23, 1939 was largely derived from the North Side Works.

When the Southwest Works went into service on May 23, 1939, an accumulation period occurred for a few weeks, in which activated sludge was built up. By September, the sludge dewatering and drying began. At times the amount handled built up to over 200 tons of dry solid per day. Most of this was shipped away for fertilizer. The dried excess not shipped was burned. The sludge not handled was discharged to the Main Channel from the Southwest Works. In the spring of 1940, after the Racine Avenue Pumping Station was cut in, the solids from the preliminary tanks were diverted to the West Side Works for digestion.

1470 The table shows what came from the North Side, grit by railroad to the dump and sludge by pipeline. Under disposal is shown the distribution of the sludge, whether to the West Side, Southwest, or Channel.

As the Southwest Plant came in, some of the North Side sludge was put into the Southwest and dewatered. More or less, but continuously sludge from the North Side, from 1929 on, went to the Main Channel. The largest amount was 38,394 tons in 1938. Sludge from other sources reaching the Channel is shown under Calumet and Southwest.

1471 Up to the end of 1935, the Calumet plant was an Imhoff tank plant, with a couple of experimental units of activated sludge. No sludge went into the channels from the Calumet plant during the operation of the Imhoff tanks. In 1936-1937-1938, during the tuning-up period, excess sludge was discharged to the Channel. For a time a lagoon was operated on the excess sludge but it produced so much odor, which was commented upon for a half mile or more, that we decided, with the diversion we had then, to discharge the material into the channel. It was not a great addition over the amount already going in from the North Side Works. The odor was cut down. Apparently there was very little difference in the channel. The Southwest Works went into service in 1939. Sludge was discharged.

1472 The grand totals correspond with those read from Illinois Exh. 50.

1472-1473 Illinois Exh. 52 shows the record of sludge handling in tons per month from the North Side and South-
1474 west Works from July, 1939 through July, 1940. For each plant is shown the total tonnage, and its disposi-

tion, distributed to the West Side, Southwest drying 1475 and channel. Under the final disposal is shown the total tons to the same points. The material from the Southwest to the West Side digestion is the sludge from the preliminary settling tanks at the Southwest. It was desirable to keep this out of the material used for fertilizer on account of the grease content and its unchanged character, not having been through the activated sludge process. The peak discharge to the channel was 6,435 tons in October, 1939. Thereafter there was a steady decline to 1866 tons in July, 1940. That figure is somewhat under the average monthly discharge for the first seven months of 1940, calculated from Illinois Exh. 50 and 51, which show the total for the first seven months.

1477 The West Side plant is a digestion plant. The digested solids are taken from the tanks, air-dried, and run out on our railroad to the sludge dump. At no time have they ever gone to the channel.

1478 The West Side treatment is a partial treatment, to remove by settling whatever will settle in around two hours. There is a removal of B.O.D. around 50 per cent, and approximately the same of suspended solids. Ramey has estimated the additional plant needed to bring the effluent up to the quality of the Southwest plant. There is material in the effluent of the West Side plant that is untreated, except for such part as was 1479 settled out. The material in the effluent is not included in these tables. Such material is classified as part of the sewage which went through a sewage treatment plant. We can compile the amounts of such material for you from the operating tables.

1480 The effluent of the West Side plant now contains a considerable percentage of untreated matter. Eventually the West Side will have an effluent as good as the activated sludge part of the Southwest Works. At present the sewage in the Southwest Works only receives partial treatment. The tables were prepared to inform the Opponents on the technical data requested, not so

1481-1482 much to inform the Master. Illinois Exh. 53 shows for 1938 the tonnage per month of sludge and grit at the various works of the District, with the disposition thereof.

1483-1484 Illinois Exh. 54 shows for 1939 and 1940 the tonnage per month of the sludge and grit from the various works of the District and the disposition thereof.

1485 These two exhibits are breakdowns of Illinois Exh. 50, to show monthly data. For general purposes back of 1938, we felt the yearly records were sufficient.

1486 Under the heading "Channel" is a record of sludge that came out of a plant as a result of sewage

1486-1487 treatment. In 1939, the sludge removed was finally disposed of as follows:

Method of Disposal	Tonnage (Dry Solids)
Digestion	28,110
Main Channel	53,970
Dried by Heat	23,782
Grit to Dump	3,061
TOTAL	108,923

These figures are taken from Illinois Exh. 54 but are summarized in a different form.

The drop in efficiency in the Southwest Works in 1940, followed the period of January, February and

March when all the flow handled went through the entire plant, that is, the preliminary tanks and the activated sludge. From April to date, a part of the flow in varying proportion, has been given only preliminary
1488 treatment by settling. This appears to be due to the explosion in one of the boilers in January, which put two units out of service, because two of the heat-drying units are connected to one line of breeching to a single stack. This cut down the available capacity for sludge drying. It seemed better, early in April, to remove by preliminary settling whatever sludge could be settled for digestion in the West Side Works, and while repairing the heat-drying units to discharge the excess settled sewage to the Main Channel, over what could be treated by the activated sludge process to sufficiently load the heat-drying apparatus.

We discussed emergency lagoons, but in the light of our experience at Calumet with lagooning activated sludge, we felt it was better to turn the sludge loose in the channel.

1489 The chief difficulties in tuning-up have come from the lack of adequate air compressors and adequate dewatering and heat-drying equipment. These lacks are chargeable to inadequate funds prior to 1940.

The boilers turned out too much steam generating capacity. Owing to the hookup in pairs on each stack, if repairs are needed, two units of heat-drying have to be shut down. This is being remedied. The changes in the drying equipment are practically completed (September 9, 1940). The blower capacity has been too low from the start. Three additional blowers are
1490 under contract, each of 100,000 cubic feet per minute

capacity. The additional filters under contract are arriving in installments and will be in operation before the end of the year. Some slagging has occurred when sludge is burned in the boiler furnace. The fusion of mineral matter in the sludge may occur if the furnace temperature goes too high. This has required attention to the operating end, to train the men. If molten slag were to fill the ash pit, the usefulness of the boiler setting might be destroyed.

1491 The remaining reason is that because of inability in the earlier months of 1940 to make a budget, we did not know how much money we had to spend in operation. This resulted from the uncertain taxing power of the District for corporate expenses. The Sanitary District had requested a special session of the Legislature. It was delayed. The trustees desired to make the money in hand last as long as possible before shutting down the plant, if the worst came, and the legislature was not called in special session or failed to act. For the first five months of 1940, we were up in the air, and after the first three months economies were enforced to keep down use of power and coal. Luckily the Legislature came to our relief. We were able to go ahead, continue operation, and develop.

1492 A special act was passed in 1940, increasing the ability to tax for corporate purposes, to serve the operation of the plants and works in the District. It is a taxing power to raise operating money. It enabled the issue of temporary certificates.

1493 I will furnish the record of air used at the North Side Works from October 3, 1928 up to 1930.

Cross Examination by Mr. Naujoks

1629 At the North Side Works, from October to December 1928, 0.97 cubic foot of air per gallon of sewage was used, and in 1929, 0.8 cubic foot per gallon.

1630 My duties are general. I collaborate with Dr. Mohlman on many questions of operation and investigation. I take up questions in connection with the design and operation of the works. I pass on right of way matters. Such a position might be styled Consulting Engineer. I have no assigned duties to be done each day. I prepare opinions for the Engineering Department, our Chief Engineer, and the Legal Department. I was a witness before the Special Masters Hughes and McClennen.

1631 An explosion in the furnace setting of a boiler at the Southwest Works shut down two units in the dewatering and drying end of the sludge handling and restricted the handling of the sludge, and thus interfered with the operation of the works.

1633 There are two sources of sludge, one from the North Side through the pipeline, the other, excess sludge from the Southwest Works. These are mixed. Whatever the conditioning, filtering, and heat-drying apparatus can handle is heat-dried and shipped out in box cars as fertilizer material. The excess, due to lack of capacity caused by the shutdown for repairs, was discharged to the Main Channel. About April 1, 1940, the preliminary solids, which had theretofore been handled with the activated sludge, were put into the West Side Works for digestion. This improved the quality of the fertilizer material and removed grease, which was higher in the preliminary sludge.

1634 The repairs are practically complete. The practice of not treating all the sewage completely at the Southwest Works during 1940 originated in the troubles such as the accident in the boiler. We were fearful our money might not hold out to operate into June or until such time as the Legislature would give relief. The
1635 operating department decided to by-pass the portion of sewage whose sludge could not be heat-dried and sold and put the preliminary effluent into the Main Channel. To complete the sludge handling, eight filters are under contract to increase the present 24 to 32. These should be in service by the end of 1940. In the boiler repairs, the connections to the stacks are being rearranged to give flexibility so only one unit can be shut down, instead of two at a time. The blower capacity is inadequate at present to continuously carry 400 m.g.d. Three blowers, each of 100,000 cubic foot per minute are under contract. One blower will be delivered in 18 months, all in two years. At present the Southwest Works is underblowered, because our money did not go far enough to buy sufficient blowers for the nominal capacity of 400 m.g.d. The PWA Board
1637 cut out one blower and left us three. I believe the bids were taken within the last three months. Deliveries are difficult to obtain because of the competition with the United States, which is buying such equipment for use in the manufacture and testing of aeroplanes.

1638 The contracts were let as soon as possible after the report made by the PWA Review Board. The present equipment does not furnish sufficient air for the com-

plete treatment of all the sewage at the Southwest Plant. The figures on Illinois Exh. 50, 51, 52, 53, and 54 are expressed in pounds of dry weight, in one case computed from the removals of suspended matter by
1639 the plant, and in another from the sludge measurements. It is possible they will not entirely cross-check. In the sewage field it is difficult to reconcile sludge weights with suspended matter. The North Side pipeline has a flow capacity of 2.5 m.g.d. and operates at a fairly uniform rate. The density has varied around 98-½ per cent water.

1640 The problem of cleaning the pipeline is before us, to restore its capacity. From the Standard Saturation tables of the American Public Health Association, the dissolved oxygen in Lake Michigan water may be around 8.1 p.p.m. in the summer and up to 14 or 15 p.p.m. in the winter.

1641 The winter conditions in the waterway are better than in the summer, although conditions were not satisfactory in January, 1939, following the cut in diversion. The dissolved oxygen dropped to zero at Lockport, which is very unusual. Conditions continued unsatisfactory in the winter and early spring, even with a high dissolved oxygen in the lake. There was less trouble in the 1939-1940 winter than in the previous winter.

1642 The chart (Rec. 258) shows on monthly averages some dissolved oxygen in January, February, and March of 1940. In April, 1940, the dissolved oxygen was exhausted. The B.O.D. in 1940 were lower than in 1939. My general impression is that conditions were better in the winter of 1939-1940 than in January to March, 1939.

1643 The introduction of oxygen tends to reduce the B.O.D.
somewhat. However, under existing conditions, the
increase in oxygen may have little practical value, de-
pending on how it is done. With B.O.D. running up to
25 to 30 parts per million in 1940 and 40 in 1939, it
would be difficult to obtain sufficient oxygen without
1644 increasing the diversion. At the North Side Works,
the B.O.D. removal in September, 1929, attained 97.2
per cent. That was the maximum reduction in B.O.D.
in that year. The average removal for the year 1929 was
95 per cent of the 5-day B.O.D. in 1928, the air used was
0.97 cubic feet per gallon of sewage. In 1929, 0.8 cubic
feet per gallon was used. In 1930, air in amount 0.52
cubic feet per gallon was used and removal of B.O.D.
1645 of 92 per cent was attained. In 1931, a removal of
92.6 per cent of B.O.D. was obtained. In 1932, a remov-
al of 91.7 per cent of B.O.D. was obtained with 0.41
cubic feet of air per gallon. In 1933, a removal of 88.3
1646 per cent of B.O.D. was obtained with 0.37 cubic feet
per gallon. In the later years a good effluent was ob-
tained with a lower use of air, around 0.4 cubic feet per
gallon, than formerly, with as good an effluent. In such
degrees of treatment and amounts of air, a slight differ-
ence in the amount of air does not make much differ-
ence in the reduction of B.O.D. In the exhibits from
1936 to 1937, the air averaged 0.36, 0.35, 0.36, 0.37 cubic
feet per gallon, with a reduction of B.O.D. of 91.5 or
92 or 92-½ per cent. The reduction of B.O.D. is lower
in winter, and greater in the summer. Little is gained
by using more air, because nitrates are produced, which
are of little value in our ultimate result. We are trying
to keep dissolved oxygen in the flow at all times, where-

as nitrate oxygen does not become available until the dissolved oxygen is exhausted. In the earlier period
1647 more nitrates were carried than now, yet the present effluent is practically just as good. The use of more air would not duplicate the result of 1929, because that was obtained with a period of aeration of 7.2 hours on a reduced flow and now the period is around 4.5 to 5 hours. There is an element of time in the period of aeration, as well as the amount of air.

1648 The use of more air without an additional aeration period would not do much good. Nitrate production by the activated sludge process does not do enough benefit to warrant the expense. This is the trend in many of
1649 the large activated sludge plants in the United States The making of nitrates by the activated sludge process is not an efficient use of public money. Additional air will make a little more nitrate in the effluent, but the nitrates do not become available until the dissolved oxygen is exhausted. Then you are at the point of nuisance. The small amount of oxygen in the nitrate is unimportant. It is best to keep up the degree of treatment through the entire system of the Sanitary District.

The nitrate content is not a common index of stream condition. The first index is the dissolved oxygen, because some must be present in order to avoid a nuisance
1650 in the absence of sludge banks. Nitrates in a stream may be a detriment. Some of the older sewage plants in the United States produced 10, 15, or more parts per million of nitrate. The nitrate encouraged the propagation of plants, algae, and the like, which die and make a nuisance. Nitrates may produce a secondary nuisance worse than the conditions created by the raw sewage

before a treatment plant was built. Nitrate forms in the Illinois Waterway as the flow nears Peoria as part of the purification cycle.

The condition of the Illinois Waterway above Peoria
1651 for a number of miles is good. There is at least 3 or 4 parts per million of dissolved oxygen. Fish have moved up the river and commercial fishing is practiced up to Ottawa. From the standpoint of the dissolved oxygen test, the river is in good condition. We do not analyze for nitrate because we do not consider that test of value. I have no data on the content of nitrite and nitrates in any stream the size of the Illinois Waterway with reference to nuisance.

In the Calumet area, the Calumet River flows out into Lake Michigan at South Chicago. Near 130th Street,
1652 it forms two branches, the Grand Calumet and the Little Calumet. The Grand Calumet runs easterly to Gary. The Little Calumet runs southeasterly, passing the controlling works of the Sanitary District at Blue Island. The Sanitary District endeavors to keep the flow in the Calumet River out of and away from Lake Michigan. There is another outlet to Lake Michigan, in East Chicago, the East Chicago Ship Canal. The Grand Calumet River receives the flow as high as 600 c.f.s. of condenser or cooling water from the steel mills in Gary. Most of this runs into Lake Michigan through the East Chicago Ship Canal, carrying the pollution of sewage from Gary, part of East Chicago, Hammond, and part of Whiting. Current meter tests show a flow west-
1653 ward into Illinois around 30 to 40 c.f.s. The menace to the Chicago water supply is the discharge of untreated sewage at East Chicago. In Illinois the sewage

has been picked up along the Calumet River within the Sanitary District, except for part of Blue Island. Certain pickling liquor wastes are also discharged direct to the river, as unfit to enter the treatment works. These are a relatively small part of the pollution with the present dilution. The flow from Indiana into the Calumet-Sag Channel is from 40 to 50 c.f.s. Mr. Howson states the Gary plant went into operation about September 1, 1940. With the completion of the Gary and Hammond plants, a small load will still come from Indiana into Illinois.

1655 The final solution of the Indiana situation in the Calumet region depends on the proposed arrangements of Controlling Works or Locks by the United States in the proposed widening of the Calumet-Sag Channel. The Snaitary District has suggested two Controlling Works —one in the Calumet River, the other in the East Chicago Ship Canal, so no flow goes to the lake. This would require the steel mills to reverse their condenser water back to the lake instead of discharging into the Calumet River, unless the United States permitted the condenser water to be taken in addition to the allowed diversion. The Sanitary District has not consented to such flow. The decision of the War Department is awaited. Whatever the Indiana towns may do in sewage treatment is welcomed, both from the standpoint of the channels and the effect on the Chicago water supply.

1656 Lemont discharges raw sewage into the Main Channel, but is planning treatment works. Lockport discharges into Deep Run, as does the Texas Company, entering the Waterway about half way between Lockport and Joliet. The flow of Stateville Prison goes to the

Des Plaines River. The flow of the old penitentiary may enter the river below Brandon Dam. The treatment of any sewage entering the Waterway above Joliet from municipalities, industries, or state institutions will improve conditions by the amount of pollution removed, although a very small proportion of the whole.

1658 The sewage at the start of the Calumet plant contained a great deal of acid pickling liquor waste from the steel mills, foundries, and others, where acid is used to clean the product. There is also a paint mill, with varied wastes. The pickling liquor interefered with the operation of the plant by introducing ferrous iron,
1659 which oxidized in contact with the air and created a deposit in the surface of the diffuser plates. The pressure built up rapidly, so each tank had to be drained and the plates cleaned every two weeks. At the request of the Sanitary District, practically all these industries have diverted or transported all such waste direct to the river or Calumet-Sag Channel.

1660 The diffuser plates have not been used as long as those on the North Side. Further cleaning may be required. Certain industrial wastes may have interfered with operation. Rather than handle one waste, the producer moved that department from Chicago. We are
1661 trying to operate the Calumet Works to the highest degree and eliminate whatever interferes.

The B.O.D. removal at the Calumet Works has at times exceeded 92 per cent. During 1940, the average B.O.D. removal for the first five months was 91.3 per cent. With the additional capacity available, a longer period of aeration with a greater amount of air per gallon of sewage might produce a somewhat higher grade effluent. Whether the additional aeration would aid in removal of B.O.D. is a question. The nitrification might be greater. The B.O.D. might be reduced perhaps one part per million.

1662 I will examine the procedure referred to in the Budget Report on Engineering Work for the Sanitary District of 1940, on page 53, and see what caused the better reductions of B.O.D., with an increase of air rates and somewhat higher concentration of solids in the mixed liquor. Apparently the record shows around 83.5 to 86.9 per cent in the summer months and a jump in November to 92.2 and in December to 91.

1663 I assist in the preparation of the Budget Report in a general way. I would want to check up and see if I approved that particular statement in its entirety. I have prepared a record of the nitrates and nitrites, and air in cubic feet per gallon for the various works from
1664 1928 to 1940. The results for the Southwest Works are on the activated effluent alone.

1665 (Pearse Cross Exam. Exh. 1)

1666 I do not recall the amount of oxygen in a pound of nitrate. Dr. Mohlman states that there is 0.47 pound of oxygen in a pound of nitrate, the relation being 80 to 170. That is the available oxygen.

1667 The West Side Works provides preliminary treatment only in Imhoff tanks. The amount of sewage handled in those works is given by the exhibits. I will look up the amount of the West Side sewage run through the Southwest Works each month.

1668 I will also obtain how much load the Southwest Works can now assume. In January to May, 1940, the West Side Works removed a little less than 50 per cent of the B.O.D. The June and July averages brought it up around 50 per cent. No chemicals are added. The addition of chemicals would increase the treatment, but not to a removal of 75 per cent.

1669 In our tests the removal did not go much above 60 per cent. I assisted in the investigations in a general way. Dr. Mohlman directed them. I took the final data and worked up the Report of April 16, 1940, with the aid of the others who signed it.

1670-1671 Assuming the B.O.D. in the raw sewage at the West Side averages 100 parts per million, the final effluent without chemicals averages 57 parts per million and with chemicals 36 parts per million, the difference (21 p.p.m.) on a flow of 450 m.g.d. represents an equivalent population of 444,000.

If the raw sewage of the West Side area was settled in Imhoff tanks and chemicals applied so as to reduce the B.O.D. from 100 to 36 parts per million, this would amount to increasing the treatment of approximately 440,000 people.

1672 The addition of chemicals to the West Side Works would improve the effluent by removing organic pollution, and so cut down the amount of B.O.D. in the Pool. The amelioration of the Pool is subject to the effect of the sludge deposits. I listened to Andrew's testimony and cannot tell to what degree the dredging he proposed would change conditions in the Pool. Apparently his method of measurement does not reach the material Dr. Mohlman and I classify as sewage sludge. The sludge determined by Andrew is very dense and not the lighter sewage sludge. If this dense material were removed, the conditions in the Pool would be much the same. I doubt if he could remove all the material classi-

1673 fied as sewage sludge. The removal of the denser material, unless an obstruction to navigation, is a very speculative benefit, and so is any dredging that I can conceive. Sewage sludge around 90 per cent moisture
1674 content is hard to drain off a relatively flat floor. If the Pool were emptied, a lot of the sludge material would flow out. How much is hard to say, as I do not know the relation of the outlet of the Pool and its bottom depths. I do not believe he can drain it out short of actual pumping. When draining, there will be 2,000 or 3,000 c.f.s. running in all the time. Doubtful if anyone would advocate running the Chicago River into the Lake to drain and sweep out the Pool at Joliet.

1675 Dredging is impractical and will accomplish little unless it is in removal of actual obstructions to navigation. I doubt if much of the sewage sludge will be moved which has a demand for oxygen and is decomposing for two or three years in the Pool. It is intensely speculation. I would hesitate many times before spending the public money on such a venture.

1675 The time for an organic deposit in a stream to finally decompose and become inert is not thoroughly determined and may run from three to five years. It is a question of the decomposition of the organic material in the mass. Andrew is working on the question of removal of deposits which are essentially inert, but may contain some organic material. He wants to remove physical material in the deeper layers. We are looking to the removal of a body of more or less liquid stuff which would flow, if it would drain down, relatively slowly. It is not solid or liquid sand. It has a very effective demand for oxygen.

1676-1677 Our studies on the Illinois Waterway show a double demand from sludge deposits in the Waterway, coming partly from the sludge coming contemporaneously and partly from the prior deposits and from the winter deposits. Stream cleaning the Joliet Pool is very speculative as to whether it would accomplish any practical result unless to remove an obstruction to navigation which is caused by material, some or a good portion of which may never have come from a sewer.

1678 If the liquid material went out of the Pool it would create a demand for oxygen in the lower regions of the Pool and transfer the complaints from Lockport and Joliet to points below. There would also be odors from the exposed surfaces, and complaints from shippers if navigation were stopped. I conclude that pulling the Pool down and doing some housecleaning is utterly impractical. Material is removed from Imhoff tanks at moistures as low as 90 to 87 per cent. In settling basins of the old type, with very flat bottoms, men are used with rubber boots and squeegees to shove the sludge along with the aid of fire hoses.

Andrew could move some of the border line material. The bottom material is relatively dense, but he says he
1680 cannot walk on it. Over the dense material is material of increasing fluidity, maybe 6, 7, 8 per cent solid. Ever since I joined the Sanitary District staff, I have discussed cleaning waterways, with the late Mr. Wisner, the cleaning of the channels. We came to the conclusion that trying to clean a waterway of such material by dredging is very impractical. In Chicago, the Health Department would not permit disposal in the lake. At Joliet, it would be necessary to pump the material to

a lagoon, where it would decompose and create odors.
1681 This would shift the trouble from one spot to another. If the money were spent in the treatment works of the Sanitary District to speed up the work, it would be better.

The District expects to discharge less and less material to the Waterway, until eventually, with complete treatment, a small residual is reached of relatively light suspended matter, perhaps 5 or 7 per cent of the total. It will move a long way, but should not tend to form a dense sludge. The final result is entirely different from the summer of 1939.

1682 If no more sludge were put into the Waterway the difficulty in Brandon Pool will gradually lessen. In two or three years the people down there will forget all about the Pool, from the odor standpoint. An additional diversion in the summer months would be helpful in sweeping along the gases and products of decom-
1683 position out of the Pool. That is why conditions were supportable prior to the cut in diversion.

1685 How the suspended solids can be moved out of the Brandon Pool, and how much can be moved, I do not know. I therefore do not know how much you could ameliorate the condition in Brandon Pool. Of course, on a hypothetical basis, if you moved all the solids from that Pool to the next, you have improved conditions. I do not know a practical way of moving the solids. I doubt if a dredge with constant pumping, and stirring the Pool would do much good. I am skeptical as to whether opening the gates at Brandon Dam at time of flood would scour to a practical degree. Probably only

1686 a very small limited scouring would occur, with no effect a half mile away.

The movement of sludge close to the dam is inconsequential when talking about a Pool say four miles long from 200 to 1400 feet wide. I heard Andrew testify that the way he measured material there was no deposit about Jackson Street in the Brandon Pool. I did not understand he testified there was no sludge. He is careful to qualify what he describes. I am talking of one thing. He is talking of another. What he
1687 measures is by a disc with an 8-pound weight on it. He and I are not on the same premises. I doubt if opening the gates in winter at the Brandon Dam would scour the Pool. I doubt if you can stop navigation. In some winters, navigation is almost continuous.

In the effluent of the Sanitary District plants there will be some suspended matter. The effluent of a
1688 well-operated activated sludge plant contains some suspended matter. At the North Side Works in 1939, 7.6 per cent of the suspended solids went through. Such residual will tend to settle as sludge. However, such solids are light and will eventually settle only after traveling many miles. Not knowing how much suspended solids Chicago drinking water contains, I cannot tell whether a well operated activated sludge effluent contains less. I do not know what you mean by an average clear stream. I know what a trout stream would look like and I know what the Mississippi River looks like, or the Ohio.

1690 I admit the parts per million of suspended matter shown in our plant records in the effluents. An activated sludge effluent is relatively clear, with colloidal flocs in it.

1690 I have not drunk any Chicago water. I have filtered water at Winnetka and spring water at the office. I avoid Chicago water because it has a chlorine taste. I would be surprised if Chicago city water contained as much suspended matter as an activated sludge efflu-
1691 ent, except on a windy day.

It is possible to dump chlorine into the West Side plant and prevent odors from the plant and sterilize the
1692 bacteria. Such chlorination would be a wasted effort, so far as doing any real good in the Brandon Road Pool.

There is no complaint of odors from the plant.

Examination by the Master:

Chlorine is not applied in any of the major plants of the Sanitary District to the sewage or effluent. We regard chlorine as a means of sterilizing may be justified if sewage is put into a drinking water supply. At Cleveland, the plant effluents have been chlorinated in the past, also at Milwaukee. But such effluent goes into the drinking water.

In our situation no one uses the Illinois River for drinking water in its length of 310 miles. There is no need of destroying the bacteria which are to serve in the useful work of self-purification of the stream.

1693 Chlorine is applied to the Imhoff tank effluent before discharging upon the trickling filters, at Glenview, Morton Grove and Northbrook, to keep down plant odors in the summer time. It is not introduced per se for the

1694 effect on the stream below. Chlorine does not fit in the Sanitary District picture. It does not get rid of organic matter. It delays decomposition to a point where the effect is exhausted. Then the same nuisance starts over again. The flow is then freed from the restraint of chlorine and decomposition proceeds actively. If chlorine were soaked in to restrain decomposition for miles the cost would be impractical.

At the Southwest Works the sewage is rather stale in the summer. A slight odor is noticeable from the preliminary tanks. Inside the dewatering and drying building there is a peculiar odor from the handling of sludge,
1695 but it does not go beyond the building. There is practically no odor from the aeration tanks. We are always watching the preliminary tanks. Chlorine is used at the Southwest Works to maintain clean surfaces in the condensers. Chlorine is introduced into the condenser water to prevent the growth of slimes on the outer surface of the condenser tubes, and prevent loss of efficiency. This is good practice, which is followed by the Commonwealth Edison Company in its generating plants. In general, there are no odors from our plants as such. Once in a while there is some odor from the drying operation at the Southwest Works. There are
1696 other sources of odors from industries in the vicinity of the West Side Works, such as the American Tar Works with a very distinct phenol odor. Chlorine will reduce the B.O.D. apparently. Thus the application of one part per million will reduce the B.O.D. by about 2.4 parts per million temporarily. But from the standpoint of the ultimate removal of the organic matter I do not admit that it does any good. Such reduction

is not permanent in a stream and may wear off in the
1697 travel of a mile or two. In a corked bottle, if sterilized
1698 the result might be permanent, until uncorked and re-
seeded. On the Illinois Waterway problem where the
organic matter must be disposed of, chlorine would de-
lay decomposition and merely transfer the nuisance
somewhere else down stream. The cost makes a pro-
posal to chlorinate the stream fantastic.

1699 Cross Examination By Mr. Naujoks

If all the bacteria are killed in an effluent and it is sealed in a closed container, it will stay so indefinitely. If the effluent is put in a stream bacteria come in. There is no way of reaching a permanent controllable situation. I know of no stream exactly sterile.

The B.O.D. reduction in an effluent that has been
chlorinated is not permanent. For the purpose of the
test decomposition of the organic matter has been de-
layed. But the organic matter causing the B.O.D. has
not been destroyed. That is my understanding of the
process. I was the editor of a book, entitled "Modern
Sewage Disposal". I was not the author of all the ar-
ticles contained therein nor do I guarantee their cor-
rectness. The quotation on page 160, from the chapter
on "Chlorine in Sewage Practice" referring to some
1701 tests of Rudolfs and Gehin does not shake my opinion.
I do not know the conditions under which their tests
were made. Enslow quoted certain tests in that article.
What the conditions were, I do not know. Some have
claimed as on page 106 of Modern Sewage Disposal that

with only a partial satisfaction of the chlorine demand, a substantial reduction of the oxygen demand may be expected. I have never examined this myself to determine the exact picture of what really happens. I am thinking of what would happen if our effluents or the channel were chlorinated to improve the Illinois River. I adhere to my statement or opinion.

1702 I have practically no experience on the breakpoint on chlorine demand in water purification or its application to sewage treatment.

The effluent of the North Side Works picks up dissolved oxygen in flow to the North Shore Channel. The effluent of the final settling basins drops down some 15 or 16 feet in its flow to the North Shore Channel, passing over steps to dissipate the velocity. In its flow the dissolved oxygen is increased from 1½ or 2 parts per million to 6 or 7 parts per million. The cascading effect is produced by the design, originally built to dissipate
1703 the hydraulic head without damage. The liquid picks up dissolved oxygen in amount depending on the degree of de-oxygenation.

It is possible to install cascades at the Stoney Gates in the Canal above Lockport. When the old Bear Trap dam was in existence, and flow was run over it, there was a pickup of 4 or 5 parts per million of dissolved oxygen. The water appeared to pick up more, but did not hold it. The residual was seldom over 5 parts per million. Whatever is picked up is of value to meet B.O.D. but at no time could we pick up to saturation. The Bear Trap dam has since been removed. If the gates were opened there would be some re-aeration.

Cascades at Lockport might restore some dissolved oxygen to the flow, but it would be only a very small proportion of the B.O.D. arriving at Lockport.

I do not recall an exact figure for B. Coli in raw sew-
1705 age as I am primarily interested in the bacteria. Sometimes half a million are present per cubic centimeter, or one million or several million. We are not primarily concerned with destroying bacteria.

The flow discharged over the dam at Lockport would pick up dissolved oxygen, as described for the old Bear Trap dam. The width of the crest of the two small dams
1706 is less than the width of the old Bear Trap dam. Such oxygen as is picked up may amount to 4 or 5 but seldom 6 parts per million. The dissolved oxygen at the North Side Works may run up to about 85 per cent of saturation in the summer, as shown in August and September of 1939 with 7.2 and 7.8 p.p.m. as against perhaps a saturation value of 8.5 p.p.m. Neither Dr. Mohl-
1707 man or I are entirely satisfied that all of such oxygen is able to give us full service. We report what we find.

If the additional sewer were constructed to directly connect the West Side effluent into the Southwest Works, this would provide increased treatment within the limits imposed by the installed blower capacity at
1708 the Southwest Works. Whether a better overall treatment would be secured, I will explore and report.
1709 There would be no value in building such a sewer if the plant cannot take the flow. It is possible to give activated sludge treatment up to the blower capacity available and discharge to the channel any excess activated sludge which the heat drying apparatus cannot handle.

1710 Maybe if such procedure had been followed we
would have been better off. The preliminary solids
would be taken to the Imhoff tanks for digestion. The
Chief Engineer of the Sanitary District decides what
1711 is to be done. If we had shown a lower B.O.D. there
would still be a lack of dissolved oxygen to meet it.
The excess sludge cannot be dumped on spoil banks.
It would run off. As to lagoons, we tried a lagoon at
Calumet during the tuning up of the sludge drying
plant. It produced the only odors we have had at Calumet.
The odor was traceable a mile away. Complaints
1712 came in. We are doubtful as to how satisfactory a
lagoon would be.

If a scum is formed, maybe the odor would be less.
Activated sludge alone is a very peculiar digesting
material. Such excess material could be pumped West
of Harlem Avenue but the Lagoons might create another
nuisance. Lagooning would cost money, better
expended in permanent improvements. The chlorination
1713 of a lagoon would be speculative. Indianapolis has
operated lagoons for years in a sandy soil with success.
Our soil is heavy clay, very poor draining. The
installation of elaborate underdrains and appurtenances
would add to the cost and lengthen the time
1714 required. The excess sludge could be dewatered on
vacuum filters. Vacuum filters cost money. There are
eight on order. If the additional filters are installed
by the First of 1941, we should be able to handle the
tonnage from the North Side and Southwest Works.
The efficiency varies, but has not come up to our
1715 expectations, despite elaborate preliminary tests. The
West Side sludge is digested and air dried on the open

1716 airbeds some 30 acres in extent. At no time has the Sanitary District dumped any sludge from the West Side Plant into the Channel. The effluent is sewage
1717 partly treated. It contains residual suspended matter after the Imhoff tanks have removed 60 per cent of the suspended matter. The West and Southwest plants have interchanged flow of sewage. As far as sludge is concerned the West Side Plant is separate, except that preliminary settled sludge from the Southwest Plant is dumped into the West Side for digestion. In the Southwest Plant the excess activated sludge which cannot now be dried is dumped into the Channel. With the additional filters and the repairs and alterations in the first of 1941 the Southwest should be able to care for the excess activated sludge originating within it. In addition provision must be made
1718 for the sludge to come from treating the West Side effluent.

The plan is to mix the West Side effluent with the Southwest sewage. To the excess activated sludge, the North Side sludge is added. At present the North Side sludge is mixed with the Southwest sewage and is aerated with it.

The Southwest Plant is not physically able to treat
1719 400 million gallons daily, because of lack of blower capacity.

The major problem from the monetary standpoint is supplementing the West Side Works. The minor problem is building up the Southwest Works, so that when combined with the West Side effluent there is sufficient air and sufficient sludge handling all the other equipment required to complete the job. This will take two and one-half years, and should be done by the end of 1942.

There is the finer problem of tuning up and enlarging where equipment is scanty to handle the normal 400 million gallons per day at the Southwest Works.

1720 Whether it is desirable to build the sewer from the West Side Works to the Southwest at this time, I will ascertain. Ramey suggests it as part of the final future improvement, whereas Mr. Naujoks wants it immediately for doing more work on the West Side effluent. Ramey indicated it would add to the work now on hand, which is plenty, and I raise the question whether the Southwest Works has enough aerat-
1721 ing capacity now to care for the West Side effluent if the sewer were built. I will figure this out, as well as the ultimate hydraulic capacity of the Southwest Works as it now is. I have the impression that its hydraulic capacity is insufficient to take the entire
1722 flow of both the West Side and Southwest sewers. I will check the PWA report.

1723 The cause of the trouble in Brandon Pool goes back to the closing of the Brandon Dam in 1933. This caused a pool and stopped a rapid flow through Joliet. The sewage solids came down in large degree as the sewage treatment was limited to the Imhoff tanks at Calumet and the West Side, and the activated sludge plant at the North Side, with its sludge discharged to
1724 the channel at Stickney. The trouble comes from the sewage from the Chicago area. There are several elements. The deposited solids of previous years from the population and industry. The untreated sewage and the currently deposited material. In the older

days around 1919 with the raw sewage going in the
1725 flow swept the material down river. The time of flow
was shorter to Joliet. Today it is longer. The solids
3 or 4 years old are relatively digested. Each year the
solids are becoming less. It is possible to say whether
the partly treated West Side effluent is more important
than the excess sludge from the Southwest plant.

1726 We have never determined the B.O.D. of the discharge of the sludge pipe line.

1728 Cross-examination by Mr. Naujoks

1729 I will check up on the hydraulics of the Southwest Works and see if the entire West Side and Southwest flow can be put through it.

1730 On the tests, the detention period was 1.45 hours and air at 0.18 cubic feet per gallon, with an average B.O.D. reduction of 89.5 per cent. That result was obtained on settled sewage. If raw sewage and preliminary settled are mixed, I would not expect to attain the same result.

1731 The detention period in the Southwest aeration tanks is 5 hours. The design basis was for an average flow of 400 m.g.d. and a maximum of 600 m.g.d. The present flow is shown on the sheets given you. In some cases it has been below 400 m.g.d. The aeration basins may be planned on the 5 hours for the 400 million, but the blowers and other equipment are not adequate to take what comes if you handle that volume.

1732- The flow in August through the Southwest Plant
1733 was 340 m.g.d. At no time during 1940 has 400 m.g.d.
flowed through. In August, 167 m.g.d. received complete
treatment, in the preliminary clarifiers, aeration
tanks, and final settling basins. The clarified effluent is
1734 173 m.g.d. The Sanitary District intends to run
through the Southwest plant not only the sewage from
the Southwest area, but as much more as can be fed
in from the West Side, as soon as the plant is tuned
up.

1735 I doubt if all the sewage from the West and Southwest can be put through the present plant.

If there is the flow of 400 m.g.d. from the West Side and 340 m.g.d. from the Southwest, there may be theoretically sufficient capacity to provide two hours detention in the present aeration tanks. I have my doubts whether any such flow can be put through the plant hydraulically. The arithmetic may be correct but the conduits may not be large enough.

1736 Neglecting the hydraulic capacity or the ability of conduits to convey flow, the paper calculation shows that there would be sufficient capacity to provide about two hours detention for the combined West and Southwest areas. However, there will be an additional flow before the end of the year of about 40 to 50 m.g.d. from Kostner Avenue and miscellaneous connections.

1737 The dry weather flow of both plants will be somewhat over 800 mg..d. and less than 900 mg..d. Kostner Avenue sewer now (September 11, 1940) discharges to the channel, but will be picked up before the end of 1940. The flow is about 40 to 50 m.g.d. The pickup will help ameliorate conditions in 1941.

1738 At present there are three blowers installed, each with a nominal capacity of 60,000 cubic feet per minute. One is kept as a spare, so the present capacity generally operated at the Southwest Works is 120,000 cubic feet per minute. I will figure out how much that is in cubic feet per gallon, and also what happens with two blowers and three, also on 400 m.g.d.

1739 Activated sludge is material derived from sewage by repeated actions of aerating the sewage in the presence of the sludge retained from previous operations. The exact action of the sludge is a question of debate between biologists, chemists, and physicists. After 10 to 20 days of operation, a plant should develop a sludge with the power of purifying the sewage. The activated sludge has a clarifying power when mixed with sewage kept in suspension and supplied with adequate air. When settled, a fairly clear liquid results, with a small amount of suspended matter. The activated sludge acts on the organic matter present and reduces the B.O.D. and transforms the organic material in so-
1740 lution into more or less permanent form. If carried far enough, considerable nitrate can be developed, as shown by the original experimenters, Ardern and Lockett, who developed nitrates without regard to the efficient use of air, as high as 10 or 15 parts per million. Present day operation is to stabilize the organic matter and reduce the B.O.D. markedly and not develop more than one or two parts per million of nitrate. My conception of the process is that the action is
1741 largely biochemical. The sludge contains volatile and mineral matter in varying amounts, a little phosphate, and a little potash. On our case, the mineral or ash

may run around 40 per cent. The volatile may run from 60 to 70 per cent. At Milwaukee, the volatile runs up to 80 per cent. The sludge also contains a number of bacteria of various types, of which some are nitrifying. Others aid in clarification. The exact composition in terms of carbon, nitrogen, and other chemical components, I do not know. I have never seen a detailed analysis on that basis. Upon the proportionate balance of the volatile and the mineral matter depends the behavior of the plant, as well as on the type of micro-organisms present in the sludge.

1742 The sludge from our final settling basins may run as high as two per cent solid matter, or from the operating standpoint, 98 to 98½ per cent moisture. Sometimes the moisture in other plants is as low as 97 per cent. It settles in a cylinder in perhaps 30 minutes, to about 20 per cent of its original volume. Some days it does better, others worse. It is not a stable sludge. It has putrefactive possibilities, with a demand for oxygen. The sludge is returned as promptly as possible to the incoming sewage, so it may return to the oxygen supply.

1743 The North Side plant has aerated channels connected to the return pumps. In the Southwest Plant, the return is made directly by air lifts. We have never determined the oxygen demand of that sludge. I have
1744 no figure in mind. However, I believe I can present an estimate of the population equivalent of 53,970 tons
1745 of dry sludge discharged to the canal in 1939. I am pretty sure I cannot produce any such figure as 1,500,000 people. 53,970 tons is the total to the channel from all sources, not the North Side Plant.

1746 I do not say the figure of 1,500,000 population is in line with anything. I was trying to correlate it with the North Side pipe line, where the solids come from 1,000,000 people. I would naturally expect that the solids coming out would not have the equivalent population of the sewage that originally went in.

1747 Raw sewage is the liquid coming out of a sewer, varying in composition, depending on the type of sewer, separate or combined. The raw sewage contains solids. The total solids in suspension and in solution may range anywhere from 350 to 600 or 700 parts per million. Of those solids, a part is suspended matter. The suspended matter plus the finely divided colloidal matter determine the amount of sludge taken out of the sewage. Colloidal matter, roughly, is material so finely divided that it does not readily settle in a few hours.

1748 If sewage is settled in the Imhoff tanks of the West Side, the sludge is chiefly derived from the suspended matter. There is very little colloidal matter taken out compared to the removal in the activated sludge plant. The sludge producing ability of the plant is measured by the amount of suspended matter removed, which shows as solids recovered as sludge. There is digestion in that sludge, so that the sludge actually removed from the drying beds will be less in dry weight than what was actually deposited in the tanks. In the Imhoff process, there is a 3 to 6 months digestion of the organic matter, so that about 50 per cent of the orig-
1749 inal organic matter deposited is lost. This loss on digestion varies. The dry solids removed from the beds are less than the solids deposited in the tanks,

because of digestion. In the activated sludge plant, there is the coagulation or clotting of the fine particles produced by the prepared activated sludge as well as the settling action. The liquid after settling, aside from the residual suspended matter, is almost as clear as lake water. There is a certain removable suspended matter. Each day there is an excess taken out of the activated sludge plant when it has arrived at its proper operation, which is approximately the amount of the suspended solids. There is reason to believe there is some reduction in the amount of solids coming in, but not any such digestion as occurs in an Imhoff tank. Starting with the sewage, and largely, but not wholly from the suspended matter, you remove solids, either directly by sedimentation or by the addition of activated sludge and final settling.

1750 These solids, mixed with water from the sludge, which in the activated sludge may run from 98 to 99½ per cent moisture, or in the Imhoff tanks around 90 to 92 per cent moisture. 98 per cent water and 2 per cent solids, compared with 90 and 10, shows a remarkable concentration. One sludge is 49 water to 1 of solid, the other, 10 water to 1 of solid. To remove the water in activated sludge, we use ferric chloride to coagulate the sludge, followed by a vacuum filter. That is different. The Master saw it on the trip.

1751 I would not attempt to say whether in the activated sludge process with an overall removal of some 90 per cent of the B.O.D., about 30 per cent is by oxidation and 60 per cent by bio-precipitation. I have not speculated on the division of the process. I have been working on the overall removals. By analogy and

not for exactness, I believe a large per cent of the reduction of B.O.D. in the activated sludge process is accomplished by precipitation of the suspended solids. Comparing the results in the settling tank with the activated sludge plant, there is the average figure reported to the U. S. Supreme Court of 33-1/3 per cent removal by the settling process. Actually, in the West Side Plant we attained 48 to 50 per cent removal. That is primarily due to settling, with whatever coagulation occurs as the particles sink. In the activated sludge
1752 plant, the removal of B.O.D. reaches 90 to 95 per cent. This additional purification is attained by reason of employing the activated sludge process. I am interested in the overall accomplishment. I have not speculated on the part due to aeration and mixing and to final settling. To the extent that the sludge discharged to the Main Channel has B.O.D., it nullifies the effect of the benefits accomplished at the North Side in making a high-grade effluent. There is a beneficial effect in the flow of well treated effluent through the heart of the city.

1753 On the completion of the West and North Side interceptors, from the North Side Works to the entrance of the South Fork at Bridgeport, we have tried to have no raw sewage or sludge dumped in. We did have a certain amount of industrial waste in that stretch. Until last April, we had most of the Stock Yard waste coming in at Bridgeport.

1754 There is a residual benefit effect of the treatment given the liquid. We have no exact determination of it. We never put any sludge into the North Shore Channel from the North Side Works. The pipeline was in operation at the time the plant went into service in October of 1928.

1755 The effect of old sludge on the North Shore Channel and North Branch depends on the timing. North of Fullerton Avenue, the interceptors were completed by the end of June, 1930. That was later than the opening of the North Side Works. The West Side Intercepting sewer system was not completed until a later date. Until rather recently there was sewage entering the North Branch from Fullerton Avenue south.

1756 After the sewage was intercepted, there was still the effluent and some sludge material from various industries, which had an effect on the stream. The City and the District have cooperated to divert the effluent of industries from the river to the City sewers or the District interceptors. For quite a while after the North Side Works were in full service, there was the effect of old sludge.

The Sanitary District has never made any B.O.D. analysis of the Activated sludge. It has no B.O.D. analysis of the sludge out of the pipeline. We do
1758 not make such an analysis as part of our routine work.

Assuming no further sludge is deposited in the Illinois Waterway beginning January 1, 1941, the older the sludge deposits in the Channel are the less the B.O.D. exerted. In so far as that tends to lessen the amount of putrefaction in the Brandon Road Pool it tends to improve conditions. Whether it would improve them in the next year or two to a point of entire satisfaction in the community, is a question.

1759 As the material digests, the gasification decreases and the B.O.D. exerted is lessened. That tends to improve the conditions in the Pool. Whether these conditions will improve sufficiently before the West Side Plant effluent is finally treated, is a question. I have my doubts as to whether they would be sufficiently improved until that effluent receives final treatment by activated sludge. There would be material deposited, the difference between what is taken out of the Imhoff tanks and what will be removed by activated
1760 sludge. There is undoubtedly a tendency to improve conditions.

Theoretically, if you use a chemical coagulant in the West Side plant, you improve the effluent. You would improve it still more if activated sludge were added. To go at chemical coagulants, takes both time and money. The Report to the PWA Board shows it cannot be done simply. Contracts must be prepared and let. It would take from 1½ to 2 years. That was why we recommended to our Chief Engineer that the District go ahead and install the supplemental activated sludge plant at the West Side. We are spending our money for a permanent purpose to get the highest effluent for the benefit of the people down below. We did not believe that by using chemicals we could obtain as good an effluent or as permanent a solution,
1761 or as cheap a solution, on the comparative estimate. We saw no hope of quickly obtaining relief by adding chemicals on the scale that we had to work. To add chemicals to 400 m.g.d. means a fairly permanent type of installation. Eventually it would have to be scrapped because it would not produce the grade of

effluent (on our tests) that is necessary to meet the conditions that we expect to meet in trying to carry out the request of the Supreme Court. We told the Court we expected to deliver an effluent treated 85 per cent or better. We did not see how it could be done by chemicals.

1762 To add chemicals to the influent of the West Side Works requires equipment for handling and storage of chemicals, contracts, construction. If you are looking for something that you can say today I want done tomorrow, you cannot do it by chemicals. You cannot do it by anything short of turning the water on. The chemical method would take one to two years. In the meantime, we can install activated sludge, which will do a better job, and fulfill what we told Mr. Hughes we would do.

1763 I see no need of the control of odors by chlorine locally at the West Side Works. There was no necessity to chlorinate to protect a water supply by destroying bacteria. We saw no value in adding chlorine under our conditions because it would not cure the conditions, probably in the Brandon Pool.

I do not know what is meant by the term "chlorinate the effluents." There are various degrees of chlorination.

1764 I see no value in sterilizing the effluents so no bacteria are present. I understand chlorine has been used in moderate amounts for various purposes of control in trickling filters and sludge digestion, but I would not say it has not interfered with the biological action. Many experimenters discuss how far you can go before you injure the biological action. Moderate

amounts have been used. We add chlorine to the effluent of the three small sewage plants of the District for the control of odors, yet there is biological action in the filters. Chlorine has been added to the returned activated sludge in an attempt to control bulking. Some users have worried that if too much were added the
1765 bacteria might be destroyed. The point I have in mind is that chlorine as a means of curing the nuisance in Brandon Pool does not fit. If I try to sterilize the whole flow so it passes through the Pool in a state of arrested decomposition, the time element is such that it seems very impractical. Partial application of chlorine is not particularly helpful on account of the amount of B.O.D. to be overcome, if you assume that by the application of chlorine you can remove the B.O.D. The exact extent is a moot point. I testified as to my theory the other day.

I have made no tests whatever as to sludge in the Brandon Pool. I have endeavored to ascertain the depth of sludge in the channels of the District on several occasions. As far back as 1910, sludge deposits existed above Lockport in the fore bay up to the old controlling works, as much as 8 and 10 feet deep near the Power House.

1766 At the old controlling works there was 2 or 3 feet. Through the rock cut with the high velocities then prevalent, there was practically no deposit. We tried to find deposits with a little dredge and with bottles. In the wide full section of the Channel we found some deposits. The velocities in the Channel today are much lower. In the rock section, with 2,500 c.f.s. discharge at Lockport, the velocity is about 0.7 foot per second and may go lower. We now have deposits in the rock section, which makes a B.O.D. exerting area.

1767 From observation of Brandon Pool on several occasions when gas boils came up, I conclude there must be light sludge in such a pool. This is confirmed by the reports of our chemists. Andrew limited his observations to material determined by the permanent position of a 10-inch diameter sheet iron disc with an 8 or 10 pound weight on it. From our knowledge of sludge and trying to measure sludge in tanks and elsewhere, Andrew's test defines only compact material at the bottom. There is certainly lighter sludge above it, becoming lighter as the thread of the flow is reached. Andrew is talking about material obstructive to navigation. His line of demarcation may very properly be below a lot of the material, which we are speaking of, that boils up.

1769 If 6 to 10 feet of sludge were removed from Branon Pool, the depth of the Pool is increased. I have no knowledge of the depth of the Pool. I have made no soundings. It is not in the control of the Sanitary District. Any new deposits would seek the bottom of the excavated Pool. Any gas from decomposition
1770 would have to pass up through a greater depth of water and a greater volume of water than exists today, or a greater cubic volume of space. If more flow were added, the conditions would be ameliorated. I do not know just how much gas can be absorbed. Probably as much gas would come out, whether the Pool were 10 feet deep or 16 feet. A greater flow would wash the gas away. Then there would be less coming to the

atmosphere, because there is greater displacement at
1771 all times. This would be more effective than digging a deeper hole.

The material defined by Andrew is different from the sludge Mohlman and Pearse have in mind. Andrew is talking of the denser material with the lesser amount of organic matter. Dr. Mohlman and I are worrying about the more liquid material containing the greater part of the organic matter. Andrew cannot pick up all the material by the use of a dredge. He proposes to use a cutter head, necessarily in the more dense material. He will pump a larger volume into a large pool, which will discharge an effluent into the stream down below.

1772 He may transfer part of the nuisance to his lagoon or pool. How much that will ameliorate the nuisance is doubtful. I believe the money could be better spent on blowers or filters or something of that sort.

In January, February, and March, 1940, all the sewage entering the Southwest Plant received activated sludge treatment. The flows ranged from 197 to 287 m.g.d. From April on, about fifty-fifty up to September, 1940, except for June with 235 m.g.d. through the preliminary process only, and 130 m.g.d. through the
1773 activated sludge. In August, 340 m.g.d. were treated, of which 164 m.g.d. received preliminary treatment only. For the five months April to August inclusive, the average flow not receiving activated sludge treatment was 162 m.g.d. I will compute the population equivalent.

1774 The removal of B.O.D. by the preliminary tanks at the Southwest Works on the short period of settling is around 20 to 25 per cent. This I will check. I will determine also the population the increased treatment would be equivalent to if all the sewage receiving preliminary treatment were given the activated sludge treatment. I will consider it with our inability to handle the sludge, and also for the future with sludge all handled.

1775 I will calculate the oxygen made available by 3500 c.f.s. additional lake water in pounds per day and how many people this flow would satisfy the B.O.D. of.

From my tests on the Bear Trap Dam years ago, we introduced from 2 to 4 parts per million of dissolved oxygen into de-oxygenated flow in the Canal. I doubt if a cascade built there would increase the dissolved oxygen up to 6 or 8 parts per million.

1777 I doubt if deoxygenated liquor of that kind can actually be saturated with oxygen in any reasonable time by cascading. I have tried to do it but could not. There is no need to build a cascade at the Controlling Works. Just lower the controlling dams at the Power House and shut off the flow through the turbines. With some 42 feet of crest, and the drop to the tail race, a nice cascading effect is produced. This may put in 2 to 4 parts per million of dissolved oxygen.

1778 I do not think this would cure the condition in the Brandon Pool. With the B.O.D. exerted last year and this summer the oxygen would be gone before the flow reached the Pool. If you wish to avoid a nuisance, some oxygen must be present. There is no practical place to reaerate today. You cannot get enough oxygen in under those conditions.

In the old days there was the old Economy Light dam, with a small amount of reaeration when water did not go through the water wheels. In the Eddy report to the Board of Review, there is shown a large amount of oxygen taken in down through the Joliet stretch of the river, because of the high velocity, the exceeding turbulence, and the thorough mixing at a time in the summer months when the flow at Lockport was deoxygenated. At Marseilles, the oxygen was all gone again.

If the wheels at the Lockport Power House were stopped, there would be a cost to the District to purchase the equivalent power now generated at Lockport. I do not recall what the purchase price for power is under the contract. Ramey can tell.

1780 Oil on the surface of a pool or in our activated sludge tanks does interfere to some extent with reaeration at the points where the oil film exists. I have seen very little spots of glistening oil on my trips on the Canal and Pool recently, but not a remarkable amount of oil. For a stream serving upwards of 4 million people, there is remarkably little floating occurrence of that kind.

1781 I do not know how much oil enters the Waterway from the Texas Refineries. The State of Illinois has been using its utmost to have all floating material retained. I have the impression the Texas Refineries have been consistently successful in retaining such material and were retaining such material several years ago.

If the flow of sewage can be reduced, obviously on a fixed design, the more sewage you can put through.

The effect of universal metering in Chicago on the sewage flow is very problematical. It is a problem whether universal metering is possible or will be at-
1782 tained. I have never felt that in our calculations universal metering could be reckoned on as a factor. Universal metering might reduce per capita flow somewhat. The amount is very speculative. The effect of metering in the last seven or eight years, in a population with little change, is negligible. The treatment works and sewers are not designed on a universal metering basis. About 28 per cent of the services are actually metered. The City has shown no disposition
1783 up to date to completely meter the flow. Whatever the PWA Board said about the effect of metering on sewage treatment facilities is in the record. Whatever effect metering may have, if it reduces the per capita flow, will prolong the useful life of the works or enable better results to be obtained.

1784 In the North Side Works, the flow has held steadily around 200 m.g.d. for the last ten years, with certain variations. I do not yet know what the exact population on the area is at present. It probably has increased but little. It is largely built up with apartment houses, with many meters. Whether the District can get down to 200 gallons per capita per day for its entire sewage flow is very speculative. The metering program is very much in the future, and moves slowly. The District will take advantage of any capacity it gains.

1785 In 1939, the per cent of water services metered in Chicago was 27.9 and the per cent of water metered

was 37.56. The number of services decreased roughly
10,000 from 1930 to 1939.

1792- The metering required of the City by the U. S. Dis-
1793 trict Engineer permit of March 3, 1935, was never
carried out. This shows that it is rather difficult to
have complete metering installed in Chicago. From
1930 to 1939, the number of meters increased from
85,846 to 115,000 out of a total number of services in
1930 of 422,066, and in 1939, of 412,228. The rate of
1794 increase averages 3,000 meters per year. On that
basis, with 300,000 meters to be installed, it would
take 100 years. In my position, I figure that while
metering will come and will benefit the Sanitary District, it is not a very immediate factor which has any
bearing on the current improvement of the Brandon
Pool. The Sanitary District has no control over metering, which is a function of the City of Chicago. I do
not know to what degree metering can be accellerated.
1795 If a reduction in water use were effected in Chicago
by metering, it would tend to make slightly more capacity available in the intercepting sewers and treatment works for storm water. Universal metering, if
it reduce the flow, would make available a little more
capacity for storm water in the intercepting sewers
1796 and treatment works. Any reduction in flow by metering would affect the flow at Lockport and reduce
the amount of power developed, and also the amount
of water available for dilution.

The report was made to PWA on April 19, 1940. On May 3, 1940, the PWA Board made its report. Consideration had been given the supplemental works for the West Side effluent many months before. Ramey will tell you when the first steps were taken.

1799 At the request of the Chief Engineer, he took the
original report sent to the PWA Board and assembled
the facts from the various departments. I then pre-
pared a rough draft, which was reviewed by the men
who signed the final report, of date April 19, 1940. A
second draft was made, which was filed with the Chief
1800 Engineer. This was forwarded by him to D'Esposito,
who referred it to his Board, which had requested such
a summary of the proposed plan of the Sanitary Dis-
trict. That Board was composed of eminent engineers,
including Mead, who was an excellent hydraulic en-
gineer. The Report of April 19, 1940 was accepted,
with some reservation as to the rapidity with which
the work should go ahead. The Board thought we
should delay a bit. I advised going ahead, buying the
equipment, and completing the plans. With the money
available, we are going ahead on the complete job.
We had three or four sessions, in which Ramey, John-
son, and Mohlman joined.

LANGDON PEARSE

Cross Examination by Mr. Naujoks

2520 In answer to the question asked by the Master (Rec. 1465-1466, Illinois Exh. 50 shows 53,970 tons of dry solids discharged into the Main Channel in 1939. This is from two sources, the North Side and the Southwest Works. The excess sludge from North Side in 1939 totaled 39,213 tons of dry solids, in a volume of 693.5 million gallons. Of this, 34,776 tons of dry solids went into the Main Channel. The dry solids content as originated was 1.34 per cent. The volume of the sludge was 1.9 million gallons per day from 202.5 million gallons per day of sewage. From the Southwest Works the sludge discharged in 1939 only from July to December inclusive was 19,194 tons of dry solid. The amount and moisture content varied each month.

2522 I have prepared a table (Pearse Cross-Exam. Exh. 1, Rec. 2523) to show each month the tonnage of dry sludge, the volume of sludge, the volume of sewage from the North Side and Southwest Works ,the volume of sewage from the North Side, West Side, and Southwest Works, the discharge at Lockport, and the flow at Summit, all in million gallons per day. For instance,
2524- the 192 tons of dry solids per day is contained in
2525- 4.22 m.g.d. of liquid. The percentages of moisture
2526 content were between 98 and 99 per cent. On the North Side pipeline the dry solid content averaged 1.34 per cent. The solid is represented by dry weight. If it is 2 per cent, the water is 98 per cent, which gives the volume. The tonnage of 192 with a volume of 4.22 million gallons per day, went into a volume in the Channel at Summit of 1,303 million gallons per day.

2528 An additional flow enters the Main Channel between Summit and Lockport from the Calumet-Sag Channel.

One million gallons per day is equal to 1.54 cubic feet per second.

2529 A discharge at Lockport of 1862 million gallons per day would be about 2850 c.f.s. This includes both sewage and sludge.

2530 If sewage is aerated for a longer time in our aeration tanks and more air is used, there is a better reduction of B.O.D. and a larger generation of nitrates. Doubling the air will not double the nitrates. In 1929 at the North Side, with 0.8 cubic foot of air per gallon and 7.2 hours detention, the yearly average showed a removal of B.O.D. from 115 down to 5.6 parts per million, with 5 parts per million of nitrate in the
2531 effluent. In 1933, with 0.38 cubic foot of air per gallon, and 5.4 hours detention, the B.O.D. was pulled down from 122 to 14 parts per million, with 2.3 parts per million of nitrate. With half the air, we had less than half the nitrates, with a slightly higher B.O.D. in the effluent, and a detention of 5.4 hours instead of 7.2 hours. In 1939, with 0.37 cubic foot of air and 4.7 hours detention, the B.O.D. was pulled down from 117 to 7.7 parts per million, with 0.7 parts per million of nitrate. The 1929 result would cost twice as much for air as the 1939 result.

2532 At present the flow is 200 million gallons per day, on an average of nine years. The longest period we can now obtain is 5.5 hours. The period of 7.2 hours is out of the question. In 1934, with 5.4 hours and 0.38 cubic foot of air per gallon, the final B.O.D. was 14.1 with 2.3 parts per million of nitrate. In 1931, with 5.2 hours and 0.47 cubic foot of air per gallon, the final B.O.D. was 8 parts per million, with nitrates 2.2 parts. In that comparison, a slight increase of 0.09 cubic foot of air did not increase the nitrates, but did reduce the B.O.D. somewhat.

2533 In a rough way, it is possible to figure for a plant the amount of air required to remove 1,000 pounds of

B.O.D., without regard to nitrates. Ignoring cost, the conclusion is that with an increase of air per gallon of sewage, the removal of B.O.D. is better and the nitrates are probably higher in the effluent.

2534 An additional 25 per cent of air in 1931, over 1934, reduced the B.O.D. from 14.1 to 8 parts per million.

2535 The plant may not have been operated on exactly the
same basis, as considerable experimentation was going
on. With more air, within certain limits, a better efflu-
ent is obtained. The showing made by these compari-
sons as to the production of nitrates is rather inconclu-
sive, when you try to pick how much air must be used
to produce a definite amount of nitrate. There appears
2536 to be no way of calculating. Only a test will show.
The production of nitrate in our plant is not an eco-
nomical venture.

At the Southwest Works, the following dates are submitted:

Pumping began (from West Side)	
Preliminary tanks only in use	May 23, 1939
Activated sludge started	June 9, 1939
First battery in service	June 27, 1939
Second battery (half service)	Sept. 6, 1939
Second battery (full service)	Oct. 26, 1939
Southwest Interceptor cut in	
up to Western Avenue	Sept. 7, 1939
Dewatering and incineration began	Aug. 7, 1939
In continuous use	Aug. 28, 1939
Racine Avenue Pumping Station—	
Partial pumping to Southwest	March 20, 1940
Complete flow to Southwest	May 2, 1940

2537 Prior to March 20, 1940, the Racine Avenue Pumping Station flow went directly into the South Fork of the South Branch of the Chicago River, and entered the Main flow just above Damen Avenue, or Robey Street.

2538 I have prepared a table showing the connection of 29 sewers to the Southwest Interceptor.

2539 PEARSE CROSS EXAM. Exh. 2.

These connections were made between June, 1939
2540 and May, 1940. The flow is estimated. The table shows the number of sewers, the estimated dry flow, and the cumulative dry flow. The total dry flow on the Southwest Interceptor is estimated at 325 million gallons per day. The flow has varied.

2542 In May the pumpage at the Southwest Works was
2543 310 m.g.d.; in August, 340 m.g.d. The pumping may include some flow from the West Side system, or some rainfall. Apparently in August the figure, corrected for the West Side, would be 335 m.g.d. That exceeds 325. The sewers are designed on a general basis of carrying 150 per cent of a dry weather flow. The de-
2544 sign dry weather flow is considerably over 325 m.g.d., probably over 400 m.g.d. The capacity of the intercepting sewer is probably over 600 m.g.d., as I recall, about 1100 c.f.s., or, roughly, 750 m.g.d. This is far in excess of the average dry weather flow.

2545 The capacity of the Southwest plant was nominally 600 m.g.d., or 900 c.f.s. If more flow comes than the plant can treat, the excess could be diverted direct to the river, or if the interceptor filled up, backed out through the city sewer outlets. Those are two safety valves. There are also the limitations of the hydraulic

capacity of the plant, and the pump capacity. The de-
2546 sign covers the broad situation. It is our intention to carry a flow through the plants up to 150 per cent of the dry flow during a storm. Beyond that, the excess spills to the river. In some few cases more sewage has
2547 been carried in an interceptor. There is also the question of what happens to the sewage not picked up. There are some 350 municipal sewers which discharge to the various rivers or channels in the District. The intercepting sewer picks up a certain proportion of the flow from those sewers. If exceeded, the excess goes to the stream. This is in time of storm. The regu-
2548 lators are inspected almost daily to see that material does not escape in dry weather.

I am correcting my testimony on the blower contract (Rec. 1636) for the Southwest. The contract for three blowers was entered into on August 29, 1940. One blower is to be delivered on or about May 1, 1941. It should be in operation by August 1, 1941. The other two units are to be delivered on or about March 1,
2549 1942, and should be in operation by October 1, 1942. Each blower unit has a capacity of 100,000 cubic feet of air per minute.

2550 I will make up a statement of the results with the new equipment installed, to give a picture for the summer in 1941 and 1942.

LANGDON PEARSE

Cross-Examination by Mr. Naujoks

2555 The blower contract was awarded to the Allis-Chalmers Manufacturing Company of Milwaukee, Wisconsin.

The two Illinois State Prisons at Joliet both discharge raw sewage into the Waterway. The old prison is located just outside of Joliet to the south and east of the Waterway. At one time it had an Imhoff tank,
2555 which has since been abandoned. The new prison at
2556 Stateville is two miles north of Joliet, to the north, and west of the Des Plaines River. This discharges into the Des Plaines River just above its junction with the Waterway. Negotiations are pending for the discharge of the sewage from both prisons into the Joliet sewers. The sewage of Lockport, with a population of about 3,000, enters Deep Run, which discharges into the Illinois Waterway about ¼ mile below the Power House. The outflow from the Texas Company also enters Deep Run. The plant is equipped with settling basins for retaining sludge and skimming oil. Lockport is planning sewage treatment.

2556 The sewage of Lemont, with a population of about 2,500, enters the Main Channel without treatment. Lemont is planning for sewage treatment and has requested the Sanitary District to lease it a site. Financial aid is asked of the WPA.

2557 The Joliet sewage discharges into the Waterway below the Brandon Road Dam. If the prisons arrange with Joliet to receive their sewage, the discharge,
2558 whether treated or untreated, will be below the Dam. It is an advantage not to have such sewage in the Pool.

2560 The population of Joliet is 41,936 for 1940, as com-
2561 pared with 42,993 in 1939. At Ottawa the population was 15,938 in 1940, and 15,094 in 1930. Peoria had a population in 1940 of 105,003, as compared with 104,968
2562 in 1930. The Census releases show populations for

cities over 10,000. I will attempt to obtain the population of all the towns along the Illinois River.

2563 With reference to the use of air at the Calumet
Works (Rec. 1661-1662), I examined the plant record
2564 for 1939 and 1940. I present Pearse Cross-Exam. Exh.
2565 3 showing monthly averages for air, suspended solids
in mixed liquor, iron, per cent iron in returned sludge,
aeration period in hours, B.O.D. in effluent in parts
per million, and per cent of raw, sludge index, nitrites,
and nitrates from January, 1939, to August, 1940.

2566 The sludge index is the milliters of volume occupied by one gram of sludge solids. It is determined to indicate the settling behavior of a sludge. If the index is under 100, the operator seldom has to worry.

The table (Pearse Cross-Exam. Exh. 3) shows the air at Calumet was steadily reduced in 1939 to 0.29 cubic foot per gallon in July, with a lower mixed liquor solid content in June of 2720 parts per million, and in July of 3040 parts per million. The air was increased to 0.35 cubic foot per gallon in September and held through October, with mixed liquor solids around 3100 p.p.m. In November, the air was increased to 0.52 cubic foot per gallon and the mixed liquor solids ran up to 4310 p.p.m. The B.O.D. in the effluent went down to 8 p.p.m.

2567 During the summer the air used proved too low. The operator increased both the air and the solid content of the mixed liquor. In December he dropped back to 0.43 cubic foot of air and obtained a 91 per cent reduction of B.O.D., an effluent of 10 p.p.m., B.O.D. and nitrates practically at 3 p.p.m. as against 3.2. Thus almost as much nitrate was obtained with less air. The nitrification was practically the same in November and July of 1939, but the air used was 0.52 cubic foot per gallon in November and 0.29 in July.

2567-2568 By taking figures at random from a table like this (Pearse Cross-Exam. Exh. 3), I can easily prove that less air produced more nitrates. Plant operation must be studied by and large. In June, July, and August of 1940, a lower or equal residual B.O.D. was obtained 2569 with less air than used in February, 1940. The fluctuation in nitrates is irregular and not in constant ratio to the reduction in B.O.D. In July, 1939, the nitrates were 3.3 p.p.m., whereas in August they dropped to 0.8 p.p.m. with a slight increase of air. Probably the air in July, 0.29 cubic foot per gallon, was too low. The operator did well in July at the expense of the sludge. In August and September he 2570 had to refresh the sludge and continued to increase the air. In November he speeded up.

I did not produce the table to show I could make 2571 more nitrates with less air. I produced it to show the difficulty of determining from the operation of a well controlled plant what the underlying causes were. In 2572 general, more air means more nitrates and better reduction of B.O.D., up to a point where the air becomes wasteful. The longer the period with the more air, 2573 the better the results. In operation, a low residual of B.O.D. is important, rather than merely a percentage reduction. We are seeking to keep down the B.O.D. in the plant effluent.

2574 The per cent of reduction depends on the strength of the sewage. With a sewage containing 100 p.p.m. B.O.D., with 90 per cent removal, the residual is 10 p.p.m. With a sewage containing 200 p.p.m. B.O.D., a 95 per cent removal is required to give 10 p.p.m. residual.

2575 The hydraulic capacity of the Southwest Works from preliminary basins to the plant outfall is 750 million gallons daily. This cannot be utilized for sewage treatment under present conditions because the installed pump capacity is inadequate. The total discharge capacity of the four pumps installed is 780 m.g.d. With three units running, only 600 m.g.d. can
2576 be attained. The probable load factor is 75 per cent. The present installed capacity of the air lifts on the activated sludge return system limits the sewage flow to 600 m.g.d., with 30 per cent return. The final settling basins now installed are planned for an average flow of 400 m.g.d. A poorer effluent is expected at 600 m.g.d. The present air supply may prove inadequate. I assume the flow to be handled at the Southwest
2577 Works is limited to 600 m.g.d., and that the Southwest flow is 325 m.g.d., and the West Side 475 m.g.d. If 600 m.g.d. be taken through the Southwest Works, 275 m.g.d. will be diverted from the West Side, which has left 200 m.g.d. The estimated analysis of the sewage mixture entering the Southwest Works is 170 p.p.m. suspended matter and 135 p.p.m. B.O.D. The North Side sludge is kept out of the aeration circuit.

If the preliminary tanks remove 30 per cent of the suspended solids, 119 p.p.m. remain. If the effluent contain 40 p.p.m., then 79 p.p.m. are retained, or 395,000 pounds. For convenience, this is taken as 200 tons. Adding 100 tons from the North Side, the total 300 tons per day of total dry activated sludge solids is

2578 available for disposal. The preliminary sludge of 128 tons per day is diverted to the West Side plant. At present (September 26, 1940) 24 filter units are installed at the Southwest Works. Only 18 can be relied upon for constant service. In the warmer months, a rate of output around 1.5 lb. of dry solid per square foot of filter area per hour is attained. This amounts to 184.5 tons per day. In the winter, a rate around 2 lb. per square foot per hour is attained.

After the 8 filters now under contract are delivered and installed, there will be 32 on the floor. Of these, 24 will be available. At the 1.5 pound rate, the possible output is 246 tons per day during the warmer months. This leaves a difference of 300—246=54 tons to be disposed of. The easiest point is the Main Channel. Additional filters will require time and becomes part of the permanent plan.

2579 Assume 50 per cent removal of the suspended solids from the West Side sewage produces 48.5 tons of dry solids daily. The solids sent to the West Side from Southwest are 128 tons daily. The total is 176.5 tons per day to be digested. It is questionable whether the present West Side Imhoff tanks can handle the additional tonnage of preliminary solids in the winter months. The sludge drying beds are inadequate. They can only average from 68 to 85 tons per day per year. There is thus an excess of 33 to 50 tons per day per year to be disposed of, or 14,000 to 18,250 tons per year.

This sludge should be kept out of the Channel because of its density. Three methods of handling are available:

Additional drying beds; lagoons; and filtration after dosing with lime and iron salts.

Any one of these takes time. The relative merits require investigation.

2580 The three blowers now installed have a combined capacity of 180,000 cubic foot per minute. These cannot run continuously as some time is required for inspection and repair. The auxiliary air required at low flows is 21,200 cubic foot per minute. With one blower only, 38,800 cubic foot per minute is available for the aeration tanks. At 0.5 cubic foot air per gallon, this would handle 112 m.g.d. With 0.2 cubic foot, 278 m.g.d. With two blowers running, the auxiliary use is estimated at 34,000 cubic foot per minute. This leaves 86,000 cubic foot per minute for the aeration tanks. At 0.5 cubic foot per gallon, this cares for 284.8 m.g.d., or at 0.21 cubic foot per gallon, 600 m.g.d. can be aerated. With three blowers running, 146,000 cubic foot per minute is available, which provides at 0.5 cubic foot per gallon, for 416 m.g.d., and at 0.35 cubic foot per gallon, for 600 m.g.d. At 600 m.g.d. and 30 per cent returns, the aeration period
2581 is 3.2 hours. The settling rate in the final tanks is 2000 gallons per sq. ft. per day. This would produce an effluent probably containing around 40 p.p.m. B.O.D., with a uniform load. With the variations in load expected and the cramping of the air supply for maximum daily loads, the exact results are in doubt.

2582 In a hearing of a popular nature before a congressional committee in 1925, I was contrasting the relation between a high-grade effluent and a settling tank

effluent, and in so doing I indicated that the effluent of a well operated activated sludge plant might be
2583 clear, stable and odorless, and that fish life might be maintained right at the plant. In the intervening 15 years, I have learned that while a fairly clear effluent can be made as shown in our plants, there is a certain amount of suspended matter in it. There is a certain amount of B.O.D. and of dissolved oxygen. If the flow period was from 30 minutes to an hour, under certain conditions such a flow could be introduced into a stream. What I said in 1925 does not bind me today (September 26, 1940). I admit the words, but I do not admit the implications. The effluent comes out of the North Side Works containing about 8 to 9 p.p.m. of B.O.D., with 7 to 8 p.p.m. of dissolved oxygen. It flows down the North Branch
2584 and in its flow, during a period of 16 to 24 hours, it may lose all its oxygen. These changes occur. Time is an important factor. I do not tell anybody that such an effluent is harmless. It is odorless; relatively clear at times; contains some suspended matter; contains organic matter which needs oxygen. In a flow from Damen Avenue to Lockport, during a period of about 4-1/2 days, there is a very different picture from the original statement. With all the present facts in mind, I do not admit the correctness of the quoted statement as applied to the present analyses of the situation here.

2585 The effluent of an activated sludge plant is odorless; it is clarified, being fairly clear but containing suspended solids maybe 6, 8, 10, 14 p.p.m., or in wet weather, even more. It is stable within the degree

of oxygen that is there to meet the B.O.D. However, the conception of stability today is different from 1925. Then we thought of methylene blue stability test, which is now largely discarded, because it meant little. Stability today is measured by the amount of oxygen present as against the oxygen demand. On paper, the North Side effluent looks stable because at times the effluent shows more dissolved oxygen than
2586 B.O.D. It may not be so if all the dissolved oxygen in the effluent does not stick. As to fish life, the situation is this. At the outlet of a plant and for a distance below, until the oxygen goes below 4 p.p.m. or 3 p.pm., and in some streams that might be indefinite if there is a little dilution, and, again, that might be only a matter of some hours, fish could exist. I have had fish living in the effluent, for experiment purposes, right at the test plant. But if the flow is 16 to 24 hours older, the fish might die if the oxygen is exhausted.

2587 My earlier testimony before Mr. Hughes was with relation to overall treatment, which was set at 85 per cent as an annual average. I further testified that on our activated sludge treatment at the plant, we expected to attain 90 per cent or better for a number
2588 of months and maybe for averages. I believe that around 1925 to 1928 a 90 per cent purification was considered a very good effluent for our class of sewage. Trickling filters ran around 85 per cent. In 1928 the Sanitary District had only operated a small plant, treating 4 m.g.d., known as the Des Plaines River Works. Since 1928, we have operated the North Side and the Calumet, and conducted experimental work

in addition. Therefore, my opinion is entitled now to be weighed on what I know today in trying to solve these problems and not what I said 15 years ago.

I testified before Mr. Hughes in 1929. The hearings
2589 ran from March 25 through September 25. The North Side Works started in October of 1928, and was operated at about on-third of its nominal capacity. In January and February, there was excess capity. The aeration period was 7.2 hours, instead of the bases we have learned is useful, that is, 5 hours. We may have attained those percentages, but we were not sure we could sustain them indefinitely. Two or three months at the beginning of operation at the North Side Works has small influence on what I learned in the last 12 years. I have admitted that if there is the time period and more air, a better effluent can be produced. The Sanitary District is trying to expend the public money to best advantage in a rather difficult situation on its operating finance.

In the 1928 pamphlet issued at the opening of the North Side Works, there may be been a statement that the effluent would be clear, sparkling, and resemble drinking water. I did not sign it. It was written by a newspaper reporter. I recall telling him he had better strike out that kind of stuff. I am not responsible for whatever is printed by the District.
2590 If the potency of the effluent of an activated
2591 sludge plant working at 90 per cent efficiency is measured by the B.O.D. test, it would be approximately the same as the potency of one-tenth the volume of raw sewage. If you are trying to measure the

potentialities of the case, raw sewage contains sludge producing elements which are not in the effluent.

2591 Assuming 85 per cent treatment on a population of four million leaves a balance of 600,000 people. The effluent of this treatment may not exert the same influence on the Main Channel as the raw sewage
2592 of 600,000 people. The raw sewage would deposit sludge down the Channel, which later decomposes and exerts B.O.D. The discharge of raw sewage carries different implications under our situation than if effluent were discharged. The raw sewage has more potentiality for trouble. Under certain conditions, sludge deposits in the Upper Illinois River
2593 might exert an oxygen demand in the summer as great as the original B.O.D. of the incoming sewage. Another factor in our situation is the storm flow effect. When I speak of taking all the sludge out, I mean that I expect to take out all the readily settling solids removed by a treatment plant. The residual solids are very much less harmful than the original sewage solids.

2594 In North America in only two cases has storm water been treated, Columbus, Ohio, and North Toronto in Canada. It is expensive.

Ramey testified that precipitation occurs about 110 times in an average year. There may be 55 storms which tend to fill the interceptor, and at least 5 to 7 which make a heavy discharge through the sewer outlets. Thus varying amounts of raw solids enter the stream without treatment. If the storm water is ten times the dry flow, and only 1-1/2 times the dry flow is treated, 85 per cent of the solids enter the stream during the storm.

2595 No sanitary engineer would say that all the sludge producing material is removed from the channels of the District, when its sewage has been treated. There is still some remaining material entering the Waterway. Sometimes in a storm the B.O.D. rises at Lockport. The effect of storm water will need to be watched, after the treatment works are built to treat all the liquid and retain all the solids possible in the plants.

Cross-Examination by Mr. Cohan.

2596 If a treatment plant is working at 85 per cent efficiency, on 4 million people, ordinarily the answer would be that 15 per cent of the organic matter is in the effluent.

2597 Plant efficiency is commonly measured by the B.O.D. test or the suspended matter test. No one has tried to develop a test to reflect the potentialities I have discussed.

Examination by the Master.

2598 Assuming a city of 600,000 people discharging untreated sewage into a canal, and another situation with a city of 4 million, discharging sewage treated 85 per cent, and that both places have the same flow in gallons per capita, the ratio of volume is 400 to 60.

Assuming for convenience the people are 400,000 and 4 million, the volume of the flow from the latter is 10 times that from the smaller city. If B.O.D. tests were made, the raw sewage might be assumed as 100 and the 85 per cent treated effluent as 15.

The third step is what happens because of the material carried in the liquid. The volume contains sol-
2600 ids in suspension and solution. If the original sewage contains 200 parts per million of suspended solids, and if the effluent only contains 10 parts per million, the raw sewage in every unit of volume contains 20 times as much suspended matter as the effluent. The suspended matter may deposit, and make a potential condition, which means the effect of that sewage pollution is far greater in the summer months than in the winter. We do not try to express this, because as as matter of routine we are interested in knowing what the plant does. In studying the conditions of the Canal and River, all factors are considered.

2601 If a man is sick, the doctor analyzes all causes, not merely whether the man has a bag leg or a good leg.

In this case, we have applied a simple test and discussed the efficiency shown thereby. I see no way to extend the method to a broader situation.

I would rather live on the banks of a stream receiving the 85 per cent treated sewage of a town of 4 million people than on the banks of the same stream at the same location into which emptied the raw sewage of a town of 600,000 people. In the case of the 4 million people, the stream would be relatively clear and unpolluted to the eye, without odors. In the other case there would be a dark looking stream, which would give off odors and obviously would consist of untreated sewage.

Cross-Examination by Mr. Naujoks.

2605-
2606 The Kostner Avenue sewer, with a flow of about 45 m.g.d., should be connected up shortly.

Dr. Mohlman's curve and chart can be adjusted, after an appraisal of population and industry and plant operation.

Cross Examination by Mr. Naujoks.

2730 The Southwest Plant is limited in its flow to 600 m.g.d. by pump capacity and air lifts. At 600 m.g.d. the period in the aeration tanks is approximately 3.15 hours. With three blowers now installed running, and a flow of 600 m.g.d., the air supply figures 0.35 cubic feet per gallon of sewage for service to the aeration tanks. However, only two blowers can be relied upon for continuous service. With two, the air supply fig-
2731 ures 0.21 cubic feet per gallon. To attain an aeration period of 1.45 hours is purely hypothetical and impossible as it means pushing through an entering flow of nearly 1200 m.g.d. in a plant actually limited to 600 m.g.d. but with a theoretical hydraulic capacity of 750 m.g.d.

Air in amount of 120,000 cubic feet per minute is not available at the Southwest Works from two existing blowers for aerating mixed liquor. The air for auxiliary uses totals 21,000 cubic feet per minute at

present which may increase to 24,000 cubic feet per minute as the output of dried solid increases. The net air available is 98,800 cubic feet per minute. Arithmetically this provides for 800 million gallons air at the rate of 0.1778 cubic feet per gallon. With three
2732 blowers running, as a matter of arithmetic, the air available for aerating 800 m.g.d. would be 0.286 cubic feet per gallon. The average for 5 months, April to August, inclusive, in 1940 shows preliminary treatment given to 163 m.g.d. at the Southwest Works. The raw sewage contained 202 p.p.m. Suspended solids and 151 p.p.m. B.O.D. The tanks made a reduction in B.O.D. of 33 per cent. The B.O.D. of the treated sewage was 101 p.p.m. The population equivalent is 807,000 persons on the bases of 0.17 pound per capita. The population equivalent for the 53,970 tons of dry solids discharged to the canal in 1939 is being worked out. Assuming the net dissolved oxygen in Lake Michigan water to be 8 p.p.m. the content of dissolved oxygen in 3500 c.f.s. of lake water would be 151,200 pounds per day. The dissolved oxygen in the lake may be between 8.5 and 9.5 p.p.m., from which an allowance for B.O.D. is deducted, leaving a reasonable net of 8 p.p.m. The amount of 151,200 pounds per day of oxygen would satisfy the 5-day B.O.D. of 889,410 people on the assumption of 0.17 pounds of 5-day B.O.D. per capita.

2734 I have prepared an exhibit, Pearse Cross. Exam. Exh. 4, which shows the interchange of sewage from the West Side interceptor to the Southwest intercep-
2735 tor or vice versa. This shows that from May, 1939, to March, 1940, a considerable amount of sewage from

the West Side was diverted to the Southwest. In 1940 in June and August some flow went from the West Side to the Southwest. In August 5 m.g.d. was so diverted.

2736 The reductions in diversion from the West Side system synchronize with the pickup of additional City sewage by the Southwest system.

2737 The Southwest plant began operation on West Side sewage. Not until April, 1940, were both plants on their own. The West Side plant ran far below its capacity from September 1939 to February 1940.

2738 The sewage coming to the Southwest plant had previously discharged untreated through the West 39th Street Conduit, which is now connected to the Racine Avenue Pumping Station; the Western Avenue sewer and other sewers entering the South Branch of the Chicago River.

2739 The Kostner Avenue sewer was connected up on
September 26, 1940. This reduces the sewage not con-
nected by about one-half. About 55,000 population is
2740 left untreated. This means the Sanitary District has
approximately attained the stage of pick-up of sew-
2741 age, indicated by the petition of the State of Illinois.
(Petition p. 11). The area from which untreated sewage flows comprises the Clearing District, certain areas around Blue Island, a small sewer in the Stockyards, and miscellaneous small situations. These have not been picked up because of the expense involved. The extension of the Summit-Argo sewer to Clearing is delayed because of adjustments in the Corn Products plant. The method of handling its residual pollution

is being worked out. These smaller projects make excellent WPA projects.

Cross Examination by Mr. Cohan.

2752 There is no assurance from the City when it can meter the water. At the average rate of installing meters in the last ten years it will take 100 years. Opinions differ as to how low the flow can be reduced by metering.

2753 The works of the Sanitary District are designed to a capacity ample for present conditions. The City has no appropriation on its books for the purchase of
2754 meters. The money allotted to meters in the PWA fund for the filter plant construction has been spent for other purposes. In general meters are purchased at the expense of the consumer.

2755 The Sanitary District has not predicated its plans for construction in the next two years on the metering of the Chicago water.

In the light of past performance any prediction based on metering is purely speculative. The District investigated the situation, gave it proper consideration and concluded it did not influence our problem.

Quoting Mr. Andrew

Examination by the Master.

2757 In connection with a proposed test to flush the Brandon Pool, I have serious doubt whether the flocculant material will flow out. If it does, the gates should be opened at Dresden Island Pool, Marseilles Dam, and Starved Rock Dam to allow the material to work on down the waterway. This will require investigation.

At Dresden Island Pool an electric generating station draws water from the Pool. At Marseilles there is a hydro-electric plant.

To drain even one pool is serious, to say nothing of draining several pools.

2759 In my opinion the Chief of Engineers would not feel it was feasible to permit opening the gates at all these pools to permit draining out the flocculent material, if it can flow out.

LANGDON PEARSE

Direct Examination by Mr. Clausen.

3313-
3316 I have prepared population data on the counties and towns on the Illinois River from data from U. S. Census Bureau.

3318 Data on the population of Joliet prisons was obtained from the Department of Public Welfare of the State of Illinois.

3320-
3321 I have prepared data on the population in The Sanitary District of Chicago for 1940 and its distribution, from press information, as census figures
3321 not available. The increase in human population from 1930 to 1940 in the Sanitary District is esti-
3322-
3324 mated at 65,031, and the increase in industrial equivalent population is estimated at 596,180 from 1930 to 1940. Including Argo, the combined figures show:

Population	Estimate for 1930	1940
Human	*3,901,569	**3,966,600
Industrial Equivalent	1,486,000	2,082,180
Total	5,387,569	6,048,780

* Census

** Estimated

3326 Assuming chemical treatment applied to the West Side effluent, reducing B.O.D. from 57 to 37 and being equal to the population of 440,000; and adding treatment as of May, 1940 (from January, 1940 Illinois Petition) including one-third West Side sewage diverted to the Southwest plant; I find the reduction in B.O.D. in May flow was equivalent to 286,000 population, and treatment per cent increased from 75.1 to 81.4.

3328 I find in the period April to August, 1940, that if the 163 m.g.d. of sewage given only preliminary settling at the Southwest Works had received activated sludge treatment, the effect would be equivalent to a removal of 719,110 population with sludge kept on shore, or 479,220 population if excess activated sludge went to the Main Channel.

3331 There are several methods of comparison of conditions in a waterway before and after treatment is installed; first, compare volume of treated sewage and raw sewage; second, compare weights of suspended solids discharged into the stream, either on total or
3332 volatile solid basis; third, compare the concentration of the B.O.D. and dissolved oxygen at various points along the Waterway; fourth, a study of the oxygen

balance. I do not think Howson Exhibits 13 and 14 are a true oxygen balance. They merely represent sources of material.

3335 In comparing conditions in the Main Channel and Chicago River, of June, 1937-1938 with 1939-1940, following the cut in diversion, the concentration of B.O.D.
3336 increased and the dissolved oxygen decreased. The effluent of the North Side Works lost all its dissolved oxygen in passing down the North Branch to Chicago Avenue, due to sludge deposits, industrial wastes, and
3337 possible ineffective dissolved oxygen in effluent of wastes. Comparing the average of June, July, and August, 1938-1939 with 1939-1940, following the cut in diversion, the concentration of B.O.D. increased and the dissolved oxygen decreased.

3341 The estimate of the B.O.D. and the dissolved oxygen in the Upper Illinois Waterway for June, 1938 to 1943 left open for figures on effect of sludge deposits a very important element. Reareation effect is
3342 also omitted. It is necessary to remove the sludge forming solids entering the stream as promptly as possible.

Pearse Cross-Examination

3343 Exhibit 12 differs from Howson Exhibit 11 in that it assumes the Southwest plant and additional West Side will not be complete until the end of 1942. Many
3344 figures are the same as used by Howson in Exhibit
3345 11. Others differ. Howson overlooked the B.O.D. from a large amount of raw sewage which entered the stream in 1939.

3348 The estimate of the B.O.D. and the dissolved oxygen in the Upper Illinois Waterway for June, July, and August, 1938 to 1943, as shown in Pearse Cross Exam. Exh. 13, is a companion piece to Howson Exh. 14. Left open for figures on the effect of sludge deposits, a very important element. Sludge deposit effect may exert demand of 510,000 B.O.D. daily in June, 1938.

3349 Sludge may exert a demand almost as much as
3350 the demand of the sewage itself. Sludge demands are estimated from a correct oxygen balance, trying to determine two unknowns; one, the amount of the oxygen demand of the sludge, and the other, the amount
3351 of reaeration at the surface. The different factors
3352 must be studied from their proper time relation. In the summer, there is a double demand on the stream. Confirmed by the Eddy report of the Engineering Board
3355 of Review. The sludge demand is indicated as of the time in question; for 1940 as of today.

3357 I find in Howson Exhibit 12 a neglect of the importance of the aeration period, when proposing more
3358 air. It is difficult to finance such proposals. Time for building chemical precipitation to supplement West Side Works is as long as for activated sludge plant. Installation for chlorinating the Canal water
3359 has no space. I believe aeration by cascades at Lockport is of little value in effect on Brandon Road Pool. Not much use in removing compacted solids unless
3360 to remove an obstruction to navigation. Addition of settling basins for temporarily speeding up flow to
3363 Southwest Works will cost more than Howson estimates. The cost of the gate house, conduits, and meters

should be $1,300,000 instead of $610,000. Roads and grounds should also be included, in amount of $90,600. This increases the Howson total of $3,267,000 to
3364 $4,048,000. This estimate includes $600,000 for temporary conduits, which are of no value in the permanent scheme. The total is close to the Sanitary District estimate of $4,878,500 for the entire activated sludge extension.

3364 I believe it is preferable to push ahead on the complete program. Plans on 16 final tanks for Batteries
3365 A and B are under way and work should be under contract in March, 1941, and completed between June and December, 1942. Presents tanks need modification
3366 for betterment. Plans for Battery should be started this winter; work under contract by September, 1941, and completed by December, 1942.

3367 The Sanitary District of Chicago is a municipal corporation, organized and existing under the laws of the State of Illinois. It is operated by a Board of
3368 Trustees. It must advertise for at least ten days, usually two or three weeks on large jobs. Bids are referred to the Chief Engineer, canvassed, and reported to the Board. If the low bidder is financially responsible, contract is awarded. At a subsequent meeting, the bond is approved and the Chairman of the Finance Committee and the Clerk authorized to execute the contract.

3368 The Howson scheme for treating 800 m.g.d. in the Southwest Works is impracticable, for several reasons; first, the top hydraulic capacity of Batteries A and B is 750 m.g.d.; secondly, the peak loads during six to ten hours of the day would run the excess over

3369 750 m.g.d. to as high as 200 m.g.d.; thirdly, the air
3370 supply is limited, and the probable limitation until
next August would be around 500 to 550 m.g.d. to have
enough air for a fair effluent; fourthly, the amount of
activated sludge solids would be increased to a point
where the equipment is inadequate, until the entire
3371 Southwest plant is available. The plans for the 16
final tanks for Batteries A and B are being pushed.
Little value in shoving the 24 additional tanks ahead
without the aeration tanks of Batter C and the sludge
handling equipment.

3372 I find with reference to Howson Exhibit 13 that
in the principal sources of B.O.D. some errors are apparent.
3373 The largest error is in line C, where in the
1939 column there should be 427,000 pounds instead
of 266,000. This is due to the omission by Howson of
certain raw sewage from the Southwest area. These
3375 corrections increase the total of 496,000 by about 160,000.
The summation as presented by Howson is incorrect
for 1939. Should be about 657,000 pounds. As
present, Exhibit 13 is erroneous and misleading, because
of the omission under 1939 of the raw sewage
factor, as noted.

3374- I find with reference to Howson Exh. 14 that comments
3375 similar to those re Exh. 13 hold.

3378 The construction of cantonments by the United
States Government is not an index of construction
for large sewage treatment works. In the last war, I
was connected with the work at Camp Custer. Cantonment
3379 construction is entirely different from the
sewage treatment works of the Sanitary District. The
Government approaches the problem with unlimited

funds and power, both to comandeer men and ma-
terials. Cantonment work is repetitive and spread
over a wide area, with a minimum of plans and a
3380 maximum rapidity of construction. Cantonment work
is construction of a temporary nature.

3383 The financial status of the Sanitary District is such
that we are operating under a pegged levy to produce
3384 $5,000,000 annually. The Engineering Department has
no money to expend on additional air or the purchasing
3385 of chlorine or chemicals. The operating budget could
be thrown out of balance by any order to spend on
such ameliorating measures.

Direct Examination by Mr. Clausen.

3633 I have prepared certain exhibits bringing the op-
erating records down to date. Illinois Exh. 24-A shows
3636 in 1940 a yearly average of 422.7 tons per day of dry
solids removed from sewage at the sewage treatment
3638 works; Illinois Exh. 25-A shows that in 1940 the av-
3642 erage flow was 929.9 m.g.d. at the sewage treatment
works; Illinois Exh. 27-A shows at the North Side
Works a yearly percentage removal of B.O.D. of 94.6
in 1940, the highest since 1929; Illinois Exh. 28-A shows
3644 at the Calumet Works a yearly percentage removal
of B.O.D. of 90.7 in 1940, the highest in its history;
3645 Illinois Exh. 29-A shows at the West Side Works a
percentage removal of B.O.D. of 50.0 in 1940, with the
3654 largest flow in its history, 361.5 m.g.d.; Illinois Exh.
47-A shows the Southwest Works gradually picking
3656 up its sewage load. Illinois Exh. 49-A shows in 1940,

on an estimated total sewage flow of 1053 m.g.d., that
3658- 930 m.g.d. was treated and 123 m.g.d. untreated. Il-
3660 linois Exh. 50-A and 51-A show that in 1940 the total
tonnage of dry sludge and grit at the sewage works
3662- was 151,933. Of this, 20,224 reached the Main Chan-
3664 nel. Illinois Exh. 52-A and 53-A show that in Octo-
ber, November, and December of 1940 no sludge was
3662 discharged to the channels of the Sanitary District.
Illinois Exh. 52-A shows that in October, November
and December of 1940, 6,382, 6,587, and 6,759 tons of
sludge were heat-dried, respectively, at the Southwest
Works, the highest averages since operation began.
3670 Pearse Cross Exh. 4-A shows that since March, 1940,
from 10 to 70 m.g.d. of the West Side sewage has been
treated at the Southwest Works.

3672 Exhibit 40-A "Main Channel Discharge at Lockport—1938, 1939, and 1940" offered by Pearse and received.

3673 Exhibit 62, "Diversion from Lake Michigan, showing Monthly Discharges for 1938, 1939, and 1940" offered by Pearse and received.

3679 I collaborated with Dr. Mohlman in the prepara-
tion of the Mohlman Report on the flushing experi-
3680 ment and subscribe to the Summary and Conclusions
therein. I believe the summer of 1941 may present
better conditions in Brandon Pool than in 1939.

3682 The Southwest Works is operated to produce suf-
ficient sludge, plus the North Side sludge, to supply
dewatering apparatus. The eight dryers are not yet
operating, but are in process of erection, due to delay
in obtaining rubber covered pipe, on account of interfer-
3683- ence of National Defense. New crushers are expected

3684 to be in operation by May. Additional blower is expected to be in operation by August.

3684 In the present operation, the preliminary sludge is put in the West Side tanks; surplus sludge to temporary lagoons. A small lagoon was completed in the fall
3686 of 1940 and an additional lagoon is nearly finished. No excess sludge is to be placed in the channels. La-
3687 goons now on hand may not be adequate for the entire year of 1941. Can be enlarged if necessary. The lagoons are an emergency measure.

3761- I cannot state from Illinois Exh. 60 and 61 just
3765 what will happen in 1941, 1942, and 1943. I made Illinois Exh. 60 and 61 on the Howson pattern, but
3767 correcting his figures where need be. The Howson
3769 exhibit is not an oxygen balance. The statement of
3770 figures in Lockport in 1938, 1939, and 1940 are actually what occurred.

Examination by the Master.

3932 At the Southwest Works, the eight additional filters will not be ready until March 1, 1941. New coal
3933 crushers will not be ready until May 1, 1941. The blower should be ready by August 1, 1941. A temporary lagoon has been constructed. At the present time
3934 the existing equipment is handling 200 to 210 tons of dry activated solids in dewatering and drying, and we expect by June to handle 250 to 260 tons of dry solids per day, for sale as fertilizer or for burning. The operating program for 1941 and 1942 is based on giving activated sludge treatment to sufficient sewage

to produce enough Sludge to combine with the North Side sludge and stay within the dewatering and heat-
3935 drying capacity. All the sewage receives preliminary settling. The sludge from the preliminary settling is sent to the West Side Works; digested, and the excess placed in the temporary lagoons. The period of preliminary settling as around 11 to 13 minutes instead of 20 to 30 minutes, earlier stated. Performance of Southwest Works for next two years measured by amount of sewage receiving preliminary treatment
3936 only. No sludge as such has been discharged into the Waterway during the last three months of 1940.
3937 Weighted average of Southwest plant was lower in November and December, 1940 than in the summer for removal of B.O.D. and suspended solids.

3938 The performance of the Sanitary District plant for 1940 and for the year was removal in per cent, B.O.D. 67.8, suspended solids, 72.5. For April to Demember, the removal in per cent was—B.O.D. 65 per cent, and
3839 suspended solids, 71 per cent. The performance of the plants is obstructed by the choke in the Southwest Works, which is inability to dispose of solids plus relation of disposal of preliminary solids to the West Side Works and sludge drying beds, which are not adequate to take all preliminary sludge. Temporary
3940 lagoon ought to carry through 1941. The B.O.D. discharged in Southwest effluent for 1941-1942, as shown in Illinois Exh. 60 and 61, was too low—error in computations.

3941- On the question of lagooning, we have found la-
3942 gooning of activated sludge proved unsatisfactory unless mixed with digested sludge. If the extent of

the difficulty caused at Joliet by the lack of equipment due to lack of money had been more adequately foreseen, some temporary steps might have been taken to provide more adequate lagoons.

Cross-Examination by Mr. Naujoks.

4033- In accordance with the request of the Master, I
4034 have checked Illinois Exh. 60 and 61 and produce herewith the revised compilation of figures, Illinois Exh. 60-A and 61-A.

4034 Little difference is expected in sewage works operation between 1941 and 1940, while a greater difference may occur between 1941 and 1942 than shown
4035 on the Exhibits. The extent of the difference will depend on the additional treatment gained by the new blower due by August 1, 1941. This may lower the B.O.D. at Lockport, but the D.O. will still be zero.
4038- The condition of the Brandon Pool in the summer
4039 of 1941 will be worse than the condition at Lockport.

4049 Credit was given for reaeration in Illinois Exhibits
4050- 60, 60-A, 61, and 61-A. Adjustments were made up-
4051 ward on Illinois Exh. 60-A and 61-A, because operating figures on the Southwest Works were too optimistic for 1941 and 1942. In 1943 and 1944, as shown on
4052 Illinois Exh. 60-A and 61-A, our figures are somewhat more optimistic than on Howson Exhibits.

4052- Estimates on the effect of sludge deposits based
4053 on experience of last fifteen years and including work of Engineering Board of Review. Differences between

4053- our figures and Opponents' on what will occur
4054 largely due to Howson assumption plants are completed in 1941 and Illinois assumption plants cannot
4056 be completed until end of 1942. Differences caused
4057 by change in judgment. Change of judgment caused by slowing up of construction program and effect on operation of attempt to keep all sludge out of the Main Channel. Earlier estimates too optimsitic.

Examination by the Master.

4058 Effect of sludge deposits is reduced in 1941 and
4059 1942. Effect of sludge deposits should decline as sol-
4060- ids deposited decline. Relationship of sludge depos-
4061 its to sludge discharge. No sludge now discharged. Volume of untreated sewage has declined. Figure for
4062 untreated sewage adjusted between Illinois Exh. 60, 61, 60-A, and 61-A.

4063 Sludge deposits refer to the oxygen demand of material deposited in the channels. Effect comes from past and current deposits. Separate items from North Side, Calumet, and Southwest sludge are for sludge discharged from the plants. Such items are not re-
4064 flected under effluent items of B.O.D. Storage of material through the winter months is a factor. The B.O.D. of a sludge deposit is in addition to the B.O.D.
4065 of the sewage then coming. Effect of current deposits of sludge declines also.

Cross-Examination by Mr. Naujoks.

4065 Gave no credit to effect of removals of solids during test of December, 1940. Test may have stirred up material and uncovered fresh surfaces. Considered effect of test on the system, but did not include any
4066
4067- figure for such effect. Arithmetic compuation vs.
4068 appraisal as to effect of solids removed during test period. Sketch of general method employed for oxy-
4071 gen balance determination. No definite figure available first, on effect of sweeping out, or, secondly, on effect of what is left in, or on effect of current material coming. Knowing conditions and appraising effect at somewhat less than one-half the value of the
4072 sludge deposits in 1940 seems fair. Gave credit for reaeration in transit.

4074 *Memo. on Lagooning,* Pearse Exh. 15-A and 15-B.

4075 Existing lagoons (area 37 acres) on West Side site have a volume capacity of 250,000 cubic yards, or 16,800 tons of dry solids in sludge at 92 per cent moisture. 27 acres of lagoons, 5 feet deep, cost $38,000.
4076 Additional area available of 20 acres would hold at 5 foot depth 145,000 cubic yards, or 10,200 tons of dry solids at 92 per cent moisture. Lagoons on West-Southwest site will hold 27,000 tons of solids.

At the Southwest Works, handling about 350 m.g.d., preliminary settling period is 15 minutes. Only sufficient settled sewage is given activated sludge treatment to produce solids up to the capacity of the sludge handling plant. In December, 1940, Southwest Works handled 210 tons dry solids per day, including 100 tons from the North Side. If the 13-minute settling period continues in the preliminary tanks, the 27,000 ton

4077 lagoon will suffice until 1943. If the settling period be increased to 40 minutes, at the Southwest, the total capacity of 27,000 tons of dry solids at 92 per cent moisture will be exceeded in the winter of 1941-1942. Additional area for lagoons is available four miles to the southwest of the West Side Works. The lagoons, to hold 31,000 tons of dry solids at 92 per cent moisture, would require 31 acres. The cost of a sludge pipeline, pumping station, lagoons, and fencing would be about $165,000. On the 40-minute settling basis, about 15 acres of lagoons, 10 feet deep, are required per year for the excess digested sludge from the preliminary tanks at the Southwest Works.

4078 The rate of drying in lagoons on the additional area site is very problematical, due to the type of soil. At Indianapolis, on a sandy soil, the period of rotation is about six years.

Explanation requested by the Master.

4199 Weighted average, as in Pearse Exh. 16, is obtained by multiplying the B.O.D. of the various effluents by the respective gallonage and the sum is divided by the total gallonage.

4200 Settled sewage (Rec. 4076) refers to the effluent of the preliminary settling tanks.

4499 Complete treatment during December, 1940 at the Southwest Plant lower than in October and November, probably due, first, to increased total solids as strength of sewage increased, and, secondly, to the handling only of sufficient sludge for shipments on order because of condition of equipment.

FLOYD W. MOHLMAN, Director of Laboratories, The Sanitary District of Chicago.

Direct Examination.

234 I reside at 10724 Drew St., Chicago, Ill. I graduated at the University of Illinois in chemistry in 1912, and received a Master's Degree in 1914 and a Doctor's Degree in 1916 in sanitary chemistry, with a minor in bacteriology and a second minor in sanitary engineering. In 1916 I was instructor in sanitary chemistry at the University of Illinois, and chemist and bacteriologist of the Illinois State Water Survey. In 1916 I went to New Haven, Connecticut, to take charge of investigations of sewage disposal for the City of New Haven. Later I worked for the State of Connecticut, in charge of investigations of stream pollution and industrial wastes. I came to Chicago in 1919 as Chief Chemist for The Sanitary District of Chicago and have been here ever since. My title was later changed to Director of Laboratories.

For the past twelve years I have been editor of the
235 Sewage Works Journal, a national publication on sewage research and sewage plant operation. For several years I have been a lecturer on sanitary chemistry, stream pollution, and the disposal of industrial wastes in the Graduate School of the Armour Institute of Technology.

In the Sanitary District I am in charge of all of the laboratories and the work of such laboratories in chemistry and bacteriology. In 1925 I organized the chemical investigations of the Illinois River, that

have continued to date. In the laboratories here in the city we take care of all chemical work that is done
236 to measure the efficiency of treatment by the sewage treatment works. In addition, our laboratory work has included a survey for the past five years of the wastes from some 250 industrial establishments in the city. I have also been in charge of the chemical work connected with the investigations of new or improved processes of sewage treatment, both in the laboratory and in experimental stations.

There are four laboratories in the city and three down the Illinois River under my direction. We have
237 about seventeen chemists and numerous samplers. Approximately 9,000 samples per month are analyzed for dissolved oxygen content in our laboratories.

Samples have been collected and analyzed continuously on the Illinois River since 1925, and at Lockport, one of the most critical stations on the river, we have made thorough investigations ever since I came here in 1919. On streams within the City of Chicago we have continuous records of analyses since 1935.

238 The purpose of the analyses is to furnish a quantitative measure of river conditions as affected by treatment of sewage and reduction of diversion; the most important results are those obtained since 1938. The critical stations are in Chicago and down to Lockport and below; entrance of the Kankakee River greatly improves conditions.

239 The dissolved oxygen test shows the condition of the water; Lake Michigan water is practically saturated with dissolved oxygen, varying from 14 parts

per million in winter down to 8 or 9 p.p.m. in summer; such water has a very low demand for oxygen, and brings in assets of dissolved oxygen. Additional oxygen is gained from absorption at the surface; from aeration over dams; and a certain amount is present in sewage effluents, although a rather low amount.

240 On the other hand, the biochemical oxygen demand expresses the avidity for dissolved oxygen of the putrefiable matter in sewage or effluents. The B.O.D. may be considered as a liability to be balanced against the assets of dissolved oxygen. If the B.O.D. exceeds the available dissolved oxygen, anaerobic conditions result, and odors occur and the foul conditions noted in the Drainage Canal and Illinois River. The dissolved oxygen decreases down to zero, then the B.O.D. shows the amount of polluting matter.

241 Sewage treatment reduces B.O.D. to varying degrees and thus improves the oxygen balance. In addition to the drain on the oxygen by sewage and effluents the sludge deposits on the bottom of the stream induce a very serious oxygen demand. Imhoff or activated sludge treatment reduce the oxygen demand and remove solids so as to result in a positive oxygen balance, with dissolved oxygen present, and no odors or nuisance.

242 In following the course of dissolved oxygen and B.O.D., I will show on Illinois Ex. 5 how the samples are collected at the mouth of the Chicago River, where the water is taken for dilution purposes. Other samples are taken down the South Branch, and at Summit, which is below practically all of the sewage

treatment works. Samples are also collected above the dam at Lockport.

243 These samples are analyzed for dissolved oxygen and B.O.D. I can demonstrate the test for dissolved oxygen on some samples collected this morning at the mouth of the River, the pure lake water, then at Halsted St., about three miles down the South Branch, and another at Summit, fourteen miles from the Lake.

The tests I will make are merely for demonstration purposes, and I don't consider that the results will
244 show the average conditions, but only for the samples as collected between eleven and twelve o'clock this morning. The test is a standard test, in which chemi-
245 cals must be added to the samples. The oxygen is fixed in a precipitate, in which you can gauge roughly the oxygen content ~~by~~ the darkness of the sample. Then sulfuric acid is added, and at this stage the oxygen is fixed as iodine, and the more oxygen that is present, the more iodine you will find. Thus sample one, from the lake, is darkest, number two from Halsted St. is
246 lighter, and number three, from Summit, is white. The next procedure is to titrate a measured quantity of the iodine solution against a solution of sodium thiosulfate, which is what I am doing. Before the yellow color disappears, I add a few drops of another reagent, starch, which changes the color to a deep blue. Finally a last drop of sodium thiosulfate causes the blue color to disappear. The dissolved oxygen in that sample was 9.6 parts per million.

The second sample, from Halsted St., is treated the
247 same way, and is found to contain 6.7 p.p.m. The dis-

solved oxygen is lower than at the Lake, due to the oxygen demand of bottom deposits and the effluent from the North Side Plant.

The third sample, from Summit, contains zero dissolved oxygen. From there down, through Lockport and Brandon's Road, oxygen is completely gone from the water.

Summit is below all the treatment works. The
248 sample from Summit has an odor and a turbid appearance.

The B.O.D. determination shows how much dissolved oxygen is used up when a sample of water is incubated for five days at 20 deg. Centigrade. It thus measures the avidity of the water for oxygen.

249 These tests have been carried on in the same way and at the same places prior to and after the reduction of diversion from 5,000 to 1,500 c.f.s. I have prepared six exhibits of monthly average results at six
250 stations on the river. These are offered as Ill. Ex.
to 31 to 36, inclusive, covering the period from Jan.,
262 1938, through June, 1940.

263 The results of analyses of samples from the mouth of the river extend back only to November, 1939, because I am familiar with what the dissolved oxygen should run in Lake Michigan, but I started then to show what a normal year might show. Exhibit 31 shows 14 parts per million in Jan., 1940, and 10 p.p.m. in June. The oxygen demand is small, extending from 1 1/2 to 3 p.p.m.

264 The temperature, in Centigrade, is 16 degrees in June, equivalent to 61 deg. F. In summer the dissolved oxygen will be lower, possibly 8 1/2 to 9 p.p.m. That

is the water we have to draw upon for our assets of dissolved oxygen.

Exhibit 32 shows results at Damen Avenue, below the stockyards. The B.O.D. has increased over the dissolved oxygen, but in 1938 there was always dissolved oxygen present, with a minimum of 5 p.p.m. in July.

265 In 1939, however, when the diversion was cut, there was a sharply increased B.O.D. in January and it increased enormously to 55 p.p.m. in May. In June it dropped to 20 p.p.m. and there was a fluctuating increase and decrease to the fall of the year. The dissolved oxygen was very low in April, 1939, and in August and September, 1939, it was completely gone.

In 1940 the B.O.D. is still very considerably above the year 1938. The high month of March, 1940, with 21 p.p.m., compares with a very low result, not over 13.5 p.p.m. all through the year 1938. Therefore the B.O.D. in 1939 was far greater than at any time in
266 1938, and it was still well above 1938 in 1940. The month of June, 1940, shows a low B.O.D. as the stockyards wastes have been intercepted and taken out to the Southwest Plant for treatment.

Exhibit 33 shows results at Summit. The dissolved oxygen results are lower than at Damen Avenue. In 1939 there were six months with no dissolved oxygen at all at Summit. In 1940, there was an increase to 4 p.p.m. in the winter, but in June, the B.O.D. showed a tremendous increase up to 44 p.p.m. and all of the year 1940 is far worse than anything in 1938.

267 Exhibit 34 shows results at Lockport, including discharge, which is the diversion plus the city pumpage.

In 1938 the dissolved oxygen was low during the summer months, but in January, 1939, it was almost completely depleted, whereas there was 7 p.p.m. in January, 1938. The B.O.D. reached a maximum of 43 p.p.m. in 1939, and from 23 to 27 p.p.m. in 1940 (compared with a maximum of 22.6 p.p.m. in 1938).

Exhibits 32, 33 and 34 show the conditions in the Main Channel were far worse in 1939 than in 1938, and in 1940 they were still worse (than in 1938).

268 Exhibit 35 shows results at Marseilles, down below the Kankakee River. Here the river is recovering its aerobic condition, with a substantial amount of dissolved oxygen from 1938 to date. The minimum of 2.4 p.p.m. in June, 1939, is however, very low in comparison with the dissolved oxygen content of Lake water.

Exhibit 36 shows results at Chillicothe, 147 miles from Lake Michigan. There is always a substantial amount of dissolved oxygen at Chillicothe, but the
269 B.O.D. showed some rather high values in 1939 and again in 1940. They indicate that conditions were not so good as in '38, even that far downstream.

The general effect of treatment is to cause conditions to become better downstream and then to work upstream as conditions improve. Chillicothe indicates about the lower point of our interest in the investigations of the Illinois River.

270 These charts have two main purposes; first, to show the concept of balance between dissolved oxygen and B.O.D. and the recovery of the stream; and second, to show the increase pollution in 1939 and 1940, as com-

pared with 1938. They indicate 1940 was somewhat better than '39 and worse than '38.

These charts show a quantitative measure of pollution, and the efficiency of dilution or other dissolved oxygen assets to equal that pollution.

The station at Lockport is above the powerhouse, in the drainage canal.

271 Exhibit 37 shows the results over a long time at Lockport, from the start of investigations in 1925. These monthly average results show that from 1925 through 1938 there was a certain amount of variation in the 5-day B.O.D., as one would expect, but at no time was there a sharp and notable increase. The di-
272 version was cut from 8,500 to 6,500 cu. ft. per second in 1930, at the time of the Decree. On Jan. 1, 1936, it was cut to 5,000 c.f.s., and held there for 1936, '37, and '38. On Jan. 1, 1939, it was cut to 1,500 c.f.s. There was a tremendous increase in B.O.D. at that time, and from then until May, 1939, there was a very notable increase, more than doubling anything that had ever been found since this investigation started. Up to June, 1940, the results are still well above anything in the years up through 1938. In every summer through 1938 the dissolved oxygen has gone down nearly to zero for three or four months, but starting in January, 1939, there was a very decided drop instead of
273 an increase that occurred every year prior thereto, and in the summer of 1939 there were seven months with a complete absence of oxygen, no increase in the winter (1939-40) and practically zero through the summer of 1940 to date.

The temperatures (of the water) in the summer of 1939 showed an increase to anything we had before.

The great increase of B.O.D. in 1939 is significant, particularly in the summer. A much heavier pollution is shown after the cut in diversion Jan. 1, 1939.

274 The foul and odorous conditions in 1939 extended much farther up toward the Loop than in any preceding year, and the stream was deoxygenated even up to, at times, 18th Street, which was an unprecedented condition. This year (1940) that part of the river is not nearly so bad. The high oxygen demands from Damen Avenue down to Lockport show a very foul condition of the canal. A station below Brandon Pool, but above the Kankakee River, was established in 1939. The results show a very foul condition last summer (1939) and somewhat improved this year.

275 We have made a number of studies on sludge deposits. They show that the oxygen demand of sludge goes on for hundreds of days. We have run them for as long as 700 days at 20 deg. Centigrate in an incubator. The rate of disappearance of oxygen demand is much greater in the first two months, then it slowly tapers off.

In the river, with the increase of temperature in summer you get a putrefactive effect and ebullition of gas, and as the solids are brought up into the water they absorb the oxygen and greatly increase any effect of deoxygenation in that part of the stream. This can go on for several seasons. I should say that possibly 50 per cent of that demand is satisfied in the first summer and 25 per cent in the second summer.

During the winter the sludge deposits lie dormant,
276 and then revive in the summer. That will go along for possibly three or four years, but the major effect will be worn off in two or at most three seasons. These deposits will therefore exert a demand on the water for some time after all sewage is treated.

There are also other sources of solids, from storm-water and the sewage effluents, and all of these effects will considerably delay the improvement in conditions after all sewage is treated. The effect becomes very strong in the early summer with the sudden increase in temperature.

In three years the oxygen demand wears off down to possibly 3 to 5 per cent of its original demand, and that keeps going along for a long time.

277 Sludge may be defined as a muck or putrefactive mass of solids. It is any sort of deposit coming from sewage origin, consisting of organic putrefiable solids deposited in a stream or in sewage treatment plants. By "solids" we mean undissolved material, in a suspended form, and we determine it that way chemically, but it may have any content of water directly in the solids themselves, even up to 98 per cent. In contradistinction to that we talk about dissolved or colloidal solids.

278 In time, sewage treatment will improve the conditions, but the only immediate relief I know of is by increase of diversion, to provide more dilution of the present discharge of solids. There are no other emergency measures that I know of to relieve the nuisance or existing conditions.

Chemical treatment has been with us for many years, and it was the hope that that would relieve the situation. Following the recommendations of the Board of Review we studied this process of chemcial treatment and, frankly, I was disappointed with the results of our own studies. They didn't show as much reduction of B.O.D. as I had hoped. As Mr. Pearse stated, the reduction from an Imhoff effluent was only
279 from 57 p.p.m. B.O.D. to 36 p.p.m. in the chemical effluent, whereas in our investigations of activated sludge we got down to 10 p.p.m., about where our plants operate. The chemical treatment would therefore provide only a minor or an inadequate additional purification of the Imhoff effluent.

For temporary chemical treatment of a condition such as that at the Brandon Road Pool, the only thing that is used to any extent for combating odors is chlorination, and we have considered chlorination for a long time, but it is my conclusion that it is very, very expensive and would be only of doubtful value on such an enormous scale, and with these sludge deposits in the bottom of the channel and in Brandon Pool. I don't know of any other emergency treatment except more dilution.

280 Chlorine, if applied, would quickly disappear. If solids are present it would disappear within ten minutes or so, and then you will lose a great deal of that effect. I don't think it offers a practical possibility for any such problem. It would have to be applied at a number of places in the canal, to be effective. With a flow of 3,000 cu. ft. per second at Lockport,

an enormous amount of chlorine would have to be applied, with only very doubtful possibilities.

Eventual relief will come from installation of activated sludge treatment as rapidly as possible. I hesitate to say that even then 1,500 c.f.s. will give conditions such as we should have, because I don't think that conditions prior to 1939 were by any means satisfactory. We have Zero dissolved oxygen at Lockport, and would be merely keeping up with what we have had, and would not be improving conditions down there, after the expenditure of all this money for our treatment plants. 281

Up through 1938, by installation of the treatment plants, we held the status quo, but made no improvement.

282 In studying processes for further treatment of the West Side Imhoff effluent, we have made tests of almost anything that would be suggested to us as modern or recent processes of sewage treatment. We studied new types of biological treatment, rapid filters; variations of activated sludge treatment in which iron salts are used; and chemical treatment on a very large and expensive scale, costing about $150,000. We also studied sand and magnetite filters and activated sludge treatment. Of these processes, activated sludge treatment gave by far the best effluent. There is no doubt that activated sludge treatment is the only thing that can be used; there is no temporary expedient.

283 The activated sludge treatment was studied with a short period of aeration, using only two hours in place of the usual five. We were able to get a low B.O.D. with this short period of aeration.

1420 In previous testimony (Rec. 279) I testified that chlorination would be very expensive and of doubtful value, as a temporary chemical treatment to relieve the nuisance and odor of Brandon Pool. Other chemicals that might be considered are as follows:

1421 Use of sodium nitrate. This is a white powder
with formula NaNO3. The oxygen in this compound
can be applied to satisfy some of the demand of the
putrefactive matter for oxygen, but it has the fol-
1422 lowing deficiencies: (1) the oxygen in nitrate would
not be available until all dissolved oxygen had been
used, (2) this would eliminate fish life, (3) the cost
would be enormous, as the amount required might
reach 500 tons per day, costing $17,000, (4) it would
fertilize or stimulate the growth of algae and green
plants that would later die and putrefy; with putrefac-
tive sludge deposits and zero diss. oxygen, there would
be odorous gases liberated; therefore it would not be
practicable to use sodium nitrate.

1423 Other miscellaneous chemicals such as potassium permanganate, K Mn O4, or potassium dichromate, K2Cr2O7, have been used for oxidizing organic matter in sewage, but they are far too costly to be considered for this problem.

Ozone, O3, is used for oxidation and sterilization to a very limited extent in water purification; a few plants in France use it; but it hasn't even been proposed for sewage or polluted waters, and it would be too costly for this situation.

1424 As to the effect of dredging sludge deposits in Brandon Pool, while dredging was going on, there would be disturbance of sludge deposits, and sludge brought to the surface would disseminate odors;
1425 dredging would have to be repeated in the spring for several years until the previous winter's deposits were removed; if deposited on a spoils banks, there would be odors from such deposit, even if overlain by water.

Sludge sometimes contains as much as 98 per cent water and that is a very light material, which flows like water, and can easily be disturbed; it is in a very delicate equilibrium on top of sludge deposits and can easily be disturbed and brought up into the overlying water.

The only practical procedure for relief of the putrefactive conditions in the Main Channel, Brandon Pool
1426 and Illinois River is the diversion of more water for dilution of the putrefactive matter in the water itself, and then as rapidly as possible the construction of activated sludge plants to give us the highest degree practicable of sewage treatment here in the city.

FLOYD W. MOHLMAN.

Cross-Examination, 1817-180.

1819 At the request of opponents, I offer results of chlorine demand studies of water in the Main Channel
1820 as Mohlman Cross-Examination 1. These tests were made July 2 and 3, 1940, and show the amounts of chlorine, in parts per million applied to samples from

the Drainage Canal, to satisfy the chlorine demand and give a test for residual chlorine after ten minutes; the results and temperatures were

1821

Station	Chlorine Demand Parts per Million	Temperature Deg. Cent.
Damen Ave.	1.9—2.2	18
Summit	4.4—4.2	20
Lockport	4.6	22

1822 Tests on chlorination of sewage effluents were made about 15 years ago. I consider that these tests indicated the value of chlorine for our conditions.

1823 I will produce records requested by opponents of results of chlorination of Imhoff effluents at Morton
1824 Grove and Glenveiw. These are small plants, for possibly 2,000 to 4,000 people.

1825 Report of Committee of the American Public Health Assn., "Chlorination in Sewage Treatment", dated 1934,
1826 offered as Mohlman Cross-Examination 2, by opponents.

1828 Chlorine is used in a specific and limited way for the control or prevention of odors. Chlorine will arrest putrefaction in sewage and polluted waters, if used in sufficient amounts.

1829 In the presence of sludge, not enough chlorine could be used to be a satisfactory or dependable method for preventing putrefaction in Brandon Pool in the summer of 1940.

The B.O.D. of sewage at our plants is as follows: West Side, around 100 p.p.m., Souhtwest 170, North Side, 120 parts per million.

1830 B.O.D. is not determined on sludge as a routine procedure; it requires 100 days, or more, incubation; it is made in no sewage treatment plant as a routine test; however, we have research studies up to 1100 days of incubation, results of which will be furnished.

Sludge analyses are made to show moisture content and volatile, or organic, matter; and such results will be offered.

1831 Chlorination to prevent putrefaction in Brandon Pool is impracticable because of the great amount of sludge in the pool, which would nullify any efforts to put in chlorine at the entrance to the Pool. If done, I would recommend addition of chlorine at several places
1832 in the Main Channel and above Brandon Pool, but would have grave doubts that it would accomplish what was intended. I mean that it would not be practicable in terms of results. If I were given the task of prevention of odors, I wouldn't use chlorine.

1833 Assuming chlorine were used, I would apply it at the stations shown in Exhibit 1, i.e., at Damen Ave., Summit and Lockport; the chlorine demands shown, however, would have to be increased very materially to carry along over the sludge deposits. The total requirement of chlorine, to have any assurance that there would be enough to do some good, might be as much as 150 tons per day, costing between $6,000 and $7,500 per day.

1834 When used for killing bacteria in sewage effluents, chlorine might remove from 90 to 99 per cent of the bacteria in activated sludge effluents. Chlorine is not used to kill bacteria in effluents from Sanitary District plants because the Illinois River is not used as a source of water supply.

Routine bacteriological analyses have not been made at Lockport or Brandon Pool, as such results would be of minor importance as compared with the tests for
1835 dissolved oxygen and B.O.D., which are made daily, in fact hourly. At one time we did make bacteriological analyses, and I have records of thousands of bacteriological analyses made on samples from the lake front and Lockport.

1836 Water of the canal constitutes a menace to health, if accidentally ingested; the effect of nauseous odors is a very definite menace to health, but we are not justified in adding chlorine for fear people might drink the
1837 water. There is always the possibility of bacteria of sewage origin in the water of the Drainage Canal, introduced by storm water; these bacteria could not be completely eliminated by chlorination. The time of flow through the canal and river is so long that the effluents would be re-inoculated, even if chlorinated, and there would be no assurance that the water was of safe sanitary quality.

1838 The Illinois Waterway was polluted even prior to 1900; it has also been polluted since opening of the Drainage Canal on Jan. 17, 1900; my studies have been carried on to determine the degree of intensity of pollution.

If the flow were reduced from 5000 cu. ft. per second to 1500 c.f.s., plus domestic pumpage in both cases, and if the same quantity of water entered a well, the hazard would be nearly three times as great with the lower di-
1839 version. The hazard of contamination of wells would

be greater with the lower diversion, because the concentration of bacteria in the canal water would be greater.

The records of analyses of samples from the Chicago River and Main Channel, shown in Ill. Ex. 31 to 36 inclusive through June, were as follows for the months of July and August, 1940:

1840

	Dissolved Oxygen P.P.M.		5-day B.O.D. P.P.M.		Temp. Deg. C.	
	July	Aug.	July	Aug.	July	Aug.
Ex. 31—Lake Michigan	9.6	8.7	1.3	0.9	19	21
Ex. 32—Damen Ave.	3.7	3.3	5.6	4.2	21	22
Ex. 33—Summit	0.1	0.2	24	23	23	23
Ex. 34—Lockport	0.0	0.1	18.7	15.2	23.5	23
Ex. 35—Marseilles	4.9	3.6	3.9	2.5	25	25
Ex. 36—Chillicothe	5.8	5.0	5.7	6.8	25.5	25.4

1841 If nitrates were present in effluents, they would
not be used until all dissolved oxygen is used; nitrates
1842 are undesirable and indicate inefficient operation;
they would not prevent odor under our conditions.

1844 The average B.O.D. of the North Side effluent was
5.6 in 1929 with nitrates present, and 7.7 in 1939 with
no nitrate; in order to produce nitrate in 1929 it was
necessary to use 0.8 cu. ft. of air per gallon, whereas
only 0.37 cu. ft. was used in 1939; this indicates more
efficient operation in 1939; the difference of only 2.1
1845 p.p.m. in B.O.D. in an effluent is a very close variation,
the per cent reduction being 95 per cent in 1929
and 93.5 per cent in 1939.

The B.O.D. for canal samples on July 2 and 3, 1940,
at the stations where chlorine demands were run, was
1846 26 p.p.m. for July 2 and 29 p.p.m. for July 3 at Summit;
and 24 p.p.m. for July [illegible] at Lockport.

I have not made investigations of streams containing
nitrates with reference to septic conditions and
1847 odors; I do not believe nitrates would prevent odors
in the Drainage Canal and Brandon Pool, if large and
1848 putrefying deposits of sludge were present in the bottom
of that stream. Effluents of Sanitary District plants
would not have a lower B.O.D. if nitrates were present,
except to the degree discussed previously for the
1849 years 1929 and 1939; production of nitrates would require
seven hours of aeration, which would mean larger
aeration tanks, as five hours is all that is available
now.

The North Side effluent contains 1 to 2 p.p.m. dissolved oxygen as it leaves the final tanks; if it contained 5 to 6 p.p.m. plus 5 p.p.m. nitrate nitrogen, and you in-

1850 cubated it in a bottle there would be the equivalent of 20 p.p.m. in potential oxygen, but the nitrates have nothing to do with the B.O.D., which is concerned only wiht dissolved oxygen; dissolved oxygen introduced by cascades may be partly entrained oxygen of microscopic size that escapes and is really not available to satisfy the B.O.D.

1851 The equivalent of nitrate oxygen is N2 to O5, which was computed yesterday at Mr. Naujok's request as 28 to 80, or 1.0 nitrogen equals 2.86 oxygen; the nitrate test for oxygen demand has been abandoned.

Population equivalent of the sewage by-passed at the Southwest Plant cannot be estimated without records, which are to be offered by Mr. Pearse.

1852 I have no data on the amount of hydrogen sulfide in the canal and Brandon Pool, but am quite certain there is hydrogen sulfide present in the canal above the powerhouse and in Brandon Pool.

1853 If chlorine were added to effluents for reduction of B.O.D., it would not reduce B.O.D. load in the canal and Illinois Waterway; tests made in our laboratories showed 1 p.p.m. of chlorine equivalent to 2 p.p.m. B.O.D., but this would not be true in the canal, and chlorination is not the proper way to remove B.O.D.; we have made as extensive tests as have ever been made on this point; these tests were made after chlorination was suggested for B.O.D. removal during the hearings before Master Hughes 14 years ago; chlori-
1854 nation of effluents from all sewage plants as a temporary measure in 1941 and '42 would not result in any practical amelioration of the pollution, because of sludge in the channel and not all of the sewage treated.

1855 Discharging water of the canal over cascades at Lockport would introduce possibly 2 or 3 p.p.m. dissolved oxygen, but with B.O.D.'s running from 25 to 60 p.p.m., the dissolved oxygen would be zero before the water reached Brandon Pool; such a procedure is simple, but would not be successful next summer; we have had a B.O.D. of 50 for a month's average this year.

1856 Conditions at Lockport and Brandon Pool will be better in 1941 because more sewage will be treated.

1857 The data for July and August, 1940, indicate a decreasing B.O.D.; this is to be expected because the sludge deposits partly work out their demand in summer, but during the winter the deposits accumulate and exert their main effect in May and June next summer; while conditions will be definitely better than this year, they will still be very deplorable early next summer in the absence of additional dilution.

1858 In the tests of chemical treatment at West Side, the B.O.D. was reduced from 57 (Imhoff effluent) to 36 p.p.m. by chemcial treatment; this was much poorer than activated sludge, which reduced the B.O.D. to 10 p.p.m.

1859 Chemical treatment at the West Side Plant would not be a small scale operation in which a few barrels of ferric chloride would be dumped into the sewer, but it would need a flocculation tank, a chemical building and much equipment; the operating costs would be as much as for activated sludge; we investigated all of
1860 these factors in our experimental plant. Dr. Buswell estimated as well as he could, in the absence of any data from our plant, that 75 per cent of the B.O.D. could be removed, but we operated this large scale

experiment, treating 2 million gallons per day for over a year, in order to find out the facts, and we obtained only 60 to 65 per cent reduction. 1861

After the P.W.A. Board reported in 1935, experiments were started at the West Side plant on further treatment of the Imhoff effluent; the Halvorson biological filter was installed in 1935; several other types of devices were installed; the chemical plant was designed in 1936 and although its construction was not pushed or urged particularly by the P.W.A., it was installed early in 1937 and operated through 1938; so there was a continuous array of experimental work going on, of which the chemical treatment was the largest and most expensive. It was carried out in a thoroughly satisfactory way, on a large scale, and under good control.

Chlorine alone would be ineffective as a means of reducing B.O.D. in the West Side effluent.

1863 Activated sludge installation for the West Side Imhoff effluent would be an extension of the same type of plant at the present Southwest Plant.

1864 I will explain my estimate of the amount of chlorine required for the Canal and Brandon Pool: Mr. Andrew testified as to the presence of sludge deposits in the Canal and Brandon Pool; considering these deposits and their effect in dissipating the chlorine applied, and the long time of flow in the Canal, it was my estimate that the chlorine applied should be 5 p.p.m. at Damen Ave., 8 p.p.m. at Summit, and 10 p.p.m. at Lockport; this equals my estimate of 150 tons per day.

1865 Metering of the Chicago Water Supply would not have any benefit under present conditions, and prob-

ably would not have much influence in the future in preventing discharge of a storm water to the channel;
1866 it would only extend tanks and other equipment for more years; to get nitrates at the North Side Plant the aeration period would have to be extended from the present five hours to at least seven hours, and metering could not accomplish this.

1867 It is a guess to say that 30 per cent of the purification by activated sludge is due to oxidation, and 60 per cent to precipitation, because we don't know just how oxygen requirements are distributed between the solids and the liquid, and we do not determine the five day B.O.D. of sludge as a routine test; therefore the distribution of the B.O.D.—so much to oxidation and so much to absorption on the sludge—is not definitely determined.

1868 Activated sludge spread on land becomes odorous and putrefactive, even if filtered; it must be incinerated or dried; chlorine would not prevent putrefaction of the sludge or filter cake because it would soon wear off, and the odors thereafter might be worse.

1869 Depositing of activated sludge from the North Side in the Main Channel at the West Side was the best thing to do under the circumstances, rather than to discharge it into the North Shore Channel, where it would have settled and odors would have been produced through the city. Sludge could not have been filtered and deposited in lagoons because it was not digested; the filter cake would have created an intolerable nuisance.

1870 Aeration tank treatment of the preliminary tank effluent at the Southwest Plant would produce more sludge to be discharged into the Channel, whereas by taking it over to the West Side, the Imhoff effluent goes to the Channel and sludge is kept out; this is a better procedure than the suggestions of opposing counsel, that all the flow be put through aeration tanks, and the sludge discharged to the channel.

1871 The Southwest sewage is stronger than the West Side, therefore with a short aeration period of two hours, the effluent would not be nearly so good as the West Side effluent with two hours aeration, as produced in the experimental plant.

1872 If rapid flow occurred through Joliet, as was the case prior to the installation of the Brandon Dam, the odors might be worse because the odorous gases generated in the highly septic sewage above Lockport would be liberated more rapidly in the rapid stretches through
1873 Joliet. I am going on the B.O.D. results at Lockport (Exhibit 34) which showed an enormous increase when the flow was cut; this resulted in much worse odors.

Odors are produced when temperature rises in spring
1874 and the sludge suddenly putrefies. The generating element is sulfate—splitting organisms, present in the sludge, which produce hydrogen sulfide from the liquid sewage. If sludge could be kept out of Brandon Pool in 1941, it would have an ameliorating effect, but the
1875 old deposits plus storm water solids would still be present; all sewage cannot possibly be treated by the end of 1940. About three years will be required to stabilize sludge, 50 per cent the first year, 25 per cent the second, and the balance the third.

1876 Assuming no sludge discharged in 1941, the conditions should be better than in 1940; the worst effect will be worn off; but tests up to 1100 days show sludge still has an oxygen demand.

1878 Mr. Pearse said he would attempt to answer how much of the present difficulty is due to sludge and how much to untreated sewage from the West Side Plant.

1879 Increase of diversion in summer is practical because that is when the dissolved oxygen is gone, but I think you would have to estimate five months in that period.

FLOYD W. MOHLMAN

Cross Examination: 1882-1887 1902-1918

1882 With reference to the hazard of pollution of wells
at Joliet account must be taken of the longer time of
flow with reduced diversion, therefore, there would be
greater death rate of bacteria, and the hazard to wells
would not be three times as great with the lower diversion, but somewhat less than three times; definitely
1886 greater, however, than with a larger diversion, because
of the larger number of bacteria per unit volume with
lower flow.

The B. coli counts would be greater in 1940 than in 1938, if in proportion to B.O.D. results; B. coli was determined in earlier years but not in 1938, nor by myself in 1940.

1887 The hazard to wells would still be greater in 1941 than in 1938; the well would have been unsafe even in 1938 if water from the canal had found its way into the well and such water was used for drinking purposes.

1902 Experiments on chemical treatment of the West Side Imhoff effluent were made since 1934. Various

combinations of chemicals, copperas plus activated sili-
1903 ca, was developed by research during the course of the experiments. The most efficient chemicals are those which give the best results for the least money.

1904 Pickling liquor was inferior; inert materials such as clay or waste paper were not used; paper had been used in a process investigation some years ago by Dr. Buswell at Dearborn, Michigan, but its use has since been abandoned there, and it is not used in any plant at the present time.

1905 Application of chlorine up to 150 tons per day would be necessary to counteract the effect of sludge deposits. If chlorine were used for odor control it would also be effective for bactericidal efficiency. Chlorination would reduce the bacteria immediately below the point of application, possibly for a half mile, but even with chlorination, ebullition of sludge would
1906 create danger of bacterial contamination of a well, by bringing solids up into the sewage flow.

1908 The degree of hazard to the well would be shown by records of analyses for B. coli; it is not a fact that if any B. coli are found, the water is unsafe; B. coli would have to occur in more than one tube in five 10 c.c. portions to cause one to suspect the water.

1909 It would not be possible to sterilize the water in Brandon Pool; whatever pathogenic bacteria were killed would not reappear. Bacteria of a dangerous nature might live in sludge deposits from 10 to 80 days, possibly longer than that.

1910 Ameliorating measures: hypothetical questions: assume

Air increased to give 5 p.p.m. diss. oxygen and 5 p.p.m. nitrate;

Chemical treatment for Imhoff effluent;

Chemical effluent passed through Southwest Plar ;

All effluents chlorinated;

Chlorine applied above Brandon Pool;

Hydroelectric plant shut down, water passed over cascade;

Sludge removed from Brandon Pool;

No sludge discharged after Jan. 1, 1941;

Sewage from industries and institutions treated;

Would the conditions now complained of be remedied?

Yes, if sludge also were removed from the Drainage Canal; this would have to be done to assure alleviation of conditions in the early part of next summer.

1912 There will be a substantial improvement in 1941 as compared with 1940; but the early summer con-
1913 ditions may not be greatly different in 1941 than in 1940. Budgeting water to obtain merely 500 to 1,000 c.f.s. more in May and June, 1941, would not be nearly enough.

I am not a doctor of medicine, but as a chemist know the characteristics of gases, those which produce odors
1914 and those which do not; have knowledge of toxic concentrations of gases and their irritating effect, but am not qualified as a physician.

1915 Oil as sleek on the Pool would not have the slightest effect to prevent absorption of oxygen.

1916 Chlorine might remove 90 to 99 per cent of bacteria from a clear effluent, but it would not be effective in removing pathogenic bacteria in the presence of sludge.

1917 Hydrogen sulfide produced sickness and affected eyes and irritated membranes of men working in the

operating galleries at the West Side Plant; it was given
1918 off from the sludge vents. I have no records to indicate that any employees of the Sanitary District of Chicago have ever been harmed by handling sludge or sewage in the ordinary course of employment.

FLOYD W. MOHLMAN

Cross Examination: 2411-2463 2492-2519

2414 I have no data on hydrogen sulfide in the water or air at Brandon Pool.

Presentation of data and records requested by opponents:

2412 Chlorination studies.

Exhibit 3, Mohlman Cross-Examination, Reprint of paper "The Chlorination of Sewage and Effluents" by F. W. Mohlman, E. Hurwitz and C. C. Ruchhoft, presented at a Texas meeting in 1929. This was the report of laboratory and plant work at the Des Plaines Treatment Works.

2415 The oxygen demand was reduced 2 p.p.m. for each p.p.m. of chlorine applied, but a further reference, page 29, states that conditions in nature differ from those in the laboratory, in that the residual chlorine will quickly disappear in nature, followed by general infection with bacteria. Favorable conditions will be presented immediately below the outfall but less favorable conditions farther downstream. If considerable dilution is available within a reasonable distance, conditions will be satisfactory, but when several days of flow time occur, the demand for oxygen will be re-intro-

duced and the net effect will be to delay putrefaction. Chlorine is more expensive than biological processes, but where only partial oxidation is required or the elimination of odors essential, chlorine may be the most
2417 practical means of obtaining the desired results. This work confirms the opinion expressed that chlorination in the case of subsequent inoculation or in the presence of sludge deposits is ineffective.

I agree with the conclusions of Baity and Bell that the B.O.D. reductions are permanent, as 15-day incubation shows relatively the same effect as 5-day incubation, provided one restricts this to laboratory tests.

2418 I do not agree with the statement that chlorine exercises a very marked effect in reducing B.O.D.; I would say a very minor effect. The value of the use of chlorine for overloaded sewage plants, or to protect stream quality would depend upon the length of
2419 time over which the effect of chlorine was desired. Any chemist knows that chlorine will destroy odors, but the practical application of this fact depends upon the specific characteristics of the problem.

In my estimates of the application of chlorine to the Drainage Canal and Brandon Pool, chlorine would first be applied to the Canal at Damen Ave. as it is a gen-
2420 eral principle developed in work on chlorination that prevention by pre-treatment is better than destruction of odors after they have been formed; at Damen Ave. there is still some dissolved oxygen in the water, and between Damen Ave. and Summit, most of the sludge has been discharged to the channel; the chlorine demand at Damen Ave. was 2½ p.p.m. with 1-10 p.p.m. residual; to maintain residual over these sludge de-

posits would require a much higher residual than 1-10 —say 2 p.p.m.; to get that I estimate that we would have to apply 5 p.p.m. at Damen Ave., equivalent to 20 tons per day of chlorine.

2421 Before Summit is reached, in a flow time of 30 hours, (put in by Mr. Ramey at request of Opponents), all chlorine would be gone, and more would have to be ap-
2422 plied; the time of flow from Summit to Lockport is 62 hours, the distance 20 miles; the chlorine demand with 1-10 p.p.m. residual was 4 to 5 p.p.m.; to carry over that distance, I would apply 8 p.p.m. at Summit, equivalent to 50 tons per day.

At Lockport the chlorine demand with 1-10 p.p.m. residual was 5 p.p.m. I would apply 10 p.p.m. to carry over Brandon Pool; equivalent to 75 or 80 tons per day.

2423 These applications would total around 150 tons per day.

2424 If chlorine were applied only at Lockport, the results would be more uncertain than if chlorine were applied also at Summit and Damen Ave., because of decomposition in the channel; but if applied only at Lockport, to protect Brandon Pool, the amount required would be more than 75 tons per day and less than 125; if sludge were removed at Lockport there could be a further reduction.

2425 (Cross-section of Drainage Canal offered as Mohlman Cross Examination 4.)

2428 The estimate I have given for the amounts of chlorine to be applied was based on a consideration of the records of dissolved oxygen and B.O.D. at Damen Ave. and Summit, introduced previously as Ill. Exhibits 32 and 33. The chlorine would be applied continuously.

2429 The effect of chlorine would wear off in a number of minutes or an hour, if only enough were applied to satisfy a residual of 1-10 p.p.m.; some of opponents witnesses were estimating even less than this; to main-
2430 tain the effect over a number of hours, much larger amounts would be needed; I agree with Mr. Enslow that it might be desirable also to add lime to make the chlorine effective over a longer period.

2431 I testified on direct that I didn't consider chlorination to be certain and effective method of eliminating odors, in the presence of sludge; after the present deposits lose their potency by years of action, then chlori-
2432 nation would offer much more hope of success. If sludge ceased to be deposited, you would need a greatly reduced quantity of chlorination to take care of accumulations that had not yet lost their potency. However, the sludge volumes now present have not lost their potency; I will present an exhibit later on this matter.

2433 Use of chlorine for odor control at Morton Grove and Glenview: Exhibit 5, Mohlman Cross Examination, introduced at request of opponent's counsel, shows the result of chlorination of Imhoff effluents for odor con-
2436 trol, at Morton Grove and Glenview, in 1939; the results show up to 21 p.p.m. used at Morton Grove in August, and 7.8 at Glenview, where the sewage is much weaker.

2440 Exhibit 6, Mohlman Cross Examination, consists of a table of analyses and a diagram which shows the course of oxygen demand of sewage sludge up to a

period of more than 1100 days; the sludge was covered with river water from the Illinois River at Peoria, where the work was done in our laboratory as a research study. The curve is plotted according to the B.O.D. of the volatile, or organic matter, in the sludge, and the downward slope shows the rate at which the
2441 organic matter is stabilized, and loses its potency; quite a reduction goes on for 300 days, after which there is a very slow reduction.

In order to check against sludge in the Main Channel, other work was started Dec. 14, 1936, on sludge collected at the Lockport Power House; this was run for 300 days, the results are offered in a table of analyses and a diagram, as Exhibit 7, Mohlman Cross Examination. The loss of potency as shown by this curve is quite similar to that shown in Exhibit 6.

2444 These curves show as closely as one can in any research study the effect of time on the loss of potency of sludge.

2445 Exhibit 8, Mohlman Cross Examination, is a photostat of an editorial written by me in the "Sewage Works Journal" for May, 1938, page 613; it includes a discus-
2448 sion of the results I have just offered as Exhibit 6. This editorial discusses the significance of the curves I have introduced, and the question of the influence of sludge deposits in streams.

In addition to this editorial, I have here a translation from a book of Dr. Imhoff's, which I offer, plus a photostat of some pages from a book, as Exhibit 9, Mohlman Cross Examination. Dr. Imhoff has visited here and we have discussed the question of pools; I visited him two years ago in Essen, where he has a somewhat simi-

lar problem of pools in the Ruhr River; I have translated excerpts from his book relating to sludge deposits. Curves shown in the photostat from the book include
2454 values of B.O.D. of sludge deposits taken from my Exhibit 6; he shows for the first summer of 120 days a 55 per cent reduction, then the sludge lies dormant through the winter; the second summer he shows a further 11 per cent, and 5 per cent the third summer.

2456 Referring to Exhibit 7, there was a two-thirds reduction of the B.O.D. in 196 days; this was at 20 deg. C., and in the river the temperature does not remain at or over 20 Deg. C. for as long as 196 days; temperature has quite an influence.

2457 Mr. Pearse showed in an exhibit 54,000 tons of sludge discharged to the channel in 1939, and 19,000 tons in the first seven months of 1940; the 1939 sludge would lose 50 to 55 per cent of its potency by next summer, and 20 per cent the second year; in 1941 the sludge would have from one-half year to two years of decomposition, and I took that into account in the estimates I have made of the effect of sludge on the requirements for chlorine and the oxygen demand of the deposits.

2461 The time when sludge was discharged must be taken into account; one must consider that the major effect is concentrated in the early summer when the temperature rises.

2462 I believe it would be closer to five months than three for a complete summer's control.

FLOYD W. MOHLMAN

Cross Examination: 2492-2519

2492 I have no data prepared on bacterial remvoals by chlorination at the Des Plaines Treatment Works.

In our sampling of the Chicago River and Drainage Canal, a chemist visits the sampling stations once daily; if the sampler is not using proper technique, it is corrected; reliance is placed on the average of 24 daily
2494 samples; samplers have no special training; a sampler was recently killed; the report by Klassen and Wisely on Illinois River work refers to samples being thrown out as not representative; these samples were taken by the State samplers; they used the Sanitary District results at Peoria and Beardstown and state on page 577 of this publication that the procedure used by the Sanitary District laboratory is standard in
2499 all respects.

2500 Exhibit 6, Mohlman Cross Examination, refers to sewage sludge from the Peoria sewage treatment works, primary and activated sludge; sludge for the next Exhibit, No. 7, was taken from the Drainage Canal at Lockport, collected in a bucket in the forebay of the power house, the curve is similar to that in Exhibit 6; the sludge was in the water the number of days it took to reach there from the Southwest Plant.

2501 Questions have been asked by the Master and Mr. Naujoks concerning the B.O.D. of sludge and effluents discharged to the channel; as testified previously, B.O.D. of sludge is not determined as a routine test, but we do have determinations of volatile, or organic suspended solids on both sludge and sewage, and in order to pre-

sent a record of the sources or organic matter dis-
2502 charged, I have prepared Exhibit 10, which includes
tables and a chart. Exhibit 10 shows computations for
2509 the years 1939 and 1940 of the discharge of volatile
solids, in tons per month; the first table shows the tons discharged as sludge, the second table the tons in the West Side Imhoff effluent, the third table the tons in the Southwest effluent, and the fourth table the tons in untreated sewage. The untreated sewage was esti-
2511 mated by taking the difference between the total water pumpage and the amount of sewage treated.

This exhibit shows that an effort has been made with the facilities available, to keep sludge out of the channel and to treat the raw sewage; this made it necessary
2512 to discharge more West Side effluent and partially treat Southwest effluent, but this seemed more desirable than to discharge sludge or raw sewage; the solids from the West Side will not decrease appreciably until activated sludge is installed.

2513 The large amount of rain in May, 1940, increased the sewage flow so that it was equal to the water pumpage, but that does not indicate that all of the sewage in dry weather would be treated; the general decrease through the year, however, is apparent; sludge was discharged until July; this and the sludge discharged last winter will have a very noticeable effect on the channel next summer; however, the total tons of untreated sewage deposited for the two years preceding July 1, 1941 will be considerably less than for the two years preceding July, 1939; a table could be made up showing the sludge deposited for the two years preced-

2514 ing July 1, of 1939, 1940 and 1941; the latter year would involve some assumptions. (See Exhibit 13)

There has been a steady decrease, except for the increase in June and July, 1940, of the discharge of solids in the effluent from the Southwest Plant; the general average is 88 tons in April, 55 in June, and 76 2516 in August; the sewage treated in July was 287 million gallons per day, which was less than the average in May, June or August.

2517 With reference to sampling errors at Pekin, in the report of Klassen and Wisely it is stated that they found it difficult to select a proper sampling point at Pekin because the Peoria pollution was not evenly 2518 mixed, and therefore the results at this station were subject to considerable question; there was no question concerning the manner in which the samples were collected by the samplers.

In that particular station (Pekin) we made cross sections of the river, took current meter readings in each section, collected samples in each section, and had a weighted analysis to tell us where the best place would be for taking samples; this was in the Sanitary District work, they indicated they weren't satisfied that they had the best place for sampling.

FLOYD W. MOHLMAN

Re-Direct: 3278-3312

3278 A discussion of Howson Exhibit 10, in parallel columns, is offered as Mohlman Exhibit 11. There is a con-3284 trast between Mr. Howson's first item, increase of diversion from 1,500 to 3,500 cu. ft. per sec., and the other items, which refer to increase of nitrates, reaeration at Lockport by cascades, and regulation of flow. Increase of diversion results in dilution of the polluted and nauseating conditions, practically halves the B.O.D.; none of the other suggestions can accomplish this.

Mr. Howson's suggestion refers to increased air at the North Side and Calumet plants, to produce nitrates; increased air alone will not accomplish this, but it also takes a longer aeration period, 7 hours instead of 5 hours; that is not available; nitrate production at the North Side would give no measurable improvement because it would only stimulate growth of plants in the North Shore Channel, which growth is now prolific; the plants break loose and decompose; the dissolved
3286 oxygen is quite low at the lower end of the North Shore Channel; the diluiton would be from 300 cu. ft. per second at the North Side to 3,000 at Lockport; so it seems the beneficial effect of this suggestion is practically negligible.

3287 Reaeration at Lockport by cascades, Item 3 in Mr. Howson's exhibit, would create a local odor; the loss of power would be $1,500 per day; I don't agree that 6-¾ p.p.m. of dissolved oxygen would be absorbed. Because of the high B.O.D. and the anaerobic condition of the water not more than 3 p.p.m. would be absorbed and that would be used up very quickly and have no appreciable beneficial effect at Brandon Pool.

3288 Item 4, an increase of water in summer, has merit because it recognizes the fact that dilution is beneficial, and the suggestion would give 1,000 cu. ft. per second more than we have been flowing.

3289 If the budgeting of flow could give 4,200 cu. ft. per sec. in summer, the extra 1,000 cu. ft. would provide 43,200 lb. of oxygen without cascades, but this would equal only 1.9 p.p.m.; however, the diluting effect would be helpful.

3291 A discussion of Howson Exhibit 11, in parallel col-
3298 umns, is offered as Mohlman Exhibit 12, I have attempted to sift these proposals with reference to their practicability and the degree to which they would relieve the situation at Brandon Pool.

Mr. Howson has estimated the 5-day B.O.D. at Brandon Pool as 25 p.p.m.; although we have results there last June up to 39 p.p.m., I would consider 25 p.p.m. a fair average.

The second item, in which is given the B.O.D. for the effluents from the West Side and Southwest Plants, refers to the B.O.D. at the outfalls; the B.O.D. at Lock-
3299 port would be much lower because of the time of flow of four days; the relation would be 27/68 times the values he has given; therefore, these contributions to the B.O.D. at Brandon Pool have been estimated too high, and the other sourec of B.O.D., sludge deposits, has been estimated too low; I have not made estimates on this basis, possibly Mr. Pearse has values for sludge demand; I have not used this method to show sources of B.O.D. as I am not satisfied with any of the computations.

3301 The third item of Mr. Howson's Exhibit 11, refers to the desirability of eliminating by-passing of part of Southwest flow after primary treatment; I do not consider this as by-passing, as it is not raw sewage, but settled effluent.

Item 4 on Howson Exhibit 11 refers to the desirability of keeping sludge out of the canal; I believe Mr. Howson has estimated a very low value of B.O.D. of sludge deposits. In my opinion they will exert an influence twice the 105,000 lb. shown in Howson Exhibit 11, for the first season and 105,000 the second season, and 50,000 the third season.

3302 Item 5, referring to chlorination, shows an estimate of removal of 12 p.p.m. of B.O.D. in the channel by application of 6 p.p.m. of chlorine; I do not agree that this is possible; I do not consider chlorination to be a proven method for removal of B.O.D. as compared with known and used methods of sewage treatment; where chlorine is used wtih settled effluents, as at Detroit, Cleveland, Buffalo and Toledo, the purpose is not to remove B.O.D., but to kill bacteria. Mr. Howson does not include in his Exhibit 11, the suggestion of using chlorine for the West Side Effluent; this suggest-
3303 ion was made by Mr. Enslow (page 2023 of the record) who stated that "I began thinking how simple it would be to chlorinate that effluent as well and get reduction in oxygen demand and this delay in bacterial effect a good deal more economically than with chemical precipitation. I was rather thinking out loud now, but that is my thought in the matter". I submit that this is rather snap judgment concerning choice of a method for treating the West Side Imhoff effluent; I reject it as totally incapable of doing what is claimed for it.

I have prepared a tabulation of volatile solids discharged to canal, offered as Exhibit 13, Mohlman Cross Examination. This exhibit is an extension of Exhibit 10, offered earlier; the present Exhibit 13 shows an-

nual results for the years 1938 through 1943, (esitmated
3306 after August, 1940); I would call attention to the reduction in the West Side effluent at the end of 1942 because of the operation of activated sludge there at that time; there is a sharp reduction in 1943, indicating that at that time conditions can be expected to become
3309 materially better. I call attention to a statement on the exhibit referring to the flocculation of solids from the Imhoff effluent, this causing some sludge demand in the channel; this will be a factor to be considered seriously through 1942, after that the activated sludge effluent will not have that effect.

The Master: I would be interested to see the results on this same basis for earlier years, say 1936 and 1937.

3311 Ans. I will be glad to give you those figures; (offered later as Mohlman Exhibit 15.)

One more comment—I note in Mr. Howson's Exhibit 14, which will be discussed by Mr. Pearse, that on Line 4 he shows the B.O.D. at Lockport in pounds; this does not show the actual condition of the water unless you take the flow into account, and show the results in parts per million; one might assume from the record of pounds that the condition of the water has been steadily improving since 1938, but the parts per million, that is the actual analyses, show that it has been much worse since 1938; the p.p.m. were 17.3 for 1938, 30.2 for 1939, and 20.6 for 1940; his estimate for 1941
3312 shows 7.3 and for 1942, 4.8; I believe he is estimating an optimistically low B.O.D. for those two later years, because of the B.O.D. from old sludge deposits.

3382 There are no results of tests for hyrogen sulfide made by the Sanitary District or by others, that are known to me, except those that have been testified to in this hearing.

FLOYD W. MOHLMAN

Exhibits: 3530

3530 Mohlman Exhibits 14a to 14e, inclusive, are as follows:

14a. Basis for Estimating Addtional Diversion Needed in Summer.

14b. Analyses at Lockport and Diversion, 1940.

14c. Proposed Increase of Diversion—Actual Increase to be Modified in Accordance With Results of Sanitary District Analyses Submitted to U. S. Engineers—Year 1941—Cu. Ft. per Second.

14d. Proposed Increase of Diversion—Actual Increase to be Modified in Accordance With Results of Sanitary District Analyses Submitted to U. S. Engineers—Year 1942--Cu. Ft. Second.

14e. Basis for Estimating Additional Diversion Needed in Summer for Ameliorating Conditions in Brandon Pool.

Mohlman Exhibit 15, is as follows:

Record of Dry Volatile Solids Discharged to Canal in Sludge, Raw Sewage and Effluents—Tons per Year.

FLOYD W. MOHLMAN

Re-Direct: 3589-3628

3589 Preliminary steps were taken by me to carry out the sampling and analytical work for the 10-day flushing test. The order was dated Nov. 25, 1940. Prior to this date a scheme of sampling and analyses was worked out and discussed with Mr. Warrick, and his suggestions were followed. He visited Brandon Pool with me twice, once before and once during the test.

3590 Samples were collected from Nov. 17 through Dec. 17, 1940, comprising five days before the test, ten days during the test, and five days after the test. The scheme of sampling and analyses was described in a letter of instructions dated Nov. 28, 1940, which I offer as Mohlman Ex. 16.

3594 Samples were collected at 14 stations, extending from the Mouth of the Chicago River to Chillicothe. The most important stations were those at Cass St. in Joliet just above Brandon Pool, and at Brandon Bridge, just below the Pool.

The original data of the test are included on 80 pages of typed forms comprising some 8,900 results. These data are summarized in the Report in 23 pages of tables.

3595 The original 80 tables are available but are not included in the Report.

I suggest that the "Summary and Conclusions" be read and then I will explain the detailed data therein. I offer the Report as Mohlman Ex. 17.

3597 The Report is divided into discussion first of suspended solids, which form sludge; second, dissolved oxygen; third, B.O.D.; and finally, a survey of sludge deposits before and after the test.

3598 The Des Plaines River enters below Lockport and above Cass Street. Most of the tests for dissolved oxygen were made hourly.

The suspended matter at Lockport averaged 15 to 19 parts per million before the test. On the first day of

the test this increase to 327 p.p.m., and the maximum
of 491 p.p.m. occurred on the second day. After the test
3599 the results again returned to 17 or 18 p.p.m. At Cass
St. the results were slightly higher than at Lockport.
The maximum at Cass St. was 504 p.p.m. at Brandon
Bridge the results before the test were 14 to 19 p.p.m.
On the first day the average was 75 p.p.m., and the
maximum of 109 p.p.m. was reached on Dec. 7-8, the
sixth day of the test.

The parts per million are computed to tons per day,
3600 showing 75,990 tons of suspended solids and 24,190
tons of volatile suspended solids carried past Lockport,
84,010 total and 27,067 volatile past Cass St. into Brandon
Pool, and 21,123 tons total and 7,512 tons volatile
carried out of the Pool. These results show that 74.8
3601 per cent of the total suspended solids and 72.2 per
cent of the volatile suspended solids were deposited in
the Pool.

The increase of suspended solids was very rapid at the start of the test. At Cass St. the suspended solids increased from 25 p.p.m. at noon, when the flow was increased, to 526 p.p.m. at 6 P. M. At Brandon Road the increase reached 131 p.p.m. at 1 P. M., thereafter running 88 to 90 p.p.m.

3602 There was an 86-fold increase in suspended solids and a 32-fold increase in volatile suspended solids at Cass St. for the first day of the test, as compared with the day before the test. The results show a great variation from hour to hour, demonstrating the necessity for frequent samples.

The Brandon Bridge results never reached those at Cass St. by quite a bit. There was a slight increase at

3603 Brandon Bridge on Dec. 7th, the day the level was lowered one foot; but even on that day the results were only half those at Cass St.

It appears that 506 times as much material was carried out of the Drainage Canal during the test as would have been transported in one day under dry weather normal winter conditions with a diversion of only 1,500 c.f.s.

3604 The results show that considerable material was carried out of Brandon Pool during the test, but considerably more was deposited in the Pool.

In my Exhibit 15 it was estimated that 76,000 tons of volatile solids would be discharged into the Channel from all sources in the year 1940. About 35 per cent of this amount was carried out of the system at Cass St. during the test. The actual sludge deposited in the Channel in 1940, as volatile solids, was about 15,000 tons.

3605 Results at Marseilles and Chillicothe during the test showed a rather moderate increase in solids, mostly silt. There was hardly an appreciable increase in B.O.D. and suspended matter that far downstream.

For stations above Lockport, results indicated that there were no very large or extensive deposits of sludge above Summit. Results at Chicago Avenue indicated no large amount of sludge in the North Shore Channel.

3606 Turbidity results are of no particular significance.

3607 Dissolved oxygen results in Brandon Pool were somewhat higher than at Cass St., but at the end of the test the dissolved oxygen in the Pool samples slowly decreased from an average of 10.3 p.p.m. on Dec. 12th to

8.1 p.p.m. on the 15th to 2.7 p.p.m. on the 16th, and 0.9 on the 17th.

A similar decrease occurred at Lockport. The table preceding page 15 of the Report shows flows and dissolved oxygen at Lockport in December of 1938, 1939
3608 and 1940. In 1938, with a flow of 5,469 c.f.s. the oxygen increased to 8.2 p.p.m. at the end of the month. In 1939, with a flow of 3,469 c.f.s., the D.O. was very low and increased to 3.5 to 4.5 p.p.m. at the end of the month. In 1940, the D.O. increased from 1.2 p.p.m. the first day of the test, Dec. 2, 1940, to a maximum of 10.7 p.p.m. the day after the test ended. Thereafter the D.O. decreased very rapidly and came down to a few tenths p.p.m. at the end of the month.

Results through Jan. 7, 1941, show only 0.7 to 1.0 p.p.m. D.O. to be present. A longer period of observation will be needed to demonstrate whether this will increase. We might expect conditions at Lockport ought to be improved because of the flushing out of the large
3609 tonnage of sludge, but I am disappointed that more D.O. hasn't been present these last several weeks, because there is no question that a little later on when the weather begins to get warmer the D.O. will be less and will get down to zero pretty quickly. It is a little disturbing to see those low dissolved oxygens at Lockport in the middle of the winter.

3610 The dissolved oxygen results in Brandon Pool are shown in Appendix F and Fig. 2 of the Report. Samples
3611 above the ice fender wall were not collected until Dec. 6th. At Brandon Bridge the dissolved oxygen increased possibly 7 p.p.m. This was because of passage over the dam under winter conditions. Under summer

conditions, according to our records, we rarely find more than 3 p.p.m. increase in D.O. by passage over Brandon Dam.

3612 The D.O. at Lockport Dec. 17th was 2.6 p.p.m. as compared with 1.2 on Nov. 27th; there was also an increase at Cass St., but a decrease at Brandon Bridge. These results would indicate that the test had done no good in so far as creating any more dissolved oxygen.

3613 The consideration of dissolved oxygen is not as important in winter as summer, but if as low values are reached in winter as have been shown at Lockport, it is getting pretty close to the danger point with refer-
3614 ence to putrefaction. However, the main object of this test was to move the solids. The presence of D.O. during the test may have had beneficial effect on the solids because they were washed with an oxygen-rich water.

3615 The results of determinations of B.O.D. showed that the material carried out of the Pool was of more organic character than that carried in. Based on suspended solids, 25 per cent that entered was carried out; 27.8 per cent of volatile suspended solids; and 47.2 per cent of the B.O.D.

3616 In order to check on the amount and character of sludge deposited in the Pool, I had samples collected, before and after the test, by a crew of men using a pitcher pump with a suction hose that can be lowered to any definite level.

3617 The first sample was collected Nov. 1, 1940, and the second trip was made Dec. 27, 1940, long enough after the test to allow conditions to reach equilibrium.

We made soundings, using the disc of the U. S. Engineers. In most cases the disc sank lower than the most dense sludge we were able to collect on Nov. 1st, and therefore I conclude that the soundings pass through the lighter sludge and down into the thicker and denser sludge.

3618 The putrescibility of foulness of the sludge is shown by the B.O.D. per gram of volatile solids, and in eight out of ten samples this was greater after the test than before. This indicates the surface sludge was somewhat more putrescible than before the test.

3619 The soundings indicated a fill of about two feet of sludge. At 88 per cent moisture the suspended matter deposited in the Pool would equal a fill of two to two and one-half feet, and would be equivalent to about 500,000 cu. yds., or an equivalent number of tons. This was taken out of the Drainage Canal and therefore water coming from the Lake should contain a higher
3620 level of dissolved oxygen. However, the results at Lockport have not as yet shown an increase of D.O. If enough water is diverted to maintain oxygen at Lockport, it should benefit Brandon Pool. But in my opinion this cannot be done unless the diversion is increased as in the suggestions I made in Exhibit 14.

3621 I believe it would have been slightly more helpful if the Pool had been lowered five feet, instead of one foot, but I can't believe it would make a great deal of difference in this cold weather, when gas is not being given off and it is not in ebullition. There was some gassing after the test but none before. Such ebullition is much more marked in warm weather.

3623 Lowering the Pool levey by five feet would give greater velocity, but that would not be a very great factor. If gas were being given off, it might bring sludge to the surface, but it wouldn't occur anywhere near as much in winter as in summer. Even in summer the sludge would only rise and fall again, if there were a flow of only 3,100 c.f.s.

3624 The foot lowering during the test didn't do much. On that day the tonnage going past Brandon Pool was only half that coming from Cass Street.

3625 The results of the test have led me to believe that conditions of odor production have been concentrated in Brandon Pool, that sludge of greater putrescibility has been put in it, and that the need for relief will be about the same next summer.

3626 It is my judgment that within the next month or two the dissolved oxygen at Lockport will again be down to zero. If diversion were increased through the summer and oxygen were maintained at Lockport, there would be a better chance of getting the beneficial effect right at Brandon Pool. If nothing more is done and the Supreme Court doesn't increase the diversion, I would say that conditions at Joliet next summer would be about the same, or worse than if the 10,000 c.f.s. had not gone through for ten days.

3627 Down stream, as far as Peoria, there was hardly a noticeable effect from the test. There was always a large excess of dissolved oxygen, even below there, as shown by tests made by the State Department of Health.

F. W. MOHLMAN

Cross Examination: 3699-3777

3699 The maximum width of Brandon Pool is about 1400 ft. and the depths vary down to the sludge level of around 18 to 20 ft. From the surface of the sludge to the bottom of the Pool the density of the sludge in-
3701 creases. The depth where you detect the sludge by soundings depends upon the weight and shape of the sounding apparatus.

It is generally true that the higher moisture content is at the surface of the sludge and the moisture content decreases as you go down into the sludge.

3702 In winter there is a sharper line of demarcation between sludge and water than in summer. There is a greater degree of mixing or intermingling of sludge with the overlying water in summer because the temperature induces formation of gas in the sludge, which lifts the solids, and when the gas is liberated the solids will again drop.

3703 The suspended solids in the West Side effluent would be mixed with silt and of different character in the Pool than when discharged. Only analyses to show the avidity for oxygen will show the degree of putrefaction of the sludge.

The tests we made indicated only about a foot and a half or two feet of active flocculent sludge in the Pool in winter.

3704 Out of a total depth of 18 ft. of water, the upper 5 ft. is relatively clear compared to the sludge layer below.

3705 If you lowered the Pool level five feet you would get comparitively clear water, as we found a maximum of 105 p.p.m. suspended solids in our samples at Brandon Bridge, whereas the sludge at the bottom of the Pool contained from 40,000 to 120,000 p.p.m., therefore
3706 400 to 1,200 times as concentrated. Therefore skimming off the top water would not in any measure be equivalent to getting rid of the sludge that is on the bottom of the Pool.

The top solids would not be much more avid for oxygen than the bottom sludge—approximately in the ratio of say 300 milligrams oxygen for bottom sludge compared with 380 as a maximum for the Lockport sludge, as shown in Mohlman Ex. 7.

3707 The sludge still has 75 per cent of its original potency.

The lighter flocculent sludge has greater avidity
3708 for oxygen than the heavy dense sludge. There is only a foot or two of this lighter sludge in winter, but a greater depth in summer due to mixing by ebullition of gas.

3709 Attempts to raise sludge in winter by dragging weights with boats would not be successful, in my opinion. Sludge is not like a soluble material, sugar, which diffuses so that the concentration is the same from top to bottom. Sludge is insoluble and is graded according to its specific gravity.

With that depth of 18 ft., I think it would be quite
3710 difficult to stir the sludge in winter to a degree that would bring it up into the water. After you get it in the water, it will again sink if you don't have enough velocity to sweep it through.

No attempt was made to stir up the material during the 10-day test by dragging weights from boats, or any other method. I don't think such a procedure would have helped appreciably, for the reasons I have given. In winter it would have to be violently stirred, whereas
3711 in summer if you once gave it a good stir, the gas and other actions would help to bring it up. Even then, if you don't have the velocity to carry it through, it will
3712 sink again. If you got it into the upper five feet and then didn't wash it out, it would be more prone to give putrefaction and odors then if it hadn't been stirred up. I think it would increase odors, since it would not be oxidized nor removed.

3713 Several factors entered into the failure of the 10-day test to give the results hoped for. It would have had more chance to succeed in warm weather, at a time when the sludge was in a condition just ready to rise. In winter the only way in which it could wash through Brandon Pool was by opening some of the gates and getting a concentrated effect through the center part of the Pool that would carry sludge through.
3714 As the test came out, the current induced wasn't sufficient to carry through the material that came in from the Main Channel. However, 28 per cent of the suspended matter and 47 per cent of the B.O.D. carried through, but more putrescible material was left in the Pool than was there before.

3716 I have no data on the actual velocities in the Pool during the test. Mr. Ramey looked after that.

3718 The general level of the flocculent sludge in the Pool in winter is from 18 to 20 ft. below the water sur-
3719 face. Flocculent sludge contains from 99 down to 90

per cent moisture. In summer I would estimate that this potent, active material would not be closer than
3721 15 ft. to the surface of the water. The total depth of the Pool is approximately 24 ft. The summer sludge will bulk a little and I might as well guess 12 ft. from the surface as 15 ft. I will find out next summer.

3723 The gates at the lower end of the Pool were opened close together, over a distance of about 80 ft.

3724 The increased velocity during the test took some of the sludge out of the Main Channel, but not all of it.

3725 The maximum lowering of the Pool was one and one-half foot. Any further lowering would, in my opinion, have produced only a minor increase in the solids carried out of the Pool. With the lowering of a foot and one-half, twice as much sludge was carried into the Pool as out, therefore I don't think a further lowering could overcome that large differential and carry
3727 out more than was brought in. This is my best opinion but I am quite willing to defer to Mr. Andrew's opinion on that if he has a different view.

3728 The maximum hourly result at Brandon Bridge was within 20 p.p.m. of the minimum hourly result at Cass St., but you must take the average for 24 hours, not single selected results. The average results for
3730 the day of maximum lowering showed that only half the tonnage that came into the Pool was carried out. The average difference between Cass St. and Brandon Bridge on this day was 30 to 35 p.p.m.

3731 The reduction of B.O.D. of 47.2 per cent does not apply only to the solids, but to all of the flow, liquid as well as solid. The sludge demand goes on for months and years and must be considered on a different basis from the flowing material.

3732 There has been an improvement in the Main Channel and a deterioration in Brandon Pool. If you take the entire system, there has been an improvement due 3733 to the removal at Brandon Road of 21,112 tons of suspended solids and 7,512 tons of volatile suspended solids. One-fourth of what was moved was carried out of the Pool.

Mr. Ramey can give the amount of water that went 3734 through the wheels at the Lockport Power House and the value of the power produced.

3735 The term "volatile suspended solids" means the loss of solids when a dried sample of sludge or dried suspended solids are ignited in an electric furnace at 650 deg. Centigrade. It is the putrescible part of the 3736 solids as the other part, mineral matter, does not putrefy. Even some of the volatile matter does not putrefy. For example, in nature if a dead animal putrefies and everything returns to the soil, you still have a humus material there that is still organic but not putrefactive. The rate at which volatile, or organic matter is stabilized is shown by the curves I introduced (Mohlman Cross Ex. 6 and 7).

3737 There is some degree of aeration of the Southwest effluent that enables it to pick up dissolved oxygen 3739 before it enters the Main Channel. At the Lockport Station, during the test, on Dec. 2-3 there was 1.6 p.p.m. dissolved oxygen, whereas at Cass St. it was 0.7 p.p.m. 3740 The flow passes through the turbines at Lockport. The decrease in dissolved oxygen is due to the amount of sludge picked up between Lockport and Cass St., an

increase from 73,990 tons at Lockport to 84,010 tons at Cass St. This increase was due to agitation. The sewage
3741 of Joliet comes in below Cass St. The substantially greater content of dissolved oxygen at Brandon Bridge during the test was due to the aeration in passing over Brandon Dam and through the gates. This was under winter conditions, and the increase was about 7 p.p.m. We have made many tests in the summer and had
3742 never found more than 3 p.p.m. This was with a flow of 3,000 c.f.s., or with 1,500 c.f.s. diversion.

I would think the opportunity for aeration would be greater with a thin layer going over the dam with 3,000 c.f.s., than with a thick layer going over at 10,000 c.f.s. "Aeration" means the rate at which you can force oxygen from air into a dissolved state in water, whether
3743 you do it by blowing air in, or by passing over a dam, or by inducing agitation. It is a fact that the thinner the layer of water flowing, the more rapidly it will take up oxygen. You would get more tons of oxygen into a larger volume of water, agitated, but you would get more in a thinner film in parts per million.

3744 In the Report of the Flushing Experiment, the increase of dissolved oxygen with 1,500 c.f.s. diversion, from Cass St. to Brandon Bridge was from 1.1 to 8.5 p.p.m., whereas during the test, the increase was from 8 or 9 p.p.m. at Cass St. to 12.1 p.p.m. at Brandon Bridge. Thus the larger flow absorbed less oxygen.

3745 Aeration by cascades would have to be practiced at Lockport, above Cass St. The 10-day test records show the aeration that took place at Brandon Dam. At Lockport, where the water goes through the turbines, there was no dissolved oxygen picked up by aeration.

For the third time, I want to point out definitely that this is under winter, and not summer conditions.

3746 I consider that the condition of Brandon Pool was a menace to the health of the people of Joliet in 1940.

3747 The pickup of oxygen depends on the temperature of the water. In winter, for example, I show up to 14.8 p.p.m. dissolved oxygen at the Mouth of the River, whereas in summer, it is only about 8 p.p.m. Likewise the absorption varies as to the degree of unsaturation. The ebullition of gases is caused by production of gas

3748 by bacterial putrefaction. The production of gas depends almost entirely on the temperature of the water, which is dependent on the temperature of the air.

3749 I believe that the only solution to this problem at Brandon Pool is increased diversion from Lake Michigan. No other temporary measures proposed in this case compare with it in efficacy.

3750 With the present flow of around 3500 c.f.s. I do not believe that any of the suggestions brought up and discussed would be successful. None of them were really new to us. We had analyzed their practicability, efficacy, cost, and time to install, and we had concluded that none of them offers the hope, I would say almost the certainty of improvement, that we could get by additional diversion.

3751 Assuming that no increased diversion would be granted, it is my opinion that the other ameliorating measures proposed do not have enough possibility of success to warrant the attempt to do any of them, or all of them together. I have no reservation in my mind of any other remedies that haven't been proposed. I mentioned the use of chlorine and nitrates myself and stated the enormous cost of those measures and other witnesses took up the question of time.

3753 Leaving out the element of time for installation, I would not consider the ameliorating measures would correct conditions next summer. As a permanent solution I would say complete our activated sludge plant as quickly as possible.

3754 The best suggestion for amelioration, next to the immediate use of water, was the idea and hope we could get the sludge out of the Channel and downstream, as discussed in this hearing. Since that has not been done, if no increase of water will be available next summer, I would say we would just have to wait until the sewage plants were completed.

Sewage has been discharged into the waterway for
3755 forty years. Analyses to show conditions at Lockport since 1926 have been put into the record as Ill. Ex. 37. Records of tonnages of sludge have been shown in Mohlman Ex. 13a back to 1936 and of pollution in Pearse Ex. 61.

3759 Records in pounds per day would indicate that 1940 was much better than 1938, but in parts per million 1940 was much worse than 1938. This is because of the diversion of 5,000 c.f.s. in 1938 and only 1,500 c.f.s. in 1940.

3760 I would infer that if the pounds of B.O.D. at Lockport in 1940 were 432,000, equivalent to 27.9 p.p.m., that with 194,000 lb. in 1941, the B.O.D. would be less than half the 27.9 p.p.m. shown in 1940.

3764 I think that the critical thing that is a guess for anybody is the effect of the sludge deposits. With this test coming along, changing those characteristics, I certainly won't make a guess on it.

4015 Mohlman Exhibit 18 consists of the following parts:

18a. Dissolved oxygen and B.O.D. at Lockport; January, 1938 and 1941 (Chart)

18b. Total Discharge at Lockport; January, 1938 to 1941

18c. Dissolved Oxygen and Oxygen Demand at Summit, January, 1938 to 1941

18d. Dissolved Oxygen and Oxygen Demand at Lockport, January, 1938 to 1941.

4000 Mohlman Exhibit 19 consists of a general statement for the assistance of the Court. The first section is
4001 entitled "Sewage Disposal and Stream Pollution"
4009 and the second section "Sludge Disposal".

4464 Mohlman Exhibit 20 is a Table showing the Results of Analyses for Dissolved Oxygen and B.O.D. at Lockport for the Month of January, 1941.

Illinois Exhibit 37A is an extension of Ex. 37, with results brought up through December, 1941.

1496 C. R. ANDREW

Direct Examination by the Master

An aeroplane view of the Brandon Road Pool taken on March 28, 1933, is marked "Andrew Exh. 1."

1497 I am the principal civilian assistant of the District Engineer in the Chicago office of the United States Engineers. Graduated from Norwich University in 1906. Worked on the Ohio River Improvement; then for the Missouri Pacific Railroad for a year; then the McClintic-Marshall Construction Company for six months. During the War was captain of engineers. Worked for the Division of Waterways. From 1925 to 1930, in private practice; City Engineer for Decatur from 1919 to 1921; with the Mississippi Valley Structural Steel Co. for nearly two years, on construction. Since 1930, have been in the office of the Chicago District Engineer.

1499 Am familiar with the Illinois Waterway. (Identifies Andrew Exh. 1 as correct representation of the Brandon Pool.) The Rock Island Railroad bridge can be readily identified as the first bridge one sees looking
1500 north in that exhibit. Today there is another bridge at McDonough Street.

1501 Sludge in the Brandon Pool and at other points in the channels of the Sanitary District can be removed by hydraulic means. Sludge is defined as material settled out of the water in a deposit so solid that a 10-inch disc attached to a 10-pound lead weight defines the
1502 surface thereof. The District Engineer has made two surveys of the Pool, one in 1933 or 1934, the other in 1939. The deposits since 1933, according to the 1939 survey, have ranged from 2 to 10 feet, and generally
1503 are from 6 to 10 feet. The deposits are mostly below Jefferson Street. Above Jefferson Street there were no appreciable deposits. The depth of the Waterway in the Pool ranges from 10 to 20 feet below the present water surface. The data only indicates the deposit during the period. The material of which I speak can be re-
1504 moved by hydraulic methods. The deposits run from 1,250,000 to 1,500,000 cubic yards. In 1932, the United States removed about 73,000 cubic yards of soft material above Lockport by hydraulic methods at a cost of

not less than 37 cents per cubic yard. The cost of removal would be not less than 40 cents per cubic yard at present, but not including the cost of the spoil area. The total cost would be between $500,000 and $750,000. From six to nine months would be would be required. Navigation would not be disturbed. The material could be placed on vacant land downstream from the Brandon Dam near Hickory Creek, on the
1504 left bank, behind the present retaining wall. About 200,000 to 250,000 square yards would be required for the spoil area, or about 400 acres. I have no idea of the cost of the land, but it is not in cultivation. The dredged material so placed would be left to dry out. There is no other method to remove such material from the Pool.
1506 This deposit has accumulated for years, even with a flow of 8,500 c.f.s. or 5,000 c.f.s. A diversion temporarily increased to 5,000 c.f.s. would not remove such a deposit. In so far as the deposit is the source of odors, a flow of 5,000 c.f.s. will not remove the accumulated deposit. Other means than an increased diversion will
1507 be required. It is physically possible to drain the Brandon Pool by manipulating certain gates in the Lockport lock, the Power House, and in the Brandon Dam and Lock. Such draining will not remove the material of which I speak, in any quantity. Such material can only be removed by dredging hydraulically or otherwise. The United States deposited some 107,000
1508 cubic yards in the Pool from the dredging in the towpath. My estimate of the deposit is within 1,2500,000 and 1,500,000 cubic yards and is not accurate to 100,000 cubic yards. The Government deposit is accurate.

1509 The pollution comes from the flow in the Main Channel. There may be some discharge of oil above the Power House. The most feasible or practical measures to eliminate the odors emanating from the Waterway at Lockport or Joliet are to remove the pollution at its source and to flow an additional diversion. I know
1510 of no other methods which are feasible. I am not a sanitary engineer. I cannot tell whether the odors come from the accumulated deposit or from the current matter coming down.

Cross-Examination by Mr. Clausen.

1510 By sludge, I only refer to the material detected by
1511 the method of sounding used by the District Engineer. I would sink into such material if I stood on it, and could not walk on it. It is detected by a disc 10 inches in diameter attached to a 10-pound lead weight.

I have not considered the biological results of the removal and do not know if material removed would give off odor in the spoil areas. The depth of deposit would be about 6 feet on the spoil areas. Dikes would
1512 be thrown up to create lagoons into which the deposits would be pumped by the hydraulic dredge. The Hickory Creek area adjoins Brandon Pool and is closer to some houses than the wall of the Pool. I cannot tell
1512 how much liquid will have to be pumped per cubic yard of material moved. From 60 to 90 per cent of the material pumped is water.

1513 A cutter head would be required on the suction of the dredge. The cost of the spoil areas and dikes are not in the estimates. The dikes would be built with drag line, with material from within the spoil area.

Cross-Examination by Mr. Naujoks

1513 I served five years with the Division of Waterways
1514 of the State of Illinois. The contract for dredging at 37 cents per cubic yard was on the Waterway, just above the Lockport locks. In the 1940 Budget Report of the Sanitary District, on page 71, the flow of 23 c.f.s. from the Texas Company is water taken from the canal
1515 and discharged into the Des Plaines River or the Creek and eventually enters the Brandon Pool.

The area of land for the spoil areas should be around 40 to 50 acres, not 400 to 500 acres.

Direct Examination by the Master.

1516 There is some deposit in all the pools of the Waterway below the Brandon Pool, above each dam. Such material is not primarily material dropped by polluted water from the Main Channel of the Sanitary District. A great deal of that material is ordinary erosion from the upper end of the pool settling in the lower end, where the current is much less. In Peoria Lake, there is a large amount of very soft material.

1517 A current survey indicates from two to four feet of deposit in the Main Channel from Damen Avenue to Lockport, but not as much as the six to ten feet at the lower end of Brandon Pool.

1518 The Pool was placed in operation in 1932 or 1933 by the United States as part of the Waterway completed under the Rivers and Harbors Act of July 3, 1930.

The Master indicates no need to press the question of opening the locks at Brandon Road with the U. S. Engineer office.

Cross-Examination by Mr. Clausen

1519 In a general way, prior to the creation of the Brandon Pool, the current above the old Jackson Street dam was reasonably slow. Below the dam the river flowed rapidly over rocks in low water. The bottom was very 1520 rough. The channel was from one to three feet deep, depending on the flow from Lockport, but might rise to six or eight feet. The river was not navigable. Navigation went through the old I. & M. Canal.

There is no necessity for removing the deposits in Brandon Pool for purposes of navigation.

Direct Examination by the Master

1521 A new survey would cost from five to six thousand 1622 dollars and might require over two or three weeks, if rushed. There is no way to determine the rate of accumulation at present in the Pool without a new survey. It would be very difficult to obtain accurate quantita- 1523 tive data, because of the type of material. There is still over 20 feet of water in the Pool, so the necessity of dredging is many years away.

Cross-Examination by Mr. Clausen

1523 There is material, semi-liquid or semi-solid, which floats near the bottom of the river over the mate- 1524 rial you define with your disc. I have no knowledge of its amount.

Cross-Examination by Mr. Naujoks

I know of no spoil areas within reasonable distance other than the Hickory Creek area, where dredged material could be deposited by hydraulic means.

Direct Examination by the Master

2031 The movement of traffic on the Waterway and lockages at Brandon Road, for 1938, 1939, and up to March, 1940, is shown by tabulation on page 2032 of the Record.

2033 The structures at the Brandon Road Lock and Dam consist of a section of earth embankment, a lock, and a head gate section. There is an ice chute with a sector dam, also six emergency valves. The dam proper is of concrete, with Taintor gates, which can hold the water 30 inches above the concrete. Of 16 gates, 6 are movable. By manipulating these 6 gates, the water in the Pool can be drawn down to elevation 511, or 28 feet below the present pool water level. If all six gates
2034 were opened, the Pool might be emptied in about three hours, with an average outflow of 13,800 c.f.s., including 2,500 c.f.s. from Lockport. The present capacity of the Pool is around 120,000,000 cubic feet instead of 151,000,000, the original volume. By opening all gates to full extent, the speed of emptying would be too fast and would create a wave downstream, which would
2035 damage low land. By raising only the top half of the six gates, a net outflow of 4,300 c.f.s. would drain the pool in eight hours and lower the water to elevation 521. Elevation 521 is from one to three feet above

present level of firmer sludge, as shown on the 1939 survey.

2036 The level of the Dresden Island Pool might also have to be lowered. The Dresden Island dam is of a different type, consisting of a series of Taintor gates, which can be lifted. The water goes under the gate instead of over the dam. Operation could be conducted
2037 simultaneously with operation at Brandon Road. Because of the wave, further operation would be required at Marseilles and downstream. The ultimate result
2038 transfers downstream considerable material now in Brandon Road Pool into the other pools down river as
2039 far as Peoria Lake. Repeated flushing would lengthen period of time that navigation and other interests are
2041 damaged. Repeat flushings should be done as rapidly as possible. A larger diversion will probably carry more material to the Brandon Road Pool from the channel of the Sanitary District.

Cross-Examination.

2043 I consider the Brandon Road Pool extends from the lower gates of the Lockport Lock to the upper gates of the Brandon Road Lock. The larger proportion of the sludge or even the light flocculent material is located in the lower quarter of the Pool. There is little material in the upper three-quarters above Jefferson Street in Joliet.

2044 As material moves downstream, it would not be uniformly deposited through the channel but would deposit in immediate vicinity of dams or wide portions

2045 of the river where the current was slow. The pools from Marseilles downstream would be in worse condition than now.

2046 Refilling of Brandon Road Pool could be controlled. 2047 However, refilling at the rate of 10,000 c.f.s. would set up heavy currents in the Main Channel and would interfere with navigation in the Chicago River and 2048 would be hazardous. The level of Dresden Island and all the other dams below would be predicated upon the action at Brandon Road.

2049 Brandon Road Pool does not freeze except in extreme freezing weather. Only on rare occasions does ice form in the Pool or in the Sanitary District channel. 2050 Every year there is heavy ice in some parts of the 2051 lower river. With ice on the lower river it is hazardous to put extra water through, because of danger of ice gorges and flooding of territory.

Cross-Examination by Mr. Clausen

2052 The whole bottom of the pool can be exposed if necessary. By increasing the flow in the Sanitary District canal, a considerable quantity of the light flocculent material in the canal would be transferred to 2054 Brandon Pool. The larger flow or diversion would probably carry more material to the Brandon Road 2056 Pool from the channel of the Sanitary District. In filling up Brandon Road Pool at the rate of 10,000 c.f.s., navigation would stop for two or three days in the Joliet Pool and navigation would be interrupted along the river for a greater period.

Cross-Examination by Mr. Naujoks

2057-
2058 A diversion of 5,000 c.f.s. would carry more material than a diversion of 1,500 c.f.s.; that is, as its velocity increases, its carrying capacity increases.

Examination by the Master

2727-
2728 The Government has a permanent force of 25 to 40 men working continuously between Lockport and Brandon Road. There are eight at Lockport, twelve at Brandon Road, and ten to twenty at the moorings and repair yard. Two lock keepers and their families sleep alongside the lock in houses at Lockport, and two lock keepers and families have lived over the bank near the I. & M. Canal at Brandon Road. On a tow boat the crew varies from eight to twelve men, many of whom sleep on the boat. Again, they may sleep at home in Joliet. The crews of non-government craft passing through ran from eight to twenty men. Some boats go through several times a month. Probably 75 to 100 men pass through on commercial boats several times a month.

Examination by the Master

3581 My report on the temporary 10,000 c.f.s. diversion
3582 has to do entirely with operations. No difficulties occurred. We did not get anticipated rise in lower river because of cold weather, which froze the water in the tributaries. Lowering of the dam at Peoria proved
3583 dangerous because of ice conditions. Regarding the

lowering of the Brandon Pool, the War Department will cooperate in lowering it five feet if provision is made to protect water supply of users, the United States to be held harmless of all claims for damage,
3584 and if given ten days' advance notice of any change in water levels. Such a lowering at present will have no substantial beneficial effect unless rising material is removed, while an increased diversion would be helpful, as it dilutes and increases the velocity, but it will not make a substantial difference in the amount of
3585 solids carried through the Pool. A floating boom might be pulled through the Pool on surface to carry floating material raised by lowering the Pool. I doubt
3586 if increased flow will move much of the material now in the Pool. From my records, the effect of the 10,000 c.f.s. test was to wash a large amount of material into the Pool from above. At one place, nine feet of deposit was added, although very little was detected above McDonough Street. Considerable material was washed out of the Pool during the test. Lowering of
3587 the Pool level would not have changed results substantially, even if accomplished at the same time as 10,000 c.f.s. flow, while if Pool is lowered without in-
3588 creasing the flow, no benefit would occur. Only object of lowering the Pool is to free some bottom material to float.

Examination by the Master

3781 Prior to the 10,000 c.f.s. test experiment, we computed the expected velocities in the Brandon Pool with 10,000 c.f.s. and elevation 539, and the average

velocity was 0.47 ft. per second. Current meter measurements on December 5, 1940 with Pool at Elevation 539 and flows from 9,500 c.f.s. to 11,700 c.f.s., averaging 10,500 c.f.s., show average velocity of 0.55 ft. per sec-
3782 ond. Maximum velocity was 1.58 ft. per second at 0.2 depth near center of channel, and minimum measured velocity was 0.07 ft. per second. Actual minimum was zero. The measurements took three hours, and
3784 the location of the measurements are shown on An-
3788 drew Exh. 6. During the 10,000 c.f.s. test, our measurements show the velocity in Dresden Island Pool ran from 1.49 to 2.27 ft. per second, and near the Jack-
3789 son Street Bridge in Joliet, velocities ranged from 1.58 to 3.1 ft. per second, while another series near the Jackson Street Bridge ran from 0.02 to 3.09 ft. per second; and another set from 0.39 to 3.92 ft. per sec-
3789 ond. The velocities through gates at Brandon Dam exceeded 12 ft. per second. No figures are available as to the velocity in the Pool under ordinary conditions prior to the test. The test experiment failed to sweep
3790- out flocculent material because we believed erron-
3791 eously that the flocculent material was light enough to pass through the Pool, even at low velocities. The
3792 effect of increasing the diversion from 1,500 to 5,000 c.f.s. would be to carry material further down the Pool toward Brandon Road Dam. Navigation requires a 9-foot channel and dredging has never been necessary
3793 in the Pool. The depth at which flocculent material is encountered in the Pool depends on the depth. If 20 to 25 feet depth, probably encounter flocculent material at 15 feet below surface. Depths of water are from water surface to point measured by United States

3795 Engineer method of sounding. In my judgment, lowering the Brandon Pool any distance up to five feet in cold weather, or after an extended warm period, with or without additional diversion, would have no appreciable beneficial effect upon the sanitary conditions at
3796 Joliet. Even with a lowering of five feet during recent test, no benefit would have occurred because in the lowering of the Pool five feet, the change in estimated velocities is so small that it would result in only a very small difference in final results of material passing out
3797 of the Pool. No complaints of damage yet received from this 10,000 c.f.s. experimental flow test. I have worked fifteen years along the Waterway, except for
3798 six months. In 1924-1925, I was located at Starved Rock. Odors from the river were very offensive. Odors from the Marseilles Dam also were very offensive. Odors in Joliet were very offensive. Conditions improved until 1930. In 1933, when dams went into operation, water continued to improve. From 1933 to 1938, conditions improved year by year, with nuisance only where water was broken up at Lockport or Brandon Road dam. Unable to make comparison between
3799 1925 and 1939 because conditions were so different.
3800 Opinion is conditions were about the same. Prior to 1935, odors at Joliet were not obnoxious. My recollec-
3801 tion of conditions at Joliet falls into several periods: (a) 1925 and shortly thereafter—conditions very bad; (b) 1933 to 1938, conditions were improving; (c) 1938 was best; (d) 1939 was worst; and (e) 1940 not as bad as 1939. Odors not particularly noticeable below Dresden Island.

3801 The number of men in the employ of the War Department at Joliet varies from 65 to 70 at the various locks, and at the moorings, 25 to 30 more. The crew is quartered in only one boat; six to eight men. No par-
3802 ticular increase in complaints of illness in 1939 from those men.

Examination by Mr. Cohan.

3802 The velocity in the Pool is 0.47 ft. per second, with 10,000 c.f.s. flow and elevation 539, normal elevation, and 0.63 ft. per second with 10,000 c.f.s. flow and ele-
3803 vation 534. If Pool elevation were lowered more than
3804 5 feet, the velocity would be greater. With equal flows, the velocity in the Main Channel regular section will always be greater than the velocity at any point in the Pool below McDonough Street. I re-
3806 moved some material from the Main Channel by hydraulic dredging. We called it silt and sludge but no chemical or physical analysis was made of the ma-
3808 terial. Water leaving Pool through gates passes under
3809 ice protection wall. Impracticable to lower pool 1-1/2 feet by lock gates. Generally speaking, I would say the
3810 area of Dresden Pool is much larger than Brandon Pool; at least twice; maybe three or four times as large.

Examination by the Master.

3810 I am more and more of the opinion that it is not feasible to drain out the Pool entirely by opening gates and locks. Other methods can be used to remove material, namely, hydraulic dredging.

Examination by Mr. Clausen.

3811 I do not see all the sick leaves for all field employees. Government physician at Joliet only treats injuries. I know of no skin diseases reported in 1939. Government physician only reports in connection with accidents.

Examination by the Master.

3817 In connection with the experiment, I felt it hazardous with 10,000 c.f.s. flow if it occurred when large amounts of ice were in the river and if the Pool were drained by opening all gates at once, as it might damage and overflow land below Brandon Dam. Actually, we had no ice above Starved Rock, but the ice in Peoria Lake went down and endangered operation.

Examination by Mr. Cohan.

3819 The Illinois Waterway has eight pools and it is almost impossible to drain all pools to be empty.
3820 Dredging of Brandon Pool is preferable rather than
3821 trying to empty Pool. If the material now in the Pool were put in the River below Brandon Pool, someone would have to remove it from navigation channels.

2608

C. K. CALVERT

Direct Examination by Mr. Clausen

2609 I have a B.S. degree from Earlham College. While in College, I was a Chemist with the U.S. Geological Survey for 6 or 8 months.

I served as Chemist for the Indianapolis Water Co. from 1908 to 1921. From 1921 to 1936, I was engaged on sewage treatment work at Indianapolis, first on the operation of the experimental plant, then on the construction of the final plant, and finally as Superintendent. During four of those years I was Superintendent of the Indianapolis garbage plant, acting as Superintendent of the Plant for a number of years.

From 1936 to date employed as Superintendent of Purification of the Indianapolis Water Company.

2610 I am a member of various technical societies and have held office therein.

I have had occasion to utilize chlorine in water works at Indianapolis about 1910, first as calcium hypochlorite and then in 1916 as liquid chlorine.

2611 Chlorine was used at the Sewage Treatment Works of the Indianapolis Sanitary District in 1930, at first in the laboratory to learn the effect of chlorine on plant effluent for control of river conditions.

Later used from 3,000 to 6,000 lb. per day on a plant scale in an attempt to control river conditions below the plant. In my water work now I am using from 1000 to 6000 pounds of chlorine per day according to the season and the condition of the water.

In a test on the White River, during August, 1930, a sewage flow of 79 c.f.s., mostly activated sludge plant effluent entered a river flow of 162 c.f.s. which contained about 4.1 parts per million of dissolved oxygen, or about 7600 pounds per day of oxygen.

2612 The effluent contained about 36,800 lb. B.O.D. per day. In the pool below the sewage outflow there was a B.O.D. of 35 parts per million. The stream consisted of a series of pools and riffles. Above the plant stream contained 4.1 parts per million of oxygen. The flow below the plant was about 242 c.f.s. The pools varied in length from 200 yards to a mile. In the riffles the river water picks up oxygen and gives off the noxious odors from decomposition in the pool above. During the summer 150,000 lb. of Chlorine were used.

2613 The chlorine was applied by a home-made apparatus, by delivering the liquid chlorine into a stream of water under high pressure and high velocity. The chlorine entered the sewage in solution. An average of 10 parts per million of chlorine was applied, more than enough to satisfy the 10 minute demand. The rate was changed during the day on the basis of chlorine demand determination in the laboratory. A residual chlorine averaging around 3½ parts per million entered the stream, but sometimes as high as 7 parts per million. I tried to put in enough chlorine to show some free chlorine downstream.

2614 The residual chlorine is the chlorine remaining in the mixture as it entered the stream, which could be removed by the titration of the chlorine by sodium thiosulphate in acid potassium iodide solution. We set up a residual to carry free chlorine down stream as far as we could to take care of the reducing substances produced in the decomposition of the sludge in the pools below the sewage outfall. The residual chlorine usually disappeared as soon as the sewage flow entered the river, in a distance about 2,000 feet. On one occasion residual chlorine was found about 0.7 mile below the outfall or about 2 hours flow.

2615 The reduction in B.O.D. of the plant effluent was about 10 per cent or 20 parts per million or about 2 parts per million of B.O.D. per part per million of chlorine added. In the laboratory, prior to plant scale operation, a reduction of B.O.D. was found about 35 per cent, but this did not occur in practice. So far as the determination of B.O.D. is concerned, the reduction was permanent for the duration of the test, i. e. 5 days. But when it goes into the stream, no difference could be found in the stream, maybe because it is so small. The reduction in the field was much less than in the laboratory experiments.

Primarily chlorine acts as a sterilizing agent. Chlorine is toxic to bacteria. Chlorine also unites with certain forms of organic matter, in reactions which are not well understood.

2616 The application of chlorine reduces the number of bacteria enormously. Some forms of reduced substances are attacked. Chlorine may combine with amines or ammonia, so both are destroyed. After the chlorine is gone, the bacteria remaining are low in number, but there is plenty of food. If the temperature is right, the bacteria then increases rapidly. In relatively pure water bacteria may multiply 100 fold in six hours. After the chlorine residual disappears, the bacteria freely grow again, and multiply very rapidly.

2617 In relatively pure water, chlorination produces low counts. In 6 hours flow in a settling basin, the count may increase a hundred fold. The phenomena may be described as delayed decomposition, since decomposition can take place only through the action of bacteria.

Chlorine is not a substitute for Chemical Treatment or Activated Sludge treatment in permanently reducing B.O.D. Chlorine is not a suitable agent for treating sewage adequately. If enough chlorine can be added, to produce a permanent residual of real chlorine, decomposition would be delayed permanently. A high degree of chlorine may be equivalent to pickling, rather than purification.

2618 In an attempt to obtain a real chlorine residual on an activated sludge plant effluent containing 7 parts per million of ammonia, 175 parts per million of chlorine was applied before a real residual was obtained. That is certainly a pickling agent.

Chlorine is usually applied by putting the gas into solution and carrying the solution to the liquid to be treated. Mixing must be thorough and quick.

2619 Dry application is not satisfactory, because it is difficult to keep the diffusers clear, and difficult to secure proper dispersion. Chlorine is bought in 100 lb. cylinders and 15 ton tank cars. Ton containers are delivered by truck at the Indianapolis water plant. Chlorine is first volatilized in heaters and then delivered into chlorinators, which put the gas into solution. The solution is piped to the point of application. The chlorinators and the pipe require corrosion-proof material. Wet chlorine is very corrosive. Precautions are necessary to protect the men working with Chlorine,
2621 particularly to secure tight joint on all piping. Fan ventilation is provided for quickly changing the air or gas in the rooms housing the chlorinators, evaporators and consumers. The exhausted gas should pass through a spray of cold water or caustic soda solution to pick

up the chlorine gas before discharge to the atmosphere. Gas masks should be available.

I am familiar with the conditions along the Main Channel and at Joliet from past visits and a recent 2622 trip with Dr. Mohlman on September 18. The temperature in Chicago was minimum 61, maximum 78, with south to southwest wind, 13 miles per hour. I noted no precipitation. I have seen the operating records of the District plants in this case. I have learned of the sludge deposits in the Main Channel and Brandon Pool and have seen the gas rising from the deposits. To my mind to remedy the conditions in the Main Channel and the Joliet Pool the most important change is to keep the sludge out.

2623 Sludge settles in a slowly moving stream, forms banks, decomposes anaerobically and uses up oxygen very rapidly in the supernatent water. I do not know the 5-day B.O.D. of sludge. Routine tests for it were never run at the Indianapolis sewage treatment plant. Special tests were unsuccessful. The 5-day B.O.D. is only a small part of the B.O.D. which may run for hundreds of days. I know of no sewage works in the United States which makes 5-day B.O.D. determinations on sludge as a routine. It is sometimes done in research work.

2624 For immediate action to better conditions in the Main Channel and Joliet Pool, an increase in diversion is most effective, because it introduces fresh water and dilutes the organic matter and provides conditions for the normal biology of the water biology to proceed.

Chlorine is not advisable for the betterment of the Main Channel and Joliet Pool. The experience at

Indianapolis was unsatisfactory. No sludge as such went into the stream, only a mixture of activated sludge effluent with a little clarified sewage. This mixture enters the stream in a pool. Sludge banks form in the pools below the plant. The pools are around 4 to 5 feet deep, sometimes 10 feet, but are interspersed with riffles where reaeration occurs and objectionable gases are eliminated. In the first six miles of flow the water
2625 is passing over riffles nearly 50 per cent of the time, yet at this 6-mile point, about 18 hours away from the plant, conditions were not satisfactory either with or without chlorine. In the case of the Main Channel at Chicago the depth, 25 feet, is much greater than in the pools at Indianapolis. There is little chance for reaeration, the flow is slow, and sludge deposits are in the Channel. This is true of the Brandon Pool as well as the Channel. If we were unable to correct the conditions at Indianapolis where we had more favorable conditions than exist at Chicago, then I cannot expect to correct the Chicago condition by the use of chlorine. At Indianapolis the residual chlorine was found on only one condition farther away from the plant than about 2,000 feet. On that basis application would be needed every half mile. Without rather extensive laboratory determination and study of the conditions themselves, I would be afraid to guess.

2626 The operating expense is considerable for applying chlorine. The building requires janitor service, perhaps a laborer would be required. Electric lights and telephone are needed. Fuel is needed for vaporizers and heating building. A Chemist should be on duty at all times, also someone of better than average ability should be available for chlorinator repair and adjustment, also to connect new containers to the chlorine lines as the containers are emptied.

2627 Suitable housing must be supplied. A switch track is also required. Apparatus deteriorates rapidly if not used. Chlorinators may last 5 years.

Piping may not last as long. If moved, the lining may crack.

Chlorine Treatment for the Chicago Joliet situation would require a chlorine application of 150 tons per day as a moderate estimate. The application is required over 5 or 6 months, because the temperature is 15 deg. Cent. or higher for 5 or 6 months.

2628 The expenditure of money for Chlorine in an amount of 150 tons per day to dose the canal is not justified on the basis of the Indianapolis experience. I cannot believe the nuisance would be reduced in a measurable amount in the Joliet Pool. We could not find it at Indianapolis. There is a similarity of industrial conditions at Chicago and Indianapolis. The wastes are preponderantly organic. Both places have slaughter houses, canning plants, laundry and dairy wastes. At Indianapolis there is little iron waste.

2629 Knows of no Chlorine Plant in U.S. designed to and using 50 tons Chlorine per day.

It is difficult for the Indianapolis Water Co. to obtain delivery on Chlorinators at Indianapolis. No delivery is promised at this time on recent orders. We hope for delivery next Spring, because our new plant goes into service then. The Company furnishing the Chlorinators is making war material which takes precedence over chlorinators for other purposes.

2630 The effect on Brandon Pool by passing the water over a dam or cascades at Lockport would improve conditions very slightly. It would set free many noxious gases and pick up a little oxygen which would quickly disappear. At Indainapolis after 1930 a dam was built in the White River below our plant. Some oxygen was picked up, but not a great deal, perhaps a few tenths or one or one and one-half parts. Within a quarter or half a mile below, with a B.O.D. around 10, the oxygen so picked up was gone. Yet the river was in the nature of a riffle below the dam and shallow .

Cascades would create a local nuisance.

2631 At Lockport, wherever a septic sewage or liquid high in B.O.D. and devoid of oxygen passes over an aerating device the gases leave the liquid and go into the atmosphere.

2632 Indianapolis has a population around 385,000. The water purification plant has a maximum capacity of 51 m.g.d. but produces an average of 30 m.g.d. with a maximum of 45 m.g.d. The capacity of the Sewage Treatment Plant at Indianapolis is rated at 55 million gallons per day. Some of the water used in Indianapolis comes from wells.

2633 The sewage works is an Activated Sludge plant, preceded by clarification. It started in operation on clarification in 1924. I was with the plant then. The activated sludge process began in May, 1925. Not all the sewage was treated by activated sludge, until the summer of 1936. It was our practice to operate the activated sludge plant to a higher rate in summer, than in the other months, because the flow in the river was lower in the summer.

2634 We treated more million gallons in the summer. We were using from 1,000 to 6,000 pounds of chlorine daily in the water plant.

Cross-examination by Mr. Naujoks

3161 Conditions in Chicago are more difficult for application of chlorine than in Indianapolis, because of the
3162 greater depth of the Channel, the discharge of sludge into the Channel and the more extensive sludge deposits. The B.O.D. of the water in the Channel is higher at Chicago. The amount of B.O.D. per cubic foot second of water is about the same. The B.O.D. of the water to which chlorine was applied at Indianapolis was about 8 times greater than that in Brnadon Pool. The B.O.D. of the raw sewage at Indianapolis is about 3 times as great as that at Chicago. The suspended solids are several times greater at Indianapolis. Indianapolis has
3163 a stronger sewage in general than Chicago. Indianapolis is fully metered and water is used more carefully, running about 80 gallons per capita daily as compared to 250 or 300 gallons in Chicago, of which I am not quite sure.

3164 At Indianapolis the chlorine is gone in about 2000 feet, and if that is taken as evidence, I would say it should be applied every 2,000 feet. I qualified that by saying considerable experimental work is required to know how often it should be applied, where and how. This is based on my experience at Indianapolis where chlorine quickly disappeared. Construction of aerating cascades in the outfall sewers of the Sanitary District is not a mistake.

The White River at Indianapolis carried only 4.1 parts per million of dissolved oxygen. This indicates the presence of organic matter and the depletion of oxygen. That river had much less oxygen than that with no sewage added to it for 40 miles. The river has been polluted but had recovered, through its biologic cycle, growth and development of algae and their death, which consumes oxygen.

3165 The oxygen may be low, and still not be a polluted stream under some conditions. At time of test the B.O.D. was 6 and dissolved oxygen 4.1 p.p.m. The test was made to determine if chlorine would improve conditions until the plant could be enlarged to take care of all the sewage. Before the test was made, my opinion was that the better procedure would be to enlarge the plant. The tests at Indianapolis were not made with standard chlorine feeding devices. This was unique in the United States.

3166 The handling of chlorine as we did it was not new in its basic principles. Chlorine at Indianapolis was not applied to reduce odors from hydrogen sulphide. No particular observations were made at Indianapolis on the delayed action effect of chlorine. Nor were we interested in relative efficiency of chlorine and activated sludge treatment in the removal of B.O.D. The Indianapolis plant was too small. Money was lacking to build

3167 a larger plant, and time would be required. In 1929 when the use of chlorine to protect streams came along we thought there might be a chance to improve conditions until the plant could be enlarged. The stream was in bad shape. No systematic observations of hydrogen sulphide were made or the effect of chlorine, if any, on it. We applied chlorine directly to the sewage effluent before it entered the river. It was much easier. Application in the stream would have needed elaborate mixing devices.

3168 Bottle experiments in a laboratory are difficult to translate into actual conditions in a stream or on a plant. To say that the reduction of B.O.D. by chlorination or any other means as shown by the 5-day test, is not a permanent reduction for 5 days, is an acknowledgment that the 5-day test is no good. If a portion of sewage with its oxygen is put in a bottle and held for 5 days we say the oxygen used in that period is its B.O.D. If another sample treated by some chemical or biological process is subjected to the same procedure in another bottle, we say the difference between them
3169 is permanent for five days and is due to that treatment. I cannot say that if a certain reduction of B.O.D is found in the laboratory that treating a similar liquid in a similar fashion and putting it in a stream will result in the same thing. As a matter of fact I do not think it would.

3170 If you make the determination of B.O.D. in the canal before treatment and after treatment, whatever difference occurred is due to the treatment. You have to repeat the tests many times to be rid of irregularities. It is what we did at Indianapolis after we did our bottle experiments. The normal way is to do some
3171 laboratory work first and then try to apply a suitable factor of safety. The normal way to determine the good done by chlorination is to take the B.O.D. before and

after chlorination. To determine how long the effect
3172 of chlorine lasts, tests should be made of the waterway
at stated intervals. The B.O.D. tests only give the B.O.D.
at the time the tests are made. I do not understand what
is meant by permanent in this connection.

3173 The B.O.D. test is made in a bottle, not in the
open in a waterway. The B.O.D. test on a chlorinated
sample is permanent for the 5 days in the bottle. This
does not mean that 5 days below the point where the
sample was taken, the B.O.D. reduction is permanent
or that the same B.O.D. is obtained. Conditions may
change, even at the point where the sample was taken
3173 five days later or ten days later. If the stream was
3174 bottled up so the condition was the same five days or
a week later, then the B.O.D. would be the same. Unless the stream were bottled up, the sample taken today might not be representative of the situation two
weeks later or at the same point. I am not sure that a
10 p.p.m. reduction in B.O.D. could be made permanent
for 5 days in the river, with a residual chlorine at all
times. It might be, but this is doubtful. You can hardly
find 10 p.p.m. in a large quantity of B.O.D. The determination is not that accurate.

3175 Indianapolis has lagooned its activated sludge without digestion or any treatment for a period of 15 years or more, and still does, even with a materially enlarged plant.

A lagoon is an earthen storage basin into which sludge may be pumped.

Material in a lagoon digests but most lagoons are so
deep that effective drying is slow and takes a period of
3176 years. The description is simple, but the operation is

more complicated. It is really digestion in deep pits. The fresh sludge is composed of mixed primary and activated sludge, placed in a part of the lagoon in which there is active and sweet digestion so the seeding is good. If it is all added at one point continuously sour digestion develops, with offensive odors and inefficient digestion. In draining and handling the pits, care must be used to have the sludge as dry as possible before removal.

The lagoons are about 10 or 11 feet deep and 300 feet square. They cover about 40 acres at Indianapolis
3177 for some 50 to 55 m.g.d. of sewage. The 1940 population is about 385,000. The lagoons give off some odor. They are isolated. No habitations are near, but there are some slaughter houses and fertilizer works. There is no appreciable amount of hydrogen sulfide gas given off. There is a dominant odor of sweet digestion of
3178 sludge, not the acid digestion. To a sewage plant operator, this odor indicates good biological action. It might be offensive to ordinary persons. The health of workers around lagoons is not affected. In connection with the experimental work at Indianapolis, I recall discussing chlorination with Enslow many times. I do not recall any objection from Enslow. I believe he aided
3179 and abetted. If he had put a damper on it I do not think we should have tried it, because we valued his advice. There was no use in the experiment if good results could not be expected. The matter was discussed before the work started. Chlorinating the water before cascading would reduce somewhat the release of odors.
3180 Any odor which is caused by a material which will combine with chlorine to form an unobjectionable sub-

stance would be eliminated. The time during which the dissolved oxygen introduced at the cascades remains effective would only be extended in so far as the amount of chlorine added was effective in itself.

The present conditions in the Brandon Road Pool result from a deficiency in oxygen, in a measure.
3180 When the flow was higher and the B.O.D. in total
3181- poundage per day was higher, the conditions in the
3182 Brandon Road Pool were not objectionable then. Actual experience is much better than any opinion I might have or any handling of figures of B.O.D. and D.O.

3183 A given amount of dissolved oxygen is not efficient in ameliorating conditions resulting from sewage pollu-
3184 tion, regardless of its source. Dissolved atmospheric oxygen is effective, in sufficient quantity. Available oxygen from chemical sources is not dissolved oxygen. Chlorine in solution in water is HOCL, and theoretically the "O" is available. Assuming 150,000 pounds of dissolved oxygen from the lake water in 3,500 c.f.s. and assuming 150,000 pounds of dissolved oxygen from the aeration of sewage, immediate B.O.D. would be taken
3185 up by either one as quickly as the other. But each might not be equally effective in removing the ultimate or the 5-day B.O.D. The 5-day B.O.D. would be less in the case of dilution than by adding air by blowing through.

3186 In dilution, the biologic balance is different. The conditions are changed with different amounts of organic matter. It is easier to remove a dilute B.O.D. by aeration than a concentrated B.O.D. The immediate B.O.D. is caused by reduced substances such as H2S, which immediately unite with oxygen without intervention of bacteria or any waiting period. Permanent B.O.D. is a B.O.D. which will not reappear under the influence of biologic action, bacterial or biologic growth.

3187 I can remove 10 parts per million B.O.D. more quickly from a sewage with 35 p.p.m. than from one with 15 p.p.m. The fact that Cleveland, Ohio practices seasonal chlorination during the summer only does not change my opinion that chlorinators need overhauling completely if idle for a time. New parts may have to be supplied, as required.

3188 I do not know that practically every water works has duplicate chlorinating equipment, half of which is idle all the time and yet is ready for instant use. There may be improvements of which I have no knowledge. The Indianapolis Water Company does not have a number of chlorinators in reserve, idle practically all the
3189 time. It has no equipment not in use. It has equipment which is idle part of the time. Any properly operated plant rotates machines and sees they are all in service on a given schedule, ready to use at any time. No piece of machinery at Indianapolis is permanently idle. Throughout the year there is a certain percentage of all machines which are not in use.

3190 If machines are allowed to stand idle and are wanted suddenly, they may not be serviceable. If you have 10 work horses and are only using 3 or 4, you do not let them stand idle in the barn. We have duplicate machines for every use, but they are not machines standing idle waiting for a time when needed. It is not difficult to expand a 25-ton chlorine plant to a 50-ton plant. It is simply a matter of building a larger plant in either case.

3191 I do not recall whether I ordered the chlorine at Indianapolis for the test and decided to go ahead before talking to Enslow.

Examination by the Master

3192 As a matter of plain reasoning, it is difficult to say there is more chance of hydrogen sulfide in the Brandon Pool than in the digestion pits at Indianapolis. There is considerable odor of other sorts about the plants. A small amount of hydrogen sulfide may not be noticeable. In the use of sludge gas for power in some plants, hydrogen sulfide is removed. If there is hydrogen sulfide in controlled digestion, there must be some in our pits. Tests were not made, but hydrogen sulfide is not a dominant odor about the pits.

3193 There has been no illness from hydrogen sulfide at the Indianapolis sewage works so far as we know.

Cross-Examination by Mr. Naujoks

At Brandon Road Pool, hydrogen sulfide may come from both water and sludge if under anaerobic conditions. Sludge is a concentrated organic matter which under biologic or bacterial action yields hydrogen sulfide. A dilute solution of similar organic matter might
3195 also produce hydrogen sulfide. There is nothing in a combination of sludge and water which produces more hydrogen sulfide than sludge in lagoon, unless there is

a chemical action on the gases passing through a strong solution. The water from Lake Michigan contains dissolved oxygen which should be a factor against these gases. Maybe the plant in Indianapolis should pro-
3196 duce more hydrogen sulfide than the Waterway, even with the reduced flow. The water in the Pool is anaerobic, due to the sewage and sludge. The hydrogen sulfide produced there is in an amount in the same relationship as the organic matter present. We are justified in assuming that there should be as much hydrogen sulfide from the digestion pits as from a similar volume of canal water and sludge. There is a relative difference in organic matter.

It is difficult to say whether most of the hydrogen sulfide comes from the solids at the bottom of the Pool or from the dissolved sulphates in the water.

3197 There are more sulphates in the Indianapolis water than in Lake Michigan.

The oxygen combined with hydrogen in water is not available for the use of B.O.D.

Redirect Examination by Mr. Clausen

3198 Water works as a rule have more equipment than necessary to do the immediate amount of work. In a large installation, some additional equipment is required. For chlorination equipment, perhaps some 50 per cent additional is required. The amount depends on the size of the installation. For work here, 50 per cent would probably be satisfactory. Chlorine was not
3198- applied to raw sewage at Indianapolis, but for

3199 the most part to the activated sludge effluent and the balance to the settled sewage. Indianapolis has considerable industrial waste, maybe more in proportion
3200 to its population than Chicago. The use of home-made equipment in the Indianapolis experiments had no bearing on results. The equipment was satisfactory for the tests. Any hydrogen sulfide in the Indianapolis situation would have united with the chlorine promptly. At Indianapolis, the B.O.D. is determined before and after the application of chlorine.

3201 The laboratory experiments indicated an expected reduction of 30 or 35 per cent of the B.O.D. Actually in practice we obtained about 10 per cent.

The time of flow through Brandon Pool is around 19 to 24 hours. In that time only one day or less of the B.O.D. is used against the oxygen in the lake water. Dilution water supplies dissolved oxygen, and also
3202 dilution. That is not done by aeration. Dilution improves conditions by favoring growth of more different kinds of life. It dilutes organic matter and reduces odor and reduces time of flow in the channel, as well as supplying dissolved oxygen. From the experience at Indianapolis, chlorine to be effective must be sufficient to exert a pickling effect. This prevents growth of bacteria and pushes organic matter downstream. It is oxygen of an entirely different sort, entirely unsuited for the use of life.

3203 The use of cascades of aeration is a step in the right direction. Aeration over the dam at Indianapolis with a small fall, 48 or 54 inches, picked up oxygen in a stream containing from 10 to 15 p.p.m. of B.O.D. but the oxygen was quickly used up in a few hours flow. It was used up immediately. The mixture of river water and effluent carried about 10 p.p.m. of organic matter.

3203-3204 The cost of nitrates is considerable and the effectiveness is doubtful. In an activated sludge plant, a longer time is required. Nitrate oxygen is only available after dissolved oxygen is gone. During time the nitrate oxygen is used, odors may occur. From an effluent high in nitrates, trouble may come from excessive algae growths.

Examination by the Master

3204-3205 The same test methods were applied to the laboratory scale experiments and the plant scale operations.

Recross Examination by Mr. Naujoks

3205 I do not know what is the principal source of hydrogen sulfide in sewage treatment plants. I would not try to choose a principal source. It would depend on the amount of sulfates and the kind of sulphur in the sludge. I am not competent to answer.

ANTON JULIUS CARLSON

Direct Examination by Mr. Wallenstein

2873 I have received a Bachelor's Degree and Master's Degree from Augustana College in 1898 and 1899. I received a degree of Ph.D. in Physiology from Stanford University in 1903. I received a degree of M.D. from the University of Lund in 1917 and I have the honorary degrees of Doctor of Science and Doctor of Laws from Appleton College, Augustana College and the University of Colorado.

I was Assistant in Physiology at Stanford University Research Associate of Carnegie Institution of Wash-
2874 ington, Instructor in Physiology in the University of Pennsylvania Medical School and since 1904 I have been on the medical faculties of the University of Chicago, Rush Medical College and the Medical School of the Division of Biological Sciences. For the last 25 years I have been Professor and Chairman of the Department of Physiology in the University of Chicago and for the past 10 years have been the Chairman and Frank P. Hixon Distinguished Professor of Physiology in the University of Chicago.

2875 I belong to numerous societies and associations.

2876 I am familiar with the Sanitary District Canal, the Illinois Waterway and the so-called Brandon Road Pool
2877 at Joliet. In June 1939, I passed by the pool and noticed a sewage odor. I made an inspection trip on the Illinois Waterway and Brandon Pool on the afternoon of October 13, 1940, from three to five.

2878 I read all of the testimony of the local physicians and most of the other. I read the testimony of Thomas Testin.

2880 An actual menace to health to me means that conditions exist in that pool that through accidents or any ordinary course of human events in the district can lead
2882 to health injury. It is my opinion that the concentration of gases and other odorous particles in the air emanating from that pool adversely affect the health of the people subjected to that kind of odors and that concen-

tration of odors. Hydrogen sulphide gas is a highly poisonous gas to the human and animal organisms. It
2883 is about three times as poisonous as carbon monoxide, but not quite as poisonous as the deadliest of all known gases, cyanide. It is an irritant gas. It affects the delicate membranes of the eye, the nose and throat. The
2884 human system can be tremendously injured before we are sick.

2887 The odors of putrefaction and hydrogen sulphide that I observed both in the summer of 1939 and yesterday, are more than a menace, because a menace is something that may occur but hasn't. Hydrogen sulphide is a heavy gas and that will roll over the retaining wall and concentrate down on the homes of the people who live lower than that water level, unless the wind is very
2888 strong. We don't know at what dilution it ceases to be a menace. Putrefaction odors have their effect on the human system. They will affect the heart; they will affect the circulation. It may produce headache, produce salivation, nausea, lack of appetite. Hydrogen sul-
2889 phide and the other odors do set up these direct irritations and these secondary sequences in the nervous system which produce these effects. The present condition down there, certainly as I saw it in the summer of 1939, is more than a menace to health; it is inimical to health. There inevitably will be a menace from dysentery bacillus, from typhoid bacillus and from the amoeba of dysentery, and the water doesn't have to be used for drinking or cooking to constitute such a menace, and it doesn't have to occur either for 10 or 15 or
2890 5 years. It is still a menace. This highly polluted body of water may through accident, through flies or mos-

quitoes, or spray or wind get on the surface of man, on his clothes, on his skin, or in his food, or even in his drinking water, even in his lunch pail, and anything—we know anything that gets on our skin anywhere—flies don't have to bite, mosquitoes don't have to bite, they don't have to settle on the water. This stuff splashes up on the sides when the boats go through, when they empty their locks and fill them and when the wind blows. Such a polluted, highly infectious body of
2891 water of that extent is an actual menace. The fact that the present communicable disease rate in the City of Joliet is no higher than other cities in the State of Illinois would not be a factor in determining whether or not the Illinois Sanitary District Canal in its present condition is an actual menace to the health of the community. They have either been lucky or the medical statistics isn't what it is supposed to be. Germs could reach the community in various ways. The water is
2892 not used for bathing, but people will drop in by accident and the children will jump in by choice, no matter what you say. It can reach them that way. The bacteria can reach them from flies and mosquitoes carrying this stuff mechanically from where they have lit on the walls of the canal. Under extreme conditions it might reach them if they walk close by the canal by spray in a high wind.

When I observed hydrogen sulphide gas in the air I salivated considerably. There was more secretion of tears and after a while I had a peculiar sensation or taste in the back of my mouth. Where the concentration
2893 is not heavy, the physiological reaction of the human organisms is largely reflex through the nervous system

as a result of our social conditioning. As a result of that setting in the nervous system, these substances, these odors, acting on our system, and that will vary with individuals—some have a keen nose, as we say, some don't smell so well, so that will vary with the individual. They set up these processes of the salivation, a disagreeable state, inability or lack of desire to eat when those things are present. Some individuals develop headache. In some individuals we can show that this setting inhibits gastric motility and gastric secretions, and in others
2894 produce vomiting. Human being are very variable, but those are the general things that do happen.

Hydrogen sulphide is heavier than air. It is more
2895 noticeable during the moist weather. It affects different people in markedly different ways. The olfactory senses become quickly fatigued to the smell of hydrogen sulphide, but it also quickyl recovers.

Examination by the Master

2897 I am familiar with the fact that there has been untreated sewage put into this Waterway for many years.
2898 I would consider it undesirable. Under certain conditions I would consider it a menace to health. The pool has been in existence three or four years. The menace has been less while the flow was greater. You increase the menace by concentration, reduced speed
2899 of flow, and diminution in oxygen. I would say that there was some menace there before the flow was decreased. The gradual efficient handling of the sewage reduces the menace. I know nothing about con-

2900 ditions in the summer of 1940. There is plenty of menace today. I could not compare the menace today with the menace in 1939. There has always been a menace since this pool existed. It has increased with the cut down of the flow. A fact on the other side is the improvement in the sewage. Notwithstanding the im-
2901 provement there is a greater menace today because of the cutting down of the water. The actual menace would be largely from the infectious organisms in the water and from the hydrogen sulphile. Infectious organisms in the water would be translated by splashing, by people going in, by flies and other insects getting these organisms on their legs and then getting to human being. I do not place any weight on that at present.

2902 Any open waterway under modern conditions of life would not be safe for drinking without treatment, without filtration or chlorination. Lake Michigan water near the shore is not safe to be used for drinking with-
2903 out treatment. I am more worried about the menace from the standpoint of people falling in or children going in than the likelihood of drinking. If flies carried
2904 the organism to human food it would cause dysentery, amoebiasis. The odors are not a menace; they are actual injury. Hydrogen sulphide is a protoplasmic poison, and so are many of the other substances that we get into our system in our development of civilization. That is one of the very serious poisons, protoplasmic poisons, which in certain concentrations produce symtoms that we can see, but we can be terrifically injured before we reach the point that the doctor can say we are sick or we feel sick. That is the problem before us.

ANTON JULIUS CARLSON

Cross Examination By Mr. Naujoks

2971 I have never practiced medicine privately, but I have trained some over 5,000 doctors.

Bubbly Creek, the Canal or part of the ancient
2972 Chicago River back of the stock yards, possibly had no flow of water from Lake Michigan in the sense of our intake now; but, of course, if there was any flow at all, the water did come from Lake Michigan indirectly through the sewage system and the water system of
2973 Chicago. The rain water, of course, surface water goes in.

I have never made any analyses of the water in the Brandon Road Pool. I have never made any chemical analysis of the air above or in the vicinity of the
2974 Brandon Road Pool. I have not made any analysis of any scum on the face of the water at Brandon Road Pool, nor any analysis of the water which flows from the oil refineries into the Illinois Waterway below the Lockport lock.

2975 Carbon monoxide is a poisonous gas and in enclosed areas can be fatal to an individual. Carbon monoxide unites with the hemoglobin, the red pigment of our red blood cells and anything that interferes with the
2976 union of oxygen with a red cell is detrimental. Of course, in cities, a certain amount of carbon monoxide comes from other sources besides the automobile sources. It is not a menace because menace is some-
2977 thing that is threatening but not actually doing. It is unfavorable because it interferes with the union of oxygen with the red pigment in our red blood cells.

2978 I have not weighed the comparison that carbon monoxide from automobiles in the City of Chicago is just as objectionable from a health standpoint as the odors from this Canal, and a menace, as I understand it, is something threatening, and, if it does happen, would injure, but it hasn't actually done so.

I am interested in ameliorating any conditions which are, or remedying any conditions which are, harmful to
2979 the human machinery. My research is directed towards understanding the human and animal body workings in health and disease, and the matter of health has become and is become a very large concern of medicine, physicians and biological investigators.

I am not familiar with any evidence of direct injury of mercaptan in comparison to such substances as sulphur dioxide; but if mercaptan is present in concentration and through its action on the olfactory system introduces the same unfavorable conditions as the emanations from the Brandon Pool, I should say it was in a similar way unfavorable or injurious to health.

ANTON JULIUS CARLSON

Examination by the Master

2980 If the Supreme Court restored the flow to 5,000 c.f.s., there would still be a menace to health, but it would be less. It is a matter of experiment, and I should think the Court and the States should be ready to make the experiment. We can predict to a certain extent what will happen, but if they actually restored this flow for one season we could follow the bacteria, we could follow the oxygen, we could follow the odor; then we would know, if the Court please, and we would'nt be quibbling. There would still be a menace in the bacterial contamination. There would be, in my judgment, very great reduction in sulphur dioxide and in the other odors because of the increased oxygen and the increased flow.

2981 If the odors are due to gases other than sulphur dioxide, that is sulphur hydrogen, the health of the people working in a sewerage plant, if the odors produce these symptoms in them, their health is unfavorably affected. One must have a tremendous amount of injury before one is incapacitated for work, but there would still be a menace to health even though one did not receive that amount of injury.

2982 I am not testifying here or giving my opinion from theory. I am testifying as to facts, and I have tried to make it plain what I understand by menace and also what I understand by actual injury or unfavorable influence on the human system, quite short of frank disease or incapacitation, as we describe it. I appreciate what you say, that the Supreme Court will have to decide what it has in mind by those terms, but I am also aware that law and courts ultimately will have to square their decisions and their judgment with the facts of science and medicine; and, ultimately, in my
2983 judgment, I think the policy that guides us and you and the courts is to take all measures to minimize all these, any or all of these unfavorable conditions, that we can do within the practicability of our knowledge and our civilization.

Redirect Examination by Mr. Wallenstein

I consider the odors and the hydrogen sulphide as having passed beyond a stage of menace to an active detrimental agency to those people.

With permission of the Court, I might again try to clarify, because I think this is a very important case, what I mean by the depressant scientific and medical uncertainties, as to the danger of these minimal concentrations of unfavorable poisons; and I want to, if possible, guide the Court against the assumption, the common assumption, that where we have at present no
2984 method of discovering, no evidence of, injury, that we can then convert that into a positive proof that there is no injury.

For example, there is the Massachusetts Code of Permission of 20 parts per million of sulphuret hydrogen in the immediate air, and there is the Wisconsin Code of 10 parts. Now, all that means, scientifically, is that in that concentration we have not yet proven an injury, and I should like to guard the Court against the contrary assumption that we have proven it is non-injurious.

Examination By the Master

2985 The regulations in Massachusetts and Wisconsin are based on actual observation and experience, and then they are put lower as a matter of safety because of our
2986 present ignorance. My only remark was to the effect that we do not know today that even these lower standards are non-injurious.

Insomnia, sleeplessness, is not a trifling thing in the matter of health. As a matter of fact, we die from lack of sleep much more quickly than we die from lack of food; and sleeplessness, lack of sleep, is one of the serious questions in connection with disturbances of the nervous system. I hope the Court will not take lightly any condition that disturbs a person's sleep.

Redirect Examination By Mr. Clausen

2987 With respect to the Massachusetts Code and the Wisconsin Code they have had a period of years over which they have studied these problems as to the number of parts per million of hydrogen sulphide that might be detrimental to health; and yet, on the other hand, we have only a year and a half to compare conditions in the Brandon Pool, so that we can't determine those two measurements of parts per million. Of course, it is a fact that in science and medicine we make use of all reliable information in other places and other countries and other sources for our guidance.

Recross-Examination By Mr. Naujoks

2988 The subjection of the human system to new conditions that we have not been subjected to in the past, new substances and combinations of substances, are serious problems. I said that those are serious problems in biology and medicine, one of the most serious problems before us; and in our present ignorance our only guidance is all practicable, feasible measures to minimize those influences to know just what is safe. I am a pragmatist. I would favor, if feasible, if practicable, economically possible, other methods or ways of ameliorating conditions in the Brandon Road Pool without any additional diversion of water.

Personally, I have lived here a long time, and this problem has been before me as a public-health interested man in this region for years, and I have lived
2989 on the lakes here and in the State of Michigan, and still live on the lakes in the two States. The amount of water asked for by the State of Illinois temporarily, or even during the summer, could not conceivably have any health significance for the other States; and I think it insignificant and uneconomic.

2990 My understanding of this petition is that this is not for a permanent increase but temporary, until the treatment is adequate. I think the Sanitary District is progressing very well with the treatment of sewage.

Recross-Examination By Mr. Cohan

2991 I am a physiologist, I am an investigator, I am a teacher of medicine; but I have been asked from time to time to assist both the Federal Government and other agencies in these public health matters, but I am not a public health official, professionally, or othwise.

2992 My attention was directed to the Brandon Pool and the people at Joliet in 1939, and then I made a very casual and private, for my own information, inspection;

but I have never been consulted by the Sanitary District or by the Health Department of Joliet or Peoria or the City of Chicago on this problem.

October 14, 1940

Direct Examination By Mr. Wallenstein

2786 DR. CLARENCE W. MUEHLBERGER. I am a toxicologist. A toxicologist is a person who makes a specialty of poisons, their effects on the body, their detection, analysis for them. I graduated from Armour Institute of Technology in Chicago, receiving a degree of bachelor of science in chemical engineering in 1920. I then did graduate work at the University of Wisconsin in chemistry and toxicology, receiving the degree of Master of Science in 1922 and Doctor of Philosophy in 1923.

2787 From 1923 till 1930 I was the State Toxicologist of Wisconsin and from 1924 to 1930 I was Assistant Professor of Toxicology and Pharmacology in the University of Wisconsin Medical School at Madison. During that latter period from 1924 to 1930 I was also the Staff Toxicologist of the State of Wisconsin General Hospital at Madison. In 1930 I came to Chicago and took up my work as the toxicologist in the Cook County Coroner's office and from 1930 to the present time I have been on the faculty of Northwestern University Medical School, first as assistant professor of toxicology and later as associate professor of toxicology. For the past five years I have been lecturer in toxicology at the University of Illinois College of Medicine, and for the past four years I have been professorial lecturer in toxicology at the University of Chicago Medical School, and just recently, during the past few months, I have been appointed lecturer in toxicology at Loyola University Medical School.

2788 I am familiar in a general way with the Sanitary District Canal, the Illinois Waterway and the so-called Brandon Road Pool at Joliet. I have visited Joliet, not for the purpose of examining the pool, but I am familiar with the location of it.

I am familiar with the effects of poisonous gases on the human organism. Hydrogen sulphide has two actions, depending on the strength of the hydrogen sulphide and the gas which is brought into contact with the human. If it is very dilute then the effect is primarily that of an irritant. It irritates the mucous surfaces, those of the eyes, the nasal passages and the throat, and if it is presented to the body in high concentrations, then in addition to the irritation there is an asphyxial nervous depression resulting in symptoms of drowsiness, stupor and coma, finally causing asphyxial death with terminal convulsions.

Now the place where the concentration at which the irritating symptoms merge into the depressent symptoms is about seven hundredths of a per cent, that is, below seven hundredths of a percent the primary effect is that of an irritant. Above seven hundredths of a
2789 per cent, the nervous depressent effects become controlling, and from then on it is an acute poisoning in which the nervous symptoms are predominant.

Subacute poisoning depends upon the concentration of the hydrogen sulphide in the atmosphere which is breathed, and also the duration of the exposure, that is, both factors have to be taken into consideration, the strength of the gas and the length of time it is breathed.

Hydrogen sulphide, outside of the chemical laboratory and in chemical manufacturing establishments, is found wherever any organic material which contains sulphur putrefies. That means we will find it in sewers, places where sewage putrefies and decomposes. We find it among tannery wastes and stockyards wastes which is permitted to putrefy and decompose. You find it in the gases which come from certain oil wells where there is sulphur in the oil, and which gases are rich in hydrogen sulphide. You find it in mines where sulphide minerals are mined. You find it in sulphur mines to some extent—that is, gas pockets. You find it
2790 to some extent in the gases which result from the explosion of black powder, although it is there to a minor extent.

The best way of detecting hydrogen sulphide without chemical means is by means of your nose, if you have a good sense of smell, because it has a very pronounced rotten-egg-like odor.

It is possible to be overcome by hydrogen sulphide gas in a place or location which is not inclosed. Whenever the concentration of hydrogen sulphide becomes high enough, it doesn't make any difference whether it is enclosed or whether it is out in the open. If the concentration is high enough and the person breathes it long enough, he will suffer the symptoms of poisoning and they could easily result in stupor or even coma. There are numerous references in medical literature of persons being overcome by the gas in open places. I believe Mr. Yant's article in the American Journal of Public Health cites many instances of people being

2791 overcome by hydrogen sulphide in open places. Fatalities which have occurred in unenclosed places would indicate that there has been a suffiicent high concentration to be fatal.

The decomposition of sewage containing human fecal material is usually accompanied by the release of hydrogen sulphide gas. The symptoms of subcute hydrogen sulphide poisoning are irritation of the mucous surfaces, primarily those of the eyes, which result in a burning sensation of the eyes, irritation of the nasal passages, resulting in burning and sneezing and constriction of the nasal passages, and burning sensation in the throat, producing coughing, and if the irritation is severe enough, it may go on to a sufficient extent so that the person not only has the irritation but they feel nauseated and they may even vomit as a result of the prolonged exposure to low concentrations of the hydrogen sulphide.

2792 I would say that such a method of analyzing gal-
lon samples of air taken at points near the canal for de-
tecting small amounts of hydrogen sulphide, as given
in Mr. Bergman's testimony at page 2712 of the record,
was practiaclly worthless for two reasons. In the first
place the strength of his solution is so great that if he
used gallon samples and used tenth normal iodin and
thiosulphate, as little as one cubic centimeter of his so-
2793 lution would be equivalent to one c.c. of hydrogen sul-
phide in a gallon of air sample, which would be one
part of hydrogen sulphide and 3875 parts of air or,
roughly 300 parts per million, which would be about
the minimum that he could accurately determine with
such a strong solution.

In the second place, you can't bubble air through tenth normal iodin solution without losing some iodin. Iodin is volatile. As a matter of fact, you can take iodin solutions and smell the iodin. You know it is being volatilized. So the passing of air through iodin is certain to cause a loss of iodin, and especially in the summer time that loss would be material, and unless it were corrected the results would be entirely erroneous on the basis of the loss of iodin from even pure air bubbled through an iodin solution.

2794 I certainly don't agree with the answer of Dr. Enzer, at page 2161 of the transcript to the question "If for example, by a calamity the sewage system of any large city were destroyed by bombs or otherwise, and you had a lot of untreated sewage, would pestilence ensue" to which he replied—"It would ensue because such untreated sewage would contaminate drinking water or food—and only in that way". In addition to the spreading of bacteria there is a possibility that the toxic gases given off in the decomposition of such sewage could produce illness and possibly death—although that is rare—to people who are exposed to such gases.

2795 Yes, I think an approximate concentration of .0025 per cent of hydrogen sulphide would be required to blacken and discolor the paint on houses located approximately 750 feet from the canal, as testified by Dr. McNally. I think that is a reasonable average. You can't put a definite concentration below which houses won't be blackened. .0025 per cent represents 25 parts per million. It depends on how long it is going to be inhaled as to what I would consider the maximum concentration of hydrogen sulphide in the atmosphere

for safety. For constant exposure I would say from 10 to 20 parts per million is certainly as much as should be permitted. For the average person exposed to under
2796 50 but over 20 parts per million, the symptoms would be purely those of irritation—irritation of the eyes, of the nasal passages and the throat. There would be no systemic symptoms in the average individual. Now, there are persons who are more susceptible than others and to a person who is susceptible and easily influenced by hydrogen sulphide, that person might show more profound irritation, possibly even nausea or vomiting. In the capacity of State Toxicologist of Wisconsin from 1923 to 1930 I have been consulted by state agencies concerning the possible harmful effects of toxic gases. The Wincsonsin Industrial Commission instituted an investigation into the hazards of industry in the state of Wisconsin. A committee was organized which was composed of several representatives of labor appointed
2797 by the various labor unions of the state—several representatives of industries as appointed by various large key industries of the state, I believe two medical men were appointed by the medical society, and then there were two representatives of the general public. I represented the general public of the State of Wisconsin as the State Toxicologist concerning matters of possible poisoning, and Mr. Muehlstein represented them as the engineer of the Wisconsin Industrial Commission concerning matters of engineering aspects of ventilation and so on. We not only investigated toxic gases, but we made recommendations concerning toxic vapors, gases, dusts and fumes and we made recommendations concerning the limits which were to be permitted in

the working atmosphere in the State of Wisconsin. There was a table propounded of limits for safe practice.

2798 This table of safe limits for toxic gases was embodied in the report of our committee and the report was adopted by the Wisconsin Industrial Commission as an order to industry for the regulation of ventilation in factories and workshops.

(Pamphlet entitled "General Orders on Dusts, Fumes, Vapors and Gases" issued by Industrial Commission of Wisconsin was thereupon identified by witness)

That is the order of which I spoke. The table is on page 20 of the order.

2799 The table is entitled "Harmful Concentrations of Various Materials, by Volume, in Parts per Million" and under hydrogen sulphide the limit is listed as 10 parts per million, giving "slight symptoms after several hours or maximum amount for prolonged exposure", and under the table of "Hazardous limit for very brief exposure" it is 1000-2000 parts per million, which is one-tenth to two-tenths of one percent.

(Said pamphlet thereupon was marked "Muehlberger Exhibit No. 1", and introduced in evidence)

2801 In 1924 to 1930 I thought it was in the interests of the public health to recommend such a limit for the breathing zones of workmen in Wisconsin factories. I am still of the same opinion because hydrogen sulphide is a very poisonous gas. It is just as poisonous as hydrocyanic acid or prussic acid, which is another name for the same thing. I am familiar with the report of "Code for Safe Concentration of Common Substances used in Industry" published by Doctors Drinker, Hamilton and Haggard in the June (1940) issue of the Journal of Industrial Hygiene. The limit set by them for safety 2802 in hydrogen sulphide is 20 parts per million.

I have examined the transcript of the testimony taken from witnesses residing in the City of Joliet in this case. I would say that the nausea, headaches, insomnia, loss of appetite testified to by the residents of 2803 Joliet may have been caused by hydrogen sulphide. I do not agree with Dr. McNally who, at page 2701 of the transcript, said if trains went by and gave off hydrogen sulphide in the smoke, and they do give off hydrogen sulphide and sulphur dioxide, that would be sufficient ot cause a discoloration for some distance away. Trains burning coal which contains sulphur give off sulphur dioxide, but they don't give off hydrogen sulphide.

2805 It is my opinion that hydrogen sulphide caused the discoloration of the houses along Railroad Street abutting Brandon Road Pool, and the household utensils to which Mrs. Beulah Booklund testified at page 906 of the transcript. In judging the amount of gas present, the intensity of the odor is very unreliable because, especially with hydrogen sulphide, the nerve endings of your nose become paralyzed after you have smelled it for a while. It is a common observation in chemical laboratories where they are using hydrogen sulphide gas that as you enter the laboratory you smell the stink, but after you have worked in the atmosphere for a while, you don't notice the stinking odor any longer. In other words, the nerve endings no longer send their

2806 warning to you that there is a stink there. You do notice the irritation of the eyes and the throat, but the smell itself is very much less than it was originally when you came from fresh air into the hydrogen sulphide contaminated atmosphere. There are many odors other than hydrogen sulphide given off when sewage decomposes. In general some are organic sulphur compounds, indol and skatol, mercaptan, cadaverin. Those have offensive odors also.

2807 After reading the transcript of testimony given by the residents of the City of Joliet and those people working in St. Joseph's Hospital, and based upon my experience and knowledge of the conditions that surround the Illinois Waterway Canal it is my opinion it is a very definite menace to the health of the people of that region.

Cross-Examination by Mr. Cohan

8208 As a citation of recorded instances of persons having been overcome by hydrogen sulphide gas out in the open I refer you to an article by Mr. William P. Yant in the July 1930 issue of the American Journal of Public Health. It is about page 598 or 600. That is one of the sources of my information. The other sources are the standard textbooks on toxicology, including the two texts of Dr. William D. McNally, the text written by Kobert, the German work on Schadlichs Gase, by Flury and Zernik. These are examples I have read about. I haven't had hydrogen sulphide poisoning in either Chicago or Wisconsin in open places.

Examination by the Master

2809 Except these cases of mild poisoning indicated by this transcript I am not familiar with any cases of hydrogen sulphide poisoning in the region of this canal. As to there being no serious cases reported in this transcript it depends on what you mean by "serious". The people didn't die from it or they weren't rendered so ill as to require hospital treatment or anything of that sort. They might have been rendered very uncomfortable and very unhappy. I wouldn't want to be put in the position of thinking that was a serious illness.

2810 As a definition of menace to public health, I would say that this transcript indicating the degree of unhappiness caused in the people who testified here was sufficient to prove a menace to public health. I believe that people are entitled to a decent place in which to live, comfortable surroundings where the air that they breathe is perfectly good, healthy air, and I believe that anything which contaminates the air so that they aren't in a good sound state of health is a menace. You don't have to kill a man to have a situation which is certainly a menace.

I spoke just of the inexactitude of Mr. Bergman's method of determining the presence of hydrogen sulphide. There are other methods which are more exact. I didn't try any of those methods with respect to the presence of hydrogen sulphide near this waterway because I was just called into this case and there is no use going down there now because the time to make the test is when the odor is bad, which is the middle of the summer. Here we have still a pronounced odor,

but not so much putrefaction, not so much decomposition as you would have, say, in the latter part of June, July and August. Here we are in the middle of October when things are cool and when the gases that come off
2811 are still unpleasant but are certainly not as rich in hydrogen sulphide as they would be during the hot summer months, especially on muggy days when there is no breeze to dilute the gases which come off of the canal. The menace to which I have referred probably exists through the year, but I believe it is very gravely accentuated during the hot summer months, at least it has been my experience just driving along there that I notice the tightness in my throat and the irritation in my nasal passages more in the summer months than I do in the winter time.

October 16, 1940

Direct Examination by Mr. Wallenstein

3032 DR. ANDREW CONWAY IVY, received Bachelor of Science degree from the University of Chicago and Master of Science, Ph.D. Degrees from the same institution, the M.D. degree from Rush Medical College. The Ph.D. degree was granted in the field of sociology, pharmacology with a minor in pathology. I have taught physiology and pharmacology at Loyola University
3033 Medical School, at the University of Chicago, and in 1925 I became chief of the Division of Physiology, Pharmacology, Materia Medica, Toxicology, Northwestern University Medical School. I belong to the staff of Passavant Hospital and have a license to practice

in the State of Illinois and I have consultation in private practice.

At present I am President of the American Physiological Society and American Gastrointeriological Association. I have been a member of the Public Health Committee of the City Club for a number of years and I took part in the campaign to obtain a filtration plant for the South Side, and at that time I had occasion to study questions pertaining to sewage disposal and the procural of water from Lake Michigan and water pollution. I had to gain that information and make a study of that problem because it fell upon me to make about 30 speeches to various men's clubs and women's clubs and groups in order to convince them of the importance and the neecssity of having a filtration plant, particularly on the South Side where the water was rather heavily polluted at times and for a number of hours during the year was definitely above the standard requirements of the United States Public Health Service.

3034 I am familiar with the Illinois Waterway and the so-called Brandon Road Pool at Joliet. I had occasion to visit, and observe the canal during the year 1939. I happened to be taking an automobile trip with my family. I was going to the meetings of the American Medical Association in San Francisco. When we crossed the canal in Joliet we noticed the odor and also islands of scum in the waterway. I think that was the latter part of June 1939.

I have read the transcript of Professor Carlson and
3035 made a trip in the company of Professor Carlson on
Sunday, October 13th, as I recall, 1940. I visited the same points that he described. I have read the tran-

script of the testimony of the residents of the City of Joliet, the nurses, nuns and doctors attached to St. Joseph's Hospital in Joliet and the local physicians—five or six volumes of testimony. And I have read the testimony of Thomas Testim, the chemist, particularly with reference to the tests of water of the Sanitary District Canal during the summer of 1940. I understand that one of the questions before the Master is the question of what constitutes an actual menace to health.

From the medical and physiological standpoint the factors I would consider in determining the question of whether or not a waterway or stream or a pool is an
3036 actual menace to health are, first, I should consider whether any existing detriment is present as a result of the pollution of the waterway and, second, I should consider whether the waterway is a potential menace, that is, whether it hangs over the community as a sort of threat that may cause disease some time.

From my personal inspection and observation of the canal and from a reading of the transcript of the testimony of the lay witnesses, nurses, doctors, of the City of Joliet, I believe that the health of some of the members of that community is being detrimentally affected at the present time. From my observation of the waterway, the so-called Brandon Road Pool and the Sanitary District Canal I believe that it constitutes an actual menace to the health of the community of Joliet. In the first place, the pool impressed me as being a cesspool that was uncovered. Generally when a cess-
3037 pool is present or is constructed, it is supplied with covers to prevent flies from being contaminated and spreading disease. Then I am convinced of the truth

of the dictum or general principle that pollution of the air or of streams is unhygienic or unhealthful, and that they should be abated, if possible. Continuously in society we are trying to improve unhygienic conditions of living because we regard them as being unhealthful. We abate smoke; we abate noise; we abate dust; we try to abate pollen distribution because of the hay fever sufferers; we abate stray dogs because of the threat of rabies and the spread of disease by stray dogs, and when a water supply is even threatened with pollution we immediately take steps to take care of the situation, and it is on the basis of generalization and principles of that sort that I believe that there is an actual menace to health existing there now.

3038 Yes, I noticed an odor emanating from the canal on the occasion of my visit there last Sunday. We examined particularly what we were told to be the Brandon Pool from the locks and dam along the retaining wall almost back to the McDonough Bridge. I obtained the odor of hydrogen sulphide plus the type of odor that one obtains from a cesspool, some trace of indol and skatol. It was a cool day. The pool was bubbling. There was scum only around the edges of the retaining wall and the dam and the retaining wall of the locks, and we got this odor in different spots. It seemed as if you could smell the odor at certain times and at other times you could not, and two explanations of that occur to me: One is that the gas would bubble out and tend to pocket because of convection currents in the air. There was not much of a breeze at the time. Secondly, because of the possibility of the occurrence of olfactory fatigue which occurs when one smells hydro-

gen sulphide or other odors. I happened to experience after smelling some four or five of these areas in which the odor was rather strong, a metallic taste, and then because I lecture so much—I just lectured two hours last evening and another hour this morning, frequently three hours a day—I have a rather sensitive nasal pharynx which is irritated by smoke, that is, coal
3039 smoke, and is irritated, for example, by the fumes of Whiting. I live on the South Side, and after I got home I noticed irritation in my nasal pharynx. I don't recall having noticed the odor when I visited the point directly across from St. Joseph's Hospital, on the other side of the canal on Sunday. It made no impression upon me, but in 1939 I noticed the odor when I crossed the bridge in Joliet. Yes, I recall going up on the retaining wall on the east side. I got out of the car and walked along the base of the retaining wall to look for some seepage water. I noticed the railroad pumping station was working, and I walked up on the wall and saw the water bubbling, and I obtained the odor there,
3040 as well as down at the locks on the dam. I observed some of the homes of the inhabitants of the city were located or were situated at a level lower than the level of the Brandon Road Pool. Particularly I recall that was true on the east side of the pool. I might say that while I was making that inspection and looking for seepage of water through cracks in the retaining wall, we inquired of the man living there as to whether or not when the storm came up if any of that water splashed up over the retaining wall and on the retaining wall.

3041 I believe that since it has been testified that the odor has caused nausea, vomiting, disturbance of appetite and disturbance of sleep, that it is an unhygienic condition and works as a detriment to the health of the people that the odor so affects. Now, that would be particularly true of children who do not have a good appetite. That would be true of patients in the hospital convalescing, invalids, where it is important that their digestive apparatus is not upset or interfered with and their appetite is not affected, and at times it is conceivable that the odor may, or the hydrogen sulphide may be sufficient to irritate sensitive respiratory mucous membranes. That would, as I indicated, tend to delay recovery and to interfere with the proper growth and nutrition of children.

3042 If the concentration of hydrogen sulphide were sufficient, one would be able by examining the mucous membranes to detect irritation, but the odor itself that nauseates would not show up in ordinary public health statistics. It would be something that would predispose to infections of the respiratory tract and prevent the recovery of convalescent patients whom we want to eat and whom you desire to digest food, and the same would be true of children who do not have good appetites. The effect of hydrogen sulphide gas upon the human nervous system, the heart and other organs that would be affected, depends upon the concentration of the hydrogen sulphide. Most people detect the odor of hydrogen sulphide in a concentration of about .13 parts per million. Now, that is subject to variation, depending upon the sense of smell. The odor would nauseate some persons and not others, and it would

depend upon how accustomed one would become,
3043 whether or not they would develop olfactory fatigue.
In the higher concentrations it would irritate mucous
membranes and the mucous membranes that it would
irritate would vary in different individuals, depending
upon their sensitivity. If an individual had a sensitive
conjunctiva, just normally sensitive conjunctiva, then
the conjunctiva would be irritated first. If they had a
sensitive mucosa in the sinus or nasal pharynx or in
the lungs, that would be irritated first. Generally, a
concentration of about 20 parts per million is consid-
ered to be the limit of tolerance—when one is exposed
to it as an industrial hazard—and, of course, if you
get up to around a thousand parts per million, then
acute symptoms result and death may occur in a rela-
tively short period of time, such as one or two hours,
depending upon the resistance of the person or animal
3044 subjected to that concentration of gas. I believe that
concentrations of from 20,000 to 40,000 bacillus coli
per cc and concentrations greater than 10,000 pyogenic
cocci, staphylococci and streptococci per cc in the water
of the Illinois Sanitary District Canal constitutes an
actual menace to the health of the community of the
City of Joliet and the surrounding area. Such concen-
trations of B. coli indicate rather heavy pollution of
the stream and it is possible for flies to become con-
taminated and spread disease through the community.
Only one person would have to become infected and
serve as a carrier or as a distributor of disease such as
dysentery or typhoid. The staphylococci might pre-
suppose to impetigo, for example, which is a disease
of the skin that generally occurs around the face, par-

ticularly in children. Then it is possible that dogs or cats or other animals might get into this water and carry organisms away on their feet, or playing with children, and then I notice that Joliet gets their water supply from deep wells which are properly cased, but we never know when a fissure in the stone or the earth is going to form or when these casings are going to break down, and if there is a high pollution of the water in that stream, then the water supply of the city is in danger. Those are potential menaces.

3045 I don't think the fact that the present communicable disease rates of the City of Joliet are no higher than in other cities of the state that would be a factor in determining whether or not the Illinois Sanitary District Canal in its present condition is an actual menace to the health of the community. I don't think that this canal would increase the incidence of diphtheria or of communicable diseases of that sort, or small pox, and it may not have caused an increase in typhoid or in dysentery, but it may in the future do that. You can never tell when it might do it.

In those individuals in which the odor causes nausea and vomiting, such disturbances of digestion, it is my opinion that foul odor is an important part in reducing vitality and predisposing to disease. The acuteness of the sense of small varies markedly in different individuals. Some people are hyperosmic. They are very sensitive to odors and some people are anosmic, that is,
3046 they smell nothing, and others have blind spots, insofar as odor is concerned. We can perceive odors much more readily when the air is moist than when it is dry because the solution is facilitated so that the sub-

stance stimulating the olfactory nerve endings of the mucosa can penetrate more readily.

Q. (Mr. Clausen) It appears from the evidence that conditions at the Brandon Pool were much worse in 1939 than in 1938, and in 1940 were better than 1939 but worse than 1938. Now if it is true that the witnesses didn't suffer nausea and vomiting and insomnia and loss of appetite prior to 1939, but suffered these symptoms subsequent to 1939, would you say that such is evidence of their coming about in 1939 or 1940 a condition resulting in an actual injury to the health of some of the people in that community?

A. If there was no odor present prior to 1939 to 3047 cause nausea and vomiting and disturbance of sleep and irritation of sensitivity mucosa, then if the odor were present in sufficient intensity in '39 and '40 to cause those things, then I would say that public health in general was not as good in 1939 and '40 as it was in 1938.

I would also say that—although there is no evidence of death or hospitalization or even a doctor's care resulting from conditions existing in 1939 and 1940 at Brandon Pool, and only the symptoms that have been testified to by these various witnesses—their health has since January 1, 1939 become impaired by reason of such conditions existing, because it is not healthy for one to be so affected by odors as to cause nausea and vomiting and loss of appetite. It is also true that the effect on the health of some of the people in the vicinity of Brandon Pool by reason of conditions there, although not actually traceable to such conditions, still exist.

Cross-Examination

3048 In my visit to the Illinois Waterway last Sunday I did not get up to Lockport. I have not been through Lockport for a number of years. We got just as far north as St. Joseph's Hospital. I made no analysis of the water. I made no analysis of the air except the analysis one makes by sense of smell. I made no chemical analysis or bacteriological analysis. I made no analysis of the scum on the surface of the water. I did not notice any oil odor when I was there, although I saw the bank was stained in places, a type of stain that one would
3049 ascribe to oil; in places there was a little oil on the surface.

I would not agree with the statement of Dr. Evans in previous hearings in this case that the typhoid rate is a general index of the health of the community; that is, if the typhoid rate is low then the health of the community is good, while if the typhoid rate is high the health of the community might not be so good, because typhoid is only one disease. When you introduce sanitary measures you would abolish the incidence of typhoid, yet there might be other conditions present which would make the health of the community very poor. As to the testimony of Dr. Ferderick, Health Commissioner of Joliet, Illinois, in these hearings, that the health of the community was very good I should say that the health commissioner of the town or a community only knows to a certainty the incidence of communicable diseases. Those are diseases that are reported directly to him. He may not know anything
3050 about minor ailments and complaints, such as gastro-intestinal upsets. He may know nothing about the

presence of mild dysentery epidemic unless that happened to be reportable in the particular city in which he is health commissioner. In many cases of mild dysentery epidemics are not reported to the department of health unless they find Shiga type of dysentery and analyze the feces to make a specific diagnosis of the type of dysentery that the patient is suffering from.

I do not believe that the statistics on health which are reported by the health commissioner to the State Board of Health are necessarily an index of the general health of the community. They are an index of the incidence of communicable diseases—of reportable diseases. It will give you no idea of the time of recovery, give you no idea of the rate at which the children grow. It will give you no idea of the incidence of sinus disease, the frequency of recurrence of sinus disease. The only way that you can get an idea of that sort is by talking to the practicing physicians in that community and to hospital authorities. In regard to complaints and disturbances of that kind which are real disturbances of health, and represent an index of the health of the community, you can only get that from people who are actually dealing with sick people
3051 every day and are observing them.

The fact that for the first six months of 1940 there were no cases of typhoid fever reported in the City of Joliet and for the year 1939 there were eight or nine cases reported, all of which were obtained at Manteno by residents of Will County who are employed there, would not affect my conclusions. That only means that this potential menace as far as typhoid is concerned has not appeared on the surface yet; flies not lighting on the edges of this pool or material coming from the pool have not infected anyone with typhoid, the fissures have not opened into the water supply, cats and animals have not become contaminated by coming into contact with the pool and then with persons living in Joliet.

It is my theory that this stream being polluted with untreated sewage should be cleaned up in some way; that is, it is a bad thing for a community to have. I believe that it should be treated at its source and I also believe that other towns along the stream should
3052 have their sewage treated, but as I understand the case, it is only a request for a temporary increase in water diversion for the purpose of dilution. Now, if you dilute this that will decrease the menace but will not eradicate it. The only way it can be eradicated is by proper treatment of the sewage, and if that is not 100 per cent efficient, then there should be enough water added to dilute it.

I think it is a fact they have had this menace, if any, for 40 years or more, ever since this polluted stream has been going through Joliet. It is my opinion that any stream polluted and laden with untreated sewage
3053 would be a menace to health, and that menace would be increased if a stagnant pool were created, as it has been here, since 1933, and even if you dilute the stream with an additional 3500 cubic second feet of water you don't remove the menace, you just decrease it. The menace is still there, whatever it may be, unless it is diluted to the point where you get to a stream that has more bacteria in it, B coli in it, than can be kept out. I don't believe that 3500 cubic second feet of addi-

tional diversion would remove entirely the menace I claim is there. It would depend a great deal upon the amount of oxygen that would be added to the water and the degree of dilution of the B. coli. I would like to see actual counts of B coli. I don't know how much the addition of that specific quantity of water would dilute the water in Brandon Pool.

3054 The approximately 150,000 pounds of oxygen per 24 hours which it has been testified an additional 3500 cubic feet of water would add would certainly help but I don't know whether it would entirely eradicate it. That would depend upon tests when that addition is made.

By Mr. Williams

I am not sure whether the typhus germ is destroyed by the presence of oxygen. Of course, there is another organism that may be present in a stream and that is ameba dysentery. I had that in mind when I referred to carriage by dogs and cats.

3055 It will depend upon the sensitivity of the individual as to how strong a concentration of hydrogen sulphide would be necessary in order to produce the objective symptoms described here, such as vomiting. I know that when our stomach is unstable from other causes, vomiting is more easily elicited by objectionable odors than otherwise. Sometimes our stomach is more stable than others. Some individuals are more sensitive than others. The lower limit of this sensitivity is a concentration necessary to produce the odor, sensation of rotten eggs, hydrogen sulphide odor, indol or skatol or mercaptan; and the upper limit would be that that would produce unconsciousness or an exposure of sufficient length to produce olfactory fatigue. By olfactory fatigue I mean exposure to the odor for a sufficient length of time that its intensity so far as that person is concerned, depending upon his sense of smell, 3056 is much less. For example, that question comes up in the egg packing industry. One rotten egg would spoil a batch of egg yolks or of egg white, and they have girls who smell the eggs to throw out the rotten eggs, and they will develop olfactory fatigue; but if they inhale some fresh air for a short period of time, or if they inhale some contrasting odor for a short period of time, then they become sensitive to the eggs again. It would depend upon the mental association of the odor with unpleasant things in the past whether these persons at the lower limit of sensitivity would be similarly affected by any ill-smelling odor regardless of whether or not hydrogen sulphide is present.

By Mr. Naujoks

I believe an increase in diversion would by dilution decrease the number of harmful bacteria in the Brandon Road Pool. To what extent I can't state specifically.

3057 I do not know of one single case recorded in medical works or literature or journals, of an individual having been rendered unconscious by hydrogen sulphide coming from a waterway containing untreated or partially-treated sewage. It is a fact that the human system generates hydrogen sulphide in the colon at times and dispels it in the form of gas. It varies in amount depending upon the diet and the amount of colon stasis. We have a means in the liver of taking care of any H2S that is absorbed in quantities of that type. You see this H2S is absorbed by the liver and is oxidized to a sulphate—an innoxious material; but that is different from the action of H2S on the mucous membrane of the eyes and nose and the respiratory tract. There is no detoxicatory mechanism there. You get direct effects of irritation, the reflex effects from the odor as well as from the irritation.

Hydrogen sulphide is generated as well from decomposing animal wastes, refuse. For example, in a farm
3058 yard, and so forth. Also from the petroleum industry at Whiting. There is some hydrogen sulphide given off by certain oils, particularly at times when oil is cracked. The odor is very noticeable at times if you drive through Whiting. It varies there considerably, but it would be very noticeable to any person going through if at that time there was hydrogen sulphide given off. I have smelled the hydrogen sulphide from Whiting at times when it has been pretty bad. A lot of people reside in Whiting near these oil-cracking plants.

3059 I would consider that detrimental to their health, and I think that should be abated. If I lived there I would be active in an attempt to reduce that because of health menace.

Q. (The Master) Could you compare that in terms of degree with this situation at the Brandon Road Pool? Would you say it was about as bad, or would you say the Pool was worse or the Pool not as bad?

A. Well, there is a difference in the odor. When we smell the odor in the air at Whiting we know that it is coming from oil, hence it does not affect us psychologically, which is a real effect, as when we get the odor of H2S when it is associated with fecal odor, and then when we further associate it with its source and when we know that we can get disease by coming into contact with the water that is giving off an odor of that sort, a fecal odor.

You would get disease by coming into contact. I was developing associations. If we get the odor in the air at Whiting, we know that it is coming from oil; we know that oil is clean and we can't get typhoid or amebic dysentery or other diseases from that odor
3060 or from anything associated with that odor. I was pointing out that the effect of one odor might psychologically be more detrimental than the effect of another odor, even though those odors alone would be on the same footing.

Odors from the stock yards, in part, emanate from hydrogen sulphide, decomposing animal matter. There is some hydrogen sulphide in that odor. There is also
3061 some indol and skatol, and some individuals are nauseated by that odor. And again, I think that should be abated, and according to my understanding the people of the stockyards are doing their best, everything that is possible and feasible to abate it. At times that odor penetrates the city to the downtown section and up north beyond that. I drive along the Outer Drive twice a day, most every day in the year, and I

will get that odor about twice a year on the Outer Drive. That is a distance, as I recall now, of about a couple of miles. There are a lot of residential homes and houses in the vicinity of the stock yards that would be affected by the odor at times. I have had no personal experience in regard to the production of conjunctivitis by hydrogen sulphide. The addition of more water from Lake Michigan would not decrease the
3062 total number of harmful bacteria passing Joliet per unit of time. If you have a thousand bacteria in one gallon, or a thousand in two gallons, and if the one and two gallons flowed by a point at the same rate during the same period of time, there wouldn't be any decrease in the total number. According to my best knowledge and information increased oxygen would destroy more of it, but that is a different question from the first one you asked me. Bacteria—typhoid for example, according to my information do not live a shorter time in polluted water than they do in pure water. According to my information the number of B. coli per certain volume of water is an index of the pollution of the stream and an index of the danger of that water so far as typhoid infection is concerned. For example, the United States Public Health Service allows one B. coli per hundred c.c. Here, as I recall, we have all the way from 10 to 40,000 B. coli per 1 c.c. The number of B. coli in the intestinal contents varies, but there may be many of them in feces. Normally when
3063 the stomach is secreting acid, they are not present in the stomach. The acid of the stomach destroys them and will not permit them to grow. There are very few colon bacilli in the upper portion of the intestine. They

are principally found in the large intestine, and they are found there in large amounts; some are dead and some are alive.

I didn't say the odors at Whiting which are produced by hydrogen sulphide, and the odors from the stockyards which are produced from hydrogen sulphide, and those over a waterway which is polluted producing hydrogen sulphide from decomposing organic matter, would be the same excepting the psychological effect on the individual. There is hydrogen sulphide in certain of the odors that come from Whiting. There is hydrogen sulphide in the odors that come from the stockyards, but there are other volatile substances in the odors from Whiting that are not present in the odors from the stockyards. I live on the South Side of 3064 Chicago, about four or five miles from Whiting, and I have never smelled indol and skatol. I have never smelled anything suggesting the odor of fecal material and other than H2S coming from Whiting. Where I live I will get those odors from Whiting about five days out of a year, depending upon the direction of the wind, the humidity and the barometric pressure.

My residence is about 10 miles from the stockyards, but I get the stockyards odor once or twice a year when I come to the Medical School by way of the Outer Drive along the lake. I am much further from the stockyards than the people living along the banks of this stream at Brandon Road Pool. To make a comparison you would have to get some testimony from the people who live right along the stockyards.

3065 When I visited Brandon Road Pool last Sunday, October 13th, I did not notice garbage dumps below the

Brandon Road Locks. We were on the locks and walked out on the south retaining wall where the water spills over the dam, but there was not much spilling over when I was there.

By the Master

Typhoid and amebic dysentery would only be carried 3066 through the air in the case that we had some infected water and the wind would blow a wave and that water would splash in our mouth. You would have to have the water itself in your mouth. If I had typhoid I could give it to you. For example, the most frequent place in the body for the typhoid bacillus to reside for any length of time, and it may reside there for many years, is the gall-bladder. Then it grows and proliferates the gall-bladder, comes down in the intestines and will be passed in the stools. Then the individuals will contaminate their hands, and then they will handle food and will pass it down. Of course, if they get it in the food that is cooked, then the typhoid bacillus would be killed with heat; but if they handle fruits and vegetables and biscuits and plates, then they can pass it. That is the way the famous "Typhoid Mary" infected so many. Amebic dysentery is distributed by carriers in the same way. Of course, they can infect foods in a number of other ways.

By Mr. Cohan

3067 In order for an odor to cause vomiting one must of necessity go through a certain amount of mental gymnastics. When most people become nauseated from an

odor it is due to the association of that odor with something unpleasant or an unpleasant experience. That, however, is not always true because the material may irritate the mucous membranes, we will say, of the pharynx, and reflexly cause nausea and vomiting. It stimulates sensory nerve endings from the pharynx and nerve messages go into the medulla and then motor impulses will come and cause salivation, which is an objective manifestation of nausea—which is a subjective sensation—and more impulses will come out that
3068 will cause the motor action of vomiting. For example, some irritating substance may be introduced into the stomach and will provoke vomiting; or, for example, sometimes a pain nerve is stimulated, and vomiting and nausea will be produced or provoked reflexly.

3069 These mental associations may occur subconsciously. You become nauseated and vomit without even thinking about it, for the present, saying "Well, that odor is associated with the odor of the feces, and that is why I am going to become nauseated and vomit", because certain of these things, reflexes go through in the subconscious portions of our brain. We are not aware of them. Just like we walk. Walk is a voluntary act. We initiate our walking and we stop our walking through the processes in the cerebrum, but after we start to walk we don't think about it; it is the subconscious act. Nausea and vomiting can be brought about subconsciously. As a matter of fact, we can take animals and produce vomiting, which is an objective manifestation of nausea which is subjective, without a cerebrum.

3070 It is possible for a good stiff smell of rotten eggs to cause one to vomit. I would say the jublic health in general of the City of Chicago, insofar as communicable diseases are concerned, infant and maternal mortality, the prevalence of typhoid, to be specific, is very good. Insofar as the prevalence of amebic dysentery is concerned, we have not had a good record. Insofar as the prevalence of irritations of the upper respiratory
3071 passages by smoke and dust, irritation of the nervous system by noise, and unhygienic factors of that sort, I would say it is not so good. If I were to be asked as to the general health in general of a municipality, whether it was good or bad, I could not give an answer yes or no—I would have to qualify it. As a matter of fact, there are very few things in science and medicine that we can answer a straight yes or no. In my opinion the degree of pollution of a stream passing through a municipality determines whether or not it is a menace
3072 to the health of the people living there, because it predisposes to the amount of odor given off and it increases the bacterial content. It depends upon the degree of pollution as to whether or not the stream is a menace to the health of the people of the community. Loss of appetite is not a rare thing.

3073 A few of the causes of loss of appetite in an individual are, first unpleasant odors; second, unpleasant surroundings, sight of unpleasant things in the environment; the presence of unpleasant associations in the environment such as business worries or domestic worries; and then, many acute and chronic illnesses and, of course, lack of vitamins, eating too much fat, too much sugar. The expressions insomnia and loss of sleep are synonymous. I should say that they are rare disturbances. Vomiting and nausea are much more rare than the disturbance of appetite and disturbance to sleep.

3074 Nausea is a subjective sensation associated with certain objective findings when you study the patient, but vomiting is an objective phenomenon. You can see a person vomit but you can't see them be nauseated. Of course, they get pale and salivate. If you take their heart pulse rate you would find it would become irregular, slow down and speed up.

Hydrogen sulphide is by no means the only thing that irritates the mucous membrane. It can be irritated by chlorine, gas fumes of nitric acid, sulphuric acid. I can give a large list. Gasoline, for example, will do the
3075 same thing, fumes of benzine, fumes of ammonia, exhaust from a Diesel engine, smoke from certainly tobaccos. The presence of noise like the operation of elevated railroads passing by houses where people live would be an unhygienic factor and by disturbing the sleep of certain persons living along the elevated will interfere with their health—with normal healthy individuals. Therefore, in my opinion, it should be reduced and, of course, that is what we are trying to do in the cities by getting the street cars constructed so that they run more quietly. I would conclude that it would be a menace to the health of people living there. It is an unhygienic condition.

By Mr. Naujoks

3076 I couldn't say how many people at Joliet would be affected by nausea, vomiting, or otherwise if .2 of 1 part per million of hydrogen sulphide were in the air. I would have to go down there and test them out. .13 parts per million would stimulate the olfactory organs of some individuals; .13 is less than .2.

3077 I don't know how much smoke there is at Joliet or how much railroad traffic there is. Of course, I believe that if the smoke is excessive and if it is feasible to reduce the amount that should be done. That is why I am in favor of rigid enforcement of the smoke abatement ordinances in all of our cities.

Re-Direct Examination by Mr. Wallenstein

This psychological process, this process of suggestion —association is real. We are doing it all the time. We are all doing it during our discussion here. Sure there is a physiological response in the body as a result of
3078 that suggestion. Nausea is a physiological response; change in heart rate; change in blood pressure. The act of vomiting is a physiological response very definitely. Nausea and vomiting are very undesirable and one of the most common symptoms of disease.

Recross Examination By Mr. Williams

You would have to condition the individual to secure a similar result merely by the color blue in certain individuals. If, for example, we would select an individual who was nauseated and has vomited by the of asafetida, and if the color blue were presented with this odor of asafetida at the proper time and for a certain number of times, that individual would become conditioned, or he would be educated or trained to vomit when he sees blue. You can do that with a dog or a rat. You can't do it with a rat because a rat doesn't vomit.

October 16, 1940

Direct Examination By Mr. Clausen

3079 HUGE ALISTER McGUIGAN. I reside in Evans-
3080 ton. I graduated with a Bachelor of Science degree, North Dakota State College in 1898. I stayed there for three years as assistant professor of chemistry. I came to the University of Chicago and was assistant professor in physiological chemistry. I got my Ph.D. degree in physiology and chemistry in 1906, a medical degree from Rush Medical College in 1908. I have been assistant professor of physiology and pharmacology at Washington University for four years; professor of pharmacology at Northwestern University for seven years and since 1917 I am professor of pharmacology and therepeutics at University of Illinois, College of Medicine.

I belong to the American Chemical Society, American Association for Advancement of Science, American Physiological Society, Biochemical Society, Society for Experimental Pharmacology and Therapeutics, Institute of Medicine in Chicago, Fellow of the American College of Physicians, and there are some others.

I have written several books. One "Applied Pharmacology", another "Materia Medica on Pharmacology for Nurses" and several previous to those.

3081 I accompanied Dr. Carlson and Dr. Ivy on a trip
to the Brandon Road Pool, Sunday, October 13, 1940.
I have read Dr. Carlson's testimony and I have heard
Dr. Ivy's testimony. In the main I agree with their testimony.
There are many things we could add. In the
first place the hydrogen sulphide on which they are
dwelling so much isn't the only thing. The cadaverin,
putrescin and all the other things mentioned—those
are positive things, but there are many other things
that we won't know anything about in there which
3082 may be even more toxic than the hydrogen sulphide.
For instance, 30 years ago I worked for a while in
a government laboratory at Washington with Dr. Wiley
and in those days we thought of food as consisting
only of carbohydrates, fats and proteins. Now we have
developed things that were entirely unknown, that are
just as important, like the vitamins. The same way
in the chemistry of this sewage business. We know
some of the big things, some of the positive things; but
there are many other things we don't know anything
about that may be more toxic than the hydrogen sulphide,
which I think they are according to the evidence
given. There are other things in there, in my
opinion, that are more toxic than hydrogen sulphide
could be in the concentrations that could exist.

I spent three hours on the transcript of the record.
I got, I think, the main points of it. I went through
3083 that list showing the effect on the various people.
(The Master: The list referred to is a summary of
the testimony at Joliet which Mr. Naujoks prepared
and furnished copy to opposing counsel). It is my
opinion that an actual menace to the public health

exists in the community of Joliet. The weight of some of the people who testified didn't seem to change even though they were affected. Weight can remain the same and a person be very markedly affected. The composition of the human body is, roughly, say two-thirds water. A person can lose a great deal of actual flesh and remain the same weight because they drink more water. In diagnosis, the actual weight means
3084 the weight may be the same and the person may be really losing weight.

Another thing, I think you are paying too much attention to statistics of public health. I think half those people could be sick and it wouldn't be mentioned in the public health records. They could be out of work and suffering from something that wouldn't show in the records at all.

3085 Very frequently people might have these particular ailments by reason of these conditions and still not go to a doctor. I didn't ask some of the people I talked to if they had a doctor, but they complained of being sick. On the ordinary headache you might get more information from the actual number of headache remedies which are used down there. The medical profession object to people medicating themselves. One of the things that is most used is the ordinary
3086 headache remedies. That don't show in any records at all, even in drug store records. If hydrogen sulphide is injected into frogs you get a strychnin-like tetanus that may persist for two weeks. It shows definitely that hydrogen sulphide has a very definite effect on the central nervous system.

Cross-Examination by Mr. Williams.

3087 I think the meaning of the term "detrimental to health" means anything which causes impairment or deterioration of or is detrimental to the full functioning of the human system. I would say if a person was 100 per cent healthy we could apply the converse term and say that a healthy person is one who has a 100% full function and coordination of his being, but few people are 100 per cent healthy. Using the term in that sense it is a debatable question where I know of any healthful people. We take the average man's health and say he is a healthy individual—reasonably healthy.

I would accept as a correct understanding of my testimony the statement that there may be conditions existing at Joliet which are detrimental, but which are unknown for the reason that the causes are
3088 unknown. If you don't know the causes you can't eradicate it. In many cases it would also follow that if we didn't know the cause we could not ameliorate it or make it better. Many cases we can. We don't know the cause of cancer, for instance, but we can ameliorate it a lot. But in the sense that I am now using cause, we have an objective symptom in can-
3089 cer. So far as presently known there would be no method of remedying that situation until the cause and the observable results were known.

By Mr. Naujoks.

If you had a large number of people ill in any community that would be reflected in the mortality statistics only if they died. They might be more apt to

die if they were ill because of their reduced resist-
ance to most diseases. When I mentioned headache
remedies I wasn't meaning to imply that they were
3090 sold only in Joliet. I am in general agreement with
Dr. Ivy's testimony, both on direct and cross exam-
ination.

By Mr. Herbert.

3091 Earlier in direct examination I stated substantially
that there might be other things in that condition
down there, in addition to hydrogen sulphide,—un-
known things which may be creating a bad health haz-
ard. By the same token I don't know of anything in
that stream—unknown things—which may be health-
ful to that community. The question asked of Dr.
Ivy here was if bacteria would live as long in a pol-
luted stream or shorter time in clear water. What he
was referring to was a bactericide, something that was
eating away the bacteria. So far as some of the bac-
3092 teria is concerned, your statement may be true. How
far that would apply to the general community I can't
visualize anything in that stream that would be help-
ful to the community as a whole. My motive in bring-
ing into this record the statement that there may be
unknown things down there at Joliet which are detri-
mental to health was based on the testimony I have
read of the priests, nuns, doctors and all the others.
I can't see how a concentration of hydrogen sulphide
in itself would be the only thing that would do that
or could do it. There must be, in my opinion, some-
thing else there.

3093 I was first conculted with regard to testifying in this case a week or ten days ago, and that is the first time I have ever directed myself consciously to this situation at Joliet.

By Mr. Naujoks.

It is not so likely that these unknowns might be, for example, gases from the refinery wastes, oils and things. I would confine them mainly to protein products, decomposition products. The gases we know pretty well. There is none of them toxic that we know of in any ordinary concentration, in the petroleum industry.

3094 You can get overcome with gasoline, but in enormous concentration. For instance they have actually used gasoline as an anesthetic, but have given it up because it is dangerous and uncontrollable, and so on. You can kill a man with anything, even pure oxygen. In certain concentrations that is toxic.

By Mr. Cohan.

On the basis of this record we have a real sick
3095 community in Joliet. According to this record I have read, you have a serious condition there.

By the Master.

I can't say that I am a practicing physician. I am licensed in the State of Illinois to practice and I have some consultations, but I wouldn't rate myself as a
3096 practitioner of medicine. My field is particularly phar-

macology and therapeutics. In pharmacology I deal with the action of drugs and in therapeutics with the application of drugs to the treatment of disease.

By Mr. Herbert.

I don't think I examined the convalescence records of the hospital down there at Joliet. Assuming that the average convalescence from any type of illness would be the same in Joliet as in any other community, that would have no influence on my conclu-
3097 sions. The reason why is that we have never seen a patient in a hospital yet who didn't want to go home before he should go, and at Joliet where the conditions were nauseating, as they state here, he would want to go still earlier, so I don't think the record would be of any value in that case.

3098 By Mr. Naujoks.

The fact that no one of these witnesses who testified at Joliet lost any time from work wouldn't change my opinion that Joliet is a sick community. They wouldn't be incapacitated for work, but those people who have to work, in my opinion, get out where if they had a little more money they wouldn't go to work.

September 23, 1940

Direct Examination—Mr. Clausen.

2136 C. E. SCHWOB. I live in LaGrange and work in Chicago. I am Assistant Sanitary Engineer for the Department of Health, State of Illinois. On June 20, 1939 I took a picture along the Sanitary Canal where Route 45 crosses the Canal right south of LaGrange. That is between Summit and Willow Springs.

2137 At this point witness identifies picture which is offered and received in evidence as State of Illinois Exhibit 58.

That picture was taken about six o'clock in the evening.

2139 A barge had just gone down the Canal and the reason I was particularly interested was that there was a slick on the water from the boat passing through and the rest of the Canal where the boat hadn't gone through was completely covered with sludge. I took it merely from the interest of public health.

Yes I could see the barge from where I took the picture. That black spot here (indicating) is the barge going towards Joliet.

At this point witness identifies an enlargement of the above mentioned picture, which is offered and received in evidence as State of Illinois Exhibit 59.

2142 Before the barge went through a scum covered all across.

Cross-Examination—Mr. Cohan.

2143 When I see things of that nature that are of interest from a public health standpoint I take pictures of them. I gave the small photograph to the Chief Engineer, Mr. C. W. Klassen, of the State Department of Health. No one from the Attorney General's office asked me to take that picture.

228 CHARLES L. ADAMS, on behalf of Petitioner.

Direct Examination by Mr. Clausen.

I am a graduate of Miami University, A.B. 1924, and received an M.S. in Chemistry from the State University of Iowa in 1925. I have been with the Sanitary District 15 years, of which 12 years was spent in charge of the Joliet Laboratory.

229 I cross the Des Plaines River daily, morning and evening. I analyze about 60 samples daily for dissolved oxygen. The samples are collected for dissolved oxygen hourly each day except Saturday. The B.O.D. samples are collected every four hours.

230 I look over Brandon Pool every week on way to Smith's Bridge Station. Once a month I run down to Peoria, collecting samples every five miles. In a month I make a total of 1200 tests. Such tests have been made for 15 years. I have personally made them for 12 years.

231 I report to Dr. Mohlman on results at Lockport and Smith's Bridge. The Brandon Pool was in much worse condition in 1939 than in 1938, and was also worse in 1940 than in 1938.

232 Warm weather brings the sludge to surface. This action stops with advent of cold weather in fall. The water was worse in the Pool in 1939 after cut in diversion. Odor changed to a characteristic nauseating odor in 1939 and 1940. The odor in 1938 lacked the sickening quality of 1939 and 1940.

233 The B.O.D. increased in 1939, and was higher in

1939 and 1940 than in 1938. In 1938 I made seven round trips through the Lock at Brandon Road. I was on the Pool seven times. In 1939 I was on the Pool four times, and in 1940, I was on the Pool four times prior to July 12. The river improves definitely near Dresden Pool, about one-half mile above Kankakee River.

LORAN D. GAYTON.

3538-3545 Gayton Exhibit 1, Affidavit.

I have been in Engineering Practice for 35 years. During this period I have been in the employ of the City of Chicago for 26 years, including 13 years as City Engineer. As such I have charge of the Water Department. The number of water services in 1940 in Chicago was 412,228. Of these 115,025 services are metered. To install universal metering requires 300,000 meters. The cost of meters installed is estimated at $10,400,000. This installation would require 5,640,000 man hours, and might extend over at least six years, but more likely twelve years. In ten years from 1930 to 1939, the City placed 41,564 meters, or an average 4,156 per year. The greatest number placed in one year was 16,864, in 1931.

The cost of water to the consumer is higher in New York than in Chicago. In New York City, the cost is 25 cents per per 1,000 gallons, whereas in Chicago it is only 7 cents per 1,000 gallons on a meter. In New York City, 143 gallons per capita are used with 28 per cent metered, whereas in Chicago, the supply is 28 per cent metered, but the use is higher.

Universal metering, if inaugurated at present time, would have no appreciable effect in reducing the demand for water from the Chicago water supply system in the next two years. I do not believe that whatever meters may be installed in 1941 and 1942 on the South Side area will appreciably reduce the use of water therein.

LOUIS R. HOWSON, a witness called on behalf of Wisconsin et al.

Direct Examination by Mr. Naujoks.

1935 My name is Louis R. Howson. I am a consulting hydraulic sanitary engineer. I graduated from the University of Wisconsin in 1908 with the degree of Bachelor of Science in Civil Engineering. I am now 1937 a member of the firm of Alvord, Burdick & Howson. I have a general familiarity with the problems of the Sanitary District going back over a considerable period of years. In my opinion one of the influences 1939 to remedy the conditions complained of would be to step up the aeration facilities now available and operate them at their maximum. This would result in a slight lowering of the remaining B.O.D. It would increase the dissolved oxygen in the effluents and would result in the creation of nitrates and nitrites, the oxygen from which would be of value in satisfying the oxygen demand of the channel waters.

Another improvement would be to divert the water which now passes through the water wheels at the Lockport Power House where at the present time very little aeration is accomplished, and diverting it over a properly designed and constructed cascade over the side of the canal into the Des Plaines River, picking up in that way a considerable amount of dissolved oxygen.

A third improvement would be effected if the Brandon Road Pool were dredged for the removal of as much as possible of the sludge now impounded there

1940 and concerning which Mr. Andrew testified. Hydrogen sulphide that reaches the surface and is detected 1941 usually comes to the surface accompanied by other gases, and frequently accompanied by disturbance in the sludge depending upon the origin, whether of liquid or sludge origin, of the hydrogen sulphide. A remedial measure may be taken without additional diversion by addition of chemicals to the West Side Imhoff tanks. That might reduce the load from 57 parts per million to 36 parts per million, which is a reduction of some 37 per cent in the amount of B.O.D. going from that plant to the stream.

Another improvement would be effected by passing a maximum amount of West Side effluent through the present South Side facilities.

1942 A reduction in the consumption of domestic water per capita in the Chicago area would cause fewer overflows if there was less of the intercepting sewer capacity utilized by the normal or dry weather flow. 1943 If nitrates were present and were continually present, there would be no basis for the present complaints 1944 at Lockport and Joliet. Chlorination is a very effective and positive method of controlling odors. I believe its use would be practicable and effective along the Illinois Waterway. The amount of oxygen that could be introduced over cascades would be equivalent to the dissolved oxygen in the summer months of 2500 cubic feet per second, approximately. It would ameliorate conditions now prevailing if the sewage and wastes from adjacent municipalities, industries, etc., 1945 were treated. I think it would take from six to nine months to construct sewage disposal facilities for the

municipalities, state institutions, industries, etc. A well receiving seepage from the canal or Brandon Road
1946 Pool, regardless of any amount of diversion, would be unsafe.

1947 I do not know of a condition in Joliet where people are using water from wells for drinking purposes with sewage seepage. If so I would unhesitatingly pronounce them unsafe wells, whether the diversion
1948 was 1500 or 500 cubic feet per second. I don't think
1950 under the presently existing conditions there is a
1951 menace to health. All Chicago drinking water is chlorinated. There would be some slight benefit from chlorination and sterilization of the plant effluents. These remedial or ameliorating measures I have spoken of would afford the same relief that would be afforded
1952 by the addition of 3500 c.f.s. more water from Lake Michigan. Temporary cascades could be constructed near Lockport which would introduce into the water a large amount of dissolved oxygen. The cost would fall somewhere between $50,000 and $100,000 as a maximum.

Cross-Examination by the Master.

1953 I believe that lighter flocculent material which is in that upper zone of 2 or 3 per cent moisture could be
1954 removed by flushing out. A great deal of the lighter material could be moved down by washing down into the Dresden pool below, which is in a largely uninhabited area, and the success of that could be extended
1956 by doing it more than once. No substantial interval would need to elapse between those treatments. The

formation of ice does not interfere with the flow of
1958 water under the diversion from Lake Michigan. The
longer the deposit is there the less potent it becomes,
and the lower layers having been deposited first they
1959 are the least potent and progressively become more
potent as the light flocculent material on top is approached. Sludge deposit in this stream of more than
a year ago has lost enough of its potency to probably
not be the cause of offense. I am inclined to believe
that more could be accomplished by taking out the
layers recently accumulated than by taking out the
greater bulk of that that has been there for a period
1960 of years. Chlorination of the pool would effect more
positive results per dollar than the expense of removing that million and a half more or less cubic yards
1961 of sludge. I think it would be worth while to draw
out all of that top layer that can be drawn. If any
dredging is done at all you might as well take it all
out. I don't believe it would be feasible to take out
the top layer. If a spill bank or lagoon were used
at a sparsely settled point to dredge out positive ma-
1962 terial would sooner come to an inoffensive state because the water would be decanted off and go on down
the stream and the solids alone would remain, and
they would soon become liquored sewage sludge digested in so far as they had not previously been digested. It might be possible to put the heavier materials on top and stuff that has been in there for six
or seven years and practically control the nuisance
as the dredging was done. Reduction in domestic
pumpage by metering would require the installation
1963 of meters in every household. Metering would take

considerable time if you were to meter the whole city.
1965 If you reduce the domestic pumpage while you would reduce the volume passing through the sewage treatment plant you would also reduce the amount of oxygen in that sewage which is now supplied by this water. It would not affect the total pounds of B.O.D. coming to the plant, but instead of being transported in per capita water of 250, it would be, as generally estimated, down around 160 gallons. You would have
1966 fewer gallons of liquid coming through your plant. You would have no economy in air, but you would have more facilities available in your tanks. If you have a smaller amount of sewage but it has to stay in the tank longer you have to offset the smaller quantity against the longer period to some extent.

LOUIS R. HOWSON.

2812 Direct Examination by Mr. Naujoks.

2813 When I stated that there might be a concentration of hydrogen sulphide of 1 per cent more or less in the sewage gas, I had reference not at all to the atmosphere or air above the water, but, rather, to that part of the minute bubble which is coming up through the water, which is hydrogen sulphide. That, of course, is immdeiately dispersed and diluted upon reaching the surface, or such part of it as reaches the surface, without having been dissolved in its passage up through the water. A single bubble or a collection of bubbles could not contain a sufficient concentration of hydro-
2814 gen sulphide to be detected except by detailed analy-

sis. (Opponent's Exhibit No. 8 was offered and re-
ceived in evidence, being chart showing Use of water
2822 per capita in twenty largest cities in 1940 census).
(Opponent's Exhibit No. 9 was offered and received in
evidence, being Orders and Reports relative to meter-
ing of the Chicago Water Supply).

2825 Exhibit No. 10 was prepared to show in as concise
form as possible the alternative methods of adding
oxygen or securing additional oxygen for the pre-
2827 vention of complaints from Brandon Road Pool. (Op-
ponent's Exhibit No. 10 was offered and received in
2828 evidence, being Sources of Oxygen for Prevention
2832 of Complaints from Brandon Pool). (Opponent's Ex-
hibit No. 11, was offered and received in evidence, be-
ing Means of Reducing B.O.D. Load to Canal to ameli-
orate or remedy conditions complained of at Bran-
don't Pool).

2833 Opponent's Exhibit No. 12, entitled "Estimated Cost
of Measures to Ameliorate or Remedy Conditions
Complained of at Brandon's Pool" was prepared in
response to the Master's request that we express in
dollars and in time required these various ameliorat-
ing measures that have been suggested. The item of
cost in "6", I think, is inclusive of the cost of acquiring
2837 a place to dump this material that is extracted by
dredging. That would not help much because most of
2838 the more compact solid has lost its potency as a
source of trouble. No. 7 on Opponent's Exhibit 12 is
flush Brandon Pool to remove active sludge and floccu-
lent material. That could be done at the proper time
without the requirement of much time or the expendi-
ture of much money. No. 8 on Opponent's Exhibit 12

covers the diversion of all West Side effluent to the Southwest Aeration Plant, requiring an expenditure of
2839 about 3 million dollars, all of which is a part of the permanent program of the Chicago Sanitary District and which, if it were organized and pushed at once could be done so as to be all or very largely in use by next summer. As an emergency measure, the expenditure of funds, all of which will be permanently useful, No. 8 requiring about 3 million dollars, will produce results as shown on Opponent's Exhibit 11, No. 2; it will reduce the present B.O.D. demand about 200,-
2840 000 pounds per day, or some 40 per cent. No. 9 on Opponent's Exhibit 12 is to cover chlorination of West Side effluent for 150 days, being somewhat comparable to No. 2, chemical treatment. It would cost only $100,000 to install and would cost less to operate. It could be installed in from six to nine months.

The figures of cost given on Opponent's Exhibit No. 12, for No. 9, chlorination of the West Side effluent, Mr. Enslow advises are sufficient to effect a reduction of 15 parts or more in the B.O.D. of the West Side Imhoff tanks. That would be equivalent to approximately 50,000 pounds of B.O.D. removed as compared to the 76,000 shown on Opponent's Exhibit 11 for
2841 chemical precipitation. No. 9 would be preferable to No. 2 because it would do most of what No. 2 would do and cost vastly less. Chlorination measures would
2842 have value after the projects were completed. Chlorinators are provided at the Southwest Side Plant primarily for the control of growths in approximately half of the effluent which goes through the condensers. If the waterway were to be used for water supply

purposes or for recreational facilities, it is common practice to introduce chlorine, or if it were used—if it were in any way a health hazard the chlorination
2843 is the most effective control of that. It is also always available in case of a breakdown of some other process.
2844 No. 9 could be a permanent installation; that is, the dollars cost of installation is sufficient to cover. Item
2845 No. 7 would be changing the location—the location of the sludge; depositing it in Dresden Island Pool which is several times larger than Brandon Pool and which is in a very sparsely settled area. (Opponent's Exhibit No. 12 was offered and received in evidence, being Estimated cost of measures to alleviate or remedy conditions complained of at Brandon's Pool).

Direct Examination by Mr. Naujoks.

2848 It is not a universal practice to chlorinate water with which dairy cattle come in contact. It occasionally becomes necessary to by-pass sewage. A chlorinator is a very valuable shock-absorber and insures against breakdowns. In connection with flushing the Brandon Road Pool I believe more would be
2852 accomplished with the same volume of water. Opponent's Exhibit No. 13 was offered and received in evidence, being Sources of B.O.D. and B.O.D. of Canal at Lockport.)

2854 Examination by the Master.

2855 For the last four or five months of 1939 and the first three months of 1940, all of the Southwest Side Plant was functioning, so that during that time they

were doing a more complete job than they were taking this particular month, and I think that that meant that there was less material, from, say September last year to April this year. The Sanitary District in July
2860 1940 were doing a 20 per cent better job than they did in June 1939. I think that the B.O.D. at Lockport in 1941 won't be over somewhere around a third as much as it was in 1940.

2862 Direct Examination by Mr. Naujoks.

Chlorination of the Imhoff tank effluent would reduce the B.O.D. going to the Canal. If that be taken at 15 parts per million, it would effect a reduction of about 45,000 pounds, making 169,000 pounds, about 124,000 pounds. That chlorination of the West Side effluent would be reflected by 15/21 of the Item No. 1 on Exhibit No. 11. Item No. 1 on Exhibit 11 ties up with item 9 on Exhibit 12. I am undertaking to give the court a picture of what the situation is going to be in the summer of 1941.

2865 Cross-Examination by Mr. Clausen.

Referring to Item 9, the cost of $100,000 I figured on a building which would be a summer-operated building. I have not made any detailed plans. It in-
2866 cludes chlorinators, evaporators, piping and a structure. I figure about $5,000 per ton of daily capacity. I think no storage capacity is required for chlorination. The building would be a steel building, light

construction, with some type like transite slab side-
2867 walls. The life of the building is a question of main-
2868 tenance. If properly maintained it would be good for
anywhere from 15 to 25 years.

2870 When I refer on Exhibit No. 12, to the approximate annual operating cost of chlorination of Canal water, No. 3, as 70,000 to 300,000, that relates to Item 5, Exhibit No. 11, as chlorination producing 6 parts per million of chlorine.

October 17, 1941

LOUIS R. HOWSON (Cross-Examination).

3217 Referring to Exhibit No. 12 of my testimony, item 3: If I were to assume that the chlorine used were a maximum of 12 parts per million continuously, the annual operating cost would be one-third more than $300,000 figured on 9 parts per million continuous, or $400,000. That is continuous, over, I believe, a hundred day period.

3218 Exhibit 10, under item 2 where I refer to the North Side and Calumet Plants, 370 million gallons daily, that is an error. It should be 270 million gallons daily —200 million gallons daily for the North side and 70 million gallons for the Calumet. At 270 the pounds of oxygen would be about 40,500 pounds instead of 55,000.

In item 3 under Exhibit 10 the figure of 6-3/4 parts per million of oxygen pick-up is based upon two principal sources of data. One, the observation of re-aeration over the Hastings Dam in the Mississippi River,

where the water in going over the dam consistently carried about 7 to 7-1/2 parts per million, and, secondly, it is based upon experience at the North Side Plant in the effluent channel of the Chicago Sanitary
3219 District as reported by Mr. L. C. Whitemore, designing engineer for the District in Sewage Works Journal in, I believe, about May 1937. In that issue he stated that it was consistently practicable to pick up oxygen in the amount of 85 per cent of saturation and comparing that with five years' records of the North Side Plant, which are in evidence in this case, the average pick-up in that outfall, which was a happenstance rather than a matter of design, has averaged 6.7 parts per million.

3219 I think that is about right, that the North Side effluent has only 1.5 parts per million of oxygen before it goes over the aerator, as of 1939, but as it goes to the canal after going over the cascade—or not a cascade—just simply the aeration it picks up in the conduit during the year 1939 averaged 8.7. The pick-up average during that year was 6.5 parts per million.

3220 The B.O.D. in the effluent during 1939 was also 7.7 parts per million. Exhibit No. 12 under item 9, I expected to get a reduction in B.O.D. from chlorination of the effluent for 150 days. I testified that it would probably be about 15 parts per million, equivalent to approximately 50,000 pounds of B.O.D. per day. This was omitted from Exhibit 10 because Exhibit 10 is sources of oxygen. I don't call chlorination for the reduction of B.O.D. the production of dissolved oxygen or an oxygen source.

B.O.D. is stated as so many parts per million, that
3221 is, one part per million would be one pound per mlilion gallons. To convert parts per million into pounds with respect to water, we multiply by the weight of water, which is 8.34 pounds per gallon. So that in pounds per million gallons is 8.34 times parts per million.

I think the reason it was omitted from Exhibit 11 is that it was put on after Exhibit 11 was prepared. It is comparable in its effect to No. 1 on Exhibit 11, only 15 parts per million instead of 21 as shown in No. 1. It is an ameliorating effect of the same type. It is one form of chemical treatment in reducing B.O.D. The relationship between item 9 on Exhibit 12 and item 5 on Exhibit 11 is—Item 5 on Exhibit 11 is chlorination of the entire canal flow and corresponds to item 3 on Exhibit 12. Item 9 on Exhibit 12 refers only to the effluent of the West Side Plant.

3222 There is no figure for the chlorination of Brandon Pool alone except that Mr. Enslow's lower figure —the figure comparable to the $70,000 under 3 on Opponent's Exhibit 12,—as I recall his testimony, would be sufficient for one point chlorination at Brandon Pool. I can't tell you how much chlorine I expected to apply to the West Side effluent in parts per million under item 9 Exhibit No. 12. That figure was taken from Mr. Enslow's testimony and I don't presently recall it. I think he testified $691 per day, is my recollection of his testimony.

I think the various times required shown in Exhibit 12 are ample if work was started immediately, starting from its present status with plans in preparation and expedited to the full extent that is justified if a health condition is thought to exist. Some of them have already been started. I think all of them ought to be going right now, the ones that are going to be built.

3223 Assuming that they haven't started, bearing in mind that it is the Sanitary District of Chicago who has to advertise for bids and so forth, I would say that the times I have put there are practicable of accomplishment providing it is pushed as rapidly as practicable and I am basing that upon my experience in handling municipal contracts which constitutes some 75 per cent of my work. All public works requires bidding, in preparation of complete plans and specifications and the advertising of the work and it takes time for drawing plans and specifications too. Take No. 4 which has 3 to 6 months on it. If that job were assigned to my office under municipal requirements of
3224 advertising for bids, but assuming, on the other hand, that all expedition would be exercised, I am quite sure that the outside period of 6 months would be adequate to have it in operation. I mean to draw all the plans, make the design, call for bids, let the contracts, complete the work.

I can't say whether it would be necessary to secure the approval of the War Department, but in view of the fact that it does not affect navigation, as I see it, it seems to me that there ought not to be much difficulty. The flow is going to be there for lockage just as it is now. I think, however, that on all work in connection with navigable waterways a permit of some kind would be required, but my experience is that there has not been very much time required to get permits where it is really gone after. With what I contemplate there would be no structure within the channel lines of the Sanitary District Canal.

3225 I can't answer positively whether or not there would be necessity for seeking a permit from the War Department on this item 4. I think there would have to be a permit probably. The first thing I would do would be to ascertain whether I needed one and then I would go after getting it. I have secured permits from Army Engineers in many, many jobs, and I know that it does not take a great deal of time. Only in certain things would they have to have public hearings—in case there are objections and controversies. In
3226 most cases a permit, where you do not get inside the harbor line or navigation line that has been established, is a comparatively simple matter. I can't see where this would affect any industry. It doesn't lower any water level in the canal. It is the same as it is today. I did not inquire from the government whether or not they would issue a permit without a hearing in that connection and I am not sure whether or not they would require a public hearing before they would issue the permit. I am simply basing it on prior experience in dealing with governmental agencies. If they were to require a public hearing it is indefinite as to how long it would take. In general then I would say that in all the applications I have made to the government engineers for a permit there has not one of them yet gone to a protest hearing.

3227 I still say it is indefinite as to how long a hearing would take if it did go to a hearing. It is entirely a question as to whether one or more hearings and how much opposition there is to it. It might be more than 30, it might even be more than 60 (days) depending upon the extent of opposition developed. I simply state that in all the applications I have made to date we have never gone through a protest hearing.

3228 I think the sludge deposits in the main channel above the power house have been there for a long time. Yes, in my opinion, such deposit does exert a demand for oxygen—the extent of the demand depending upon their condition. Such deposits would exert more demand in the summer than in the winter time —the higher the temperature, the more active the demand. The sludge deposited in the main channel above Lockport Power House is an additional source
3229 of B.O.D., but I have yet to see anybody that has found any very definite way of evaluating it. It is not included in the figures in Exhibits 11 and 13 except as reflected in the B.O.D. of Brandon Pool, which represents the B.O.D. picked up by flowing over these same solids before getting into Brandon Pool. To that extent it is reflected in the sum total.

In determining the B.O.D. of Brandon Pool in Exhibit 11, that is based upon other testimony in this record. It is based upon, I believe, an exhibit put in by Dr. Mohlman showing the B.O.D. of Brandon Pool and it is based upon an average annual flow of 3130 cubic feet per second. Brandon Pool as used in these figures extends from Lockport power house to the Brandon dam.

3230 Item 6 of Exhibit 13 has no significance, and you will notice on Opponent's Exhibit 14 I say "This line of

Opponent's Exhibit 13 omitted as of no significance". It was a figure that was in my original work sheets and was copied over. It has no significance. The column under 1941 in Exhibit No. 14, in my opinion, means that by the summer of 1941 everything can be cleaned up, so far as treatment is concerned, with the exception of the treating of the effluent at the West Side Plant and, as shown on Exhibit 11 or Exhibit 12, I personally believe that by pushing that work that too can be completed. Certainly I believe the West Side final treatment construction can be completed very practicably by the summer of 1942.

3231 No, I don't think there should be an increase shown in the column 1942 for the item under "F" reading for 1941 169,000. That is the West Side effluent. I think by the summer of 1942 activated treatment can be applied to that waste and produce an effluent which will be in oxygen balance. That is the same thing which I understand the District plans to do by the end of 1942.

The only difference between me and the District is that they say it will not be finished until the end of '42 and I say it is entirely practicable to finish it to be effective during the summer of 1942, and it is my contention, as indicated by Exhibit 14, that with diligence there should be no excessive B.O.D. over D.O. in this situation after the summer of 1941; certainly not in the summer of 1942.

3232 Yes, my firm was employed by the United States Government to install sewage treatment at the Great Lakes Naval Training Station during the World War. We designed there what we call a winter aerator—

a cascade to aerate the effluent from separate digestion tanks handling the station sewage. Speaking from recollection, I think it operated a month or two. I think I had something to do with not operating that aerator. That was put in before the Great Lakes construction was expanded. At the time that plant was started there were about 4,000 men at Great Lakes and by the time we finished, as I recall it, there were over 60,000. They built a hospital about the time this plant was built within three to five hundred feet of that winter aerator, and the aerator was only operated for a short time because of the fact that construction had been built so close to it.

3233 It didn't create so much of a nuisance. It was not the proper construction to operate within 500 feet of a hospital. There was odor and steam. The temperature of the Great Lakes sewage was very high. It was a non-return heating system, and in the cold weather, the colder the weather the hotter the sewage, and the sewage, as I recall it, was as hot as 95 degrees Fahrenheit, and in cascading, steam was created and it was shut down. I recommended that it be shut down as not being applicable construction to the locality and, further, by that time we had put in our final settling or coagulating basis and our sand filters. I said that it was shut down because of the hospital being built immediately adjacent to this plant and located about 50 to 60 feet above it in elevation.

3234 The hospital was located after the treatment plant. I think if the hospital had been there when the plant was built I would have done several things about that plant that was not done then. I think I would have done what I later did in the same plant, closed in the conduits. I would have done that simply for the reason that when we found our sewage was 95 degrees temperature, we didn't want it steaming. I wouldn't run undiluted or untreated sewage right past a hospital, especially if it was hot and steamy. I think there are better places to run it.

3235 I think the impression here, possibly from the questions, is that the cascade was originally designed to be operated continuously. As a matter of fact there were two pipes leading from the tanks and the cascade, and it was never planned to operate the cascade continuously. There was a rapid sand filter built as the finishing process for the plant and the sewage that came to that rapid sand filter came to it either through pipes or the cascade. That was cascading of straight sewage.

3236 I think that is entirely different from what is suggested here—the cascading of water. The purpose, so far as the picking up of a little oxygen is concerned, is the same, but the main purpose of the cascade up there—we had, I think, some 40 feet of waste head. Our tank was built on the top of a knoll and our plant was built at the bottom, and I put in that cascade to utilize that head to pick up what oxygen I could on the way down. This rapid sand filter continued to operate for a great many years and satisfactorily. It is not a fact that it plugged up rather quickly. It operated for 15 years.

3237 The only case of plugging on it was when it was washed backwards once with dirty wash water containing matches in it—that plugged openings in the

pipe. Aside from that, it operated 15 years satisfactorily. No, I don't think it is so that the wash water from the filter was impounded behind a break water. I think the wash water went to a storage tank and was repumped back through the plant again as sewage. I am quite sure that is the case. It went into a holding tank from which it was repumped to the plant and went through again as sewage. To my knowledge chlorine was never recommended to ameliorate the nuisance caused by the combination of cascade and the filter. The effluent of that plant was chlorinated for sterilization purposes because it went back into the lake from which the water supply was taken about a
3238 half mile or mile distant. To my knowledge it was not chlorinated to ameliorate any nuisance that was caused by it. If so, it was after the war.

In my testimony on page 1939 I referred to cascades and stated that such a device would pick up a considerable amount of dissolved oxygen. My estimate of what it would pick up, as stated a few minutes ago, was based upon the records of the Sanitary District here in the North Side outfall and on the Hastings Dam. Behind the Hastings Dam there was a lot of sludge. All of the South St. Paul packing plants, the Newport Minnesota Packing Plant of Cudahy Company and all of the untreated sewage of St. Paul and Minneapolis went in behind Hastings Dam. I can't tell you from memory what was the B.O.D.

(By Mr. Clausen) I think Mr. Warrick testified it
3239 was below 7—around 7. That was the average as I understand it.

(By Mr. Howson) If that was the average, it doesn't conform with the peak in B.O.D. in Hastings Pool. I don't think it makes so much difference. It was practically devoid of oxygen and the amount it picked up isn't so much a question of B.O.D. as it is of oxygen deficiency. I have never personally run any tests on air picked up by sewage passing over a dam. Yes, I think you would get dissolved oxygen into such water as at Lockport by cascades where the B.O.D. may be 30 or 40 parts per million and the dissolved oxygen zero and the water necessarily very septic. I don't think it would disappear almost at once because there is below the gates at which I would contemplate adding this aeration a two and one-half mile turbulent stretch in which there is over 15 feet fall comparable
3240 in that respect to the conditions that formerly prevailed through Joliet itself before the construction of Brandon Road Dam, and through that reach they used to pick up about 400,000 pounds of oxygen per day, partly dissolved oxygen and partly through satisfaction of B.O.D. That is reported officially in Part No. 3 of the Sanitary District Board of Review, a report prepared about 1925 by 38 engineers employed by the Chicago Sanitary District. Yes, I said it was turbulent. Now, no. That was before the dam was built. There was a turbulent section there. Now there is a turbulent section in the Des Plaines River extending from the power house northerly to the Stony Gates where I would figure on cascading.

3241 The distance is about two and one-half miles. The firm of Alvord, Burdick & Howson has designed and built three, I think; maybe more, activated sludge plants.

They are at Gary, Indiana, just recently completed; West Dundee, Illinois; Elmhurst, Illinois. I would have to guess at the population of West Dundee—maybe 3000. Elmhurst serves about 21,000, at least that is the basis of the design. It may be somewhat less than
3242 that now, but it is not far from that. Gary is a 40 million gallon plant, designed for 170,000. It is among the ten largest in the country. Gary is the largest activated sludge plant the firm has built. I would say that a 5 million gallon plant at Elmhurst is a moderate size plant. Elmhurst was built first. The processes of sewage treatment investigated were the trickling filters, the Guggenheim process, which is a chemical precipitation aeration process, activated sludge and trickling filters combined with chemical precipitation. That was at Gary. We recommended the activated sludge process.

3243 I recommended it because it produced the best effluent and a large part of that effluent discharged back into Lake Michigan from which the water supplies of the Calumet area as well as Chicago are received. It was about intermediate, as I recall it, of the four processes in cost of construction, and intermediate, I think, as well in annual cost. It was chosen primarily because of its high quality of effluent. I did not include at Gary the installation of chlorinators. I put in a very complete treatment at Gary and the effluent discharges into the Grand Calumet River which receives the pickling liquors from the sheet mill at Gary in the amount of 3-1/4 million gallons a day, which is then diluted to about 10 to 1 and is a sterile waste. That is, it discharges into a stream that is practically a pickling stream. Our firm has advised on activated sludge plants. We are not operators.

3244 Personally I have never operated an activated sludge plant. I couldn't tell you from memory what, in my sewage works practice, is the largest dose of chlorine per day I have had occasion to plan for. The Racine (Wisconsin) plant is designed for an average flow of 12 million gallons a day but has taken storm flows, chlorinated, in, I think, to 55 million gallons a day through the plant. As to pounds of chlorine I can't tell you what that installation is. I would have to look it up, but it is an installation that will feed a small tonnage per day. I think that is the largest sewage chlorinating plant we have put in probably. Yes, the sewage plant at Gary is in complete operation. The garbage grinding end of that plant is not yet started. That went into operation about the 1st of September (1940).

3245 A part of the effluent from that plant goes into the water supply of Chicago through the Calumet, the Grand Calumet River, and part of it then by-passes out through the Indiana Harbor ship channels of the lake. Assuming the East Chicago Ship Canal is blocked and flow cut off from the steel mills to the lake, I don't believe chlorination of the Gary effluent would ameliorate conditions in Brandon Road Pool. I don't believe you would ever find it, bearing in mind that that discharges into and immediately adjoining the pickling liquor wastes of the steel company. I don't think the additional pollution from the Gary plant is a load on the disposal system of the Sanitary District. I don't think there is any measurable or ap-

preciable amount gets into the Chicago Sanitary Dis-
3246 trict channels, very small, at least. The meetings of the governors and the attorney generals for a number of years has been more with respect to other cities' wastes than Gary. Gary differs from other Calumet cities in its point of discharge of its wastes. I know there have been conferences but I don't know what Gary has admitted about causing this pollution.

The effluent of the new Gary system will be the same as the completed program of the Chicago Sanitary District. It is just started now six weeks—full operating data is not yet available—but it is designed to produce an effluent having a B.O.D. of less than 10 and a stable effluent in oxygen balance. It is designed to produce
3247 the same result as the completed program of the Chicago Sanitary District is designed to produce.

When I testified on direct that equipment for chemical treatment could be obtained before the summer of 1941, I meant that a temporary installation could be made by that time. I do not mean that the permanent chemical head house, chemical feeding such as would be used if chemical precipitation were the only form of treatment to be put in at the West Side, would be constructed. That was a temporary installation. If the Gary Plant does what it is designed to do, we expect the purification to be between 90 and 95 per cent.

3248 I believe our firm was first employed as engineers for Joliet on sewage treatment in the summer of '38. It might have been '37. We made our report in three or four months from that time. We recommended a plant to be located at the mouth of Hickory Creek which flows into the Illinois Waterway at Brandon

Road Dam, the plant to consist of separate sludge digestion type of tanks followed by trickling filters and secondary sedimentation. The Joliet problem is status quo until the Chicago problem is cleaned up. By "Chicago problem", I mean until the condition of the canal, the Illinois Waterway, is cleaned up. I think Joliet feels that an investment by it should be deferred, although the City Council, or the City of Joliet, did make application to the Federal Works Administration in, I believe, 1938, for an allotment to proceed promptly with the construction.

3249 I think the suggestion they should wait to take in the area which they would eventually have to take in also had something to do with it. Joliet's boundaries were restricted to something like 45,000 people in Joliet and another 30,000 immediately outside. We think all ought to be in one plant. They have taken in some of that territory and the matter of getting additional territory is one of the problems they are confronted with. The mayor did talk to me and told me he was taking all the steps they could to get these boundaries extended so as to serve the entire district instead of just the heart of it, and I think that has some bearing upon just when they proceed. They put in an application and intended to go ahead in '38 had they received an allotment. They didn't receive the allotment.

3250 I think all three circumstances influenced their waiting somewhat, because all three were discussed in the conferences I had. Had they gotten an allotment under the PWA, I think they would have gone ahead without waiting for either annexation or the Sanitary District to complete its program.

3251 In sludge as withdrawn to drying beds we usually find a moisture content of 88 to 92 per cent. It might run as high as 90 to 95 per cent depending upon plant conditions and other factors, but our experience has been mainly 90-plus or minus. I would expect to find more than 2 to 5 per cent of solids and 90 per cent of water. I would not expect in a sludge digestion tank to have a moisture content as low as 70 per cent. Such a sludge couldn't flow—it would require a steep-pitched flow. In proper operation the ebulli-
3252 tion of gas is continuous in a sludge digestion chamber. If the effluent of an activated sludge plant contains dissolved oxygen to the saturation point, an increase of air in the aeration tanks won't add any dissolved oxygen. It may add nitrates and nitrites. I have never personally run any tests on the air picked up by sewage or polluted water passing over a dam or cascade. Assuming the double of the amount of air at the North Side Works, it would reduce the present B.O.D. in Brandon Road Pool some 24 hundred thousand pounds—the oxygen added by the additional nitrates and nitrites would be some 40,000 pounds, about 10 per cent. In a general way I know the conditions in the North Shore Channel.

3253 As a measure to be adopted to ameliorate conditions within the next year or two, the installation of a 100 per cent metering for Chicago domestic water supply wouldn't be practicable of accomplishment in one year. I am advocating meters. I have advocated metering of Chicago's water supply for 20 years. I don't think that to ameliorate you have to get 100 per cent done in a year. I think you ameliorate to just the extent that you get it done. I think it would be practicable to put in 30 to 50,000 meters in one year's time, and that would have a very appreciable effect in reducing the flow. Yes, our firm has advocated to the City of Chicago the use of meters on the Chicago water supply.

3254 The first report on that I had anything to do with was in 1915—25 years ago. We have made a good many of them since. Yes, our firm recommended meters in the report made to the District Engineer in 1925.

The reduction of domestic pumpage is not an item appearing on any of these exhibits 10 to 14. It appears only on the blueprints and the blueprint showing comparative water use in different cities. It isn't noted in my exhibit 11 as a means of ameliorating conditions. I couldn't tell you without reference to the report what I reported to the U. S. Engineer in 1925
3255 in regard to the value of 3500 c.f.s. diversion. I don't think 3500 second feet was put up to us. I don't think we reported anything on 3500 second feet. I am quite sure we didn't. We reported upon the fair and reasonable costs of sewage treatment requirements of Chicago with varying rates of diversion from 2,000, 4167, 8500 and 10,000 second feet, is my recollection. Possibly there was another one in there at 6,000. That was based upon conditions in the canal given to us. The conditions stated to us were that, so as to result in conditions in the Illinois Waterway which would restore and promote a thriving fish life, which is much

more rigid than a nuisance requirement, because it takes about two and one-half to three and one-half parts per million of dissolved oxygen at all times to support fish life, whereas, with nuisance, to avoid
3256 nuisance, simply requires slight dissolved oxygen or even nitrate and nitrite oxygen. In an oxygen balance the dissolved oxygen should equal the B.O.D.

(The Master) I might break in here to say that I have just been informally advised by the Chicago Office of the U.S. Engineers, whose observer is present at all these hearings and is present now, that approximately 14 days would be required for the handling of a permit for the cascading unit near Lockport described by Mr. Howson. This includes the minimum period relative to issuance of a public notice. No public hearing would be necessary. No opposition is anticipated. I am further informed by the U.S. Engineers that this, in their opinion, would not involve any delay of carrying out the suggestion of Mr. Howson, because he could submit his plan and they would go through their routine and the plans for the work could be proceeded with without delay.

(Mr. Howson) I prepared and read a paper at Milwaukee, Wisconsin on sewage treatment last spring (1940).

3257 That looks like a copy of the paper although I hadn't seen it in print.

Q. "I wish you would read to the Master the paragraph at the bottom of page 37 in which you mention a number of plants using chlorine.

A. "Chlorine is being increasingly used for a wide range of purposes, including grease flotation, sterilization, prevention of filter bed clogging, septicity, and so forth. About 700 plants now use it for some purpose."

I think there are approximately 3000 sewage plants in the United States. I see on page 32 of my paper I say approximately 3500. That was in 1935. Since that year, up to this year (1940) there has been about 700 new plants built. I say here: "696 were reported up to February 1940" a total of about 4200.

3258 Q. "Now, would you also refer to pages 40 and 41 of the article and read to the Master the portion that is marked?

A. "A marked trend in the operation of activated sludge plants which is now being reflected in construction and design is that formerly excessive amounts of air were used, even dilute sewages being given as much as 1 cubic foot of air per gallon. Following the lead of the North Side plant in Chicago where, with a 5-day B.O.D. averaging slightly over 100 parts per million, the air requirements have been reduced progressively from about 1 cubic foot per gallon to approximately .35 cubic feet per gallon; other plants having similarly reduced their air requirements. Whereas, formerly plants operated so as to carry a large dissolved oxygen content in the effluent, it is now generally considered economically desirable to operate with a dissolved oxygen of but one to two parts in the effluent."

Redirect Examination.

3259 Yes, I think that oxygen efficiency is the most important factor in obtaining oxygen through reaeration over cascades. That and also the question of head available for it.

I think the opinion expressed in this article with reference to the amount of air in use by operators of activated sludge plants, and the opinion I expressed here in this case as to the use of increased air as a temporary ameliorating measure to obtain additional dissolved oxygen or nitrates and nitrites in the effluent is entirely consistent. As the quotation states, it is generally considered economically desirable to use as low quantities of air as will maintain 1 to 2 parts of dissolved oxygen in the effluent. That is the economy of the thing. When it comes to a question of health
3260 or remedial measures to alleviate conditions said to result in detriment to health, I think the economy can well be outweighed by the desirability and the beneficial results that will be secured from nitrates and nitrites.

Examination by the Master.

The word "present" opposite dissolved oxygen in Exhibit 14, item 5, under columns 1941 and 1942 means that there would be some dissolved oxygen present that I did not undertake to measure the extent of. I think there would be dissolved oxygent present at all times which would mean that hydrogen sulphide would not be given off, and in view of its being present and

the difficulty of saying exactly how much there would be, I thought it was sufficient to indicate and better to indicate by "present" than by parts per million. Now in the balance condition that I speak of the B.O.D. would be balanced by the dissolved oxygen. There is some B.O.D. even in our natural watercourses that haven't sewage pollution from other organic sources, so that in the last column, 1942, B.O.D. in Lockport, pounds per 24 hours, I put 100,000 pounds
3261 plus or minus, which is about 5 parts per million of B.O.D. and that isn't arbitrarily taken. It is taken from a study of the figures in line 4 and in the bottom line of column 1938 '39 and '40. For illustration, the principal sources in 1938 contributed 645,000. The B.O.D. as measured in Lockport was 627,000. In other words, enroute to Lockport the dissolved oxygen in the lake water of 220,000 pounds had been used up in the process, in the travel, and similarly in the next year, 539,400 from the sources, 558 at Lockport, and in 1940, 421,000 as compared to 389. Well, from a comparison of those figures I am quite sure that next year, 1941, at Lockport and, incidentally, from the figures I have received from the district for August operation, the discharge of sludge to the canal has practically ceased. Only, I believe, 315 tons in the month of August, which is nominal. So that I am quite sure that the 150,000 pounds of B.O.D. for 1941 is liberal, and that it will progressively go down to 100,000 or below. In a 90 degree purification the B.O.D. would be about on an average of Chicago sewage—10 or 11 in the effluent.

3262 If that B.O.D. was balanced at only 90 per cent it would take 11 parts of dissolved oxygen, which is higher. That corresponds to the B.O.D. but of course, that is higher than they could get the year around. Their operating results show the ability to get 8 or thereabouts, out of that 11, but on the other hand, their operating statistics show their ability to get better than 90 per cent treatment, and to get an effluent; for illustration, for the last three years the North Side plant has been in complete balance, an excess of available oxygen in the effluent. I think that is practicable with the others as well. These conditions at Lockport, I think would be indicative of conditions at Brandon Road Pool.

3263 If Brandon Road pool were not drained or the accumulations there were not removed, then the conditions in Brandon Road Pool would not be as favorable as at Lockport, to whatever extent there was B.O.D. absorption from that sludge. However, if there is no new sludge put in from now on which is, say, September until next summer, the effect of the sludge previously put in is going to be very materially reduced.

Recross-Examination.

On Exhibit 11, "1" and "2" are not comparable with No. 5. They are all ameliorating. They are a different type of amelioration. They are either alternates or
3264 possible measures, all of which might be put into operation simultaneously. I indicate various combinations at the bottom.

Yes, as I understand it, No. 2, 3 and 4 are in the Sanitary District program. I don't think No. 3 is in anybody's program. I think No. 3 ought to be done right now. Somebody testified they proposed to do it after the first of the year, but they hadn't commenced 3265 to do it after the first of September. The statement in your petition that you contemplate having your work completed December 31, 1942 doesn't refer to No. 3. If I gave the impression that you would have all of your program completed right now, that wasn't what I meant. What I meant was that No. 3, which is simply by-passing after primary treatment, I don't think you have to wait for; you can do it now. I don't think anybody has testified exactly as to when that was going to be done. It can be done now.

3266 In my judgment item 3 could be done right away. With respect to item 4 that is substantially being accomplished now. The last figures I got there was only 315 tons of sludge, I believe, discharged to the canal during the month of August and that is between 5 and 10 per cent of the total, so that No. 4 is pretty well cleaned up at this date, maybe wholly for all I know.

In "5" I have the same amount as in No. 2. It just happens to figure that way, both about the same. No, I haven't said I think chlorination is equivalent to 3267 activated sludge treatment. You are chlorinating and activating different things. You are activating only a West Side effluent and you are chlorinating 3,000 cubic feet a second; entirely different things. In pounds of B.O.D. removed they happen to give practically the same pounds. It is about as much alike as apples and

oranges may be the same size but they are not the same fruit. I don't think you would probably do both "2" and "5". "2" according to the District program takes two and a half years to do, "5" gives the same amount of pounds of B.O.D. removal and can be effected, I believe, before next summer. If someone thinks a health hazard exists that is one way of ameliorating it. I think if it went full speed ahead right now without waiting until a decision comes out, but simply push right ahead now, I think "2" could be done by next summer. There is only about 4 million dollars or 3 million dollars involved. Theoretically,
3268 if money were no object I could do both 2 and 5 as rapidly as possible. If 2 were done, 5 wouldn't be as effective, because a lot of that B.O.D. would have been removed by activation and there wouldn't be as much left to take out with chlorine, so you couldn't really add them up together. I think the pounds of B.O.D. removed from the canal in its present condition by chlorination would be the same as pounds of B.O.D. removed from the West Side plant effluent by activation. So far as the economics of the thing, I don't think they are in the same position. As I pointed out under 5 chlorine would be applied to 3,000 cubic
3269 feet a second which is 2100 million gallons a day, where activation of the West Side only takes about 400 million gallons a day—about 5 to 1.

I am not recommending here chlorine in place of activated sludge treatment. I think the District engineers are right in making complete activated sludge plants and it should be done just as quickly as possible. I think we have been in accord on that general policy for a good many years. As a matter of fact, I think the Lake States' witnesses testified to activated sludge even before the District adopted the program.

3270 I think 500 feet is about the distance the hospital at Great Lakes Training Station was subsequently built from the cascade about which I testified previously. The sewage passed into a settling tank and then went over the cascade. I said that in cascading that warm sewage down over the steps, steam, or a moist vapor, a fog, resulted. I don't know that it was carried to the hospital. I don't think it was, but there was a general fog around that area. I did recommend stopping of this cascade. We didn't need it in the process when we got everything finished up. We were not interested in dissolved oxygen in that plant after we got filters and then discharged it into the lake where there was an abundance of dissolved oxygen.

3271 You correctly understood my testimony in which I stated that the close proximity of the hospital was one of the factors which influenced me in recommending that this cascade in this project be stopped. I wouldn't run raw sewage or settled sewage in an open conduit or in an open canal past a hospital. I would put it in the pipes that were already provided for it. I don't think it is good engineering practice to flow raw sewage in any open place, and that was in the nature not only of an open conduit, it was in the nature of an open conduit with a bunch of steps in it. It was more than an open conduit because its very construction was conducive to spray and fog. The medical authorities at the Great Lakes Naval Training Station did not consult with me with reference to the cascade. The construction such as at Great Lakes and under the conditions there operated was conducive to spray and fog.

3272 The spray and fog is simply somewhat more objectionable because it is broken up. It accentuates the objectionable features of raw sewage flowing in open conduits through inhabited, densely inhabited areas. Some of those objections are esthetic; I think most of them are esthetic, as a matter of fact, except as affected by possibly, use or contact. We don't build open sewers through cities any more. We put them underground. There may be a health standpoint there, depending upon the use and the availability to contact.

Redirect Examination.

3273 The time for completion of the aeration plant, final settling tank, all of which is part of the permanent program, shown in my exhibit 12, item 8, was based upon a consideration of what is practicable to do when something has to really be done. An extreme illustration, during the former World War we were on five large construction jobs, cantonments, pickling acid plants, things of that kind. In those it was necessary to build six to eight million dollar constructions in 90 day periods. We are just now starting another cantonment, estimated cost about nine million dollars. That is under contract to be completed in four months' time; and we are also working on water supplies for powder plants which are emergency jobs. Those jobs are the extreme illustrations of what can be done in necessity.

3274 The cost of construction of the Gary plant was about two million dollars. From the time we started until it was completed and placed in operation the total time was approximately a year and a half. As I recall it, we were instructed to proceed with the plans in the very early spring or late winter of '39 and the plant went into active operation about the first of September in '40.

Q. (By Mr. Clausen) How long in advance of that before the plans were prepared.

A. The first date was the date on which we were instructed to proceed with the plant.

Q. What preliminary work was done prior to that.

A. Well, we had made plans for sewage treatment at Gary once in 1928, and the depression came on and it was never built. Those plans were completely junked even to the extent of going to a new site. That was a trickling filter plant.

None of those plans were used.

3275 When did we make the investigation? We made a report I would say, from memory, November or December 1938. It took from the time we first started to study it to 1940 to complete the job, which isn't the case with the Chicago Sanitary District, because they know what their program is. We spent a total of some 20 months at Gary from the time we started this study
3276 to the time the plant went in operation. That included all the time that was put on that project from

the time of our preliminary investigation until the time it went into operation.

January 16, 1941

L. R. HOWSON (Recalled).

Direct Examination by Mr. Naujoks.

3873 I have made an examination of Mohlman Exhibit No. 17, a report on the flushing experiment for the period from December 2d to December 12, 1940. I have made some analyses of the data therein in order to have an opinion as to the matters about which you now ask me. The time allotted—the time available
3874 —has not been as ample as I would have liked but it has been sufficient to have enabled me to arrive at the conclusions which I now state.

I believe the flushing experiment has been of permanent good throughout the entire length of the waterway from the upper end to Brandon Road Dam, including, in my opinion, the pool itself. There has been some 80,000 tons of solids picked up, and that is suspended solids, of which approximately 21,000 has been washed through the pool and Brandon Road Dam. Those solids that have gone through the dam will not again effect any leaching effect on the oxygen sources of the canal. Before this flushing test there was this 80,000 tons pretty well distributed in the canal itself above Lockport. At least 73,000 tons of it came from there. If there was 6 inches taken out over the reach of the canal from Lockport to the West Side Plant it would account for 84,000 tons.

3875 Solids of a putrescible nature that are deposited in a channel, such as the main drainage channel, exert a leaching effect on the oxygen in the water. Now if those solids were uniformly distributed, or of the nature of the distribution from the West Side plant to Lockport, there would be a cumulative leaching effect, and that would have continued through the Brandon Road Pool and that continuing or cumulative leaching effect would have been due to that 84,000 tons. Now the cumulative leaching will be only that due to 63,000 tons, of which the very great proportion will take place in Brandon Road Pool itself.

In order to visualize this I have prepared a diagram.

(Said diagram entitled "Sketch illustrating effect of flushing test on B.O.D. of Brandon Pool, Based on Suspended Solids Carried Out" was offered in evidence and marked "Howson Exhibit 1")

3877 There are two lines on this diagram. The upper line shows at the West Side Plant zero of the solids later carried out which, according to Mr. Mohlman's evidence, accumulate to about 73,000 tons at Lockport and 84,000 tons at Cass Street or the Dam. That curve, the upper curve of Howson Exhibit 1 from point "A" to point "B" illustrates the probable approximate depletion of oxygen due to the suspended solids that were removed or that were moved in this flushing experiment. The lower curve, designated from point "A" to point "C", is illustrative of the conditions after flushing, by which the oxygen depletion affected by the sludge

remaining in the canal is much reduced in the stretch of the first 25 miles extending from the West Side Plant to Lockport, and then rises sharply to point "C" because of the fact that there has been a large volume of sludge deposited in the last 5 miles, which includes Brandon Road Pool. The total cumulative effect, however, from
3878 the West Side Plant to Brandon Road must, in my opinion, always be less than if the experiment had not been conducted, in the ratio of 62,000 to 84,000 tons of solids. The cumulative effect of the oxygen leaching due to the solids will always be less in the ratio of 62887 tons of solids left in Brandon Pool as compared to the 84,000 that originally were drawing out oxygen; in other words, something like a 25 per cent improvement.

Examination by the Master.

In the pool itself there has been a substantial increase in the amount, both of solids and volatile matter in Brandon Road Pool as a result of this experiment. The total of 84,000 tons of total suspended solids which went into the pool all stayed in there except for the 21,000 tons approximate that went out, so there is a net
3879 amount of 63 or 64,000 tons stayed in of which a considerable quantity was organic. The inorganic material would not be the source of much nuisance, but the other material would.

My viewpoint on any improvement in the pool if you have increased the total amount of deposits in the pool, not merely of the inorganic matter but also of the organic matter is: First, these solids can only exert an oxygen demand once, and they exert that irrespective of their location. If these solids were in the upper part of the canal above Lockport under the conditions prevailing before the test, they exerted there just as much leaching effect on the oxygen as they now do in Brandon Road Pool, and the 21,000 tons that have gone out of the system entirely, so far as this reach of the river is concerned, will not exert any leaching effect any place so far as the area above Brandon Road is concerned.

3880 The oxygen that has to meet the demand of the considerably larger quantity of organic matter at Brandon Road Pool has to come from the canal above in the form of dissolved oxygen in lake water, in the form of oxygen in the plant effluents, in the form of re-aeration of the surface, and these solids have only so much oxygen demand. They have been moved from the initial point where they could absorb or exert their oxygen demand to a point downstream where they are more concentrated. It is true that in a limited area there is now a very much greater demand for oxygen than formerly existed there, but considered in terms of total oxygen demand of the entire mass of sludge, about 25 per cent of the sludge is no more a part of this problem, and something like 47 per cent of the B.O.D. went out with it, and something like 28 per cent of the putrescible or the volatile matter, so that it seems to me that there has been a net improvement in the Waterway, or I should say in that part of the oxygen demand resulting from putrefying solids in the ratio of not less than 25 per cent as measured by solids themselves and not more than 47 per cent as measured by the B.O.D.

3881 The nuisance will not come, if it does, as I view it, from the sludge itself. It results from the sludge leaching the oxygen out of the water that flows over. Now, I think it is immaterial where in the process of this water from the West Side to Brandon Road Lock that
3882 leaching occurs. I think it is important as to how much overall leaching does occur and what condition that supernating water is in to absorb the load when it is put on. Before this test it was comparatively uniform leaching, and by the time it got to Lockport the water was already bad. Now, to the extent that three-quarters of that sludge is out of that reach, the water will be correspondingly improved and will be able to absorb a more rapid leaching in the Brandon Road Pool itself, and the total cumulative effect is still some 25 per cent, as a minimum, less than it originally was. I believe that this experiment will prove to be beneficial even as to the area immediately adjoining Brandon Road Pool.

There are some things in which the experiment differed with what I thought it would and some things in which it agreed. Of course, this sludge that we referred to as light flocculent sludge on top of the heavier sludge, I think, must have been somewhat heavier than at least I visualized. I had in mind that there was a layer of sludge in there that was 2 to 3
3883 per cent solids, 97 to 98 per cent moisture. If that was the case, it has now apparently been replaced by a sludge which runs about 88 per cent moisture. I noticed by Mr. Mohlman's report that the sludge sam-

ples taken out of the superimposed layer in Brandon Road seem to average about 88 per cent moisture, or 12 per cent solids. Now, that is a sludge 4 or 5 times as dense as what I would term a light flocculent sludge. Accordingly, the scouring, has been less extensive than I anticipated. Either that or the light stuff was there and carried out and was later replaced by the denser stuff that came down from above.

Then too, the first time I thought of this flushing, I thought of it as a sort of fill-and-draw procedure in Brandon Road Pool itself; that is, empty Brandon Road Pool, or substantially so, close the Brandon Road gates and fill it up again, pull it down again, and that kind of thing. Later in the discussions that all of us had, it got to this question of increased flow, and a week or 10 days' flushing. I think all the engineers realized
3884 that when we got velocities of 3, 4 feet a second in the drainage canal we could pick up fairly coarse solids, and that when those solids hit Brandon Road Pool with its larger section, the coarser solids would tend to settle out, and that led to the discussion of dropping Brandon Road Pool's level some 5 feet, more or less. The data, I think, indicates that could that have been done there would have been substantially improved conditions. We have really only one day on which to base that, but that one day on which the water level was lowered the percentage of B.O.D. removed was a hundred per cent above the average for the other nine days. I have made some charts which, while they aren't in good shape, are illustrative of that.

(Howson Exhibit 2, entitled "Diagram Illustrating Effect of Lowered Pool Level, Carriage of

B.O.D. and Volatile Solids through Brandon Pool" offered and received in evidence)

3886 It must be recognized that when we have only a one-day period, figures are illustrative and indicative, rather than absolute, but this diagram, Howson Exhibit 2, is drawn from the data in Mohlman Exhibit 17. At the left of the diagram the ordnance shows the per cent of B.O.D. passing Cass Street which also passes Brandon Road. The average of the nine days in which there was no lowering of the Brandon Road Pool other than the six inches necessary to give it flow, 43 per cent of the B.O.D. which passed Cass Street went also past Brandon Road. That figure is
3887 taken from Mohlman Tables V and VI. I made a new table which was a consolidation of Tables V and VI. That table showed the date with respect to the tons of B.O.D.—the figures for each date appearing on Mohlman Exhibit 17, Table V. For illustration, on December 2d and 3d, 1724 tons of B.O.D. were shown as passing Cass Street and, referring to Table VI following, on that same day 406 tons passed Brandon Road. On that particular day 23.6 per cent of that which passed Cass Street also passed Brandon. I followed that same procedure through for the ten days. The ten days averaged, as Mohlman showed, 47.2 per cent. That is stated in the text of Mohlman Exhibit 17, page 2.

The 7th and 8th of December, the date on which the flushing occurred with the one foot further lowering of water surface, showed 86.5 per cent of the B.O.D. that passed Cass also passed Brandon. Deducting that figure from the total of the 10 days, 47.2, resulted in the average for the 9 days when there was no lowering of 43 per cent, which is the first diagram at the lefthand side of Howson Exhibit 2.

3888 The next or middle block on that diagram shows 86.5 per cent which was the percentage of B.O.D. that passed Cass Street which also passed Brandon on that one day when the water level was dropped one foot. Now, similarly, at the righthand side of Howson Exhibit 2 I showed graphically the figures with respect to the tons of volatile solids and the per cent which passed Cass Street which also passed Brandon Road, on the 9 days when there was no lowering, which was 24.4 per cent, and on the one day, December 7th and 8th when the water level dropped one foot, 50 per cent, and on the average of all ten days, 27.8 per cent, which is the same figure reported by Mohlman, in his Exhibit 17, at page 18.

I then prepared another diagram based on absolute tonnage carried through:

3889 (Howson Exhibit 3, entitled "Tons of B.O.D. and Volatile Solids Carried Through Pool" offered and received in evidence)

3891 Howson Exhibit 3 is illustrative of the effect of lowering Brandon Pool one foot on the tons of B.O.D. and volatile solids carried through the pool, and the same comments relative to the meagerness of the data—that is, only a 10-day period total and one-day with a lowering, applies to this exhibit as applied to Howson Exhibit 2.

Referring to the lefthand part of Howson Exhibit 3, it shows the facts relative to tons of B.O.D.—the first two lines to the left referring to what passed Cass Street, the middle two blocks showing what passed Brandon Road, and the righthand two blocks of the lefthand half of the diagram showing what was dropped in the pool.

During the 10-day average at Cass Street, 914 tons of B.O.D. per day passed Cass Street. On December 7th and 8th, 683 tons passed. At Brandon Road, of the 914 which passed Cass Street, 431 passed on the average of the 9 days, but on December 7th and 8th, 589 of the 683 passed, and that part of the B.O.D. which dropped out in the pool on the 10-day average was 483 tons per day, whereas on the one day, December 7th and 8th, when the pool was lowered, only 94 tons was dropped.

At the right hand side of this diagram in comparable blocks is shown the data relative to tons of volatile solids. In general, this shows again that while the 3892 tons of volatile solids entering at Cass Street was somewhat less on the day in which the water level was lowered a foot than for the average of the 10 days, the amount removed permanently through passage out of Brandon Pool was somewhat higher than that, and the amount of volatile solids dropped in the pool on December 7th and 8th was 971 as compared to 1956 tons, or about half the average, indicative, to my mind that at least the lowering was beneficial even though the figures are not intended to be absolute. Whether the condition on long test would be precisely that or something else I wouldn't want to say. I am not sure

that if dropping the level one foot was beneficial to the extent indicated, that dropping of the level 4 or 5 feet would be on a straight line of 4 or 5 times as beneficial—I doubt whether it would be a straight line. I think it would be materially more beneficial
3893 and I have drawn the next diagram simply to illustrate what happened in the first foot.

(Howson Exhibit 4, entitled "Effect of Lowering Brandon Pool on B.O.D. and Volatile Solids Leaving Pool" was offered and received in evidence)

3895 At the lower part of this diagram are laid off feet bearing from 1 to 5 for the amount Brandon Road Pool is lowered, and at the left ordnance is tons, and the diagonal lines are volatile solids and B.O.D. The data for the points platted are taken from Mohlman Exhibit 17, Tables V and VI. At the left hand border are platted the tons of volatile solids and the tons of B.O.D. per day leaving the pool during the 9 days on which there was no lowering of water. The two points vertically above the one foot mark are platted to represent the data taken from Mohlman's Exhibit 17, Tables V and VI, of the solids, volatile solids and the B.O.D. in tons leaving the pool on December 7th and 8th, the period in which it was lowered one foot. During that day there was a discharge of volatile solids at Brandon Road of 34.5 per cent in excess of the average of the other 9 days, and the B.O.D. discharge, 42 per cent increase over the average of the 9 days. The data, I believe, warrants the conclusion that there would be a material increase in matters carried out

of Brandon Road Pool by lowering and there would
3896 have been a still further answer had it been practicable or possible to have lowered the water level in Brandon Pool still further. I am a hydraulic Engineer as well as a sanitary engineer. In converting B.O.D.'s into tons—B.O.D.'s are expressed in parts per million, and one part per million is, for instance, as measured in water, a million gallons of water. A gallon of water weighs 8-1/3 pounds so that one part per million of B.O.D. is 8-1/3 pounds of B.O.D. per million gallons of water or sewage, and if that liquid had 200 parts per million B.O.D., it would be 200 times 8-1/3, or 1667 pounds of B.O.D. per each million gallons that flowed by or that was under consideration. In Dr. Mohlman's exhibit, Tables V and VI the discharge in
3897 second feet is shown averaging approximately 10,000 cubic feet per second during the test. Now, cubic feet per second is approximately two-thirds of a million gallons per day. You got the B.O.D. from the sample and multiplied that by the total volume of water passing through there. They took B.O.D. samples, I recall from Dr. Mohlman's report, each four hours, so there would be six samples a day taken and averaged, and the B.O.D. determined and applied to the amount of water flowing. You are correct in understanding from Mohlman's Exhibit 17, pages 2 and 3, that the B.O.D. figures showed that there was a substantial increase in B.O.D. in Brandon Road Pool, but it was something less than you might have expected from the percentage of organic matter that might be in and out of the pool, and the net increase in organic matter might have led you to expect a greater increase in B.O.D. than the

B.O.D. figures themselves indicate. In other words, there was some 73 per cent of the volatile solids left in the pool, but only 53 per cent, as I recall it, of the B.O.D.

The B.O.D. and the other figures are confirmed by the observation on page 2 that there was higher oxygen than prior thereto. That fits in with the figure of
3898 the actual increase of B.O.D. in the pool. The table following page 13 of Mohlman Exhibit 17 shows that the D.O. at Lockport on December 27, 1940 was substantially less than it was on the same day in 1939, although the permitted flow would have been the same in both years. (Mr. Pearse directed the Master's attention to the fact that the actual flow on December 27, 1940 was only 2,397 feet as compared with the flow on that day in 1939 of 3,8[illegible] et) That might account, at least to some extent, for the difference in dissolved oxygen on the same day in 1940 as compared with 1939, because if you take from each of those flow figures the water supply at some figure, say, 1600 second feet, it would mean that the dilution water flowing in 1940 was about 800 as compared to 2300, approximately, in 1939. I mean after deducting domestic pump-
3899 age which is estimated to be about 1700 feet in winter per day. I just took 1600. If it was 1700 the abstraction of water then would be about 700 in 1940 and about 2200 in 1939; in other words, a little more than 3 to 1, which would be certainly a contributing factor to the difference in the dissolved oxygen. There may have been other things, such as water temperature and storm conditions, but certainly that was one—an important
3901 one. May I add too that the effluents from the plants,

even though they carry some dissolved oxygen, also have a residual oxygen demand which, in general, about balances out, so that there isn't much net oxygen, if any, put in by the plants, whereas the lake water comes in as net oxygen, and the general state-
3902 ment explaining the differences in the dissolved oxygen contents in 1939 and '40, as I indicated, has some variables. For instance, referring to December 18th, there is 3.9 parts per million in 1940 as compared to .9 in 1939 and yet the flow is only three-quarters as much in 1940. I think that probably results in part from the beneficial effects still residual from the flushing which stopped about a week earlier. The next day—December 19th, the comparison is much more favorable to 1940, and from then on it is more unfavorable, and I think Mr. Pearse's explanation of it being the dilution water is the primary factor.

Cross-Examination by Mr. Clausen.

3903 Table V of Mohlman's Exhibit 17 on the 11th and
3904 12th shows at Cass Street 555 tons of B.O.D. Table VI for the same date shows 412 tons passing through Brandon Bridge. That is 77 per cent. I have it on my table as 76.9. It is practically the same. The 77 per cent on December 11th and 12th compares with 86 plus per cent on December 7-8 with a lowering of one foot—a difference of 9.6 per cent according to my figures. That is for the highest of the 9 days with no lowering you got 76.9 per cent, while your lowest day without would be 23.4 per cent.

3905 I think I can explain a little bit why there should have been such a fluctuation of 23 per cent to 77 per cent. Mr. Ramey's impromptu sketch that he prepared here this morning showed a quicker pick-up at Lockport which tapered off, and a pick-up at Brandon Road that lagged several days. To illustrate that I analyzed the days by two groups of the first five days and the second five days, irrespective of any lowering. In the first five days 37.8 per cent of what passed Cass Street also passed Brandon. In the last five days 77.4 per cent. In other words, twice as much in percentage after the thing really got going. Now, that same thing follows in rough in volatile solids. The first five days average 20.1 per cent; the last five days averaged 43.0 per cent. Of course, the last five days in each case embraces the day in which it was lowered, but taking it by two groups, it shows that the effect in the last five days, whether it be volatile solids or B.O.D. was about double that of the first five. Which supports Mr. Ramey's theory that if the experiment had been continued longer, the results would have come nearer the anticipated results, even without a lowering.

By Mr. Wallenstein.

3906 On the day of lowering 50 per cent of the volatile solids that passed Cass Street passed through the Brandon Road Locks at Brandon Road. The average for the entire test was 27.8 per cent, I tried to make it very plain that that was not an absolute comparison. It is indicative or illustrative.

3907 There was one day—the 10th and 11th, when the volatile solids passing through the same place got up to 56 per cent, and other days of the nine it got as low as 12-1/2. My answer to the question of how I explain the fact that on the days that it wasn't lowered the percentage was higher than on the day it was lowered, is that I have eight other days to see whether or not that one is out of line, and I think that it is out of line. I would expect, as a hydraulic engineer, that if I increase the velocity I will transport more material without dropping it than I otherwise would. I would say that on the only data we have it indicates something of that nature, but it isn't conclusive.

I wouldn't say that the lowering of the pool on the
3908 7th and 8th would necessarily account for the difference between 50 and 27.8 per cent, which is pretty nearly a hundred per cent, but because it is in line with sound hydraulics, I believe it is properly indicative of what would happen, not taking it as an absolute figure.

The Master.

There is a good deal of uncertainty here because of uncertainty about the density of this material and the extent to which it will sink and the extent to which it will go out and those are things you can't test precisely by any established rule of hydraulics. If we were dealing with pure water it would be easier for three competent hydraulic engineers to agree on what would happen in the lowering of the pool. It is a fair statement that here we have a complicating factor through this foreign material so that we cannot prognosticate with certainty.

Mr. Clausen.

3910 Referring to Howson Exhibit 4, I understand from Mr. Ramey's testimony today the pool was lowered one foot for a period of about 36 hours. I had assumed it was 24 hours, so the lowering effect would also be exerted on one-half day of the 8th and 9th. The reason the amount of B.O.D. and volatile solids is so much larger on the 8th and 9th than for the 7th and 8th is that there was less coming in and less going out. The
3911 percentage of both B.O.D. and volatile solids was lower on the 8th and 9th where there was only a half day of lowering than it was on the 7th and 8th when there was a full 24 hours, which substantiates rather than otherwise the figures relative to the 7th and 8th.

(Howson Exhibit 5, entitled "Analysis of Mohlman's Exhibit 17 to Determine Effect of Lowering Brandon Pool Level on B.O.D. and Volatile Solids Carried Out" offered and received in evidence)

Recross-Examination by Mr. Clausen.

3913 Comparing the 7th and 8th, and the 8th and 9th, the discharge of volatile solids on the 8th and 9th is less in tons with a greater discharge of flow, which indicates a lower efficiency. There was dropped out in the pool, which is really the measure I think, on the 7th and 8th, 971 tons of volatile solids. On the next day on which there was a flushing only a half day, there

was 1172; in other words, 201 tons more and the efficiency of carriage—that is, what went by Brandon that had previously passed Cass—dropped from 50 per cent
3914 to 39.5 on the next day. Table V shows 1945, for the 7th and 8th and Table VI for the 7th and 8th, 974. That is 50 per cent, almost exactly. Then when you take the 8th and 9th it shows 1920 at Cass Street and it shows 758 on Table VI at Brandon Road. The reason for the higher discharge on the 8th and 9th, I think, it shows that the efficiency of carriage from Cass to Brandon on the second date was only 39.5 per cent. The fact that there is less passed Brandon means that more settled out in the pool. The difference between those two flows is a little less than 300 cubic feet per second, which is 3 per cent. Now lowering the pool speeds up the velocity more than 3 per cent, so that the actual velocity on the 7th and 8th was higher than on the 8th
3915 and 9th. Howson Exhibit 5 will show that on the 7th and 8th the amount passing Cass was 1945—the amount passing Brandon 974—and the amount falling out in the pool 961. On the next day it will show that there was 1920 passing Cass, of which only 758 passed Brandon, leaving 1172 to drop out in the pool. In other words, 201 more tons dropped out in the pool the day the water level was restored half a day than on the day previously, dropping the efficiency of carry-through from 50 per cent to 39.5 per cent.

3916 The flow on the 7th and 8th was 9754 feet as shown on Mohlman Exhibit 17, Table VI. On the day following it averaged 10,047; about 3 per cent increase. Now I haven't figured just how much one foot lowering changed the velocity, but it is my understanding that

Mr. Andrew testified that lowering five feet would change the velocity something between 30 and 35 per cent, which would be equivalent to 5 or 6 per cent per foot of lowering. If that is true, the velocity on the 7th and 8th, due to the lowering would be about 6 per cent higher, and on the 8th and 9th 3 per cent of that 6 per cent would be counteracted by the increased flow, but the velocity on the 7th and 8th, the day it was lowered, would still be about 3 per cent greater than on the 8th and 9th.

The Master.

It is substantially accurate to say that if the velocity is increased by X, by reducing the level one foot, then it would be increased 5X by reducing the depth 5 feet in a pool such as this with vertical sidewalls or substantially that, until you get to where the bottom begins to cut in. This pool has concrete sidewalls on
3917 both sides, so that that is substantially correct, except for such variations as you might have with the irregularity of the deposits, but when you lower it, you take it off the top and the bottom stays the same.

3930 I believe, with the flows now available under the Supreme Court order, and dropping the pool level five feet at this season there would be no appreciable benefit of any kind in ameliorating the conditions to be anticipated at Joliet in the summer of 1941. I believe that would even be true with a substantial increase in the present flow because that material is now a deposit, and we know hydraulically that it takes more to scour than it does to transport. The velocity would be increased about a third if we pulled it down five feet. I don't believe that changing the velocity one-third would pick up anything that was deposited under a velocity that was somewhere around three times as high. I don't believe there would be any noticeable result at all.

3931 I don't think even with scarifying or stirring up the pool by weights or any other method, with a lowering of five feet, and with an average diversion of 3150 during winter conditions there would be any worthwhile results. The scarifying, in effect, takes care of the scouring and it then becomes a transporting instead of a scouring problem, but that material was deposited there before at a flow of about 10,000 second feet and scarifying would simply restore the matter to suspension and the velocity of 3,000 second feet and the lowering of five feet in water level would still be less than the velocity at which it formerly precipitated out. Therefore, I believe there would be no appreciable result.

Sept. 12, 1940

Direct Examination.

1968 LINN H. ENSLOW, sanitary engineer and chem-
1969 ist, Editor of "Waterworks and Sewage", and
1970 consultant for the Chlorine Institute, a trade
1971 association supported by chlorine manufacturers.

Sept. 13, 1940

1980 I receive no commission on the sale of chlorine, nor is my income dependent upon the sale of chlorine. I have visited and inspected approximately 2000

1981 sewage treatment plants in the United States. The most important single thing for which I have been responsible in sewage chlorination is the control of septicity and odors and improved stream conditions below sewage outfalls in the stream.

1982 Chlorination is very much an accepted means of preventing or controlling odors and the destruction of bacteria. Chlorine is not offered as a substitute for sewage treatment works. From many pieces of evidence gathered all over the country at various plants we understand that it does reduce B.O.D. It very definitely does improve stream conditions.

1983 Chlorine I would say is used in 2000 plants or thereabouts in the United States for various purposes of odor control, destruction of bacterial, reduction of B.O.D. and attaining general stream improvement below sewage disposal plants, or for combinations of these purposes.

1985 From my opinion and general experience with sewage treatment I would say if the Chicago Sanitary District would stop putting settleable solids into the canal that would be a tremendous step in the direction of remedying or ameliorating the conditions complained of, without the diversion of additional water through the drainage canal from Lake Michigan.

1987 As another remedial or ameliorating measure available to the State of Illinois without additional diversion of water from Lake Michigan I think chlorine properly applied would go a good ways toward improving conditions. I would say, to ameliorate or remedy conditions complained of at Lockport and Joliet,
1988 an application of chlorine at the Southwest Plant of

not over three parts per million, which is 25 pounds per million gallons, with or without lime added in order to produce chloramines in the sewage proper, will carry through to Lockport in its effectiveness. Chloramines are not rapidly taken up by solids, whereas chlorine, as such, is a very rapid oxidizing material and is dissipated much more rapidly than chloramine. In water supply treatment they use Chloramine to maintain residual chlorine—excess free chlorine as it is called by some—out through distribution systems for
1989 many miles, whereas chlorine alone will not accomplish that end. In sewage treatment it seems folly to go to the expense of buying amonia to form chloramines when the effluent of sewage treatment works abounds in this amonia, as does the drainage canal waters. In order to make available this amonia naturally present we find that by the addition of a little lime the amonia becomes available just as if you were putting lime on land where you had manure—it liberates amonia. At that time if chlorine is added you get chloramines produced.

1990 When it comes to what to do at Lockport there are two alternatives. One would be to attempt to do the whole job with chloramine treatment at that point. The second result would be a combination of an aeration step at Lockport with chlorine. If we introduce along with aeration, chlorination in one form or another we get a pasteurization effect which slows up the multiplication and reduces the density of population
1991 of the organisms, and thereafter has a very marked effect on reproduction, and the longer the contact period without outside influences entering, the greater

this effect. The only thing that could disturb it, in my opinion, would be the sludge conditions in Brandon Pool. This is a bad situation and might require three or four times as much chlorine to do the same work as if that sludge were not there.

1992 The situation in the Brandon Pool looks pretty bad in every respect, but it is a bad situation when you consider whether you can control odors economically; that is, the amount of chlorine required with the Pool in the condition as I see it now will be several times more than it would be if the solids were not in an active state of decomposition.

To answer intelligently the question how many days during the year it would be necessary to chlorinate to prevent odors, I would have to see a temperature chart

1993 of the waters of the canal and pool. From my experience when the temperature drops below 62 degrees Fahrenheit, which is in the neighborhood of 17 degrees Centigrade, you do not have active sludge decomposition. Those particular organisms seem to cease operations at below 62. Without more accurate knowledge of temperatures my best opinion would be that they probably will have to start this arrangement in May, if not the latter part of April, and it probably would have to run through the month of September; that is, May, June, July, August, September. It probably would run for five months.

1994 I don't think those temperatures will go up in this latitude much before May first. You probably get active decomposition of sludge earlier, that is, an evolution of sludge coming to the surface, but as far as hydrogen sulphide production is concerned I don't think so. That is to say, the organisms of general fermentation work at very much lower temperatures than hydrogen sulphide producers. I am referring to canal water temperatures. I have no exact parallel to Brandon Road Pool where in my experience chlorine was used for odor control. I have one case which was worse considerably; another case which is somewhat better, simpler. I will first refer to a case in this chapter on sewage chlorination, of which I have no first-hand knowledge, and I am merely now referring to literature published:

1995 (Reading from pages 106 and 107 of "Modern Sewage Disposal")

> "Chlorine may also be applied to increase the efficiency of overloaded or a partial treatment plant. With only a partial satisfaction of the chlorine demand, substantial reduction in the oxygen demand may be expected. At Bristol, England a serious odor condition was produced in 1935 by sludge deposits in the tide-locked river of Avon. Chlorination on the basis of 25 per cent of the aggregate chlorine demand at the outfall effectually checked septicity, three-day incubation period showing rather more favorable septicity figures than seven-day tests. This partial chlorination had a definite but incomplete effect on odor nuisance. Chlorination of 50 cent of the aggregate demand brought about a greater reduction of septicity. The capacity of the chlorinating equipment was insufficient to insure complete control of odor nuisance, but the mud flats of the river, which generally caused much nuisance in hot weather, became non-septic and remained so during hot August weather."

1996 The other case of which I have a little better knowledge is that right here at Downers Grove (Illinois). There they have bad odor nuisance during these months that I have mentioned of May to September, below the treatment plant which is not complete treatment. Half the plant gives complete treatment and the other portion gives only primary treatment. Unless they chlorinate they have odor nuisance downstream, and that method has been effectually used for eight summers. It is discontinued in the fall.

The most severe condition of this nature that I have seen helped by chlorine is that of the Coney Island Creek at New York City. This work was done some years ago to ameliorate a condition of hydrogen sulphide evolution from this meandering creek, and a terrible nuisance and also damage to property. The work was done on a gamble. Nobody knew what to expect. There a bleaching powder, which is hydrochloride of lime, and incidentally the same as would be produced if
1997 you ran chlorine and lime water together into a sewage, was applied to this creek by the New York City chemist, named William T. Carpenter. This article is titled "Sodium Nitrate Used to Control Nuisance". It appeared in "Waterworks and Sewage" for May 1932, pages 175 and 176. The bleaching powder was applied, first to the entire water body—the best part of it—and later applied to the effluent going in from the sewage works, but the results surpassed expectations and Mr. Carpenter, the author, writes: (Reading from above mentioned publication)

> "As soon as chlorination was completed the more optimistic of the observers claimed to be able to

> note an improvement in the odor and appearance of the water, but by the next morning one who had seen the conditions previously could not fail to see the change for the better. The inky blackness of the day before had given way to a brownish
> 1998 color and effervescence had notably vanished. The odor had not entirely cleared up but certainly was less than on the day previous."

The author goes on further to state:

> "On July the 14th and 15th the average values for dissolved hydrogen sulphide in the lower stretch of the creek had been 84 and 95 parts per million, respectively. By August the 6th the amount had risen to 16½ parts. The chlorine treatment reduced this to 12.7 within an hour, and on the morning of the 7th the average value had fallen to 10.8, and it continued to fall regularly until the 14th when it was but 6.5. When the treatment was finally stopped completely, the dissolved hydrogen sulphide rose to 9.3 on August 18th. Even the mud banks exposed at low tide seemed to be deodorized. The dissolved hydrogen sulphide at the points most remote from the point of application of chemicals rose from 7.3 per million on August 18 to 8.3 on August 20, then fell steadily to a minimum of 3.2 on August 27. The two other settling points in the area gave results which showed a general decrease to the 25 when they showed total elimination of the sulphide."

Now, I want to point out that this first year of treatment in 1931 was a combination of nitrate and bleach-
1999 ing powder, the nitrate being there for the purposes of preventing septicity—a hydrogen sulphide production, and the hyperchloride being used to modify

the bacterial activity so that they would not utilize as much nitrate as otherwise. Report made by the same author to his superior, dated October 16, 1933, at the close of the second season of this application
2000 has never been published, but from my knowledge, here is what happened. The nitrate treatment was rather expensive and Mr. Carpenter did not consider it justified to continue the nitrate the second year. So they used bleaching powder alone and obtained results which were really as beneficial, if not more so, than the previous year because they continued to use bleaching powder rather than a temporary application. Then the following year they had completed the intercepting sewer and the treatment works and there was no further need of the treatment of Coney Island Creek. So, you see, this matter of chlorination is so frequently, you might say, a palliate until the permanent improve-
2001 ment can be attained. This is an example of a very severe condition and about the worst that I have ever known to show that it is possible to get improvement, if not 100 per cent remedy. The Coney Island Creek of course is salt water—a tidal estuary, and backs and fills with water, but worse than that the gas works' wastes went in and that is loaded with sulphates and really they created about as much trouble as the sea water or the sewage.

Another milder case was Houston, Texas—a bayou which is a sluggish body of water flowing down to the Gulf. This bayou receives the sewage effluent from the plant. Now this Houston plant has been for many years overloaded. They lagoon the sludge for diges-
2002 tion purposes but the effluent does carry solids over

with it because they do not have enough plant capacity to give as high a grade treatment as they do here in Chicago and other places and the chlorination at Houston has improved the condition of the bayou materially below the plant and there has been quite a lot of argument as to how chlorine does act. Some say they think it vitiates the biologic cycle and upsets it so that nobody can answer the question, but the proof of the pudding is that the condition of the stream below the plant gives evidence of effective results, regardless of theory. I would say, if I were given the task of preventing odors at Brandon Road Pool by next summer, it is my opinion I could successfully accomplish this with chlorine alone or in combination
2003 with other remedies. Yes, I agree with the conclusions expressed by Dr. Buswell and Mr. Howson as to the effectiveness of chlorine in odor control in the canal and Brandon Road Pool in comparison with the diversion of additional lake water in the amount of 3,500 cubic second feet. I can't conceive that that small amount of water would do the same thing that a sterilization effect, a pasteurization effect, such as is obtainable with chlorine or the lime-chlorine treatment, will do. As far as Brandon Pool is concerned I think if you increase the flow through the canal you would sweep more solids down into Brandon Pool that are now not in that pool, so maybe that isn't the thing to do. If the whole trouble is in the Pool down there and we want to keep the sludge out of it, then the thing to do is not to increase the velocity in the channel.

2004 I don't know how difficult it is going to be to drain Brandon Road Pool either once or successively for two

or three or more times to remove the light, active sludge which might contribute to the odors complained of and the bad appearance of the pool. If it is possible, I would do it by all means and I would do it as often as I could until the Sanitary District can finish their job of taking out all of the settleable solids. I have been around sewage plants and bad streams enough to know that there is a certain zone, layer, of what I call active sludge. Below that there is a humifying sludge that don't count and I would not go to a nickle's expense to drain it out. This active sludge is a bad actor; being down deep it settles when it is undecomposed and being deep it has this hydro pressure on it and the little bubbles of gas all through it are very small, minute, and they cannot expand and they can-
2005 not lift that sludge; but if you start to drawing down that pool—I don't know whether it will be ten feet down or two feet down—at some point there is going to be a tremendous volcanic action. The whole thing is going to turn upside down and there will be more sludge floating than there will be on the bottom. If it can be put down there out of sight somewhere and let it go, fine, that is the thing to do. Incidentally, if you do that it will be very much simpler for chlorine to
2006 have an effect on it. The sludge which might contribute to the conditions complained of in the Brandon Road Pool is a long ways down under the surface of that water and how effective the top chlorination is going to be in retarding gas evolution from that sludge I couldn't answer; but the evidence is there will be an effect which will be noticeable but how extensive I cannot answer. We now have a method of retarding

septization of activated sludge which consists merely of putting chlorine on the top water and purposely keeping it away from the sludge because we do not want to destroy a certain organism in that sludge, but they do want to destroy the general saprophytes which use up oxygen and reduce nitrates and cause trouble in sewage treatment plants. With this method we are able to take activated sludge which is a very unstable material and with that treatment we can hold that sludge three or four times longer in a settling unit so as to let the liquid squeeze out of it.

2007 I wouldn't say that nitrate oxygen would stop gas evolution from Brandon Pool or in the canal above—there would still be eructations of sludge and gas evolution—but I don't think there can be any hydrogen sulphide and, therefore, no odors resulting if there are nitrates in that water. So with chlorine or with nitrate you would be apt to have some eructation of sludge, but no odor.

2008 As to the effectiveness of introducing into the water additional oxygen through re-aeration by the construction of a properly designed cascade at or near Stony Gates, upstream about a mile from the power station at Lockport, Dr. Mohlman testified that a re-aeration of that nature would not justify the cost in comparison with the value attained on that score, that the period is short, you can only take up a definite amount of oxygen in that period, and that does not last very long afterwards in summer conditions, and he is eminently right. There have been some attempts at aerat-
2009 ing sewers in order to try to hold sewers fresh, but it has never been proven practical. If you combine aera-

tion and a method of pasteurization by any means that you like—it doesn't have to be chlorine—then your oxygen will carry through much further. Without some means of pasteurization I don't think it would be worth talking about. It would just create a local odor nuisance.

2010 I would not say that cascades apart from chlorination or some similar pasteurizing method would be positively detrimental except I would expect it to give a local nuisance—increase the local nuisance. I would say it would increase the complaints by creating a greater odor nuisance. If the figures on hydrogen sulphide is as much as two parts per million at Lockport
2011 you are going to have a nuisance if you try to aerate at that point. If there were less than that I would put in chlorine ahead of the aerating, then it would be all right. It is true, it would take a little more chlorine but the chlorination would fix the sulphide so you would not get this. As a matter of fact one of the chief uses of chlorine now is ahead of so-called sprinkling filters and that consists of a big stone bed with jets that spray the sewage over this stone and create quite an aeration by this method, liberating about every gas
2012 there is in there and in doing so taking up oxygen. If hydrogen sulphide were not present above the cascade I would say it would not be detrimental; it would have some value. I don't think it would carry very far but if the rate of bacterial activity is retarded by any means, cold weather, chlorine, or what have you, then it will have a much more beneficial effect because the oxygen will remain, it won't be sapped right up.
2013 Chlorine with cascading would be beneficial and chlor-

ine with cascading would be more beneficial than chlorine alone. There are other possible ways than by cascading of getting oxygen into the sewage or canal water. It probably could not be done as quickly nor would the construction be as economical but it certainly can be done. The method I have in mind involves a low lift pumping and a riffle type aeration, taking the water from the canal, lifting it a couple of feet or so and throwing it out over these riffles.

"Q. What would be the advantage of that over the cascade system?

2014 "A. 37 feet of head at Lockport is a pretty expensive thing to throw away, to drop water over the side of a canal, in my opinion, sir. I think you can take that power and do a lot more with it in other ways."

As to the effectiveness of chlorinating activated sludge to render it innocuous, that sewage sludge can be super-chlorinated and converted into something like paper pulp. In other words if it were essential for the Sanitary District to continue discharging activated sludge back into the canal waters, I believe a great help would result from super-chlorination of that sludge for the purpose of rendering it non-useful as bacterial food or, if useful, very slowly useful and very difficultly useful.

2015 I have seen sludges which were super-chlorinated and they just seemed to lay around without any odor and bacteria can't make use of them. How much chlorine in ratio to the million gallons of sewage is involved in that sort of treatment I am not prepared to say, but

it can be done in my opinion. Settled sewages can be dependably chlorinated to reduce the bacteria to a
2016 residual of .1 of 1 per cent, that is, 99.9 per cent of the total bacterial removed and that doesn't include the 20 degree organisms. I am speaking now of body degree organisms, and the 20 degree organisms are reduced long before the 37 degree organisms are. Partial chlorination, say 50% (and by partial chlorination I mean if the chlorine demand is 5 parts per million, partial chlorination to satisfy 50% of the demand would be 2½ parts per million) will actually reduce the pathogenic organisms by, I think it is 80 per cent. Copy of the Report of the Committee on Sewage Disposal of the Public Health Engineering Section of the American Public Health Association has already been introduced as the evidence of Dr. Mohlman in cross-examination. The committee was headed by Mr. Langdon Pearse, who is in this case, and as members, Dr. Mohlman, Dr. Buswell who testified here, Mr. Calvert, Mr. Eddy and others. There are figures presented with this report which are typical of what can be obtained with chlorination of sewage and it shows the number of
2017 minutes of contact as against the bacterial reduction or the percent of bacteria remaining, which is the same thing, and after a short contact of even five minutes the reduction is 99.9 per cent when complete chlorine demand has been satisfied; with lesser amounts, about 80 per cent. The tables referred to are on page 6 of that report. It was my conception that in order to control disinfection to the efficient degree we had to chlorinate to the full chlorine demand point, and that is to have a residual, at least a trace of residual chlorine. In

order to test out this theory, Mr. Teeterman of the New York State Department of Health and I have spent many a night and day at the Huntington, Long Island sewage plant working on that problem and this paper of Teeterman's is the outcome of that work. Here is what he says:

> 2018 "In solids separated from those samples containing no residual, the corresponding removals are from 96.75 to 98.5 within 15 minutes."

2019 I do not know how fast the District can operate, but I would say it would require four months, maybe five months, to get bids, secure and install everything needed for proper chlorination of the sewage and/or canal waters. If bids could be advertised promptly and work proceed it is conceivable it might run six months before they are ready to turn on the valves. That is for equipment to apply chlorine at, say, two points in the canal. The first I would recommend would be at the Southwest plant and then again down at Lockport. I am sure there would have to be some put in down there as long as this sludge condition exists.

2020 The second application would be at Lockport Power House to take care of the Brandon Road Pool.

2023 I had in mind chlorinating the canal waters—the waterway itself—at the Southwest Plant. After hearing the testimony yesterday about treatment of the West Side sewage at the point of effluent with chemicals and after hearing these reductions of 57 down to 36 by chemical treatment and thinking of the great mass of sludge involved and equipment required to install such a treatment, I began thinking how simple

it would be to chlorinate that effluent as well and get
2024 reduction in oxygen demand and this delay in bacterial effect a good deal more economically than with chemical precipitation. It is my thought chlorination would be the simpler and quicker thing to use.

"Q. (By Mr. Clausen) I didn't quite understand the time you said it would take from the time when they decided that they would go ahead and then to draw the plans and then receive the bids; just what length of time?

"A. There are no plans involved; merely analysis. The equipment would consist of Johns-Manville transite board—make a very neat building. The fact is, New York City have several of them. There is no heating involved; no insulation. The equipment involved consists of pedestal type chlorinators set in a row, and the piping of them is the serious matter."

2025 The period of time I mentioned was six months from the advertising of bids to the date of completion. If it is a necessary thing to do it can be done very quickly. In connection with the chlorination at Lockport it is very probable that the dry-feed application could be arranged there to consist of diffusion of chlorine gas into the waters above the locks or wherever it seemed most convenient to put it in. The chlorinating equipment of such capacities as I would recommend is about the size of the plan now in use at Detroit. The
2026 probable cost would be around $85,000—would not cover buildings—would cover the equipment. You would have to have two such plants which would then cost $170,000 if you use the Detroit figures as a basis,

without anything for the buildings. The buildings would be constructed of something like this transite board I spoke of. I wouldn't know how to estimate the cost of them at this time.

2027 The Detroit plant is a 27 ton plant—27 tons a day capacity, and the plant I had in mind at the Southwest Works would be about 25 tons—practically the same. At Lockport if we really want to do a job we would have to practically almost double the size of that plant.

2028 It is possible the same size plant at the two points would be all right but I cannot guarantee Brandon Road Pool will be completely and effectively controlled with three parts per million of chlorine. I know it will be helped but I don't think it will be completely controlled. I did not contemplate over three parts per million at the Southwest plant, but at Lockport I think three will help but am doubtful of complete effectiveness. If they would have aeration down there with the three I am almost inclined to think it would be all right. Dr. Mohlman testified that on January 1941 this matter of solids going in would be very much alleviated, if not completely corrected, and this will be a tremendous help.

Sept. 13, 1940

LINN H. ENSLOW—Direct Examination Continued

2070 If that active sludge were not present in Brandon Pool it is my opinion it would take just about half my chlorine estimate to do the job of clearing up those odors. Rather than, say, 6 parts per million I would say 3, and I would even say I doubt it would take any
2071 at that point if it was properly done up the canal, par-

ticularly if the canal would be, in part, flushed, that is, the active sludge flushed out when they lowered that pool.

2072 In estimating the cost of the chlorine required to ameliorate the odor conditions in the canal at Brandon Road Pool I have used the figure of 3000 second feet at the point of chlorination, and that would be at the Southwest Plant. One second foot of flow is .6463 million gallons daily; therefore the 3000 second feet is 1954 million gallons of water. One part of chlorine applied is 8.33 pounds to the million and multiplying that by 1954 gives 8.1 tons a day of chorline, so if we put in as much as 3 parts per million, and I am assuming that is the top, and chlorine at the market price delivered in Chicago is $2.16 per hundredweight, $43.20 a ton; therefore 3 parts per million the actual cost for chlorine is $1050 per day. If after this sludge removal in Brandon Pool chlorine is necessary at that point there will be an additional equal figure of $1050 a day.

2073 If no sludge is removed and an attempt is made to do it with chlorine, of course there will be an additional $1050 a day so the cost then in my estimate would be anywhere between $700 a day minimum—that is 2 parts per million—and, say, roughly $3000 for the chlorine alone.

The lagooning of sludge is essentially the making of
2074 a cesspool for depositing the noxious sludge and therein
it renders anaerobic decomposition and, eventually
it has to be dug out or removed by some other method
to an ultimate disposal point. At Houston these lagoons
are dug out of the earth and open at the top. They
lagoon activated sludge entirely at Houston. It is far

from being a new procedure and it is used at many points. The outstanding example of lagooning in this country is at Indianapolis, Indiana. To my knowledge they have successfully lagooned sludge there as much as ten or twelve years. If these lagoons are properly operated there does not seems to be any odor nuisance. If they are improperly operated they are terrible.

2075 It is a difficult question to answer as to the practicability of lagooning activated sludge of the Southwest Plant as an emergency measure. If the land is available I see nothing impractical about attempting the lagooning of sludge temporarily at Stickney. I believe that it could be done with a minimum of odors, particularly if a temporary pipe line were laid to those lagoons and a considerable amount of that Imhoff tank sludge from the West Side put in those lagoons before beginning the discharge of the activated sludge. If anybody went to the brink and stuck their head over they could smell something, but so far as a general area of complaint is concerned I do not think there should be. I have seen lagoons in Toronto operated very close to habitation and all they did was to cover the surface of this sludge with a marsh grass. It kept the direct
2076 sun away and it seemed to hold the odors. They used chlorine at Toronto only in some small plants. They did not at this main plant that I am speaking of now. In speaking of the lagooning of the effluent from the West Side Plant and the excess sludge of the Southwest Plant I did not have in mind the use of chlorine at this lagoon. I see no use for chlorine in connection with it. I am recommending this as a makeshift until they can actually handle it as planned. I think for two or

three years that would be an acceptable expedient.

2077 There would be a certain amount of operating cost involved, but not much, in addition to the cost of the lagoon.

2078 I did say above West Side sludge and I meant Southwest sludge, the two being so close together I confused them in my statement. The sludge to be disposed of is the Southwest sludge; that is the one that is giving us the trouble, and when I mentioned the addition of sludge from the Imhoff tanks on the West Side that is only what we consider to be seeding material and buffer material. It is very valuable for the purpose of avoiding acid digestion and odors, so we should start off with something besides dirt in the hole and that would be sludge from the West Side plant.

2079 This last suggestion of mine did not take into account the West Side effluent at all, which is 50 per cent treated, and that would have to be cared for in some way to remove complaint about it. The suggestion I was making was merely my idea of one method of keeping these putrescible solids out of that canal
2080 and I still think that 80 per cent at least, if not more, of the difficulty we are now discussing is these solids and not the liquid. I wouldn't be able to say without knowing a lot more about it, if my suggestion were adopted, whether it would be necessary to use chlorine to take care of the West Side effluent. If chlorine were used for the West Side effluent the top would be 16 tons a day. I don't know whether you would want to use quite that much, but that would be the top. $691 a day, I believe I mentioned that before.

2081 I would say, No the chlorinator installations for
chlorinating the canal would not have to be written
off at the end of the emergency period, that is, the sea-
sons of 1941 and 1942, because from my experience and
the experience of many others, chlorination is a very
valuable tool in an emergency. Those same chlorinators
will probably serve on other days in other years if I
2085 know sewage treatment. If the problem was to cor-
rect this nuisance through to the spillway of Brandon
Pool I would say that it couldn't be done for less than
$3,000 a day for chlorine. That would be almost 75
tons of chlorine a day.

September 13, 1940

LINN H. ENSLOW (Recalled by The Master)

2098 Q. (By The Master) I had a note to ask you about reference to the Brandon Road Pool at the time you visited it there. I think in one part you said conditions were bad and another part that the conditions were not bad. I am not sure that I got you straight and I am not sure what you were referring to when you spoke of conditions. Were you speaking of odor or the sludge that you saw? How much inspection did you make and when were you there?

A. I probably referred to the fact that I could see
from my visit yesterday, day before, that con-
ditions there must be pretty bad in summer
and, of course, the testimony shows that it is
pretty bad, but that when I was there, this par-
ticular day, they were not bad. There was just
a slight amount of sludge floating in that spill-
water and we walked right under the dam un-
2099 der the guidance of a caretaker and could smell

> very distinctly if there was any odor. In other words, above the fall you got odor if you have got it anywhere. The only odor that I could complain of, and anybody else at that visit, was the odor of oil wastes. I don't know where they come from, but there is quite a lot of oil that gets down the canal and probably oil, refining sludge, that is what it smells like. Outside of that I would not say there was an odor nuisance existing at all.

I didn't get on a boat, I only walked across the locks at the lower end of the pool and across the dam, and at the upper end of the pool we went across several bridges—two I think—and that is all. I have been there before in past years but that was before the
2100 treatment plants were in operation. I was not there in 1939 and haven't been there for five years that I know of.

October 14, 1940

LINN H. ENSLOW

Cross-Examination By Mr. Clausen

2907

2911 Enslow Cross-Examination Exhibit No. 1 offered and received in evidence entitled "Chlorination in Sewage Disposal—Discussion of the Report of the A. P. H.
2917 A. Committee on Sewage Disposal." That exhibit contains a discussion by me that is not included in the green book (Mohlman Exhibit 2).

Q. (By Mr. Clausen) Now, looking on page 54
2918 which I have marked, will you read that discussion starting at "Indianapolis" there?

A. "At Indianapolis and Flint, Michigan, the effect of chlorination had not been worth while because in each case the stream was sludge-laden below the plants and one could not expect chlorination to perform the work which should have been done by sedimentation and efficient secondary treatment. In other instances where
2919 streams were to a less degree overloaded the chlorination effect had been sufficient to tip the balance from that of almost complete oxygen depletion to that of positive oxygen balance and thereby relief from seasonal uses. Chlorination had likewise been effective in clearing up unsightly biological growths in somewhat over-polluted streams at several points where sphaerotilus growth predominated; and in other instances where algae had proved a nuisance in streams receiving highly nitrated effluents."

As far as I am concerned, I will testify to that now, and so that ends the argument. I am in agreement with those words.

2920 When I presented that discussion I concluded that sludge deposits would nullify any benefits to be derived from chlorination of a river, and they will in a large measure. My conclusions coincide with the findings of the committee, as noted on page 20, item 5, Report of Committee on Sewage Disposal of the American Public Health Association, and I would like to read this into the record:

2921 "Conclusions. In the case of a stream containing extreme sludge deposits, the effect of excess chlorine carried in a sewage effluent may be negli-

> gible insofar as the maintenance of aerobic conditions is concerned."

That word "aerobic" I wish to emphasize. Aerobic is defined as a condition existing where there is not putrescence and anaerobic is a condition where there is putrescence.

2922 I take it this particular conclusion, item 5, coincides with the findings of the committee. My discussion coincides with the findings of the committee. I would say that when sludge is in sufficient amount in the bottom of a stream you can actually put residual chlorine on top of it and a mile or two down you would never know it was there.

2923 The depth of the main channel in Brandon Pool is 24 feet, I believe, and Brandon Pool's depth varies somewhat, but as I understand it it is over 27 feet deep in places.

Yes, I am informed as to the respective times of flow from Damen Avenue to Summit; from Summit to Lockport and from Lockport to Brandon Dam, with a flow of 2900 cubic feet per second.

2924 From Damen Avenue to Summit it is 31 hours; Summit to Lockport 63 hours, and Lockport to Brandon Dam 19 hours. I believe I testified, as far as I know there is no place where chlorine is used to prevent septicity for such long periods of flow in a deep river underlaid with sludge. For years I have urged application of chlorine to sewage or polluted water while it is still fresh before it has had time to become septic and odorous.

2925 I think this would be the first occasion of a condition of this particular sort that I have recommended chlorination. I recommend pre-chlorination to prevent the formation of hydrogen sulphide. Once the hydrogen sulphide is produced in the water, not less than two parts of chlorine are required for each part of hydrogen sulphide.

2926 It is essentially correct that if you allowed hydrogen sulphide to form then you must waste chlorine to destroy it before the chlorine can be of any use to repress further production of hydrogen sulphide downstream. Some benefit is secured but it is certainly a waste of chlorine to wait until the sulphide is reduced, and when you can use it at a better point ahead of the production. That is why I have always advocated upsewer chlorination where possible.

2927 (An article by the witness, entitled "Chlorination in the Field of Sanitation—Advantages and Developments in Sewer Chlorination"—a reprint from the Engineering Journal, March 1929, was offered in evidence, reading:

> "Even after the hydrogen sulphide is already formed, it is possible to destroy it with chlorine. Thus, H2S plus C 1/2 equals 2 hydrochloric acid plus sulphide, but this procedure is to be avoided unless it is not practical to prevent its reduction, and when one considers that one pound of hydrogen sulphide requires 2 pounds of chlorine to destroy it, then it is readily apparent that prevention by early chlorination is less costly than destruction by later chlorination."

In my testimony I said that B.O.D. removal would be incidental in the canal chlorination and, as I recall it, I rather favored it in treating Imhoff effluent until
2928 they can get activated sludge going. In my opinion, the first step would really be to chlorinate the Imhoff effluent or influent as the case proved out, in order to help alleviate oxygen demand down the canal until a permanent remedy is provided.

2929 Yes, I recommended chlorine for odor control. I have recommended chlorine for pool trickling filters. I did not recommend chlorine for sludge in this case because I never heard of that before. I don't believe that I ever recommended chlorine for sludge filtration. As far as I know, the only time that chlorine was ever
2930 used for sludge filtration was experimentally here, and also in connection with some of the work at Cleveland, but I never did have enough real information in order to recommend it. I don't believe I ever recommended chlorine for sludge pasteurization. I don't think I have ever recommended chlorination of sludge to such a degree that the product looked like paper pulp. It can be done, I understand, but I have never done it and I have never recommended it. Yes, I do recommend chlorine for treatment of the West Side Imhoff effluent. I think under the present condition of the canal I would not recommend the chlorination of all the sewage treatment plant effluents of the Sani-
2931 tary District as a health matter, but I do believe that I would recommend it as a future consideration, and I certainly recommend it as an alleviating measure when it is necessary, say, to by-pass at intervals. I don't know enough about it to say whether I would or would

not recommend treatment with air and chlorine at the Southwest Treatment Works to separate grease. Chlorine was used for odor control of vapors and gases from the sludge dryers at Milwaukee. If it has been abandoned I don't know it. I know that it has worked indifferently. It is one of those matters where if you don't chlorinate you wish you had, and if you do chlorinate you don't know whether you have helped the matter greatly or not.

2932 In your review of my recommendation for the use of chlorine in sewage treatment I can think of one thing the Sanitary District has missed. I think possibly you might have some sewage that you can keep a bit fresher in traveling to the treatment works. Outside of that I don't think of anything.

Break-point chlorination is a coined expression and copyrighted. I will describe it as super-chlorination to the point of expelling ammonia, breaking down ammonia so that you cannot find it longer in the liquid being chlorinated. That is the best definition I could give you and the shortest. Chlorination to the break-point positively requires very much more chlorine than that required merely to satisfy the 10-minute chlorine demand.

2933 In filtering sludge at the Southwest Plant, ferric chloride is used for conditioning the sludge before it is filtered. The last I heard I though the ferric chloride
2934 was under 5 per cent of the dry sludge produced. I will take Dr. Mohlman's word for it. (The Master: Dr. Mohlman has stated that 5 to 7 per cent is correct.) When the plant produces 300 dry tons of sludge per

day that will require from 15 to 20 tons per day of ferric chloride.

2935 Roughly, it looks like 13 tons of chlorine are needed to make 20 tons of ferric chloride. No, this will not be the largest amount of chlorine used by any sewage or water plant in the United States. Buffalo and Detroit both use more. New York City uses more, but it is in more than one plant. I don't know how much Detroit is using right now. They have a capacity of 27 tons.
2936 Buffalo goes up practically to the height. I don't mean that the average is 15 tons a day, or 13 tons, but at times they are up to the full capacity of 15 tons. I am sorry to admit I don't know what the average is without looking it up. It might run less than 15 tons for the average but not a great deal less.

2937 I stated at page 2028 of the record that one 27 ton chlorine plant above Brandon Pool would apply three parts per million but I felt that twice that amount might be necessary to guarantee effective control down at Lockport. I doubled it because of the fact that even with drawing down Brandon Pool it is going to be impossible to get rid of all sludge effects, and I thought
2938 that the 6 parts per million—I just wanted to be ultrasafe. It is a speculation in anybody's sense. My best judgment is even with drawing down that pool and getting rid of a lot of sludge, still it is going to be a tough proposition. If it weren't for those solids in there I would be pretty positive about that 3 parts. I haven't changed my opinion when I stated at page 1991 of the record that the sludge in Brandon Pool is a bad situation and might require 3 or 4 times as much chlorine to do the same work as if that sludge was not

2939 there. With the sludge going in at the rate that it has been during this past summer, I wouldn't know how much chlorine it might take to control the odors from Brandon Pool. If that sludge is removed by any method whatever—and I am thinking of the poorest, the quickest method, which will not be a thorough method, but it will be an alleviating method—of lowering the pool and then letting it fill back up, and lowering it again, under that circumstance I still wanted to boost my first estimate of 3 to 6, and I still stick to that; but you understand me that I do not think that it will take all of this 6, and I don't think that 3 is going to be ample in real hot weather on that pool; even though we use lime along with chlorine to get chloramines. I still want to be perfectly safe about this matter and say 3 to 6, with the sludge removed by the best way you can—by lowering and filling and filling and lowering the pool.

2940 Without the sludge removed I would say it would be anybody's guess as to the amount of chlorine required to do the same work. If we don't take the sludge out of that pool, I wouldn't know what to say about it. It would be like Coney Island Creek. You would get some alleviation, but you would still get a smell—a smell instead of a stink, we will put it that way. I wouldn't say that if you don't drain that pool, and that you don't put any new sludge in, but you leave in that pool what is there now, it would take an extraordinary amount of chlorine to give you any assurance that you
2941 would eliminate the odor at the pool. If no new sludge goes in, I wouldn't worry about sludge which was put down there last summer, next summer. I would be worrying about the sludge that is going in now from

June or May because that is accumulated and when the right temperature conditions arrive you have a conflagration of kindling that you have been packing into that pool all winter that hasn't burned. Assuming that (1) the pool is not drained, and (2) that sludge continues to go in for the next few months at the ex-
2942 tent to which it has been going in, I would say that if 12 parts per million of chlorine did it, it would be a fair job, and it might take another 3 to 6 parts. I might say that a good many sewages are chlorinated with 25 parts per million of chlorine on that account because they are septic and have a very high chlorine demand. All you would have down there would be a giant septic tank served from the City of Chicago and you would have to put in 25 or 30 parts of chlorine I wouldn't know whether it would take 15 parts or 25.

If fresh deposits of sludge were terminated so that after January 1 1941 there would be no new sludge put in, but the pool not drained, I don't think you would be very successful in the early spring when the boiling begins. You would get some odors there with a very high amount of chlorine that wouldn't sound practical at all, and as the summer wore on and the excelsior part of my kindling and fuel is passed on, you see no more coming in, then I would go back to my 6 parts.

2943 9 parts per million would be about 75 tons a day, and 12 parts would be 100. As long as that sludge is active in that pool I don't think anybody can tell you the answer because here is what happens: You will be going along with a good chlorinating effect and then all of a sudden you get this boil started and it just impregnates the whole pool, and that is going to smell bad when it goes over the dam, and it will have hydrogen sulphide in there. Until the amount of sludge that has been going in during the last several months is stopped, a confident opinion about the amount of chlorine that would eliminate odors could hardly be expressed.

2944 The cost of $85,000 for a 27 ton plant at Detroit as stated by me at page 2025 of the record, included supervision of installation and drawings but it did not include miscellaneous accessories or hard rubber piping, which will add, apparently, about another $25,000 to that figure. I would say it is a fair statement that the auxiliaries and pipes would make the cost about $115,000.

2945 That wouldn't include a building. For this summer situation, I hadn't anticipated any heating. There would be involved a railroad spur on which you would have a tank car of liquid chlorine, just as they do at paper mills, and pipe it any distance you might wish into ordinary heavy-weight iron pipe to the so-called evaporators, and there the liquid chlorine goes into chlorine gas, and from that point it goes through gas meters of the chlorinating machines and into the water solution; or in this case it would be canal water solution, and on into the sewers. New York City does a lot of this seasonal chlorination and they have to cool these buildings and not heat them. They cool them by opening the windows.

2946 The bid to the City of Detroit on chlorinators of 54,000 pounds capacity, that is 27 tons, was $67,000. That is the actual bid price and this did not include any of the evaporators and some of the accessory equip-

ment which is normally a part of the chlorination contract for which an allowance of $10,000 should be made. I would say that with the labor situation in Chicago that it would probably be $115,000 for the construction of that plant with auxiliaries and piping costs. To a certain extent I collaborated with Mr. Howson in the preparation of some of these exhibits that were introduced this morning. He has taken a good deal from my letters. If this item 3 in Exhibit 12—approximate cost to install for chlorination of canal waters—did in-
2947 clude the auxiliaries and piping and so forth, it included a darn sight better building than I would ever put up for it. I talked to Mr. Howson about that and asked him where he got that $360,000. If I say that it cost $120,000 to put the Detroit job in Chicago—duplicate the Detroit installation in Chicago—it wouldn't be twice that much to make it twice that large. There is one pipe line that takes all of the flow of the chlorinated water, and if you have twice the capacity it doesn't take two of those pipe lines. It merely takes an 8 inch instead of a 6 inch, or a 6 inch instead of a 4 inch pipe, so that labor, bolts, and all that are the same, no matter whether it is a 4 inch pipe or a 6. Consequently those estimates are high.

Redirect Examination By Mr. Naujoks

In indicating that I had no hope that chlorine would be effective at Indianapolis, that is a pretty bad situation. It isn't any too good yet. What they needed was
2948 a bigger treatment plant and very much so in Indian-

apolis. I don't believe Mr. Calvert ever conceived or nourished the idea he could save enlarging his treatment plant by using chlorine at Indianapolis. Mr. Calvert proceeded to invent a method of adding chlorine to sewage and after that he began to make some studies of the stream but as far as I know he didn't make any hydrogen sulphide study. The river, as far as I could picture it looked just as bad when he chlorinated as when he didn't, and it was sludge laden and no dilution water to speak of. That he did have was pretty well polluted and had about 4 parts per million of dissolved oxygen coming down to the sewage plant and the whole matter was one in which chlorine should never
2949 have been given serious consideration. In Indianapolis it was very definitely a failure. There isn't any problem down at Brandon Pool now. I was down there yesterday (October 13, 1940) and the only odor coming from the canal was just a sewage odor—smelled like urine, amin and did show that sewage wasn't overly well-treated at that time; but it wasn't any hydrogen sulphide odor and nobody could complain of it half a block away from this turbulence at the locks. As far as I could see the odor that would be complained of is oil field wastes. I didn't smell a great deal of hydrogen sulphide but I smelled something even more nauseating and that is the mercaptan, and very distinctly sulphur compounds and it might be what is causing the
2950 paint to turn black. If I understand the situation that oil waste has merely developed within the last year or two, but to my mind it is a distinct nuisance right now.

2951 I was here and there yesterday at Brandon Pool.

I was not in the City of Joliet, I was nearer Lockport. I would say there wasn't more than a trace, a good deal less than a half a part per million of that hydrogen sulphide present yesterday judging by my nose.
2952 I have got a kind of a sharp nose and I can differentiate between 1 and 2 parts per million hydrogen sulphide in the sewage that is being aerated. In other words if I could take a sample of sewage and shake the jar and smell it, I could determine it.

2954 (The Master: For the purposes of this record, we can agree that the area of the controversy (as to odors) is limited to a point bounded on the north by Lockport and bounded on the south by the lower locks at Brandon Road Pool.)

Berak point chlorination is primarily a development in water purification to overcome pollution in the source of supply. I don't believe anybody would wish to consider break-point chlorination to sewage treatment.

2955
2956 (Discussion between counsel and Master relative to permitting witness to read from Article "The Efficiency of Chlorine in Sewage Disinfection and Affected by Certain Environmental Factors" by William Rudolfs and J. V. Ziemba of the Sewage Experimental Station of New Brunswick, N. J. Agreed that if Master wants it for his own study, it could go in without reading)

2957 Well, I was rather anxious, in having read some cross-examination testimony here, to correct an impression which the Master seems to have got, and to my mind wasn't corrected, that if you started with residual chlorine and you got downstream half a mile and it

disappeared, then you were just out on a limb, so to speak, and you had to grab another limb which was more residual to carry on further, and consequently it was chlorinating here, there and all the way down every few miles at least. I am introducing this to indicate that that doesn't have to be so, and we are actually chlorinating in sewers a good distance ahead of the treatment works and getting results; but in the instance of this canal it is a lot easier than chlorinating a concentrated sewage floating down a sewer in contact with slime and oxygen which encourages a splitting of sulphates into sulphides. The evidence I am trying to present is to this effect: If we start with a fraction of the complete satisfaction of chlorine
2958 demand and if we give a sufficient contact time, according to these investigators a 77 per cent reduction of bacteria with 20 per cent of the chlorine demand after 7 days becomes 98 per cent. It is slow and progressive, and 54 per cent becomes 92 per cent after 7 days.

This is really a laboratory study. There was no sludge present in this case. It doesn't say the size of the bottles here, but it is indicative of the fact that unless you have continual receding from such thing as sludge boils going on, or from a side influence, a polluted stream flowing in, that you can expect to get bacterial reductions which are not chopped off and then flare up, but they go along at a smoother pace than that, and here is what the authors say:

> "The effective disinfection of sewage does not depend upon the persistence of primary chlorine, free
> 2959 chlorine hypochlotates or hypochlorous acid. Sewage disinfection is effected by the germicidal chloro-

> organic products produced by virtue of reactions between chlorine and organic compounds. Bacterial reductions produced by chloro products are very small when the contact time between the chlorine and the sewage constituents is short, for the amounts of chloro products formed are comparatively small. Increasing the contact time results in the formation of more chloro products and consequently a greater bacterial reduction. In this process the early bacterial reduction is produced with primary chlorine, but with longer reaction periods the bacterial reductions are caused to a greater extent by the chloro products."

I refer to this article to correct the notion that chlorine wears off and would have to be renewed at short intervals. I cite this article to show that chlorine does not wear off so quickly but the effect of it will continue over a period of time.

2960 If you chlorinate to 50 per cent of the chlorine demand, and you have a long enough contact, you come out with better than 90 per cent and a good many times almost 99 per cent of bacterial removal; whereas if you wish to do that in a short period of time, say you would have a contact period of 10 minutes, you would have to go the whole road, and have residual chlorine and maintain it for a time, at least, say, 10 minutes, and then you have gotten a result which is in line with what you would wish to put on a bathing beach; whereas, in this canal condition I am not considering a sterilization in any respect, I am considering a disinfection action which is a horse of an entire different color.

2961 With sludge present in the canal, it will be different if the sludge boils up from the bottom and is present in sufficient amount to vitiate the results. Under present condition of the canal that might happen, but I don't anticipate that that sludge is going to be in that canal too long.

If the sludge were kept out after January 1, 1941
I think I could control that through the power station.
That is easy, in my opinion. The gamble is on Brandon
Pool, and that is why I don't know whether it will
take 3, or what it will take. Incidentally, we would
not attempt to hold dissolved oxygen in that pool. It
wouldn't be necessary, in my opinion, nor as far as
2962 that goes, in the canal either. Dissolved oxygen is
a useful material for fish but I don't believe that the
City of Chicago is going to raise fish in that canal and
Brandon Pool, and if chlorine will assist in keeping
down putrefaction and sulphate splitting which gives
sulphides, although there is no dissolved oxygen, then
that is my idea of a method of keeping down odor nuisance and not spending too much money in doing it.
I think I testified that when the Sanitary District finishes its plants and no new sludge goes into this waterway, and the sludge that has been in Brandon Road
Pool has been there long enough to lose its potency, I
doubt whether chlorine would still be advisable, except
possibly during the hottest weather. I don't think there
is going to be a great nuisance down there when that
situation is cleared up. If a nuisance condition became
likely in the hottest weather, I believe Dr. Mohlman
and the rest of the experts can do something which

will be equal to putting through more lake water, and
2963 that will be chlorination.

As long as there is sludge going into the stream or as long as there is sludge in Brandon Road Pool which hasn't lost its potency, it is speculative as to the extent of the efficacy of chlorine, whether it would be 100 per cent alleviating or 90 per cent or 70 per cent. I wouldn't want to stake my reputation on saying it would be 100 per cent. On the other hand if we complete the treatment, and the Brandon Road Pool stuff loses its potency then we wouldn't need any chlorine except in cases of by-passing, or something of that sort.
2964 It is quite a common practice to include chlorination in modern sewage treatment works, and I would venture to say that three-fourths of the sewage plants now being built almost automatically include chlorination at some point or other. In New York State it is almost required now to have chlorination in every sewage plant and I believe other states are doing similarly.

October 17, 1940.

LINN H. ENSLOW

(Redirect Examination)

3213 Yes I talked with Mr. Calvert at some time or other with reference to the experiments he conducted at Indianapolis to which he testified in this case. I cannot give the date when I was first consulted but it was immediately after a certain meeting of the Central States Sewage Works Association and I went with him to his plant and found that he had planned this chlorination for it and also to develop certain forms of chlori-

nating equipment for the purpose. I offered to arrange for Mr. Calvert to obtain the use of regular chlorinating equipment so as to facilitate the work, but he didn't
3214 wish to use it, and so proceeded to develop this feeding device and to carry on the work. The next information I had of the work was in the form of an article which was presented before the American Chemical Society. I merely want to point out that I was not familiar with the work in progress, and as a discusser of Mr. Calvert's paper I stated very frankly that I could see why the experiment had failed but my knowledge of the river conditions below Indianapolis was next to nothing. As a matter of fact, I have never seen the river at the points on which this sampling was done, and haven't seen it to this day, so I don't know the exact conditions. When I testified that the Brandon Road Pool situation and canal were not parallel with Indianapolis, I did so on the strength of the plant effluent—the mixed activated sludge effluent and the settled sewage, the number of pounds of B.O.D. compared with the number of pounds of dissolved oxygen in the diluting water, and the ponded condition below Indianapolis which, I understand, was one pool after another, and sludge eructations were rather continuous and receding of the plant effluent to the place all the way down the river. Mr. Calvert, after these experiments were
3215 over and after the results were published, thought he might try it again the next summer using the lime chlorine process rather than the straight chlorination as he had done before and I discouraged that. I never did think that chlorine at Indianapolis was right for trying to improve that stream. It was too evident that

the treatment works were inadequate. The amount of water in the stream was also inadequate and I couldn't conceive of chlorination taking the place of a higher degree of treatment at Indianapolis.

It is my opinion that the Indianapolis situation is wholly different from the situation we have here in Chicago because of the fact that Chicago is certainly going to stop putting sludge into the canal and I believe they have practically stopped already. The other thing is that the Indianapolis sewage was a good deal stronger than Chicago and still a further consideration, in my opinion, is that the Indianapolis application of chlorine was never perfect. It was deficient in its
3216 application, and by that I mean that it was not distributed in the best fashion and at times there all of the chlorine was put into a portion of the sewage flow, the activated effluent, and then the two effluents were run together. Now, that is not efficient chlorination of plant effluent. I don't say, though, that if it had been 100 per cent efficient it would have answered that problem, but when Mr. Calvert observes 10 per cent in plant practice versus 20 to 30 per cent in the laboratory tests, it is evident why that differential appears.
September 12, 1940.

Direct Examination By Mr. Naujoks

1888 ARTHUR M. BUSWELL, Chief of Illinois State Water Survey and Professor of Chemistry, University of Illinois, subpoenaed to give testimony before The Special Master.

1889 Beginning with 1908 I have been actively connected with water analysis and water treatment, both from sanitary and industrial standpoints. I was asked in 1934 by the P.W.A. Board of Review on the Sanitary District of Chicago project to give a report on certain questions which were asked in connection with the possible methods of obtaining complete treatment of the West Side sewage of the Sanitary District of Chicago. Among others was the question: "Do chemical precipitation processes of sewage treatment merit serious
1890 consideration (b) as a means of supplementing the existing Imhoff tank installation on the West Side?" To this question my answer was "Yes, with proper doseage a 75 per cent purification would be obtained." That is still my opinion. The effect of using coagulating chemicals is to increase the removal of the B.O.D. load and experiments which I have carried out at other plants and other experiments which I have observed, improvements from 60 to 75 per cent have been obtained. It was on the basis of that that I made my answer to the Board. The chemical treatment is not exactly a standardized process. There are various chemicals that may be used and the 75 per cent was based on the assumption that the optimum dose of lime and coagulant, such as alum or iron, and inert material such as clay or paper fibre, an absorbent I would say, rather than inert,—clay or fibre paper or something of that sort would be added to the influent.

1891 In answer to the questions submitted to me by the P.W.A. Board of Review I further stated: "The sedimentation compartments could be used substantially in their present form". That is still my opinion. I

haven't reviewed the figures, but at that time I remember checking volumes and capacities and so on and there was ample time for the coagulation to take place in the sedimentation basin. The addition of chemicals will not interfere with the digestion in the Imhoff tanks. In fact the addition of lime is frequently recommended in connection with digestion. The addition of chemicals will not interfere in any way with the drying qualities of the sludge. The chemicals tend, if anything, to improve the drying qualities of the
1892 sludge. I haven't made any recent calculations based on current markets but the chemicals required to treat the influent of the West Side sewage would probably run between $5 to $10 a million gallons and the operation and supervision cost would probably run $15 a million gallons or thereabout. Those are very approximate figures not recently checked. An increase in air in the activated sludge plants of the Sanitary District of Chicago beyond that required to merely produce bio-precipitation, results in the formation of nitrates and nitrites from the nitrogenous material in the sewage.

1893 There is no advantage in having nitrates and nitrites in the effluent of an activated sludge plant if it is discharged into a clean stream. Assuming that the effluent from the three activated sludge plants of the Sanitary District of Chicago is dumped into the drainage canal which, at the present time, carries a B.O.D. load of from 20 to 25 parts per million, then the presence of nitrates and nitrites in the effluent would be beneficial. It has been known for many years that nitrates carry oxygen available for the stabilization of the

B.O.D. load. I do not know of any streams with nitrates and nitrites present in the water where septic conditions occur. Nitrates in my experience tend to oxidize hydrogen sulphide if it is produced in some portion of the stream and also to prevent the formation
1894 of hydrogen sulphide. The bacteria in decomposing organic matter requires oxygen in order to burn the organic matter and supply energy for their growth, and they take oxygen, first from the dissolved oxygen, and then from nitrates, and then from sulphates; and the end product left when they take the oxygen away from sulphates is hydrogen sulphide. One part of nitrate nitrogen would carry 48/14 parts, or approximately 3½ parts of oxygen. Oh yes, there would be odors if there were nitrates present in Brandon Pool at the present time. If there always
1895 had been nitrates present in sufficient excess I wouldn't expect odors under those conditions. If the pool were cleared of the old sludge deposits and in the new water nitrates were maintained then there would be no odors arising from the sulphate. The source of hydrogen sulphide in very large measure is the sulphate mineral salt dissolved in the water and in the body of the sludge that is reduced to hydrogen sulphide, and then reduced organic compounds formed in the digestion react with the sulphates in the liquor above the sludge and so the hydrogen sulphide is produced from the dissolved sulphates throughout the body of liquor if zero oxygen and zero nitrate conditions exist. Hydrogen sulphide comes almost entirely from dissolved sulphates.

1896 The generating element in producing hydrogen sulphide is organic From analyses of gas from similar situations I would expect that the principle constituents of the gas that bubbles up through the water in Brandon Road Pool is largely methane—an odorless and colorless gas—and an appreciable amount—perhaps 20%—of carbon dioxide—ordinary carbonic acid —and probably three or four per cent of nitrogen. I would not expect to find more than 1 per cent of hydrogen sulphide, if that. It is a fact that chlorine is widely used as an agency for the sterilization of bacteria and the prevention of odors, and chlorine is effective in the reduction of B.O.D.

1897 To answer the question whether chlorination of the sanitary canal and Brandon Road Pool would not, as a temporary measure for a two year period ending in 1942, be a better solution for the prevention of odors now complained of than by the addition of 3500 cubic second feet more of lake water, I should have to make a complete oxygen balance on the organic matter in the canal as against the oxygen which would be carried by 3500 second feet of lake water and consider the possibility of that oxygen all actually being used to prevent odor. However, chlorine has been, and is, used effectively to destroy odors and is prompt and effective in its action. I would say, I would be sure that the chlorination of the canal water applied at proper place or places would relieve the odor condition. In other words I am sure that chlorination properly applied in the proper doseage and at the proper place or places in the canal would prevent the odors complained of, but I am not certain that lake water would do the job without further study.

1898 It has been mentioned that there is considerable sludge at the bottom of the canal at the present time and I don't believe that any amount of diversion could be depended on to remedy the odor within any reasonable length of time unless that sludge were removed.

Examination By The Master.

If properly applied it is my opinion that chlorination would relieve the odors, notwithstanding the deposits of sludge that exist now in the waterway and the Brandon Road Pool. Of course, if at certain times an enormous amount of bubbling occurred locally, it might not be possible to maintain enough chlorine to take care of all of that. I haven't seen the Pool; I don't know how much of that is going on. Ordinarily it is feasible to maintain enough concentration of chlorine in that liquid to take care of odorous compounds which would be given off from the sludge and in the liquid itself.

1899 Ordinarily from 5 to 10 parts per million is enough chlorine to sterilize ordinary untreated sewage. To maintain chlorination of the Brandon Road Pool and the waterway, excluding the additional sludge and untreated sewage that is going in daily, I would think that all the way from one to three parts per million of chlorine would be enough to deodorize the liquid as it flows in the canal. In order to work out the total figure I would have to determine how many million gallons there were there.

1900 Chlorination would have to be done only in the portion of the year when nuisances occur. In other portions of the year the temperature is low, putrefaction is slow and reaeration is rapid and chlorination can then be omitted. But in times of the year when the temperature is high, putrefaction rapid and reaeration slow, the chlorine combines with odorous compounds, decomposes them and, in effect, lengthens the available time for reaeration; and in some cases of which I have read the reaeration is sufficient to prevent further development of nuisance downstream. It requires calculation to determine whether one application of chlorine would be adequate.

September 24, 1940.

A. M. BUSWELL

Direct Examination Continued by Mr. Naujoks

2214 From the flow in the canal shown in the testimony
2215 of other witnesses, it appears that one part per million treatment, figuring the chlorine at 2.14 cents per pound would cost $360 per day. In my testimony the last time I stated that in my opinion one to three parts per million would be sufficient to alleviate the nuisance and I am still of that opinion, assuming that the sludge is no longer discharged from the Southwest Plant. As to the point of application of the chlorine I would say that below the dam at Lockport would be the point for the principal chlorination and, in my opinion, an average of from two to three parts per million or from $720.00 to a little over $1,000 per day worth of chlorine would be sufficient applied at that point to remove odorous substances and probably over a period of not over 100 days.

The principal focus of odors, according to the testimony at any rate, appears to be in the turning basin

in Brandon Pool just above the locks, and it would seem entirely feasible to introduce chlorine directly at that point by means of a boat or barge. This is by no means a new practice. Swimming beaches and various places have been disinfected with what are known as chlora-boats. Such a barge to carry enough chlorine to treat as high as three parts per million,
2216 based on the volume of that more or less stagnant basin would probably not cost over $10,000. I obtained figures for the different pieces of equipment that would have to go on such a barge from the Wallace & Tiernan Company, dispensers of that type of equipment. Treatment of one part per million per day in that pool I figured at $50 worth of chlorine so that taking the whole situation in view, assuming chlorination below the locks at Lockport and a chlora-boat in the turning basin at Brandon Pool, it is still my checked opinion that an average of three parts per million per day should take care of the situation. Now the sludge from the Southwest Plant, according to records, amounts to 90 tons or 180,000 pounds per day and that by various means of estimation would amount to the equivalent of about 120 tons of B.O.D. per day, and figuring the other loads discharged into the canal the total B.O.D. load appears to be in the neighborhood of 400,000 pounds. If the sludge is removed or no longer discharged it would appear to relieve the load by about 25 per cent, so taking that into account it is my opinion that an average of 5 parts per million per day should
2216 take care of the situation with the sludge discharged into the canal, applied in those conditions and at the particular focal point of the nuisance.

September 24, 1940

ARTHUR M. BUSWELL

Cross-Examination By Mr. Clausen.

2250 I would not put in any chlorine above Lockport. I would not increase the amount of chlorine at Brandon Pool more than if I were introducing it both at the Southwest Plant and at Brandon Pool. My understanding is that the point of difficulty is Brandon Pool, Brandon Pool being defined as the entire water below Lockport to the Brandon Road dam. Three parts per million at Lockport with a flow of 3000 cubic second feet is figured at about 16,000 pounds per part per million. It would be about eight tons per part per million, or 24 tons I suppose.

2251 Q. (By Mr. Clausen) Now would this not have to be increased unless the sludge could be removed at Brandon Pool?

A. It is my opinion that the sludge in Brandon Pool has received undue emphasis from the technical standpoint of this problem. Sludge lying quiet, as it would, assuming that the flow was less than half a foot per second would undergo what is known as anaerobic decomposition, self-stabilizing, without the consumption of any oxygen. The quantitative evaluation of that would be a complicated problem, but in many cases flowing water, flowing evenly at a relatively slow rate, will show dissolved oxygen at or near the surface when sludge in the bottom will be in a decidely septic condition as shown by stirring it up.

The gas evolved from sludge in the bottom of a stream is ordinarily discharged intermittently in places, and in other places the gas will work up continually from the bottom without causing any rising of sludge; in other conditions you might have slow evolution of the carbon dioxide and methane, both of which are odorless gases, without the lifting of sludge.

2252 In referring to Brandon Pool as a stagnant pool, the turning basin of ~~Brandon Pool~~ would, from my observation, have very comparatively little flow. The amount of water required for locking boats would be about all the through flow that there would be in the turning basin. That is where I want to put in chlorine. 3000 cubic second feet does not flow through the turning basin of Brandon Pool every day. The dam is over at one side and the bulk of the flow is over at the dam and the turning basin is down below in a sort of a loop, and the lock is at the lower end of that turning basin. The only flow through that would be in the lockage water. I don't know how many cubic feet per second goes through there. I would have to take the lockage and multiply it by the amount of water taken. It is relatively small in proportion to the 3000 second feet.

2253 It is my understanding that it isn't a straight pool and it receives practically no water except rain water. Some of the testimony indicates some trade wastes discharged into that pool $50 worth of chlorine in 3000 second feet would be only about a seventh of a part per million. At 2 cents per pound $50 worth would be about 2500 pounds per day. One part per million would be 16,200 pounds per day. On the basis of the total flow $50 worth is only about .15 or 1/6th of a part per million. That wasn't my original testimony. My answer to the Master was based on an estimate of the volume of the comparatively stagnant turning basin, and is not based on any accurate survey, but 2254 it is an approximation of the volume of the turning basin.

Examination by the Master.

My testimony this morning was $1000 a day for about 100 days over all. But the questions, so far as I understand them, apply to my suggestion that chlorine be applied at a second point, namely, precisely in the turning basin where the water is comparatively stagnant and where one would expect the worst condition to exist, and it has a comparatively restricted volume of water, being much smaller than the total flow through; and there $50 per day would provide one part per million per day treatment if my estimate of the volume of that pool is anyway near correct.

2255 It is my very approximate estimate that over all one part per million per day for 100 days in this pool, and three to five parts per million at Lockport, depending on the condition above Lockport, gives an over all figure of $1,000. When I say "over all" I meant to say a summer's operation. Some days the amount of chlorine applied at Lockport might be much over three parts per million. The amount applied down in the turning basin might be much over one part per million, still over the 100 day period for any given summer it is my estimation that somewhere between $1000 and $1200 per day would be the chlorine cost.

I wouldn't want to be on record—stake my reputation—that that would be a correct statement of what

I figure would be the total chlorine cost to effectively meet the odor conditions complained of at Joliet and
2256 Lockport. I have, of course, been supboenaed in this case. I have not given a great deal of study to it, but I find that the amount of water which is requested to alleviate the condition would supply approximately one-third of the total B.O.D. In other words, the problem there is to alleviate the condition and it is my opinion that the introduction of chlorine in the amounts mentioned would very largely alleviate the conditions. I am basing that on testimony and extensive records where amounts comparable to that, and not very much larger, have been used in alleviating nuisances where the liquid was raw sewage with 8 to 10 times the B.O.D. of the water at Lockport. It is my opinion that this expenditure in removing the conditions complained of at Joliet and Lockport would be as effective as the oxygen from the additional diversion and I would stake my reputation on that.

Cross-Examination by Mr. Clausen.

2257 I don't know what the maximum is you would have to have. I know that some days, according to the testimony and many inspections, there has been no nuisance down there. There wasn't any Saturday morning (September 21, 1940). I took a drive down there Saturday morning. My estimate was based on equipment to got up to three parts per million per day in Brandon Pool. The average treatment I estimate not over one part per million per day down in the turning basin, in the Brandon Road Pool proper, and three parts per million at Lockport. My estimate is based on a review of a report on chlorination which showed the amounts used in many places where chlorine is used to alleviate odor and nuisance immediately below sewage treatment plants with inadequate preliminary treatment as, for example, simply screens or sedimentation, or something of that sort. To make an accurate calculation, based on what has been done elsewhere, you would have to compare figures as to dissolved oxygen, B.O.D., velocity of stream, amount of water coming in and other elements.

2259 All of those things would have to be balanced to permit me to say that I had reached an opinion on
2260 which I could stake my reputation. It would require an experimental program. It really should be done actually under the conditions of the canal. The reactions of chlorine with waste matter do not follow simple chemical laws. It is not possible to calculate the exact amount of chlorine under any given condition the way one would calculate the amount of lime required to soften water for example. One could not sit down and take the figures supplied by the Sanitary District as to B.O.D., dissolved oxygen, temperature conditions, tons of sludge deposited in this stream, size of the stream, velocity, amount of water coming through and then comparing all of that data with data available in reports of other situations reach a definite conclusion without actual experimentation with chlorine on the spot. If the information were available on what is known as to the immediate B.O.D. demand, or
2261 the chlorine demand or the hydrogen sulphide by ac-

tual chemical determination in this stream, a more reliable figure could be obtained; but it is certain that one part per million applied to the turning basis and three parts per million applied below Lockport would in a great measure alleviate the condition, because from 5 to 10 parts per million has been found to alleviate conditions where the B.O.D. was eight times or more the B.O.D. in the discharge into Brandon Pool. The data referred to a few minutes ago is available in this report "Chlorination in Sewage Treatment" marked "Mohlman Cross Examination No. 1" which is submitted in evidence and Mr. Ellms' testimony which I read, indicate 10 parts per million—7 parts per million in pretreatment and 3 parts per million post treatment on the raw sewage. The specific data which would be helpful would be hydrogen sulphide figures on Brandon Pool and immediate B.O.D. and chlorine demand.

2262 (The Master) "Dr. Mohlman says it is not available".

I am confident without further information (a) that the quantities of chlorine to which I have referred would substantially ameliorate conditions although I could not be confident it would eliminate all odors, and (b) that I am confident the quantities of chlorine to which I have referred would give as much amelioration as 3500 additional cubic second feet from Lake Michigan.

Cross-Examination by Mr. Clausen.

2263 I am the same person whose name A. M. Buswell appears on page 46 of Mohlman's Cross-Examination Exhibit No. 1. It may be I subscribed to the statement on page 20 under Item 5:

> "In the case of a stream containing extensive sludge deposit the effect of excess chlorine carried in a sewage effluent may be negligible in so far as the maintenance of anaerobic conditions is concerned." and I subscribed to the statement on page 30—"Investigators agree that fresh domestic sewage containing some dissolved oxygen is not offensive and that odors of an offensive nature are derived generally from decomposition in the absence of dissolved oxygen. When sewage solids accumulate a sludge decomposition sets in. Sludge banks, therefore, may prove offensive even though overlaid by a liquid containing some dissolved oxygen."

2264 I haven't made any estimate of the maximum amount of parts per million that I would introduce at Lockport. I think that some days none would be required and that would be the minimum. There probably would be days that would require more than three parts per million. The sewage treated by Mr. Ellms, as I understand it, had a B.O.D. of about 100 or 150 and the B.O.D. in this liquid is stated to be 25. Mr. Ellms treats this post-treatment with three parts
2265 per million. I would have to base my amounts of chlorine on summer conditions. I have had occasion to put chlorine in sewage at Balston Spa, New York. That was in 1914, 1915, 1916, 1917 as nearly as I can

remember. I used 50 parts per million there. That was an attempt to kill anthrax. Anthrax is dangerous to men and to cattle who might drink the effluent or plant containing the anthrax.

2266 So far as I am aware that is not a part of the Chicago problem. The $1000 to $1200 per day cost represents just the cost of the chlorine and does not include the cost of installation including the equipment and the handling of the chlorine. I have not determined the cost of the chlorine plant to be installed at Lockport or estimated the cost for handling the material.

Examination by the Master.

The chlora-boat that I spoke of would be used only at the Brandon Road Pool and there would be another installation required at Lockport.

Cross-Examination by Mr. Clausen.

2267 I have not made any tests but I believe it appears in the testimony that the drainage canal is devoid of oxygen in the summer for more than twenty miles—just below the Southwest Plant to Lockport. As I remember reading Mr. Andrew's testimony he said there was hard dense sludge of 3 to 4 feet, which would presumably be a stabilized humas. That above that there was some indeterminate amount of light, thin sludge. Lake Michigan water is used for dilution of Chicago sewage and Lake Michigan water is what you would call clean water when used for dilution of sewage. I don't know what the 5-day B.O.D. of Lake Michigan water is—not very much probably.

2268 The 5-day B.O.D. of any raw sewage I happen to analyze, say Urbana, Champaign or any other sewage, is all the way from 100, 150, 200; some sewages with considerable trade wastes or very heavy sewages run on up to relatively enormous figures. Ordinary domestic sewage probably is in the range between one and two to 300 parts per million.

(Mr. Clausen) "I have here a sample of settled Chicago sewage" collected last night (September 23, 1940) from the settling basin of the Southwest Treat-
2269 ment Plant—effluent—just settled sewage plus about 18 hours standing. The sludge is essentially the same as activated sludge. Now if I pour Lake Michigan water into the sewage, doubling the volume (Counsel pours Lake Michigan water into jug containing Chicago sewage) "does that result in reducing the B.O.D. to approximately half its original value in parts per million?"

A. "In parts per million, yes."

Q. "If I would pour enough to double this, wouldn't that reduce the B.O.D. again to one-half?"

A. "Yes."

Cross-Examination by Mr. Clausen.

2270 If Lake water reduces the B.O.D. by dilution and if you start from Chicago with that additional water your additional B.O.D. would be about half what it is now in parts per million or pounds per day. Yes, you could reduce the B.O.D. to that extent by chlor-

2271 ination in parts per million. With enough chlorine the reduction would amount to 50% to 75%. Three parts per million wouldn't reduce it that much. I don't know that anyone has ever tried chlorination in any such amounts. I allowed for this factor of dilution in my computation comparing chlorine and Lake Michigan water. Dilution from tributaries greatly aids in the self-purification of streams.

The experiment just conducted (by Mr. Clausen) of
2272 adding double the quantity of Lake Michigan water to the amount of sewage he had in the other container would be comparable to carrying clean Lake Michigan water down to Lockport and there mixing
2273 it with the effluent from the canal at Lockport. That would be assuming that what you mixed it with there was the same sort of stuff as this sewage which was in one of these containers here. I didn't make any accurate calculations in arriving at this figure. This
2274 figure is so far from the amount of chlorine that is required in treating untreated sewage, partially treated, undiluted sewage, that it is my opinion that this amount of chlorine will be more reliable in ameliorating the conditions than the diversion. There again I point out that I was subpoenaed and prepared myself on the question of chemical precipitation on which I had previously testified. The questions asked in connection with chlorination were answered extemporaneously and then further checked as to the quantities in answer to the questions set by The Master. It would seem elementary that at twice the present flow in the Chicago Drainage Canal through the locks the time of the flow to the Kankakee River in the pool be-

low Brandon would be about half what it is now. It would depend on the cross-section of the channel. That is, assuming that the channel has a uniform rectangular cross section all the way down, then the answer is obviously yes; but as I saw it, it is twisty and the banks have different configurations, and so forth.

2275 Yes, I considered the effect of dilution either at Chicago or downstream as a factor in the maintenance of anaerobic conditions of the stream above and below Lockport. I have been Chemical Referee for Standard Methods of Water Analysis ever since the fifth edition was issued. A Chemical Referee is one to whom questions of new or changed methods is referred for opinion.

2276 It was because of my objection (to matter quoted by counsel from page 79 of the 6th edition) that this method was discontinued. I have heard of a man by the name of W. E. Adeny and I believe he is quite a reputable man and has written some very eminent books on the principles of the practice of dilution
2277 method of sewage disposal. I do not subscribe to the statement (read by counsel from Adney's book, 1928 edition, page 33). Furthermore I am credited with disproving the correctness of that statement by numbers of chemists who have studied that reaction.

2279 When I stated the method of using nitrate in the Standard Methods was discarded I meant as a method of determining B.O.D. it was discarded.

2280 I testified that each part of nitrogen per million is equivalent to almost 3.5 parts of oxygen.

2281 At Balston Spa we used 50 parts of chlorine per million. I have forgotten the flow.

2282 The chlorine applied to the water of the drainage canal would be by dry feed or solution feed, whichever method is most feasible under the condition. I don't remember the flow at Balston Spa. All I remember is the dosage. I would have to know the flow in order to figure the pounds. (Document handed to witness) That was half a million gallons a day which would be approximately 4,000,000 pounds and at 50 parts per million would be some 200, 250 pounds a day.

2283 That was for a 500,000 gallon discharge. In gallons I suppose that would be about one five hundredth the size of this plant.

2284 No, I wouldn't add lime if I supplied three parts per million chlorine to the water of the drainage canal. Lime would have a purifying effect. Yes, I believe, considering the exhibit produced by Mr. Ramey that the time of flow from Damen Avenue to Brandon Road is approximately five days, and considering the testimony of Mr. Andrew concerning the sludge deposit in the drainage canal and Brandon Pool, that three parts per million of chlorine applied at Lockport would be sufficient to give assurance that there would be relief from the odors of the drainage canal and Brandon Pool next summer. Yes, I have done work elsewhere on the application of chlorine to sewage. Chlorine was used in the experiment at Dearborn, Michigan.

2285 The process used was chemical precipitation with magnetite filters and then in part of the experiment

chlorine was applied to the effluent. This was a thirty day run under my supervision. Iron salts, lime and waste paper was added to the sewage. I do not believe that is used now. I do not have any data on the present operation at Dearborn. I made several visits to a plant at Atlanta Georgia. Chemical precipitation was
2286 the process used there. There was a clay or marrol or cement dusts of various sorts that were added. The chemical plant, I believe, was not installed at Atlanta. My study of the Atlanta situation was entirely limited to the performance of the experimental plant. I don't recall comparison between those results and the plan finally adopted. There were a number of problems involved besides the question of efficiency or effectiveness of the treatment. Clay or cement dust is not used in any process of sewage treatment now in operation that I am aware of. I have investigated the addition of chemicals to Imhoff tanks. The Atlanta experiment was carried out in an Imhoff tank—in the sedimentation portion of an Imhoff tank.

2287 I stated that the B.O.D. reduction by chemical treatment ranged from 60% to 75%. Those figures were collected on a weak sewage of about 113 parts per million B.O.D.—about the same as the Chicago sewage. That is as good as any reported results that I am aware of. Chemical treatment does not produce nitrates. If a chemical plant were installed at the West Side the effluent would not contain any nitrates unless the original liquid contained nitrates. The activated sludge process would be capable of producing nitrates. On my theory that nitrates are of value in a drainage
2288 canal and with the continued discharge of partially

treated liquors, the nitrates from the activated sludge process would have a decided advantage. In my original testimony I said there would be no advantage in the nitrates if the effluent were discharged into a clean stream. Talking about the conditions as they exist now in the Sanitary District Canal, activated sludge 2289 would be preferable. I gave an estimate of the cost of this additional chemical treatment of from $5 to $10 per million gallons for the cost of chemicals, and an over all cost, operating, and so forth, of from $15 to $20 per million gallons. The use of these chemicals would not be inconsistent with the use of the activated sludge treatment. Both could be done.

2290 If the cost of the chemicals might be $5 to $10 per million gallons, assuming the flow at the West Side of 475 million gallons, that totals $2375 to $4750 per day for the West Side. You would have to have additional equipment at the plant and some operating cost on that equipment. Roughly the operating cost would be equal to the chemical cost so we would have to double those figures.

2291 On these figures it would be $6000 to $8000 a day. That doesn't include any capital cost. I testified that dissolved oxygen would be used up by the sewage in the canal first, and then the nitrates. The drainage canal would become deoxygenated just as quickly if nitrates were present as if they were absent.

2292 I don't recall testifying that in the presence of sludge deposits in Brandon Pool nitrates would not prevent septic conditions. On page 1894 of the record I testified: "There would be odors present if there were nitrates present at the present time. If there always had been nitrates present in sufficient excess, I wouldn't expect odors under those conditions."

2293 I think there is another phrase in there—at times when bubbles arise from the bottom. That would be a necessary qualification for a correct statement. If nitrates were present in the liquid there would be no odor from the liquid itself. I know only from testimony that there are sludge deposits in the drainage canal. Biological self-purification of the water would continue while chlorine was present. Purification organisms aren't susceptible to any such quantities of chlorine as I have specified here.

2294 We have found comparatively recently that 20 to 30 parts per million of chlorine is not sufficient to kill the type of organism which grows in activated sludge and flocks such as were in that bottle, and so forth. For the last twenty years my time has been only two-fifths teaching water and sewage chemistry. I am a chemist—not an engineer. I have never designed a sewage treatment works. I have operated several experimental plants running as high as 100,000 gallons per day capacity, designed and operated them—not built them—for a year, two years.

2295 This was at Urbana in connection with the State Water Survey and so forth—experimental units. I have never been in control of chlorine applications at any sewage plant—I have in a water plant. I have never applied chlorine to stream cleaning under my personal supervision and observed the results.

September 13, 1940

Direct Examination.

2086 JOSEPH W. ELLMS, Commissioner of the Division
2088 of Sewage Disposal in the Department of Public Utilities, Cleveland, Ohio. I took charge of sewage disposal plants of Cleveland in 1923 and except for a per-
2089 iod of six months I have been in continuous supervision of those plants.

There are probably a number of methods available to the State of Illinois without an increase in the diversion of water from Lake Michigan by which there can be a decrease in the material which is now, or has been, entering the canal and passing into the pools farther down.

2090 Since this material undergoing decomposition in the canal and in the pools beyond might give rise to odors from decomposing organic matter, therefore the principal remedy is to keep out as much of that material as it is possible to keep out and to provide at the treatment plants as much purification as it is possible to provide. This might be done in a number of different ways. One, by the use of a larger quantity of air at the activated sludge plants which might produce a larger quantity of residual dissolved oxygen and also possibly by the presence of certain amounts of nitrates which become available if the dissolved oxygen were depleted. The ordinary sodium nitrate would provide about one pound of oxygen for every 1.77 pounds of nitrates or, to put it another way, one part of nitrogen as nitrate will produce about 3.4 parts per million of oxygen. The effluents of the sewage disposal plants at Cleveland have received treatment

with chlorine for the past 17 years. With the City of Cleveland discharging the effluent of its disposal plants
2091 into the same body of water from which it draws its water supply, it was used as a sanitary protection, to a certain extent, to the water supply. However, the orders of our State Health Department were that we should also use chlorine in connection with keeping the marginal waters in as clean a condition as possible during the bathing season; therefore the use of chlorine has been in force for this long period of time. The first plant was only a partial treatment plant, being an Imhoff tank plant; the second plant built five years later in 1928 was a trickling filter plant and an Imhoff trickling filter plant, and discharged its effluent to the Cuyahoga River. The latest plant is the activated sludge plant which is on the lake front the same as the Westerly Sewage Disposal Plant, that is, the partial treatment plant.

These original plants have all been enlarged and quite a number of different processes have been introduced in addition to what they were originally. We use chlorine at two of them, but the plant whose effluent is discharged into the Cuyahoga River is not treated with chlorine, but during the summer season—the bathing season—between the first of May and the middle of September chlorine is applied to the effluents of the two lake front plants.

2092 From the experience we have had in controlling odors it is my opinion that chlorine has a beneficial effect upon odor nuisance, particularly those odor nuisances that might be derived from hydrogen sulphide —development of hydrogen sulphide. We had a bad

case in one of our plants which received a trade waste from the rayon industry which contained large amounts of acid sulphates and sulphides. They were productive in our Imhoff tanks of considerable hydrogen sulphide and gave rise to a certain amount of nuisance in the immediate vicinity of the plant. The use of chlorine in the influent to the plant where it flowed through the flowing compartments of the Imhoff tanks reduced the amount of this gas to practically zero, but it didn't reduce the odor because the odor came from other parts of the same tank. That is, it was evolved from
2093 the so-called gas vents and, therefore, it did not produce any effect on the reduction of odors. We did find that there was a reduction in the sewage flowing through the upper flow chambers of the Imhoff tanks so that for a reduction or elimination of hydrogen sulphide chlorine is a very effective agent.

As to the effectiveness of the use of chlorine to control odors complained of in the Illinois Waterway and particularly at Brandon Road Pool I believe that they could reduce, perhaps eliminate, the odors from hydrogen sulphide that may be produced as a result of the decomposition of organic matter in the Brandon Road Pool. The continuous feeding of that pool, however, with partially decomposed organic matter is going to provide a continuing source of hydrogen sulphide which is, perhaps, the chief cause for complaints at, in and around that pool. As to the effectiveness as an ameliorating measure of keeping the sludge of all of the several sewage treatment plants out of the
2094 canal after January 1, 1941, I am firmly convinced that that is the hope of those operating the treatment plants

and I also believe that if such sewage solids are kept out, or diminished to a minimum there will be no further trouble in the Sanitary District Canal or any point downstream in the pools below. As to the effectiveness of the use of chemicals to the influent of the West Side Sewage Treatment Plant as a means of increasing purification and thus taking a load off the canal, the use of precipitating chemicals in connection with sewage treatment wouldn't increase the purification in the Imhoff tanks and would produce an effluent which contains somewhat less organic matter than what now results from plain sedimentation, but it would only be a partial ameliorating condition or provision if such chemicals were used. (See correction of this statement by witness at page 2296 of record). If the expectations of the operators of the Sanitary District sewage disposal plants are carried out I think conditions in the canal and in Brandon Road Pool in the summer of 1941 will be better than conditions were in the canal and in Brandon Road Pool in the summer of 1940.

2095 At Cleveland we have been using during the present summer (1940) what we call pre-treatment, or rather pre-chlorination and post-chlorination. I mean by that in this particular plant—well in both plants for that matter—that chlorine is applied to the influent of the plant as the term pre-chlorination and to the effluent in the plant as post-chlorination. At one plant we have been using 3 to 4 parts per million of chlorine in pre-treatment and in some cases as high as 7 or 8 parts in the post-chlorination treatment which,
2096 in this case, is the partial treatment Imhoff tank

treatment plant. We are using 2 to 3 parts at the other activated sludge plant and we are applying about 2 parts and getting very remarkable bacterial reductions in the effluent from the activated sludge plant. In all our plants we are using 5 to 6 tons of chlorine per day. In the course of a season when we had less complete treatment of the sewage, we used from 4 to 500,000 pounds at the plant where we had the least amount of treatment and about 2 to 300,000 pounds at the other plant and that was in the period of about 100 days so that the chlorine contracts have generally run from about a million to a million two hundred thousand pounds for a season, because it wasn't used at any other season except during the bathing sea-
2097 son. The quantity of sewage passing through those two plants would run about probably 125 million gallons a day. That is about one-sixth the 900 million gallons at the West-Southwest plants here.

September 24, 1940

Cross-Examination.

(Joseph W. Ellms)

2296 May I correct one error in my direct testimony. On page 2094, the answer to the question, second paragraph, "The use of precipitating chemicals in connection with sewage treatment", it says "wouldn't". Of course, it means would increase the precipitation in the Imhoff tanks. It is "would" of course, because chemicals added prior to passage to the Imhoff tanks would increase the precipitation.

The water purification plant at Cincinnati is a plant
2297 of 112,000,000 gallons capacity daily. At the time I operated that plant between 1907 and 1918 we used sulphate of iron and lime for coagulating the river water and we used from a grain and a half to perhaps a grain and three-quarters of sulphate of iron and some three-quarters of a grain, probably, of lime per gallon. In round figures that would be in the neighborhood of 286 or 300 pounds per million gallons. If we treated 60 to 70 million gallons it would be 60 times that amount. It would be in the neighborhood of 9 or 10 tons, I think, if I have the correct figures in my head. Those chemicals were applied in a solution or suspension. The sulphate of iron was applied as a solution and the suspension of lime was run into dilution tanks and changed to a lime water solution.

2298 We did not employ a mixing basin. We had no mixing tanks. The chemical solutions were applied to the raw water just prior to their entrance to the settling basins. We had two coagulating basins into which the treated water was passed and through which it was passed from there to the filters. We had at this plant 28 sand filters, each having a capacity of about four million gallons a day on a basis of 125 million gallons per acre rate of filtration. The valves were operated by electric motors. Other than that the usual
2299 methods of operating were the same as in all rapid sand filter plants, with the exception, perhaps, that there was first introduced a high velocity method of washing the sand filters by sending the wash water up through the sand bed at such a rate that the sand was floated. Yes, I think it is customary now days to

provide both mixing and coagulating basins ahead of the sedimentation basin, and one of the Cleveland plants was provided with so-called baffled mixing channels which took and flocculated the treated water prior to its discharge into the settling basins. On the other hand the plant that was built while I was Consulting Engineer for the city did not contain and pre-mixing channels but did contain what was known as the hydraulic jump mixing flume which gave a very rapid mixing action to the water to be treated. At both filter plants in Cleveland we have quite ample storage for our chemicals. We have about 1300 tons capacity at one plant for sulphate of alumnia and at the other plant there was very large bins provided for the lime and sulphate of iron which were first used
2300 there but which are not now used, since we have substituted sulphate of alumnia for the iron sulphate and lime which we used between 1918 and 1921 or '2. That would take care of probably three months supply. The capacity of the Baldwin plant at Cleveland is 165 million gallons per day. In that plant we used a solution feed for the sulphate of alumnia by dissolving the solid material and diluting it with water in tanks and feeding it on a solution base. That is the only chemicals used except chlorine. Approximately 4 to 5 tons of chemicals were used per day. This plant did not have a mixing basin.

2301 As I explained before it contained this hydraulic jump mixing flume and following that we had settling basins. These were installed because they were regarded as necessary. Expressed in days for which the supply is adequate there is four months storage at the

Baldwin plant for chemicals. In a general sort of way, I suppose, the application of chemicals such as lime and ferric chloride to sewage on a large scale would follow along the same general lines as for water purification; that is, as to the methods of applying and handling chemicals and storage and installation of
2302 mixing and coagulating devices to be used, or the effectiveness of the amounts of coagulating chemicals that might be applied upon the particular sewage being treated.

In my practice as a water works engineer the largest amount of chemicals I have had to provide per day, I do not believe could be over ten tons. In my practice I have applied chlorine to water as a solution of the chlorine gas in water. It is applied to sewage in the same way. At one of our plants we have also applied it as a gas combined with air, more for the purpose of separation of grease and the suppression of odors rather than for its chemical effect otherwise. Yes I have used the dry application direct, except as I just mentioned in connection with air. Otherwise it has always been by passing the gas into the water and dissolving the gas and forming what we call chlorine water.

2303 The difficulty, I think, of applying dry chlorine direct is the liability of gas escaping to the surface of the water, particularly where depth at which it is applied is insufficient to dissolve the gas prior to its rising to the surface. There has been some indication of that in the plants that we are operating, particularly in conduits which were shallow and where the gas apparently escaped to the atmosphere before it could be dissolved in the sewage. Yes, I have in the application of dry chlorine, run into the formation of so-called chlorine hydrates which would tend to clog up the outlets of the distribution grid. Under low temperature conditions that is quite liable to happen. It, however, is usually quite easily controlled by heating the water used to dissolve the chlorine gas. We are applying chlorine at two sewage plants only in Cleveland and we are applying it to the influent to the plants in each case and to the effluent as well. The quantities applied to the influent will run from 3 to 5 parts per million and to the effluent, in one case, 4 or 5 parts per million, and in the activated sludge plant effluent only 2 to 3 parts per million.

2304 One part per million is equivalent to 8.34 pounds per million gallons, so that any of those figures multiplied by 8.34 will give the number of pounds per million gallons. In Cleveland it is applied for the purpose of preventing any odors which may arise from sewage entering the plant and in the effluent from a plant it has been applied to keep down the pollution of the lake water in the vicinity of the bathing beaches of Cleveland and that has been carried on through about 100 days during the summer months, or during the bathing beach season. To protect the men that put chlorine into the water, we have always provided water with hose connections so that if any break occurs it can be flooded with water immediately, and the men are provided with masks so that they are able to work in an atmosphere that contains some chlorine.

2305 We provide special ventilation in some of the buildings so that fans will suck out air that may be contaminated with chlorine gas. When I testified previously as to the value of chlorine in ameliorating the conditions in the Joliet Pool I don't think I knew exactly the time elements of flow from the Stickney Plant—that is, the West Side Plant—to Brandon Pool. I assumed it was in the neighborhood of 3, 4 days. I don't think my answer would be any different if I assumed the time to be from 4 to 4½ days to Lockport and then three-quarters of a day from Lockport to Brandon Pool or Brandon Road. The Westerly plant at Cleveland was a partial treatment plant and consisted only of screens and grid chambers and Imhoff tanks and still is operated in that way except that the sludge now is really digested sludge taken from separate digestion tanks to which the raw sludge has
2306 been pumped from the settled sludge in the Imhoff tanks. In other words at the present time the Imhoff tanks are not operated as Imhoff tanks; they are merely settling basins through which the raw sewage is dropped out and pumped to the separate digestion tanks with floating covers, which enables us to obtain the methane gas which is needed for incineration and which can be collected from such tanks and cannot be collected from the Imhoff tanks. For a number of years the sludge from that plant was discharged into Lake Erie through an outfall conduit. The reason for that was that we had no other place to put it. We had no treatment of that on land; there was no area where we could treat it. In later years we arranged to handle that sludge as you are doing now.

2307 It took us 14 years to do that. For that period of 14 years the digested sludge was discharged about 2500 feet out from the plant through the outfall into the lake. No 5-day B.O.D. determinations have ever been made as routine tests on sludge at the Cleveland sewage works. I do not know of any sewage works in which 5-day B.O.D. determinations are made on sludge. Prior to the installation of the Southerly plant in Cleveland the sewage in that plant was passed through Imhoff settling tanks and the effluent from the plant was treated on trickling filters. The sludge was dried under glass in sand drying beds, except that which we were unable to handle on the drying beds. Prior to the operation of the sewage works the sewage went into the river.

2308 The so-called Southerly interceptor which collected sewage from the southerly district was completed at the same time that the treatment plant was built so that all the sewage which has come through that Southerly interceptor so far as I know has always been treated. Before they had the interceptor the sewage flowed through the various trunk sewers to creeks or to the Cuyahoga River. The river was pretty foul, there is no question about that. I wouldn't be a bit surprised if it contained sludge deposits, although I don't know it. That then washed out into Lake Erie at time of storms. Lake Erie is used as a source of drinking water for Cleveland.

2309 The first intake was directly north of the river mouth. The second intake was about a mile and a half from shore. The third intake was about four and a half miles from shore. Those large basins in which sedimentation takes place at filter plants like Cincinnati or Cleveland, or in which sedimentation is accelerated by coagulating chemicals, must be drawn down and the sludge washed out under hose pressure; two under drains carry it away to some disposal plant. In addition to these hydrants and fire hoses we also put men in with rubber boots to squeege or shove the sludge along to the outlet of the basin. I don't know that any measures were taken to relieve the nuisance in the river prior to 1928, that is, prior to the time when the plant started operating.

2310 The efforts of Cleveland and the general metropolitan district has been such as to coordinate a series of trunk sewers and interceptors in such a way that the collected sewage might be taken to the three plants which now dispose of it, two on the lake front and one in the Cuyahoga River Valley on the Cuyahoga River. The problem of the low level sewage along the Cuyahoga River is not as yet entirely settled. Not even designs have been made for interceptors which will have to be built to collect the sewage which is produced in this industrial area. Chlorine was never applied to the river that I know of, or to the sewers entering the river. The only application of chlorine to the sewage I know of has been at these plants since about 1922. Yes, we applied chlorine to the effluent of the Southerly plant during one year in the summer months because of the septic condition in which the sewage reached the plant and in order to reduce odor troubles we applied chlorine to the raw sewage as it entered the plant.

2311 That was for controlling odors in the plant and not in the river. Construction was commenced on the Southerly Plant about 1925 or 1926. It was completed in 1928. I am not sure when the first contract was let. There was some land bought down there and some excavation made prior, I think, to 1925 or '6, but I wouldn't be able to say just when. It was finished in the late summer of 1928. The approximate cost of the Southerly Plant was three and a half million dollars. We have a chlorine plant at the Easterly activated sewage sludge plant in Cleveland which has six 4,000
2312 pound units for the evaporation of the liquid chlorine and its conversion into a solution with water. These units consist of an orifice apparatus and is known as the vacuum type of chlorine feeder. The modern machines are rather elaborate in their controls. A great deal or hard rubber piping has to be used on account of the corrosive character of the solutions and the gas itself. The chlorine that is applied in this particular plant is actually some five or six hundred feet away. We purchase it in ton containers; that is, in cylinders containing one ton of chlorine. These are placed on a large platform scale and the quantity of feed or rather the gas pressure in these cylinders forces the liquid a distance of some several hundred feet and to a higher elevation into the evaporators, so-called. These evaporators being steam-heated keeps the entering liquid in gaseous form because it is being forced up to those machines as a liquid. The solution then is fed at the various points at which we apply it, and that is carried in hard rubber piping, I guess, to the points at which we apply the gas.

2313 I think it would be very desirable to have a plant that is going to use 25 or 50 to 75 tons under laboratory control. I should think it best to have a man—a chemist—on the job all the time. In mixing water with chlorine you would not necessarily have to have drinking water. We could use the best effluents from our sewage treatment plants, like the trickling filter or the activated sludge plants. The only thing that has to be avoided is suspended material which might clog water orifices or upset valves or something of that kind. It needs clear water, that is about all it needs. If the water were partially polluted there would be a certain amount of demand on chlorine.

2314 If the object were to obtain at the earliest possible time the use of a chlorination plant under municipal conditions as applied to Cleveland or the Sanitary District of Chicago, ready for application of, say, 50 tons of chlorine per day, and contracts were diligently prosecuted, I imagine that that can be done in the course of six or seven months. That is from the time when the contract is let. I imagine you would want a couple of months to plan the work and advertise for bids and let contracts. For a 75 ton plant it would require, perhaps, a month or a month and a half longer.

2315 A chlorine plant to apply 50 tons per day could I think be built and equipped for a sum considerably less than $300,000. That would be everything. If deliveries could be depended upon enough chlorine storage would be provided by the amounts used in 15 or 20 days. I don't look at this problem in the same way that I would look at a problem involved with a drinking water supply. This is a preventive measure that is supposed to avoid odor nuisances and gaps in treatment, I doubt, would have any very noticeable effect unless there was too long a period.

2316 Chlorine could probably be obtained cheaper in either 15 or 30 ton tank cars. I have used 30 ton tank cars but generally we allow smaller quantities which we use at the sewage plants or at the water plants. We use the 15 ton tank cars. I don't know of any works in the United States using such quantities as you have mentioned for either water or sewage. If you used the tank car as a storage while it is being applied it would, of course, be necessary to have the railroad siding close to the point of application. On the other hand there is no reason that tank cars can't be
2317 emptied into permanent tanks set at some point where the liquid could be stored and with the gas pressures which exist above the surface of that liquid they might be able to force the liquid chlorine to quite some distances. In fact, that is what we do at the Easterly sewage plant at the present time. Storage tanks would probably be required as a necessary part of a 50 ton or a 75 ton plant since tying up tank cars is rather an expensive proposition for the manufacturers, and I doubt if they would care to enter into contracts where those tank cars would be held for any length of time, although those tank cars are leased by us without any demurrage charges, so that it is possible if you use the tank car very fast and at a point where the chlorine could be drawn directly, a matter of holding in use these tank cars there for storage tanks from which to deliver the chlorine would not be prominent.

2318 The only guide I have on the cost of a plant sufficient to supply 50 tons is the chlorine plant at our Easterly plant. That has a capacity of 12 tons a day and cost about $85,000. Of course if it is in direct proportion for a 50 ton plant it would be four times that amount which would be over $300,000, but that has some features that, perhaps, would not be required for a temporary plant such as might be built or made use of in connection with chlorination of that Brandon Pool or the waterway in general or at the plants themselves, so I said perhaps less than $300,000.

2319 The Cuyahoga River, about which I was examined, is a small stream. It has a flow that ranges probably all the way from 4,000 to 40,000 or more cubic feet a second. Back five or six miles from the mouth it is really a sort of an estuary—a lagoon of Lake Erie. Above that point it passes through a country district and receives some pollution from an effluent from a sewage plant at Akron, Ohio. So that it isn't entirely a clean stream above the point of discharge of the effluent from our Southerly plant, which is about 9 or 10 miles from the mouth of the river. I don't know exactly, but the river must be some 40 or 50 miles in length, total, but it is a very crooked stream and the larger vessels have a great deal of difficulty getting up the river. We have been making some improvement in cutting off bends in the river in the last two years and changing bridges, but the navigable portions at present, even for the large ore boats, is only about five miles from the mouth. The nuisance, as far as the Cuyahoga River is concerned, extends as
2320 far as the metropolitan district of Cleveland—a dis-

tance of about 10 or 12 miles. For that distance there was a nuisance condition resulting from the discharge of untreated sewage into the stream and also from trade wastes. That nuisance condition still obtains today. I don't think it is very much different today from what it has been. Last week we took a series of samples of the river.

2321 There was dissolved oxygen in all the samples taken from above our Southerly plant and below the plant for a distance of about 4½ miles. From that point on there was no dissolved oxygen in the water at all, another distance of 4½ miles. Sewage treatment has improved in Cleveland in recent years, particularly on the lake front. We have three districts called, Westerly Sewer District, Easterly Sewer District and the Southerly and combined with the Southerly what is now known as possibly the Southwesterly. Now these do represent an increase in the treatment and they represent a decrease, probably, upon our general lake pollution, but the valley district has never been provided with any interceptors so that the sewage from these industries and from some of our trunk sewers still flows into the creeks which discharge into the river or into the river directly. The effluent from the
2322 Southerly plant goes into the river. That effluent is from completely treated sewage, but the other sewage to which I have referred, which does not come through our plant, is completely untreated. Week before last I was visiting with Mr. Howson the Brandon Pool and was down to the dam at the lower end of the pool. That is all I have seen of the conditions excepting what can be seen out around here. I stood on the

gates at Brandon Road Pool and crossed the bridges at Joliet. From that examination, I imagine looking at it, that the Brandon Road Pool is in better shape than our Cuyahoga River. The Cuyahoga River is 300 or 400 feet wide, perhaps wider, I don't know just how wide. The velocity over the distance we are talking
2323 about is very low, indeed, because as I say, up to four miles, as far as navigation goes, about all that ever flushes it out is a flood in the stream from the back country, that is merely a lagoon of the lake. From the few (samples) that we took last week the B.O.D. of the water in that stream near the plant range from 3 to an average of about 15 or 18 or 20. The lowest ones occur apparently very close to where considerable iron pickling from the steel industry gets into the stream which, of course, absorbs all the oxygen immediately. It isn't a biochemical oxygen demand; it is a chemical satisfying of the ferrous iron which is present in the pickling. That would not exactly afford a satisfactory comparison with the Illinois Waterway at Joliet or the Brandon Road Pool because in this case, I think that the bio-chemical oxygen demand and the low dissolved oxygen is more likely
2324 to be due to industrial wastes, a larger proportion of it at least, than to raw sewage. I don't think that the odors down the Cuyahoga River are so noticeable. Of course it is not a residential district at all; it is an industrial district entirely. While there may be more or less gas, I guess there is more or less sludge in the lagoon or the lower portions of the river, there is little chance for absorption of oxygen from the air on account of this extensive oil slick and probably there

is some gas-lifted sludges from the bottom deposits. I imagine there is some accumulation of sludge in that stream, although I couldn't say. It has to be dredged every few years in order to keep the draught for large vessels going up. That stream runs right through the business district of Cleveland and the industrial district south of it. I referred to it as a foul stream some
2325 time ago in my testimony and I don't think I withdraw the name. The trouble there is due to a combination of sewage and industrial wastes and oil scum. I hardly think you could justly draw any comparison between that stream and this waterway. As far as your canal and your waterway are concerned you are dealing entirely with a large sanitary sewage flow. Pollution and the deoxygenation of your water is due to organic matter. I don't know to what extent trade wastes enter into the situation but it is always my impression that they were minor; that is, I mean iron and steel trade wastes, although the starch industry and other industries of that kind do add a heavy organic load.

2326 I wouldn't consider the Cuyahoga River a health menace unless the people insisted on bathing in it, or something of that kind. It is a foul stream as far as these trade wastes that enter it and so far as the oil and the scums from the refineries. It has ruined its surface and they lay there in a stagnant condition. I would not consider the Sanitary District Canal a health menace in the way it is used, so long as it is not used for drinking or for bathing.

2327 If it were possible to do so I would say it would be advisable to apply chlorine in the stream or canal before septic conditions had developed, because very much less chlorine probably would prevent septicity if it could be done before rather than after. If chlorine is to be applied to the Sanitary District Canal, I think it would be very helpful if it were applied in several places rather than one. I think it would be more effective.

2328 Q. (The Master) "If it (chlorine) wears off in half an hour to an hour as some testimony here given, as I understood it, indicated, what is the advantage of applying it upstream, say at the Southwest Side Plant instead of waiting to apply it at Brandon Road Pool.

A. I don't know whether I can explain to you exactly what I think takes place when chlorine may be applied to a liquid that contains organic matter. My theory is that the application of the chlorine to such a liquid as a sewage probably kills off a certain amount of the organisms which are at work to produce septic conditions. It may not kill off, and probably does not kill off, all of these organisms which are productive of oxidation conditions through bio-chemical activity, so that you may have a condition in which there is an arrest of the decomposition of organic matter due to the addition of chlorine to the sewage and to its effect that it may have upon certain organic compounds, and yet there still continues an activity which is along lines of oxidation which would 2329 have a normal effect to reduce the biochemical oxygen demand. Take in the case of trickling filters; you can apply chlorine to trickling filters and yet you will have oxidation conditions in your effluent, even probably nitrites and nitrates."

The way I look at it, the administration of chlorine would have a tendency to arrest the operation of the poisoning conditions, the septic conditions. If it arrests it to a certain point and then wears off—ceases to be operative—it still has arrested it up to that point —to a half way point and then the chlorine ceases to be effective, but still you have accomplished something. The septic operation is half dead. That would be a reasonable method of putting it.

May I briefly recite an experiment that I carried on some 30 years ago? I took a dozen or more samples of water, determined the number of bacteria which they contained, and then I treated those ten or a dozen beakers with different amounts of chlorine, ranging
2330 from one-tenth or two-tenths of a part up to several parts per million chlorine. Then I allowed those to stand with cotton stoppers in them so they couldn't get contaminated with the air, and opened them one-half hour to an hour, two hours, three, four, forty-eight hours, up to ten days, and here is the general result which was obtained: That whenever the residual chlorine in that water disappeared, then bacterial forms began to appear, although up to that time, so far as our culture methods were concerned, there were no bacteria present, and yet there they came to or whatever happened to them I don't know. When they revived I was no better off than if I had never put in the chlorine and the net result would be that I was better off only while the chlorine was operative. That is true as to odors also.

2331 If you can prevent septic conditions in the pool you won't have odors.

TESTIMONY OF LOUIS F. WARRICK.

2100 My name is Louis F. Warrick and I am the State Sanitary Engineer of Wisconsin. I was graduated from West Virginia University with degree of bachelor of 2101 science in chemical engineer. I obtained a degree of master of science at Cornell University. In 1924 I was Assistant Sanitary Engineer of the State of West Virginia. In 1925 I went to Wisconsin to become Assistant State Sanitary Engineer. I became State Sanitary Engineer of Wisconsin in 1927.

2102 I have had occasion to make use of chlorine in water purification and sewage and industrial waste treatment. It has been commonly employed for a disinfection of sewage and has been used very extensively 2103 in the water purification field. Chlorine has been used to a considerable extent in the prevention or reduction of odors and has been very beneficial in overcoming serious nuisances. Chlorine does play a part in basic stream clean-up program in the State of Wisconsin.

2104 When I came to Wisconsin the sewage from our municipalities was discharged through 60 sewage treatment plants. Less than 30 per cent of the population served by public sewers in 1925 passed through sewage treatment plants. We now have 89.7 per cent of the sewered population of Wisconsin taken care of by at least primary or the basic chlorine treatment. Sixty-four per cent of that population is now receiving complete treatment. There are a number of states in the Midwest, Minnesota, Iowa, New York and other states that have employed chlorination as a part of their programs of stream clean-up.

2105 I have attended all of the present hearings before the Special Master in connection with the order of the Supreme Court of April 3, 1940, and I have heard the testimony of Dr. Buswell, Mr. Howson, Mr. Enslow and Mr. Ellms relative to the effectiveness of the use of chlorine in ameliorating or remedying the conditions complained of in the Illinois Waterway and I agree with their conclusions. I believe from experience that there would be a decided beneficial effect
2106 in the application of chlorine to the Illinois Waterway. It is my opinion that an increased amount of air at the several activated sludge plants in the Chicago Sanitary District as an aemliorating measure would have a beneficial effect. I have had occasion to make studies of the pollution conditions in the streams in the State of Wisconsin, and it has been
2107 my observation that water that has been depleted in oxygen through the introduction of wastes, when such waters pass through rapids or cascades, that there is an introduction of a very appreciable amount of oxygen. It is very common to expect that from 50 to 75 per cent of the saturation value at those temperatures may be realized through the passing through rapids or cascades or aeration spillways. I believe that the use of the cascade near Lockport at Stony Gates as ameliorating or remedying the conditions complained of would be beneficial from the point of view of the introduction of additional oxygen.

2108 I think the discontinuing of the discharge of sludge into the Sanitary Canal as an ameliorating measure is probably the most important of the items that have been brought up. A well receiving surface drainage

2109 or seepage is regarded as unsafe. Any well in the vicinity of the City of Joliet, Illinois used as a source of domestic water supply, if it receives any seepage from the Sanitary Drainage Canal or from the Brandon Road Pool, would be regarded definitely as unsafe. It is my opinion that there is no measureable difference in the hazard to the health of the people using wells in the vicinity of Joliet as a source of domestic water supply if such well receives seepage from the Sanitary Drainage Canal or Brandon Road Pool whether the flow is 1500 cubic second feet or 5000 cubic second feet.

LOUIS F. WARRICK.

Examination by the Master.

2110 The quantities of chlorine used in one treatment plant roughly would be from three to five parts per
2111 million gallons for a treated effluent, from 5 to 10 parts for a primary treated effluent with settleable solids removed and from 10 to 20 parts for a screened or raw sewage, possibly having a still higher require-
2112 ment in order to disinfect or control odors. In order to make those figures comparable to other figures given here by other witnesses you would multiply by 8-1/3.

LOUIS F. WARRICK.

Direct Examination.

2119 In the bracket 3 to 5 parts per million for completely treated sewage, this is equivalent to from 25 pounds to 42 pounds of chlorine per million gallons.

In the bracket 5 to 10 parts per million of chlorine, this is equivalent to 42 pounds to 83 pounds per million gallons. In bracket 10 to 20 parts per million of chlorine for screened or raw sewage, this is equivalent
2120 to 83 pounds to 167 pounds per million gallons. These amounts are necessary for disinfecting and deodorizing these effluents. The strengths of sewage will determine largely the chlorine demand. Generally speaking the chlorine demand roughly parallels the oxygen demand. The amount of chlorine for counteracting the effect of hydrogen sulphide is in ratio to their combining weights.

LOUIS F. WARRICK.

Cross-Examination.

2226 I have been active in state sanitary engineering work since June 1924. A chief engineer of a state board of health is both an executive and an advisor.
2227 My first visit to the Lockport Power Plant and Brandon Road Pool was in 1927 or 1928. It was an incidental trip. It is true that if there was a velocity
2228 of a half a foot per second or less in the main channel, deposits would occur under present conditions. Such deposits would exert an oxygen demand and chlorine demand. If chlorine were introduced at the Southwest Works in the effluent in the amount of three parts per million several facts would enter in as to how long such a dose would last. The chlorine demand that existed at the time; the amounts that would be taken up by the sludge is influenced to a
2229 certain extent by the temperature. It might last a

half hour. It is impossible to state unless you know
2230 the specific conditions existing at the time. Possibly
2231 under summer conditions that chlorine residual would
exist half an hour to an hour. The most important
would be removing sludge at the source. As an ameliorating
agent, chlorine might be applied effectively in
addition to overcoming odor nuisances and the like.
Chlorine is not applied at Milwaukee for disinfection
of the effluent. The effluent is diluted in Lake Michigan
at considerable distance from the point of intake
2232 of the public water supply. Madison, Wisconsin has
used chlorine at the sewage treatment works for sludge
conditions; incidentally, odor control. In reports on
sewage plant operations nitrate oxygen is not included
in the percent reduction of B.O.D. I do not permit
any sewage plant operators to report the oxygen in
nitrates as part of the reduction of B.O.D.

2233 Redirect Examination by Mr. Naujoks.

With reference to a 50 to 75 per cent saturation restored
to the water by aeration, cascades or spillways
we have had occasion to determine how much oxygen
was restored to the streams above and below points
of aeration. There has been considerable attention
given to cascading, aeration spillways, to increase the
2234 turbulence of the water in order to permit rapid absorption
of oxygen in the atmosphere. In the initial
survey that was made, there was a considerable depletion
of oxygen due to ~~the sewa~~ge and industrial wastes
from the Twin Cities that in passing downstream

2235 toward Hastings rapidly removed the oxygen from the water. The results of these tests show that as the oxygen in the water above the dam becomes more nearly depleted, the rate of restoration of the oxygen to the water goes up. The head above the dam was the most important factor. The beneficial effect of that aeration is brought out in the oxygen profiles of the
2236 stream, an oxygen profile being the dissolved oxygen taken at different points progressively downstream and a line drawn through those points gives you an oxygen profile of that stream. The usual procedure is to lower the pool level since the navigation season is closed. This oxygen recovery is shown very markedly by the sudden rise in the dissolved oxygen content at the station below Hastings Dam.

Examination by the Master.

Chlorine administered at the points to which Mr. Clausen referred would wear off in half an hour to an hour. During the summer conditions the chlorine is taken up at a more rapid rate and you would have
2237 a very rapid depletion of the available chlorine as measured by the residual chlorine test as the flow proceeded downstream toward Lockport. In order to make chlorine constantly effective as a deodorizer you would have to apply it at several points in order to maintain a continual residual chlorine content, depending upon the flow. You can chlorinate below the amount necessary to take care of the chlorine demand and have an ameliorating effect. An example is a slaughterhouse in a residential neighborhood. We heavily

2238 chlorinated at the slaughterhouse, added enough to suppress the odors through that area until it reached a larger diluting body of water and that solved the problem. That was considerably less than the chlorine demand. Chlorine demand is the amount of chlorine that is taken up, as a ten-minute contact period of the chlorine with the particular waste or water. The amount that is used up is the chlorine demand. The effect of the chlorine dose as a deodorizer may continue beyond that period. There is no precise way of determining how much beyond that period the effect
2239 would continue. It would be just a matter of the expert opinions as to how much chlorine would be required. It would depend upon the strength of the pollution, degree of pollution in the stream.

Recross-Examination by Mr. Clausen.

It is difficult to state exactly to what extent the operation of cascades at Lockport would ameliorate
2240 conditions in the Brandon Road Pool. That would depend upon the amount of oxygen that is restored through the cascading. If the percent saturation at the point of cascading is around zero, then it is perfectly possible to put in as much as 50 to 75 per cent of saturation by that cascading procedure. In summer conditions your per cent of saturation is computed based upon a figure of about eight and a half to nine parts per million as being 100 per cent saturation and the amount restored would be 50 to 75 per cent of that amount, and it is difficult to state just how long

2241 that would last. The oxygen resources and pollution of the Mississippi River are given in Chart 4 on page 29, but it is not in parts per million. At the Hastings Dam the five day B.O.D. was around 7.95 in August and September 1934. During July, August and September 1933 the oxygen added by aeration at the dam averaged 4.3 parts per million, equivalent to 39.800 pounds per day.

About 7.8 parts per million of dissolved oxygen was present below the spillway of the Hastings Dam. Some
2242 of that might have been in there originally when it came to the dam. The five-day B.O.D. at Lockport for the month of June last summer was 25 to 30 parts per million. With so much greater B.O.D. at Lockport the dissolved oxygen would rise about 7.8 parts per million. It might rise above that by aeration by cascades. The results indicated in the book show that with the 18 feet of head at the Hastings Dam there and zero dissolved oxygen in the water, that there was restored
2243 approximately 75 per cent saturation. That is summer conditions. Assuming you have a B.O.D. of 25, it would be in the ratio of whatever the amount of oxygen you restored was to that 25 parts per million of B.O.D. It would be hard to state how long you would be able to hold any dissolved oxygen through Brandon Pool after it has left this proposed cascade. I doubt whether
2244 it would be carried through Brandon Pool. The sludge deposits would utilize dissolved oxygen contributed through cascading. The application of chlorine to the effluent from the West Side Plant would ameliorate conditions in Brandon Road Pool to the extent to which it would reduce the oxygen demand, to the extent to

which it would retard the biological action below the point of discharge. I think from the standpoint of Brandon Road Pool a much more beneficial effect would be the chlorination at or above the pool. I could give no exact computations. It would be beneficial to the extent to which the oxygen demand is reduced and the biological life retarded.

Examination by the Master.

2245 It is my opinion that cascading would contribute some oxygen. How much it would contribute and to what extent that would be effective in removing the odor and conditions complained of is a matter of speculation, with the exception of past experience to indicate that oxygen put in has a beneficial effect in increasing the dissolved oxygen at progressive points
2246 down-stream. The effect of the oxygen or the amount of oxygen it would contribute at Brandon Road Pool would help to the extent that it would put that much more oxygen in there to take care of the oxygen demand of the sewage and the wastes. You couldn't positively state that that in itself would correct or would completely overcome the oxygen demand. It would simply satisfy a portion of that demand that you expect during the summer conditions with sludge pres-
2247 ent in that pool. It would be beneficial to put chlorine in down near Lockport and Joliet, to the extent of
2248 retarding the rate of decomposition on the way down. Even though there is no available chlorine showing up by tests, there is a beneficial action. It has also been

shown by experience that chlorine applied ahead of septicity has reduced the amounts of chlorine, the overall amounts that have been necessary in controlling nuisances. I think the application of chlorine at Brandon Road Pool or immediately above would be the most beneficial as regards conditions at Joliet and Lockport.

Recross-Examination by Mr. Clausen.

2249 I would think it would be advantageous to put in chlorine at several places above Brandon Pool.

3385 LOUIS F. WARRICK.

Direct Examination by Mr. Naujoks.

3386 Opponent's Exhibit No. 16 is an enlargement of Opponent's Exhibit No. 8 showing a section of the Sanitary District Canal taken from near the south end or south bank of the canal at U. S. Highway 45 bridge. This picture was taken on the afternoon of September 24, 1940, at 1:40 P. M. Central Standard Time. The picture is practically from the identical location where the picture was taken by Mr. Schwob of the Illinois State Department of Health, which I believe was testified to as being the year before, during the summer of 1939. This corresponds to Illinois Exhibits 58 and 59. It will be noted that at the time this picture was taken, that there was no scum or sludge in evidence over the surface of the canal. (Said exhibit marked "Opponent's Exhibit No. 16" was thereupon offered and received in evidence.)

September 26, 1940

Direct Examination by Mr. Naujoks.

2635 WILLARD L. BERGMAN,

2636 2748 Mildred Avenue, Chicago, is a chemist employed at Rush Medical College, Department of Toxicology and Medicine, located at Chicago. I have been a cehmist for about 30 years.

I have made analysis of the air in the vicinity of Joliet or Lockport along the Illinois Waterway. I made these tests on August 3, 1940. In my tests or analyses of the air I tested for hydrogen sulphide. One test was made at the 9th Street Bridge in Lockport, Ill. This test was taken under the bridge. I took a three-gallon sample of air, three separate gallon samples.
2637 Another test was made at the Jackson Street Bridge in Joliet, Ill. That test was taken alongside the bridge. You couldn't get under it close to the water. I have to take that on the outside, on the concrete embankment. My tests of the air taken at those places disclosed no trace of hydrogen sulphide.

By the Master.

There was no reason for selecting those particular points. I was told to go to Lockport and Joliet at the Sanitary Canal and get some samples of air. I located the canal at Lockport. I found a little house where the caretaker of whatever you call him was and I asked him whether that was the Sanitary Canal. He said "Yes" so I said "Well, here's where I take a sample". The same procedure at Joliet.

I did not go to Brandon Road Pool below Joliet.
2638 I discerned no odors, except just an odor of oil—
lubricating oil. The temperature that day was pretty
hot—I will say about 90 or so.

September 27, 1940

WILLARD L. BERGMAN (Recalled)

Cross-Examination by Mr. Wallenstein.

2711 The tests made at the Ninth Street Bridge in Lockport
and at the Jackson Street Bridge in Joliet were
the only tests I made. That was on August 3, 1940. We
2712 went along the pool a little bit, but not very far down.
We went down to the bottom at Lockport and took a test. The reason for picking these bridges was for identification. I wouldn't know how to identify any other spot along there. The only odor I could perceive was an engine oil odor, as though from motors or something of that sort. I couldn't detect any sewage odor at all there from my sense of smell. There were no gas bubbles on the water that I saw and that was true of both places where I made my tests.

The method of determination used—well, I bubbled this air through an N10iodin solution and titrated it back with the thiosulphates.

2713 The analysis was completed at the laboratory in Chicago. Perhaps two and one-half hours elapsed between the collection of the sample and the analysis. That was when we started. The analysis was completed about four hours after I got back. When you bubble pure air through N10 iodin, the loss of any iodin depends upon how fast you do it. If you bubble it through fast you may get some splashing there. This was bubbled through a wash bottle and very slowly —perhaps two bubbles a second or something like that.

2714 Under those conditions the loss of any wasn't perceptible.

2717 The concrete abutment from which the test was made at the Jackson Street Bridge is, I would say, 8 feet above the water.

2720 The tests I made at Joliet at the Jackson Street Bridge and at Lockport at the Ninth Street Bridge, represented fair and accurate tests based on my thirty years' experience as a chemist. The instructions
2721 when I went down there was to get some samples of the air and test them for hydrogen sulphide. I was told just to go to Lockport and Joliet, so I had to find some place of identification. I selected the points —I wasn't with Mr. Jenkins.

September 26, 1940

Direct Examination By Mr. Naujoks

2659 DR. WILLIAM D. McNALLY. I am a graduate of the University of Michigan; taught in the University of Illinois. I am a graduate from Rush Medical College, affiliated with the University of Chicago; postgraduate work in Vienna; have been teaching at Rush Medical College since 1913; was coroner's chemist over

16 years; toxicologist; coroner's physician over 4 years;
2660 still teaching toxicology at Rush Medical College. I am author of two books and a large number of articles published in medical journals. One book is "Toxicology" published in 1937; the other is "Medical Jurisprudence and Toxicology" printed in 1939.

2661 In a general way I am familiar with this case. Hydrogen sulphide is a gas having an offensive odor resembling that of rotten eggs. It has a formula of H2S, molecular weight 34. In high concentrations it is a very toxic gas. It can cause death in a few minutes in concentration of 0.15 of a per cent or over. In amounts less than that it may cause nausea, vomiting, giddiness; a person may drop to the floor unconscious, recover from such an exposure and not have any lasting effects. Smaller amounts have an irritating effect. It is an irritating gas. It is absorbed through the lungs and causes an edema of the lungs. It causes a conjunctivitis in small amounts; amounts from 50 parts up to 150 parts per million may cause this in some people, although not constantly. It is not a constant symptom. It has an effect upon the nervous system. It may cause, first, a rapid breathing and later on the breathing becomes short, snappy. The person may have tremors,, become extremely restless, all of which is described in the book as an agitation. It means restlessness. The gas
2662 is abosorbed into the blood and is changed ultimately to sulphates. It is not a cumulative poison like lead or some metallic fumes. It is destroyed rapidly within the system. It is a gas found in mines, sewers, and wherever there is decomposition of organic matter which contain sulphur, whether this sulphur is inor-

ganic or organic form. It is found around the distillation of oil, where mineral oil is being distilled for its various fractions, and in that sense has, in that place caused many cases of illness and even deaths. It is found in the artificial silk industry along with carbon disulphide. It is found in cesspools, gypmsum mining. It is found in septic tanks, Imhoff tanks, in quantities varying from nothing up to a tenth of a per cent. Concentration of hydrogen sulphide as low as 100 parts per million may cause local irritation and depression of the nervous system not unlike that following a prolonged course of bromides. Concentrations such as that are chiefly found in industry. If a man was in a large 2663 sewer where there was putrefactive matter, he could get concentrations, but it would be only in enclosed spaces where we find such concentrations. In my opinion, it would not be possible to obtain in the open air from a stream polluted with sewage wastes a concentration of as much as 100 parts per million of hydrogen sulphide.

At page 209 of my book entitled "Medical Jurisprudence and Toxicology", appears the following statements:

> "Hydrogen sulphide by its direct action on tissues induces the phenomena of local inflammation and, therefore, is classified as an irritant gas. Breathed in its pure state, the gas is immediately fatal. It acts upon all animals through all tissues, especially in lungs. If somewhat diluted, it produces nausea, giddiness, cold skin, labored breathing, irregular action of the heart, transient auricular fibrillation, as noted in one case (omitting the reference), pains in stomach and death by coma

> or in violent convulsions with tetanus and even delirium. In greater dilution, sleepiness will be produced. The continued respiration of the gas prov-
> 2664 ing fatal, sensibility not being restored. In exceedingly dilute conditions it sometimes occasions febral symptoms somewhat resembling typhoid. Fatal edema of the lungs can be produced experimentally in animals by exposing them for many hours to concentrations of hydrogen sulphide, 500 parts per million, insufficient to cause marked general symptoms."

The first three lines refer to concentrations of over one-tenth of one per cent—that would be concentrations greater than 500 parts per million, to produce those results upon human beings. If diluted it produces nausea. That can be produced in some individuals with as low a concentration as 50 parts per million, and the code now allows a maximum of only 20 parts per million for hydrogen sulphide. The code is what we follow along that line, so 50 parts per million in some people would cause nausea, giddiness, but the cold skin, labored breathing, irregular action of the heart is caused only by dilutions of 200 to 300 parts per million and that refers also to the pains in the stomach, and death by coma would only be in excess of 700 parts per million. Two to 300 parts per million will cause
2665 sleepiness in some people. I have inhaled 200 parts per million for several hours without getting any sleepiness, although I have felt nausea. The fatal edema refers to over 500 parts per million. The conjunctivitis can be caused in people from 50 parts per million and up and in some people even 100 parts per million will not cause conjunctivitis.

I am familiar with Brandon Road Pool; I have been
2666 there many times. I know where it is; I know the extent
2667 of it and the locations. To get a concentration in
the open air above the surface of the water in Brandon
Pool of 100 parts per million of hydrogen sulphide you
2668 would have to be right over some of these floating
particles. The fact that a person was standing or walking
over a bridge, it would not, in my opinion, be possible
to get a concentration of 100 parts per million of
hydrogen sulphide above the Illinois Waterway on the
Brandon Road Bridge. I have been on two or three
bridges there in Lockport a number of times and never
noted a concentration that would be anywhere near
150 parts per million.

2669 My answer to the question whether in my opinion
the Illinois Waterway as a result of receiving untreated
or partially treated sewage could constitute an actual
menace to the inhabitants of the communities of
Joliet and Lockport, or to the people working or
sleeping on boats over such waterway from the presence
of hydrogen sulphide, would have to be that the
conditions would have to be comparable with the air
conditions when I crossed that stream. If it was such,
I would say there would be no menace to health. What
they might be at some other time would be a conjecture
on my part. It might be very high and it might
be nauseating to some people. When I crossed it numerous
times it was not a menace to health. I crossed
2670 it two weeks ago Sunday. That was a very hot afternoon.
2671 It was in the 90's. Assuming an analysis of the
air alongside one of the bridges at Joliet and under
a bridge at Lockport showed no traces of hydrogen

sulphide, the air in the vicinity of such locations—the effect of hydrogen sulphide—would not constitute an actual menace to the health of the people of the communities.

Assuming a concentration of 100 parts per million of hydrogen sulphide right at the surface of the Illinois Waterway the concentration of hydrogen sulphide, say, three blocks away would be much less. It would be foolish for me to say. It would depend upon the velocity of the wind, the temperature and all that.

2672 There would be great dilution a thousand feet away. You would have to be right over this gas or decaying matter in order to get a concentration around 150 parts per million, because that gas is very soluble in water, and water takes up about three and a half times its volume of hydrogen sulphide. If you were more than five feet away you wouldn't get that concentration. That concentration would be diluted many thousand
2673 times when you got 500 or a thousand feet away. Even under the most favorable atmospheric conditions for preventing diffusion, if you proceeded more than five feet away, say, to 100 feet away the concentration would have been reduced several thousand times. The gas is heavier than air. Its specific gravity is about 1.92 compared with the air, so it would hang low — it wouldn't go up suddenly in the air, but if it was a hot day some of this would go up high and these gases like
2674 hydrogen sulphide can be smelled for long distances away though the concentration at point of origin is small, say, 150 parts per million. In order to get these deleterious effects described in my book you would

have to have the concentrations I have testified, say, anything from 50 up—some people would feel the effects of the gas. It will be true of any gas, any solvent, that some people are much more sensitive to the smell of hydrogen sulphide and other smells than other people. We can have some people work with benzol for years
2675 and not have any effects, and other people work right alongside of them, the same concentration and within a year they are very sick.

Yes, there is something in the idea that you get accustomed to an odor. The Olfactory sense can be paralyzed so that after a while you don't notice the odor. If you are working with some very foul material like samples of fertilizer from tankage, the first time you work in a place like that it makes you sick to your stomach and after a while you could stir it up with a spoon and eat your dinner alongside of it and it will never bother you. Fertilizer plants and stock yard plants give off ammonium sulphide and hydrogen sulphide, indol and some mercaptans. That is in the tankage room and in the drying room.

2676 When people in the neighborhood of fertilizing plants and stock yard plants complain of odors they are complaining of hydrogen sulphide. There is not much complaint of stock yards odors here in Chicago. People living around there know that it is one of our industries and say nothing, but the odors still exist. The odor comes as far north as Foster Avenue some times. That is 5000 north. That varies with the wind. It is worse in summer than in winter.

2677 You can't detect it out here, but there is some hydrogen sulphide in the material. The people living

in the neighborhood probably complain or claim it is hydrogen sulphide, but it is a lot of other things than hydrogen sulphide. What they smell is not hydrogen sulphide, and the same is true of a fertilizer factory—
2678 they smell a lot of other material. The things that cause the offensive smell near a stock yards are what we call animal odors, tankage odors—they are sulphides, mercaptans usually. I was in a packing house for a long time and I never saw anybody sick from those odors emanating from it. Yes there are some recorded experiences of extended illness from odors in sewage plants. In some sewage there is a high concentration of hydrogen sulphide. You may have no hydrogen sulphide or it may run up to even 8 per cent. In my book I record 2.88 per cent coming from Paris sewage, but we have other figures where it may run up as high as 8 per cent. That is in enclosed spaces. There are no recorded cases of any epidemics of illness from hydrogen sulphide breathing from open water-
2679 ways like this waterway, but around petroleum distilling tanks hydrogen sulphide in the purification of mineral oil—death has occurred from hydrogen sulphide, numerous illnesses. This was within 25 feet of this distillation process. There is no recorded instance in the literature of toxicology of deleterious effects from hydrogen sulphide from a waterway. All of them are industrial plants.

Cross-Examination By Mr. Wallenstein

2680 I personally have not made an analysis of the air at Brandon Road Pool. On the occasion of the visits I spoke of, I crossed there several times during the summer of 1939.

Q. "Mr. Howson, one of the witnesses in this case, in Vol. IX, pages 1940 and 1941 of this transcript was asked the question—'Will you explain Mr. Howson, just what occurs or might be expected to occur in the Brandon Road Pool when hydrogen sulphide is formed and produces some of these odors complained of?' Mr. Howson answered: 'Well, the hydrogen sulphide that reaches the surface and is detected usually comes to the surface, I think, accompanied by—well, certainly accompanied by other gases, and frequently accompanied by disturbance in the sludge depending upon the origin, whether of liquid or sludge origin, of the hydrogen sulphide. It is part of the sludge of digestion, usually in waters of low sulphate content, such as Lake Michigan water, oh, possibly one per cent more or less of hydrogen sulphide in the sewer gas.'

2681 "To further assist you in the question I am about to ask you, let me read you from the testimony of Dr. Buswell in Volume IX, page 1896 of this transcript. Dr. Buswell was asked by Mr. Naujoks the following question: 'Doctor, what are the principal constituents of the gas that bubbles up through the water in Brandon Road Pool?' The Doctor answered: 'From analyses of gas from similar situations I would expect that it is largely methane, which is an odorless and colorless gas, and an appreciable amount, perhaps 20 per cent, of carbon dioxide, ordinary carbonic acid, and probably 3 or 4 per cent of nitrogen. I would not expect to find more than 1 per cent of hydrogen sulphide, if that. I haven't made analyses of gas from that—'

"Now, Doctor, assuming that these statements are correct as to the approximate amount of hydrogen sulphide contained in the gas generated by the decomposition of sludge at Brandon Road ~~Pool,~~ have you an opinion as to what the effect would be upon a person who inhaled such a gas
2682 for a period of time. This one per cent was over the surface of the water so people could breathe it."

A. "That would kill any person that was breathing a concentration of one per cent, because 0.15 to 2 per cent is fatal within 15 minutes. That would kill them immediately."

Assuming that the approximate figure given by Mr. Howson and Dr. Buswell as to the amount of hydrogen sulphide contained in the gas generated at Brandon Road Pool is too high—that it is diffused with ten times as much air so that its concentration is reduced to 1000 parts per million, the effect upon a person who breathed this gas for a period of time would be very dangerous.

2683 A thousand parts per million would be very apt to kill over half the people that breathed it within one hour. Assuming that this gas described by Mr. Howson and Dr. Buswell as containing 1 per cent hydrogen sulphide became diffused with air so that its concentration is reduced 100 times, that is, so that there are 100 parts of hydrogen sulphide per million, there would be no cumulative effect to that gas upon a person who inhaled this odorless gas for a period of 60 days over a four or five months period and for periods ranging from 2 to 7 hours. They would get only the effects of the day that they breathed that gas. That would cause an irritation of the lung and in many individuals it would cause nausea, and some sensitive individuals might have an irritation of the nervous system. It might produce headaches.

If I were to assume as correct the testimony of Beulah Booklund appearing on page 906 of the record, that the
2684 paint on the houses located along Railroad Street, which is about 750 feet from the canal, abutting Brandon Road Pool, was affected in the manner she testified, i. e., turned black, I would say, in the absence of trains, smelter smoke, foundry smoke, hydrogen sulphide would have this effect upon buildings painted white with lead paint. Hydrogen sulphide will cause the formation of lead sulphide in any paint containing lead, usually lead oxyacetate—white lead it is called.

2685 That canal has an oily residue and boats all have a thin black scum along the water line. Undoubtedly that mineral oil carries along some of the gases and it would discolor the paint. I have seen one or two boats and I have never noticed that their brass work was discolored black. If you had a brass fixture in this
2686 room any length of time it will turn color. That is why in fire departments they have to keep that brass polished every day to keep the right color. Silver would be turned black by hydrogen sulphide. A concentration

even as small as .0025 would cause discoloration of paint—lead paint.

I have read the article by Mr. Yant in "The Hydrogen Sulphide Industry" and agree with his table showing the physiological response to hydrogen sulphide, 2687
(This was thereupon received into evidence as McNally Cross Examination Exhibit 1, and is as follows:

2688 "PHYSIOLOGICAL RESPONSE TO HYDROGEN SULPHIDE.

"Physiological Response—The physiological response attending exposure to various concentrations by volume in air is as follows:

"0.005 to 0.010 per cent: Subacute poisoning—slight symptoms such as mild conjunctivitis and respiratory tract irritation after 1 hour exposure.

"0.02 to 0.03 per cent: Subacute poisoning—Marked conjunctivitis and respiratory tract irritation after 1 hour exposure.

"0.05 to 0.07 per cent: Subacute poisoning—dangerous in ½ to 1 hour.

"0.07 to 0.10 per cent: Possibly acute poisoning—rapid unconsciousness, cessation of respiration and death.

"0.10 to 0.20 per cent: Acute poisoning—rapid unconsciousness, cessation of respiration, and death in a few minutes.

(Page 603, American Journal of Public Health—Excerpt from article "Hydrogen Sulphide in Industry Occurrence, Effects, and Treatment" by W. P. Yant.)

2689 I also agree with Table I in Mr. Yant's article, except the last figure of 27 parts per million opposite the item, "Strong, cogent, forceful, not intolerable." Alice Hamilton and Drinker of Boston now believe 20 parts per million are intolerable, and the code says 20 is the maximum that should be tolerated by workmen in industry.

(Said Table I was thereupon offered and received in evidence as McNally Cross-Examination Exhibit No. 2, and is as follows:)

2690 "ODOR INTENSITIES FOR VARIOUS CONCENTRATIONS OF H2S

Intensity of Odor	Concentrations of H2S in air	
	Parts per million	Percent by volume
No odor	0.022	0.0000022
Detectable; minimum perceptible odor	0.13	0.000013
Faint; a weak odor, readily perceptible	0.77	0.000077
Easily noticeable; moderate intensity	4.6	0.00046
Strong, cogent, forceful not intolerable	27.0	0.0027"

(Table I, page 605, American Journal of Public Health—Excerpt from Article "Hydrogen Sulphide in Industry Occurrence, Effects and Treatment" by W. P. Yant)

2691 A number of investigators in the field of toxicology, industrial toxicology got together and from experimental data they made up this code for Massachusetts that I spoke of—just published in the Journal of Industrial Hygiene and Toxicology for June of this year—which will probably be used all over the United

States. Alice Hamilton, who was head of that department in Washington and well-known industrial toxicologist and Drinker, of Harvard University, are the co-authors of that table. They have come to the conclusion that not more than 20 parts per million of hydrogen sulphide should be tolerated in any industry because above that it was harmful.

2692 I estimated that as low a quantity as 25 parts per million would be required to turn paint black at 750 feet. The amount of hydrogen sulphide in the air required to change the paint would be much less than 20 parts per million—much less than the concentration to cause illness. The fact that it would turn the paint would not indicate that it would cause illness.

(At this point an extended colloquy took place between Master, the witness and counsel as to the method of converting percent into parts per million. At the suggestion of the Master a recess was taken while the witness explained the formula to counsel. After recess the witness resumed the stand and testified as follows)

2697 You are correct in understanding from my previous testimnoy I said that at 750 feet from the canal in order to blacken these houses I gave an approximate figure of a concentration of .0025 hydrogen sulphide, and that would be 25 parts per million.

2698 The maximum for safety in the Boston code of which I spoke was .0020 or 20 parts per million. The statement at page 208 in my book Medical Jurisprudence in Toxicology "it has also been found that a concentration of as little as .005 to .01 per cent will cause a conjunctivitis, popularly known as gas eyes" means the lowest figure of .005 is 50 parts per million. That would be twice as much as the figure given with reference to blackening the paint. One per cent would equal 10,000 parts per million.

Redirect Examination By Mr. Naujoks

2699 Yes, automobiles give off a poisonous gas. The combustion of gasoline is incomplete, and the average 6.7 per cent of carbon monoxide, CO, which is very highly toxic gas. A one per cent concentration of carbon monoxide would kill within two or three minutes. Concentrations of carbon monoxide and hydrogen sulphide causing symptoms parallel. They are very toxic gases.

2700 Based on the number of times I have crossed the Illinois Waterway comprising the Sanitary District Canal, been in Joliet, been in Lockport, it is my opinion such waterway was not a menace to health on those days I passed through this place.

The Massachusetts Code is predicated on the fact that the air in thees industrial plants is charged at all times with that concentration of hydrogen sulphide.

Recross Examination By Mr. Wallenstein

2701 A concentration of hydrogen sulphide in the air expressed as .0027, meaning per cent by volume would be close to 27 parts per million. The odor given off by such a concentration would be noticed by nearly everybody unless they had a defective sense of smell.

Redirect Examination By Mr. Naujoks

2702 If trains went by and gave off hydrogen sulphide in the smoke—and they do give off hydrogen sulphide and sulphur dioxide—that would be sufficient to cause a discoloration of paint on houses for some distance away.

October 16, 1924

Direct Examination By Mr. Naujoks

3100 DR. M. STARR NICHOLS. I am a chemist, bacteriologist, teacher. Graduated in pharmacy from Highland Park College in Des Moines in 1905; registered pharmacist, State of Wisconsin 1913; Bachelor of Science, University of Wisconsin 1916; Master of Science 1918; Doctor of Philosophy, Physiological Chemistry, 1926. My experience has been quite varied, principally in the field of water and sewage sanitation; some experience
3101 teaching clinical laboratory diagnosis to medical students; teach water and sewage chemistry to engineering students. I teach at the University of Wisconsin, but teaching requires approximately only 30 per cent of my time. The rest of the time is in the State Laboratory of Hygiene, in which laboratory are done the analyses for the State Sanitary Engineering Department of the State Board of Health. I am an employee of the State of Wisconsin.

I am a member of Sigma Psi; member of American Chemical Society; Fellow of American Institute of Chemists; Fellow of American Medical Association; member of Federated Sewage Works Association; mem-

3102 ber of the Society for Experimental Biology and Medicine; member American Water Works Association.

I am to some extent familiar with the Illinois Waterway and Brandon Road Pool. I have made two trips to Brandon Road Pool.

I failed to mention that I hold the rank of professor
3103 of sanitary chemistry at the University of Wisconsin; that I have published some 30 to 40 papers on subjects relating to water and sewage; that recently I have written three chapters in the book known as "Water Supplies", written by Turneaure and Russell. The three chapters had to do with the quality of water and its examination.

The results of my tests and analyses of the water, air and scum at Brandon Road Pool are shown in this report which is hereby offered in evidence and marked "Opponent's Exhibit No. 15".

3112 The first part of this report has to do with an attempt to arrive at the bacterial pollution of the air at the locks and at nearby points. The test was made by exposing sterile nutrient agar and malt agar plates at various locations. By this method it was hoped that bacteria present in the air would lodge on the agar plates and establish what is known as a colony when they grew. By counting the number of colonies which grew on these plates we hoped to arrive at comparative concentrations of bacteria in the air at these various points. Those results are shown on the first table on page 2.

You will note that only plates 2, 3, 6, 12 and 13 are listed. The missing numbers are not shown because they dried up while they were open to the air. In other words, the culture material, the water from the culture material, evaporated. We had hoped to get results at many other points not shown. However, the ones shown in this table are considered satisfactory, and the results you can see in this report.

3113 Because of the fact that all these testing points did not produce satisfactory results, it was decided to make another atempt with what we consider a more accurate method for determining the number of bacteria in the air. It is realized that these counts probably do not represent the total number of bacteria present in the air but the results will be comparative one with the other. The principle of this method is that of impingment. When you direct a column of air it tends to go in that direction until something changes it so our idea was to draw this air in directly on top of an agar plate through an orifice. This movement of air was produced by a pump calibrated to deliver so many cubic feet in
3114 a certain length of time. In this particular instance we standardized on one cubic foot of air per minute. As the air impinges on this agar plate, the bacteria are caught on the moist surface, and after being incubated, produce the colony of microscopic size which can be counted readily by use of suitable apparatus similar to the "Quebec" colony counter in these experiments.

The results shown in the next table should represent the character of the air as to its bacterial content by means of comparison, at least, one plate with another. You will observe from the table that the number of bacteria at various locations varies considerably, and that in the city proper of Joliet, Illinois there does not seem to be any remarkable difference from the numbers

found at other cities in Illinois and in the rural areas. There is one outstanding difference which I believe should be pointed out, and that is that the number of bacteria at Brandon Locks, that is Station C; Brandon Dam, Station D; Lockport Locks, Station H, all three
3115 show approximately one-tenth as many bacteria as are found at the other stations.

The types of bacteria present gave no information I can see, except to say that they are varied and there are many varieties present. No attempt was made to isolate any pathogenic organisms, nor was any attempt made to identify the species of bacteria growing.

On page 7 are shown six of these plates. Aside from the plates obtained at the three points on the locks, all the rest of the plates were more or less similar, and so I tried to pick locations which would give a picture, at least, of the condition at the locks, in cities, and in the country, and you will note from the picture of the plates that there are fewer colonies on the lock samples than are present on the other plates.

The chemical part of this work consisted in determining hydrogen sulphide in the canal water at three separate points—one at a point one block north of Jefferson Street Bridge; one at the canal just above Brandon Lock upper gate, and one at Lockport locks in the canal above the upper gate. The first two of these
3116 showed two-tenths of a part per million hydrogen sulphide. The latter—the one at Lockport Locks—showed one-tenth part per million.

Samples of scum were also analyzed, and a description of the scum and analysis is to be found on page 3. On one sample of scrapings was extracted oily tar-like material, not identified as to its source. The scrapings are removed from the canal wall and contain, as found 21.8 per cent of oily tar-like material which we calculated on a dry basis would amount to 42.3 per cent. Note also these scums 2 and 3 reported are from selected points inasmuch as the scum was not found at all places in the canal, locks and Brandon Pool.

I would like to call your attention to the analysis under paragraph 4 of this page 3, in which a determination was made on the effluent flowing away from the Texas Company plant, Lockport, Illinois. This sample showed a similar oily tar-like substance amounting to 58.7 parts per million, which on the basis of a quantity of water which has been reported to be used by that company would amount to some 12,000 pounds of oily tar-like material daily. Note that this effluent does not
3117 contain hydrogen sulphide and that its Ph is practically normal.

The Master

Ph has to do with the intensity of the acidity or alkalinity. In this case it would mean that the water was practically neutral as far as the acidity or alkalinity intensity was concerned. In making the test for hydrogen sulphide a sample of 100 cubic centimeters of water without aeration was placed in a hundred cubic centimeter cylinder, glass cylinder. To this was added 10 per cent of its volume or 10 cubic centimeters of concentrated hydrochloric acid. To this was added from
3118 10 to 20 milligrams of para dimethylamino aniline sulphate, and the cylinder and contents inverted gently.

To this was added one cubic centimeter of one per cent ferric chloride solution. The resulting mixture, if hydrogen sulphide is present, becomes some shade of blue, depending upon the concentration of hydrogen sulphide. I did not make any test for hydrogen sulphide in the air as distinguished from hydrogen sulphide in the water. I wasn't asked to do that. In selecting a sample of water from the effluent of the Texaco Company we made what was known as a "grab" sample, that is, taken at one particular time in the middle of the stream which was flowing away from this plant, the idea being to select as near as possible a representative sample of that effluent. No attempt was made to get the scum because I got scum from that same place by taking the sample near the banks of the stream, but my idea there was to find out what was really in the water flowing away from the Texas Com-
3119 pany plant. At other points the samples were taken actually to get the scum, and do not represent the character of the water in general in the pool. I failed to see any points where bubbles were arising. Bubbles may indicate the presence of some gas but not necessarily hydrogen sulphide.

Mr. Naujoks

The hydrogen sulphide samples were selected because of the proximity to suggested complaints. In other words that was quite close to St. Joseph's Hospital, the one near Jefferson Street Bridge, and the one taken down at Brandon Locks was just to find out if there was any difference in it.

The Master

3120 I didn't know about there being bubbles coming up any place at that time and if I had known that I certainly would have liked to have found the concentration at those points. They may have thrown some light on whether or not those bubbles are hydrogen sulphide. I didn't see any bubbles on my visit which was on September 27th and 28th when I was down there the last time. That is the time I made the hydrogen sulphide examination.

Mr. Naujoks

3121 I think the amount of hydrogen sulphide at various places might vary, although I have no information upon which to answer in the affirmative or in the negative on that question. I noticed an odor along the Illinois Waterway at the time I visited the Brandon Road Pool. I would like to offer my opinion that it was an oily tar-like odor, and I was anxious to find out whether I could smell any hydrogen sulphide, and I was observant particularly for that compound because of its apparent significance here, and I felt that I ought to be in a position to determine whether it was present or not because I worked with it in the chemistry laboratory.

The Master

The odor one gets on going into a badly kept urinal in a railroad station or in a small town is not that of hydrogen sulphide.

3122 That is ammonia practically and certain aromatic substances from urine which are not related at all to hydrogen sulphide.

3123 Rotten eggs would be the best single substance to describe hydrogen sulphide, although you get other odors there if the egg is very bad. On my visits (to the Pool) I got no odors of either stale urine or rotten eggs. When we crossed the Brandon Road Bridge going out in the country to collect a sample of bacteria, we noticed a slightly different odor which I am freely willing to admit had a sewage odor to it. It is hard to describe an odor. It is the odor you get around sewage plants. The interesting thing in regard to odors at Joliet was, as I noticed it, at Brandon Locks the odor
3124 was mild. As you neared Lockport, you began to get an extremely strong tar-like odor. On the first visit Mr. Warrick and I walked up the locks to the Texaco plant outlet of their waste and the tarry odor got stronger as we went towards that plant. In taking samples of the scum at Brandon Locks I held Mr. Warrick's leg and he reached down and got the scum. I couldn't
3125 answer the question, "What is the material in that scum, generally?" because I haven't analyzed it. It is a very difficult material to analyze. My examination for bacteria didn't include the scum. It would be my opinion that bacteria couldn't live in that scum.

The examination for hydrogen sulphide was made on specimens of water without scum. The tar-like sub-
3126 stance was extracted from the scum in two instances; form the scrapings from the lock walls in one instance and from what I considered to be the representative sample of the Texaco effluent collected in the middle of the stream.

3128 The average amount of B coli found in raw sewage is from two million up to possibly 25 million per cubic centimeter. Three or four experiments I know of have shown that typhoid germs were destroyed more quickly in polluted water than in pure water. Typhus and typhoid are two different diseases entirely. Typhus is mostly caused by rickettsia bodies. There is some typhus in the Eastern States and I think occasionally they
3129 get typhus at the West Coast. A very small number of
3131 cases, comparatively speaking. It is very difficult to answer the question, "If all the hydrogen sulphide present in the water in the Brandon Road Pool were capable of being released instantaneously, would this produce a sufficient quantity of hydrogen sulphide in the air above Joliet to produce a toxic effect?" I cannot answer it yes or no, but it is my opinion there would not be sufficient concentration in the air if all of the hydrogen sulphide of two-tenths parts per million were released instantaneously, if you would consider a volume of air surrounding the buildings of Joliet. It must be understood that a concentration could be attained by an instantaneous release at points directly above the water, which would be toxic in the opinion of experts, that is, above 10 parts per million, and I doubt very seriously if you could take a sample at St. Joseph's Hospital after that release had been effected,
3132 that you would find as much as one-tenth part per million in the air. It would be my opinion that no matter how great the concentration was at the point of release above the surface of the water, by the time

it got to St. Joseph's Hospital the dilution and diffusion would be so great that it could have no effect. If the quantity of hydrogen sulphide in the pool were the same in June and July as for September and October
3133 I would make the same statement. I am limiting my answer to what I found at that date. A concentration of two-tenths of one part per million of hydrogen sulphide in the water was not noticed by myself on a bridge crossing. I would need to know the concentration in the air before I would be able to give an idea about what concentration you would be able to notice if it were present and you were looking for it. The testimony this morning brought out that different people have different sensitivities as far as odors are concerned and one person might be able to detect .13 parts per million and another would require a larger amount. The man who has done most of the work on that maintains that to detect as low a quantity as that they must come from fresh air and make their observation practically
3134 instantaneously or else they get fatigue and won't even notice that amount. In accordance with physical chemical laws hydrogen sulphide in water would not, as far as I know, be capable of being released instantaneously.
3135 It would diffuse out slowly and the lower the concentration the lower the rate of diffusion. Aeration removes hydrogen sulphide rather rapidly, and is used in water works practice to remove this obnoxious component of some underground waters. At times I, as a chemist, work in an atmosphere containing hydrogen sulphide. I often breathe hydrogen sulphide in my work, but not any more often than I have to. Ordinarily, chemical laboratories nowdays are provided with

exhaust hoods to remove this compound but the apparatus isn't very efficient. I have visited the Qualitative Chemical Laboratory in which there are probably 200 or 300 students, and you can get plenty of hydrogen sulphide odor when they are working there. An additional diversion up to 3500 cubic second feet would decrease the concenrtation of B. coli in the water passing through Joliet but, of course, the total number that
3136 went by Joliet would be just the same. By concentration I mean the numbers per unit volume. The fact is I think there is a possibility that there might be more numbers if there is any difference, because of the killing off effect of strong, stagnant water, polluted water, except in certain kinds of organisms like the aerogenes type of colon. That organism might multiply better in the stronger waste, but the type that is found in the intestinal tract and is present in many million per c.c. of feces, is not supposed to multiply in nature and would, as far as all experimental work that I am acquainted with is concerned, die off somewhat in polluted water. That is known as aero-bacteria. There are about 32 to 35 varieties of this colon organism. Some 7 or 8 varieties are found in the human feces. Others have their habitat in organic matter that is undergoing decomposition.

Cross-Examination By Mr. Clausen

3137 At one location—Brandon Locks—we found an ant on one of the plates. None of the plates shown on page 7 of my exhibit indicate that any insects walked on
3138 them. The fact of the matter is the apparatus was screened so that no insect could get in with the inrush of air. It had a screen over it to keep out anything that might possibly be there aside from the air and the dust particles. I didn't determine the species. I made no determination for pathogenic organisms.

3139 The organism listed on page 6 of my exhibit indicated as similar to escherichia coli is the one defined in the feces, but note that I have not said that the organisms found were escherichia coli. This organism is typical of sewage pollution, but there are many organisms that are not escherichia coli that are similar to es-
3140 cherichia coli. You find them everywhere. I might just as well have said that the organisms under No. 6 classification could have been said to be B. proteus which have nothing to do with sewage. You couldn't tell escherichia coli and B. proteus apart under the microscope. The reason I put escherichia coli in there is simply beacuse it was the first thing that came to my mind of a short gram negative rod, and it doesn't mean
3141 anything in connection with escherichia coli. The key is simply a method of saying what morphological types are present and that is all the report states—that they are morphological types. There are nineteen different kinds of morphological types listed and No. 6 is a type similar to escherichia or similar to B. proteus. I could

have said similar to typhoid if I wanted to and be correct. Morphology has to do with nothing except the form. Morphological types mean simply the shape and staining characteristics of the organism when stained with a certain type of stain, and that is all they mean.

3143 I made no determination of species so I wouldn't know whether there was any sewage types or not. My sole purpose in making this bacteriological aid analysis was to determine the relative numbers of bacteria at the locks and at distant places from the locks, and I simply put down the morphological types to indicate what I saw under the microscope without further identification of species. I found no hydrogen sulphide in the Texas Company wastes. These tests for hydrogen
3144 sulphide were made on September 28th (1940). The temperature of the water on that date was not measured. The temperature of the air at Joliet, Illinois at 11:25 Central Daylight Savings Time was 70 degrees Fahrenheit at the Lock House. The water would be cooler now than it would be during the summer. I observed no bubbling. I have no way of knowing what the activity or decomposition of the organic material was as I made no tests. Chemical and biological reactions increase with increase in temperature.

3145 This chart headed "Gases from Sewage Sludge Digestion" and from in "Industrial Engineering Chemistry" simply tells that hydrogen sulphide is produced in larger volume as the temperature of digestion rises. The chart shows that at a temperature of 66 degrees where you might have .2, if the temperature were 76 degrees you might have .9 per cent by volume hydro-

3146 gen sulphide in sewage sludge digestion. It should be inserted that this chart refers to the rate in volume of gas production from sludge digestion in Imhoff tanks and not in the waterway. The conditions are entirely different in this experiment and in what would happen in a natural waterway, but there is no doubt but what there would be increased hydrogen sulphide production with increased temperature. I don't know that it would be anything like as great as that. May I inject here that all the chemical reactions taking place in the waterway are increased by increase in temperature. If hydrogen sulphide is produced at a greater rate by a higher temperature, so will that hydrogen suphide be eaten—oxidized if /oxygen is present in the air or in the waste—by a higher temperature. If you have oxygen present, your hydrogen sulphide disappears that much quicker. Of course, now there is no oxygen present there, so it may not disappear, except for the
3147 fact the solubility of hydrogen sulphide is less at a higher temperature than it is at a lower temperature. The production of hydrogen sulphide in an Imhoff tank probably takes place from two sources: One from the protein material, the other from the sulphates contained in the carriage water. No two Imhoff tanks will produce the same quantity of hydrogen sulphide, due to variations in these two components. Likewise no direct comparison from these results can be made with another plant, and probably much less to an open stream in which we have entirely different conditions.

The Master

3148 It is true that increased temperatures tend to generate more hydrogen sulphide. With similar quantities of sulphur proteins and sulphates, if you conduct that digestion at a low temperature you will get less hydrogen sulphide than you will at the higher temperature. That goes for Imhoff tanks. I think it is essentially true that if you had the same quantity of untreated sewage in this open waterway at Joliet in September as you had in July and your temperatures were much higher in July than in September, you would expect to find more hydrogen sulphide in July than you would in
3149 September, but it would not follow that the rate of increase in hydrogen sulphide in an open waterway from a cool day to a warm day would be the same as the rate of increase in an Imhoff tank from a cool day to a warm day.

Mr. Clausen

I know Mr. Hatfield. He is Chairman of the Standard Methods Committee of the Federation of Sewage Works Associations.

The Master

Assuming that there is a certain degree of concentration of hydrogen sulphide gas at a certain point on the waterway, the diffusion from water to air would be faster in hot weather than it would in cool weather because the solubility of hydrogen sulphide is greater at a lower temperature than it is at a higher temperature.

3150 In the hot weather the hydrogen sulphide would get from the water into the air more rapidly than in cool weather. Assuming the hydrogen sulphide has gotten out of the water into the air, the diffusion in the air would have very little to do with the temperatures of the air, because both gases expand with heat at the same rate approximately. The only thing which would tend to make hydrogen sulphide diffuse more rapidly would be air currents.

Mr. Clausen

Hydrogen sulphide is slightly heavier than air. Moisture in the gaseous form would have nothing to do
3151 with the diffusion of hydrogen sulphide. Barometric pressure would have the same effect on the air as it had on the hydrogen sulphide, and I doubt that diffusion would be any different. I think the diffusion would be approximately the same provided the moist air was in gaseous form. I know that only from my knowledge of physical chemistry and general chemistry, inorganic, and a few things like that.

Broadly speaking, a pathogenic organism is one capable of causing disease in man or animals.

If I had undertaken to make an examination for
3152 pathogenic organisms, the next step in the procedure would be the isolation of these individual colonies. In other words, we would transplant from those colonies the organisms growing into suitable media, and when we had other biological characteristics in different kinds of culture media besides agar, we might resort to animal experimentation to prove it. Agar is a sea-weed. It is produced on the West Coast of California some-

what now. It is a sort of substance which is dry and when you mix it with water it swells up, and when you get it up to the boiling point it dissolves apparently, and then stays melted until the temperature drops to about body temperature, at which point and a little above it becomes solid.

Redirect Examination By Mr. Cohan

3154 It does not necessarily follow that these bubbles observed on the surface of Brandon Pool are hydrogen sulphide gas bubbles. There is very apt to be a gas known as methane in those bubbles rather than hydrogen sulphide, because methane is much less soluble in water than hydrogen sulphide.

The Master

3155 Methane gives off no odor. Methane, in sludge digestion is one of the principal gases evolved and in much larger volume always than hydrogen sulphide. You can have hydrogen sulphide without bubbles. Bubbles would be indicative of great activity of gaseous nature. The bubbles could possibly be hydrogen sulphide, but because of the solubility of hydrogen sulphide at 30 degrees Centigrade, which would be rather warm temperature—32 degrees is about 80 I believe—hydrogen sulphide is soluble about 2 c.c.'s of the gas in 1 c.c. of water. In other words if it traveled from the point of formation in the sludge at the bottom towards the top, I doubt very much whether a large bubble would ever get there because it would be dissolved before it got to the top, provided there was less than 2 or 3 parts

3156 per million of hydrogen sulphide in the water. If it had an odor it couldn't be methane. As to this solubility I was describing, it makes very little difference whether air or hydrogen sulphide is over the water until the bubble gets to the air-water surface.

Recross-Examination By Mr. Wallenstein

3157 The amount of hydrogen sulphide given off from the water depends on whether there is air or hydrogen sulphide above the water. When you talk about the solubility of a gas in the water you take the condition in which you have one atmospheric pressure ordinarily above the water in which you are making your solubility test. You assume that to be fifteen pounds' pres-
3158 sure, the same as ordinary atmospheric pressure at sea level. That is the pressure of just ordinary air. If you were going to mix one part of hydrogen sulphide and a million parts of air it would affect the result. Much less hydrogen sulphide would dissolve in the water, but if your going to talk about solubilities of a chemical substance you ordinarily expect to have the pure substance in solvent—in this case water.

October 17, 1940

DR. M. STARR NICHOLS (Recalled)

Cross-Examination By Mr. Clausen

3208 As far as I have gone in my investigation it is very unlikely that we might have the following pathogenic organisms: B. Anthracis, B. diptheriae, pyogenes albus, B. Typhosus, B. dysenteriae, septic sore throat, scarlet fever, bargens bacillus of ulcerative colitis. It is very unlikely that they might have been on those plates — a remote possibility.

3209 The record should show that of bacterial types found in the air 99.9 per cent of them are not pathogenic organisms. There is one chance in a thousand that type No. 1 shown on page 2 of Opponents Exhibit 15 where I say "similar to B. subtilis" could also be B. anthracis. Under type 3 where I said "diptheroids" they somewhat resemble B. diptheriae. The chance that they could be present too is a very small chance, probably one chance in 10,000, 20,000, 100,000.

3210 Under 6 where I say similar to escherichis coli it could also be B. typhosus and B. dysenteriae and B. proteus and a thousand other organisms. Under 8 where I say streptococci, there is one chance in 100,000 possibly that it could also be septic sore throat and scarlet fever. Under 15 where I say streptobacillus there is one chance in a million that it might also be bargens bacillus of ulcerative colitis. Under 17 I doubt that it might be a B. typhosus. The rods, as I remember them, were so long they couldn't have been that. I wouldn't know whether they were or were not present. No attempt was was made to identify species. Air-borne infections of the type mentioned are very uncommon.

Redirect Examination By Mr. Naujoks

3211 My tests showed one-tenth of one part per million of hydrogen sulphide in the Sanitary Drainage Canal above Lockport and two-tenths of one part per million of hydrogen sulphide in the water of Brandon Road

Pool. My tests further showed 62.8 parts per million of sulphates in the effluent of the Texas Company which goes into the Brandon Road Pool. It would be possible for the increased amount of hydrogen sulphide present in Brandon Road Pool to be derived from the reduction of these sulphates in the Texas Company effluent.

Recross-Examination By Mr. Clausen

I saw a record that gave the average flow at the Texas Company as 23 second feet. That would be about 16 milloin gallons a day. My analysis showed no hydrogen sulphide in the effluent.

September 25, 1940

Direct Examination By Mr. Cohan

2465 DR. JAMES ELIAB PERKINS. I reside at 1 Salisbury Road, Elsmere, New York, near Albany. I am Director of Division of Communicable Diseases, New York State Department of Health. I received my Bachelor of Science and Doctor of Medicine from the University of Minnesota in 1927 and 1930, respectively; my Master of Public Health and Doctor of Public Health from the John Hopkins School of Hygiene and Public Health in 1931 and 1933, respectively. Following my internship at the Anker Hospital in St. Paul, '29 and '30, I was epidemiologist in the New York State Health Department the year of 1934. Then I was District State Health Officer of the New York State Health Department from January 1, 1935 until November 1938. I

have been Director of the Division of Communicable
2466 Diseases since that time. I am also Director of the Extension Course for physicians qualifying to become Grade 2 health officers in the State of New York, that is, since 1937; and since the same time in charge of the Public Health of Preventive Medicine in the Albany Medical College.

I am familiar in a general way with the order of the Supreme Court appointing the Special Master to make summary inquiry relative to the actual condition of the Illinois Waterway and whether that condition constitutes a menace to the health of the inhabitants along the waterway. I am familiar in a general way with the Waterway and this so-called Brandon Road Pool from my visit to it yesterday (September 24, 1940). We went down in an automobile, crossing the Waterway at several points; the first at U.S. 45, then at Lemont, then at Lockport and several places in Joliet, and also went to the foot of the Brandon Pool at the Brandon Lock.

2467 At the first two points, that is U.S. 45 and at Lemont, there was a slight odor perceptible that I would liken to the odor I notice from the effluent of a sewage treatment plant to which I take my Albany Medical College students. It was very slight but detectable. At Lockport the odor, apparently, was marked by the smell of oil from a little stream that runs just east of the Waterway, so I noticed hardly any odor from the Canal itself because of the smell of oil from this small stream. Down in Joliet the odor was again very slight. It too, was marked by the odor from a burning rubbish pile located apparently just north of Joliet on the western bank. At the southern end of the Brandon Pool there was again just a slight odor similar to that I noticed up at the crossing of U.S. 45 and at Lemont. I was on top of the lock structure yesterday, and there was rather a strong breeze. Apparently it was coming straight down Brandon Pool.

2468 I did not observe any scum on the surface of the Waterway at any place.

Assuming that this Waterway is polluted because of the introduction of untreated or partially treated sewage, I believe only the enteric communicable diseases, most important of which are typhoid and bacillary dysentery, would emanate from the Waterway. Assuming that a polluted and septic condition exists and has existed in this waterway for some time and that it were diluted by an additional 3500 c.f.s. of Lake Michigan water I do not think there would be a possibility that the typhoid germs present in the water would decrease. In fact I think there would be a possibility you might even have an increase. You have septic conditions only when the pollution is so severe that the oxygen has been used up. You then have an anaerobic condition. The typhoid bacillus, like most non-spore-forming pathogenic organisms, is a very delicate organism. It is not anaerobic and would not live very long under anaerobic conditions, that is, in a septic stream of that
2469 sort. So, if you have further dilution you might actually have more viable organisms than typhoid bacilli present, and I would also think that with the increased flow you would have great possibility of transmitting these organisms over a greater area along the Waterway than otherwise. Individuals could contact these

diseases from the water in the canal only by swallowing it. That would, of course, occur principally through actual pollution of a water supply. I presume it is conceivable that a person swimming in it and inadvertently swallowing the water in that process would also possibly contact one of these enteric infectious diseases. Assuming that the water supply of the communities along the Waterway is safe from pollution from the canal, I do not consider that this present polluted condition of the waterway constitutes an existing, real and present menace to the health of the inhabitants of Joliet or Lockport.

Typhoid bacillus in the water is very sensitive to chlorine. With an adequate concentration of chlorine it will kill the typhoid bacillus. I am not a sanitary en-
2470 gineer but I believe in drinking water the usual accepted concentration effective for disinfecting the water at the point of discharge into the mains is one-tenth part per million. I also believe that the commonly accepted standard for disinfecting effluent from sewage that has undergone primary settling is five-tenths parts per million for a period of 15 minutes. So that if you had residuals, to that extent they are greater and your typhoid bacilli would be destroyed.

I do not think flies might be of importance in the transmission of typhoid germs from the canal. The house fly is the only insect that has been strongly incriminated in the transmission of typhoid fever. This was best worked out and brought most forcibly to the attention of public health workers at the time of the Spanish-American War, when there were terrific epidemics of typhoid fever in the various army encamp-

ments. Under those circumstances there were open privies, open pits, filled with fresh excreta from the men, and hordes of flies were going from the excreta to the mess kitchens and mess halls, and back and
2471 forth. That situation is quite different from this. Flies will not light upon the water and I doubt that there are very many typhoid bacilli. I do not agree with the testimony of Dr. Louis J. Frederick, Health Commissioner of the City of Joliet, appearing at page 458 of the record in which he said: "This material dries, the sun dries it. I am talking about the scum now, not the water, the scum on the water. They light on it and the sun dries it, and they light on it and it is carried, wafted away by the winds, where no one knows how far they carry it, but it has been known to be carried for miles." The typhi bacillus, as I have said, is a relatively delicate organism. It is readily destroyed by sunlight and by drying, and under the circumstances given there I believe you would not have any live typhi bacilli.

2471 I do not agree with Dr. Frederick's statement appearing at page 451 of the record where he said:

> "The scum that forms in the canal is loaded with bacilli that we call colon bacilli, the odor of which you will probably never appreciate unless you smell it and if you smell it once you will never forget it. It is one of the most deadly odors of any of the germs that we have in the human body, the colon bacilli".

The colon bacilli, per se, do not have any odor. As a mater of fact when I used to run water samples for the Minnesota Health Department I used to deliberately sniff my endosagar plates of pure cultures of colon bacilli because I liked the odor which reminded me very much of freshly-baked bread. Mosquitoes do not transmit typhoid fever.

Cross-Examination By Mr. Wallenstein

The trip I spoke of yesterday was my first visit to 2473 the Brandon Road Pool. I performed no laboratory experiments with reference to the gaseous odor given off; just smelling. I observed no gas bubbles on the surface of the pool. In speaking of communicable diseases I think particularly of the diseases which are reportable to me in the New York State Health Department. There are some 35 reportable diseases in New York.

2474 I don't know whether I can give all 35. I can start off. Diptheria, scarlet fever, anthrax, glanders, bacil- 2475 lary dysentery, amebic dysentery, undulant fever, trichinosis, Rocky Mountain and spotted fever, typhus fever, paratyphoid fever. The communicable disease classification of Illinois are quite similar one state to the other. I do not consider hydrogen sulphide poisoning a communicable disease. I am not a toxicologist. I have had little direct experience with hydrogen sulphide poisoning.

2476 I do not believe that a polluted stream would give off sufficient hydrogen sulphide to be a public health menace.

2479 If sufficient hydrogen sulphide would generate from that stream so as to affect the large percentage of the population of that community through toxic effects from that gas itself, then I would consider it to be a public health menace. I am not a toxicologist.

2480 I think that one has to distinguish clearly with regard to hydrogen sulphide between an odor from hydrogen sulphide but in insufficient concentrations to cause toxic symptoms, and sufficient concentrations of hydrogen sulphide to actually cause toxic symptoms from the hydrogen sulphide itself. I do know that you can have enough hydrogen sulphide to give a very distinct odor and yet have it be far below that necessary to cause toxic symptoms. I do not know what that percentage is.

2481 I can only say that it is beyond my comprehension, without being able to back it up with scientific data, that sufficient hydrogen sulphide would be generated to cause ill effects from the hydrogen sulphide itself, that is, the toxic effects. I was quite familiar with a situation not unlike this, a creek that was very severely polluted which runs through Gloversville and in through Johnstown and finally empties in the Mohawk River. Gloversville treats only a fraction of its sewage. Furthermore there are many tannery wastes. Johnstown empties all its sewage into that same little creek, with the result that every summer we had septic conditions, due to the bubbling from this gas, and I had many complaints as District Health Officer because of

2482 the nuisance created by that stream, but at no time during the four years I was District Health Officer in Amsterdam was any illness attributable to the hydrogen sulphide given off from that stream.

I have no idea as to the percentages of hydrogen sulphide given off by a stream required to create nausea in the ordinary person. I have no idea as to the parts per million. I believe, as has been brought out in the medical testimony prior to this time, nausea is a subjective symptom. Furthermore individuals can become nauseated, and so on, through the psychological effect of an odor. It would not mean that it was due to an actual toxic effect from the concentration of gas. I think it is necessary to keep these two things separate.

2483 It is difficult to answer whether, if a nausea condition results from the odorous gas, I would consider the source from which that gas emanates a health menace. If the individual is suffering from these symptoms because of a sufficiently high concentration of gas so that the symptoms are actually the result of toxicity, yes. If it is the result merely that the individual has a very nervous temperament and is easily upset by stimili which, to the average individual, would not cause any disturbance, then I would hardly say the gas was causing ill health in that individual. He might be nauseated, he might even vomit.

With the assumption that in a community it affects generally the people in the same way, causing nausea, vomiting and lack of sleep, and was carried on over a period of time of, say, fifty days, I would say that it was a health menace.

Mr. Clausen

2484 I am simply familiar from my own experience with the fact that one-tenth part per million is the accepted chlorine treatment for water. I am always dealing with water-borne outbreaks and so on, and that is a figure I know that is frequently given as the desired residual at the point of distribution, that is, one-tenth to two-tenths parts per million. I believe frequently
2485 they put in two-tenths to be sure. In stating that the accepted chlorine treatment for water is one-tenth parts per million I mean that I think it is generally conceded that if you have one-tenth part per million residual of chlorine in your drinking water at the point of entrance into the mains of the distributing system that is considered sufficient to kill the usual pathogenic organisms. That, of course, is after the water has been filtered.

2486 I don't know how much would have to be applied before you get the residual. That would vary, of course. By "residual" I mean the amount of chlorine that you would find by the orthotolidin test.

2487 I have heard from time to time that five-tenths parts per million is the accepted chlorine treatment for sewage effluent. I think that is one of the standards that is used. I have never checked up the amount of chlorine applied to sewage works effluents. I do know, however, that the typhoid bacillus is very susceptible to chlorination.

2488 I said five-tenths parts per million after a 15 minute contact with this sewage effluent was sufficient for a primary sewage works effluent. I don't know how much would be applied. It would vary according to the sewage, undoubtedly. I do not know what range it would be. That is not within my province. I was down at Brandon Pool yesterday (September 24th). We left Chicago right after lunch, I presume around one, two o'clock. We caught the five twenty-five train back from Joliet so I think that gives you an approximate idea.

2489 I presume we took about three-fourths of an hour to an hour altogether going back and forth and across in Joliet, up at the pool and back again and into the city. We traveled by automobile, but we got out at these points.

The Master

2491 I have never in my experience heard of germs being wafted through the air from a polluted stream. I agree with the testimony by other doctors that the only possibility of health trouble from this stream would be either by the drinking of the water or by swimming in it. The suggestions in the testimony of the doctors at Joliet that nose, throat and sinus ailments had been experienced because of the fact that there were streptococcic germs in the water of this polluted stream does not fit in with anything in my professional experience.

DR. JOSIAH J. MOORE

Direct Examination By Mr. Naujoks

2649 I am located in Chicago, Illinois. I am a physician and pathologist. I graduated from the University of Montana, A. B. 1907. I am assistant in research with Dr. Ricketts at the University of Chicago. Was Fellow

in pathology 1909-1910 and assistant in pathology at the University of Chicago in 1911-1912. Graduated from Rush Medical College 1912; Master's Degree from University of Chicago in pathology in 1915; taught pathology and bacteriology at the University of Illinois from 1913 to 1921; was director of National Pathologi-
2650 cal in Chicago from 1921 to 1936; director of the Moore Clinical Laboratory from 1936 to the present. I worked with Mr. Jenkins in examining the culture plates exposed to the air in the vicinity of the Illinois Waterway at and near Lockport and Joliet. I found the bacterial forms on the plates as indicated on Opponent's Exhibit No. 7. On these plates we found Hay baccillus; also
2651 diphtheroid bacilli, which is non-pathogenic and are non-disease-producing and may be found any place; and we found molds and streptobacilli and some staphylococci. Some forms of staphylococci are pathogenic, but these were of the large type, grew very readily and we did not think they were pathogenic. These are the usual bacteria one might find in air any place. Some of these tests made July 16, 1940, were made at points
2652 away from the waterway. It is my opinion that all the bacteria which may be found in scum on the surface of a polluted waterway would not be blown away in such a way that they would cause a hazard, producing disease to people along the waterway. No epidemic could occur or break out in a community adjoining a waterway containing untreated or partially treated sewage as a result of the transmission of germs or bac-
2653 teria from such a waterway by air. It is my opinion from my analysis of the air in the vicinity of Joliet and Lockport along the Illinois Waterway, that there

is no danger to the health of the people along that waterway.

Examination by The Master

2654 It was suggested to us that we take tests beside the waterway, over the waterway, in places on bridges and 2 or 3 miles on either side of the waterway. Strep-
2655 tobacilli, Key No. 3, was at a point about 4½ miles east of Joliet. Streptobacilli is not a source of disease. You may find staphylococci in any air. I considered them not pathogenic.

Cross-Examination by Mr. Wallenstein

2656 If there were pathogenic bacteria, insects and flies lighting on these sludge banks might carry it.

Examination by The Master

2657 Flies would usually alight on solid material on the surface of the water. If there were germs on the material they would get them on their feet and carry them on their feet. Flies would have to carry that material to food which was eaten by people. Typhoid fever is the common disease resulting. There is no basis for any suggestion that germs from this water
2658 might cause streptococcic infections in the throat or nose. If you had an epidemic of streptococcus infection, it would be due to contact carriers and not by any water. If it was from sewage, then you should

constantly have an epidemic of streptocuccus sore throat in that locality, and that can be easily checked up and determined whether it is constantly there or whether it is just like we find it in any other city or community not in contact with the canal or not in contact with exposure to this material. You could not get streptococcic sore throat through odors. Streptococci would have to be in the sewage and you might get it from a person having the streptococcus enteritis and then the individual would drink that and get those streptococci in his throat. You could live along the
2659 banks and breathe the air all your existence and would never have to worry about getting a streptococcic sore throat.

Cross-Examination by Mr. Wallenstein

2764 Mr. Jenkins took the tests, brought them in, and I examined them with him. The plates in the tests would indicate only air-borne bacteria. If insects got on the plates it would tell what was brought by the insects, but we were out for air-borne bacteria primarily. We
2765 could not find any evidence of any insects or flies on the plates. Unless the sludge banks contained pathogenic bacteria that was blown on tne plate it wouldn't be reflected in our test. It would have to get into the air and get over to the plate through the air. The stream or sludge banks could contain a large amount of pathogenic bacteria on the day these tests were made and it would be possible for some of the bacteria to be carried by flies and insects. If the insects had walked

upon any of the material that bacteria would be carried. I could not give the exact amount of B. coli con-
2768 tained in the stream and sludge banks where these tests were made. I do not have an opinion as to whether or not the sludge in the stream would contain any pathogenic bacteria. With the exception of B. coli, B. coli is considered pathogenic, but it is non-pathogenic when our colon is filled with it, but if you get the coli out into other tissues you will have an infection from the B. coli. Other than B. coli we would
2769 have to prove that there were pathogenic bacteria in the stream. The name bacterium coli is given to that organism which is found in the intestinal tract of man and the lower animals in large quantities, and when it is in its proper place it is non-pathogenic.

Examination by The Master

There is no other source of danger from it besides the instances given. If it gets into the blood where it could be carried you could have abscesses in various
2770 parts of the body due to the B. coli, but other than that we very seldom find it except as secondary to other infections where we may have a peritonitis due to some other organisms. B. coli, due to injury to the intestinal wall, may get through and might make it worse. You might B. coli in lymph nodes if cultures were made or you might find it in arthritis sometimes where looking for other organisms. You might have B. coli introduced by injection if you had B. coli on a needle giving an injection. If you didn't give it by

2771 penetrating the skin you would have to have it in through your mouth. Say you had an instrument contaminated with B. coli and a doctor giving an injection of vaccine or something like that and the coli organisms were on the needle or had a vaccine that had live coli in it, you could get an abscess. You could not get it by breathing the air over this Waterway.

Cross-Examination by Mr. Wallenstein

B. coli is the indicator of fecal contamination and tests are made to show whether water is palable or drinkable. If the water in Brandon Road Pool had from 10,000 to 40,000 B. coli per cubic centimeter it would indicate the presence of fecal material or the water was in contact some way or other with fecal matter, but it
2772 would not indicate pathogenic bacteria. There is no criterion on the amount of B. coli to be contained in a cubic centimeter of water that would indicate the presence of pathogenic bacteria. Any B. coli in water makes it dangerous for drinking and the standard test we use is 10 c.c. of water for the amount. So if we find any B. coli in that 10 c.c. water it isn't fit to be taken for human consumption. I did not make any attempt to determine the amount of hydrogen sulphide in my test.

Redirect Examination by Mr. Naujoks

2773 We have no test by which we can differentiate the coli that might get on the feet of the fly in these various locations, such as sludge or scum or garbage dumps or farm yards or fertilized fields or privies or other places where decomposing organic material is present. Assuming that flies carried pathogenic bacteria such as B. coli to the food of some individual so that he might be contaminated, I could not determine whether that came from the Canal or where it was.

ROBERT C. JENKINS

Direct Examination by Mr. Naujoks

2639 I reside at Glen Oak Acres, Glenview, Illinois. I am a clinical laboratory technician. I have been working at that occupation about 16 years. I had about six months training in a hospital at Baltimore, Maryland prior to that time. I have made tests of the air in the vicinity of Joliet and Lockport along the Illinois Waterway. (Opponent's Exhibit No. 7 offered and received in evidence, pages 2641 to 2646.)

2647 We took 22 prepared plates, 11 nutrient agar and 11 Sabouraud's dextrose agar, and exposed these plates in the location specified by removing the cover of the plate and leaving the surface of the agar exposed to the air. We exposed plates at five locations on the west bank of the canal and river from Lockport to Joliet, and five plates on the east bank of the river between Lockport and Joliet, and six locations about seven miles west of the canal and the river, and six plates about four miles east of the canal and river, scattered along a line opposite Lockport to Joliet. I made these tests July 16, 1940. After proper exposure we took
2648 them back to the laboratory. We then put them in an incubator at body temperature for 48 hours. Then we

examined the plates and made counts of the colonies of bacteria present on each plate. The bacteria forms indicated on the exhibits (Opponent's Exhibit 7) are the ones found at the several plates which were exposed during the time indicated and at the locations indicated. Dr. J. J. Moore worked with me on the examination of these plates.

Direct Examination by Mr. Naujoks

Witness identifies locations indicated in Opponent's Exhibit No. 7 (p. 2722 to 2724).

2724 Cross-Examination by Mr. Wallenstein

I would judge that these tests were taken just for the purpose of determining the amount of bacteria that is air-borne and to make bacterial counts in an area along the river between Joliet and Lockport and from 5 to 10 miles away from the river. The only bacteria
2725 that could be reflected on the slides would be blown on by the air or carried by insects. We made a microscopic examination of smears from colonies selected from the plates. In one case out of all these tests I saw some form of insect on the plate, and this was away from the pool. I did not make any actual slides of the sludge or scum deposits in the river to determine what
2726 bacteria was present. My tests were to determine the bacteria in the air. I can only say that insects do carry thousands of bacteria on their feet from what I have read in newspapers and if that be true and insects

had come across those slides you would have thousands and millions of bacteria and we would expect a higher
2727 count on the plates. These tests were not made to in any way determine any hydrogen sulphite content in the air. They would not reflect anything as to the composition of any gaseous odors given off.
September 23, 1940

Direct Examination by Mr. Naujoks

2145 DR. NORBERT ENZER. I live in Milwaukee, Wisconsin. I obtained my Doctor's degree of Medicine at McGill University in Montreal, Canada in 1923 and then spent four years in post-graduate work in New York and Chicago and in April 1927 I became the Director of Laboratories at Mount Sinai Hospital, Milwaukee, and I have been director of those laboratories since then. In addition to that I have been engaged in
2146 private consulting practice for the past seven years. In a casual way I am familiar with the order of the United States Supreme Court dated April 3, 1940 appointing a Special Master to make summary inquiry in this matter, and I am familiar in a general way with the Sanitary District Canal and the Illinois Waterway and the Brandon Road Pool at Joliet. We drove along and around it today (September 23, 1940).

2148 It is my opinion that any odors that might at any season be given off by that canal would not constitute a menace to health. It is my opinion that if that waterway was used for drinking or bathing it would constitute a menace. If it wasn't used for drinking or bathing or physical contact with a human being I don't think it is a menace.

2149 Assuming that the Illinois Waterway is not used as a source of domestic water supply by any of the communities along such waterway, and that such waterway is not generally used for bathing or other recreational purposes at Joliet it is my opinion that such waterway would not constitute an actual menace to the health of the inhabitants of Joliet and Lockport merely by reason of the fact that such waterway flows through the City of Joliet. One reason for my opinion is that any source of this kind would have to be judged, so far as its menacing qualities are concerned, by the history of its effects. It is a menace if it has produced ill effects. If over a period of years sufficiently long to allow for the mathematical corrections incident to
2150 an epidemilogical study such ill effects have not been shown, then such waterway wouldn't be a menace.

Then one could approach it from the standpoint of whether incidental accidents might occur, occasional accidents might occur from such a polluted stream. For example, at one point in the canal a break might occur and water might seep into the soil and somebody might be tapping a well later on through that soil. That would be an accident and would constitute a menace and hazard to health, but it would be due to something not inherent in the merits or demerits of the waterway. It could happen in any structure of that kind. It could happen in a sewer. It could happen in a city waterway.

How this thing would constitute a menace, I think is fairly simple. It must produce a contact infection. In other words the individual must consume the water, or he must bathe in the water, or it must contaminate dishes or kitchenware, but other than that I don't think that it would constitute a menace to health because I don't believe there is any evidence by which we can determine that there are air-borne diseases from a structure of this kind.

2151 Air-borne diseases, as a general rule are not derived from moist surfaces. They are more generally derived from dry surfaces. So, outside of the discomfort or annoyance of an odor to which one might not be accustomed, I don't believe there is any menace to health. Odors can be annoying; they can be a source of discomfort; they can produce even symptoms on occasion, but they are transient and they are evanescent, they don't cause a disease, they don't undermine health and, as a general rule, people who are constantly exposed to the same odors rapidly become adjusted to them so they very soon become less conscious of it and finally do not notice it at all.

2151 It would be impossible for that Waterway to project bacteria into the air from the scum which may be found along the sides of the Waterway or the walls of Brandon Road Pool. It hasn't any propulsive force of its
2152 own; it isn't a spray. Bacteria do not fly. They have to be carried away and wherever there is a moist surface, and particularly a gummy or sticky surface, bacteria are less apt to get loose. They are more apt to stay on such a surface. They flourish and grow there —that is, certain kinds of bacteria do, and when we use the term "bacteria" you must remember that not all bacteria are harmful or pathogenic to the human. Some are very beneficial and to use the word "bacteria"

in its inimical sense I don't think would be giving the right impression.

I have read the testimony of Dr. Frederick in this case. I do not agree with his opinion as to the effect of the Waterway upon the health of the inhabitants of Joliet.

2153 It is my opinion that increasing the diversion of water from 1500 cubic feet per second to a total of 5000 cubic feet per second, plus domestic pumpage, wuoldn't affect the menacing qualities of that stream, if there is a menace there.

Cross Examination by Mr. Wallenstein

Today is the first inspection I have made of the canal. It is the first time I have ever been that close to it. I have driven by it on a number of occasions, but never with this sort of thing in mind. We didn't make any tests; we simply looked at it. An odor was perceptible today; I would describe it as the odor of oil.

2154 I did not notice any sewer odor. The nearest thing to a sewer odor came, I believe, at the Brandon Pool. There was a garbage heap on the south of the canal, just off the bank of it. There was a very distinct, malodorous quality of the air there, but other than that I didn't notice any. I am not a toxicologist, but toxicology forms part of my practice. I don't like to consider myself eminently qualified as a toxicologist. I have had experience with the effects of gases on the human organism. I said that I detected an odor of oil and that, I think, perhaps, answers your question as to what various elements constituted the gas given off by this canal. I didn't detect any odor of gas.

2155 There is a mixture of fumes in the odor ordinarily given off by a stream which carries raw sewage. There are sulphide compounds, nitrogenous break-down, methane. I don't think that one could limit them except to say that they belong to the results of the breakdown of nitrogenous material.

No, I don't think the odor I smelled today was resultant from any sewage. It didn't suggest that to me at all. If the canal gives off such an odor I haven't experienced it. If it did give off such an odor hydrogen sulphide would be one of the gases given off; methane would be another gas.

2156 I would hazard the guess that hydrogen sulphide would be a very low percentage of such a gas. I wouldn't want to state an approximate figure because I don't believe one could arrive at a figure of that kind unless one made a large number of tests over a sufficiently long period of time. Excluding carbon monoxide, I have never run into any actual cases where there have been tests made as to the effect of sewer gases upon populations in any other cities. I am not familiar with tests made in Paris as a result of the sewer gas. I would use the word "menace" with respect to health as applied to something which was actively a menace. In other words, it would pronounce deleterious effects to health to a sufficiently large number of people who came in contact with it so that one could say that it eliminated the accidental factor of some particular or
2157 peculiar individual's susceptibility.

To give an opinion as to what effect a sewer gas odor would have upon the population in Joliet if the same was given off for, say, periods of three to four weeks constantly, I think you would have to lay before me the extent of the penetration of the gas into the community, the constancy of its flow, the amount of flow. It would all be important. One must distinguish between an odor and the sewer gas. I am testifying in answer to the questions that were given me and I did testify that I hadn't detected any sewer gas. The only odor I detected is that which I describe as nearly as possible as the odor of oil. I detected no hydrogen sulphide.

Mr. Clausen

2158 The only familiarity I have with the Sanitary Canal is the result of an inspection trip I made today, plus a map that was given to me, and a transcript of some of the testimony that went on here, and a statement of the problem involved. I don't know anything about the bio-chemical oxygen demand of the Sanitary Canal. I don't know anything about the number of colon bacilli that are located in the water of the canal. I don't know anything about the pyogenic cocci or the staphylococci or the streptococci that are in the canal. If a stream were heavily polluted with those bacteria or germs that would have no bearing on my testimony.
2159 As a matter of fact I answered it fully in the belief that that stream was heavily filled with bacteria. I simply assumed, because of the very nature of the stream, that it would have a high bacterial content. I

don't think that would affect my answers at all irrespective of the number of count or anything else.

The Master

I am a Director of Laboratories at the hospital, labeled as a pathologist and in my department I have charge of all of the investigations that go on in the hospital which involve bacteriology, serology, chemistry, toxicology, examination of tissues, and so forth. My practice is to advise doctors with respect to questions which may come up in the examination of specimens or patients and so on.

2160 It is my opinion that if this water is not used for drinking or bathing, there is no likelihood that people would be made sick, and I am assuming that the B.O.D. is high in this water.

2161 It did happen in the past that Chicago didn't treat its sewage and dumped it all untreated, and I don't think the records show that any ill health resulted from it, and we have situations all over this country where open sewage, untreated sewage, is dumped into open streams, and even water taken from those streams for drinking purposes and still it hasn't been established that constitutes a menace to health, providing the water used for drinking purposes has been filtered and treated. If by calamity the sewage system of any large city were destroyed by bombs or otherwise, and you had a lot of untreated sewage, pestilence might ensue. It would ensue because such untreated sewage would contaminate drinking water or food, and only in that way.

2162 If the Supreme Court had said "We won't allow
any time, even though you haven't got your treatment
plants constructed yet; we won't allow you to take
any water from Lake Michigan" nine years ago, then
Chicago would have had to dump all of its sewage
out on some open territory. That would constitute an-
other type of danger. When you are dumping sewage
out into open territory then you are permitting a type
of proliferation of insects and lower animals which
would permit the dissemination of a disease by insect
carrier, which doesn't obtain in this sort of thing we
are talking about today. That is why I pointed out that
there was a garbage heap on the bank of this canal,
which I considered far more important as a possible
menace in that particular little sphere than the water
itself. The explanation of the Health Commissioner of
Joliet as to how this might be a health menace because
of insects, flies spreading disease from the sewage in
the canal would not tie up with what I have just said
for several reasons. One is that sewage that is in that
canal has been converted and partially oxidized and
2163 probably to a very great extent has been oxidized.
Secondly, there is an oily film on that water. A scum
forms from the sewage. The bacteria that are in that
sort of material are not the bacteria that have patho-
genic qualities. Those have been destroyed long since.
I don't think flies lighting on the surface of that water
would pick up anything very damaging to carry away
and deposit on people's food or hands or that sort of
thing.

In the case of flies picking up bacteria from sewage dumped out on an open area of land that could be made

a source of illness by their flying to kitchens, restaurants and food shops and bakery shops and open-air vegetable stands, light on them, deposit the bacteria there, and finally carried on to where the human being consumes them. The only way this can be made a source of illness is by this being taken in by some injection process into the human body by eating or drinking, and also by bathing. Contact with the skin can produce ill health
2164 too. It can produce inflammations of the skin and diseases of the skin. Then too, contact with the skin makes it possible for an individual's hands to become infected with material and later on the material on the hands is transferred to food or on to the mouth and eyes and so forth and produces disease. I don't think a sting by a fly that had alighted on a sewage dump would produce a skin disease. I am not personally aware that a disease has been transmitted to the skin by direct contact of the fly. I think it is almost entirely contamination of food or the utensils that are used in the preparation of food.

I don't think it might happen that a fly alighting on untreated or partially treated sewage coming into this stream every day from the Sanitary District might carry disease because that material would be down at the bottom of the stream when it is fresh and the material that comes up to the top is the less harmful material. The new material is heavier and is apt to be at the bottom.

2165 The material at the top is unsightly and not very attractive from an esthetic point of view, but I don't think it is nearly as harmful as its bad looks might indicate. I don't think my answers would be any different if there were not oil in this waterway, as to the spread of disease. I merely mentioned the oil because it was the odor of the oil that I detected. Secondly, it was visible on the surface of the water. There is a further reason for my being of the opinion that flies would not spread disease from this waterway. The main fly that is responsible for the transference of bacteria in the sense that we are talking about is the common house fly.

2166 The common house fly lays its eggs in refuse deposits; it doesn't lay them on the water; its habitat isn't the water, but any casual inspection will indicate the many, many thousands of times more flies there are on a refuse or garbage heap than there is on the surface of even a stagnant pool.

Assuming that there was a menace it is my opinion that an increase in the water from 1500 c.f.s. to 5000 c.f.s. would make no difference because I don't believe that the sides of the canal and the eddies and pools that form in it would be washed clear in that way. Where the canal widens out around the Brandon Pool would allow for even greater accumulation of waste products because it would come down faster through the narrow part of the canal and then settle where the canal is widened out. I am not a physicist or an engineer, but it would be my guess you would have to have many, many times more rapid a stream to wash a menace out. If I were mistaken in my assumption that
2167 this new material went to the bottom—if it remained on top—so much more would it setle where the pool widened out. To the extent that there is more oxygen in 5000 cubic feet per second than there is in 1500

cubic feet per second, the additional oxygen in the water would oxidize the content of the stream and reduce any hazard that otherwise exists.

Mr. Wallenstein

If there was a gaseous odor given off from this sewage it probably would contain hydrogen sulphide. As-
2168 suming it had 100 parts per million of hydrogen sulphide, if an individual got a pretty good whiff of it before it became disseminated into the atmosphere he would probably feel a little bit nauseated. He wouldn't like the odor of it very well. You must remember that 100 parts per million at the source is reduced so rapidly by dissemination into the air that it would probably be immeasurable. Assuming that at the point of inhallation there was 100 parts per million and this is prolonged over a period of a week, I think it would be very disagreeable. It might cause nausea in some people. Whether it would have any effect on the nervous system would be indulging in a good deal of speculation. Some people might be made irritable and nervous by it and others would not, but it certainly wouldn't constitute a state of ill health of the nervous system as a physician would
2169 understand it. I think it would be speculative whether it would have any effect on the sleep of an individual. I think if a person told me he couldn't sleep because he smelt the odor then I would be obliged to believe him, but I would have tc make a statistical analysis of all the people in the community and find out how many were so affected.

If the inhalation is continued, such as one would have in a laboratory where hydrogen sulphide is escaping in a closed room, I agree with Dr. McNally's statement at page 396 of his book "Toxicology" where he says: "Concentration of hydrogen sulphide as low as 100 parts per million may cause local irritation and depression of the nervous system not unlike that following a prolonged course of bromides." In order to
2170 have a concentration of 200 or 300 parts of hydrogen sulphide gas per million cubic feet of air over a period of a week, it would be almost a physical impossibility unless one literally poured that gas through a conduit, because the escape of that gas in the general atmosphere so rapidly dilutes it. With that reservation I would say that the effects of 200 to 300 parts of hydrogen sulphide per million given off for a period of a week would have that many times the effect of a lesser concentration on the surrounding community. It would cause some depression; it would cause headaches; it would cause nausea, bad taste in the mouth; it might cause vomiting, and I think people could be made to sleep less.

2171 I agree with Dr. McNally's statement in his book that a concentration of as little as .005 to .01 per cent will cause a conjunctivitis, popularly known as gas eyes. That is a pretty high concentration. I also agree with his statement that if there was a diluted amount of hydrogen sulphide it would produce nausea, giddiness, cold skin, labored breathing, irregular action of the heart, and transient ventricular fibrillation. I agree with the statement that "In greater dilutions sleeplessness will be produced" and that "in exceedingly dilute conditions it sometimes occasions febril symptoms somewhat resembling typhoid." If he inhaled .15 per cent of hydrogen sulphide it would produce quite a few symptoms. It might be fatal if he got a good dose of it.

Mr. Wallenstein

2172 Loss of sleep might have an effect upon the health of a person. I can conceive, for example, that the loss of sleep that is going on in London now might affect some of the people there in an unfavorable manner, but loss of sleep as an incident, I don't think, contributes to ill health, and if the thing that produces the loss of sleep at the time sleep is normally expected is continued over a long period of time, the normal individual will readjust himself and find his sleep at other times. A man who works during the day and sleeps at night will be affected if he can't sleep at night; he will be tired. Loss of sleep might have an effect upon the convalescence of a person who has been ill. It would depend entirely upon whether you could distinguish whether the loss of sleep was arising out of
2173 factors not incident to the convalescence. If it was not it could produce ill effects. Assuming again a convalescent person who was unable to eat or became nauseated from causes other than something incident to the illness from which he is convalescing, I think that would have an effect in retarding his recovery.

Redirect Examination

Mr. Naujoks

I think it would be utterly impossible to have the concentrations of hydrogen sulphide mentioned in Dr. McNally's book under the conditions obtaining at Joliet.

I say so because hydrogen sulphide is soluble in the 2174 first place and a great deal of it will remain dissolved in the water. Secondly it comes up at best in minute bubbles over a large surface and within a few feet of the surface of that water its dispersion would be so great that it could never reach that concentration.

If anybody were exposed to hydrogen sulphide I would say that the people who went up and down this stream on boats would be closer to it than anyone else.

Mr. Cohan

The chief odor that arises from sulphur baths is a sulphur odor. It has hydrogen sulphide in it. I am not so sure that the odor most perceptible to the sense of smell that arises from the putrefaction of untreated sewage in a stream is hydrogen sulphide. I think there are other odors that are just as readily if not more readily perceived by the human smell than hydrogen sulphide. The product of the combustion of nitrogenous material, the breakdown of bacterial fermentation contain other substances which I don't think we can label by a name. We simply speak of them as putre-

2175 factive odors that one will be often more pungent and, therefore, more detectable than the hydrogen sulphide content.

With this waterway as we know it today I think any danger there would be speculative, except within the limits of the actual consumption of water. The danger or menace is not real and immediate.

Recross Examination

Mr. Wallenstein

I have never made any experiments as to the effect of the hydrogen sulphide from Brandon Road Pool.

Redirect Examination

Mr. Naujoks

2176 I have been to Mt. Clements, Michigan and French Lick health resorts where the hydrogen sulphide content in the water and the air is very high. Those are places where people go for health purposes.

Recross Examination

Mr. Clausen

I would say fundamentally my testimony has been based upon my medical education—my experience in medicine. The inspection I made today was, I think, of secondary importance. My inspection was contributory so that I could bring into play my medical training and experience. This was by automobile; we just drove around. I think if anybody had given me a good
2177 map of it or a good picture and described the conditions I think I could have answered the questions just

as satisfactorily. We left Chicago a few minutes after ten Chicago time and got back to the Loop about one o'clock. The actual driving time took about an hour. September 23, 1940

Direct Examination

Mr. Naujoks

2178 DR. EDWARD RICHARD KRUMBIEGEL. My residence is Milwaukee, Wisconsin. I am Commissioner of Health of the City of Milwaukee. I received my M. D. degree from Marquette University in 1935. I was instructor in biochemistry at Marquette University School of Medicine in the school year of 1930 and 1931. I served my interneship in the year 1934 and 1935 in Gorgas Hospital, Encon, Panamal Canal Zone. I was in the United States Public Health Service at the United States Marine Hospital, Memphis, Tennessee from 1935-1936. That is from July to July. I was resident physician in St. Luke's Hospital, Milwaukee from October 1936 until January 1937. I was Director of the Bureau of Communicable Diseases in the Milwaukee Health Department from January 1937 until July 15, 1940, and I have been Commissioner of Health since July 15, 1940.

2179 In a general way I am familiar with the order of the Supreme Court dated April 3, 1940, appointing the Special Master to make a summary inquiry in this case. In a general way I am familiar with the Sanitary Canal, the Illinois Waterway and the Brandon Road Pool at Joliet. I made a personal inspection trip of the Sanitary Canal and Brandon Road Pool at Joliet today.

It is my opinion that no odor emanating from the Illinois Waterway in the region of Joliet or Lockport directly and solely of itself is the cause of any disease in the people living along the waterway.

2180 As I have observed the Illinois Waterway today I do not believe there is an actual menace existent to the health of the inhabitants of Joliet and Lockport, but there may be a potential menace under certain conditions. Those conditions, however, are not operative at the present time. Assuming that the water from the Illinois Waterway is not used for domestic purposes or drinking purposes by the inhabitants of Joliet and Lockport and that such waters are not used for bathing purposes by such inhabitants, I believe that the Waterway does not constitute a menace to the health of the people living along its course.

Cross-Examination

Mr. Wallenstein

I have never before today seen Brandon Road Pool.

2181 We drove along the course of the Pool from its end at the Lockport locks, I believe it is, to the end where the locks are distant to the City of Chicago. Then we stopped along the side of the pool, climbed up on the retaining wall or the banking wall of the pool to observe the water and the odor. We also stopped for a short period along the course of the river just below the locks at the distal end of the pool.

We didn't perform any experiments while we made our visit and inspection. We observed the surface of the pool and the odor of the air in the immediate vicinity of the pool. The odor was distinctly that of oil. There was also, in some places, a faint, what I would call, musty odor, such as we frequently are able to detect along the course of bodies of water which are stagnant and in which there is some decaying organic matter.

2182 There was no odor there of sewage. There was an odor that might have been due to, and I believe was due to, putrefaction of nitrogenous material. That same odor could be reproduced by allowing leaves to undergo decomposition partially and then throwing them into water. I didn't detect any odor there that was distinctly that of sewage in contradistinction to other odors emanating from putrefying organic material other than the odor of garbage which had been deposited along the bank of the river just below the pool. Insofar as I have been able to smell them on many occasions, I am familiar with the composition of the gaseous odors ordinarily given off by sewage putrefaction. I have never made any chemical analysis. Many volatile substances undoubtedly get into the air from
2183 sewage. I am not familiar myself with any study that has been done to break down the odor itself into its various component parts. Hydrogen sulphide is one gas that is sometimes discernible in the presence of seweage.

My opinion as to the effect upon a person who inhaled gaseous odor of which there was 100 parts per million hydrogen sulphide is that a concentration of 100 parts per million of hydrogen sulphide in the air is a rather high concentration of the gas, and under such circumstances a person might suffer discomfort. He might be made ill, depending on the person. Some people could, undoubtedly inhale a higher concentration than others without being made ill. Hydrogen sulphide poisoning is not a communicable disease, and it is correct that any effect upon an individual from hydrogen sulphide poisoning would not be reflected in any table of communicable diseases.

2184 When I made the statement "It is my opinion that no odor emanating from the Illinois Waterway in the region of Joliet or Lockport, directly and solely of itself is the cause of any disease in the people living along the waterway" I meant by "disease" any disease.

2185 I would include all disease under that statement as not being caused directly and solely by odors which might arise from the Ililnois Waterway. As a doctor I would call hydrogen sulphide poisoning a disease.

The effect upon a person inhaling 200 to 300 parts per million of hydrogen in the air would vary to some extent with the person that was inhaling the gas; but generally speaking, it would probably cause nausea, it might produce vomiting. If the exposure was long continued it might result in headache, depression. If it was continued long enough derangement of the temperature controlling mechanism of the body might result, as well as derangement of the cardiac, heart controlling center.

2186 If a person suffered from nausea and the various symptoms I have mentioned, and those symptoms result from inhalation of a gaseous odor, I would say that the source from which there odors emanated were a menace to that individual's health.

Mr. Clausen.

As to there being a possible menace to the health of the communities along the canal, the hazard in case of the occurrence of unusual conditions would be materially greater in proportion to the increase in pollution of the Sanitary Canal. For instance, if an individual was to inadvertently drink some of the water, the hazard would be greater in proportion to the increase in pollution.

The heavier the pollution the greater the possibility is that there would be higher concentration of hydrogen sulphide, but I would find it difficult to conceive of this Illinois Waterway giving off so much hydrogen sulphide as to cause illness in the people residing along the course of the Waterway. The more polluted a stream is, the more possibilities there are of there
2187 being more hydrogen sulphide given off. The greater the amount of water, the greater the dilution of the sewage, and the less possibility of there being so much hydrogen sulphide given off. My inspection trip was the same as Dr. Enzer's. We left here around ten o'clock and got back around one o'clock. We crossed the Sanitary Canal at a number of points but we stopped at those two places at Brandon Pool to get right up next to the water. The two places I have reference to are the ones I mentioned before—one
2188 along the embankment of Brandon Road Pool, I should say approximately 1000 feet this side of the dam at the distal end, as well as the wall of the river about 800 or 1000 feet beyond the dam. As near as I can orient myself after driving around it seemed

to me that the wind was blowing from a southeasterly direction. It may have been south. At least as we were driving along the west bank of Brandon Pool the wind was coming across the pool toward us as well as along its length.

I have no knowledge as to the number of colon bacilli in this canal—no figures from any laboratory to support it, but I would assume that the colon index
2189 in the water there is quite nigh. I do not know what the amount of pyogenic cocci or staphylococci or streptococci there are in the canal. I don't know anything about the biochemical oxygen demand. I have heard these articles from Dr. McNally read as to the effect of hydrogen sulphide upon the human person, and I agree with those statements.

The Master.

2190 It is my opinion that as long as this canal is not used for drinking or bathing there is no potential menace to health. I would want to qualify this statement about drinking to also cover, as another potentiality, the fact that it might get into wells under certain circumstances. If you exclude the possibility of the water being used for drinking or bathing I would say there would be no potential menace from the presence in this stream of partially treated or untreated sewage.

2191 I was asked whether there would be more hydrogen sulphide in the air now than if the amount of dilution was considerably increased. It is my opinion that that statement is true when we consider the entire Sanitary Canal. If the amount of flow was increased, the amount of available oxygen would be increased, but that would not necessarily mean that there might not be a higher concentration of obnoxious gas at any one particular point. If the velocity was to be increased in a narrow channel and then we broaden out that channel, the settling will occur there, whereas with the lesser velocity it might occur up farther.

2192 From a health standpoint the presence of hydrogen
sulphide in the water, assuming the water is not
drunk and is not used for bathing, would have no
health significance whatever as long as it remained
in the water. If it got into the air that would all depend
on the concentration. As the gas would arise
2193 to the surface, it would, of course, be diffused immediately
into the atmosphere and people could develop
symptoms from hydrogen sulphide only if there
was enough hydrogen sulphide in the air to affect them
and that, of course, would vary to a considerable degree
with the individual. Some people might find
the fecal material of cows very obnoxious and yet we
have millions of farmers that live in and around such
fecal material every day.

There very likely would be some hydrogen sulphide present in the regions of dumps, the region of packing plants, especially if they were not kept in sanitary condition. In other words if the intestinal material was allowed to lie about and putrefy, such odors might occur.

2194 The amount of hydrogen sulphide would have to be pretty great to bring about derangement of control systems, cardiac control systems, and brain control systems.

There are no available figures that I know of, of experience as to epidemics having been caused solely by hydrogen sulphide in the air. These statements read to me from this textbook merely went to the extent of saying that there were cases on record where hydrogen sulphide might produce the results described. Such a set of circumstances might easily arise in a laboratory where a man was generating hydrogen sulphide to be used in some particular experiment. There the concentration in the air might get up to a rather high level. I do not know of any recorded cases where illness among a substantial number of people has been traced solely to hydrogen sulphide in the air.

2195 I think in that connection we must remember, too,
that when we speak of nausea, loss of appetite, and
things of that type, we are speaking of symptoms
which are not open to proof of any kind. If we find
an individual vomits we have objective evidence of
of his vomiting. We know he vomited. I could say
now that I have a terrific headache and nobody in the
world could prove or disprove that I have or have not
that headache. If he vomited today and didn't vomit
after today I would say he wasn't sick, but if he vom-
ited every day it might produce serious results, and
if a number of people vomited every day that would
be quite a serious situation from the health stand-
2196 point. If I were of the opinion that the presence
of this sewage in the canal might any day cause a
considerable number of people to vomit every day
I would consider it a serious health menace.

It is possible that hydrogen sulphide can be given off from a polluted stream of water. The temperature of the air and the temperature of the water would have some bearing on that. Bacteria, for instance, in fecal material comprises a considerable percentage of the total solids in the feces, and in the destruction of such bacteria certain protozoa are brought into play in
2197 the water. They ingest them. In fact the bacteria serve as a food for certain types of protozoa. The protozoa are much more active in warm water than they are in cold water. They propagate more rapidly as well as being individually more active. On the other hand, the colder water is, the more oxygen it can retain. As we heat water we will drive the gases dissolved in it out until after we boil it a while we have driven off all the gases in the solution. The warmer the day the more apt there is of hydrogen sulphide being given off.

Redirect Examination—Mr. Cohan.

2198 The most important odors given off at these sulphur baths would be that of hydrogen sulphide. I believe that is the one most perceptible to the sense of smell. It is my opinion that the present conditions along the Illinois Waterway do not constitute a real and immediate menace or danger to the health of the people.

Mr. Naujoks.

2200 I don't believe that under the present circumstances it would be possible for the Illinois Waterway to cause a concentration of 100 parts per million of hydrogen sulphide.

The Master.

By "present circumstances" I meant the way that it is presently being operated. That is irrespective of today or tomorrow or the next day. What I had in mind was this: that if the flow of water was to be stopped altogether, and it was to be drained and this
2201 sludge left to rot at the bottom, it might be possible —I even then would doubt it—to get a lot more hydrogen sulphide in the air than under the present circumstances. I am not basing my answer on any detailed information as to how much untreated sewage there is, or what the B.O.D. of that water is. What I had in mind was that if that thing was to be drained and covered over, then the air in this enclosed space might reach that concentration, but as long as it is open to the air where the gas can diffuse into the atmosphere, I don't believe it could ever reach that concentration.

Mr. Naujoks.

2202 The hydrogen sulphide would be diffused very rapidly in the air. I wouldn't be able to say whether there would be much hydrogen sulphide around oil refineries or not.

Recross-Examination—Mr. Clausen.

2203 I couldn't identify the particular volatile oils in the oil as a whole or low boiling temperature that I smelled out there today. Oil doesn't consist of any one particular thing. It is made up of many different molecular substances. I don't believe I could break down these gaseous odors that I smelled down there because I don't know what substances have been taken off from this oil. For instance, I don't know whether there is butane in the oil, or pentane, or octane, or heptane, or any of those substances, but I do recognize the odor of oil as a composite substance.

2204 The type of odor I am referring to would be just the same as if we had a gallon of oil here and we smelled of it.

Mr. Wallenstein.

The hydrogen sulphide given off in the gaseous odor emanating from a sewer doesn't necessarily mean from sewage, because I have smelt this musty odor emanating from storm sewers.

2205 Hydrogen sulphide given off in the gaseous odor from a sewer in which there is human fecal material comes from the decomposition of organic substances containing sulphur. Certain bacteria in the intestinal tract contain sulphur. Many of the substances we eat like eggs and onions and so forth contain sulphur. Meat contains sulphur. The hydrogen sulphide that is given off in this gaseous odor can emanate from the human fecal matter in the sewage in the stream,

but that isn't the only source of that odor. There is
2206 urine and oftentimes sanitary napkins go down in sanitary sewers; under certain circumstances blood might go into them and so on, and offal from slaughterhouses, and blood from slaughterhouses, waste material from canneries. I presume those materials go into the Sanitary District Canal here the same as they do elsewhere.

I have never made any analysis of the chemical composition of the gas given off from a sewer used to dispose of human fecal matter. The approximate amount of hydrogen sulphide that would ordinarily be contained in such gases would depend on the sewer, whether it was an enclosed sewer or whether it was an open sewer. If it was an open sewer so it could diffuse into the air the concentration would never reach a very high level. If it was absolutely closed so it could not diffuse the concentration of the gas might reach an appreciable level. I don't believe I could answer the question how high a level it might reach
2207 assuming it was a closed sewer because it would depend on the amount of organic material that was available for decomposition. It certainly is possible for a man to die in an enclosed sewer, but those deaths are usually due to methane and I could not say whether they could or could not be due to a sufficiently high percentage of hydrogen sulphide. I couldn't tell you exactly how long it would take for a man to become asphyxiated as a result of 3000 parts of hydrogen sulphide, but I presume it wouldn't take a very long period of time, possibly a matter of minutes.

2208 If the atmospheric pressure upon gaseous odors were decreased the rate of diffusion would be increased.

DR. EDWIN B. GUTE.

Direct Examination by Mr. Naujoks.

2209 My name is Edwin B. Gute; I live at 5630 North Lake Drive, White Fish Bay, Wisconsin.

I received my Bachelor of Science degree from the University of Wisconsin in 1923, and my M. D. degree from Rush Medical School in 1925. I did some residence work at Presbyterian Hospital in Chicago, in Milwaukee Children's Hospital, Milwaukee and in the Milwaukee Hospital. In 1926 I began the general practice of medicine and surgery at White Fish Bay, Wisconsin. I have been Commissioner of Health and Director of School Hygiene of the Village of White Fish
2210 Bay since 1927 and in the same capacity for the Village of Fox Point since 1934. I am chairman of the Milwaukee County Associations of Suburban Health Commissioners.

I am familiar with the order of the United States Supreme Court of April 3, 1940, appointing a Special Master to make a summary inquiry in this case.

I am familiar in a general way with the Sanitary District Canal and the Illinois Waterway and the Brandon Road Pool at Joliet.

It was stipulated that Dr. Gute would testify the same as Dr. Enzer and Dr. Krumbiegel.

Part Two

TESTIMONY OF WITNESSES AT JOLIET AND TESTIMONY OF DOWNSTATE WITNESSES

Testimony of Medical and Lay Witnesses at Joliet Illinois

July 22-25, 1940.

July 22, 1940

290 GEORGE T. JONES, Mayor of Joliet since 1935. Resides at 356 Whittier Avenue. I observe the Waterway almost daily. There has been a decided change
291 in its physical appearance since January 1939. There would be no change noticeable to the casual observer during cold weather, but in April and May of 1939, after a protracted warm spell there was a greater disintegration of sewage as evidenced by the sludge on the surface of the water. I believe that the period of May 1939 was the wost period that we have gone through. There was more sludge accumulated on the surface and there was a more offensive odor from it than at any time.

292 My home is about a mile west of the river. I have
293 observed the odor at my home quite strongly. I would describe the odor as that of a heavy sewer gas more than anything else. I have received plenty of complaints during my term as mayor about this odor. The first complaints where they became numerous at all was along in the spring of 1939. During May there was a constant stream of complaints coming into the City Hall. I associate the odor with hot weather.
294 The sludge that is accumulated on the bottom will not disintegrate and pass off as gas in cold weather to the extent that it does in warm weather. The stench

is constant. It is always present after a warm spell.

I have resided in Joliet fifty seven years. The sew-
295 age of the City of Joliet enters into the channel below the Brandon Pool. We have no sewage depot at this time. We have a population here of 43,000. Our drinking water is obtained from deep wells. We don't use the Illinois Waterway for drinking purposes. I was not sick last year (1939). Brandon Pool was com-
296 pleted I would guess along in 1934. Prior to completion of Brandon Road Pool that section of the Illinois Waterway from Lockport to the Brandon Road Bridge was a narrower stream and the velocity would be greater with the same amount of water going through. To the best of my knowledge all of Chicago's raw sewage flowed through Joliet prior to the completion of the Brandon Road Pool and prior to the completion of the walls (of the pool,) all of Joliet's sewage went
297 into the old river. There was an odor but not to the extent there is now. The odors described in my direct testimony were more pronounced in 1939. I drove across the river this morning (July 22, 1940) and it was quite smelly. You could notice a decided scum on the river between Jefferson and Cass Street bridges.

298 I always observe an odor when I come across the river, every morning this year. I have lived in that location for 24 years. I have not been able to observe odors all those years—more noticeable just the last two years. I have observed them before that in crossing the river but not at my home.

302 I didn't keep a tabulation on complaints received. There was the constant annoyance of people calling up wanting to know what they were going to do about

getting the river cleaned up. Practically all of those complaints were by 'phone. I kept no record of them.

304 There is no industrial source in Joliet from which those odors could emanate other than the canal.

305 We haven't had the conditions this summer (1940) that we had last summer (1939) for the reason that we haven't had as long a protracted warm spell.

306 We have had a warm spell for the last two or three days—the first real warm spell we have had—and it takes more than that to bring this thing up.

July 22, 1940

307 HARRY SAMPSON. I reside at 14 Marion Court, Joliet, Illinois. I am City Engineer for the City of Joliet. Have been City Engineer for right close to four and one-half years.

308 I have observed the waterway canal frequently. Late last summer (1939) there was a pronounced change, for the worse, over the previous year (1938). So far this year (1940) it has been a better condition. During a long hot, dry spell last summer (1939) it de-
309 veloped a big heavy scum on the surface. I would say it was four to five inches thick. I have seen the pool about 50 per cent covered with scum. That wasn't a constant condition—that was just a wind condition that happened to force it all down in there. I live about three-fourths of a mile west of the river.

310 We smelled an odor from the canal last night. We got a very, very distinct odor up there. It just smelled terrible at times. On a particularly bad night we don't

eat in town if we can help it. Ten days is about the longest period over which we have noticed this odor constantly.

311 I can't say the odor has injured my health, but at times it is nauseating. My wife and I are of the habit
312 of eating out quite a bit. I have resided in Joliet four and one-half years. I would say '39 was when the odor was most pronounced. Before that the river has not smelled like that since I have been residing there.

313 I have tasted the odor in my food persistently. The odor affects my sleeping and there have been times when I have awakened from the odor.

July 22, 1940

314 RAY POWERS. I live at Plainfield, Illinois. I am employed by the Joliet Material Company, located on the east bank of the drainage canal where the Rock Island crosses the river.

315 I have been employed there since 1928. I have had occasion to observe the physical appearance of the
316 waterway canal. At times since January 1939 it seems to be more offensive. Sometimes that scum will pile up as much as two and one-half inches in thickness. It seems like it is almost solid enough to walk on. I believe I have seen that before 1939. This summer (1940) I haven't. I haven't had occasion to be down there as much with my work as previously.

I saw this collection of scum in the real hot weather. It will bubble and form a gas there and you can see this material come up.

317 I haven't noticed how long this scum formation remains on the water—sometimes it is for days though. It seems to be down in the pool area—generally below McDonough Street—where this formation is the greatest. It seems to drift whichever way the wind blows. I don't know that the odor since January 1939 is more offensive than it had been prior thereto. This spring (1940) it hasn't been so bad. Last year (1939) it was terrible. The odor isn't constant.

318 It continues sometimes a day or two, sometimes all night. Some warm nights when you come in you can smell it long before you get to Joliet. I have noticed it several miles from the canal. I have noticed it in 1940, but not so great this year. It was more intense during 1939.

July 22, 1940

319 HAROLD RAUE. Mayor of Lockport, Illinois for previous 3½ years. Has lived in Lockport 41 years
320 and resides within about a half mile of canal. My place of business is about four blocks from the canal. The physical appearance of the canal is much worse in 1940 than it was prior to January 1939. At the present
321 time it is a stagnant pool. The water looks thicker now (1940); heavier and more solid than it was prior to that time. In 1939 a gassy, unpleasant, nauseating odor was given off. Odor was more intense in 1939 than prior to that time. It is worse in warm weather
322 than it is in winter or cooler weather but now (July 1940) I would say conditions are at their worst. The

odors are constant but vary in intensity according to
weather conditions. Odor has not affected my meat
323 and grocery business. As Mayor I have received numerous
complaints from residents of Lockport about
324 the Canal ever since I have been in office. I had some
complaints not over two days ago. The odor is present
both day and night. The canal, in 1940, is stagnant,
no current, water lies there and there is more grease
and oil-like and everything on the water. Water bubbles
and breaks like a gas condition.

326 Condition of the canal around Lockport during the
summer of 1940 is the same or just as bad as in the
summer of 1939.

327 Lockport empties its sewage into the canal below
328 the power plant. Domestic water supply is taken from
329 deep wells. Our raw sewage goes into the canal and
passes down through Joliet. We have one oil refinery
located at Lockport, about a mile from downtown. At
times we get odors from the Lockport refinery. It is
a slightly disagreeable odor. The oil refinery have
built what they call oil traps to catch any waste oil
that gets away and the water from that runs down
along a small stream which runs along the east side
of the canal and empties into the canal south of the
power house. That goes into Brandon Pool of course.

330 Before 1939 there were some offensive odors from
this canal but the condition wasn't as bad then as
it is at present.

The disposal from this refinery flows into the canal at least two miles below the City of Lockport. I was describing the condition of the canal as it was at Lockport.

331 These odors I mentioned were always present along
the canal as far back as I can remember.

July 22, 1940

331 MRS. MARIE BUSH, Superintendent of grade
332 schools in Lockport for ten years. School located about
333 block from center of the business district, and eight
335 or nine blocks east of the Deep Waterway Canal. There
was an offensive odor from the canal in April and May
337 of 1939. Makes me think of rotten eggs. Had to send
children home in April and May 1939. They were sick
338 to their stomach and threw up at school. I couldn't
tell you the exact number, but it was a good many.
339 Children remained out of school just a day or two.
341 Some had dysentery with it. Odor had no influence
on my ability to sleep—I can always sleep. Odor this
spring (1940) didn't seem to be quite as bad as the
spring before (1939) because it was cooler, but in May
when it got warm and the air was humid it was very
342 disagreeable and nauseating and we had a great deal
of absence. It was intermittent according to the weather
and the direction of the wind. Many were absent just
343 for the day with vomiting and dysentery. As many as
ten and twelve absent in April and May 1940. The
odor in 1939 was more intense than in prior years.
We have always had an odor from that Canal but it
was very much worse in 1939 and 1940.

344 I haven't made any complaints at any time to the
345 Mayor of Lockport or Attorney General's office. Ab-
351 sences in '38, '39 and '40 have been worse; increased in

'39 and '40. The odor described as similar to rotten eggs makes me think of hydrogen sulphide. I sup-
352 posed it came from the canal. The odors from the refinery are pleasant to what those Canal odors are. I can distinguish between the canal odor and the refinery odor.

354 It does not smell like there is hydrogen sulphide in the refinery odor. Ages of children in school average from six to fourteen and the absences extend through all grades. These children stay home for about a day and come back the next day—the nausea seems to have passed.

357 Children live one to four blocks away from the canal. They live on the west side of State Street and over near the canal.

July 22, 1940

360 THOMAS F. DONOVAN, lawyer and former Lieutenant Governor of Illinois. I am a resident of Joliet,
361 Illinois since 1905. I have lived within three blocks of the Sanitary Canal for 34 years. In the summer of 1939 there was a sort of nauseous odor differing in degree and in kind from any other odor I ever detected or noticed there before. There have been unpleasant odors from the old Des Plaines River in the past, but
362 now the odor seems to be a combination of unpleasant, disagreeable and nauseous. In 1939 the odors were more or less intermittent and more unpleasant in nighttime than in day. I have noticed such odors to some extent since about May 1, 1940. I would say they are more or less intermittent.

363 In 1939 I observed a coating, or a scum, that might be comparable to the scum caused by vegetation in a still or stagnant body of water out in a timber or on a prairie. I have no recollection of ever observing prior to the spring of '39, the conditions which anyone may observe there now. The condition is of recent origin.

364 By the term "nauseous" I would say that the effect,
to illustrate, is something like what you would get if
you would take a whiff of asafetida or something like
365 that. I have observed the odors during '39 and '40
up and down the channel from a distance of half
a mile, growing in intensity as you approach the channel.
I think these odors are the odors of gas that
arises from an accumulation of human sewage not
being diluted by a sufficient amount of water.

366 I believe that we who are here locally are becoming
somewhat immune to this condition, and it is more
noticeable to strangers and visitors. I don't think I
have ever known of any illness traceable to this condition.
A few times last year (1939) I had to leave
my sleeping porch because of the odor and on last
367 Friday (July 19, 1940) I had to endure the heat of
a closed room because of the naueous odors emerging
from the direction of Brandon Pool.

The Sanitary District of Chicago is one of my clients and has been since December 1926.

368 I do not detect any odor in the court room now. The canal is located to the west and a slight breeze blowing from the southwest. This is about the hottest we have had so far this summer.

July 22, 1940

373 REV. CONSTANTINE BACH—I am a Catholic
374 priest, residing at 404 N. Hickory Street. I have lived at that address continuously for ten years. Off and
375 on you get a very strong odor from the river and again it isn't there. I noticed it especially during the last two years. I think it was considerably worse in 1939 than it was in 1938. I never paid much attention to how frequently it occurred. I would say it was the odor of the old-time outhouse. I suppose the
376 odor this year (1940) is about the same as 1939. The odor seems to be worse in the evenings. My church and residence is about two blocks from the waterway. I observed this odor in '39 and '40 in various parts of the city. I think it is worse down here at the southern end of the city.

377 It is just an offensive odor, that is all.

July 22, 1940

377 MARY S. WURTZ.

378 I have lived in Joliet for 30-odd years. I am principal of the McKinley Public School. There are six grades in that school. The average age of the sixth grade would be 12 to 13 years. I have been principal of that one school about 34 years.

379 Approximately 140 children attended that school in 1939 and 1940. My home is three-eights of a mile, perhaps, from the Waterway. The school at the closest point is I think at least 600 feet. In 1939 I noticed

odors at school—in the spring, summer and fall. It was
very offensive and the children complained to the
380 teachers. They complained that they had to shut the
windows in order to get the children's minds on their
work, because they were restless on account of the
odor that came in those windows. This school year
(1940) wasn't quite so bad as it was last year (1939).
During the warm weather last year it was almost
continuous, and this year it has been more intermit-
381 tent. When I say "warm weather last year" I refer
to June, July and August. That was after school was
dismissed, but my home isn't so far from the Water-
382 way. Children have become suddenly sick with nau-
sea, and there seemed to be no special explanation for
it. The last of May or first of June this year (1940)
I noticed there were several children who were quite
383 sick in school and had to be taken care of. The odor
at the time I observed these symptoms of illness on
the part of the children was noticeable and disagree-
able. Not more than two or three children had to be
taken out of their classes during a day.

384 That happened on more than one day. We had fewer
experiences with nausea during the winter months
when the odor wasn't bad. Children get sick any
time of the year. The four other teachers at school
complained about that odor in 1939. In the spring of
1940 I observed symptoms of illness on the part of
the children. They were nauseated and they were sick,
and we sent them home—were kept home for a day
385 or so. In don't think there was more in 1940 than in
1939. About the same. The odor at the time the
children were sick in 1940 was noticeable—it was bad.

I think the odor was worse in 1939 than it was in other prior years. 1940 is bad but 1939 was, if anything, worse.

386 At my home in 1939 the odor always seemed to be pretty bad at night and it has kept me awake at night because the smell was so bad.

388 The average age of the pupils that were sick would
389 be around 10 or 12. Girls, I think, more than boys, were more susceptible to the nausea.

July 22, 1940

390 HOWARD SONTAG, 111 7th Street, Lockport, Illinois. I work at the Texas Oil Refinery at Lockport. I have lived in Lockport continuously for about 35 years. I am a former Mayor of Lockport, 1931 through to 1935. The condition of the waterway and its effects as I observed them during 1939 were, I think,
391 terrible, especially through the warm months, from April until the latter part of September and into October. As weather got a little colder the conditions cleared up. The odor was very bad, especially when we got a west or a southwest wind. The odor was intermittent in 1939. As I observed it there was a lot
392 of sludge on the surface of the waterway. It is a tarry substance—a sewage residue. These odors were observed two miles from town when the wind was blowing. I wouldn't say they actually made people sick but it wasn't very pleasant to breathe. You wouldn't sleep when the odor was coming in good. The only way you could sleep was by closing the

393 windows. I didn't personally make any complaints about the condition there. I got a lot of them though. I had nausea in 1939, sometimes twice a week, sometimes for over a month.

395 The odors in 1940 haven't been as bad because we haven't had the warm weather, but the last couple of days they have been terrible. I think the odors in 1939 were worse than they were in 1938. The last two days they are worse than they were in 1939. You don't detect anything right now in the court room but I bet up in Lockport you can detect it. We are only six
396 or seven hundred feet from it here. My health is good except for a skin disease. I want to get to a doctor and find out what it is.

397 In my work at the Texas Company I treat gasoline and kerosene.

Some odors along the canal have been there as long as I can remember. I got a lot of complaints as Mayor during 1931 to 1935 but there wasn't anything to be done about it at that time.

398 The liquid from the refineries that runs in a small channel paralleling the canal and then enters the canal some distance below is water from the traps. There would be a little oil on there. They don't let much get away. The odor from the refinery is detected at
399 Lockport at times. When the wind is from the northwest you get this oil odor right down town in Lockport. There is considerable difference between the two odors. I can absolutely detect one from the other.

400 I probably did have nausea while I was Mayor. It came more often in the hot weather than in the cold weather.

July 22, 1940

401 CLARICE BLATCHLEY. I live here in Joliet at 417 Grover Street. I am employed as a teacher at the Mc-
402 Kinley School. Began teaching there in September 1938. Miss Wurtz who testified is my principal. I have lived in Joliet all my life. My residence on Grover Street is approximately a mile from the waterway.

In 1939 it seems to me we had a great deal more noticeable odor than we had prior to that time. We had very few hot days in May and September 1939, but those days it was terrific.

403 I was at school when I made those observations. I sent a child home. She was ill and there were several of them that were quite upset. During that hot weather the odor was so bad that we had to close the windows, but there was this one child that just couldn't stand it, and we had to send her home. The odor at that time was very bad.

404 There are many flies in my room that certainly must have come from the terrible green viscous looking color that was on that body of water that lay there stagnant. I bear a scar on my foot that I received from a fly infection. Dr. Frederick treated me for it. I had shots for tetanus, and it must have been from that bed of water that these flies came from. The odor was terrible. I have never smelled anything like it and it is something that I couldn't describe.

405 The body of the water was practically still. It was covered with masses similar to cakes of ice floating down a river, only instead of being the lovely color

of ice it was a terrible green. I have received complaints about the condition from children, from their mothers and from my school associates. The complaints

406 were about the odors. I would say that the aroma was very bad on the hot days we have had this year of 1940. When during the school year we go outside on the playground or recess, sometimes it is positively unbearable. That was my experience this past spring. I have observed the odor at other points in and around the community. At my home which is approximately a mile away, at night, of course, all windows are open and it is very unpleasant.

407 I noticed that the odors in 1939 were more intense than in 1938. It seems to me that this year 1940 is getting worse and worse as time goes on. It is a great deal more noticeable when it is hot and when it is quite humid. When it is cool we don't pay so much attention to it.

408 I have no official duties connected with the Illinois Waterway. I know of no reason why complaints regarding the waterway should come to me personally.

409 I do not detect any odors here in the courtroom from the waterway now particularly.

411 I don't remember the summers from '36 through '38. I really think I can say that it was all right; that it wasn't so noticeable to me that it was obnoxious.

412 I testified to sending one little girl home in May of
413 '39. I beg your pardon, sir. It was this year—I can't remember whether it was April or May. It was this last spring.

414 This little girl I sent home is apparently well. I don't remember whether she stayed home longer than

a day or not. I have seen this year (1940) that green-looking stuff I spoke of. The time I noticed it was last fall more than in the springtime.

415 Go out the Channahon Road, turn to your left at the Brandon Locks, and if you will walk down where the dam is you will see all of this mess clogged up. The last time I was there I believe was in April of this year (1940).

416 I have lost no time from work because of the bad odor. I should have but I didn't.

I have a mark on my foot where I was infected by flies.

418 When I stated that I had lost no time from work but should have, I meant I had a foot that was so enlarged that I was not able to really stand on it.

July 22, 1940

420 BRUCE D. CHEADLE. I reside at 120 East 6th Street, Lockport, Illinois. With exception of one year I have lived there all my life. I am employed in the Chicago City School System. I am secretary of the Chamber of Commerce in Lockport, an incorporated not-for-profit institution. Also I am secretary of an organization representing the valley communities
421 from Joliet to Summit called the Des Plaines Valley Improvement Association. The municipalities from
422 Joliet to Argo-Summit are members. After the reduction in flow in January 1939 or thereabouts there was
423 a noticeable increase in the odor and the scum of the canal. Joliet and Lockport have a situation that is

not existent at other communities north of Lockport. They both have pools where the flow of water is slower than through the main channel north of Lockport. At Lockport we have a pool above the lock from which we catch the smell, because the prevailing winds in this territory are southwest. The smell is comparable to what you get if you lift cover from a manhole in the sanitary sewer system of Joliet. My home
424 is about 1000 to 1200 feet due east of the canal. During summer of 1939 after or during a rain storm this odor is particularly noticeable and my wife and I have been driven off our sleeping porch. It has not occurred this year (1940) yet. I had no such similar experience prior to 1939 although this canal has been a source of complaint in the valley prior to 1939. We have always objected to it being a cesspool for the City of Chicago, or any other territory. There has been an odor there but it has been severe since 1939, more intense since January 1939.

425 In 1940 the weather hasn't been so hot that we had to sleep on the porch and the odor hasn't been so prevalent during the cool weather. I never noticed during the winter months any odor that would trouble us to speak of. The odors arising from the oil refinery up there at Lockport are occasionally blown over Lockport and sometimes they are strong, but they are easily identifiable from the canal odors.

433 In my estimation this year (1940) has not been as bad as last year (1939), but when these barges pass up and down the canal and several of them get in a string, the odor and the gases from the sewage or other

fecal matter in the canal becomes worse if it is stirred up.

434 I have lived at Lockport approximately 43 years and during all the time I have observed the canal there
435 has always been some odor. To the best of my knowledge the canal has always received the untreated sewage of the Sanitary District of Chicago. There have always been complaints about it for years back, urging that something be done to clean up that situation, but the complaints have been more urgent and more multiplied since 1939. To my knowledge none of the communities members of the Des Plaines Valley Im-
437 provement Association treats its own sewage. None of these communities takes its domestic water supply from the Illinois Waterway. They get it from deep wells, except Argo, which gets its water from the City of Chicago.

438 I do not now detect any odor in the court room.

439 We slept on our porch last night at Lockport. I didn't notice any odor.

July 22, 1940

442 DR. LOUIS J. FREDERICK, I live at 222 East Clinton Street, Joliet, Illinois. I have lived here for many,
443 many years, approximately thirty-five. I am and have been Health Commissioner of the City of Joliet for a year and a half. I am acquainted with the conditions
444 surrounding the Deep Waterway Canal to the extent of the number of complaints that I have received. I have observed the canal myself on several occasions.

445 In 1939 the surface of the canal was covered with considerable scum. The odor in 1939 was very much more offensive in 1939 than in previous years. The number of complaints I received as Health Commis-
446 sioner went into the hundreds. People would call up
447 and say: "Why don't you do something about this stench in the canal? We can't sleep, we can't eat and can't work. We are suffering from nausea", and some of them went so far as to say they vomit. Many of them were nauseous and in summer all of them complained of the insomnia due to the odor.

450 These hundreds of complaints to which I referred were received in 1939 during the hot season—June, July and August, and this year (1940) during June and July. They were received from people residing not very far from the banks of the canal—I would say within a radius of a mile from the canal.

451 The origin of this odor that we are speaking of is putrefaction of material in the canal. The scum that forms in the canal is loaded with bacilli that we call colon bacilli, the odor of which you will probably never appreciate unless you smell it and if you smell it once you will never forget it. It is one of the most deadly odors of any of the germs that we have in the human body, the colon bacilli. The odor is particularly obnoxious in the hot weather because the gases rise from this material and it permeates the air.

452 I would say that this odor is due to hydrogen sulphide, otherwise it is a lack of oxygen. I, myself, noticed this odor throughout the summer of 1939. I noticed it every time I go from one side of the canal to the other. The farthest distance from the canal that

I noticed the odor during 1939 was probably within a block, crossing the bridges.

453 My home is about four blocks from the waterway. In going back and forth my attention would not be called to the odor until I got up within a couple of blocks of the canal, but I have noticed it in my home and that is about four blocks from the canal.

454 We get the odor from the north end of the City of Joliet to the south end of the City of Joliet and we get it within a mile on either side, east and west. Some of the local physicians have told me that their patients complained. I have never personally observed any evidence of temporary illness resulting from the odor.

455 In my opinion if this odor continuer we are faced with an epidemic. The fecal matter, the germs, flies, mosquitoes, will light on this, on the walls, on the sides of this canal. You will see it covered with scum. Flies and mosquitoes will light on this and carry away—they have been known to carry germs from that, and

456 that might mean dysentery or a typhoid fever epidemic.

457 The two most serious diseases that might be borne by the insects would be dysentery and typhoid fever, but it might carry with it any intestinal disease, catarrh, colitis and diarrhea.

458 The most common carriers are flies and they do carry germs and mosquitoes carry them. This material, this scum on the water dries. The flies light on it, and it is carried, wafted away by the winds, where, no one knows how far they carry it, but it has been known to be carried for miles.

459 The stench, aside from the germs, is nerve-racking. It may produce nausea, loss of sleep and loss of appetite, and the majority of the people in Joliet have to work for a living and if they cannot get their rest at night, and if they cannot eat, it brings on a condition which may lead to other more serious conditions; in other words, lowering of the vitality.

460 A more serious hazard is presented now because
461 we did not have this condition in 1939. The odor I have observed in 1939 and at the present time could be nauseating to anybody with a sense of smell. I
462 am not here to say that you don't get nausea and vomiting from other conditions, but I do know that a continuance of this odor produces or brings on a condition of nausea.

The gases that arise from this odor may set up an irritation of the mucous membrane of the nose and throat, setting up rhinitis, sinitis. These germs don't grow on healthy tissue. You have to have an irritation, heat and moisture for their propagation. You have your start with rhinitis—an irritation and an inflammation of the nose. Germs come along and light there and they go out to the sinus. They may be carried through the eustachian tube to the ear, and they
463 may go down the throat causing tonsilitis. Streptococcus germs come along about that time and you get a streptococcus infection of the throat.

If a bad smell is surrounding you your nervous system won't permit you to sleep because you will be restless.

464 Health conditions in Joliet are very good. I wouldn't say that they were any worse in 1939 than in 1938,
465 speaking generally. The only increase in diseases with

which my department is concerned was we have had several cases that contracted typhoid at Manteno, men that were working there, and they came back home feeling sick and after they arrived here, the doctors of course said typhoid fever. That had no connection with the water though. Otherwise we have had no increase in communicable diseases in Joliet in 1939 and 1940. The only difference in the canal is the odor, that is all.

July 22, 1940

471 DR. G. J. WILCOX. I am licensed and have been
472 practicing medicine in Illinois for 28 years. My office
is at 108 Scott Street five or six blocks from the Water-
way. I am generally familiar with the condition of
the waterway in 1939. The surface of it has always
been quite heavy with scum, and particularly where
473 the water is more quiet, referring to Brandon Pool
along in there where it is wide and the water isn't ac-
tive. The locks were installed, I guess, seven or eight
years ago. I think it was something like 1933. I think
that the odor that emanated from this condition in
1939 was terrible. It is an odor which I think is sup-
posed to be created by hydrogen sulphide. This putre-
facted material forms a hydrogen sulphide and ethyl-
474 ene gas, and ethylene gas is practically odorless, but
hydrogen sulphide has a very commonly called rot-
ton odor, an odor of decomposition. It was very much
worse the closer you got to the Waterway. I think the
scum must be loaded with bacilli and germs, because

that is the common occurrence of human excreta in any stream that is polluted as badly as this stream is. I think you are liable to find particularly colon bacillus,
475 which is more common in bowel excreta, and streptococcus. Flies and mosquitoes are the usual carriers of such bacilli germs. The germs I think could be blown or carried on the breeze if they happened to be on some dry surface where the bugs were pretty prevalent. They could be carried perhaps two or three miles
476 and still remain virile. I didn't keep track of the odor by months in 1939. I noticed it was much worse during the hot weather. In my opinion the odor is worse since the diversion has been cut. I can't say that it is any worse this year (1940). We haven't had an unusual amount of hot weather. I think the depth of the scum is worse, if anything, this spring and summer. I am satisfied from my observation of it that it still contains a putrid matter in the process of decomposition, and that this is the source of the odor that you smell.

477 I think it is only reasonable to presume that that will seriously upset the health of people that are asked to breathe in odors of that kind continually. It will cause symptoms of certain kinds, perhaps, vomiting,
478 nausea, perhaps it would cause loss of sleep, loss of appetite. I think there are a number of diseases that this condition could be responsible for, and that there is adequate cause for an epidemic in the community. If some of that water or drainings should get into wells it certainly could cause typhoid or different forms of enteritis or bowel infections. I think flies, mosqui-

toes, something of that kind, could easily cause sinus infections or eye infections or ear infections.

479 Those working on the waterway might have a scratch or an open wound of some kind which might develop into a very serious infection. I consider the condition of this Waterway at the present time a threat or a hazard to the health of the people of this community for the reasons I have just given.

480 The odors could reasonably be the cause of the delay in recovery of patients in St. Joseph's Hospital, located within one street of the canal. The unpleasant odors might cause trouble in sleeping, might affect upset people from the standpoint of the nervous system.

481 I do not know of anybody of my own personal experience that has been made sick by this water.

487 I could not enumerate for you how many people I have treated during the calendar year 1939 for any of the infections that I have named.

488 I have treated many in the last year for infection of the hand or leg. I do quite a bit of industrial work and a good many of those cases. I have treated in the last year (1939) for inflammation of the mucous membrane of the nose and throat, for streptococcus infections. I have known of colitis cases here, and of dys-
489 entery and other infections of the intestinal tract, but I couldn't say that the Waterway was a contributing
490 cause. In other words, I don't know where they got the infection. My records would not indicate that Joliet had any more people with these illnesses than you would find in most Illinois communities.

July 22, 1940

496 DR. H. W. WOODRUFF. I reside in Joliet, Illinois. I am a practicing eye, ear, nose and throat doctor. I have practiced in this state about 47 years. I am familiar with the physical appearance and the odor emanating from this canal.

497 I go over it a good many times a day. The surface never looked like a mountain stream of water going through here. It is a dark, cloudy, muddy-looking stream of water. Before the diversion was reduced in 1939 it looked like Lake Michigan water coming through here. After the reduction in the flow of water there was considerably more odor from the stream.

498 The odor we speak of is indescribable. It is a difficult think to describe an odor of that sort. With this more concentrated sewage in there you get more like the odor of a sewer.

499 Since the flow was reduced there is a very definite increase in the intensity of the odor. You are more apt to get the odor on the west side and north side. Our prevailing winds are from the southwest. In my opinion the waterway in its present state is a health
500 menace to this community. The more concentrated the sewage the more of a health menace it is. Most diseases are caused by microorganisms, infections; and the more of those microorganisms you have, the more of a menace it is. Local diseases like infections of the skin or the ears or the eye could be caused by such a polluted stream as the deep waterway canal in its present condition.

501 They would be caused by certain organisms, sta-

phylococci, streptococci, inflammation of the eye, the inside of the lids, conjunctivitis on the lids' margins themselves due to water getting into the eyes and on
502 the skin. If the sewage and water gets into wells it would be a serious menace. I don't think inhalation of the odor itself would cause the irritation, but possibly the sulphurated hydrogen or any concentrated irritating gas could do that. There is a gas given off by that canal but I don't know what it is. I don't know from my own knowledge that the canal water contains the colon bacilli germ.

503 I think very positively and definitely about the condition of this canal being inimical and a threat to the health of the people of this community, and yet I can't prove it definitely by specific cases. I can't put my finger on a case and say that was due to this.

505 The only increase in cases under my observation within the last year or two is eye infections from swimming pools.

July 22, 1940

506 HERMAN C. GRASSLE. I reside at 209 Western Avenue, Joliet. I am in the motor truck business. I live just on the other side of the wall of the canal, about two and one-half miles north of Brandon Pool locks.

507 I have lived in Joliet 54 years. I have noticed a change in the condition of the canal last year. The river is dirty. I can sit on our side veranda and look over in the water and the water would be bubbling

continually and great gobs of sludge would come up from the bottom, just kind of an explosion, and you could see that day after day. It started in about two months ago. We had some warm weather and that time it started to do the same thing .

508 The odor was terrible. It got real bad in 1939 just when it started getting warm. Last summer (1939) it was nothing for us to get up two- three o'clock in the morning, close the windows, and after doing this several times my wife thought of spraying perfume around on the bed clothes thinking we could sleep. The effect of the odor on me is that I walk away from the table and leave the food there.

509 It is just obnoxious, putrid. Last summer (1939) July 5th I came back from Des Moines, Iowa and I recognized the odor about two miles west of Joliet, and frequently I have noticed the odor I would say, 12 blocks east of the river.

510 In the 54 years that I have lived on this bank I never noticed any summers that approached the last one (1939). We had some warm weather in May (1940) and we had about three days that it was really
511 bad. Last Friday or Saturday (July 19 or 20, 1940)—I don't remember which it was—it was bad. In the daytime it wasn't. Last night (Sunday, July 21, 1940) was all right. Today on my way home to lunch there was a little odor but nothing like it is generally. When the atmosphere is heavy, or when it rains it is really
512 terrible. My health is fair.

I was affected by this odor in 1939 about 12 or 13, probably 14 different days. The odor isn't constant. It would be that way for a day and maybe gone for

513 a day or two and finally it comes back. The longest the odor has been constant is probably two days.

516 I am five foot six tall, weigh 173 and am 54 years old.

July 22, 1940

516 RAYMOND SHEA. I live in Joliet but not in the in-
517 corporated limits. I am President of the Central Trade and Labor Council. It represents about 10,000 laboring men in this community. We hold meetings in the Chottes Hall at the corner of Joliet and Jefferson Streets, just a little over a block from the canal. Last meeting was held July 15, 1940. Possibly 125 people were present.

518 Meeting room is approximately 40x60 feet. I don't know what the temperature was on this night but it was warm because all the delegates had their coats off. It wasn't uncomfortable with your coat off.

519 I have observed and smelled the odor from the deep waterway canal in the past. The odor was very noticeable at the meeting last Monday (July 15, 1940) and at meetings prior to that especially in the hot weather last year (1939). Last Monday the odor was very rank up there. We closed the windows facing the south because it seemed that the smell was coming in from the canal through the south windows. We relieved the odor in the hall. When the windows were
520 open the stench was very obnoxious. I live about two and a quarter miles east of the waterway. I have noticed the odor at my home. I think the odor was far more offensive last summer than in those prior to

that time. We never had the complaints in our meeting hall up to last summer when they started.

July 22, 1940

521 DR. LEWIS W. WOODRUFF. I am a physician at the Woodruff Clinic. I have been practicing for twelve years. I specialize in internal medicine. I have had occasion to observe the appearance of the canal during 1939.

522 During certain periods there is a stagnation and an accumulation of solid material on the surface of the canal. These periods were during the hot and dry season. It is at that time the odor from that is very offensive. I think the odor during the summer of 1939 was more offensive than in prior years. I have noticed the odor on some days this year (1940). I would de-
523 scribe the odor as of a fecal character. A stench would be a good word. I think it made me uncomfortable during the time it was bad. I consider the canal in its present condition a menace to the health of the community of Joliet. To the patients it is perhaps indirectly a menace because the chronically ill would be affected by very bad odor from the canal. It would
524 interfere with their recovery I believe. There is a potential danger from the dilution if there is any leak in the canal. Highly polluted water would cause contamination of surrounding land and wells. The effect of the odor upon the human organism may cause nausea, occasional vomiting; it causes loss of appetite; it may disturb rest of people who are ill. As long as the

odor continues that is a temporary result. I do not recall the longest period of time in 1939 the odor hung on.

525 This resulting nausea or loss of appetite remains just as long as the odor is present. I think the inhalation of that odor, would postpone recovery in chronically ill patients, probably such as heart patients, because they are not able to eat normally or rest properly. I have observed only one case that I can think of specifically that has had that experience. The patient stated that the odor from the canal interferes with her sleep and caused nausea and vomiting, loss of appetite.

526 This patient has chronic heart disease. She is still living. She has been in the hospital for four or five years. She probably grows worse very gradually due to the heart condition.

July 22, 1940

526 DR. ROBERT W. LENNON.

527 I reside at 900 Western Avenue in Joliet. My office is located in the Morris Building on Chicago Street in the downtown area. I have observed the waterway canal during 1939. The condition isn't present at all times, but many people seem to think it occurs right after a rain. My observations have been that the canal and waterway have been worse following a dry spell in which there has been a decreased amount of water
528 in the flow-way as a result of not having any drainage from the rains. At this time you can see the de-

bris and various other materials floating down the
canal. I have been practicing 12 years and specialize
in eye, ear, nose and throat.

My observation as to the effect of the odor eman-
ating from the canal on the human organism would
be rather limited because of my specialty but I have
noted a definite increase in the last year in the num-
ber of sinus cases and that I have observed in the
warm months—July, August and September. Ordin-
arily during those months we had little sinus trouble
in this community, and little sinus trouble is observed
in other communities of the Great Lakes district. We
have a great deal of warmness and heat and sinus con-
ditions, as a rule do not occur under that type of tem-
529 perature. I have also noticed that chronic cases I have
been observing from year to year have been definitely
worse, and I hadn't thought of anything else to at-
tribute that to. These people do complain of the odor
when the odor is present.

In my opinion there is no question about the odor
being a factor in causing this increase in sinus condi-
tion. The place isn't different, the community is the
same; the people haven't changed; the mean tempera-
ture is about the same, the humidity is approximately
the same. The only thing different that I can detect
is the odor that is coming from our canal. It has been
proven experimentally and actually that such a gas-
eous odor causes an irritation of the sinus passages.
From the strict chemical standpoint I am not extremely
familiar with that odor. Of course, the decomposition
of the fecal matter gives off a sulphurated iron. Fur-
530 ther than that I couldn't describe it. Such sulphurated

iron could certainly irritate the sinus channels if you inhale it. As to the inhalation of this odor deterring recovery of patients in cases of other illnesses, most of those things work from the standpoint of the nervous system and the element of mental upset that can be caused by a stench is considerable. I have had people come in my office complaining directly of the odor and stating that it bothered their nose and couldn't I do something about it. So far the condition this year (1940) hasn't been so bad as 1939, but it depends entirely on the rainfall conditions, I think.

531 I am speaking about the summer of 1939 that I noticed this increase in sinus conditions. I am not speaking about this year (1940) because the odor was much worse in that canal last year than it has been this year to date. I said that experimentally it has been shown that obnoxious gases similar to hydrogen sul-
532 phide in animals has shown irritation in the mucous membranes of the nose.

534 I am unable to answer the question what percentage or concentration of hydrogen sulphide must be present to cause irritation of the sinus.

535 The average length of hospitalization in my specialty is about a day and a half. That would be the general average and Joliet is approximately the same as average.

538 Anything that will irritate the mucous membranes of the nose will aggravate sinus conditions, regardless of whether it is hydrogen sulphide or what it is.

Tuesday, July 23, 1940

547 DR. CHARLES R. CURTISS. Office in the Barber
548 Building and resides at 954 Glenwood Ave., Joliet, Ill.
I have been in general practice in Joliet for 40 years.
I serve as physician for the Ohio River Company who
operate barges on the canal, and treat employes of
549 that company. During 1939 I had occasion to treat men
employed on these barges. Have to protect them against
the risk of infection of wounds received on the waterway.
I have seen lockjaw, gas and strep from infection
of wounds received on the waterway. The
550 danger of infection exists because the river is loaded
with infectious germs. Practically all the river men,
if they have wounds, have digestive disturbances and
552 are nervous. They can't sleep—their sheets smell vicious,
ugly odors. The positive result of direct contact
of this water to an open sore would bring infection.
I have observed lockjaw, gas considerably and
the different strains of streptococcus infections. Prophylactic
injections for lockjaw and gas are given as
553 emergency treatments before an infection sets in. As
to skin infections from contact with this water, we
have a great many cases of impetigo along the waterway—it
554 has been increasing each year. Men who work
on the river get it and other forms of dermatitis, and
children living in Joliet, especially along Bluff Street
have a large percent of impetigo. It is the ordinary
pus infection in the skin, the same pus that makes an
555 abscess. The more common way of transmitting bacilli
to the community would probably be insect carriers—flies
and the mosquito. The types of diseases

that would be transmitted are malaria, possibly typhoid—intestinal infections. Patients in hospitals get hysterical from this awful odor—they can't sleep. The men on the river can't. The odor would make the recovery or convalescence from other illnesses more difficult. It might be serious, but it is very disgusting and upsets their nerve balance.

557 The canal since it was opened in 1900 has always been polluted with raw sewage. The danger of in-
559 fection by reason of cuts has probably always been present, even prior to January 1939. Since the canal walls were put up in 1933 there has been an increase
560 in impetigo. With increase in traffic on the waterway and the Ohio River Company having more employees, there is more likelihood that the percentage of my cases is also greater. Streptococcus throat infec-
561 tion has been on the increase in the last year. I don't know what the percentage is. The majority of men don't report it. The three cases for the first six months of 1940 shown by the City of Joliet reports would not be a drop in the bucket. Strep throat is a reportable disease if it is associated with influenza, but by itself or a streptococcus wound, I never report it. Prior to 1939 they had quite a few deaths of strep throat in Joliet—now they seem to be able to control
562 it somewhat with sulphanilmide. So far as I know there were no deaths in 1939. I do not know of any reported in this area the first six months of 1940. There would have been an avalanche of them if we hadn't had the means of preventing it. We had a large epidemic of it (strep throat) last winter (1939). I am sure, because I did. We have more of them when

the flu starts beginning in October and going on to
563 March-April. I haven't heard of any typhoid cases
being reported in Joliet the first six months of 1940
—they have been free from it. We have had malaria.
It is not a reportable disease. I had three cases last
year (1939). I haven't had any the first six months
of 1940. We have had no deaths in 1939 or none in
564 first six months of 1940. Insect carriers would get
bacilli from walls, on the scum that lines the walls of
565 the canal. I consider the scum on the walls lining the
canal contain dangerous bacilli. I have never made
568 a test and examined it. It would be difficult to mathe-
matically give an estimate on how many of the cases
that have come to me have been compelled to be ab-
sent from work. Had quite a few of them off last win-
ter (1939). It would average a few days to maybe ten.
569 That applies to infections, flu epidemics, streps and
other things that they had, and stomach cases. I had
one patient I had to send away twice to get him out
of the atmosphere. I think he was gone three weeks.
That was a month or six weeks ago—just as spring
broke. I figured it was a nervous reaction because I
570 thoroughly x-rayed him and found nothing wrong.
The giving of anti-tetanus injections is a routine prac-
571 tice if you have any fear—if we have any doubt about
it, we give it. I have seen tetanus come from wading
in the DuPage River. In injury cases which were
575 given preventive treatments I never had an infection.
578 In cases where there has been an infection, my treat-
ment cured all but one in 1933. We didn't have as many
579 streptococcus infections in 1938 as in 1939. Last win-
ter (1939) was the worst by far. That increase was

caused by the strains of streptococcus, wherever they
came from I don't know. I wouldn't say the water did it.
581 I just observed it as a fact. I had one case that had to
quit—a cook—going into panic with that odor. The fellow
I sent away was a pilot. Got so he was afraid to take
responsibility of the load and had to send him away.
587 During the forty years I have been practicing in Joliet
I have had a great many infection cases—impetigo and
588 and others—before 1939 as well as after. It is a fact that
impetigo in children could be caused by scatching themselves
589 with dirty fingernails. The odors from the waterway
were terrible last year (1939). Conditions up to
now are not as bad this year (1940) as last year. Odor
590 in winter is not near so noticeable as in summer. Organic
putrefaction takes place much more rapidly in
heat. Throat conditions in winter would be less likely
591 attributable to the canal than throat conditions in
summer would be. If a person had the start of a cold,
of course he is prepared for strep infection and if it is
prevalent he is likely to get it. I detect no odor from
the canal in the courtroom today (July 23, 1940).

596 LEO COSTELLO. In grocery business at 353 So. Joliet
Street, Joliet, Illinois and reside at same address—
about two blocks from the canal. I noticed plenty the
597 odor given off by the canal in 1939. Previous to that
time there was a little odor but it was never so obnoxious
or prevalent as it was in 1939. During 1939 it became
so we would't stay in our home during the evening.
Would usually drive out in the country to get
away from the odor. Previous to that time we never
had occasion to do those things. Odor disturbs the

598 appetites of myself and family. At times every one of
my family was disturbed with throat ailments. Throat
condition usually occurred the latter part of spring—
599 during the summer months. In spring of 1939 the
weather was fairly nice and there was no reason why
they should have sore throats and still they had sore
throat. Usually in spells members of family would go
down with it. Every time any member was down I
600 would call the doctor. I called the doctor eight or ten
times for throat ailments in spring of 1939. My family
and I suffered from nausea quite regularly and that
came at the same time I smelled the odor from the canal.
I talked to doctor about that condition and the doctor
601 prescribed a course of treatment. Sleeping was affected
602 by the odor. Entire family is disturbed when
that condition arises. There isn't much I could do
about it; usaully drove out and stayed out as late as I
possibly could. Drove away practically every night
603 last summer (1939) to get away from the odor. Sometimes
the odor last summer (1939) was real bad two or
three nights of the week and the balance of the week
was where you could get by on it. If all the time this
condition affected me last summer was aggregated I
would say it was about three months. Conditions this
year (1940) haven't really disturbed us. When I went
in store this morning (July 23, 1940) there was a terrible
odor and I knew it came from gases. Couldn't
smell it on the outside but store seemed to have filled up
with it and earlier in the spring I thought it was quite
prevalent. The stench has affected my mode of living
604 so that I am placing my business for sale. Intend to
move away from the locality.

604 I have very fine grocery business; been there for 16
years. There has been a little odor from this waterway
in years previous to last year (1939) but it didn't dis-
605 turb us. It is true that I have had only one bad year
in all sixteen years but I expect the odors are going to
606 continue and I don't want to put up with it. I am 40
years old, 5'7" or 7½" tall and weigh 185.

607 THOMAS CALAMARIS. In grocery and bakery
business on east side of Bluff Street next to the river.
I live at 203 Reid Street, about 12 blocks from Bluff
608 Street, Joliet, Illinois. I have lived in Joliet for 27
years. I never noticed the condition of the canal to
amount to anything before 1939. In 1939 it was unbear-
able—couldn't stand it. Had to keep doors closed and
still couldn't keep it out. It was just like gas from sew-
er. I was bothered at home only in 1939. It was the
same thing. Didn't believe it could reach us 12 blocks.
609 This year (1940) they had only a light dose—very
small. A couple of times in May and June but it was
only noticeable. In 1939 it disturbed my sleep at the
house but not this year yet.
July 23, 1940

610 MRS. ROBERT W. MARTIN. Reside at 705 Buell
Street, Joliet, Ill., about a mile west of the deep water-
611 way. Has lived in Joliet 34 years. In 1939 we on the
west side observed many times an obnoxious odor—
before that time we never had. In my own case there
were many nights when I couldn't sleep because of the
terrific odor, and many times it would be nauseating
to me. I never noticed that effect upon me prior to

612 1939. My husband is a very sound sleeper and did
not notice it particularly. This year (1940) it has not
been nearly as bad as last year.

612 JOSEPH AVON. Reside at 600 South Des Plaines
613 St., Joliet, Ill., a quarter of a mile away from the canal.
I have lived in Joliet since 1892. I did find conditions
at the canal kind of strong in years before but 1939 was
614 the worst. The odor had plenty of effect on me. Every
night the wind blows from southwest or northwest to
615 the east I can't sleep. Also affected my wife and daughters.
Wife has been under care of Dr. Thomas Wagner
for about twenty years. She has been sick for a long
while. Since 1939 she got worse, couldn't sleep—couldn't
eat—lost her appetite—lost her eyesight. Tried to
shut the windows at night but couldn't stand the heat—
had to get up all night and walk around. This year
(1940) the odor wasn't so bad on account of cold weather
but now it starts.

617 STEPHEN J. HEINZEL, I am a city fireman. I live
at 510 Sherman Street, Joliet, Ill. Has lived in Joliet 27
years. On May 13, 1939 was over on South Bluff Street
618 going through our regular firemen spring drills and
one of the men noticed a person in the water—an attempted
suicide. I jumped in and rescued him—went
into the river 75, 85 feet and was in the river about
619 seven or eight minutes. Name of man was Vernon Earhardt.
After pulling this man out I went back to engine
house and notified a physician to come. While he was
coming I took a shower. Called Dr. Raymond Kennedy,
When he got there he washed my eyes and ears--with

what I do not know. I received a shot—I believe they
620 call it a gas tetanus. When I jumped in I received a bruise on my right ankle. Dr. Kennedy treated the bruise at the engine house and I had to go back to him at least two months. An infection set in the bruise and
621 lasted about two months. My health is good, weigh about 190 pounds and height is 5'8-¾".

622 ADAM CHRISTMANN, I am employed as lockman
623 at Brandon Road on deep waterway for about seven years. Live at 33 Argyle Street, Joliet, Ill. Conditions on this canal first four or five years wasn't so bad, but since they cut the flow we can notice it. Water in locks is almost black as ink. Carp and turtles used to live in
624 the locks but since they cut the flow, carp even died. The odor in 1939 was quite a bit worse than it had been in the past. It never used to smell until along about May. When they cut the flow it started smelling February, March. I am pretty well used to the odor but in 1939 it make me a little sick. About June 11th or 12th, 1940 I couldn't eat my lunch for two days. The sludge and scum on the locks smelled and it turned my stomach. Conditions this year (1940) are about the same as in 1939. If hot weather keeps up it will
625 probably be worse than it is now. There was a whole lot more accumulation of scum on the canal last year (1939) than there had been in years past. Average thickness of scum looks like anywhere from two to six inches right above dam at Brandon Pool. They had scum there in the past but scum was its worst in summer of 1939.

Today there isn't so much scum and sludge collected

626 but the odor is just as strong. I haven't missed any
lunches since June 11th and 12th, 1940. I feel sickly
627 but can still eat. My health is pretty fair.

In the years before 1939 the odor ended one or two
628 weeks after a heavy frost—along about November.
It ended in November last year (1939). I have had no
629 sick leave in last five or seven years. There is a differ-
ence in the odor of the water when the locks are being
filled or emptied. When the water begins churning and
filling the lock the odor is stronger because it turns up
that scum. There is a continuous smell and odor down
there (Brandon Locks) anyway, but when you fill the
630 locks it smells more. I notice it more at night because
every night just about sunset they raise some gates
down there—some nights two gates—some nights three
gates and sometimes four gates. As soon as it gets
daylight in the morning they close the gates. The San-
itary District up there increases the flow—they make
power for Chicago and with the increase in flow we
raise the gates to keep the pool at same level. I weigh
about 180 lbs. am 5' 10" tall and 49 years old. They
632 (The Sanitary District) increase the flow for the win-
ter months. In the winter months it gets dark at five
o'clock. In the morning the flow isn't cut until around
seven o'clock when it is daylight. In the summertime
the flow isn't increased until nine in the evening and
at four o'clock in the morning the gates are closed be-
633 cause they don't need any more light. They have to
keep pool at level of 17.9 feet. The Sanitary District
call them up from Lockport when they increase flow
so they can go out and operate the gates in time.

634 MRS. VINA POOLE, I reside at 814 Kammerman Ave., Joliet, Ill., about a mile and a half from canal. I
635 have lived in Joliet 26 years. In 1939 the odors from the canal were considerably worse than they ever had been before. The effect upon me was loss of appetite, loss of sleep, nauseating. Affected some of the other members of the family. They have difficulty in sleeping
636 on nights when the odor comes over from the canal. I am not affected with nausea much but my husband complains quite a little bit from the odor. I believe conditions this year (1940) are not quite as bad as they
637 were in 1939 because of the cool weather. I don't remember conditions in 1938. I know there always has been some odor from the canal. I thought it was terrible all during last year (1939). My appetite is pretty
639 good. Health is good. I diet only when the waterway smell comes.

Tuesday, July 23, 1940

640 PETER CATTANEO, I reside at 663 South Water Street, Joliet, Ill., about 2½ blocks from the waterway.
641 Have lived there for twenty years. Condition of deep waterway canal last summer (1939) and this summer (1940) is awful bad. I can't sleep at night on account of smell. Lost about ten pounds last summer and this summer because I can get no rest during the night. Since 1939 I know I went down more than 10 pounds and this summer have gone down 7 pounds already. Before 1939 had a little difficulty sleeping but not so much. Odor in 1939 was a lot worse than it was be-

fore that. It had no other effect on me except loss of ap-
642 petite and loss of sleep. Bothers my wife and two daughters too. Youngest girl has a headache most of the
643 time on account of that smell. She did not have headaches before 1939. So far this year (1940) on account of the cool weather conditions really wasn't so bad, but for last three or four weeks it was awful bad. Noticed the odor at my home last night (July 22, 1940).

644 Ten pounds weight lost in 1939 was gained back in
645 wintertime when it is cool weather. Weigh now 155 pounds. Am 49 years old and 5' 10" tall. Weighed 162 in 1938 and 168 in 1937. Weighed 167 last winter (1939).
646 Never lost weight in the summertime before last year (1939). I am in the wire-making business. I never
647 missed any days from work in 1939 and only days lost
648 in 1940 was when laid off. Yes, I said I became naus-
649 eated from the odor. Do not understand what "nauseation" means. Don't vomit because I don't eat much—eat only certain food and keep it down. I have never consulted any doctor on account of my loss of weight.

650 LYDIA ERICKSON, I live at 812 Kammerman Ave., Joliet, Ill., about a mile and a half from the canal and have resided at this address for 17 years. Condition surrounding the canal in 1939 was terrible. Noticed an odor in 1937 and 1938 off and on at night mostly. The odor was more offensive in 1939, it was terrible, could
651 hardly stand it. Was sick every night. I couldn't sleep nights and during the time I smelled it my throat was sore, I couldn't eat in the morning and I got nervous from it. I was nauseated to my stomach. I vomited from it and had headache. These symptoms occurred

when odor was present from canal. At times when there
was no odor they might occur a little, but not like at
652 that time. Went to Dr. Earl Steen. There were days
last summer (1939) when I had to lay down a good deal
at times. These symptoms from the odor happened prior
to 1939 but not like they have lately. This year (1940)
I have been a little better. I noticed the odor at my
653 home last night (July 22, 1940). It started last night
after eleven o'clock. Before eleven o'clock, well, off
and on. When the wind is in that direction I can smell
every bit of it all day and all night long. Dr. Steen has
been my family physician for 25 years. The last time
I went to see him about myself was the last part of
654 last year (1939). My health is pretty good and weight
in 1940 is about the same as last year (1939).

July 23, 1940

655 MRS. ROBERT MITCHELL, I have lived at 201 No.
Broadway, Joliet, Ill., a little past two years. Have lived
in that neighborhood 5½ years—block and a half west
656 of the waterway. Conditions of the canal last summer
(1939) just unbearable compared with those prior
thereto. Every night my husband would have to bring
me something because I couldn't get up—I would be so
657 sick, vomiting every night. My little boy vomited day
in and day out last summer (1939). In June this year
(1940) I had to keep him home from school--he had a
fever. Vomiting by the boy would occur when the
658 odor was perceptible in my house. I myself experienced
this vomiting just in 1939 and again a couple of times

in June this year. I haven't noticed conditions so much this year—have had cool weather, but last year (1939) it was terrible. My husband was ill last summer (1939).
659 He broke out in large sores on legs and arms and had continual headaches. He was not ill last winter (1939). In June this summer (1940) he had the same thing—sores on his arms and legs. He is better now. Prior to
660 1939 she noticed it some, but had never been sick from it until last year (1939). In response to question "Did you lose any weight?" the witness testified—"Oh, no, I never lose weight, no matter what". I have not worked
660 so far during 1940. My husband made me quit work in October 1939 on account of being sick every night.

662 MISS MARY McGARRY—I live at 24 North Broadway, Joliet, Illinois, about a block and a half from the waterway. I have lived at this address 35 years. There was a piece in the paper asking for objections and I felt it was my duty to write in to the Health Commissioner and object to the odor from the canal. The
663 odor bothered me plenty. Conditions surrounding the canal were the worst in 1939. This year (1940) is not
664 quite so bad. The odor makes it hard to get to sleep, otherwise I don't mind. I have a good stomach and can't say with truth the odor nauseates me. My complaint goes solely to the stench. Last week and last night (July 22, 1940) conditions was very bad.

666 MRS. ELLA ANDERSON, I live at 812 Kammerman
667 Ave., Joliet, Ill. I have lived at this address eight years. Conditions surrounding the canal in 1939 were definitely worse than in years prior thereto. The odor makes a

person sick to his stomach—you don't feel like eating and you lose sleep. Last night (July 22, 1940) it was terrible and lasted quite some time. Can see the waterway from my back porch. Last year (1939) the locks to McDonough Street Bridge, and sometimes on the
668 other side, were just thick with scum. When the sun beats down on that scum you naturally get a terrible odor. By this I have, to a certain extent, been affected with a loss of appetite. I did not have that loss of appetite during the winter. I have it when the odor is present. This year the weather has been marvelous up to this last week. We had a case of it then and again in
669 June when we had a few days of hot weather. There wasn't so much scum on the canal in the years before as there was last year (1939). I was nauseated and felt sick at my stomach. My daughter was the same. I do not notice that condition at any time other than when I smell the odor. Health is comparatively good
670 and I feel pretty good. Last night (July 22, 1940) was
671 a splendid night for the odor. I was nauseated last night
673 to a certain extent but didn't actually throw up. Odors were prevalent before 1939 but they were not as bad.

677 MICHAEL COSTELLO. Have been in the meat and
678 grocery business at 701 So. Joliet Street for ten years. I have lived at 508 So. Joliet St., Joliet, Ill. for 14 years.
679 The canal is three blocks west. Condition of the deep waterway canal in 1939 I think was about the worst it has ever been. I myself felt it more in 1939 than in the previous years. I had stomach trouble—vomiting complaints. This summer (1940) I haven't noticed that yet because the odor isn't bad—have had such cool

weather. I have not had stomach trouble in the winter.
This condition is present only when the odor is present.
Last summer (1939) all the family had diarrhea. The
odor bothers our sleeping—we have to keep the win-
dows shut regardless of how warm it is, to keep the
680 odor out so we can rest at night. It has affected my
business too—people think I am not keeping a clean
681 place—there is an odor in my place of business. I think
the odors last year (1939) were worse than in 1938. I
believe a man could walk on that water, that is how
thick it is. I didn't notice that condition prior to last
year (1939). I think the odor was constant last summer
(1939). I was bothered with stomach all last summer
(1939) since the hot weather came into effect. Lasted
till the cool weather came. I just doctored myself.

684 CHARLES SANTINI, I am in grocery and meat busi-
685 ness at 515 So. Ottawa Street, Joliet, Illinois and have
resided at this same address since 1925, three blocks
east of the canal. I did not live in Joliet prior to that
time. I noticed the odor from the canal last summer
(1939). A year before (1938) it seemed to me it was
stronger but it was also bad last year (1939). This year
(1940) it don't seem so strong so far because we are
just beginning to get in the hot weather. Other than
686 smell, it does not effect me. At night when the wind
687 blows, lot of times I can't sleep. Am 55 years old 5' 5"
tall, weigh 204 pounds. Weight was about 209 last
year (1939).

688 WALTER BRITZ, I have resided at 260 No. 12th
St., Joliet, Illinois (corner of Western & Bluff) since

689 about 1929. Back end of the place is about 40 feet away from the canal. Condition of the canal in 1939 was worst we have had. Scum thicker and heavier and just gradually moving. In the years prior to 1939 it seemed to be going along faster and there wasn't as bad an odor. Odor bothers my stomach—nauseates me and I can't eat.
690 Vomited as a result last summer (1939). In the winter you don't get the odor. Wife was nauseated last summer (1939). She was nauseated when the odor was present. There were millions—billions of mosquitoes around the canal last summer (1939). I did not notice
691 them in prior years as bad as last year (1939). The odor last year (1939) was practically constant all during the summer—the hot weather. Conditions this year (1940) aren't so bad—last night (July 22, 1940) was the worst. Only during the hot days this year have we had it. The older boys don't want to eat anything. Four
692 children in family—only the oldest being affected. The youngest ones don't realize what the odor is. It didn't
693 bother the youngest one. My health is good outside of my stomach. Weigh about 162 or 5 now. Height 5' 8½" or 9". Family's health is generally good.

693 WILLIAM KERWIN. I have resided at 205 No.
694 Broadway, Joliet, Ill., about 9 years. I have observed conditions on the canal during the years I have lived around there. Last summer (1939) was the worst of them all. The odor was more offensive. Would make me sick at my stomach if I was standing around when a boat went through churning it up. Vomited a few times as a result of the odor. Appetite affected—sick to my stomach—couldn't eat anything. Did not notice the

695 odor at nights. It does not affect my sleeping. This year
(1940) it has been all right; better this year than ever
before. I did not notice it last night (July 22, 1940).
I live about a block west of the canal. Age 46 years,
696 height 5' 6" and weigh 175. Used to weigh 188. Out-
697 side of last summer (1939) my health has been fine. My
stomach was kind of upset during the war. I would
go along in pretty good shape until a boat comes
through in hot weather and churns up the water. Don't
blame it all on the river.

698 JOSEPH BOLTE. I have lived about a year at 756
699 No. Bluff St., Joliet, Ill. Formerly lived for seven or
700 eight years at 817 No. Bluff St., about 50 feet from ca-
nal. We had a lot of illness in my family a couple of
summers ago (1938). My son Jimmie had a rash in the
summer of 1939. No one else had any ailment. The
children last summer (1939) got summer complaint and
stuff like that. I have Dr. McGinnis now for my daugh-
ter—she claims she can't eat. I noticed the smell last
summer (1939). When it is colder weather it ain't so
701 bad, but it stinks in the hot weather. I noticed it last
night (July 22, 1940) especially when the boats come.
The smell this year (1940) wasn't so bad as long as
the weather was cold and it was raining all the time—
now it is beginning to smell. Doctor gave the children
shots to keep them from getting typhoid when they were
702 ill a few summers ago—not last summer (1939). The
waterway always had a funny smell during all the
time I have lived there.

Tuesday, July 23, 1940.

702 NELLIE PATTERSON HANSON. I have resided at 208 West Marion Street, Joliet, Illinois off and on for
703 about 50 years with a brother and sister. Live about half a block west of the canal. I have had occasion to
704 notice the canal for many years. In 1939 my sister was in bed for six weeks as a result of the smell. She suffered from nausea, loss of appetite—just general disability. I, myself also suffered from fainting mostly. The smell was so terrible it went to my head. I noticed the offensive nature of the odor in 1938. Further than that she couldn't tell. Conditions in 1939 were worse than in the years prior thereto. The odor would last sometimes all day and all night—worse when the boats were going through. Dr. Patterson—my brother—was physician for my sister. We had other counsel too—she was very seriously ill. Odor has affected my sleeping.
705 We have to close the doors and windows. Last Sunday (July 21, 1940) it was unbearable. Had to leave home for the day it was so bad. Last night (July 22, 1940) wasn't so bad.

706 MRS. JOSEPHINE CRESPI. I have resided at 335
707 So. Joliet Street, Joliet, Ill., about 26 years—east side of river. Think condition or odor of canal in 1939 was worst year we ever had. The odor was much stronger. It would last sometimes all day and sometimes almost all
708 night. It wasn't a constant odor—it came and went. The odor would sometimes make me sick at my stomach. Health of my children last summer (1939) was all right. At times in 1940 I have suffered from the odor.

The middle part of May a day was awful bad. I did not notice the odor last night (July 22, 1940). When it is hot the odor makes you kind of sick and you really can't sleep. Have to close the windows. I have been under doctor's care for ten years now.

709 MRS. GERTRUDE MUENTNICK. I have lived at 33 No. Hickory St., Joliet, Ill., for three months about a block and half west of canal. Prior to that lived at 208
710 So. Raynor Ave., about one and a half years, and before that at 110 Illinois Street for 16 or 17 years, about four or five blocks from the waterway. I have lived in Joliet for 32 years. The Raynor Street address is five or six blocks west of the canal. I was sick in August and September last year (1939). It was my stomach and
711 just gagging all the time. Consulted Dr. Faulkner. Some nights the smell was worse than others. We couldn't have our windows closed, we had to have air, so the smell was there all the time. The odor on a day I consider it offensive is sickening—I become sick to my stomach and nauseated. I have noticed the odor only a few
712 days in 1940. It hasn't been warm. I think the odor in 1939 has been the worst it ever was. I never before
714 had anything like nausea prior to the summer of 1939.
715 The odor in 1939 first became noticeable to me in August and September. I have not suffered from nausea in 1940. The smell wasn't so bad that it would affect anybody yet. I consider 1940 better than 1939. Health now is fine.

Tuesday, July 23, 1940

717 MRS. LAURA CERVELLOTTI, I have lived at 342
718 So. Jefferson Street, Joliet, Ill., 23 years about two blocks from waterway. I noticed odor given off by waterway last summer (1939) more than this summer (1940). It was stronger. There was only one day this summer (1940)—I forget—May or what month it was. Odor did not bother me in 1939. I never got sick to my stomach like I did one day this summer (1940) in May.
721 As to affecting sleep, a lot of times I put the window down to get rid of the smell. No one else in my family was ill during the summer of 1939. Conditions this summer (1940) are not so bad—just the one day I told about—and that was only a second, just made me sick to my stomach.

723 MRS. CATHERINE LAWLER. I have resided at 508 No. Broadway, Joliet, Ill., for two years—about a block
724 and half from waterway. I have four children. My nine year old son was ill last summer (1939). Has the asthma. I noticed the odor from the canal last summer (1939). I noticed it first about the end of July and then it got worse during August. We never lived up there (508 N. Broadway) except just to sleep because we were down at my mother's most of the time. My mother lives down on Ottawa Street—about 6 or 7 blocks from the river. I did not notice the odor at our present address last summer (1939). I noticed it this summer (1940)
725 about three weeks ago and once a week ago Sunday. Last night (July 22, 1940) it was terrible. I was awful restless between the heat and the smell. It lasted about

726 three hours. My son has had asthma a year now in August (1940). We go down and spend the day with my mother because my children have no yard to play in. We smell the chemical works down there but can't smell 727 the canal. I think the odor from the canal is more offensive than the chemical works. Smelled it (the canal) so much last year (1939) that we are used to smelling it.

728 JOHN PELLINO, I am employed as pilot of a tugboat on the river. I have been working on the river about six years. I reside at 1406 No. Broadway, Joliet, Ill. 729 Have lived there about four months. I believe the condition of the canal was a lot worse last year (1939) than it is this year (1940). It was pretty bad last year (1939) most of the time. I am really accustomed to it now. Just about three weeks ago I was running up the river with a light boat. Had the window in the pilot house open. Passed another boat and waves splashed water in through windows and on my face on which I had some cold sores. Sunday morning my jaw was swelled up and I went to the doctor. Had a deep abcess 730 on each side of my face. The swelling did not occur the next morning. Last Sunday (July 21, 1940) was when I first noticed it. I was hit by this spray within two 733 weeks. I think the scum and sludge deposits on the river in 1939 was a little less than the year before 734 (1938). 1940 is about the same as 1939. Conditions in 1939 as to the amount of sludge were better than they 735 were in the earlier years, figuring back to 1936 and 1937. In 1936 and 1937 there was high as two, three inches of scum in Lake Joliet here. You could see the

736 water bubble up, big bubbles of gas—bubbles of some
kind. Very seldom you see it now. I was working more
around Joliet then and noticed it more. Last summer
(1939) was working between Lockport and Chicago—
didn't get down here very often. During the summer
737 months—May to September—last year (1939) I was
down to Joliet by boat on the canal approximately ten
741 times. I have spent six years on the waterway and my
health is good. During the six years I have lost approximately a month's time on account of illness.
742 I was sick in 1935 or 1936—don't know which one it
was. Then in 1937 went home a couple of times for a day
or so and then this year (1940) a couple of times. Stomach wasn't working right and I had to lay off for a
743 couple of days. Nothing serious. The smell would
cause it, I imagine. It gets so bad sometimes right
where it is bubbling up that it upsets you. The water-
745 way has given off odors the six years I have been on
it.

746 MRS. RAY SWANCO. I reside at 211 No. Center
747 St., Joliet, Ill., three blocks from the river, and have
liver there three months. Before that I lived at 313
Bluff St. right across the street from the river on west
748 side. Before that I lived way out at Ridgewood on
Harwood Street on east side. I noticed plenty of odor
from the canal when I lived on Bluff Street. We had to
shut the windows most the time we lived there, during
April, May and June 1939. We moved from there because we couldn't stand the odor—upset our stomachs
most of the time at meals and at night we could not
sleep. Odor affected us just about all the time. We nev-

749 er noticed the odor out in Ridgwood. We haven't noticed it so much this summer (1940) at our present address—only last night (July 22, 1940) there was a terrible odor. I think last night is the first time we have
751 noticed it for the summer. My health isn't what you could call good, but I really can't blame it on the river right now.

752 ANNA MARIETTA. I live with my brother and two sons at 310 So. Joliet St., Joliet, Ill. Have lived there about 18 years. This is about block and half from canal.
753 I have noticed odors from canal a whole lot this year (1940). I noticed it last week—had to get up and put my window down. It was a real strong gas smell. Last night (July 22, 1940) I got a whiff—it was a different odor. Conditions in 1939 was just as bad as this year (1940). Every once in a while we would have this smell
754 coming in. We would have to close the window. The unpleasant smell would just keep me awake. It did not affect my appetite in any way. Last year (1939) seemed
755 to be worse. During all the time I have lived there I have noticed an odor from the waterway. My health is all right.

Tuesday, July 23, 1940

756 R. A. FOX, I have been employed approximately five years as Chief Engineer of Globe Oil & Refining Co.
757 Live at RFD No. 2, Lockport, Illinois about a mile from canal. The oil company uses water from the canal for cooling purposes at their plant. The sludge or sediment

from the water settles in condenser boxes and men under me have to clean out this sediment at periods and they thus come in contact with the water and the sediment when they go down in there. There is a very strong appreciable odor given off. We always have
758 trouble when we clean those boxes. Have innumerable cases where the men have to climb out and go lie down, sick and blue. I noticed very definitely an increase in the intensity of the odor last year (1939) during the hot weather. I haven't noticed it as much this year (1940) as last due to fact we haven't had the hot wea-
759 ther. We have found skin eruptions after men have been in contact with water over in our plant. Especial-
764 ly with open sores we had cases of infection. We have been taking water for a number of years. We have not always had the same kind of experiences with our men as I described. We have noticed definitely the difference in effect on the men in approximately the last 12 mnoths. I haven't noticed the odor so much this year (1940) as last (1939). The offal and debris in the canal
765 I would say, is somewhat worse. Before 1939 I cannot recall of any case where men had to lay off because of the ill effects I described. During 1939 we had to send two or three men home about every two weeks (they work on their intakes about every two weeks).
766 They were home for the night and were back the next
767 day. I work right alongside the canal all the time and my health is all right. There has always been an odor from the canal during the five years I have been there.

768 WILLIAM M. DENEAU, submarine diver and construction forman. I have resided at 506 Oneida St., Jo-

liet, Ill., about 12 years. Helped build the waterway. Have been on it ever since the contractor started building it. I am now employed by the United States Engi-
769 neer at Joliet. I take care of any kind of a job under water. I generally cover the area from Joliet to Starved Rock. I have frequently gone below the water in the
770 canal off Joliet and in Brandon Pool and at Brandon locks. I would say I have been down in Brandon pool
771 five times since January 1939. I stay under the water half a day at a time—sometimes five or six hours without coming up. Before they cut the flow (December 31,
772 1938) when they had a little more current I could see a little bit under water in some places when the sun would shine. Now you might as well stay inside of a closed closet and try to see. In Brandon pool the muck down there in some places is four, five and six feet deep, seven feet deep. In reply to the question "Has it affected your health" the witness states "Well, like the fellow
773 says, you can work in a sewer for a long while and you get used to it". I have to keep in condition pretty good. I work with my bare hands and get cuts on my hands. Every time I get a cut I take care of it myself—sometimes if it is bad, the government doctor takes care of it. The government is real strict. Any time we get cut —any kind of a cut—we must report it and must have a
774 disinfectant to put on their hands. The air pumped down to me is taken from right above the water. The air from Brandon locks pool gives me a headache and when they are emptying the locks the fumes from that water stirring up makes me kind of sick. When they
775 had more water they didn't have that disposal plant working and there was a lot of stuff in the water—

practically more than there is now, but the current
kept a-sending it down the river—a lot of it went over
and didn't settle in the pool. Since they cut the current
down almost everything settles in the still water
776 of these pools and that is where most of the muck stays.
The gases in 1939 and 1940 have been worse since the
799 water has been still. At night time they have a pretty
good current, and they use that, the powerhouse is using
more water and they are letting more current down.
In the daytime around four, five or six o'clock they cut
down the turbines and that leaves less current. There
is always a little current on the surface—but below six
or seven, sometimes three or four, feet down, there is
801 none. I am 51 years old and weigh about 180.

802 ARTHUR RESIDORI, I am unemployed at present,
803 I have resided at 410 No. Bluff Street, Joliet, Ill., for
11 years—on west bank of the river about 75 feet from
canal. My oldest child, aged 10 was ill last summer
(1939). She had sinus trouble. My wife complained of
headaches, sore back and pains. She has been doctoring
804 for a bout a year. Since 1939 we have been getting the
odor from the canal pretty bad over where I live. It
bothered me, you might say, every day last summer
(1939) when it was really warm. Could smell it right
along. I have been having headaches last summer
(1939) and this summer (1940). In the wintertime it
isn't so bad. Also affects my stomach—stomachaches. I
805 noticed the odor prior to 1939. Last summer (1939) it
was more offensive than it was before that. I did not
have headaches the summer before last (1938). This
summer (1940) my girl's face was all swelled up—

rashes—and she must have touched it with her fingers
806 and it got all over her face. I couldn't sleep last summer
(1939)—couldn't keep the windows open. Last night
(July 22, 1940) I couldn't sleep. I had a headache at
twelve o'clock.—got up and went out on the porch un-
til four o'clock this morning. The odor was terrible last
807 night. My health is pretty good—only trouble is with
my stomach—I get them pains once in a while. I never
vomit. Weigh 178 or 180 lbs. am 5' 7½" or 8" in height.
808 I never lost any time from work from any of these
stomach pains. I cannot smell any odor in the court-
809 room. I have headaches in the wintertime too—just get
them when I get this smell. I get the smell in the win-
810 tertime but it doesn't smell so bad. My age is 35 years
811 and I have never had a doctor. My oldest child had vo-
813 miting spells last summer (1939). She has sinus trouble.
In the eleven years I have lived at this address I never
noticed the odors from the canal until last couple of
summers (1940 and 1939) before that never once.

Tuesday, July 23, 1940.

814 OTTO BOSWELL, I have resided at 407 Patterson
View, at the south end of Joliet about a half mile east of
815 the canal for nine years. My youngest child, aged 7,
was ill last summer (1939). Had kind of spots all over
816 her body. I never took much notice of the odor from
the canal until this summer (1940). Between the canal
and the chemical works we can hardly stand it on a
still night. It interfered with my sleeping some last
summer (1939). The odor is noticeable only when the
817 wind would come from west-north. My home is lo-
cated below the level of the canal. The odor this sum-
mer (1940) has been pretty bad last few hot days we

had. I don't know that the odor has any effect on me. Went home with headache last Tuesday (July 16, 1940) but wouldn't say that was the cause of it—the heat.

818 LEROY SHERMAN, Superintendent of Swift & Co. I reside at 346 So. Ottawa St., Joliet, Ill.—three short blocks east of the canal. I have lived there for seven
819 years. Am married and have three children, aged 10, 8 and 6. I noticed the odor from the canal during the summer months of 1939. It was more offensive than it had been in past years—in fact, I hadn't noticed it in the past. It affected my appetite at times, when the smell has been bad I haven't felt like eating. It has in-
820 terfered with my sleeping on several occasions. My oldest daughter was ill last summer (1939) from loss of appetite and loss of weight. I took her to a doctor and he gave her a tonic for that. I don't know whether it bothered my wife as much as it did me—couldn't say
821 whether she slept well last summer (1939). The odor was not so noticeable you would pay any attention to it prior to last summer (1939). In the wintertime I don't notice it. I have not noticed it much until just lately in 1940. When it is cool you don't get it like you do if it is warm. There was an odor last night (July 22,
822 1940) but not as strong as it usually is. I have noticed if we send my daughter away for a month or so, she seems to pick up and start eating and after she has been back home a week or so she is off her eating again. In
823 the winter she seems to be all right. It doesn't seem to bother the other children. My general health seems to be
824 good. The heat last night (July 22, 1940) was keeping me awake more than anything.

825 MRS. OPAL RENKENBERGER. I have resided at
708 West Jasper Street, Joliet, Ill., for 14 or 15 years—
five or six blocks west of the canal. I have noticed odor
from the canal this year (1940) the latter part of May
and in June—then it hasn't been bad until the last
week. My older daughter has asthma and we have been
sending her away every year around the middle of
826 July or August. This year (1940) we had to send her
away the last week of June because the air was such she
couldn't stand it. She had to set up in bed a lot at night
from the air. I think the atmosphere in 1939 was more
offensive than in years prior thereto, as I remember.
This year (1940) the season has just really begun. Odor
interferes with sleping very much and with eating, especially
in the evening. The odor is very offensive—
you kind of lose your appetite. Last summer (1939) we
were bothered practically every night with it. I didn't
notice it so much during the forepart of the day, but by
midafternoon and all night we notice it very much.
827 I have seen the sludge completely cover the river at
McDonough Street bridge. It looks so thick that you
828 might be able to walk across the water on it. My
daughter has had hay fever and asthma for about six
years. We have been sending her away in the summer
for five years now. My own health is all right and
I wish I could suffer from loss of appetite.

829 MRS. PALMA POLMONARI, I have lived at 408
830 South Water Streeet, Joliet, Ill., for two years—right
across the street east from the river. I noticed the odor
831 last summer (1939). I had headaches and it travels
through my neck and down my shoulder and sometimes

it bothers me awful. I get that headache when it is hot weather like today and yesterday. I smelled the odor over where I live today (July 23, 1940). It started about nine o'clock last night. It affects my appetite—but my children most, the little ones. They refuse to eat when
832 I give them food. They eat in the wintertime. The time they refuse food is on the days this odor comes by. We haven't had much trouble with it this year (1940) but when you sleep you cannot sleep. The odor comes right in through your windows. One child—the little one—for about three days now she won't eat at all. Its from the odor. She has trouble sleeping too. It
833 doesn't bother the two oldest. Hot weather does not bother my appetite. I eat as much in hot weather as in cold weather. All the time I have a pretty good appetite. I know when to eat. When the smell is there I can't eat. I do not know that I have lost any weight in the last couple of years. My general health is good.

834 DAN STOBBEONA, I have lived at 502 So. Joliet St., Joliet, Illinois since about 1921. This is on the east side of the river. I have been bothered by the odors
835 from the canal for three years now. The odor three years ago wasn't as bad as it was two years ago and this summer (1940). I have noticed it more this summer (1940) than last summer (1939). Right now where scum is so thick in there, you can walk across the river
837 without a boat. You can see that way down by Brandon's bridge. I am getting sore throat and sinus trouble and you can't eat with that smell. I have been going to
838 Dr. Margliano for a year. I am going to see Dr. Lennon, a specialist for throat and eye tonight (July 23, 1940).

I am a machine operator for American Steel & Wire
Co. I work every day. Sometimes if don't feel good I
stay home. The only thing that bothers me is my
throat and head. That has bothered me for three
840 years. Last year (1939) on the river it was pretty bad.
Year before last (1938) wasn't as bad as last year
(1939). The year before that (1937) it doesn't stink as
much as it does now because we had more water float-
841 ing through. This year (1940) is pretty bad. It is as
bad as last year (1939).

Tuesday, July 23, 1940.

845 MRS. LOUISE GARAVOLIA, I have lived at 20 Dun-
can Street, Joliet, Ill., for 25 years—about 4 or 5 blocks
from the canal. I have noticed odors from the canal
during the years 1938, 1939 and 1940. 1939 was terrible.
We could not sleep unless we lowered windows. We
never could sleep with windows open when it was
warm. It was worse in 1939 than it was in 1938. It
hasn't been so bad in 1940, but we haven't had much
hot weather. It has been bad since we had hot wea-
ther. Had some bad nights in May and June and last
846 night (July 22, 1940) was a bad night. It gave me a
nauseated stomach. I have three little grandchildren
that lost their appetites. Last year I had them sick
with dysentery three or four weeks. The odor affects
their appetites—they just don't want to eat. I do not
believe it is as bad today (July 23, 1940) as it was any
time in 1939. One or two days I smelled it awful bad
847 this year—as bad as in 1939. I have not smelled it as

much this year (1940) as I did in 1939 because the wea-
ther has been cooler. The children this year are not
eating so good but I am blaming it on the warm wea-
tner this year (1940) right now. Otherwise they have
been pretty good until last week or so. They have been
eating better this year (1940). We had a very warm
summer last year (1939) and hot weather sometimes
affects children's appetites. My own health is good ex-
cept for nauseated stomach from the odor when I get
up in the morning. I haven't lost any weight that I
848 know of. The odor noticed so far in 1940 has been no-
ticed mostly at night. In the daytime I am working
and I do not seem to notice it so much. It starts early
in the evening.

849 MRS. IRMA BUSANELLI, I have resided for two
years at 404 South Water Street, Joliet, Ill., on east side
850 of canal. I have smelled the odor from the canal the
last two years. I didn't smell it before because I lived
far away from there. The odor was bad last year (1939)
and this year (1940). Now I start to get used to it. It is
bad because we can't sleep. If we close the windows
we can't sleep on account of the heat. It makes my head
851 ache and makes me throw up whenever the wind blows
from the west. It bothers the rest of the members of
my family too. The kids jump around all night—can't
sleep on account of heat. I do not think I have lost any
weight—it is my nature to be fat. My general health
is good.

852 CHARLES DONNA, I have resided for about 15 years
at 809 Adler Street, Joliet, Illinois—about a block from

Brandon pool. The smell from the canal was worse last
year (1939) than it was in 1938. I never noticed it much
853 this year (1940) yet. We have had no hot weather.
We have had a few bad nights but not like last year
(1939). Last month (June) we have a few nights and
now lately we have a few nights. It is pretty hard to
sleep because of the odor, if you keep the window open
and it is hot. I have to cut down eating when I get that
854 smell—lose my appetite. It never bothers my children
much—just bothers me and my wife. I have lost no
weight. Weigh about 180, am 5' 7" tall. Health all right
until last year (1939) when I started to get up in the
855 night and vomit. I am a tavern-keeper. Have never
lost any time from work.
July 23, 1940 (Tuesday)

859 EDWARD P. CALLAHAN, I am 62 years of age, I
860 am employed as U. S. Lockmaster at Lockport, Illinois
861 since May 1, 1932. I live in a government house right
alongside the lock. I came there and painted some
towers in 1930. At that time the water out there (pointing
to water on north side of lock) was thick—you could
862 almost paint with it. It was filthy. Then there was an
awful stench. We almost had to get clothes pins and put
on our nose. Conditions today (July 23, 1940) are
nowhere near as bad as they were then. They have been
clearing that water up—cleared up I would guess 60%.
Would say condition today is better than it was a year
ago. Do I look as if odor had affected my health? My
wife lives with me and two grandchildren, aged 4 years
863 and three months, come down quite often to see me.
Neither of them have been affected (by the odor) by

visiting me. They are the picture of health. I have
lived alongside the canal for the past year—prior to
864 that I lived in the town of Lockport—about two miles
away. My grandchildren have slept at my house.
866 I cannot say that I have suffered any ill effects. I did
not live at the locks last summer (1939) at this time
867 (July) but I worked there every day. The condition in
1939 was much less than it was in 1930 and 1932. There
868 was no such condition there two years ago as there was
ten years ago. The cut in the flow has made no differ-
ence in the condition of the waterway so far as I have
observed it.

869 HARRY MOHR, I am 44 years of age, and am em-
ployed as Lockmate at the Lockport Lock. I have been
employed there four years, working right alongside
the canal. I do not smell anything right now (July 23,
1940). I think conditions as I observe them are now
better than they were last year (1939). My family and
I live three-fourths of a mile from the canal. My wife
870 and daughter have suffered no ill effects from the canal.
I have not smelled anything today—imagine working
there I get used to the odor and pay no attention if
there is an odor. I have fallen in the water several
times. It has caused not a bit of ill effect.
Wednesday, July 24, 1940

876 DR. THOMAS H. WAGNER. My office is in the
877 Medical Arts Building on Scott Street, Joliet, Illinois. I
have practiced in Joliet for 40 years, specializing princi-
pally in surgery. Mrs. JOE AVON has been for a num-
ber of years and still is a patient of mine. (Mrs. Avon

is the wife of Joseph Avon, a witness whose testimony
appears at pp. 612-616 of Record). Mrs. Avon consulted
me during the summer of 1939. She has always been
troubled with more or less nausea and vomiting and
general rundown condition. I could find no organic
878 basis for that condition. She seemed to be worse when
the air was heavy with odors from the Canal and I felt
her condition was due to the state of air. My home is
879 the east side and I had occasion to observe that odor
last summer (1939). Even last night (July 23, 1940) it
was terrible. I do not think any explanation is neces-
sary as to how such an odor could cause vomiting,
headaches, or loss of sleep. Any foul odor will make
880 one sick and aggravates the condition of one inclined
to be ill anyway. I found this so with other patients
many times. Such an odor would unquestionably re-
tard recovery from illness. From my own experience
at home—where we have to close the windows if we
want to enjoy a meal—I know odor will affect the ap-
petites of individuals. I feel the condition of the Canal
since 1939 is absolutely a menace to health of the com-
munity of Joliet.

881 I am the government surgeon and take care of many of the men who work on the Canal. They have had many cases of skin diseases, pustular eruptions and boils involving the exposed portions of the body. I have had to take them off their job for a while and apply protecting oils to their arms, hands and face. It is all traceable to the foul water where they come in contact with it.

The odor from the Canal since 1939 is decidely more intense. The water (from the canal) is terribly in-

882 fected with all forms of bacteria and fungi and most of these pustular skin diseases are due to fungus infection which the water is loaded with. I am on the staff at St. Joseph's Hospital and they have complained many times about the odor. It is natural to suppose the odor has an effect upon the patients at the hospital.

883 I think the waterway as it has existed since 1939 is a
884 menace to the health of the City of Joliet. The basis for such conclusion is that when a physician is called into the home of a patient and they become progressively worse following the inhalation of bad odors, you naturally think the odors are menacing their health. Then you have got to close the windows and doors to enjoy meals.

By "nauseating odors" I mean it makes you sick to
885 your stomach. Not every person—some people can stand those odors—others cannot. Some people can stand terrific odors—but one who is a little bit ill from another cause, no matter what it is—let him breathe bad
886 odors and that naturally makes them worse. I observed these odors last night (July 23, 1940) around 6:30; I live at 309 Sherman St. about six blocks from the canal; then again about 10 o'clock when we came home and turned on fan on our sleeping porch. I did not observe
887 it constantly all evening. My definition for "nausea" is sick stomach. It would take me an hour to name the common causes of nausea; there are so many common causes. I never examined the river to determine the pollution or bacteria in the river. I have had a number of patients who went into or fell into the river and everyone of them vomited and upon examining their vomit it was full of colon bacilli, typhoid and other bac-

teria. The human system normally is full of colon bacilli—but not foreign colon bacilli; you are immune to
888 your own practically, but not to others. When it comes out of their stomach, I know they must have swallowed it. Nausea and feeling of illness is only trouble I can testify to that would be caused by odors. When the odors were eliminated or kept out, nausea and feeling of distress disappeared.

889 The river has ben polluted since 1900. The raw sewage of the City of Chicago has been carried down this stream through the City of Joliet. We have always had with us cases of skin trouble, boils and eruptions prior
890 to 1939. Odors since year or year and half ago have
891 been much worse. The objectionable odor in 1940 is about the same as we had in 1939. I did not have any
892 trouble to amount to anything with odors prior to 1939. I must honestly state I don't believe the condition here is a menace to the health of the average healthy individual. It certainly is a menace to the health of the individual who is not strong and who is ill from other causes. It certainly shortens their life. I could not show a specific record of any case where unhealthy individuals have had their lives shortened by this experience here. We don't make a record of that because we
893 never expect to be called upon to show such a record. I believe Joliet is generally a pretty healthy community—as good as the average. Some of the people who testified here of their inability to eat and sleep and who look healthy and seem to be tending to overweight will thrive on those things—it takes germs to make some people thrive and others don't.

896 A normal individual in the presence of this odor

would not necessarily become nauseated. It depends upon whether he is susceptible to that odor. Some people are susceptible to the odor of a rose which is sup-
897 posed to be perfume. They become nauseated and sick. My experience with men with sores has been the case ever since the men have been working on the canal—a number of years, but they always had more cases when sludge was worse. I had a lot more cases in 1939 than in previous years. Have not had as many
898 cases in 1940. The number of men working now of course has been reduced. The trouble with the odor is always in the summertime. Never seem to notice it much in the winter.

905 MRS. BEULAH BOOKLUND, I resided for three months at 115 Wheeler Street and before that for about 16 years at 610 Railroad Street, Joliet, Illinois, on the west side of the river about half block from the canal.
906 Moved from Railroad Avenue address because we could no longer stand the odors and fumes destroying things in our house. Odor bothered me for first time in 1939. Never noticed it prior to that time. The odor was just so terrible I can't explain it. It was the worst smell I ever smelled. It caused me to have headaches and nausea. It affected my bronchial tubes. The close proximity of the canal in 1939 ruined the paint on our
907 house. This gas turned the paint on the houses around there all black. All of the buildings around there look the same. Did not have that discoloration prior to 1939.
916 1939 was the first season. I did not suffer from nausea during the summer of 1938. Did not suffer from it so much last winter (1939). During the summer the heat

makes the odor and the fumes worse. I do not know how far from canal 115 Wheeler Street is. It is about three blocks off of Raynor Avenue. Odor at new home this year (1940) is not quite so strong. We do get it up
917 there but not like we did where we lived before. Never observed the odors prior to 1939. I have been going to Dr. Faulkner off and on for about eight years.

927 DR. HENRY M. BECKWITH. I have practiced in city of Joliet since 1897. Reside at 623 Buell Avenue, about a mile west of here (hearing room).

I have a patient by name of Mrs. Jessie Marsh resid-
928 ing at 310 Broadway, Joliet, 78 years of age, who was subpoenaed to testify but whom I got excused because she was ill. I have been her physician for about 30 years. She came to me for professional advice in 1939. Diagnosed her condition as secondary anemia. I am familiar with and noticed a few times
929 the odor emanating from the Canal in 1939. That odor would be unhealthful to a person suffering from secondary anemia—it would reduce the resistance of the patient. The gases displace the oxygen of the blood
930 and that produces secondary anemia. The effect of the odor which emanates from the canal on persons convalescing from illness is anemia—displacing the oxygen in the blood. Mrs. Marsh is at home—she has
732 not been in a hospital. She is improving. She is almost as well as she will be so far as the anemia is concerned. At the present time she is in about as good shape as you can expect as far as the blood is concerned.

933 DR. GEORGE E. FAULKNER. My office is located
in the Morris Building. I reside at 20 Manor Court,
Joliet, Illinois; close to a mile from the canal on west
side of river. I have practiced medicine in Joliet for
12 years.

934 I was consulted in September 1939 by Mrs. Gertrude
Muentnech. She complained of nauseated feeling, very
weak, generalized weakness. Made an examination of
935 patient and found nothing organically wrong. As long
as nothing was organically wrong with her I came to
conclusion her condition was due to the odor originating
from the canal.

I observed the odor myself in my own home. I believe
such an odor can produce such a condition of nausea
and general listless condition because the river is
stagnant, and on the surface of the river is all kinds of
waste material. When the heat comes down on it, naturally
it liberates these toxins and bacteria. It is likely
to cause infection. We are liable to have a typhoid epidemic
unless we get rid of that. Mrs. Muentnech
936 did have general listlessness. Personlly, I don't believe
it is just the odor—but believe it is the toxins carried
from the canal by the wind that affects the gastro-intestinal
tract and it affects especially the nasal mu-
937 cous membrance. I noticed that in last couple of years
we are having more streptococcus sore throats and special
nasal pharyngeal infections. I believe it is coming
from toxins carried by the air off the canal.

The family of Michael Costello (a witness who testified in these hearings, at pp. 677-684 of the record) are patients but they didn't consult me about that. They just told me about it.

P

938 In the 6th Ward on a hot day, the odor sometimes
would drive you away—it is terrific.

As to the effect of the odor on the people living in
the 6th Ward, I think it is causing much more nasal
pharyneal disease because inhaling the toxins the odor
is carrying. I think the danger is not the odor so much
939 as it is carrying of toxins off the secretions. All types
of infections come from secretions and the sun dries
and will liberate some of them.

I am on the staff of St. Joseph's Hospital and have
noticed the odor up there on the east side of the build-
ing. That is why most people want to be on the west
side of the building. Patients have complained to me
of the odor the same as they noticed the odor from
any place. I do not feel, as far as the odor goes, it has
any affect on retarding the convalescence of patients.
I feel it is toxins carried by winds off the canal. Any
toxin undermines the resistance and does cause a sec-
940 ondary anemia. One night I had to put down the win-
dows at home on account of the odor. It was one of the
hot nights early this summer (1940). Wasn't over a
941 month ago. I think the odor in 1940 as compared with
1939 is getting worse.

942 I have made no record over past few years to deter-
mine the number of people I have personally treated
943 for nasal pharyngeal diseases, but know that it is on
the increase. The odor itself makes people miserable
but it is my belief the toxins coming off spread the
944 trouble. Toxin is a poison liberated by bacteria. It can
be the bacteria itself that is carried.

952 It has never been decided that typhoid epidemics
come only from drinking water. It is my opinion the

953 waterway could cause any epidemic, even though none
of the water is ever drunk, depending on the organism
that is involved here. We are seeing many strepto-
coccic throats in the spring and summer. Had a num-
ber of increased cases of that not over two months ago.
It is not as bad now as it was some months ago.

954 As to the actual effect this waterway has had upon
the health of the community, I believe it was not the
odor so much as the toxins carried in the air that
caused this one case I saw. That is the case of Mrs.
Muentnech and the only one I know of directly. It has
956 never been proven that typhoid fever isn't carried in
through the nasal pharynx. I know of no medical au-
thority which holds the view that typhoid may be ob-
tained by inhalation.

963 DR. PHILIP C. McGINNES, JR. My office is at 25
No. Ottawa Street, Joliet, Illinois. I have been practic-
964 ing medicine since 1936. I live at 1401 Colorado Ave-
nue.

I recall the case of a man named Earhardt rescued
965 from the canal and taken to St. Joseph's Hospital. I
966 saw him shortly after he was taken from the water—a
half to an hour after. The fellow apparently had taken
967 a considerable amount of water into his lungs. I saw
the man twice that same day and the next day. By that
968 time he had developed aspiration pneumonia and a se-
vere gastric upset. As near as I could tell, it was the
polluted water that caused the severe gastric upset.
The man died maybe 4 days after he was in the hos-
pital.

969 I had a patient by name of Stephen Heinzel (a wit-

ness who testified in these hearings at pp. 617 of record). He came to me for treatment about five months ago. He had a streptoccal infection of the tongue. By
970 laboratory methods I determined that streptococcus
971 was the germ that caused the infection. Pried into his past history and only thing I could find that pointed to the possibility of exposure was the fact that he had gone into the water to rescue this Mr. Earhardt and might have gotten a little water into his mouth.

I had a patient by name of Emil Pianca. I treated
972 him for past two years. Believe his present complaint is listlessness—he had a groggy feeling all the time, loss of appetite and just not up to par. Came to me four or five months ago. I made an examination but couldn't find anything definitely organic. Mr. Pianca has a summer cottage and whenever he goes there he picks up, his appetite approves. He tells me he can smell this river and that is possibly what is back of his
973 loss of appetite. I cannot prove that statement.

It is a correct statement of medical theory that there are present in the average human throat many bacteria, some harmful and some not—and quite often there is
974 present the streptococci germ. These streptococci may
976 be transmitted from one person to another in numerous ways. As attending physician to Mr. Earhardt I signed the death certificate and cause of death was given as aspiration pneumonia. First time Mr. Heinzel came under my care five or six months ago something
977 like six months after the attempted suicide. I am still
978 treating him. There are many things that cause sore tongue; say, anemia, diabetes and what not.

(The Master observed that there was no refererence by Mr. Heinzel in his testimony to sore tongue. He was asked how his health was and he said it was good.)

979 It is, right now because his tongue is getting along pretty good.

980 If Mr. Earhardt had fallen into Lake Michigan and had aspirated water into his lungs, he might have died of pneumonia.

987 MRS. MABLE ST. GERMAIN. I reside at 247 North
Bluff Street on west side of Canal. I have lived at this
989 address for 17 years—right across the street from canal.
988 I was bothered by odor from the canal last night (July
23, 1940) about nine o'clock. It kind of makes me sick
989 to my stomach. Gave me an awful headache. I never
noticed the odor prior to last summer (1939). Made me
nauseated last summer (1939) but not summer before
last (1938). Makes me feel like I want to throw up—
990 takes my appetite way. This summer, 1940, for last
week or so it has been terrible. It is not so bad in the
winter. I am not outside so much and we have doors
and windows closed. I suffer from vomiting very much.
Do not know my weight now—used to weigh 160.
991 Haven't weighed lately. Odor at night and early morn-
ing around five or six when I get up is the worst—espe-
cially when the boats go through. Of course I don't
992 lose any sleep over it. There has been an odor before
1939 but not as strong as what it has been lately. Never
noticed it so much before. Didn't smell it so much this
morning, (July 24, 1940). I am so used to it I do not

mind. I do not lose any sleep. It takes my appetite away in the morning—that is all.

993 MRS MARTIN RYAN. I reside at 26 North Broad-
way, Joliet, Illinois, on the west side of river about a
995 block from river. I have lived at this address about
993 five summers. Noticed the odor was terrible last night,
994 July 23, 1940. Not one of them, not even my husband,
had breakfast this morning, July 24, 1940. Nobody
could eat. The odor started last night after nine o'clock
995 and until four o'clock this morning. Last summer, 1939,
it was terrible too. Didn't notice it prior to last sum-
mer, 1939. The odor makes me nervous—and tired,
the heat along with it. In the cooler weather I do
not notice it so bad. Complained to Mayor and Com-
missioner of Public Health last year (1939). Com-
996 plained a dozen or more times. I get up in morning
and my brother-in-law upstairs over our apartment,
would be up vomiting and we would be vomiting down-
997 stairs. I have lost no weight. Imagine I weigh around
157-58 pounds. Health is all right, I imagine. The
odor first became offensive to me last year (1939). I
have vomited before in my life. Odor causes me to
lose sleep. Could always sleep well.

998 MRS. ELMA BIANCHI. I have resided since May
10, 1939 at 315 Illinois Street, Joliet, Illinois, on west
999 side of river. Prior to that I lived since December,
1936, at 521 South Joliet Street, about 3 blocks from
the canal. I noticed an odor from the canal last sum-
mer (1939) but it wasn't as strong as when we lived
at the Joliet Street address. We seemed to have more

1000 odor down there. I noticed the odor before last year
(1939) in about May or June of 1938—two years ago.
We weren't affected as much on the west side (where
they now live) as we were on the east side of the wall
(where they formerly lived). It causes a burning sen-
sation down thru the nostrils and down my throat.
I seem to be more affected with it after midnight.
Noticed it just during the summer months. Never
1001 experienced that sensation in my nose and throat
prior to 1938. This year there was an offensive odor
Tuesday morning (July 23, 1940). I use an ointment
1002 in my nostrils. Have not lost any weight. No other
odor that I can recall has ever bothered me.

1003 DR. RICHARD CALOSIS. I have been practicing
1005 medicine in Joliet for about 5 years. I have lived in
1008 Joliet about 22 years. I live at 302 South Chicago
Street—five or six blocks from the Canal; located on
east side.

1004 John Pellino (a witness whose testimony appears at
page 728 of record) is a patient of mine. He consulted
me recently. He had cellulitis of the face. He had a
red, browny swelling covering lower lip and most
1005 of the chin. After the thing was localized and opened
up it was my opinion, both from the odor and the pus,
that it was strictly colon infected. Mr. Pellino came
to me on Sunday (July 21, 1940).

1006 I have had occasion to observe the odor and con-
dition of the canal. Noticed an odor at St. Joseph's
hospital last night (July 23, 1940) around ten or ten-
thirty even before I got near the place. As far as I
can determine from my own observations, when the
1007 weather is particularly warm, patients in the hos-

pital object very strenuously to the odor. Think it does prolong the period of nausea and vomiting in post-operative patients—when they have the odor as pronounced as it is.

I have a patient whose husband works at the locks and every time she goes down there and the odor is the least pronounced she gets nauseated and gets attacks of diarrhea. That is her story to me.

1009 I would say that during the hot spell I noticed the odor more last year (1939). It was very pronounced and offensive at my home last night (July 23, 1940) after eleven o'clock or so.

1015 DR. EARL R. STEEN. I have been practicing medicine in Joliet, Illinois, since October 1899. I live on
1018 the east side—Ridgewood, approximately two miles from the Canal.

1016 Mrs. Lydia Erickson (a witness whose testimony appears at pp. 650-654 of record) is a patient of mine She consulted me in the summer of 1939. Her difficulty was a stomach and bowel disorder. Found nothing wrong with her organically. She had a high blood pressure and gastro-enteritis.

1017 It is my opinion that inhalation of odor emanating from the deep waterway canal prolonged her condition much longer than it should have been had she had good clean fresh air to breathe. The odor from the canal was sufficient to make her nauseated. She couldn't eat, therefore she was kept weak longer than if she had been able to take proper food.

1018 At times I have noticed the odor at my home. Noticed it last summer—1939. Noticed the odor last

1019 year more than usual. Noticed it yesterday, July 23,
1940. Get it at times this year (1940) but not all of
the time. There is no doubt about the odor from the
canal deterring recovery from illness. Impure air is
very detrimental to anyone. Sewer gases will make
anyone ill. I feel that the canal in its present state
and condition constitutes a menace to health of the
community of Joliet.

I have treated a case similar to Mrs. Erickson. Had
1020 several last year—1939. Have had in previous years
not only gastro-intestinal troubles but a lot of skin
troubles which I think are due to the dry sewage that
is spread over the county. Have been in Joliet for 40
years and we have had this sewer gas smell every
summer more or less. I believe the general health
1021 of the community is fair.

1022 MRS. ROSALIE HICKS. I have lived at 421 Row-
1027 ell Street about 4 months, about two miles away.
Prior to that for about two years off and on at 219
1022 North Bluff Street, about a half a block across the
bridge from the canal.

1023 I observed the odor from the canal. Last summer,
1024 1939, it was bad is about all I can say. I had terrible
headaches and it caused me to become sick to my stom-
ach. I did have headaches in summers prior to last
summer, 1939, but not as bad as I did while living
1025 around there. I was not troubled with headaches so
much during the last winter—1939. I am subject to
headaches to a certain extent, but was down in bed
two or three times after the odor was terrible around
there. I had difficulty sleeping. Had to close the win-

dows and doors because the odor would come into the
1026 house. Have had slight headaches this year (1940)
during this heat spell. I did eat last year, but if odor
was terrible enough I couldn't keep my food down.
1027 The odor sometimes lasted a day or two and sometimes you didn't get it at all. It lasted usually a day
or so and mostly when the months are hot. Since moving away have had no trouble but was bothered while
living right alongside canal. Do not think I have lost
any weight.

1028 MRS. LENA PESTERIS. I have lived for 20 years
at 607 So. Ottawa Street, Joliet, Illinois, four blocks
1029 from Canal. I have five sons, the youngest aged 9
years. I and my sons all noticed the odor from the
canal last summer (1939). The youngest son got sick.
Family noticed it more last summer, (1939) than they
1030 ever did before. We had terrible headaches. It bothers my sleeping and eating. Have been bothered ever
since—but last summer, 1939, was worst for my family.
1031 ily. Have not noticed it yet this year (1940). I weigh
147 pounds—lost three pounds in two weeks last year,
1032 (1939) but gained it back when it started to get cold.
General health is good.

1032 MRS. FLORENCE McCORMICK. I am sixth grade
1033 teacher at Sheridan Elementary School. I have lived
at 603 Oneida Street, Joliet, Illinois, for about 20 years,
1035 which is about five blocks from the Canal.

1034 Sheridan School is located about 3 blocks from
the canal on the west side. Shortly after school started
last September, 1939, the odor given off from the canal

1035 was very, very bad. Could smell it terribly in the school room. Children in my classes were very restless and it was hard to keep them at their work. I would say that loss of appetite and sleeplessness was the effect of the odor on me. Do not believe the odors in the years prior to 1939 were quite as offensive as during the last year or two. I noticed the odor at my home, but it isn't nearly so offensive as it is at the school.

1036 Can't say that conditions at school this year (1940) were as bad as they had been before, but it was a cool spring and a great many rains we felt must have taken care of it. Did not notice before the condition of restlessness among the school children. Of course the last two or three weeks of school in the spring the children are about ready to go.

1037 DR. COSMO MISICHIA. I have offices at 301 Cass street and reside at 516 Oakview Avenue, Joliet, Illinois. I have been practicing in Joliet since 1932.

1038 I have a patient by name of Mrs. Hope Fazio. She
1039 has been a patient for three years. A nervous type of woman, always complaining of headaches, nausea and what-not. Could never figure out what her trouble was. In her own words, every time there was a dirty stink coming from the Canal she was sick and couldn't eat. In my opinion the odor could create such a condition in Mrs. Fazio. They begin to smell the odor; they think about it and it upsets them. Like she complains, she is nauseated, gets a headache. I treated two of her children for the same condition. Couldn't find anything radically wrong with them—yet they
1040 were sick. The girl, 10 or 12, is off on a vacation

and the boy, 10, hasn't complained this year. The mother complained this year (1940). Last saw her about four weeks ago.

I have noticed an increase in impetigo amongst the children in last few years and a lot of pemphigus in the hospital. Have had one case after another. The babies come and in a day or two I begin to get complaints about big red sores and pus all over their bodies. I practice mostly among the Italians and most of them live in close proxomity to the canal.

1041 I did a lot of first aid or emergency for the con-
1042 tractor digging the deep waterway. Nearly all of
them were infected and sometimes they went along
two, three or four weeks before they cleared up. I
imagine it was a staphylococcus infection—right in the
wound.

1044 I had a patient by name of Felix Egizio—who was working on the canal. He had an infection of the finger. I treated him for a while but didn't get any results so I told him to go in to Chicago.

1045 The odor from the canal last summer, (1939) and
this summer, (1940) I think is absolutely terrible at
times. Personally have had some throat and ear trou-
ble for last three months. I was treated by Dr. Len-
1046 non, eye, ear, nose and throat specialist. He said it
was just a chronic inflammation. I went to Ontario
on a vacation and third morning, my ear cracked open
and throat cleared up and when I got back to Joliet
I felt 100%. After being back a week or a little over
my throat began to inflame again. Do not know whether
1047 or not the gaseous odors from the canal could pro-
duce such a condition. I think there is no question but

what the present condition of the canal constitutes a menace to the health of the city of Joliet, especially in the summertime. In Chicago when I was an interne we didn't see so much of these summer complaints as we see around here (Joliet).

1050 MRS. JAMES SAFFOLD. I am wife of the Minister of St. Mark's M.E. Church. I have lived in Joliet about 5 years; have resided at 348 South Joliet Street about 3 years, about 3 blocks from the canal.

I observed the odor from the canal last summer,
1051 (1939) and think it was more offensive than in past
years. Effect was that I was nauseated, sick at my
stomach that is all. Experienced sickness at my stomach
before last year, (1939). Have noticed the odor
this summer, (1940) but not as bad as last summer,
(1939) which was the worst. Have lost no weight.
Last time I weighed myself, my weight was 198 pounds.
1052 My general health is good.

1052 PETER LAVZZA. I have lived at 510 South Water
1053 Street for 27 years, located about 400 feet from the
1054 canal; work in the wire factory.

Odor from the canal was not so bad in 1938 but in
1939 it was awful and this year (1940) it is not so
bad because they have cold spring and water. When
the hot weather comes, the week before, we can't
stand it any more. I feel sick right now. I didn't notice
the odor last night, (July 23, 1940) because I
worked last night. I was all in when I came home
and couldn't smell anything because I was all in, I was
1055 half dead. The kids say the smell is awful. Family

visiting me complained of the odor. It is bad only in
hot weather.

1058 LEON GRIGGS. I have lived at 250 South Center
Street, Joliet, for 16 years, about a block and a half
from the canal. I have noticed the odor from the
1059 canal. I would say it was much worse in 1939. Noticed
it a few nights in 1940 but not near so much. The
odor disturbs our sleep. There are some nights we
were hardly able to get to sleep. This was quite true
1060 in 1939—it was terribly bad in 1939. Just a few
nights in 1940. That is the only way the odor has affected
1061 us. Present weight is about 195 lbs., height
5′8½″. I am a city fireman. I have been trying last
few months to lose some weight.

1062 BEN DEPRAT. I reside at 203 Sheridan Street, Joliet,
Illinois, about a block from the canal.

I have noticed the odors from the Canal. It was
worse in 1939. It hasn't been so bad this year, (1940).
There have been some nights it has been pretty bad.
1063 Affects the youngest child most (aged 9). He won't
eat half the time on account of the odor. In the winter
1064 and when it is cool he eats. Sometimes he won't
even go to bed—says he smells that stink. It bothers
my wife a lot and the rest of the family—keeps them
from sleeping. It don't bother me after I fall asleep.
Have no illness in my family now. My general health
is all right.

1065 MRS. EVELYN COLVON. I have resided at 108
DeKalb Street, Joliet, Illinois, going on three years—

1068 about a block and a half from the canal. Formerly
lived at 507 Sherman Street, close to a mile from the
canal. Moved to DeKalb Street in September 1938.

1066 There wasn't very much odor in 1938 when the
weather wasn't hot, but last year, (1939) it was something
terrible. This year (1940) it hasn't been so bad
but we have had a few nights when it was terrible.
This past Sunday night, (July 21, 1940) was awful
bad.

I have been awfully nervous lately; have been to
the doctor but he couldn't find anything wrong with
me—only my nerves and that I needed more sleep;
can't take time to lay down during the day when the
odor isn't bad; it is mostly at night after the sun begins
to go down. It bothers you terribly from then until
1067 10:30 or 11:00. You just sleep then from exhaustion.
I weighed over 100 lbs. when I lived on Sherman
Street. Now weigh only 95 lbs. Gain two or three
pounds in winter and then in summer it is gone.

1069 MARY VIRGINIA KEIGHER. I have lived at 406
Oneida Street, Joliet, Illinois, since April 1940, about
3 blocks from the canal. Prior to that I lived at 1001
Western Avenue, 10 or 12 blocks from the canal.

1070 In the last year, (1939) I could notice the odor from
canal four or five blocks but couldn't notice it out as
far as I lived. I think it is just as bad every year. I
walk across bridge every morning and there is quite
1071 an odor from it. Just after having eaten breakfast,
it sort of makes you sick to your stomach. This year,
(1940) I noticed it where I work, 163 North Joliet
Street, more than I ever do at home. My health is all
1072 right. I am 18 years old.

1072 WILLARD G. BLOOD. I have lived at 312 Grove Street, Joliet, Illinois, four years, approximately 8 blocks from the waterway. I am a funeral director
1073 and my place of business is at 163 North Joliet Street, approximately 100 yards from canal.

I have noticed odor from canal the last two or three years. I would say that 1939 was much worse than 1938. This year, 1940, you can smell it just as much as last year, 1939. You get it mostly during
1074 warm weather. You can get an odor from it in cool weather, especially when wind is in the right direction. Personally it has not affected me to any great degree. It has made my family ill at different times. It is rather nauseating. My father has become nauseated on several occasions. I wouldn't say it has affected my sleep any. I operate a funeral business and I have to open the back doors to ventilate the building from
1075 front to back. In warm weather, I have to open the doors during the service or when they have a wake in the evening. We get a distinct odor of the river that people complain about.

1076 RICHARD J. COYNE. I have resided at 163 North Joliet St., Joliet, for 6½ years. The front of the build-
1077 ing is a block from the canal, the rear is half a block.

I noticed the odor in 1939, 1938 and 1940. I think 1939 was worse than 1938. At times in 1940 it has been as bad as in 1939. That is during the warm sea-
1078 son we have had. On the whole this year, (1940) has been cooler so far than last. The odor seems to be worse in the evening, eight o'clock on, and both my

wife and children complain of it. They complain of
the odors and we shut the doors and windows, and
then the children complain of the heat and ask to
have the windows opened.

1079 I wake up most every morning during the warm
weather with a brown taste or a bad taste in my mouth
and the young fellows claim they don't want to eat
any breakfast quite frequently. They seem to go on
a hunger strike for a while and then you can't give
them enough to eat. They eat very good for a week
or so, but after a hot day and what we call a bad
night, they have the same result over again—loss of
appetite. My wife often takes very little in the morn-
1080 ing, saying she feels the effect of the condition around
there. I do not think it bothers the sleeping of any of
us unless it is getting to sleep. Once we get to sleep
1082 we sleep all right. The general health of my family
is good. We have had the odor at intervals in earlier
years, but not as consistent as last year (1939).

Thursday—July 25, 1940

1099 SISTER URSULINE. I have been Supervisor at
1100 St. Joseph's Hospital, Joliet, Illinois, since January,
1936. The hospital is located at 372 North Broadway
and we have a nurses' home connected with the hos-
1101 pital which houses about 120 people. The hospital
has about 220 beds. The hospital is located 1½ to 2
1102 blocks west of the canal. I have noticed at the hos-
pital the odor from the canal. I thought the odor was
more pronounced last year, (1939)—a disagreeable

odor The odor affects the sleep of the nurses and
1103 patients. The odor would have an effect on the effi-
ciency of the staff if one doesn't get the proper sleep
1104 and one loses their appetite when the odor is so pro-
nounced. The odor is more or less off and on—it is
just general. The odor permeates the entire institu-
tion. It is more pronounced on the east side. It is my
1106 own observation that it is a gaseous odor and it really
does nauseate you. It is very unpleasant and has an
effect on your general condition. Patients in the hos-
1107 pital talk about it. Some days this year, (1940) the
odor is very bad. Last week one morning it was very
pronounced. On the whole this year (1940) so far
it is about the same as last year (1939). Some days
are worse than others. I didn't notice odors prior to
1108 1939; last year was more disagreeable. I noticed the
odor in the early morning—it is strongest then.

1109 SISTER HILDA. I am librarian in charge of the
records at St. Joseph's Hospital. I have been located
at the hospital since 1920 and have been librarian
for 10 years. I have observed the odors from the canal.
1110 Last year (1939) it was much more noticeable—very
obnoxious. I know from nurses and visitors that pa-
tients all prefer rooms on the west side of the hos-
pital rather than the east side because of the odor.
My office is on the east side and I wish it was on
the opposite. The odor affects my throat—it causes
a rawness. St. Joseph's Hospital takes care of 5000
to 5500 in-patients and 800 to 1000 out-patients each
1111 year. Convalescent patients are not desirous to stay
any longer than they have to and one of the prime

reasons is the bad odor they have to contend with,
especially in the warm weather. Surgical patients on
1112 an average would stay 10 days and for the medical
patients, the average would be 14 days. There have
been numerous requests by patients to be going home
1113 before the normal period of hospitalization. The odor
in 1939 was very bad in that section of the hospital
used by ambulatory patients. I would say it wasn't
1114 even desirous to go out doors and take a walk because
of the odor. The surgical supervisors have often stated
to me they wished their operations were over on the
1115 west side of the house instead of the east side where
they have to contend with that odor coming in regardless
of whether their windows are closed. The
1116 odor does affect me. I can't sleep. I think this summer,
1117 up to now (1940) is just about as bad as last
summer (1939) and last summer was absolutely worse
than the summer before.

1118 SISTER BURNETTE. I am a registered nurse and
1119 have been at St. Joseph's Hospital for the last 20
years. I am obstretrical supervisor, in charge of the
maternity section located on the 4th floor of the hospital.
1120 The odor from the canal was very offensive
last summer (1939). I think it was lots worse last
summer than it had been previously. If it is very
warm like it is now we try to give mothers in the birth
room a little ventilation but we cannot do that—we
have to close the windows, especially when a boat
goes by, on account of the awfully offensive odor.
1121 The unpleasant smell has an effect on the expectant
mothers. They cannot eat—they sometimes send the

tray back without even touching it. The birth room
is on the east side toward the canal. The nursery
where the newly born babies are kept, is on the west
side. We have been forced to close the windows of
1122 the nursery on hot days because we don't want a
new-born baby inhaling that bad odor. A new-born
baby is susceptible to most anything—the skin and
everything is more tender. They haven't got the resistence
of grown people. I myself have had no difficulty
sleeping; I am a pretty sound sleeper—but I
1123 haven't got my room on that side. My appetite is
affected only if the odor is present. I think no one
could eat then. Patients often ask to be transferred
1124 to opposite side. Can't say that the presence of the
odor has retarded recovery in a maternity case.

1125 The odor is very bad at night, always. Sometimes
I get up at two o'clock in the morning and cannot
go outside with that stench. It is much worse when
a boat is passing. I did not notice the odor last night
(July 23, 1940) but did notice it the night before (July
22nd) about 10 to 11 o'clock. The odor is just as bad
1126- this year (1940) as it was last year (1939). Last year
1127 was worse than the years before. It is worse in the
summertime but we have trouble in the wintertime
too, it is better in the wintertime.

1128 SISTER HUBERTA. I am a teacher at St. Joseph's
Hospital; have been there for eight years. I live at
the Sisters' home. I notice, even during the night,
that the gassy odor when it comes, affects my throat.
I get coughing spells and have noticed the younger
girls are similarly affected when speaking or reciting.

1129 Conditions last summer (1939) were very bad—but personally I cannot say that it was worse. It was bad enough and now, too, and I notice it more on rainy days when we have a storm and when large barges pass through stirring it up. We haven't had it so bad now for several days. My schoolroom is on the first floor, one side facing the canal. The odor permeates the school room and goes to the kitchen and all parts of the house. It is a suffocating smell—it
1130 chokes me. It affects my sleeping conditions.

I did not notice so much the effect on my appetite —but when it (the odor) comes, it disturbes my appetite before I even get in the dining room and makes me irritable. It gets on my nerves. July and August
1131 last year (1939) I think were about the worst. The odor has seemed bad just this past year. There always was a smell from the canal—not bad. There are two different odors—there is the decayed odor—it reminds me of rotten eggs—and there is some sharp gas that
1132 affects a person more. The annoyance I spoke of does not keep anybody from working—it passes off.

1133 SISTER HORTENSE. I am a nurse and anesthetist at St. Joseph's Hospital. I have been at the hospital since 1933.

There are many odors in the surgical rooms. The patients notice them when they come in. There is the
1134 disinfectant, anesthetics and of course the material being sterilized; but when we get the odor from the canal we can notice that a little stronger than the other odors. When the canal odor permeates surgery it makes me kind of groggy and affects my sinuses. I

can distinguish that from the anesthetics and other
1135 odors. During operations we have to keep windows
closed in the operating room anyway. The big sur-
geries are on the west side and most of their ventila-
tion is from the east side because we have to keep
windows closed while we are working to keep out
germs that come in through windows. When the odor
is present the windows on the east side are closed
too. The odor gets too strong. It is a sickening odor
1136 —I think it nauseates. The doctors and surgeons all
sepak of it. I think the odor is stronger at night—
about two to five in the morning it is terrible. This
year when we have sunny days it isn't bad; on sultry
1137 days and after a rain, or during a rain storm, it is
terrific—it is really very bad. About two nights ago
1138 I was up between two and three o'clock in the morn-
ing and really felt very sick from it that morning.
It was Tuesday morning (July 23, 1940). I would say
that the Sunday morning previous, about five o'clock,
1139 was bad. I think there is constantly an odor around
two to five in the morning. I noticed it again in chapel
1140 this morning (July 25th) about four-thirty. I do not
know that the odor wakes me up, but think it keeps
me from going to sleep.

1141 SISTER PASCLINE. I am in charge of the office
at St. Joseph's Hospital. I have been there since 1921.
Have several times noticed a complaint on the part
of patients with reference to a desire to leave the hos-
pital early. Reason assigned for these complaints is
on account of the stench from the river. They are nau-
1142 seated—their food doesn't taste good to them. After

a rain and that gas rises, it is very nauseating and I have had trouble for last year and a half with sick headaches due to stench from the river. It keeps me from working 3 or 4 hours at a time. It interferes very much with my sleep—especially after eleven o'clock or between two or three o'clock in the worning when
1143 the tug boat goes through and that sludge is stirred up, the odor is terrific. I sleep on that side and we are forced to close our windows. Last year (1939) the condition became severe after the amount of water was shut down. In 1938 there was some stench but not as much since as in 1939. The odor at our rising time, 4:30 in the morning to 6:30, is so severe it is almost impossible to stay in the chapel. When the wind is from this side (east) it is much worse but we smell
1144 it each time. The odor permeates the entire hospital —so much so that last Tuesday (July 23, 1940) we had to burn incense to have an agreeable odor when visitors came from the outside. This was about 4:30 in the morning and we could still smell it at tray time, 11:00 o'clock.

1145 SISTER DOLORITA. I am Supervisor of first floor of St. Joseph's Hospital, Joliet, Illinois, have been at the hospital for 8 years. I do not notice the odor from
1146 the canal so much on my floor as I do in the Chapel or when I go outside. It seems when I go up on the higher floors I notice it more than I do on the main
1147 floor. I notice it in the Sisters' Home too. It has no effect on me—I just don't like the smell of it. I haven't noticed it as much this summer (1940) as last summer (1939). We haven't had as much rain this sum-

mer as last and when it rains or when the barges go through is the only time I notice it.

1148 DR. RAYMOND J. KENNEDY. I have been practicing in Joliet since 1930. I recall treating a patient last year by name of Stephen Heinzel. I believe it was
1149 in April, 1939. Heinzel jumped in river and rescued an attempted suicide and I was later called to see Heinzel. At that time the only injury I could see was a superficial laceration around his ankle. I cleaned the wound out with an antiseptic—a solution of myrtillin
1150 and a tincture of methylate—washed the wound with a little boric acid and some argyrol. I noticed a change in the condition of the laceration about the third day. He started showing a little infection—a little redness around the laceration with the production of a little superficial pus. Within the next day or so he started developing a spread of this superficial infection and it developed into what they term a cellulitis of the leg, which is an infection of the skin and underlying tissues. I have no opinion as to what type of germ produced the infection—no cultures were taken. The usual measures of hot packs and antiseptics were used and it did clear up. It took approximately 10 to 11 days
1151 before it was entirely healed. Heinzel sustained the wound in the water and I believe it may have had something to do with it.

1153 SISTER MELITTA. I have charge of the third floor of St. Joseph's Hospital, Joliet, Illinois. I have been at the hospital 20 years. The patients on the east side of the house do complain about the odor from the

canal. It does not have so much effect on their sleeping conditions as it does on their appetites. They say the odor is so terrific they just can't eat. I can't
1154 say that conditions last summer (1939) were any different than thay have been in the past, but I know that every time the boats go through it is worse and whenever it rains it is worse; when the water is quiet it is not so bad. I can't say that I have ever had any requests from patients to either leave the hospital or move because of the odor. The odor affects me only early in the morning—it is most offensive in the morning. I think the odor is mostly intermittent. I sleep
1155 too good to notice it at night while sleeping. It has no effect on my appetite.

1155 SISTER IRMENGARD. I am Surgical Supervisor in the operating room at St. Joseph's Hospital. I have been at the hospital since 1922 and have been Surgical
1156 Supervisor about eleven years.

I have noticed an odor from the canal. Think the odor was more intense last summer (1939) than I ever noticed before. In my work in surgery I have
1157 noticed the odor from the canal very much. We keep windows in operating room proper closed and get our ventilation from the east side of the house. If we don't close the windows and doors on the east side we can hardly stand it at times in the operating department. It is a nauseating odor—you just get sick to your stomach. We get used to the odors in the operating room but I cannot get used to the odors from
1158 the canal. Aside from my work in surgery I notice the odor at times, especially early in the morning

in the chapel. When I first get up I have a depressed feeling certain mornings—it isn't every morning. Do not think I could say that the odor has had any effect on my apeptite. Conditions this year (1940) have, for some reason, not been as bad as they were last year (1939). I thought it was because the heat had not been so intense and not so much rain. Have not noticed odor in surgery as much this summer (1940).

1159 SISTER PETRONIA. I am a substitute teacher—
1160 I go out and help on the different missions. Have
been living at St. Joseph's for the past two years. Have
noticed an effect on myself of the odor from the canal.
I have been bothered with sinus trouble quite a bit
since May, 1938. At times, the fall of 1939, I had to
have treatments twice a day for a period of over a
week before I could get any relief, and from then on
whenever the odor is strong, I have that congested
feeling in the sinus region. The difficulty in my sinus
is present especially when the odor is strong. Notice
the odor most of the time early in the morning, say
1161 around four thirty, five o'clock. Lately it has been
quite a bit in the evening around eight or nine o'clock.
It affects my sleep somewhat. I had a very slight touch
of the sinus trouble about six years ago. I took treatments
at LaSalle, Illinois, and it was entirely cleared
up. Since I am back in Joliet the attacks came back
in a more extensive degree. I had no treatments for
it in 1940.

1162 MRS. JOHN JEFFREY. I have resided at 211
Western Ave., Joliet, Illinois, for 17 years—100 feet

from Cass Street bridge on the west side of the canal. I have observed the odor emanating from the canal.
1164 The odors were terrible last summer (1939). Due to the cool weather we had the first part of this summer (1940) I do not think it has been so bad. It wakes me out of a sound sleep at night. Tuesday morning (July 23, 1940) and last Friday, Saturday and Sunday, (July 19, 20 and 21, 1940) it awakened me out of a sound sleep. It makes me kind of sick—just gags me—I can't get my breath. I have had trouble with my nose—it stuffs up—I just can't breathe out of my nose
1165 —I have to be spitting, that is the whole thing. I have been suffering with that since the summer of 1939 and blame it on the odor of that river. The time of day when I notice the odor especially is when a big barge goes through and stirs up that water but it is terrible in the morning from about two o'clock on.
1166 I have been confined to my bed lots of times lately. Last time I weighed I had lost ten pounds, between last winter, early in the spring of this year (1940)
1167 up to now. I am sick to my stomach practically all the time—can't eat the way I should. Last time I
1168 weighed I weighed 149. I do not know my height exactly—a little over five foot. We live in an apartment; just rent. I never noticed the odor so much as I did in 1939 and up to the present time. I could not say that there was an odor before 1939—not as
1169 bad as it is now, I never noticed it much. I am under the doctor's care now for different ailments.

1170 MRS. STELLA LOGAN. I have lived at 408 North Bluff Street, Joliet, Illinois, for the last six years. Live

about 100 feet from canal. Have five children. I have noticed very much at my home the odor given off from the waterway. It does not have so much effect on me as I am not quite so nervous. My oldest daughter had headaches and nauseated stomach all the time. She will not play outside—would rather stay in the house. Suffers from these headaches just in the summertime. Last year (1939) the odor was much more
1171 offensive than it had been in the past. This year is not quite as much because we had it cool—and it seems that may be there is more water going through, but it is terrible when the barges go through. I think
1172 there are more boats going through this year (1940) and that kind of takes the scum away. The oldest girl has become nauseated from the odor and has vomited. The odor does not seem to affect the other children. The odor generally wakes me up early in the morning before five o'clock.

1174 STUART BEEBE. I have lived at 24 North Bluff Street, Joliet, Illinois, for 6 years—on the west side about 15 feet from the river.

1175 I noticed plenty of change in the condition of the river last year (1939) from the years before that. There was a lot more scum on the river and an odor coming from it. I believe I lost my appetite from that odor. It does not affect me so much in the winter.
1176 Where I am I really don't get a lot of odor except when a boat goes through because it seems to come up and go over the house. When the boats go through I get plenty of it. It has not affected my sleeping.
1177 I do not think the odor this year (1940) is quite as

bad as last year (1939) There has always been some odor on the river during the time I have stayed at this address. Notice the odor this year (1940) when
1178 the boats go through, and it is very offensive to me.
1179 In the wintertime I have a very good appetite and in the summertime, around June or July I will have a cup of coffee for breakfast—one sandwich for dinner and may be a potato and pork chops for supper. I am 40 years of age, 5'10" in height and weigh about 152 lbs. I am employed and worked regularly up until this week when I was laid off on account of no work in the shop right now.

1180 SISTER MARY JOVITA. I am a nurse at St. Joseph's Hospital. Have been there almost 30 years. I have noticed plenty of odor from the canal. I think in 1939 it was more severe than ever before. The patients complain of nausea and vomiting and espe-
1181 cially during the night. Sometimes I have to put cotton in the patient's nose. When the patients are very sick and have stomach ailments and they are vomiting all night they have no appetite the next day, and then maybe the following night it is the same thing. Some patients won't stay long in the hospital, and before they remove the stitches after the operation, the patients go home. They tell me it is due to the
1182 odor of the canal. They have the stitches removed at home. I have noticed an effect of the odor on the sleeping or resting of the patients. I have noticed this effect on several patients who are very ill and have a poor delicate stomach. Even the other day when I made my rounds a patient had nausea all night. I

asked the cause and the patient said "due to the smell of that odor".

1183 The odor bothers my own sleeping quite a bit
when the wind goes over from east to west. At times
it also gives me headaches and nausea. I notice the
odor most early in the morning. At the Convent we
get up at 3:30 in the morning and it is awful. Sometimes
when we get up for surgery at nights then it is
1184 just terrible—a very offensive odor. I think last year
(1939) was worse than this year (1940).

1184 MRS. GERTRUDE HARPER. I have lived for a little over 2 years at 26 North Broadway, Joliet, Ill., about 200 feet from the river.

1185 I notice the odor from the canal. Since I have been
living at this address I find I have developed a sort
of sinus trouble and my throat seems to have a raw
feeling in it. I had to go to a throat specialist and have
my throat swabbed with a medicine and I have had
my sinuses drained. I think about four or five times
since I have had that condition. I did not have this
throat condition until about two years ago and then
I noticed it mostly in the spring weather. Last year
(1939) the odor was terrible. I took a cottage out at
1186 Troy in order to sleep. At times I am nauseated
1187 when I smell it. This year (1940) it seems to me,
conditions would be a little better. It seems like the
boats are still stirring it up. It is just on certain times,
like may be in the morning around two until a little
later on in the day, if the boats stir it up and the
wind is in our direction than we get that odor. My
husband is a great big guy and shouldn't be affected.

He got up several mornings and he was very nau-
1188 seated. My health was bad before I ever came to Joliet and I went on a special diet to get fat on my body. My sinus trouble began about two years ago when we moved to Joliet from Evanston, Illinois.

1188 SISTER EVANGELISTEN. I am a nurse at St.
1189 Joseph's Hospital now but wasn't for the last ten years—I was there previous to that.

I have observed the effect of the odor from the canal upon patients under my care. Patients that come in with a delicate stomach, or a sickness causing nausea, are more nauseated from the odor and due to that nausea they are unable to eat and unable to sleep. It retards recovery of a patient because the patient is not able to take the prescribed nourishment they are supposed to take. If they are recuperating or if
1190 they have just come into the hospital the odor prolongs their illness, I should say, many times. I would not say that every patient is affected because some patients might not be as susceptible to that. I am certain that certain patients, like post-operatives, are affected much more because the post-operative patient has an upset stomach and the odor naturally would make it worse. I think the odor last year (1939) was very bad. At times before we got a rain, or depending on the direction of the wind, the odor was very bad all during the nights. I noticed the odor being
1191 very strong—especially like the night before last (July 23, 1940). Two boats went through and I noticed how bad the odor was. It seems when the water is in motion that it is worse. The odor very often has

an effect on me personally. If I am not feeling so good and kind of nauseated, and if that odor comes up during the night it makes me more nauseated. This
1192 year (1940) it is just lately I noticed the odor. I think it is due to the heat. Since the heat I think the odor this year is quite severe. The odor is worse at times. I think at nights and some days when the wind comes from the right direction and before we get a
1193 rain it seems to be worse. I first came to Joliet in 1910 and whenever there was an odor we would say "It is the old dirty canal". That was quite some time ago.

1193 MARY ELIZABETH MOMPER. I have lived all
1194 my life at 254 North Center Street, Joliet, Illinois, on the west side of the canal. I am a private duty nurse and have worked at St. Joseph's Hospital a great deal
1195 of the time. I have observed the condition of patients when subjected to the odor from the canal. I was out of town from May to August of last summer (1939) but when I came home in August I found the odor terrific. The effect of the odor on the patient is nauseating and causes restlessness. Sometimes if the odor is bad around meal time they can't eat and if they do eat they are not able to retain their food. They become restless if they are nauseated and they can't sleep.
1196 The effect on me personally is to make me nauseated if I am very tired. I try to plug along when I am on duty but it isn't very comfortable. I have heard patients complain that they wanted to leave the hospital but haven't had any come directly under my care. This year (1940) before storms and if a boat happens

to go up or down the river I think it is more pronounced then. Depends on how we get the wind. I do not think it is quite as bad this year (1940) as last year (1939). My home is four blocks from the
1197 canal and I have noticed the odor at home. It bothers my mother a great deal but the rest of us seem to be able to take it fairly well.

1197 SISTER EMMA LOUISE. I am an anasthetist at
1198 St. Joseph's Hospital. I have been there seven years steady. I observed the odors from the canal last year (1939). Between two and three in the morning when it was rather sultry and after raining or during a rain it was terrible. It was very offensive and made me very dizzy, sickening. Think I would become accustomed to the odors in surgery—they never bother me
1199 like this (the canal) odor did. It was very nauseating and really would bring a sort of faint feeling upon a person. If it come out between two and three in the morning or so there was no use to try to get any sleep after that. I think, more or less, there has always been an odor there. It always seems the same to me. At times it seemed worse but the last week or so I don't think it has been as bad as it had been. There have been only two mornings that I noticed it had been somewhat offensive. It interferes with my
1200 own sleep. Patients have complained about losing
1202 sleep on account of that odor. Patients are not allowed to go home without the permission of the doctor.

1203 SISTER ALMA JOSEPH. I work in the x-ray department at St. Joseph's Hospital. I have been there eleven years. I have observed the odor from the waterway and it was considerably more offensive last summer (1939) in warmer weather than it had been in prior years. Patients for the x-ray or fracture patients all complain about the odor disturbing their sleep at night and also making them nauseated and
1204 they can't eat or if they do eat they are distressed. Noticed an increase in this type of complaint during the hot weather in 1939. The odor makes me nauseated and I can't eat and I am weakened and it does retard and hinder my work in some respect. I can't think right then. I am a good sleeper and I couldn't say I notice it at night—I have smelled it at night.
1205 I think the odor has an effect on the nervous condition of the patient. They are nauseated and not being able to eat they become nervous and irritable. That effect when the odor is perceptible is quite general —those that aren't affected are the exceptions to the rule.

1206 We haven't had enough hot weather this year (1940) to notice it much. It was early in the morning about a week ago I noticed the odor offensively at the hospital—it was very bad. Do not recall how long it lasted but it must have been several hours.

1207 SISTER CLEOPHA. I am a laboratory technician
1208 at St. Joseph's Hospital. I have been at the hospital for ten years. I certainly have noticed the odor from the hospital. The odor has been very offensive to me all along. I often have to leave my work on account of

1209 headaches and nausea. I simply cannot work any longer; I have to go off duty. I experience that feeling when I smell the odor. I don't feel that way at other times. I have noticed the odor this year (1940) but
1210 not so much as last year. I had to lay off work once this year (1940) for two or three days and last year I would be off for a few days and then go back to work. I couldn't say definitely how much, but it was quite a bit. I am somewhat of a nervous disposition.

1211 SISTER MARY GEORGE. I am a nurse at St. Joseph's Hospital and have been there six summers.
1212 The odor from the canal was quite considerably more offensive last summer (1939) than previously. I think the odor has a particular effect on patients—a great many will complain about it when it is present. It will many times have a more serious effect on a new surgical patient than a patient that is perhaps pro-
1213 gressed more along his way to recovery. The patient will become nauseated or if he is already nauseated it doesn't help his condition any; other patients, if it is around meal time, it seems to interfer with their eating. If patients are on that side of the building it is more noticeable—it makes them uncomfortable and of course that will interfere with their sleep. If I have worked quite hard all day and then the odor comes up at night it is very disagreeable to me. I am a pretty good sleeper once I get there, but it doesn't help any
1214 as far as eating is concerned. I notice the odor most during the real hot weather such as we have had the last couple of days and particularly when the boats

go by. Conditions this year (1940) do not seem to be
quite as bad as last year (1939). They are bad enough.

1215 LEONA PETERSON. I have lived for two years
at 263 North Chicago Street, Joliet, Illinois—about 4
blocks from the canal. Before that I lived in Chicago.
I noticed the odor from the canal last summer (1939)
1216 —it was very bad last summer—more so than this
summer. The odor is terrible. It caused my children
to wake out of a sound sleep and complain. They
weren't hungry because of the odor—it just seemed
to take their appetite. The odor did not especially
affect me—at times it did affect my sleep. I cannot
say that the children suffered any illness when the
odor was present. No nausea was induced by the
odor. I noticed the odor around in July and August
(1939) when it rained or was sultry. There have been
times when it hasn't been so pronounced. I have noticed
it this summer (1940) but it hasn't been quite
as bad as last summer—(1939).

1217 PETER BECK. I have lived for 30-40 years at
1218 511 West Jasper St., Joliet, Illinois—about 2000 feet
from the canal. Last year (1939) the canal had a scum
on it that thick (indicating) at the lower end but it
isn't there so much this year (1940). The odor last
year (1939) was bad. The odor got me a lot of times
1219 that I couldn't breathe. The odor affects the other
1220 members of my family. The effect on me is a gagging
1221 or choking. A lot of times we couldn't sleep on
acount of the stink—not smell. It has been better this
1222 year (1940). I did get a whiff of it night before last

(July 23, 1940) but not as bad as we used to get it. I used to get a couple of these 35c jugs of beer and drink them so I could fall asleep and wouldn't smell
1223 it. I weigh 217 pounds and think I am about 5'11" tall. I am 66 years old. I am in good health.

1224 MRS. SOPHIE SEEBER. I have lived for five years at 263 North Chicago Street, Joliet, Illinois, three or four blocks from the canal. There surely was an odor from the canal last summer (1939). It was pretty bad last summer. I thought it affected my daughter
1225 more. She (the daughter) couldn't stand it. She always complained so much about it. She had so many headaches all the time—she couldn't go to sleep. She said the smell made her head hurt her so. It didn't bother me much. It affected my daughter's appetite —she couldn't eat. Conditions this year (1940) I think are not as bad as they were last year (1939). Once in a while evenings this year we get it pretty strong.
1226 The smell doesn't just make me sick but it bothers me. I don't know whether I am overweight—haven't weighed in a long time.

1227 MRS. LOUIS DATOZECH. I have lived for 18 years at 5 North Broadway, Joliet, Illinois. I noticed very much the odor from the canal last summer (1939). Since we have lived there there has always been a slight odor, but never like it was last year. This year I don't think it has had a fair chance up to now because the weather has been cool, except that last week.
1228 The odor is terrible hard to sleep, makes me groggy like, children complain of the odors. Did not notice

1229 odor much before last summer, now it has got to be a
nuisance.

1230 This year (1940) you can smell it at times, mostly
in the morning or if a boat goes through—but outside
of that it isn't bad except on a real sultry day—then
you get it any time of the day. It was when it was
real hot last summer (1939) that the bad periods set
1231 in. Everybody in their immediate neighborhood I
talked with noticed it. I am somewhat overweight.

1232 MRS. ANNA ELFDER. I have lived for 25 years at
120 New York Street, Joliet, Illinois, maybe 50 feet
1233 from the waterway. I was in Europe last summer.
This summer (1940) the odor from the canal smelled
terrible.

1233 MRS. RAY ALTENHOFF. I have lived for eight
1234 years at 13 North Broadway, Joliet, Ill., about a block
and a half from the canal on the west side. I noticed that
the odor from the canal last summer (1939) was much
worse than it had been previous to that time. The
1235 odor was very offensive to me. Outside of making me
nauseated it didn't affect my general health. That
happened whenever it was a dark sultry day when the
air was heavy. The odor had no other effect on my
1236 general health. It affected my sleep if I awoke in the
night and the odor was there. It generally is at night
more so, it seems, than during the day. It did not affect
my child in any way. There has been a noticeable decrease in my husband's appetite. I would say he had
1237 nausea as a result of it. When I noticed the odor there
was general complaint throughout the neighborhood.

I have not noticed the odor so much to date this year (1940) because we have had a cold spring and summer except for a couple of days. Lately the last few days it has been very noticeable at night.

1239 FRANCES LOW. I live with my parents, sister and
grandfather at 12 North Broadway, Joliet, Illinois. We
have lived at that address about 20 years. We noticed
the odor from the canal last summer (1939) more than
in the years before. It affects me at night. On waking
1240 in the morning you have an awful groggy feeling and
lots of time I have awakened with headaches. When
I wake up in the middle of the night I can't go back to
sleep. When I notice the smell I can't eat—it makes me
1241 sick to my stomach. My grandfather is ill when the
odor is present. He has heart trouble and often com-
plains of lack of sleep at night. He always wants the
windows closed to keep out the odor. The odor makes
him short-breathed and when it is at its great height he
becomes ill and practically has to go to bed—he can't
stay up. Last summer (1939) we noticed the odor more
in the evening than we did in the day. It was the early
part of July I think when we first noticed it a great
deal. That was when it became particularly offensive
and it lasted three months anyway—the whole sum-
1243 mer. July and August was when it was at its great-
est. Noticed it in that hot spell in September—it was
very bad then too. Noticed it in May and June but it
1244 was not as bad. This year (1940) I don't think it is bad
because of the cold weather we have had. My grand-
1245 father is 81. He has heart trouble—for about the last
two or three years.

1245 MRS.MELLISON RENGER. I have lived for 12
years at 9 North Broadway, Joliet, Illinois. It is about
2 blocks from the waterway.

I have noticed the odor from the canal. I can
1246 neither eat or sleep. Whenever I smell that odor my
stomach is all upset—I get nauseated. I never get
1247 a headache from it. I never sleep except when the
odor isn't there. The last two weeks I haven't slept
very much. It has been pretty bad. I noticed the odor
last night (July 24th). It was so bad I had to go out
on the porch at one time at one o'clock. The odor was
1248 something terrible. The odor last summer (1939)
was quite a bit worse than in the years before. I am 76
1253 years old and have lived alongside the canal about 30
1254 years. My health is pretty good.

1254 HELEN CHRZANOWSKI. I live with my father at
1255 317 North Chicago Street, Joliet. We have lived in
the same location for 18 years—about a block and a half
west of the waterway. The odor from the canal in 1939
was so bad we could hardly stand it in our neighborhood—an offensive odor. It has been that way as soon
1256 as it gets warm until it gets cold—around December. It
1258 seems to be about the same this year (1940) as last
1259 (1939). I believe I am overweight. I myself have noticed the odor ever since we lived there—18 years.

1260 MRS. JOHN CONLEN. I live with my husband and
two daughters at 112 Broadway, Joliet, Illinois. We
1261 have lived at this address only about 4 months. Prior
to that we lived near the West Pine Street Canal on Pine
1263 Street for 8 years; lived at the Pine Street address in

1264 1938 and 1939. I think the odor from the canal in 1939
was worse than it has been this year. I think conditions
in 1938 were about the same as in 1939. First noticed
it in 1939 in the hot weather—July, August and
September. We can't sleep at night when it is real bad;
it gives you a bad taste in your mouth and throat and
1265 headache—that is about the worst affects it has. The
odor this past week has been pretty bad. Prior to the
past week there was another bad spell, six weeks or
a couple of months ago.

1265 JAMES BONAKES. I have lived at 210 Bluff Street,
1266 Joliet, for four years but have lived on the same
street for 30 years. Before 1939 we did not smell the
odor from the canal so much, but in 1939 it was very
1267 bad. This year (1940) I didn't notice it very much.
The worst year was 1939. Noticed in June and July,
1939—when the river was thick. I was in good health in
1939. I have lost 30 pounds but didn't lose it on account
1268 of the water. Odor in 1939 affected my sleep. I do not
eat very much. This year (1940) I don't feel the odor as
1269 much as I did in 1939. My age is 56. I have high blood
pressure and kidney trouble.

1272 JAMES ARGONDALIS. I operate a bakery down on
Jefferson Street about half a block from the waterway.
1273 Have been in business there for 20 years. I have lived
at 2 South Broadway for 6 years—half a block west of
the river. Just lost my wife. Have two children, 9 and
10. In the summer of 1939 the odor from the canal was
bad enough that you couldn't sleep. I came home at
night and took the kids and the Mrs. to the park—lived

1274 there practically all summer and slept there. This was because the smell was so bad we couldn't stand it. At the bakery in 1939, everybody that came into the store complained the smell was something awful. It started the first hot weather in July and ended, I guess, sometime in October. During 1939 my wife was sick and I had to move her to a friend of mine in Chicago. She died of cancer. It has a dizzy effect on me. At times it
1275 smelled so bad I couldn't eat. My sister whom I hadn't seen for ten years came July 15, 1939 to live with me during vacation. She left the second week because of the smell. Last year (1939) was one of the toughest years I can remember on Jefferson Street—the smell
1276 was very bad. It affected my sales; had less customers 1939 was the worst year. This year (1940) we didn't have hot weather yet; this is first hot weather we have had, two or three days; can smell it very light. Business
1277 this year is better than in 1939. My weight is 205 lbs.; I am 5' 11" tall and my general health so far is good.

1278 PETER IMFELD. I am 66 years of age, have lived for 25 years at 542 North Bluff Street, Joliet, Illinois—
1279 about 120 feet from the waterway. In May and June of this year the water wasn't hardly moving and when a boat came up I would get an odor, especially with an east wind; otherwise, it didn't affect us there. In 1939
1280 when the east wind came that is the only time we would get it. It had no affect on me or on the other members of my family—except the odor once in a while would get a little strong smell. Monday morning this week about three o'clock when the boat came down there was a pretty good smell of it.

1281 ROSA DOWNEY. I have lived at 356 North Bluff
Street, Joliet, Illinois, about 2 years and 3 months. We
live on the east side of Bluff Street and our lot runs
back to the canal. The odor from the canal seemed
1282 that year (1939) than it does now (1940). This year
by spells it bothers just as bad. It affects my daughter
quite a bit. It makes her sick, especially if a boat goes
up while she is eating. She just gets up and leaves the
1283 table. That has happened half a dozen or more times
this year. I am 60 years old and my health is good
but my daughter's isn't.

1283 DR. GEORGE E. ROONEY. I reside at 753 Buell
1284 Avenue, Joliet, Illinois. I have been located in Joliet
1285 for two years. I came to Joliet from Chicago in April
1938. It was extremely hard for me to acclimate my-
1286 self to the odor from the canal. There were some
nights it would be almost impossible to sleep. At that
time I lived on the southwest side near Brandon Lock.
Since that time I have been on the northwest side and
I don't get the odors quite as bad. My office is in the
Joliet Building at 4 East Clinton Street. There were
some days in 1939 when the odors were observed in
my office. I have many times observed the odor during
the exercise of my professional duties at St. Joseph's
1287 Hospital. In 1939 I observed these odors daily during
the summer. I believe the odors were about the same
in 1938 and 1939. I think my nasal apparatus has got-
ten used to the odor and I don't mind it quite as bad
in 1940.

In 1939 I had patients with nervous diseases, to which I ascribed these odors as a factor in the cause

1288 and effect relationship of the condition. I had one patient it was necessary to send to Manteno State Hospital for the Insane; she had the idea everything that came into the house carried the odor of the canal and she on several occasions thought it was definitely due to the odors that had arisen from the canal. This woman complained severely about the smell. My diagnosis of her condition was that she was having hallucinations of a nasal or scent character. The odor from the
1289 canal was an incidental cause in producing the condition she had. She lived at 108 DeKalb Street which is within two blocks of the canal. She was 54 or 55. I had another patient, a woman suffering from mental disturbance. I put her in St. Joseph's Hospital for treatment. The minute she started to feel better she com-
1290 plained the odors were so great she didn't want to stay there any longer. She left to go to friends in Lockport and from Lockport she was on the train to go to Kansas City and she expired on the way. That of course is incidental in the case. She was a patient at St. Joseph's 26 or 27 days. That was in 1940—this year—and at the time I attended her, odors were observed by me at the hospital. The odors produced the affect of her leaving the hospital at too early a date.

1292 I believe the odors have tended to retard the recovery of patients at St. Joseph's Hospital. People who come to the hospital, and live several miles from the canal usually ask to leave, because of the odors, sometimes before they should. In many cases the odors
1293 are a causative factor in loss of sleep and also in some of my cases, of headaches. There is the possibility that due to loss of sleep and the continued smelling

of these obnoxious odors over a long period, it might
1296 give people a rather weakened nervous system. The people I have observed complaining about these odors are chiefly the people who have been hospitalized in St. Joseph's.

1298 MRS. JESSE O'DANIEL. I have lived for 5 months at 510 No. Bluff St., Joliet, Illinois—about 100 feet from
1299 the canal and before that I lived on a farm in the country about a half mile from the canal. I have noticed an odor from the canal 10 or 12 times this year. (1940). I have two children aged 12 and 14 and the odor affects my daughter's appetite and sleeping. She is a
1300 nervous child; she just can't eat. When there is an odor it affects my daughter sleeping more than it does her appetite. As for myself, it affects me too—I wake up out of a sound sleep and it is worse when the boats go by.

1301 J. G. NICHOLS. I live at 611 Third Avenue, Joliet, Illinois, about a mile from the canal. I have observed the odors from the canal very often at my home; near-
1302 ly every night last summer (1939) if the wind was in the right direction. This year (1940) we haven't had so much hot weather and it was just last week I noticed it. I myself am rather immune to such things but it affects my wife—nauseates her—causes loss of sleep—loss of appetite and makes her throw up at night. That has not happened this year (1940). She hasn't been as bad as she was last summer—(1939). I think it was account of the heat.

1303 CATHERINE KOEHL. I am a nurse at St. Joseph's Hospital; have been there three years. My home is at 519 Walsh Street, Joliet, Illinois. I have lived there all
1304 my life. The odor from the canal was worse last summer (1939) than it had been in previous years. Inhalation of the odor had an effect upon patients under my personal care—they wouldn't eat and they couldn't sleep at night. I usually have five patients and when
1305 the odor was present it affected most of them. As to myself I sleep on the porch in the nurses' home and it is very hard to sleep when the odor is up. I have had patients under my care request to be moved somewhere where there is no odor. I have had patients under my care taken home before sutures were removed because they couldn't stand the smell of the river. These sutures were removed at the home of the patient. I have known
1306 that to happen several times. I noticed no effect of the odor on newly born babies. It caused loss of sleep and loss of appetite to other nurses. The odor this year
1307 (1940) has been as offensive as it was in 1939. I have noticed that when a patient complained about the odor there was a rise in temperature. I have had a patient under my care become nauseated and vomit as a result of the odor. These odors have caused a rise of temperature of one or two degrees. Before the odor was complained of the patients temperature was usually
1308 down, but after they complained of the odor it was always up. That was invariably the case. My own health is fine.

1309 ROSE VELT. I am a graduate nurse employed at St. Joseph's Hospital; have been there three years. The

1310 odor from the canal in the summer of 1939 was more intense and offensive than it had been in previous years. The effect of the odor on patients under my care has been loss of appetite, restlessness and inability to sleep. My observation as to inability to sleep was made during the times I was on night duty. I myself have no-
1310 ticed the effect of the odor in my sleeping. I have had no patients under my care ask to be moved to different
1311 parts of the hospital when the odor is present. I think the odor has been worse this year (1940) than last year (1939).

1312 HELEN HIMES. I am a graduate nurse employed at St. Joseph's Hospital. I trained there for three years and have just graduated. I noticed at the hospital in 1939 an odor from the canal. It seems to be worse this
1313 year (1940) than it was last year (1939). First noticed it this year about a month ago during those few hot days and then after a rain it always smells. I have had several—5 or 6—patients under my care complain about the odor. Usually a very sick patient has no appetite on those hot days when it smells like that—and then at night, of course, they don't sleep either. It bothers
1314 me personally—I can't sleep at night. It wakes me up. After a rain the odor usually lasts about a day—a very bad odor. There always is an odor continuously. I have noticed the odor during all the time I have been
1315 at the hospital. It is bad only after a rain or during real hot weather.

Thursday, July 25, 1940

1315 ELIZABETH BAUTINO. I am a graduate nurse,
employed at St. Joseph's Hospital. I have been there
1316 for three years. I believe the odors from the canal were
worse in 1939 than in 1938. I have not noticed any effect
on patients other than those mentioned by the other
witnesses—restlessness and inability to sleep and loss of
appetite. The effect on me personally was to keep me
awake several nights—in fact most of the time. I do not
1317 think it had any effect on my appetite. I have observed
a patient become nauseated as a result of the
inhalation of the odor. I have noticed it an hour or so
after meals, especially in the afternoons all through my
training, but believe more last year (1939). So far I
think the odor in 1940 is just as bad as in 1939.

1318 DR. DONALD BOLES. I am an interne at St.
1319 Joseph's Hospital. I have been at St. Josephs since
June 1940 and was an externe there last summer (1939)
for seven weeks from June 10th to August 2d. While
there in 1939 I observed offensive odors from the canal.
It was an unpleasant, nauseating, dirty odor. It smells
like fecal matter that is left in the sun to ferment or
1320 partly oxidize. The principal complaints from patients
were if they were located in a room on the east
side of the hospital the odor annoyed them when they
tried to sleep at night, or if the odor should come up
at meal time they couldn't eat their meals. I have had
requests to transfer patients (from east side) to the
opposite side of the hall. This was not an infrequent
experience—nor was the request from every patient

1321 either. When the weather was cool I didn't notice
the odor so much, but when it warmed up, and when
1939 is compared with 1940 day for day with equal tem-
peratures and other atmospheric conditions being the
same, I would say that a like day in 1940 would be
much worse than in 1939. During July 1940, since it
has become warm, I have been bothered personally.
The window in my room opens to the east and at differ-
ent times, if the odor should come up, I have had
1322 difficulty going to sleep. Last night (July 24, 1940)
about 7:30 in the evening I went out on the porch and
felt rather nauseated because of the odor. Later on in
the evening I couldn't smell the odor. I have lived in
Joliet all my life and was home the whole summer of
1938. Comparing the odor in 1939 with that in 1938 I
would say that 1939 was the first time the odor ever
1323 annoyed me. In 1938 we had very slight odors after
or before a rain. In 1939 the odors were present in
much greater density. They were never nauseating be-
fore 1938. I cannot observe the odor in the delivery
room because the windows are kept shut. We keep the
windows shut because the odor would nauseate the pa-
1324 tients and probably the attending personnel also. Be-
fore becoming connected with the hospital I lived only
1326 three blocks from the canal on the east bank. My per-
sonal experience has been that the odor came up more
between the hours of five to nine in the morning than
any other hours of the day.

Thursday, July 25, 1940

1326 LORETTA HOLLIS. I am a graduate nurse em-
ployed at St. Joseph's Hospital for the past three years.
I observed offensive, unpleasant odors from the canal
in 1939 throughout the summer months—it usually
1327 started around the last of June. It is hard to describe
the odor but it was terrific—very offensive. I observed
1328 that my own patients could not eat when a good whiff
of that came along—it was very nauseating and irritat-
ing to the patients. I have had that experience quite
often during the summer months of 1939. I was also
on night duty and observed during 1939 it was very
hard for patients to sleep during the night due to the
odor. I observed nausea, vomiting, insomnia and ner-
1329 vousness. That was quite a common experience. I
cannot say that conditions on hot days in 1940 are any
better than they were during the summer of 1939. 1939
was about the worst we ever had. 1939 was worse
1330 than 1938 which was bad enough. I observed the odor
in the obstetrical department but we kept the windows
closed because so many of the mothers would com-
plain of the terrific odor. I personally heard these com-
plaints in 1939—it was quite frequently. I know of
cases where patients after operative treatment have
asked to leave the hospital before their hospitalization
was finished. They said they would rather go some-
1331 where else than to lie in their room and put up with
that odor. In 1939 I know of some post-operative pa-
tients who have had sutures removed at home. I know
of none so far in 1940. The odors come and go, es-
1332 pecially during or after a rain—it is terrific then. I

have tried bringing the tray back to a patient after
the odor has passed away, but due to nausea they would
rather wait until the next meal time. I have tried this
more than once but never succeeded. The odor has
not had much effect on me lately, but in 1939 I have
given up many a meal due to that fact. It is a fact that
I lost some weight. I am not a whole lot overweight.
1333 The hot weather affects the sleeping of patients to a
certain extent.

1334 EDWARD OISELLE. I have lived at 509 West Jas-
1335 per St., Joliet, Ill., approximately three years—500 to
600 feet from the canal. My family consists of my wife
and two children. I think from my observations the
odor in 1939 is the worst year of them all. Looking at
the canal coming downtown this afternoon (July 25,
1940) I was almost ashamed to come up here—it looked
pretty nice. The odor in 1939 caused me to tear up the
1336 whole basement floor looking for a dead rat which
wasn't there. I haven't noticed the odor much this
year (1940), but last year (1939) when the sludge was
on there it was practically unbearable at times, especi-
ally in hot weather. So far as causing any ill effects
I haven't noticed any in my family, but you can't sleep
because the odor is offensive and it feels like your food
1337 is tainted. Of course when they empty that thing up
at Lockport and let the stuff come down the canal it is
very bad then. The temperature today (July 25, 1940)
must be around 101.

Thursday, July 25, 1940

1338 JOHN VOLGAR, I have lived for 25 years at 233
Bluff Street, Joliet, Ill.—about 100-130 ft. from the canal.
1339 I noticed the smell not so much in 1938. I smell
it at night time—the big boats mix the water—the smell
1340 is terrible. Last year (1939) the smell was worse
than this year (1940). I have had headache trouble all
the time from the smell. It bothers my wife and children too.

1341 JANET HEGGIE. I am a graduate nurse at St.
1342 Joseph's Hospital. During the spring and summer
months of 1940 the odor was terrific and I have noticed
patients were greatly affected by it. They were nauseated
and couldn't eat their meals—appeared to very
listless and were constantly complaining about the odor
I have observed that it affected their ability to sleep. I
did quite a bit of delivery work, and we kept the windows
1343 closed continually because the odor was offensive.
The odor was worse in 1939 than in 1938. It was absolutely
terrible last year (1939). I think 1939 was really
worse than this year (1940). I have noticed it this
year but I noticed it particularly last year (1939). I myself
was affected—lost my appetite—didn't have any
desire to eat and at night the odor from the river was
terrible. I have noticed this year (1940) they are unable
1344 to sleep due to the terrific odor. The patients
have been complaining about this continually. It was a
general complaint. I have had experience with patients
1345 requesting to go home prior to time their treatment
was finished. They said they couldn't stand the odor—

that they couldn't even rest at night. I know of post-operative patients going home last year (1939) before
1346 the sutures were removed. They complained so about the odor and not being able to eat. I have noticed the odor prior to 1939 but last year (1939) it was unbear-
1347 able. When there are no odors the windows in the obstetrical room are, as a rule, not kept closed. They are closed only when there are odors. The odors during the summer time are constant—we have had them every day all day—and after a rain it is just terrible.

STIPULATION — It was here stipulated between
1349, 1355-1356, 1364-1365 counsel that the State of Illinois had 200 additional witnesses throughout Joliet who would testify substantially along the same lines as the lay witnesses who had previously testified.

Thursday, July 25, 1940.

1357 THOMAS J. TESTIM. I reside at 606 Oneida Street, Joliet, Illinois and have been a bacteriologist for 19
1358 years. I have made an analysis of the water from the Sanitary District Canal to determine the bacillus coli communis content.

1359 I took samples on June 4, 1940 between 3:30 and 4:30 P. M. from a barge south of Ruby Street; from a barge at Jefferson Street and from a barge on Lake Joliet about half a mile below Railroad Street on the west side of the lake. In making these tests I used the recommendation of the U. S. Public Health Service
1360 for determining the presence of colon bacilli. These different samples were cultured out in various dilutions, starting with the 1 to 100 dilution, following

through to 1 to 1000 dilution and also in 1 to 10,000 dilution, to determine the highest dilution the bacillus coli could be recovered in. The lowest bacillus coli content was found at Lake Joliet barge, which was positive in 1 to 1000 dilution, equivalent to 1000 colon bacilli per c.c. The highest dilution on that day was the colon content found at the Ruby Street barge which was positive in the 1 to 10,000 dilution, equivalent to 10,000 co-
1361 lon bacilli per c.c.

I took further samples on June 15, 1940 between 1:30 and 2:30 P. M. at the same places. The lowest bacillus coli content was found at South Jefferson Street and the Lake Joliet barges, which were positive in 0.5 c.c. of the 1 to 10,000 dilution, equivalent to 20,000 bacillus coli per c.c. The highest bacillus coli content was found at the barge at So. Ruby Street and the locks at Lake Joliet, positive in 0.25 c.c. of 1 to 10,000 dilution, equivalent to 40,000 bacillus coli per c.c.

I also took some samples on June 17, 1940 between
1362 the hours of 2 and 3 P. M. at the same places. The lowest bacillus coli content was found at Lake Joliet barge, positive in 1 c.c. of 1 to 10,000 dilution, equivalent to 10,000 bacillus coli per c.c. The highest bacillus coli content was found at So. Jefferson Street barge, positive in 0.25 c.c. of the 1 to 10,000 dilution, equivalent to 40,000 bacillus coli per c.c.

On June 14th, the bacillus coli averaged 5,000 per c.c.; June 15th, 30,000 per c.c. and on June 17th, 25,000 per c.c.

On June 14th the pyogenic cocci, staphylocicci and streptococci were isolated from 1 c.c. broth cultures of 1 to 10,000 dilution of the Ruby Street barge sample

1363 showing them to be present in concentrations greater than 10,000 per c.c. These counts represented a conservative estimate of the bacillus coli content as the samples were taken between the surface and a depth of 12 inches. Inasmuch as considerable sedimentation of fecal material takes place in this slow-moving stream the colon content should be much greater at lower levels. These samples were allowed to stand at room temperatures for a few weeks, after which cultures were again made to determine the bacillus coli content. The June 14, 1940 sample from the Jefferson Street barge was recultured on July 2, 1940 and showed the presence of 200 bacillus coli per c.c. after this 18 day period—the original June 14th count showed 4000 per c.c.

The Lake Joliet barge sample taken on June 15th was recultured on July 6, 1940 and showed the presence
1364 of 400 bacillus coli per c.c. after 21 days. The original count showed 20,000 per c.c.

The Jefferson Street sample taken on June 17th was recultured on July 9, 1940 and showed the presence of 1000 bacillus coli per c.c. after 22 days. The original count showed 40,000 per c.c. These tests show it would take a long time for this sewage to sterilize itself, taking into consideration that no further contamination would take place.

1365 The U. S. Public Health Service standard for potable water permits the presence of 1 B. coli in 100 c.c. of water. In other words 1 c.c. of the Ruby Street barge sample taken on June 15th, containing 40,000 bacillus coli per c.c. would render 2,000,000 c.c. of pure
1366 water unsafe for drinking purposes.

The foundation of Joliet is limestone. There was

considerable blasting done at the time the deep waterway was constructed and a survey of wells prior to the time in which the supply had been shown to pass the U. S. Standard for potable water, later showed contamination upon completion of the waterway. I am led to believe that this blasting created fissures in the rock which caused the contamination of these wells. I would say that sewage of the concentration to which I testified offers a great hazard to the wells in the vicinity of
1367 the deep waterway. The only way to eliminate the danger absolutely is to eliminate all sewage coming down the waterway and if that isn't possible, dilute it as much as possible or prohibit the people from using well water. That has been done in the city of Joliet, but there are wells in the city not more than three blocks from the courthouse where people do not have city water supply.

1368 The City of Joliet gets its water from deep wells—approximately 1600 feet deep—located in various parts
1369 of the city. There is one on Jasper, East Washington, Ruby, Williamson and Ottawa Streets. This water isn't piped to all parts of the city. The city of Joliet dumps its own sewage into the canal below Brandon locks.
1370 We have had no typhoid conditions in the city recently that I know of. There are no towns below the dam. It is a farming community below until it (the waterway) meets the Kankakee River and forms the Illinois.
1372 The Jasper Street well isn't being used right now. Whenever the city requires it, they use that well.
1373 They are using only two wells right now—the East Washington Street well and the Ottawa street well. I believe the water from the Ottawa Street well is rea-

sonably safe and as safe as any water could be, and that
1374 the water in the East Washington Street well is as safe
as reasonably could be expected. I believe the Jasper
Street well, since it has been recased, is safe and fit
for public consumption. I believe an adequate remedy
in the case of isolated, individual wells which might
be affected by the Illinois Waterway would be to require
them to close those wells and to use the city
1378 water supply. The State Health Department has
warned the city to chlorinate the wells to be on the
safe side, and they are chlorinated now—the two wells
1379 that supply the city right now. The State Health Department
checks the City of Joliet's water supply at
1380 intervals. The Jasper Street and Ruby Street wells
have tested safe but I recommend that whenever water
is used for drinking purposes it be chlorinated as an
1381 extra precaution. Right now the city is not using
them.

The Master would be right in finding: (1) the Jasper
and Ruby Street wells are not being used by the city
at the present time; (2) if they are used they would
be chlorinated; (3) if they are used and chlorinated they
would be safe; (4) if the city needed more water it
1382 could build more wells; (5) it would cost approxi-
1383 mately $30,000 a well to drill two more wells. They
have ample water to supply everybody from the present
wells in use and operation.

1384 It would be correct to say that this canal has always
been a potential menace all the time that open
sewage is carried in an open canal like this and that
theoretically it is very undesirable. We have had this
potential menace for 40 years. The blasting has opened

some fissures and increased the menace by a small 1385 amount. Of course the amount of sewage has been diminished by the construction of the treatment plants in Chicago, while on the other side of the picture is a reduction of the amount of water out of Lake Michigan. 1389 If the Supreme Court ordered the flow from Lake Michigan increased from 1500 to 5000 feet I would say 1390 that the danger had been decreased in the ratio of 50 to 15. There would still be a source of contamination—you might go along with for a good many years and still might cause some typhoid—I would simply say that the danger has been reduced. If the flow were decreased considerably below the average in the warm 1391 months, the ratio would go up considerably. If they have a fissure in the rock in which there is a leakage of 1 c.c. an hour, granting that the leakage takes place at that rate regardless of the volume of water going through, you have diluted your infection to the extent to which you have increased your flow.

Additional treatment of the sewage of the City of Chicago, and treatment by the municipalities of Argo, Summit, Lockport, Lemont and others lying northwest of Joliet, and treatment by the State of Illinois of the sewage of the two penitentiaries, would furnish addi- 1393 tional safeguards. I am not familiar with the lime treatment method, but any method of filtration would 1394 considerably decrease the bacterial count, the hazards, if properly supervised. It is a fact that biological processes take place in the canal that are not duplicated in a bottle test. I would say that the analysis of the three samples which I collected would represent a conservative estimate of the presence of B. coli in the

canal during the summer months. The number varies in relation to the treated sewage. Tests can be taken only over a short period of time and even now they may not be exactly identical with figures taken from
1395 the tests I made. I do not think a sample taken near the surface and containing scum would show a higher B. coli content than a sample taken at greater depths then one foot. The scum is acted on by the sun and the sun is germicidal to a certain degree, and the farther you get under that scum the greater protection those
1397 organisms have against any germicidal effect of the sun. Chlorination could improve considerably Brandon Road pool, but wherever there are solid amounts of fecal material in there I do not think you could get 100 per cent sterilization. I think it would be possible to improve it to an extent sufficient to offset such damage
1398 as may have been caused by a diminution in the diversion from the lake. That would also reduce the odor in Brandon Road pool.

OBSERVATIONS OF THE MASTER ON THE DEEP WATERWAY WEDNESDAY, JULY 24, 1940

7:00 o'clock P. M.

Pages 1088-1098

1088 On Wewnesday, July 24, 1940, at about 7:30 P. M., the Master, accompanied by Messrs. Naujoks and Herbert, representing the opposing States, and Messrs. Babcock and Zimmerman, of the Illinois Waterway Division, (Messrs. Clausen and Wallenstein were invited to come here with the Master but were not able to do so because they had to make arrangements for witnesses to attend the next day) embarked at the Jackson Street bridge on a speed boat and set out upon an inspection of the canal headed south. An odor was perceptible, distinctly perceptible, when the party drove over the bridge before we embarked, and was likewise perceptible at the edge of the stream when the motor boat began to move.

When the party reached mid-stream the odor was no longer perceptible. There was a light southwest wind.

I will dictate as I proceed.

We are now going under the Cass Street Bridge. There is no very thick scum perceptible. Mr. Babcock of the Illinois Waterway Division remarked that there was very little scum tonight. There are perceptible on the surface of the water various little strips of what appear to be greasy substance, said to be oil patches.

1089 We are now under the Jefferson Street Bridge.

We are now under the Rock Island Railroad Bridge.

We are now proceeding under the McDonough Street bridge.

We have now, at the suggestion of General Herbert, turned about and proceeded upstream to the side of the canal in order to get a close look at the scum on the side of the Waterway.

We are now proceeding to the east side, which is the right hand side. There is visible along the walls here for a strip of two or three feet in width, all along the wall, a thick, rather thick, surface layer which appears to be scum, which contains a good deal of pieces of wood and pieces of paper and other miscellaneous debris and a good many grease spots. The odor is not bad. There is an odor, but it is not strong and at this point one does not feel the breeze which perhaps is now behind us, but there does not seem to be much breeze at all. I don't see any scum collected on the side of the wall.

We have now turned about again and have gone under the McDonough Street bridge.

We are now in the Brandon Road pool, according to
1090 Mr. Babcock. The width of the stream is, at this point, perceptibly greater than it was before we passed under the last bridge.

We are skirting the left side and see a rather thick scum here extending perhaps 10 feet, which as we go on increases in width to perhaps 20 feet. I detect no odor at this point, perhaps due again to the breeze. I see a number of bubbles on the water which I understand represent the operation of the gas from the sludge underneath the surface. These bubbles are apparent all over the whol width of the Waterway. No odor is perceptible at this point.

There does not appear to be any coagulation along the wall itself and the scum would certainly not bear any pressure at all.

I now, about half way down the length of the pool, get a whiff of an odor which continues as I dictate, is perceptible, would not seem to the Master terrible or particularly bad, but is noticeable. This odor continues now, I can detect the odor. I do not think it would affect me even if I had to continue breathing it.

We are now opposite the waste gates where the surplus water from these pools goes over into the Des Plaines River.

1091 We are now crossing to the west bank.

Will you note now that we went all the way down to the lock and turned about and are now proceeding north nearer to the west side of the canal. There seems to be now a current in this pool as far as one can tell by the naked eye.

There is now a perceptible breeze from the southwest.

It is now about 8:00 o'clock Daylight Time, and the sun is now beginning to set.

I see no perceptible scum, but I see gas bubbles all over the surface of the canal. I am informed by Mr. Babcock that the crew on the boat say there is no scum today but that they came down here a few days ago and there was scum all over the water but the wind must have blown it all off today.

Mr. Zimmerman, also of the Waterway Department says this is really a favorable day although a very hot day.

I now catch the odor which I lost a while back. It is perceptible but would not bother me very much but it might bother others and I certainly would not call it pleasant but it is not strong.

I have now lost the odor again entirely as we are
1092 proceeding away from the side over in the middle of the Waterway, but I now see in the middle of the Waterway a considerable scum extending across the Waterway but I detect no odor. My impressions seem to check with the other members of the group on the boat, including the court reporter and the Waterway people.

There is now not so much scum.

We are now proceeding under the McDonough Street bridge and leaving the Brandon pool. As we go under the bridge I catch a whiff of an odor, which is gone in perhaps a minute.

I see a good many small patches of grease on the surface of the water.

Now as I get under the Rock Island Railroad bridge I get another whiff of an odor, but it has disappeared again in a few seconds.

We just crossed under the Jefferson Street bridge but about midway to the next bridge we stopped and turned about and approached the east bank and I got a slight odor which I catch again every few seconds as we proceeded back to the bridge and alongside the wall, but it is not continuous.

1093 As we circle around turning again I catch the odor, distinctly, somewhat more strongly, and it persists for perhaps a minute until we pick up speed and seems to disappear.

We are now under the Cass Street bridge but I detect no odor here, but after a minute I catch an odor which has again disappeared.

We are now passing St. Joseph's Hospital. The Master just caught a spray of water from the operation of the propeller. No odor perceptible as we pass by the hospital, but as we near the Jackson Street bridge we pick up an odor but it is suggested that the piling of the bridges may catch up some of the debris and the scum. Mr. Babcock also suggested if we would stay along the walls continuously we would detect more odor than in the middle of the stream.

We have now gone beyond the point at which we embarked and are approaching the Ruby Street bridge. I catch an odor as we near the bridge, which is not strong, gets a little stronger as we go under the bridge and persists for perhaps a minute, which is longer than it has persisted at any other stage.

We are now passing the junction with the Illinois
1094 Michigan Canal.

I have observed no flies or mosquitoes on the trip so far.

I now catch the odor again, but only for perhaps less than a minute.

Mr. Babcock informs me that we have been going at an average speed of 18 to 29 miles an hour. I now pick up an odor which is rather faint.

We are opposite the Ruberoid Plant. I see considerable scum in the middle of the Waterway and catch a faint odor. The scum seems to extend along the center of the canal, a strip perhaps 10 or 15 feet wide, and more scum toward the east of the canal.

I see fewer air bubbles.

In about a minute I have lost the odor again. We have now picked up the odor again in another minute.

We are now approaching the E.J.E. Railroad bridge. The odor has now disappeared again before we get under the bridge, but I pick it up again in half a minute and it persists as we get nearer to the bridge.

As we go under the bridge it is very slight. Now I
1095 pick up the odor again, just after we leave the bridge, quite perceptible as long as at any time.

We are now nearing the coke plant of the American Steel & Wire Company. The odor here is not perceptible. There seems to be less scum.

I now catch the odor again as we are just alongside of the plant, but it is not strong but it is persisting for a couple of minutes, perhaps for a longer spell than any spells so far.

There seems to be a perceptible current in the water and little scum now observable.

We are now approaching the lock at Lockport, and the odor is perceptible. It is now 8:30 Daylight time, and the sun is almost setting.

I catch an oil odor as we pull alongside the east wall of the Waterway right at the lock, but I also detect an odor from the canal. The odor from the Waterway is distinctly perceptible here as the boat is turning about now to return to Joliet.

Now as the boat is turned about and we are headed south, I have lost the odor.

As we go down-stream we have a nice breeze, per-

1096 haps due to the motion of the boat now, but not much more than we had coming up-stream, and I catch no odor.

We have now gotten back opposite the Ruberoid Plant. Up to this time I had caught no odor and I asked that the speed of the boat be reduced to about 5 miles per hour to see if the speed had something to do with my not catching the odor. I catch now a slight odor and it goes and comes. I catch it for a few seconds and then lose it and catch it again. I see grease spots but notice no scum. It is growing dark but still daylight. I have now lost it again after a minute or two altogether. I now pick is up again for a few seconds at a time. It seems impossible to hold it long.

We are now opposite the Junction of the Illinois & Michigan Canal, which is practically grown up in weeds. I understand it re-emerges on the north side of the Brandon Locks and is open from that point to La Salle, Illinois independent of the Waterway, and unnavigable.

We are now under the Ruby Street bridge and I caught no odor. There seemed to be just a whiff for just a second but it disappeared almost immediately. I pick it up again as we are about a minute past the Ruby
1097 Street Bridge still going about 5 miles an hour, and now I have lost it in a few seconds. I think I catch it again in a few seconds and hold it for perhaps 20 seconds and lose it. It is not strong.

We are now approaching the west bank of the Canal at the point at which we embarked and I have lost the odor.

I catch no odor as we tie up. It is now 8:45, the lights of the town are on, but it is still light enough to read.

We will remain tied up as there appears to be a boat coming through on the south end and we may observe the effect of the passage of the boat on stirring up the water. So far I have not observed any flies tonight and had only one mosquito bite.

As we are tied up now along the west side, I am not troubled by any mosquitoes or flies.

Note that we discovered the boat that we were waiting for was tied up. We got into the automobile and drove across the Jefferson Street bridge. The boat had apparently passed under the bridge and was tied on the north side of the bridge. We had crossed on the Jackson bridge to the east side and we recrossed on the Jefferson Street bridge to the west side but caught no odor.

1098 Now we are driving on the west side of the canal on iHckory Street about two blocks from the canal, down to Cass Street.

Now we turn east to cross the canal again. We have had no odor so far since we got off the speed boat. There seems to be little air in motion.

It is about 9:00 o'clock as we cross now again over the Cass Street bridge. We caught nothing until just as we were getting on the east side when for a second we got a whiff which lasted only a second.

We are now coming to the town without any odor.

We are now disembarking at the Louis Joliet Hotel.

TESTIMONY OF WITNESSES FROM LOWER ILLINOIS RIVER TOWNS

September 24, 1940

MASTER'S EXAMINATION

2332 GEORGE PATRICK MOORE. I live at 221 Wiswall Street in Peoria. I am Secretary of the Pleasure
2333 Driveway and Park District of Peoria. One of our parks—Detweiller Park—has approximately 13 city blocks of frontage on the Waterway. Our park properties are upstream from Peoria. I would not know how far south of Joliet. Any statement I might make relating to health conditions would be purely a layman's. I have and still do spend a considerable amount of time on the river—both myself, Mrs. Moore and my
2334 two children. For the last year or two there has been quite a lack of odor that was formerly very noticeable, particularly directly on the shorelines. For six or seven years—from about '32 or '33 along in there—there was a decided odor that was apparently foreign to the stream odors we might find on the stream, such as dead fish or vegetation. That has been missing and we naturally began to wonder why. We began to believe that possibly there was a smaller amount of undesirable ele-
2335 ments coming down the river. We believe there isn't as much sewage and sludge coming down as there was prior to that.

I, personally, Mrs. Moore and our friends have observed an improvement in the condition as to odors the last two summers; the present summer we are now closing (1940) and last year (1939). The summer before (1938) hasn't been discussed. I wouldn't say that we had only begun to discuss it since we heard that Illinois was trying to get more water. I think the question of Illinois getting more water came out after we got a little interested and began inquiring around.

2336 I don't know what the improvement in odors is due to, but my own personal feeling is that improvement in treatment of sewage at Chicago is minimizing it. There isn't as much as there was. Our interest is that that condition should continue as it now is and not revert to the condition of old. Even though those odors might never have been caused by anything that was dangerous to health, they were offensive.

Cross Examination By Mr. Clausen.

2338 During a week spent on the river in '39, Mrs. Moore brought to my attention the difference (in odors)
2339 and from then on I began observing it myself.

The Master

I couldn't say there was any degree of improvement this year (1940) over last year (1939).

2340 As between the two years '39 and '40 I see no change between them, but I think both of them were better than preceding years.

Mr. Naujoks.

I haven't swam in the river, with the exception of an emergency or occasionally a little recklessness in hot weather—I happened to be out fishing and go over the side of the boat. I don't permit my children to. This is on general advice of one or two of my friends who happened to be physicians and don't permit their own children. They felt the river wasn't quite safe.

2341 There is general bathing down there now. There is a beach about four miles from the cottage I stayed at this year, right on the Illinois River.

The Master.

People have gone in bathing for years. I wouldn't know that more of them went in bathing this year and last year than in previous years. It looks about the same number in every year to me. To my knowledge

2342 none of this water is used for drinking. I am here just as a citizen and am not a representative of any organization.

September 24, 1940

Master's Examination.

2344 THOMAS H. DETWEILLER. I live in Peoria. I am a park trustee and also in the ice business. I heard the statement of Mr. Moore here a few minutes ago.

2345 I just want to tell you what the conditions are at the bottom of the river, and also that the wells from which we get our water supply are located along the river. Suppose a fault occurred in the bed of the river and that water would get into our supply, it would contaminate it and be a danger to us.

We have, of course, been exposed to that danger for many years. The sewage has been coming down that Waterway for 40 years or more—the last 30 years real bad. We have noticed a change in conditions in the last two years. Six months after they cut the diversion down you could notice a better condition in the river. They commenced getting some fish. There had been no fish before then.

2346 I own some property right next to the Peoria area of the U. S. Engineers. They had a little spot they wanted to fill with dredging. They had more dredging than they could take care of and I let them pour some of it over my land. It came out of a 14 inch pipe, a sediment just like tar and you could smell it about 300 feet away. That was two years ago, and I suppose that would be equally true today. Last January (1940) when the lake was froze over I got curious and we took two men and chopped a hole in the ice. We had a 24 foot 2x4 rough so whatever it touched would stick. When I let it down and hit this muck you could feel it.
2347 Then we used all our strength and pushed it through to the hardpan. When they pulled it up there was five and one-half feet of that. Some of it was black and some of it was green.

Cross Examination By Mr. Clausen

This muck they took out and put on my land was very offensive. When it dried it looked like asphalt pavement. You could smell it 300 feet away. The area on which they were putting this muck was 150 x 400 feet. It run right back into the river, some of it in liquid shape.

2348 My concern is I feel if there is more water that comes down there is apt to be more odors given off around Peoria, because now, with the water cut down, the heavier solids stay in the upper region of the river and if you get more water it would wash it down.

September 24, 1940

Master's Examination

2351 DR. J. P. KERR. I live at Versailles, Illinois, approximately 90 miles south of Peoria, and about 250 miles from Chicago. I am a farmer and I have a farm on the Illinois River bottoms and I have lived there for 35 years. I represent the Association of Drainage and Levee Districts of Illinois. It comprises people owning properties and farms in the Illinois River Valley—possibly a thousand people. I have been representing these people for approximately 20 years consecutively. I have known the officials of the Sanitary District more or less for the same period of time and have associated with them in their work in Washington and Springfield.

2352 No one city or position on the Illinois River can be considered a part by itself. What is done at Joliet affects the river more or less all the way downstream. What happens in the cities on the stream above Peoria affects us materially a hundred miles south of Peoria, so the river must be considered, technically, as a whole.

It has been proved beyond a doubt that increased diversion and dilution water does not solve the sewage disposal question. It has taken twenty years to prove that truth in the Illinois River and so when it comes to a question of solution of the problem confronting Joliet it is not a question, from our point of view, of dilution or increased diversion. There are other factors that enter into the problem.

All of us downstream have known this river dur-
2353 ing the entire period—going back to 1912 down to
1936, '37, '38 and '39, and so when we ask the question about the public health being jeopardized at Joliet wr may make comparisons of other conditions on the Illinois River when conditions were far, indescribably worse than they are at Joliet today.

During the long period when this system of maximum diversion of water down the Illinois River was followed, it is an established and well-known fact from one end of the river to the other that the great islands of floating, untreated sewage were discoverable all the way down through Joliet, through all those upper cities of Marseilles, Morris, Ottawa, Peru and Henry, and even down to Peoria untreated sewage particles
2354 were discovered on the surface of the river. I live 250
miles from Chicago or 100 miles from Peoria, and this odor was discoverable at my place, very offensively so, and the people in my neighborhood ceased to visit the

river for a rest during the summer months, the river was so foul and intolerable. There was an immense amount of sedimentation of this sewage all the way down to Peoria and during spring months that sedimentation would arise in floating islands and float down the Illinois River into the Peoria area. At that time there was a sanitarium for tubercular people at Ottawa. Ottawa is removed somewhat from the river—say a half mile or so and even though that odor was intolerable to those poor people it did not sicken any of them or cause any of them to die.

During the maximum diversion, fish life was practi-
2355 cally exterminated from Peoria up. From Peoria down the fish continued to live, but at my point, although we were regular consumers of fish, fish were not edible. They were sewage saturated and offensive even to handle in their preparation, so we did not use them.

That was the condition that continued throughout the entire river during this period. It was intolerable for any of the young people to bathe in the river anywhere, even down to my place. I absolutely prohibited my son from going into this river at this time.

Notwithstanding this intolerable, unspeakable, indescribable, inhuman condition, we know of no case of
2356 any menace to human life during those years. We watched that condition carefully, so there is no point to the question of foul odors in a river affecting the human welfare or human health. I took the trouble to appeal to the Public Health Service at Washington on this very subject.

2358 Now we want to call your attention to the fact of the river as it is today with the reduced diversion and with several factors not yet put into effect that might improve the river. In an article by W. H. Wisely and Clarence W. Klassen, Assistant Sanitary Engineer and Chief Sanitary Engineer, Illinois Department of Public Health, entitled "The Pollution and Natural Purification of the Illinois River Below Peoria" reprinted from "Sewage Works Journal", Vol. X, No. 3, May 1938, it is said on page 1:

September 25, 1940

2363 "On the other hand, through the efforts of the Sanitary District of Chicago, satisfactory conditions now exist directly above Peoria in the Illinois River and for many miles upstream."

That is the foundation of what I have to say today in its relation to this Joliet Pool, that the entire river situation has changed so very materially. The condition of floating sewage on the river surface as far south as Peoria to which I referred yesterday, is entirely eliminated. I have failed to find that there were any floating particles of sewage of any kind, even at Joliet. Fifteen years ago, during the time of the maximum diversion, there were evident at Beardstown, 300 miles from Chicago, certain floating fibrous materials in the
2364 river that were observable by the naked eye. That was more or less dissolved sewage. That, of course, is not so at all now.

It is also apparent that river plant life is beginning to appear on the lower river which was entirely destroyed during those years of maximum diversion.

The presence of sedimentation in the Brandon Pool is not unusual. That is true to this day all the way down to Peoria, but it is gradually being removed by bacterial action and the action of the boats going up and down the stream.

Today our fish life is almost normal compared with former years so far as the fish being upstream. For-
2365 merly there were no fish to speak of north of Peoria. Today the fish are quite edible throughout the entire stream, and I am reliably informed by parties living in Ottawa that there is actual commercial fishing at that town. I am also advised that bass are found at this point ad bass will not survive in unhealthy conditions, so their presence is mighty testimony to the present condition of the river.

Today bathing is practiced all the way up to Peoria, freely and without restraint. I don't know whether they bathe farther north than Peoria or not. From our point of view—downstaters—the river is beginning
2366 again to look normal, even up at Joliet. The river at Joliet 15 and 20 years ago was just an immense, inconceivable open cesspool. This is not so today. We have failed with the exception of very warm days to discover any serious odors.

These conditions have come to pass despite three outstanding disturbing factors. First, the last three or four years have been remarkably dry years. Second, the diversion has been reduced during the last two years to 1500 feet, and in addition to these facts, all of the cities with the exception of Peru, which includes Joliet, Lockport, Lemont, Marseilles, Morris, LaSalle, Henry,
2367 Hennepin, have discharged their untreated sewage into this Illinois River.

How can this be so? There is only one answer. The Sanitary District of Chicago has increased its reduction plants, has treated its sewage to a greater percentage of purification and has so materially reduced the pollution of this stream that conditions now are becoming more or less normal, proving to our minds that it is not a question of dilution, but it is a question as to how much pollution is put in or kept out of this river. We downstaters feel that there is no excuse for any increase in
2368 diversion to take care of the situation at Joliet. We regard this entire procedure as a smoke-screen. We don't consider that there is any problem at Joliet. The Supreme Court spoke in 1930 declaring that this diversion should be reduced to 1500 feet. Since then there has been a continuous effort made in Washington by different parties to modify this decision by asking for increased diversions up to the 5000 limit. The excuses given for this increased diversion were for navigation. I think three or four distinct bills were introduced and were refused passage or approval on this
2369 plea for navigation. Now the plea has come up for sanitation. There are several very valuable power sites on the upper Illinois River, including Joliet, and increased diversion—a large amount of water—is of great value from this point of view. The question is now: Shall we be allowed to hold the Illinois River in its present favorable condition, or shall we be obliged to return the river to a condition of open sewage as it was before, by increased diversion. Peorians fear that if more water is turned into the river, more sewage will be turned into the river. They also fear that more of this

sewage will be carried downstream and deposited in their front yards.

2374 We feel the people of Joliet are not suffering any harm and that public health is not jeopardized, and that by pursuing the present methods of the treatment of sewage and keeping the river clean the entire situa-
2375 tion will take care of itself beautifully. It has been my observation all the way up and down the stream that the odors in Peoria and in the neighborhood were less offensive in 1939 after the reduction of flow. We had no odors this past summer (1940) and no odors the summer before (1939). 1938 is a little back in my memory.

Cross Examination By Mr. Clausen

2376 The first bill introduced in Congress to increase the water was within the last decade. The first large bill for 10,000 feet was introduced by Mr. Rainey along back in '20, '22, '3, '4. I opposed the increase then and have opposed it consistently twenty years.

2382 If one could imagine it would not injure, I would not be opposed to an increase of diversion of water from 1500 to 5000 cubic feet per second, but I refuse to believe that it could not prejudice us.

2383 Witness has been a militant objector to water from Lake Michigan for the past 30 years because of its pollution and other effects.

September 25, 1940.

Master's Examination

2385 HARRY L. GOODELL. My residence is Beardstown, Illinois, I am a practicing civil engineer. I am a graduate of the University of Illinois in the year 1925 from the College of Civil Engineering, and I have been actively engaged in civil engineering for 15 years. About half that time I was engaged in municipal work and the other half I was employed by the Corps of Engineers in the War Department on the construction of locks and dams on the Mississippi River.

I have been employed by eleven drainage and levee districts and represent those organizations.

2387 In 1914 swimming was the usual thing in the Illinois River, perhaps against the advice of parents due to the condition of the river, in other words, there was evidence of pollution.

2388 I was 12 years old, and from 1914 on through during the war, in the '20's I continued to swim and work on the river and travel up and down the river on excursion boats. I never knew of anybody dying as a result of swimming in that river that was directly attributable to the pollution. A younger brother, at the age of 6 was swimming in the river at Beardstown and he got water in his lungs and was seriously ill immediately after that. He recovered. That was in 1919.

2389 There was one serious infection that I know of at the same time, about 1918 or 1920. The people got well.

2390 In 1918 I began to work on the river and live on the river in quarter boats. We couldn't use the water for drinking or washing or anything like that, and there was evidence of pollution even in low time when ordinarily the streams are clear—there seemed to be a continuous, more or less of a boil in the river, of always cloudy and very fine sediment in the river. That was evident as far as Beardstown—perhaps further. My experience with the river has usually been from Beardstown upstream in detail, you might say, to Peoria, and a general knowledge from Peoria into Chicago. Beardstown is 80 miles south of Peoria and 200 miles from Lockport by river.

2391 During the '20's we didn't eat the fish from the Illinois River. Then during the '30's we have had a gradual improvement of our water conditions. It has been gradual all through the decade, and our water condition at Beardstown is now very much improved. We do bathe in it, but I wouldn't say it reaches the requirements of the Public Health Department as to bathing places.

2392 Acquatic plant life is beginning to return. There is one plant—I don't know the name of it—but it is associated with bass fish. Today practically all the fishing on the Illinois River is in the Peoria pool. I think there are two reasons for that. One is there is an improved water condition in Peoria Lake, which is now the largest body of water in the lower river, and the other reason is that during the past spring we did not have a flood on the lower river to such an extent that it was necessary to drop the gates of the movable dams in the river.

I have observed the condition of the upper river from the head of Peoria Lake on into Chicago since the

2393 20's, and it is my observation that the condition was very bad during the '20's and, say, up to about the time they started reduction plants, and now it has gradually improved during this 10-year period. At Joliet I won't say it is any better but I don't think it is any worse. To my knowledge there have been no epidemics along the river during the 20's or '30's either at Joliet or below Joliet down to the head of Peoria Lake.

2395 A sewage plant was designed and constructed and placed in operation at Decatur, Illinois on the Sangamon River in 1924. The town has a population of 40,000. They had an industrial situation there that at that time made the population of Decatur equivalent to about 300,000 which was not, apparently recognized in the design and construction of the sewage treatment
2396 plant. Consequently the Sangamon River immediately below and for at least 40 miles down stream was very highly polluted due to inadequate treatment. I worked in that for days and weeks, and this stream had highly offensive odors, and we experienced no disease. We had six or eight men working there for weeks and no ill effects from it. Of course, if we had a scratch we always washed our hands in alcohol at night to prevent any infections. About 12 miles below Decatur there was a well-painted house within about 150 feet of the stream. When the pollution came along you might say it just turned the paint black. It was a cream-colored house. The people lived there and they had no ill effects from that.

2397 That waste from Decatur was sewage and starch wastes—it was a mixture—they all came through. The starch was a high industrial load. To my knowledge there was no epidemics in Decatur.

2398 There is a boat from Beardstown operating up here on the canal—a tow-boat, which traveled back and forth through the canal—mainly down to Brandon Pool—and they cook and eat on the boat, prepare their meals and to my knowledge there has ben no ill effects from that. To improve conditions at Joliet I am sure that the construction of the plants to be completed can be speeded
2399 up materially. Second, take the power generated at Lockport to run air compressors or air-producing machines to aerate the water in the tailrace at Lockport. Then I think it is practical to periodically flush the Brandon Pool. I am thinking of flushing the Brandon Road Pool with the same flow that they now have—in other words, periodically drawing that pool down.

2400 It is a difficult question to answer as what effect it would have downstream—whether this offensive material now accumulated in Brandon Road Pool would find its way downstream—because you get into the question of reaeration of streams and dilution. I don't think it will have a material effect on the river, even at Peoria. The organizations I represent would offer no objections to that. They would not object to flushing the sludge into the lower pools—the Dresden Island Pool—the Marseilles Pool or the Starved Rock Pool. I think by the time it passed Starved Rock it would be fairly well decomposed, or at least some action would take place where the condition would not be offensive or a menace.

Cross Examination By Mr. Naujoks

2402 I have not made any studies to determine the effect of an additional 3500 cubic second feet of water on additional polluted water or sewage being carried down toward Peoria. From my experience we know that with the larger diversion in the past the sewage was carried down, noticeable in Beardstown and the Peoria Pool. In the '30's the diversion has been reduced and the river has been improved, so I would say that any increased diversion would reestablish the polluted condition at Peoria and Beardstown. It is my opinion that the center of pollution was carried back toward Chicago with the lower diversion while if you increase the diversion the center of pollution would go down stream more. As to the quantity of increase—the point it would
2403 reach—I am not able to say but we want the waters of the Illinois River restored to their natural quality and quantity. It is my opinion the proper way to accomplish that is by complete treatment rather than dilution.

The Master.

I think the population of Peoria is roughly about
2404 100,000. Beardstown has a population of 6300. The country along the waterway is a rural section—sparsely settled, except at Joliet and Peoria. Even below Joliet there is Ottawa and Peru and Marseilles and several little towns on the waterway within a distance of 60 miles.

Mr. Clausen.

2405 Improved conditions now noticeable below Joliet are due to the increased treatment rather than to the reduction in the flow of water. The Peoria plant was placed in operation in '39, I think.

2406 Before that time you couldn't very well distinguish between the sewage of Peoria or the sewage of the Sanitary District except there has been a gradual improve-
2407 ment in our water condition at Beardstown through the whole decade. The improvement in our case might also be due to the treatment of the sewage at Peoria.

I can't say that there has been any change in our conditions in 1940 and 1939 as compared with preceding
2408 years. The condition is gradually better. I can't say whether there is any marked difference between '39 and '40. I don't think from year to year it is so distinguishable as it has been over the period.

Beardstown pumps its sewage directly into the river below Beardstown. We have 6300 population with a larged flow at Beardstown because we are below the largest tributary. There is a very large question as to whether or not we do actually pollute the river under
2409 the definition of pollution as set up in the statute. The population at Versailles is just a small village—a hundred or two.

Mr. Naujoks

The minimum flow of the river at Beardstown right now is in the neighborhood of four or five thousand cubic second feet. Our maximum runs in the neighborhood of 100 and 110 thousand, so we get quite a high dilution with the volume of sewage we put in there.

We have had no odors at Beardstown this summer, sewage odors. You get ordinary river bank odors—dead fish life, and so forth.

When I was a boy I did not notice any odors that I could directly attribute to the sewage. However, you could see from the water that it was a polluted stream.

2410 I wouldn't say that we had any actual odor trouble at Beardstown. I am not so sure about Peoria. There were odors above Peoria due to, perhaps, sludge settlement. I am not familiar with that in so much detail.

Respectfully submitted,

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Nos. 2, 3 and 4, Original.

October Term, ~~1940.~~ 1941

STATES OF WISCONSIN, MINNESOTA,
OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 2 Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original.

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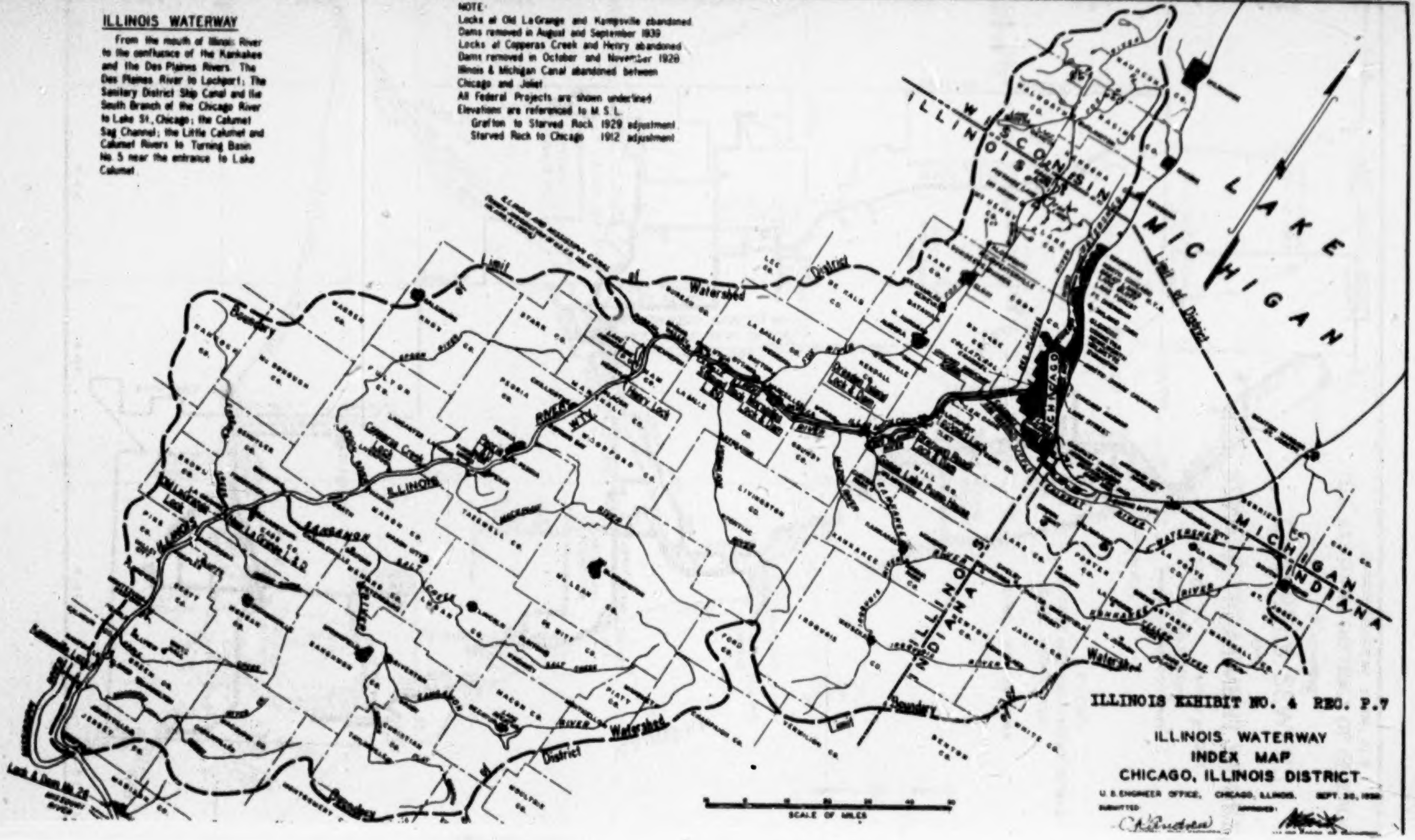
JOINT ABSTRACT OF RECORD.

Volume II.

EXHIBITS.

PREFACE.

The petitioner and respondents have endeavored to set out, for the convenience of the Court, such portions of the exhibits in these causes deemed material for due consideration of the Court of the issues raised by the petition of the State of Illinois and the return of the opposing Great Lake States. It is agreed, however, that either party may, in oral argument or in briefs, refer to any other exhibits appearing in the record and not contained herein.


LAKE MICHIGAN
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
CHICAGO
Limit of District
Limit of Watershed District Boundary
ILLINOIS RIVER
Copperas Creek Lock
Henry Lock
Lock & Dam No. 26
SCALE OF MILES

ILLINOIS WATERWAY

From the mouth of Illinois River to the confluence of the Kankakee and the Des Plaines Rivers. The Des Plaines River to Lockport; The Sanitary District Ship Canal and the South Branch of the Chicago River to Lake St., Chicago; the Calumet Sag Channel; the Little Calumet and Calumet Rivers to Turning Basin No. 5 near the entrance to Lake Calumet.

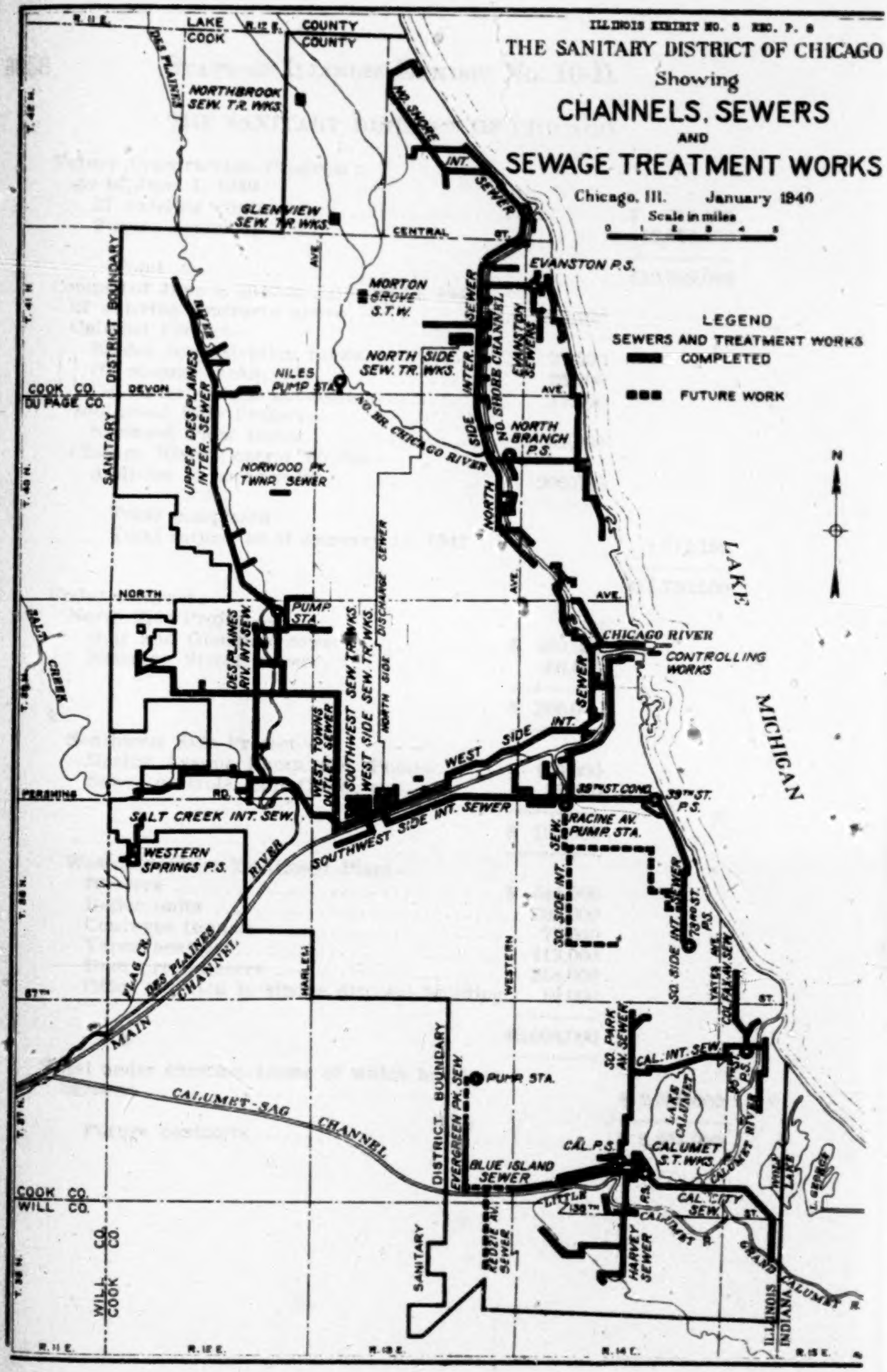
NOTE:
Locks at Old LaGrange and Kampsville abandoned
Dams removed in August and September 1939
Locks at Copperas Creek and Henry abandoned
Dams removed in October and November 1938
Illinois & Michigan Canal abandoned between
Chicago and Joliet
All Federal Projects are shown underlined
Elevations are referenced to M. S. L.
Grafton to Starved Rock 1929 adjustment
Starved Rock to Chicago 1912 adjustment

ILLINOIS EXHIBIT NO. 4 REC. P.7

ILLINOIS WATERWAY
INDEX MAP
CHICAGO, ILLINOIS DISTRICT

U. S. ENGINEER OFFICE, CHICAGO, ILLINOIS, SEPT. 30, 1939

SUBMITTED: APPROVED:



ILLINOIS EXHIBIT NO. 5 REC. P. 8

THE SANITARY DISTRICT OF CHICAGO
Showing
CHANNELS, SEWERS
AND
SEWAGE TREATMENT WORKS
Chicago, Ill. January 1940

Scale in miles
0 1 2 3 4 5
LEGEND
SEWERS AND TREATMENT WORKS
COMPLETED
FUTURE WORK
N
R. 11 E.
R. 12 E.
R. 13 E.
R. 14 E.
R. 15 E.
T. 42 N.
T. 41 N.
T. 40 N.
T. 39 N.
T. 38 N.
T. 37 N.
T. 36 N.
LAKE COUNTY
COOK COUNTY
DES PLAINES
NORTHBROOK SEW. T.R. WKS.
GLENVIEW SEW. TR. WKS.
NO. SHORE INT. SEWER
CENTRAL ST.
AVE.
EVANSTON P.S.
MORTON GROVE S.T.W.
SANITARY DISTRICT BOUNDARY
RIVER
NORTH SIDE SEW. TR. WKS.
NORTH SIDE INTER. SEWER
NO. SHORE CHANNEL
EVANSTON SEWERS
NILES PUMP STA.
COOK CO.
DU PAGE CO.
DEVON AVE.
UPPER DES PLAINES INTER. SEWER
NO. BR. CHICAGO RIVER
NORTH BRANCH P.S.
NORWOOD PK. TWNP. SEWER
NORTH AVE.
LAKE
MICHIGAN
SALT CREEK
PUMP STA.
DES PLAINES RIV. INT. SEW.
WEST TOWNS OUTLET SEWER
SOUTHWEST SIDE SEW. TR. WKS.
WEST SIDE SEW. TR. WKS.
NORTH SIDE DISCHARGE SEWER
CHICAGO RIVER
CONTROLLING WORKS
SEWER
WEST SIDE INT.
PERSHING RD.
SALT CREEK INT. SEW.
39TH ST. COND.
39TH ST. P.S.
SOUTHWEST SIDE INT. SEWER
RACINE AV. PUMP STA.
WESTERN SPRINGS P.S.
RIVER
SO. SIDE INT. SEW.
SO. SIDE INT. SEWER
73RD ST. P.S.
DES PLAINES
FLAG CR.
MAIN CHANNEL
HARLEM
WESTERN
87TH ST.
YATES AVE.
CALUMET SEW.
SO. PARK AV. SEWER
CAL. INT. SEW.
95TH ST. P.S.
DISTRICT BOUNDARY
EVERGREEN PK. SEW.
PUMP STA.
LAKE CALUMET
CALUMET RIVER
CALUMET-SAG CHANNEL
CAL. P.S.
CALUMET S.T. WKS.
BLUE ISLAND SEWER
WOLF LAKE
L. GEORGE
COOK CO.
WILL CO.
LITTLE CALUMET R.
138TH
P.S.
CAL. CITY SEW.
ST.
KEDZIE AV. SEWER
HARVEY SEWER
GRAND CALUMET R.
SANITARY
WILL CO.
COOK CO.
ILLINOIS
INDIANA

STATE OF ILLINOIS EXHIBIT No. 10-D.

THE SANITARY DISTRICT OF CHICAGO.

Future Construction Program:		
As of June 1, 1940:		
27 existing contracts		$ 912,192
Future contracts		12,056,900
Total		$12,969,092
Completed June 1, 1940 to January 14, 1941:		
27 existing contracts above	$ 912,192	
Calumet Project—		
Sludge concentration tanks	27,000	
Oil storage tanks	25,000	
Cal-Beverly drop connection	17,000	
Southwest Side Project—		
Norwood Park sewer	31,000	
Chicago River Control Works—		
Addition to breakwater	200,000	
Total completed:		
Total future, as of January 14, 1941		1,212,192
		$11,756,900
Under contract:		
North Side Project—		
Golf and Glenview sewers	$ 200,000	
Emerson Street sewer	66,000	
	$ 266,000	
Southwest Side Project—		
Racine Avenue Pump. Sta. Pumps	$ 100,000	
Sewer controls, Salt Creek, etc.	23,000	
	$ 123,000	
West-Southwest Treatment Plant—		
Blowers	$ 544,000	
Boiler units	703,000	
Conveyor tunnels	75,000	
Vapor heaters	413,000	
Dust precipitators	258,000	
Office addition to sludge disposal building	10,000	
	$2,003,000	
Total under contract (some of which has been earned)		$ 2,392,000
Future contracts		$ 9,364,900

STATE OF ILLINOIS EXHIBIT No. 10-E.

THE SANITARY DISTRICT OF CHICAGO.

Future Contracts, as of January 14, 1941:		
Calumet Project—		
Additional sludge handling equipment	$ 250,000	
Preliminary settling tanks	100,000	
Stony Island Avenue sewers	260,000	$ 610,000
North Side Project—		
North Side sewer siphons		103,000
Southwest Side Project—		
Racine Ave. Pump. Sta., roads, grounds, etc. WPA		100,000
West-Southwest Treatment Plant—		
Final settling tanks, Bat. A & B	$1,059,700**	
Sludge concentration tanks	160,800**	
Aeration tanks, Battery C	1,714,600	
Final tanks, Battery C	1,256,200	
Conduits, tunnels, etc.	682,600	
Substructure, blower plant	200,000**	
Substructure, sludge handling plant	450,000**	
Blower plant, remainder	452,800	
Sludge handling plant, remainder	1,679,400	
Roads, grounds, etc.	90,600	
Fertilizer plant	440,000*	
Screenings, scum & grit removal, etc.	365,200	
Total		8,551,900
		$ 9,364,900

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* To be advertised for bids January 24, 1941.

** $1,870,500 to be let before March 31, 1941.

State of Illinois Exhibit No. 10-F.

Future Construction Program—As of January 14, 1941.

	As of June 1, 1940 Ex. 10-A, B, C	As of January 14, 1941	
		Under Contract	Future
Calumet Project:			
Additional sludge handling equipment	$ 250,000		$ 250,000
Preliminary settling tanks	100,000		100,000
Sludge concentration tanks WPA	27,000	$ 27,000*	
Oil storage tanks WPA	25,000	25,000*	
Cal-Beverly drop connection WPA	17,000	17,000*	
Stony Island Ave. sewer	260,000		260,000
	$ 679,000	$ 69,000	$ 610,000
North Side Project:			
North Side sewer siphons	$ 103,000		$ 103,000
Golf and Glenview sewers	200,000	$ 200,000	
Emerson St. sewer, etc. WPA	66,000	66,000	
	$ 369,000	$ 266,000	$ 103,000
Southwest Side Project:			
Racine Ave. P. S., 2 pumps	$ 100,000	$ 100,000	
Racine Ave. P. S., roads, grounds, WPA	100,000		$ 100,000
Norwood Park sewer WPA	31,000	31,000*	
Sewer controls, Salt Creek & DesPl. WPA	23,000	23,000	
	$ 254,000	$ 154,000	$ 100,000
West-Southwest Treatment Plant:			
Final tanks, Bat. A. & B	$ 1,059,700		$1,059,700**
Aeration tanks, Battery C	1,714,600		1,714,600
Final tanks, Battery C	1,256,200		1,256,200
Conduits, tunnels, etc	757,600	$ 75,000	682,600
Sludge concentration tanks	160,800		160,800**
Blower Plant:			
Blowers	280,000	544,000	
Substructure	200,000		200,000**
Remainder	716,800		452,800
Sludge Handling Plant:			
Equipment	590,000	703,000	
Substructure	450,000		450,000**
Remainder	2,473,400	681,000	1,679,400
Roads, grounds, etc	90,600		90,600
Fertilizer plant	440,000		440,000**
Screenings, scum & grit removal, etc.	365,200		365,200
	$10,554,900	$2,003,000	$8,551,900
Chicago River Controlling Works:			
Addition to breakwater enclosure	$ 200,000	$ 200,000*	
Total	$12,056,900	$2,692,000	$9,364,900

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* Work completed.

** Work to be let in near future.

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ILLINOIS EXHIBIT No. 11A.

FLOW IN MAIN DRAINAGE CHANNEL.

Yearly Averages 1930-1940.

Year	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Des-Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan C.F.S.
1930 6 mo. (Jan. to June)	8500	0	1680	6820
1930 6 mo. (July to Dec.)	8216	0	1719	6497
1931	8180	0	1680	6500
1932	8100	2	1650	6450
1933	8005	45	1690	6270
1934	8125	0	1692	6433
1935	8093	7	1602	6484
1936	6607	33	1712	4862
1937	6677	23	1665	4989
1938	6648	45	1604	4999
1939	3132	13	1620	1499
1940*	3319	49	1589	1681

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* Includes 10-day test flow period.

95

STATE OF ILLINOIS EXHIBIT No. 16.

REPORT ON
ADDITIONS TO
SOUTHWEST SEWAGE TREATMENT WORKS
AND SUPPLEMENTAL TREATMENT FOR
WEST SIDE SEWAGE TREATMENT WORKS
April 16, 1940.

96 April 16, 1940.

Mr. William H. Trinkaus,
Chief Engineer,
The Sanitary District of Chicago,
Office.

DEAR SIR:

At your request, we are presenting herewith a brief report covering the necessary work required to complete the Southwest Sewage Treatment Works and to supplement the present West Side Works by additional treatment. Necessarily, this involves consideration of these two plants as a whole. Consequently the estimates have been based on a combined total flow of 900 m.g.d. and the assumption that flows up to 150 per cent of average will be intercepted, but only 115 per cent of the average will be given complete treatment.

FLOWS:

The present sewage flows to the respective treatment plants are somewhat less than originally estimated in 1934. The future flows will depend on population growth, the extent of metering, and the rate at which meters are installed. For present conditions (1940), the flow is estimated as follows:

97

Tributary Area	Sewage Flow in M. G. D.	
	Avg.	Max. (150% Avg.)
West Side	400	600
Salt Creek	62	93
Southwest	394	591
Total	856	1,284

Seasonal Variations in the average monthly flow may occur approximately 87 to 117 per cent of the average month, judging from the West Side record.

PUMPING CAPACITY:

The installed rated pumping capacity at the two works is as follows:

Works	Units			Total M.G.D.
	Number	Capacity		
		C.F.S.	M.G.D.	
West Side	2	100	65	130
	5	200	129	645
Southwest	4	300	194	775
Grand Total				1,550

The present hydraulic capacity of the West Side Works does not exceed 700 m.g.d.

Effect of Metering:

The population on the West-Southwest area may grow moderately, but the flow may tend to decrease somewhat, should universal metering occur. Consequently, 900 m.g.d. seems a reasonable figure to adopt, for the average flow to the combined plants, with 484 m.g.d. apportioned to the West Side-Salt Creek area, and 416 m.g.d. to the Southwest.

98 For the present, it is proposed to provide complete treatment for only 115 per cent of the average flow, and to care for flows between 115 and 150 per cent of average by settling only in the existing Imhoff tanks. Later on, when the flows are more exactly known, and the rate of metering is indicated, consideration can be given to the expansion of capacity to 150 per cent, if need be.

These studies of treatment for the combined West-Southwest sewage are therefore based on the following flows:

Average for complete treatment	900 m.g.d.
Maximum for complete treatment	1035 m.g.d.
Maximum intercepted	1350 m.g.d.
Settling only	315 m.g.d.

Population:

Population estimates are based on the 1930 estimates of the Sanitary District. However, in 1937, some estimates prepared by the Chicago Regional Plan Commission indicated a total population of the Sanitary District for 1940 about 90 per cent of the 1930 estimate. However, these two estimates indicate, over the next twenty years, a possible growth in the Sanitary District as a whole ranging for 25 to 33⅓ per cent of the 1940 population. The 1940 census will shed some light on the probable trend.

STRENGTH OF SEWAGE:

As yet, complete analyses of the Southwest sewage are not available. It should prove stronger than the West Side, both in B.O.D. and suspended solids, because of the Packingtown wastes. There will also be greater hourly fluctuations through the 24 hours of the day, as well as throughout the week.

99 For the purpose of design, the following averages were used:

Source	Parts Per Million	
	Susp. Solids	5-Day B.O.D.
West Side, raw sewage	120	95
West Side, Imhoff effluent	60	57
Southwest, raw sewage	170	145

SOLID LOAD:

The solids arriving at the West-Southwest Works are estimated to total 1,301,000 lbs. per day in 1940, and 1,626,000 lb. in 1960. Included in these figures are the North Side and the Packinghouse solids, which should be handled at the Southwest Works.

SLUDGE CAPACITY OF IMHOFF TANKS AND DRYING BEDS:

The existing Imhoff tanks have a total sludge digestion volumes as follows:

Battery	Sludge Digestion Cu. Ft.
A	3,091,000
B	3,091,000
C	4,350,000
Total	10,532,000

The filtering area of the sludge beds totals 1,190,240 square feet.

In all the schemes for which estimates were prepared, this sludge digestion volume would probably be adequate, including chemical treatment and filtration through fine grained filters. The existing drying beds are inadequate, except for plain sedimentation.

100 EXPERIMENTAL WORK:

From 1936 to 1939, various procedures were studied to determine their value for supplementing the West Side Works. Included were:

(a) Activated sludge process-short period aeration.

(b) Chemical precipitation.

(c) Filtration on fine grain filters.

(d) Aeration with iron salts.

(e) High-rate trickling filters, single stage-Halvorson type.

(f) High-rate trickling filters, two-stage bio-filter Jenks type.

The results of these tests have been analyzed, and applied in the consideration of various alternative procedures of varying efficiency, as measured by the quality of effluent.

ESTIMATES:

Detailed estimates were made on two schemes for the activated sludge process; chemical precipitation; and the filtration by fine grained filters of plain settled effluent and chemical precipitation effluent. Scrutiny of the remaining procedures eliminated aeration with iron salts and high-rate trickling filters of both types, as too expensive for the results obtained.

On the alternatives estimated in detail, the first cost, operating cost, and total annual cost (including interest and depreciation) were determined for comparison. Filtration on fine grain filters was eliminated at this stage because of the high cost, for the relatively small benefit gained.

101 STANDARD OF EFFLUENT REQUIRED:

In the choice of procedure, the degree of effluent required hinges on the conditions to be maintained in the Illinois Waterway. In the testimony given in the socalled Lake level case, the tentative standard set by various witnesses would seem to require at least 3 parts per million of dissolved oxygen in the Des Plaines and Illinois Rivers. The maintenance of freedom from odor in the absence of sludge banks requires the presence of some dissolved oxygen. The margin of safety between complete de-oxygenation and the presence of appreciable dissolved oxygen cannot be estimated in operation so closely as to make it possible to adjust the dilution so that 1 or 2 parts per million of dissolved oxygen will always be present. To maintain a factor of safety in preventing nuisance, a minimum of 3 parts per million is required. This may also serve to maintain fish life, although many authorities now recommend somewhat higher figures, such as 5 parts per million, because as low as 3 parts per million presents practically no factor of safety for fish life.

CONTINGENCIES OUTSIDE CONTROL OF THE SANITARY DISTRICT:

In studying the problem of maintaining the Illinois waterway in a suitable condition, a number of unknown factors, or contingencies, appear which are beyond the control of the Sanitary District, such as—

(a) The development of water power will practically stop all reaeration of dams. Such reaeration is of value in the self-purification of the Waterway. The utilization of the power at Brandon Road and Dresden

Island would materially affect the condition of the Waterway above Marseilles Dam.

102 (b) The effect of an ice sheet on reaeration is as yet undetermined. The earlier data indicated that in severe winters considerably more flow may be required than in normal summer conditions. Recent data is somewhat at variance. However, extreme winters occur but seldom.

(c) The diversion allotted may be changed. The possibility of any further reduction in diversion appears remote.

(d) The growth of population and industry within the area of the Sanitary District.

(e) The requirements laid down for stream conditions by authorities having jurisdiction thereover. At present the power of regulation rests in the State of Illinois. In the near future, judging from legislation now proposed in Congress, control may be given also to a Federal authority.

(f) The general trend of regulation seems to point toward more vigorous standards for the sanitary condition of waterways than was the case ten or twenty years ago.

DIVERSION:

The allowed diversion is an annual average flow of 1,500 c.f.s. To budget the flow over the year means that for at least six months a diversion of 800 c.f.s. may be in use. In general, this reduces the amount of flow from Lake Michigan during the warmer months of the year, at a time when the dissolved oxygen content of the lake water is lowest.

COURT REQUIREMENTS:

In the hearings before the Special Master, Hon. Charles E. Hughes, the Sanitary District indicated that it expected to install works which would provide an over-all efficiency of 85 per cent or better, on an annual average basis. In the opinion of the Supreme Court (April 14, 1930), Justice Holmes states:

103 "The Master estimates that with efficient operation the proposed treatment should reach an average of 85 per cent purification and probably will be 90 per cent or more."

OXYGEN BALANCE:

In a study of the oxygen balance in the Upper Illinois Waterway based on a diversion of 800 C.F.S. (such as may occur for at least 6 months per year), with 500 m.g.d. passing through the Southwest Works and receiving activated sludge treatment, it appears that a treatment greater than 82 per cent is required as an overall for the 400 m.g.d. passing through the West Side Works, and that supplemental treatment for the Imhoff tank effluent, making an overall purification of 90 per cent or better is required at the West Side, to maintain 3 parts per million of dissolved oxygen.

SEASONAL EFFECT:

There is also a seasonal effect of importance from two angles—first, the amount of dissolved oxygen which can be introduced into the canal system by the diversion from Lake Michigan, and, second, the temperature of the lake water and effluents and mixtures thereof, in so far as temperature affects the rate of satisfaction of B.O.D.

The temperature of Lake Michigan may vary from 32 deg. Fahr. in winter to 72 deg. Fahr. in summer, with corresponding content of dissolved oxygen at saturation, varying from 8.8 to 14.6 parts per million.

The rate of satisfaction of B.O.D. is slower at lower temperatures and thus permits a longer time of flow, and consequently greater effect of reaeration.

104 Aside from the effect of an ice sheet over the water-

way, the above seasonal occurrences would point to the need of the greatest reduction in B.O.D. during the summer months. Again, this corresponds, in general with the periods of lower diversions.

LIMITS OF CHOICE:

The promises to the Supreme Court and its understanding of the program proposed, together with the physical limitations on the problem in the Illinois Waterway, clearly point to the need of ability in the supplemental treatment of the effluent of the West Side Works to produce a high-grade effluent such as only an activated sludge plant can deliver.

For such purpose, chemical precipitation as a supplement to the Imhoff tank treatment does not go far enough. An estimate of the residual B.O.D. would indicate—

5-DAY B.O.D. IN EFFLUENT.

Treatment	5-Day B.O.D. p.p.m.
Imhoff	57
Imhoff plus chemical precipitation	36
Activated Sludge	10

To meet the critical seasonal periods and the future contingencies, a process is required to supplement the Imhoff effluent which will deliver an effluent containing only 10 p.p.m. B.O.D.

105 The percentage reduction for the combined West-Southwest Works with the following combinations is estimated as follows:

Treatment—West-Southwest	Per Cent Reduction	
	Susp. Solids	5-Day B.O.D.
Activated Sludge—Imhoff Tanks	76.7	73.7
Activated Sludge—Chemical Ppn.	81.9	81.7
Activated Sludge—All Plants	91.5	91.6

QUESTION OF POLICY:

The question of policy concerned rests on the fact that to satisfy the Court and complaining municipalities along the Illinois Waterway, the Sanitary District must act. The time for experiment or delay has passed, if financing can be arranged. Consequently, there is no opportunity for a tryout of the Southwest activated sludge works with the West Side Imhoff Works left as they are now, to test accomplishment. Whatever is done must be adequate, with certainty.

In the choice of plant types, the development of a uniform type of plant along activated sludge lines seems better from an operating standpoint than to introduce another and third type of plant for sewage treatment into the works at the Stickney site.

ADVANTAGE OF ACTIVATED SLUDGE:

There is another advantage in the choice of activated sludge for supplementing the West Side Imhoff plant, namely, the possibility of some revenue from the sale of heat-dried activated sludge. Such a supplemental plant may produce around 29,000 tons of dried sludge annually suitable for sale as fertilizer material.
106 If that portion produced in eight months of the year (19,500 tons) is sold, nets the Sanitary District a return of $4.00 per ton, a substantial revenue would be obtained ($78,000). No such possibility is inherent in any other alternative now available.

OPERATING COST CONTINGENCIES:

Apparently the contingency of fluctuating labor costs affects all alternatives. However, the added labor cost for the 400 m.g.d. from the West Side will be $39,000 greater for chemical precipitation than for activated sludge treatment.

For the activated sludge treatment, the other main items of cost are for coal and ferric chloride, totaling $126,000, whereas for the chemical treatment, the cost of chemicals is estimated at $331,000, or $205,000 more than in the activated sludge alternative.

Thus on the main items of operating cost the extent of fluctuation may be much greater on the chemical treatment than for activated sludge.

COSTS COMPARED:

From the foregoing, it is clear that the comparison narrows down to two quite different schemes of different accomplishment, for supplementing the West Side Imhoff tanks, namely: Activated Sludge as against Chemical Precipitation. The plans proposed for both alternatives include the increase in the capacity of the Southwest Works to 500 m.g.d. on an activated sludge basis.

107 The first costs on a complete basis are given in the following table:

FIRST COST.

Procedure for Addition to West Side	Extension SW Works to 500 m.g.d.	Extension West Side to 400 m.g.d.	Total for 900 m.g.d.
Activated Sludge	$3,879,800	$5,869,000	$9,749,700
Chemical Precipitation	3,879,800	1,300,500	5,180,300

If a comparison be made on the basis of adding sufficient activated sludge treatment to produce a 5-day B.O.D. discharge equivalent to that derived from treating 400 m.g.d. by chemical treatment, a capacity for treatment of only 180 m.g.d. by activated sludge would be needed, with the following results:

FIRST COST.

Extension West Side	m.g.d.	Cost
Chemical Treatment	400	$1,300,500
Activated Sludge	180	3,662,000

This would materially reduce the annual cost of activated sludge, were a lowered degree of treatment satisfactory for the extension to the West Side Works.

108 The total annual costs of the two schemes are practically the same.

Procedure for Addition to West Side	Extension SW Works to 500 m.g.d.	Extension West Side to 400 m.g.d.	Total for 900 m.g.d.
Activated Sludge............	$ 579,400	$ 569,200	$1,148,600
Chemical Precipitation......	579,400	555,800	1,135,200

In these figures no credit is shown for the sale of heat-dried sludge for fertilizer. Whatever net income is obtained would reduce the cost of the activated sludge. The possible revenue from the sale of sludge from the West Side activated sludge treatment may exceed $78,000.

If the cost of the activated sludge extension for the West Side be corrected to a plant producing the same 5-day B.O.D. as the chemical precipitation, we have:

Procedure for Addition to West Side	Extension SW Works to 500 m.g.d.	Extension West Side	Total
Activated Sludge	$579,400	$320,600	$ 900,000*
Chemical Praecipitation	579,400	555,800	1,135,200**

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* For 680 m.g.d.
** For 900 m.g.d.

In these figures, no credit is shown for the sale of heat-dried sludge as fertilizer.

109 Advantage in Financing:

In the present status of financing for the Sanitary District, there appears to be an advantage in keeping down operating costs and thus reducing the corporate tax levy. The higher construction cost under present conditions can be financed at a low interest rate, thus stabilizing that part of the fixed charges for the life of the bonds on a low basis.

RECOMMENDATIONS:

From the standpoint of utilizing the existing West Side Works to the fullest extent, and also from the standpoint of financing, we recommend that for the immediate future the extensions of the Southwest Works be designed to provide a complete plant which will handle an average flow of 500 m.g.d., with a maximum around 600 m.g.d. In such plant, the necessary dewatering, heat-drying, and incinerating equipment should be installed to provide, in addition, for all the excess activated sludge from the North Side Works, as well as from the supplemental activated sludge plant to be installed on the effluent of the West Side Imhoff tanks.

Following thereafter, the necessary additional activated sludge plant should be designed and built to treat the effluent of the West Side Imhoff tanks, on the basis that the effluent will be mixed with the Southwest Side sewage and the mixture treated in a consolidated
110 South-west-West activated sludge plant.

Respectfully submitted:

F. W. MOHLMAN,
Director of Laboratories.

L. M. JOHNSON,
Engineer of Maintenance and Operation.

WM. A. DUNDAS,
Engineer of Mechanical Design.

L. C. WHITTEMORE,
Engineer of Treatment Plant Design.

LANGDON PEARSE,
Sanitary Engineer.

H. P. RAMEY,
Assistant Chief Engineer.

112 STATE OF ILLINOIS EXHIBIT NO. 17.

FEDERAL EMERGENCY ADMINISTRATION
OF PUBLIC WORKS.

May 3, 1940.

Mr. Joshua D'Esposito,
Resident Projects Engineer.

DEAR MR. D'ESPOSITO:

Pursuant to your call the Board of Review met in your office May 1-3 with all members present.

The Board had before it—

1. The completed summary of the investigations made by the Sanitary District to determine the most effective method of giving secondary treatment to the West Side Sewage

2. The letter transmitting this report, signed by L. C. Whittemore, Engineer of Treatment Plant Design

3. A review of the report dated April 16, 1940, signed by

F. W. Mohlman
Director of Laboratories
L. M. Johnson
Engineer of Maintenance & Operation
Wm. A. Dundas
Engineer of Mechanical Design
113 L. C. Whittemore
Engineer of Treatment Plant Design
Langdon Pearse
Sanitary Engineer
H. P. Ramey
Assistant Chief Engineer

4. An Independent review of the report prepared by U. F. Turpin, Assistant Projects Engineer.

The Board has given careful consideration to these studies and is in general accord with the conclusion that the best method of supplementing the treatment now given to the West Side sewage lies in an enlargement of the Southwest activated sludge plant in the manner contemplated by Scheme A-2.

While the Board agrees with the Engineers of the Sanitary District as to the *method* of treatment, it is not satisfied that the additional treatment capacity proposed in Scheme A-2 will all be necessary to secure reasonably satisfactory conditions in the river below Lockport.

The Whittemore report is a very comprehensive one, but it is based on a number of assumptions, that though close enough for purposes of comparison, should be checked or verified as far as possible before
114 definitely embarking on a construction program estimated to cost $10,000,000. Whittemore, in his letter of transmittal, points to one of these assumptions as follows:

> "it cannot be too strongly emphasized that more data should be secured on plant performance under the conditions of operation which will eventually prevail, before final designs for extensions are prepared."

In the report, proposed treatment plant capacity is based on an estimated sewage flow (West and Southwest combined) of 900 M.G.D. This assumption can be checked by gauging the actual flow and at the same time the assumed characteristics of the sewage can be verified by sampling.

When the results of the 1940 census become available they will throw much light on population trends and permit more intelligent planning for the future than is now possible.

A water filtration plant is in course of construction to serve the Southwest area and it is reasonable to assume that eventually the supply of filtered water will be metered. When this is done, the volume of sewage from this area should be greatly reduced.

At the request of the State of Illinois, the United
115 States Supreme Court has reopened the question as to
what constitutes a reasonable diversion of water from Lake Michigan. If, as a result of this investigation, the present authorized diversion should be altered even though for a temporary period of three years, it would be wise to study the effect of such an increase before fixing the treatment capacity of the combined West-Southwest plant.

For the reasons just stated, the Board considers it highly desirable to prosecute the work outlined in Scheme A-2 in two stages—

1. Increasing the capacity of the Southwest Plant from 400 to 500 M.G.D., a task that will require two working seasons, and

2. Re-appraising the requirements as they will then exist before undertaking the second stage. Such a re-appraisal may show that part of the proposed expenditure of $10,000,000 is unnecessary.

The Board realizes that time may be saved by adopting Scheme A-2 in its entirety at this time, but the advantages from an engineering standpoint, of the two-stage plan seem to far outweigh any loss of time.

The Board invites attention to the many difficulties
116 that have been encountered in putting the 400 M.G.D.
activated sludge plant in commission and to the probability of encountering others in stepping up plant capacity to 500 M.G.D.

A further increase in plant capacity to 800 M.G.D. (or even to 900 M.G.D.) is indicated by the studies, but the experience gained under the two-stage plan will, in the opinion of the Board, be extremely valuable.

In recommending a two-stage plan of construction, the Board does not have in mind a rigid adherence to the line of demarcation between the 500 M.G.D. plant and the proposed 900 M.G.D. plant as set up by the Sanitary District. On the contrary, it recommends that the extensions of the buildings to house additional pump, blower and sludge dewatering equipment be made of the dimensions called for by Scheme A-2. To apply the two-stage program to such features would be economically unsound. For similar reasons it may be advisable to include in the first stage of the program 16 additional final tanks even though only 8 are estimated as necessary for the 500 M.G.D. plant.

CONTROL WORKS CHICAGO RIVER.

At the request of the Chief Engineer of the Sanitary District the Board examined several plans under-
117 consideration for stopping the leakage through the basin walls that form part of the control works at the mouth of the Chicago River.

In its opinion, the intrusion method does not give sufficient promise of success as to warrant further experimentation.

As between the plans calling for a clay blanket protected by rip rap and the plan calling for a steel sheet pile diaphragm, the Board recommends the latter. It notes, however, that the proposed diaphraghm is not anchored to the concrete cap of the crib. Further consideration of this feature is recommended.

Very truly yours,

DANIEL W. MEAD,
C. W. KUTZ,
W. B. STOREY,
Members of Board of Review.

118 STATE OF ILLINOIS EXHIBIT NO. 18.

FEDERAL EMERGENCY ADMINISTRATION
OF PUBLIC WORKS

Office of
Resident Projects Engineer
Resident Projects Auditor
For Sanitary District of Chicago

Suite 300-302
910 S. Michigan Ave.
Chicago, Illinois

May 3, 1940.

Mr. Ross A. Woodhull, President,
Board of Trustees,
The Sanitary District of Chicago,
910 South Michigan Avenue,
Chicago, Illinois.

DEAR MR. WOODHULL:

I transmit herewith copy of report to me by the Engineering Board of Review dated May 3, 1940, covering the problem of the enlargement of the existing Southwest Sewage Treatment Plant together with the additions necessary thereto for the secondary treatment of the West Side sewage, also a recommendation of the Board as to the best method of solving the problem of water inflow from the lake at the mouth of the river.

I concur in the recommendations of the Board, and shall advise the Public Works Administration in Washington to that effect.

Very truly yours,

JOSHUA D'ESPOSITO.

170 STATE OF ILLINOIS EXHIBIT No. 23.

THE SANITARY DISTRICT OF CHICAGO
SOUTHWEST SEWAGE TREATMENT WORKS
FLOW, B.O.D., D.O. AND SUSPENDED SOLIDS

Month 1939	Flow M. G. D.	5-day B. O. D.			Diss. Oxyg.		Susp. Solids		
		Raw Sewage	Effluent	Per Cent Reduction	Final Settling Tanks	Outfall	Raw Sewage	Effluent	Per Cent Reduction
January									
February									
March									
April									
May (1)	41								
June (2)	160								
July	216	59	12	79.6			96	12	87.5
August	216	60	12	80.0			78	15	80.8
September	313	96	17	82.3		5.4	123	15	87.8
October	313	133	22	83.5		5.8	175	23	87.0
November	326	141	11	92.2		7.8	169	15	91.1
December	307	144	17	88.2		8.4	191	14	92.7
(3)	236								
Average (4)	282	106	15	85.8		6.8	139	16	88.5

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(1) Preliminary settling only.
(2) Started aeration, part of flow, June 9th.
(3) Average May 1st to December 31st.
(4) Average July 1st to December 31st.

3642 STATE OF ILLINOIS EXHIBIT No. 27-A.

THE SANITARY DISTRICT OF CHICAGO
NORTH SIDE SEWAGE TREATMENT WORKS
SUMMARY OF RESULTS OF OPERATION
1929-1940

Year	Flow M.G.D.	5-Day B.O.D. p.p.m.	Susp. Solids p.p.m.	Per Cent Reduction B.O.D.	Per Cent Reduction Susp. Solids
1929	58.8	5.6	14	95	92.5
1930	139.4	8.5	16	92	89.1
1931	196.0	3	14	92.8	91.0
1932	200.3	9.7	12	91.7	91.3
1933	199.4	13.1	14	88.3	89.2
1934	193.5	14.1	14	89.4	90.5
1935	199.4	10.1	13	91.0	90.2
1936	204.6	8.5	14	92.2	89.8
1937	204.8	9.2	12	91.5	91.5
1938	200.1	8.6	10	92.2	93.0
1939	202.5	7.7	11	93.5	92.4
1940	188.2	7.0	11	94.6	92.4

3644 State of Illinois Exhibit No. 28-A.

The Sanitary District of Chicago
Calumet Sewage Treatment Works
Summary of Results of Operation
1936-1940

Year	Flow M.G.D.	5-Day B.O.D. p.p.m.	Susp. Solids p.p.m.	Per Cent B.O.D.	Reduction Susp. Solids
1936	62.7	16	23	83.5	86.9
1937	65.4	13	15	86.3	90.1
1938	61.8	14	13	83.1	90.2
1939	71.6	12	12	87.0	90.6
1940	67.2	10	12	90.7	90.1

3646 State of Illinois Exhibit No. 29-A.

The Sanitary District of Chicago
West Side Sewage Treatment Works
Summary of Results of Operation
1931-1940

Year	Flow M.G.D.	5-Day B.O.D. p.p.m.	Susp. Solids p.p.m.	Per Cent Reduction B.O.D.	Per Cent Reduction Susp. Solids
1931	85.1	56	69	56.0	58.4
1932	125.7	59.2	60	42.0	51.2
1933	135.2	66.7	57	42	57.5
1934	128.4	65.6	56	47.5	61.4
(a) 1935	135.2	43.2	48	54.5	61.1
1936	197.6	49.3	57	49.2	52.9
1937	275.6	57	67	40.7	40.2
1938	305.7	50	55	47.4	54.5
1939	237.8	50	57	53.7	63.0
1940	361.5	64	75	50.0	58.0

Note:

(a) Battery C placed in service April 29, 1935.

251 State of Illinois Exhibit No. 31.

Table I.

The Sanitary District of Chicago
Main Channel and Illinois River
Dissolved Oxygen and Oxygen Demands

Station: Locks, Mouth of Chicago River

Dates: 1939-1940

Date Month		Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand, 20°C., p.p.m. 5 days
Nov.	1939	8	11.9	3
Dec.	"	5	12.9	1.8
Jan.	1940	2	14.1	1.7
Feb.	"	2	13.3	1.8
Mch.	"	3	13.3	1.4
Apr.	"	7	12.0	1.2
May	"	11	10.5	1.3
June	"	16	9.9	1.3
July	"		9.6	1.3
Aug.	"		8.7	0.9

STATE OF ILLINOIS EXHIBIT No. 32.

TABLE II.

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER
DISSOLVED OXYGEN AND OXYGEN DEMANDS

Station: Damen Avenue   Dates: Jan. 1938-May, 1940

Date Month		Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand, 20°C., p.p.m. 5 days
Jan.	1938	2	11.2	8.2
Feb.		—	—	—
Mch.		—	—	—
Apr.		12	9.4	9.7
May		15	8.6	10.7
June		17	6.9	10.5
July		21	5.1	8.0
Aug.		22	5.5	6.8
Sept.		19	5.7	7.9
Oct.		15	5.5	12.0
Nov.		8	8.3	13.5
Dec.		5	10.1	13.5
Jan.	1939	5	7.5	17.1
Feb.		4	8.5	20.6
Mch.		7	5.9	23.3
Apr.		19	1.5	36.3
May		16	0.5	55.1
June		19	2.0	21
July		22	0.2	25
Aug.		23	0.0	33
Sept.		21	0.1	32
Oct.		17	1.2	24
Nov.		11	5.2	22.4
Dec.		10	8.6	13.1
Jan.	1940	4	9.5	16.5
Feb.		5	7.5	19.3
Mch.		5	8.0	21.0
Apr.		9	6.2	13.9
May		14	3.6	11.6
June		18	1.6	8.0
July			3.7	5.6
Aug.			3.3	4.2

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STATE OF ILLINOIS EXHIBIT No. 33.

TABLE III.

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER
DISSOLVED OXYGEN AND OXYGEN DEMANDS

Station: Summit Dates: Jan. 1938-May, 1940

Date Month		Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand, 20°C., p.p.m. 5 days
Jan.	1938	2	9.8	26.8
Feb.		4	9.3	24.9
Mch.		6	8.2	23.4
Apr.		10	6.6	20.7
May		13	3.2	18.0
June		17	1.4	14.6
July		22	0.6	15.2
Aug.		22	1.1	13.5
Sept.		20	1.3	12.8
Oct.		17	0.8	18.0
Nov.		10	5.1	22.6
Dec.		4	8.7	25.0
Jan.	1939	6	2.4	40.3
Feb.		6	3.9	38.8
Mch.		8	1.9	37.1
Apr.		11	0.0	47.9
May		17	0.0	66.9
June		20	0.2	48.
July		23	0.0	37.
Aug.		25	0.0	33.
Sept.		23	0.0	35.
Oct.		19	0.1	36.
Nov.		19	0.4	26.5
Dec.		15	3.3	25.
Jan.	1940	10	4.4	26.
Feb.		—	2.8	33.
Mch.		—	4.3	32.
Apr.		10	1.7	28.
May		14	0.4	30.
June		20	0.0	42.
July			0.1	24.
Aug.			0.2	23.

STATE OF ILLINOIS EXHIBIT No. 34.

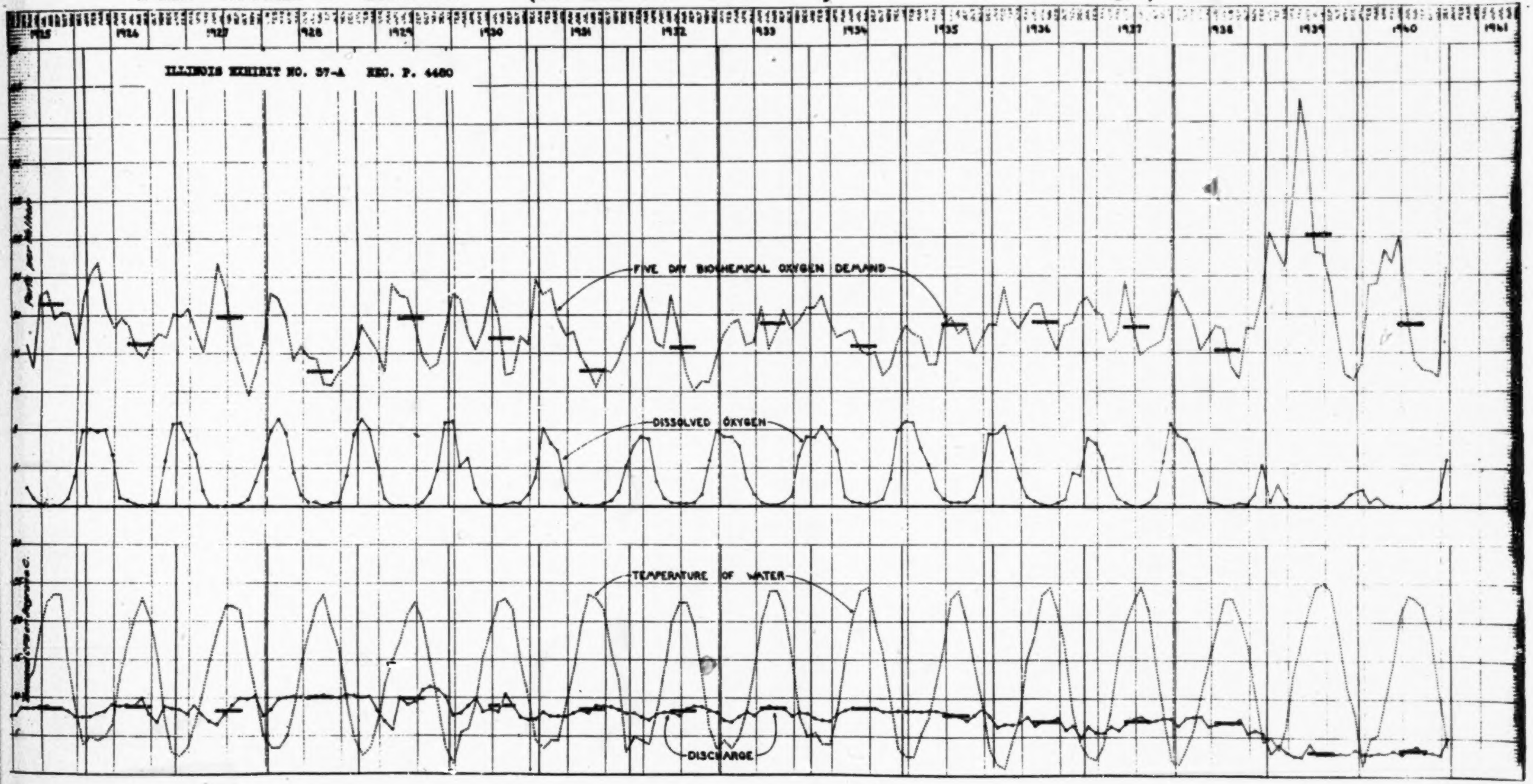
TABLE IV.

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER
DISSOLVED OXYGEN AND OXYGEN DEMANDS

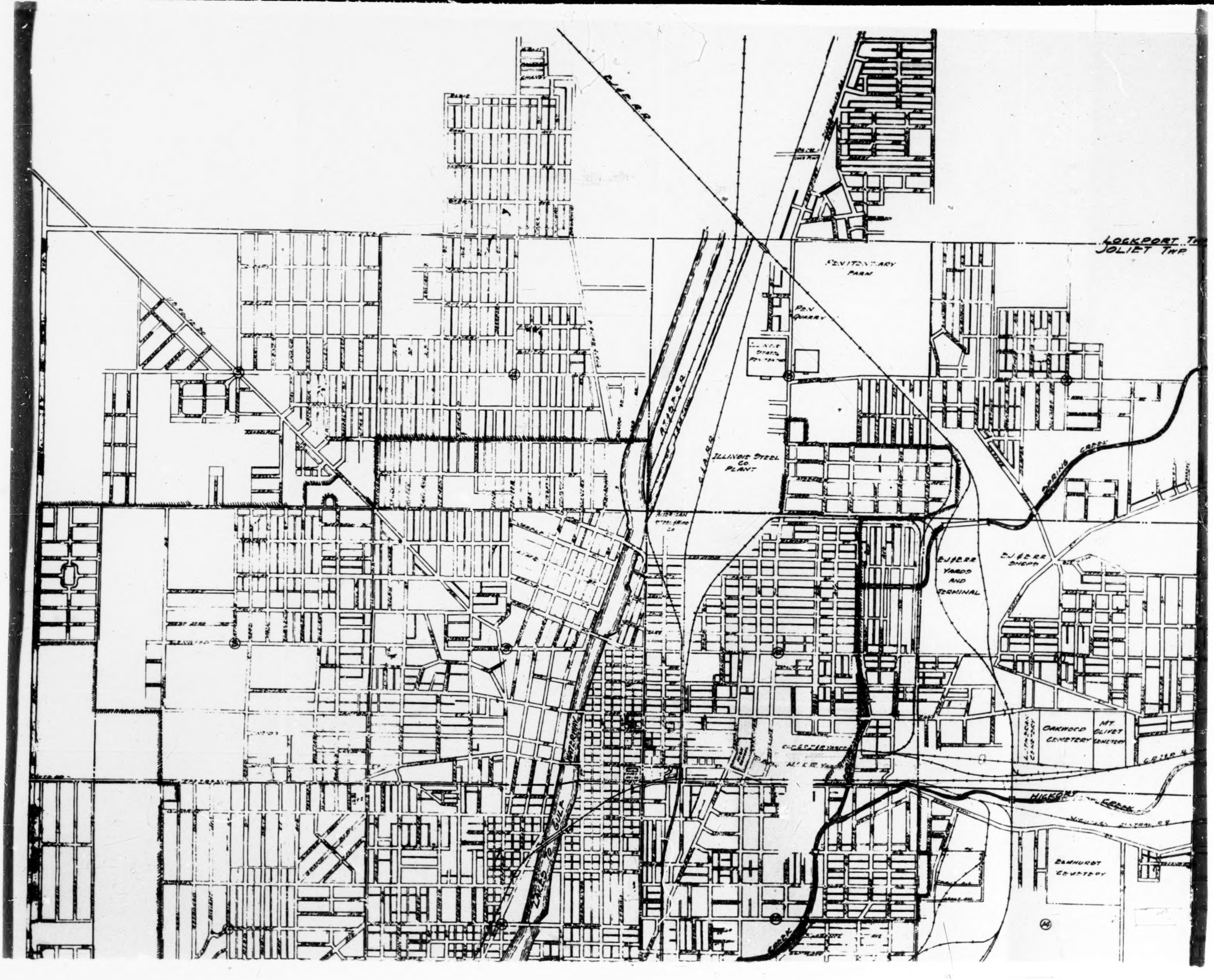
Station: Lockport Dates: Jan. 1938-May 1940

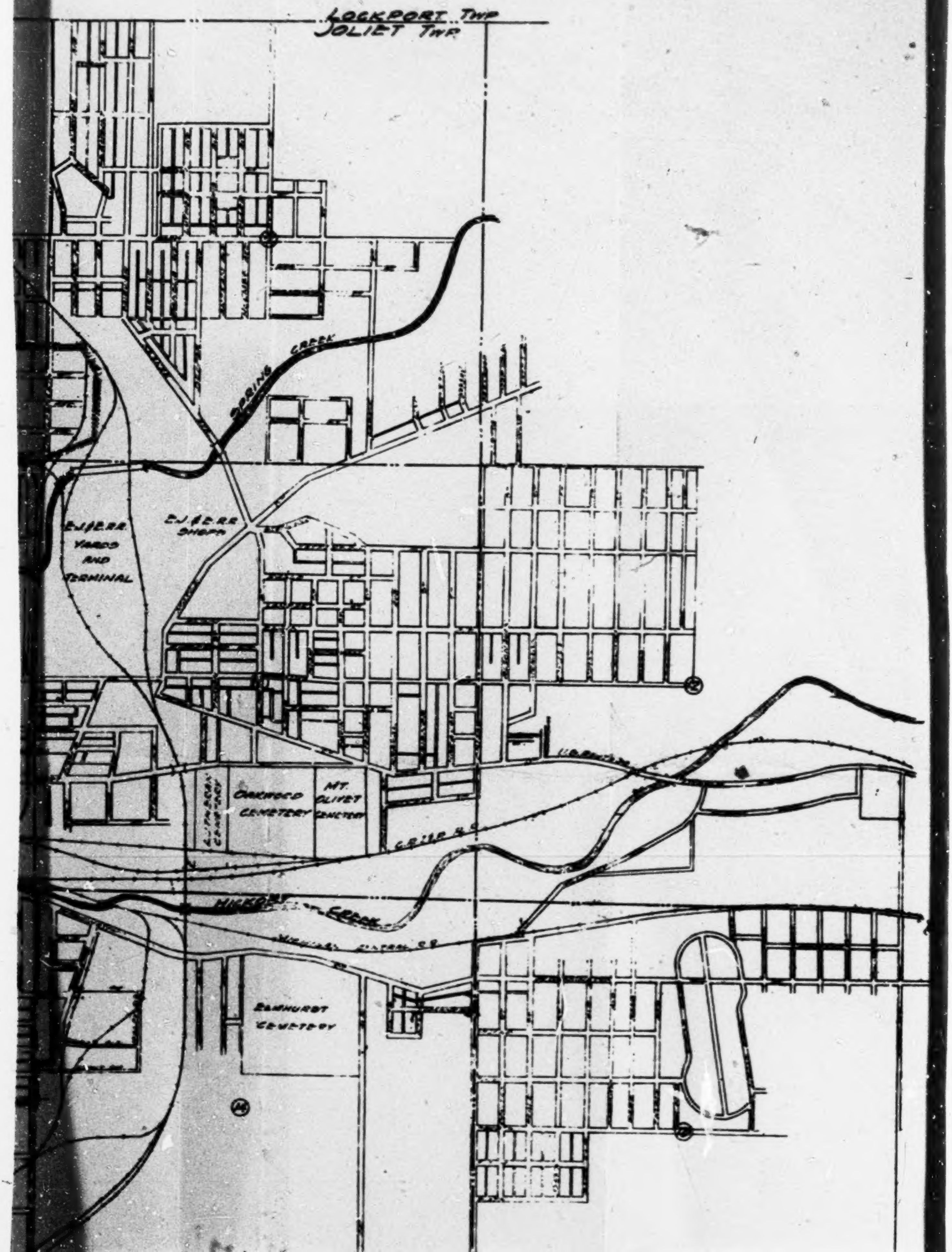
Date Month			Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand, 20°C., p.p.m.	
						5 days
Jan.	1938	6408	1.5	7.4	22.6	
Feb.		7422	3.5	7.0	21.0	
Mch.		7607	6.0	5.6	19.4	
Apr.		7686	10.5	3.2	16.3	
May		6311	15.0	0.5	17.6	
June		6701	19.0	0.3	18.8	
July		6814	23.0	0.1	18.5	
Aug.		6740	23.0	0.1	14.6	
Sept.		7247	20.5	0.3	13.4	
Oct.		5512	17.0	0.2	18.6	
Nov.		5861	10.5	1.2	18.5	
Dec.		5469	4.5	4.3	21.8	
Jan.	1939	2911	5.0	0.5	28.5	
Feb.		3989	3.5	2.2	26.6	
Mch.		3200	6.5	0.8	25.0	
Apr.		2718	13.5	0.1	31.4	
May		2623	17.5	0.0	42.3	
June		4227	21.5	0.0	37.8	
July		2880	24.5	0.0	26.5	
Aug.		2902	25.0	0.0	26.2	
Sept.		2826	24.0	0.0	23.0	
Oct.		3022	18.0	0.0	18.1	
Nov.		2820	11.5	0.4	13.8	
Dec.		3469	8.0	1.3	13.2	
Jan.	1940	2949	1.5	1.8	14.8	
Feb.		2802	5.0	0.4	23.0	
Mch.		3167	5.5	1.0	23.2	
Apr.		3026	10.0	0.2	26.6	
May		3344	14.5	0.1	25.3	
June			21.0	0.0	27.9	
July				.0	18.7	
Aug.				0.1	15.2	

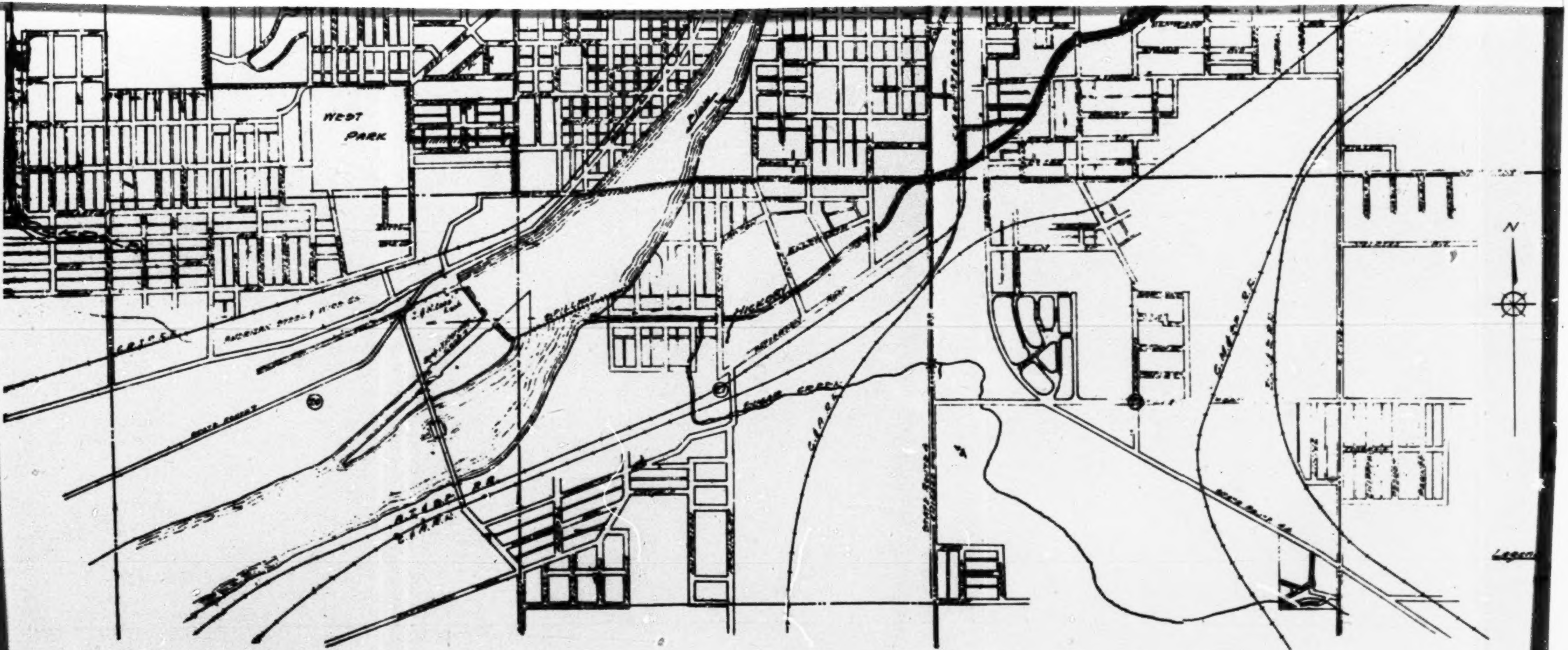
MAIN CHANNEL at LOCKPORT (292 miles from Grafton Ferry: 35 miles from Lake Michigan.)



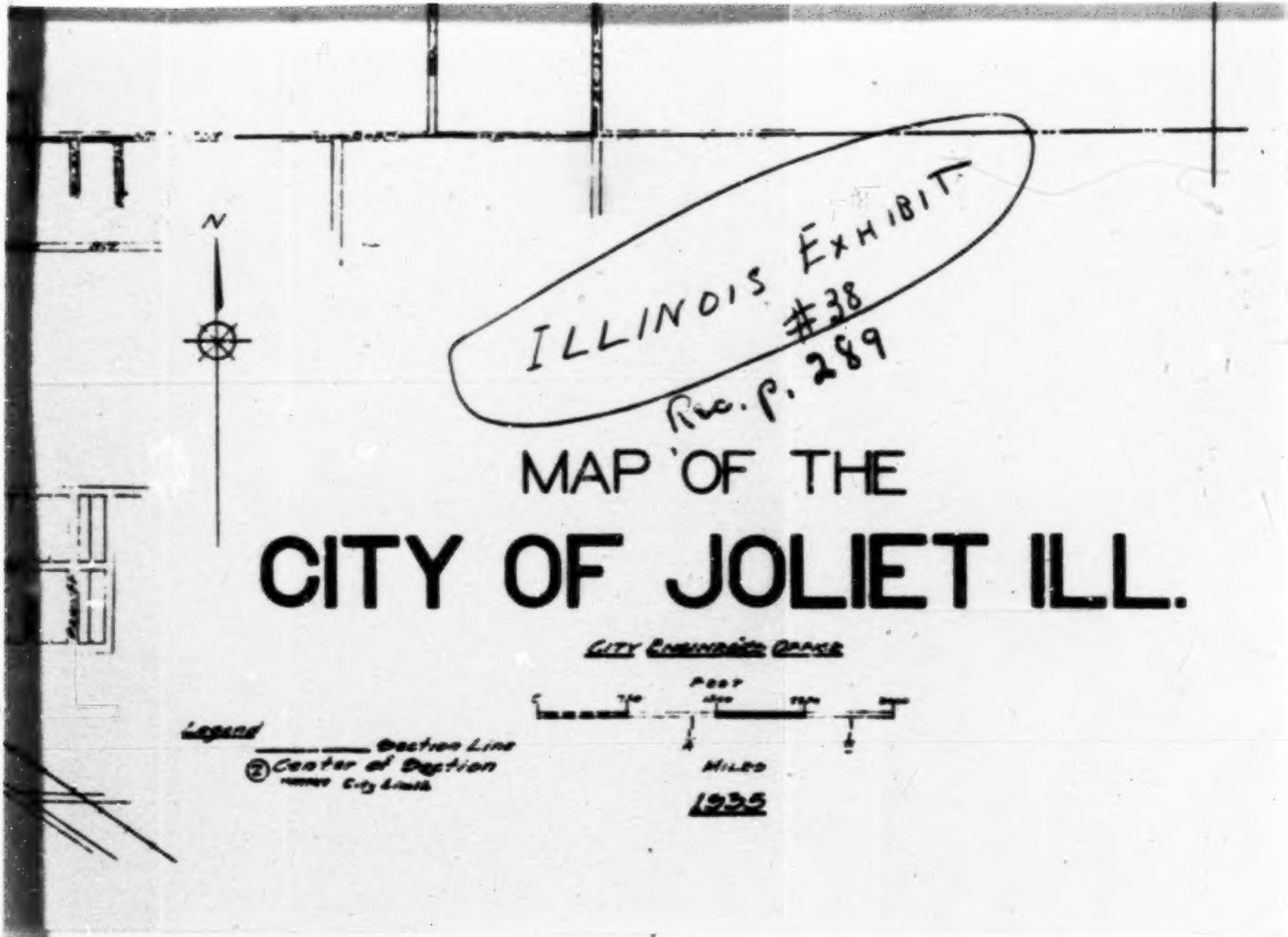
ILLINOIS EXHIBIT NO. 37-A REC. P. 4480


E.J.&E.R.R.
LOCKPORT TWP
JOLIET TWP
PENITENTIARY FARM
PEN QUARRY
ILLINOIS STATE PENITENTIARY
A.T.&S.F.R.R.
C.&A.R.R.
ILLINOIS STEEL CO. PLANT
AMERICAN STEEL & WIRE CO
E.J.&E.R.R. YARDS AND TERMINAL
E.J.&E.R.R. SHOPS
SPRING CREEK
LUTHERAN CEMETERY
OAKWOOD CEMETERY
MT. OLIVET CEMETERY
C.R.I.&P.R.R.
M.C.&M. YARDS
HICKORY CREEK
MICHIGAN CENTRAL R.R.
ELMHURST CEMETERY
LAKES TO GULF WATERWAY
CREEK


LOCKPORT TWP
JOLIET TWP
SPRING CREEK
E.J.&E.RR. YARDS AND TERMINAL
E.J.&E.RR. SHOPS
LUTHERAN CEMETERY
OAKWOOD CEMETERY
MT. OLIVET CEMETERY
C.R.I.&P. R.R.
HICKORY CREEK
MICHIGAN CENTRAL R.R.
ELMHURST CEMETERY


WEST PARK
AMERICAN STEEL & WIRE CO.
SPILLWAY
HICKORY
SUGAR CREEK
RR
N
Legend

ILLINOIS EXHIBIT
#38
Rec. p. 289



MAP OF THE

CITY OF JOLIET ILL.

CITY ENGINEER'S OFFICE

1935

Legend
Section Line
② Center of Section
City Limits

ILLINOIS EXHIBIT NO. 40-A REC. P. 3672.

Sanitary District of Chicago
Main Channel Discharge at Lockport

M&O Division
Hydraulic Control Section

Month	Planned Flow: Average Monthly as of Jan.	Planned Flow: Average Monthly as revised Monthly	Planned Flow: Storm Reserve	Planned Flow: Average Dry Weather	Actual Flow: Average Monthly	Actual Flow: Storm Run-off	Actual Flow: Average Dry Weather	Precipitation U. of C.
	1	2	3	4	5	6	7	8
	cfs	cfs	cfs	cfs	cfs	cfs	cfs	Inches
Jan.				6300	6408	208	6200	2.02
Feb.				6780	7422	522	6900	2.11
Mar.				7300	7607	307	7300	3.51
April				7250	7686	286	7400	2.20
May				6350	6311	311	6000	3.98
June				6050	6701	701	6000	6.78
July				6050	6814	714	6100	3.90
Aug.				6050	6740	640	6100	2.12
Sept				6130	7247	1147	6100	5.29
Oct.				5750	5512	112	5400	0.77
Nov.				5915	5861	61	5800	0.95
Dec.				5425	5469	269	5200	1.18
Average		6649		6279	6648	440	6200	
Total								34.81
Jan.		3200	400	2800	2911	138	2773	2.22
Feb.		2800	400	2400	3989	1559	2430	1.98
Mar.		2800	400	2400	3200	724	2476	2.96
April	2800	2800	400	2400	2718	301	2417	3.22
May	2800	2800	460	2340	2623	360	2263	3.66
June	3500	3600	400	3200	4227	992	3236	5.13
July	3500	3200	400	2800	2880	118	2762	2.74
Aug.	3500	3200	600	2600	2902	50	2852	1.47
Sept.	3000	3100	400	2700	2826	12	2814	0.49
Oct.	2900	3100	400	2700	3022	172	2850	1.79
Nov.	2800	2900	300	2600	2820	0	2820	0.95
Dec.	2700	3500	300	3200	3469	0	3469	0.90
Average	3135	3133	405	2678	3132	369	2763	
Total								27.51
Jan.	3100	3100	300	2800	2949	191	2758	1.25
Feb.	2900	2900	300	2600	2802	273	2529	0.89
Mar.	2900	2900	300	2600	3167	284	2883	2.41
April	3075	3075	400	2675	3026	429	2597	3.17
May	3000	3000	400	2600	3344	322	3022	5.16
June	3200	3200	400	2800	2876	130	2746	1.31
July	3675	3675	375	3300	3609	179	3430	1.29
Aug.	3700	3700	200	3500	3923	246	3677	3.95
Sept.	3300	3300	300	3000	3125	10	3115	0.31
Oct.	2900	3000	200	2800	3186	188	2998	2.26
Nov.	2900	2850	250	2600	2824	90	2734	2.36
Dec.	2850	2715	150	2565	2618	142	2476	1.30
Average	3125	3131	302	2829	3138	209	2929	
Dec.					9990			[illegible].08
Average					3319			
Total								26.74

Except period Noon of Dec 2nd to noon of Dec 12th
Noon of Dec 2nd to noon of Dec 12th
Year

Page Tightly Bound

ILLINOIS EXHIBIT No. 43 REC. P. 1431

Sanitary District of Chicago

Main Channel Half-Hour Discharge at Lockport
On the 15th day of each Month of year

M&O Division
Hydraulic Control Section

Year 1939

Time	Jan. CFS	Feb. CFS	Mar. CFS	Apr. CFS	May CFS	June CFS	July CFS	Aug. CFS	Sept. CFS	Oct. CFS	Nov. CFS	Dec. CFS
12 MN	3271	5695	7805	3774	2650	3573	3495	3986	3385	3176	3706	6075
30	3271	5693	7821	3759	2852	3563	3215	3604	3233	3046	5138	4494
1	3266	5698	7831	3752		5201	3215	3599		"	3543	4511
30	3276		7856	4052		3600	3210			3046	3513	4506
2			7847	4037		3590	3210		3233	2971	3497	6101
30			7838	"		3600	3205		3212		3562	4528
3		5698	7853	4037	2852	3585	3205	3599	3212		3569	4548
30		5708	7854	5069	2847	3599	4856	3529	3228	2971	5208	6103
4	3276	7325	7879	3469		3578	3227	"	3216	4604	3602	4511
30	3286	5758	7870	3069		4985	3227	3529	3216	3023	3579	4480
5	3261	5718	7891	1867		2789	2399	3524	3206	3003	5213	6072
30		5708	6529	1887		2799	2139	2391	3272	2328	3602	4461
6		5698	6026	1877		2804	2134	2021	2386	3715	3138	4490
30	3261	5700	6046	1877	2847	2779	2134	2011	2094	2092	1857	3898
7	2240	5695	5996	1882	2842	2784	2139	3723	2089	2122	1847	2148
30	1895	"	5986	1882	2822	2772	2139	2048	2099	2090	1852	2148
8	1883	5695	5953	1858	2597	2764	2149	2043	2089	3696	1852	2143
30	1883	5682	5977	1835	1880	2754	2154	2048	2094	2102	1857	2162
9	1898		7434	1906	1885	2749	2139	2043	2091	2092	1837	2167
30	1898		6040	1855		2749	2159	"	2091	2091	1907	2167
10	1893		6015	1855		4404	2121	2043	2086	3707	1837	2157
30		5682	5611	1840		2762	2121	2110	2091	2107	"	2162
11		4717	4424	1850		4414	2136	2039	2091	2099	1837	2162
30	1893	4360	4402	1845	1885	2770	2153	2034	2086	2094	3462	2167
12 N	1888	4391	4362	"	1880	2749	3823	3693	2086	2099	1859	2152
30	1889	4380	4357	1845		2734	2141	2024	3751	2104	1864	2151
1		4365	4357	3502		3820	2126	3706	2091	2104	1859	
30			4387	1872	1880	2739	2126	2028	2086	2099	1869	
2			4382	1867	1875	4398	2131	2083	2086	2104	1869	
30		4365	4382	1857	"	2766	3844	3706	2113	2099	1858	
3		2767	4412	1872	1875	2766	2129	2048	2096	2099	1847	2151
30	1889	2254	4412	1868	1880	2786	2121	2063	2081	2104	1852	2146
4	1884		4382	1909		2781	2146	2053	2086		3490	2161
30	1884		4452	3502		2781	2141	"	2071		1869	2161
5	2219		4425	1850	1880	2818	3838	2053	2066	2104	3433	3858
30	3249	2254	4410	1835	1881	2803	2138	2042	2066	2939	3888	4377
6	3254	2604	4400	1840	1881	2798	2153	3688	2084	3241	3988	4361
30	3259	2639	4386	1855	1861	2798	2168	2058	3751	3246	3973	4268
7	3254	2634	4386	2632	3545	2778	2168	2048	2183	3246	3968	4259
30		3988	4361	2887	1900	2774	2148	2115	3436	3171	3958	3926
8		4395	4391	3092	1886	2781	2141	2048	38[illegible]2	3166	3968	3911
30		4495	4376	3082	2715	2761	2131	3781	562[illegible]	3166	3896	3921
9	3254	4415	4421	3097	4622	3368	3200	4381	3900	3181	3837	3921
30	3259	"	4421	3017	2985	3568	3400	4381	3980	3111	5444	3911
10	4852	4416	4401	4740	2920	3563	3283	4276	5496	3111	3859	5456
30	3266	4365	4401	3334	2805	3573	4950	4276	3607	3175	3844	3907
11	3261	"	4396	3352	2805	3578	4920	4006	5277	3111	5329	3896
30	3276	4365	4391	4994	4362	3568	3317	3879	3629	3111	3824	3974
12 MN												
Mean	2711	4652	5587	2681	2459	390[illegible]	2728	2891	2871	2734	3131	3537
Max.	4852	7325	7891	5069	4622	5201	4950	4381	5625	4604	5444	6103
Min.	1883	2254	4357	1835	1861	2734	2121	2011	2066	2090	1837	2143

Page Tightly Bound

Sanitary District of Chicago

Main Channel Half-Hour Discharge at Lockport
On the 15th day of each Month of year

M&O Division
Hydraulic Control Section

Year 1940

	Time	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		CFS.	CFS	CFS	CFS	CFS	CFS	CFS	CFS	CFS	CFS	CFS	CFS
	12 MN	5445	2779	2951	4198	5363	3198	4067					
	30	5465	2604	2743	2578	5052	2923	3915					
	1	5460		2738	2593	5082	2903	3775					
	30	5609		2728		5092	4503	3835					
	2	6082		2703	2593	5072	2940	3835					
	30	6093	2604	2713	2513	6582	2953	3830					
	3	5948	2539	4343	2511	5005	2978	3840					
	30	5939		2713	2501	5012	2948						
	4	5800		2718	2501	5045	2933	3840					
	30	5319			2411	4997	2728	3850					
	5	5065		2718	3747	2898	2168	3103					
	30	4986		2100	2158	2178	3808	2853					
A.M.	6	4981	2539	1905	2158	2178	2174	2853					
	30	4976	2049	1880	2153	2184	2163	2848					
	7	2659	3520	1872	2153	2193	2168	2884					
	30	1829	1891	1872	2143	2183	2153	2871					
	8	1854	1894	1877	2133	3803	2146	2867					
	30	1859	1886	1868	2148	2182	2150	4495					
	9		1886	1873		2172		2854					
	30	1859	1891	1878		2191	2150	2882					
	10	1849	1890	1878			2146	4485					
	30	1854	1890	1881	2148	2191	2161	2879					
	11	1866	1875		2141	2201	2156						
	30	1866	1875		2121	2206	2156						
	12 N	1871	1872		2126	2179	3797	2879					
	30		1872		2121	2169	2178	2945					
	1		1877	1881	1706	2164	2254	2879					
	30		1872	1863	2108	2179	2198	2880					
	2	1871		1868	1726	2179	2178	2850					
	30	1866		1873	3742	2174	2244	2857					
	3	1848	1872		2147	2175	2178	2853					
	30	1858	1882		2122	3810		2848					
	4	3486	3518		2127	2180	2178	2858					
	30	1869	1904		2119	3845	2167	2853					
	5	3177	1889		2114	2175	2155						
	30	7178	1872		2114	2182	3823	2853					
P.M.	6	6584	3093	1873	2142	2196	2173	2858					
	30	6323	3363	4386	2115	3815	2173						
	7	6323	3343	4367	4926	2179	2158	2858					
	30	6354	3208	4302	3100	2177	3835	2853					
	8	6370		4187	2981	2186	3794	2863					
	30	7921		4192	2988	5841	2458	4520					
	9	6314			4580	5252	3405	5041					
	30	6224	3208	4192	3000	5263	3405	5453					
	10	6224	3063	4202	2985	5284	3106	5173					
	30	7744	3056	4195	2865	5084		4981					
	11	6119	3056	4045	2773	4966	3106	4975					
	30	6164	2856	5615	2773	4968	3096	4866					
	12 MN												
	Mean	4287	2462	2680	2545	3414	2670	3458					
	Max.	7921	3520	5615	4926	6582	4503	5453					
	Min.	1829	1872	1863	1706	2164	2146	2848					

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STATE OF ILLINOIS EXHIBIT No. 44-A.

THE SANITARY DISTRICT OF CHICAGO
NORTH SIDE SEWAGE TREATMENT WORKS
FLOW, B.O.D., D.O. AND SUSPENDED SOLIDS

1940

		5-Day B.O.D.			Diss. Oxygen		Suspended Solids		
Month	Flow M.G.D.	Raw Sewage	Effluent	% Reduction	Final Settling Tanks	Outfall	Raw Sewage	Effluent	% Reduction
Jan.	174	160	9.6	94.0	2.7	9.5	141	16	88.7
Feb.	181	143	8.2	94.3	1.6	9.3	147	13	91.2
Mar.	187	142	8.4	94.0	1.5	9.2	145	13	91.0
Apr.	189	136	8.4	93.8	2.1	9.1	145	12	91.7
May	220	108	7.2	93.3	1.8	8.5	144	10	93.0
June	193	110	6.7	93.9	1.7	7.9	146	10	93.2
July	195	112	5.6	95.0	1.4	7.6	147	8	94.6
Aug.	200	103	4.9	95.2	1.4	7.4	151	9	94.0
Sept.	181	119	4.4	96.3	1.2	7.5	124	7	94.4
Oct.	180	130	6.0	95.4	1.0	7.9	152	9	94.1
Nov.	177	145	6.5	95.5	1.0	8.4	142	12	91.5
Dec.	182	139	7.7	94.5	1.9	8.9	142	14	90.1
Average	188	129	7.0	94.6	1.6	8.4	144	11	92.4

3650

STATE OF ILLINOIS EXHIBIT No. 45-A.

THE SANITARY DISTRICT OF CHICAGO
CALUMET SEWAGE TREATMENT WORKS
FLOW, B.O.D., D.O. AND SUSPENDED SOLIDS

1940

		5-Day B.O.D.				Suspended Solids		
Month	Flow M.G.D.	Raw Sewage	Effluent	% Reduction	Dissolved Oxygen Outfall Sewer	Raw Sewage	Effluent	% Reduction
Jan.	67	125	10	92.0	8.4	121	14	88.4
Feb.	72	118	9	92.4	8.5	123	12	90.2
Mar.	62	106	9	91.5	8.7	123	13	89.4
Apr.	61	101	9	91.0	8.6	120	11	90.8
May	70	87	9	89.7	8.3	118	12	89.8
June	70	96	8	91.6	7.6	126	11	91.3
July	63	98	8	91.8	7.3	119	10	91.6
Aug.	66	98	9	90.8	7.2	128	10	92.2
Sept.	64	108	10	90.7	7.5	117	10	91.5
Oct.	66	104	12	88.5	7.5	120	15	88.4
Nov.	70	123	17	86.1	7.9	111	10	91.0
Dec.	76	115	11	90.4	8.4	120	12	90.0
Average	67	107	10	90.7	8.0	121	12	90.1

STATE OF ILLINOIS EXHIBIT No. 46-A.

THE SANITARY DISTRICT OF CHICAGO
WEST SIDE SEWAGE TREATMENT WORKS
FLOW, B.O.D., D.O. AND SUSPENDED SOLIDS

1940

Month		Flow M.G.D.	5-Day B.O.D. Raw Sewage	5-Day B.O.D. Effluent	5-Day B.O.D. % Reduction	Dissolved Oxygen Outfall	Suspended Solids Raw Sewage	Suspended Solids Effluent	Suspended Solids % Reduction
Jan.		168	129	62	51.9		152	65	57.2
Feb.		187	118	67	43.2		141	72	48.9
Mar.	(a)	348	132	74	44.0		178	85	52.2
Apr.	(b)	394	137	75	45.2		171	85	50.2
May	(c)	437	109	55	49.5		163	73	55.2
June	(d)	391	133	64	51.9		217	74	61.3
July	(e)	449	123	60	51.2		178	75	57.8
Aug.	(f)	449	116	48	58.6		182	58	68.1
Sept.	(g)	383	130	54	58.5	4.6	193	67	65.3
Oct.	(h)	371	141	60	57.4	5.1	214	71	66.8
Nov.	(i)	374	142	75	47.2	5.3	192	86	55.2
Dec.	(j)	385	128	76	40.6	8.6	167	84	49.7
Average	(k)	362	128	64	50.0	5.9	179	75	58.0

(a) Prel. sludge received from SW. Wks. 4 M.G.D., equivalent to 37 p.p.m. susp. solids.
(b) Prel. sludge received from SW. Wks. 4 M.G.D., equivalent to 38 p.p.m. susp. solids.
(c) Prel. sludge received from SW. Wks. 5 M.G.D., equivalent to 55 p.p.m. susp. solids.
(d) Prel. sludge received from SW. Wks. 6 M.G.D., equivalent to 79 p.p.m. susp. solids.
(e) Prel. sludge received from SW. Wks. 6 M.G.D., equivalent to 67 p.p.m. susp. solids.
(f) Prel. sludge received from SW. Wks. 6 M.G.D., equivalent to 65 p.p.m. susp. solids.
(g) Prel. sludge received from SW. Wks. 7 M.G.D., equivalent to 68 p.p.m. susp. solids.
(h) Prel. sludge received from SW. Wks. 7 M.G.D., equivalent to 69 p.p.m. susp. solids.
(i) Prel. sludge received from SW. Wks. 6 M.G.D., equivalent to 43 p.p.m. susp. solids.
(j) Prel. sludge received from SW. Wks. 5 M.G.D., equivalent to 34 p.p.m. susp. solids.
(k) Prel. sludge received from SW. Wks. 5 M.G.D., equivalent to 46 p.p.m. susp. solids.

STATE OF ILLINOIS EXHIBIT No. 47-A.

THE SANITARY DISTRICT OF CHICAGO
SOUTHWEST SEWAGE TREATMENT WORKS
FLOW, B.O.D., D.O. AND SUSPENDED SOLIDS

1940

		5-Day B.O.D.				Suspended Solids		
Month	Flow M.G.D.	Raw Sewage	Effluent	% Reduction	Dissolved Oxygen Outfall	Raw Sewage	Effluent	% Reduction
January	287	151	13	91.3	8.6	217	15	93.1
February	267	142	10	93.0	8.3	194	14	92.8
March (a)	197	—	26	—	9.5		34	
April (b)	252	172	62	64.0	7.4	242	63	74.0
May (c)	310	142	58	59.1	6.0	203	62	69.4
June (d)	365	154	71	53.8	4.2	191	69	63.8
July (e)	287	151	44	70.8	4.2	187	43	77.0
Aug. (f)	340	134	52	61.1	5.1	188	56	70.2
Sept. (g)	358	141	45	68.1	5.1	170	45	73.5
Oct. (h)	361	152	53	65.1	5.6	220	58	73.6
Nov. (i)	374	188	73	61.2	6.4	215	79	63.3
Dec. (j)	358	193	102	47.1	8.5	211	105	50.2
Average (k)	313	156	51	67.3	6.6	203	54	73.4

(a) Complete Treatment on 161 M.G.D.
(b) Complete Treatment on 122 M.G.D.
(c) Complete Treatment on 142 M.G.D.
(d) Complete Treatment on 130 M.G.D.
(e) Complete Treatment on 168 M.G.D.
(f) Complete Treatment on 176 M.G.D.
(g) Complete Treatment on 236 M.G.D.
(h) Complete Treatment on 248 M.G.D.
(i) Complete Treatment on 222 M.G.D.
(j) Complete Treatment on 139 M.G.D.
(k) Complete Treatment on 192 M.G.D.

STATE OF ILLINOIS EXHIBIT No. 62.

SANITARY DISTRICT OF CHICAGO
DIVERSION FROM LAKE MICHIGAN

Year	Month	Total Average Monthly 1 CFS	Des Plaines River Inflow 2 CFS	Total from Lake Michigan Watershed 3 CFS	Domestic Pumpage 4 CFS	Chicago and Calumet Rivers 5 CFS	Diversion from Lake Michigan 6 CFS	Precipitation U. of C. 7 Inches
938—	Jan.	6408	20	6388	1589	520	4279	2.02
	Feb.	7422	63	7359	1554	789	5016	2.11
	Mar.	7607	25	7582	1534	868	5180	3.51
	April	7686	22	7664	1529	1006	5129	2.20
	May	6311	13	6298	1563	460	4275	3.98
	June	6701	28	6673	1649	1009	4015	6.78
	July	6814	305	6509	1761	776	3972	3.90
	Aug.	6740	11	6729	1808	501	4420	2.12
	Sept.	7247	25	7222	1683	1814	3725	5.29
	Oct.	5512	11	5501	1577	194	3730	0.77
	Nov.	5861	9	5852	1514	125	4213	0.95
	Dec.	5469	9	5460	1491	138	3831	1.18
	Average	6648	45	6603	1604	683	4316	
	Total							34.81
939—	Jan.	2911	10	2901	1488	251	1162	2.22
	Feb.	3989	40	3949	1504	1829	616	1.98
	Mar.	3200	31	3169	1515	1250	404	2.96
	April	2718	23	2695	1689	868	138	3.22
	May	2623	18	2605	1532	906	167	3.66
	June	4227	16	4211	1669	1986	556	5.13
	July	2880	7	2873	1878	501	494	2.74
	Aug.	2902	3	2899	1801	397	701	1.47
	Sept.	2826	0	2826	1733	238	855	0.49
	Oct.	3022	4	3018	1619	197	1202	1.79
	Nov.	2820	4	2816	1518	131	1167	0.95
	Dec.	3469	4	3465	1487	116	1862	0.90
	Average	3132	13	3119	1620	722	777	
	Total							27.51
1940—	Jan.	2949	19	2930	1566	257	1107	1.25
	Feb.	2802	36	2760	1538	432	796	0.89
	Mar.	3167	68	3099	1521	582	996	2.41
	April	3026	66	2960	1523	292	1145	3.17
	May	3344	118	3220	1528	837	861	5.16
	June	2876	53	2823	1662	567	594	1.31
	July	3609	38	3571	1854	360	1357	1.29
	Aug.	3923	47	3876	1750	307	1819	3.95
	Sept.	3125	32	3093	1673	119	1301	0.31
	Oct.	3186	27	3159	1525	159	1475	3.26
	Nov.	2824	24	2800	1459	138	1203	2.36
	*Dec.	2618	68	2550	1448	304	798	1.30
	*Average	3138	49	3089	1592	363	1134	
	†Dec.	9990	41	9949	1501	225	8223	0.08
	‡Average	3319	49	3270	1589	363	1318	
	Total							26.74

* Except period Noon of Dec. 2nd to noon of Dec. 12th
† Noon of Dec. 2nd to noon of Dec. 12th
‡ Year

3677

STATE OF ILLINOIS EXHIBIT No. 63.

ANALYSES OF SAMPLES FROM MAIN CHANNEL AND ILLINOIS RIVER

AVERAGE MONTHLY RESULTS, SEPT.-DEC., 1940

(Complete Data in Record, Exhibits 31 to 36, and Page 1840)

1940

Station	Dissolved Oxygen P.P.M.				5-day B.O.D. P.P.M.				Temperature Deg. C			
	Sept.	Oct.	Nov.	Dec.	Sept.	Oct.	Nov.	Dec.	Sept.	Oct.	Nov.	Dec.
Lake Michigan	8.8	9.8	11.9	14.1	0.9	1.0	1.5	1.6	18	15	8	3
Damen Ave.	4.2	4.9	7.9	11.4	3.5	4.5	4.4	3.9	19	15	7	3
Summit	0.3	0.5	3.2	7.5	21	22	30	29	21	18	10	5
Lockport	0.1	0.2	0.8	4.9	14.3	14.1	13.6	24.7	22	19	11	4
Marseilles	4.4	5.4	9.3	11.4	3.1	3.7	4.8	5.6	21	17	8	5
Chillicothe	6.8	7.3	10.4	12.2	4.7	4.8	3.9	4.2	21	16	7	3

1820

MOHLMANN EXHIBIT No. 1.

THE SANITARY DISTRICT OF CHICAGO (1)
ENGINEERING DEPARTMENT

Subject: Determination of Chlorine Demand—Main Channel

Computation: July 2 and 3, 1940.

Parts per Million

Time	July 2, 1940		July 3, 1940		
	Damen Ave.	Summit	Damen Ave.	Summit	Lockport
9:00 A.M.	2.1	5.0	2.0	4.5	3.7
9:30	1.6	5.0	2.0	4.5	3.7
10:00	1.6	4.5	2.3	4.0	3.7
10:30	1.3	4.5	2.3	3.5	3.7
11:00	1.6	5.5	2.0	4.0	5.0
11:30	1.8	5.0	2.0	4.0	5.0
12:00	1.6	4.0	2.3	4.5	5.0
12:30 P.M.	2.3	4.0	2.3	4.0	5.0
1:00	2.3	3.0	2.3	5.0	5.0
1:30	2.3	4.0	2.0	4.0	6.2
2:00	2.0	4.0	2.3	4.5	5.0
2:30	2.0	4.0	2.3		
3:00	2.3	4.0	2.3		
Average	1.9	4.4	2.2	4.2	4.6

2446

MOHLMAN EXHIBIT NO. 8.

EDITORIAL.

OXYGEN DEMAND OF SLUDGE DEPOSITS.

The most objectionable feature of a grossly polluted stream is the presence of floating, gas-lifted sludge, foul in odor and nauseous in appearance. Abatement of stream pollution should always be directed first to the removal from sewage of the settleable solids, and second to the reduction of the B.O.D. of the clarified sewage. Although it is generally accepted that clarification accomplishes about 35 per cent reduction of B.O.D. and complete treatment 90 per cent, the actual benefit to the stream by clarification may greatly exceed 35 per cent, particularly in the early months of summer.

Stabilization of sewage sludge deposits on stream beds is accomplished at the expense of the dissolved oxygen of the supernatant water. The well-known accelerating effect of comparatively small increases in temperature on the rate of oxygen demand of sewage also applies to sludge, and when the water temperature reaches 15 to 20 degrees Centigrade in June, a sudden increase in the oxygen requirement of sludge deposits occurs. For a few weeks the sludge deposits may erupt violently and the river surface may be covered with a carpet of bubbling sludge. Later in the summer, the water temperature may reach 30 degrees Centrigrade, and as the temperature mounts, the sludge continues to putrefy, although not with the explosive violence associated with the onset of summer weather.

For a long time it has been known that the oxygen demand of freshly settled sewage sludge is far greater than that of digested sludge, or of stream deposits several years old, but there have been comparatively few investigations of the rate of B.O.D. of sludge. In the past few years, however, attention has been directed toward this subject at a number of research laboratories in the United States. Results of investigations of B.O.D. of sludge and river mud have been reported by Rudolfs, Fair, Theriault and Baity, the latter in this issue (page 539). Studies have also been under way since 1935 in the laboratories of the Sanitary District of Chicago and undoubtedly similar work has been carried on elsewhere.

Dr. Baity's paper on the results of his work at Harvard in 1925 is very interesting, and he has studied more phases of the problem, at one time, than other investigators. He started with raw sewage sludge, with a high volatile content, and with very thin layers, ranging from .089 to 4.0 centimeters in depth. The experiments were carried on for only 36 days. As Dr. Baity states, it is recognized that this period was too short to establish many factors related to the long-time incubation required for the complete stabilization of sludge deposits of appreciable depth. The curve of oxygen in his Fig. 2 is ended with the statement "oxygen demand essentially satisfied," but it seems to the writer that this conclusion is subject to doubt, and if the tests had been continued, the oxygen demand might have continued indefinitely, and the total after a year or two might have been double the 36-day total.

Other studies, on somewhat different bases, and with deeper layers of sludge, have been continued to 400 days (Rudolfs) and 700 days (Sanitary District of Chicago). The results of Dr. Rudolfs' study are given in an abstract in this issue (page 636). A somewhat casual consideration of the results of both studies shows the following:

Days at 20 deg. C.	Mgm. 5-day B.O.D. per Gm. Volatile Solids Rudolfs	San. Dist. Chi.
0	540	380
40	380	270
80	320	210
120	270	170
200	190	140
400	110	105
600	—	97
700	—	96

The rate after 40 days was approximately 70 per cent of the initial rate in both cases, while even after 400 days, the rate was still 20 to 28 per cent of the initial. During a summer period of about 120 days, the rate might therefore decrease to about half the initial. During the following winter the sludge would remain practically dormant, and through the following summer the rate would again decrease to about one-half of the initial rate of the second year. After this, the rate would apparently remain more or less constant for a number of years, at 100 mgm. 5-day B.O.D. per gm. of volatile solids. A number of well-digested sludges from the Illinois River have averaged around this value. The sludge beds studied by Rudolfs, in the Connecticut River have below Springfield, Massachusetts, also averaged approximately 100 mgm. per gm. volatile solids.

Dr. Baity gives a 10-day B.O.D. for the Brockton sludge of 244 mgm. per gm. volatile solids, equivalent to approximately 180 mgm. on a 5-day basis. This is lower than the values found by Rudolfs and the Sanitary District of Chicago for fresh sewage sludge, but higher than has been reported for sludge from river bottoms.

Notwithstanding these variations, which may be ascribed to the effect of different techniques, the fact remains that a procedure is being developed and data are being accumulated that will enable us to evaluate the effect of sludge deposits in stream studies. Even with sewage treatment, sludge banks will be formed from storm-water discharge. With data based on the organic content of sludge, we can in time evaluate the influence of such deposits.

The influence of sludge in the lower reaches of the Illinois River has been discussed briefly by Wisely, who states on page 569 of this issue that in the stretch from Mile 162 to Havana (Mile 120), 50 per cent of *the total oxygen demand was exerted by sludge deposits.* The Board of Review of the Sanitary District of Chicago estimated that the sludge deposits in the upper Illinois River exerted an oxygen demand in summer that was equivalent to the total flow of sewage, thus doubling the load on the oxygen resources of the river.

The consensus of those who have studied the oxygen demand of sewage sludge seems to be that by far the greatest source of deoxygenation is caused by freshly settled sludge, deposited during the winter months and throughout the current summer. Such deposits, when allowed to pass through another winter, will show a greatly reduced rate of demand during the second summer. Dr. Imhoff once suggested to the writer that under some conditions it might be desirable to skim off the surface of lake bottoms early in the spring, in order to remove sludge deposited during the previous winter. Such vacuum cleaning has not been accomplished, so far as the writer knows, but there is a great deal of significance in this suggestion.

It is fortunate that so many investigators are studying the oxygen demand of sludge deposits, with reference to stream conditions, and our efforts to abate stream pollution will be on a sounder foundation when we have more information on this important subject.

F. W. M.

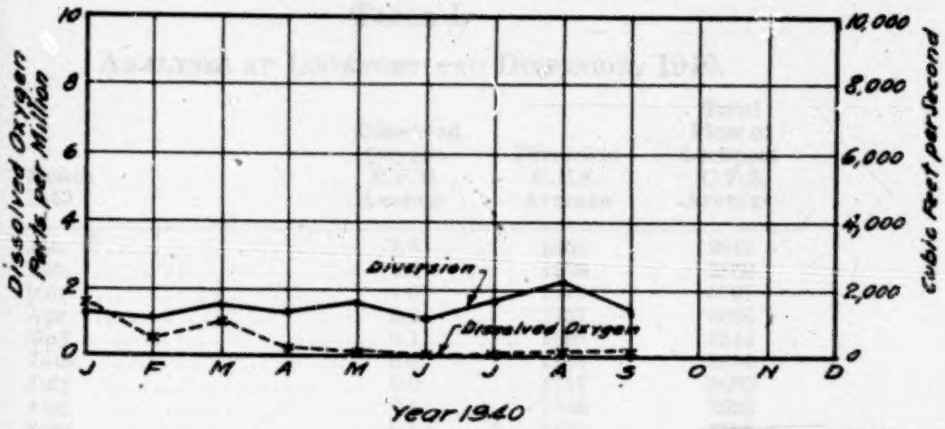
MOHLMAN EXHIBIT NO. 14-A, B, C, D   REC. P. 3530

Basis for Estimating Additional Diversion Needed in Summer

Mohlman Exhibit 14

CHART I

Average Results of Analyses and Flow Records at Lockport.

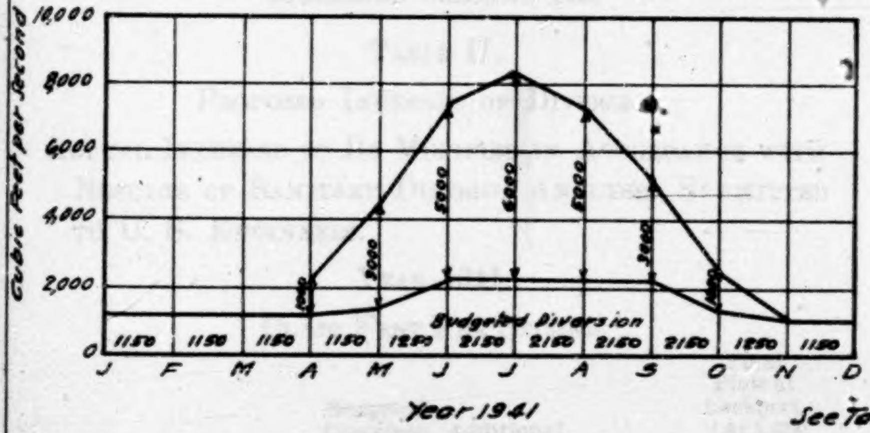


See Table I

CHART II

Proposed Increase of Diversion

(Actual Increase to be based on Analyses submitted to U.S. Engrs)

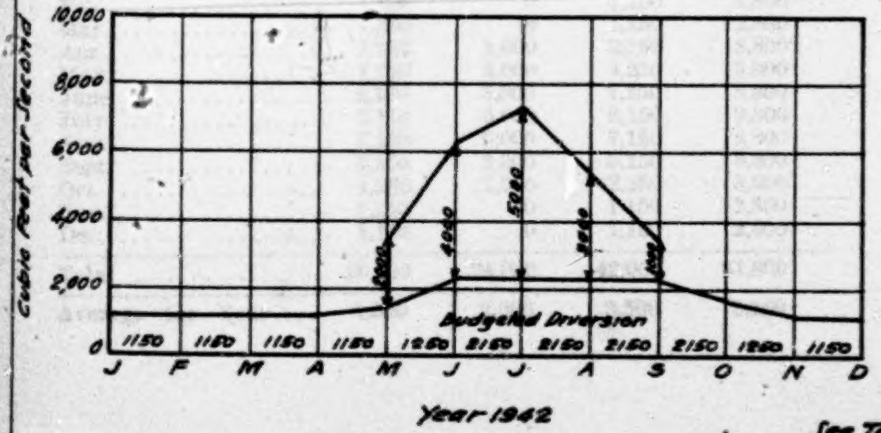


See Table II

CHART III

Proposed Increase of Diversion

(Actual Increase to be based on Analyses submitted to U.S. Engrs)



See Table III

MOHLMAN EXHIBIT 14b.

TABLE I.

ANALYSES AT LOCKPORT AND DIVERSION, 1940.

Month 1940	Dissolved Oxygen P.P.M. Average	Diversion C.F.S. Average	Total Flow at Lockport C.F.S. Average
Jan.	1.8	1364	2949
Feb.	0.4	1228	2802
Mar.	1.0	1578	3167
Apr.	0.2	1437	3026
May	0.1	1698	3344
June	0.0	1161	2876
July	0.0	1717	3609
Aug.	0.1	2126	3923
Sept.	0.1	1420	3125
Oct.	0.2		
Nov.			
Dec.			

MOHLMAN EXHIBIT 14c.

TABLE II.

PROPOSED INCREASE OF DIVERSION.

ACTUAL INCREASE TO BE MODIFIED IN ACCORDANCE WITH RESULTS OF SANITARY DISTRICT ANALYSES SUBMITTED TO U. S. ENGINEERS.

YEAR 1941.

CUBIC FEET PER SECOND.

Month 1941	Budgeted Diversion (By H. P. Ramey)	Additional Diversion Proposed	Total Diversion	Total Flow at Lockport (At 1,650 C.F.S. Sewage)
Jan.	1,150	0	1,150	2,800
Feb.	1,150	0	1,150	2,800
Mar.	1,150	0	1,150	2,800
Apr.	1,150	1,000	2,150	3,800
May	1,250	3,000	4,250	5,900
June	2,150	5,000	7,150	8,800
July	2,150	6,000	8,150	9,800
Aug.	2,150	5,000	7,150	8,800
Sept.	2,150	3,000	5,150	6,800
Oct.	1,250	1,000	2,250	3,900
Nov.	1,150	0	1,150	2,800
Dec.	1,150	0	1,150	2,800
Total	18,000	24,000	42,000	61,800
Average for Year	1,500	2,000	3,500	5,150

MOHLMAN EXHIBIT 14d.

TABLE III.

PROPOSED INCREASE OF DIVERSION.

ACTUAL INCREASE TO BE MODIFIED IN ACCORDANCE WITH RESULTS OF SANITARY DISTRICT ANALYSES SUBMITTED TO U. S. ENGINEERS.

YEAR 1942.

CUBIC FEET PER SECOND.

Month 1941	Budgeted Diversion (By H. P. Ramey)	Additional Diversion Proposed	Total Diversion	Total Flow at Lockport (At 1,650 C.F.S. Sewage)
Jan.	1,150	0	1,150	2,800
Feb.	1,150	0	1,150	2,800
Mar.	1,150	0	1,150	2,800
Apr.	1,150	0	1,150	2,800
May	1,250	2,000	3,250	4,900
June	2,150	4,000	6,150	7,800
July	2,150	5,000	7,150	8,800
Aug.	2,150	3,000	5,150	6,800
Sept.	2,150	1,000	3,150	4,800
Oct.	1,250	0	1,250	2,900
Nov.	1.150	0	1,150	2,800
Dec.	1,150	0	1,150	2,800
Total	18,000	15,000	33,000	52,800
Average for Year	1,500	1,250	2,750	4,400

3535

MOHLMAN EXHIBIT 14-E.

BASIS FOR ESTIMATING ADDITIONAL DIVERSION NEEDED IN SUMMER FOR AMELIORATING CONDITIONS IN BRANDON POOL.

(By F. W. Mohlman.)

1. Table I and Chart I show results of analyses for dissolved oxygen, and flow of water at Lockport in 1940. The October results are available only through Oct. 20, 1940. The dissolved oxygen results have started to increase, with an average of 0.5 p.p.m. on Oct. 15th.

2. Table II and Chart II show the diversion in 1941 budgeted to provide as much dilution as possible in summer, plus an estimated additional diversion extending from April through October. The increase extends up to 6,000 c.f.s. in July, but the total proposed additions average only 2,000 cu. ft. per second on an annual basis which added to the authorized 1,500 c.f.s. gives a total annual average of 3,500.

It is impossible to estimate the exact amount of increased diversion that will be needed in the summers of 1941 and 1942, therefore, it is proposed that the increases be based on the results of the actual analyses made by the Sanitary District hourly, and now furnished to the U. S. Engineers in Chicago as monthly averages. The results could be transmitted daily, and as soon as the dissolved oxygen began to approach zero, next April, the diversion would be increased within the limits of suggested increases shown in the table and chart. The amount of additional diversion required would increase markedly in June, reaching a maximum in July, thereafter decreasing.

3. Table III and Chart III show suggested increases in diversion in the summer of 1942. The total increases shown average only 1,250 c.f.s. on an annual basis, which added to the 1,500 authorized gives a total annual average diversion of 2,750 c.f.s.

As a temporary working basis to avoid nuisance during 1941 and 1942, it is proposed that a minimum dissolved oxygen content of one part per million be maintained in Brandon Pool, as determined hourly at the outlet of the pool.

Actual chemical analyses, made in the summers of 1941 and 1942, will provide a much safer criterion for determining the increase of diversion needed for those years than estimates which can be made at the present time.

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MOHLMAN EXHIBIT NO. 17.

SUMMARY AND CONCLUSIONS.

REPORT ON THE FLUSHING EXPERIMENT AUTHORIZED BY U. S. SUPREME COURT.

The flushing experiment authorized by the U. S. Supreme Court extended from noon on December 2, 1940 to noon on December 12, 1940. During the test the total flow at Lockport averaged 9,973 c.f.s. and the diversion (flow at Lockport less water pumpage in the Chicago area) 8,430 c.f.s. This was the maximum flow capacity of the Drainage Canal at the time of the test.

Samples were collected at fourteen stations, the most important being those at Cass St., Joliet, just above Brandon Pool, and at Brandon Bridge, just below Brandon Dam. A total of 8,970 analyses were made.

The suspended solids test shows the amount of sludge suspended in and carried along with the current. During the 10-day test a total of 84,010 tons of total suspended solids, on the dry basis, of which 27,067 tons were organic, were carried into Brandon Pool. During the same period a total of 21,123 tons of total suspended solids (dry basis), of which 7,512 were organic, were carried out of the Pool. The differences, 62,887 tons of total and 19,555 tons of organic solids, settled in the Pool. The amount that settled was 75 per cent of the total and 72 per cent of the organic solids. Therefore the test did not scour solids out of Brandon Pool, but resulted in deposition of large tonnages in the Pool. However, the solids washed out of the Pool were slightly higher in per cent of organic matter than those which entered, as the incoming total solids contained 32 per cent volatile matter and the outgoing solids contained 35.6 per cent.

The results of the determinations of biochemical oxygen demand showed a reduction of 52.8 per cent from Cass St. to Brandon Bridge. Therefore 47.2 per cent was carried out of the Pool. This indicates that putrescible organic matter was scoured out of the Pool to a greater extent than shown by the record of the total and volatile suspended solids.

Samples were collected and soundings made of the sludge on the bottom of Brandon Pool, before and after the test. Soundings indicated a fill of 2 to 2½ ft., equivalent to about one-half million cubic yards of wet sludge. Analyses showed that the sludge had a higher avidity for oxygen after the test than prior thereto. Therefore the potential ability of the sludge to create odors in the Pool has not been lessened. Throughout the winter the sludge lies dormant because the temperature is too low to generate the foul gases which produce odors.

The level of Brandon Pool at the Dam was lowered one-half foot to induce the flow of 10,000 c.f.s. A further lowering in the Pool level of about one foot on December 7 may have been the cause of a slight increase in the solids discharged from the Pool. However, even on this day 5,680 tons of suspended solids entered the Pool and only 2,861 tons were discharged.

The increased velocity in the Main Channel scoured out a surprisingly large tonnage of sludge. With cleaner bottom conditions in the Main Channel from Chicago to Lockport, it is probable that the oxygen demand at Lockport will be somewhat less than if the test had not been made. The results show that the concentrated 10-day effort carried out of the Main Channel about 245 times as much organic sludge as would normally be transported in one dry-weather winter day with 1,500 c.f.s. diversion, and 94 times as much organic sludge out of Brandon Pool.

During the test some 5,365 tests were made for dissolved oxygen. This indicator of purity was nearly zero at Lockport prior to the test, and increased gradually during the test to a maximum of 10.0 parts per million. The day after the test concluded, 10.7 p.p.m. was found, which quickly dropped to around 1.0 p.p.m. At the lower end of Brandon Pool the dissolved oxygen also increased to a maximum of 10.3 p.p.m. on the last day of the test, and thereafter dropped to an average of 0.9 p.p.m. on December 17. This rapid decrease, together with the observation of gas ebullition from the Pool when samples were collected on December 27, plus the fact of increased deposits of sludge of more putrescible character, leads to the conclusion that with the approach of warm weather, Brandon Pool will again become foul and odorous. The dissolved oxygen at Lockport will certainly drop to zero long before the summer of 1941 unless the diversion of water from Lake Michigan is increased progressively as the temperature of the water increases.

The more putrefactive sludge deposited in Brandon Pool during the test will begin to decompose in the early summer more intensively than the older sludge present at the bottom of the Pool before the test was made. The foul and odorous putrefaction will be concentrated in the Pool unless relieved by diversion of sufficient water from Lake Michigan to maintain at least 1.0 p.p.m. of dissolved oxygen in the water at the lower end of the Pool, as requested in the modified petition of the State of Illinois.

The effect of the test on the Illinois River was measured by samples and analyses at Marseilles, 45 miles below Lockport, and at Chillicothe, 112 miles below. The results showed only a very moderate increase of suspended solids and oxygen demand. The increase of suspended solids at Chillicothe was mostly clay or silt.

THE SANITARY DISTRICT OF CHICAGO.

REPORT ON THE FLUSHING EXPERIMENT AUTHORIZED BY U. S. SUPREME COURT.

DECEMBER 2-12, 1940.

By F. W. Mohlman,
Director of Laboratories.

The flushing experiment authorized by the U. S. Supreme Court started at 12 noon Monday, Dec. 2, 1940, and ended at 12 noon Thursday, Dec. 12, 1940. The average flows in the Main Channel and Des Plaines River, and the diversion from Lake Michigan, from noon to noon for several days before the test, for the ten days of the test, and for several days thereafter, were as follows:

DISCHARGE AND DIVERSION.

	Cubic Feet per Second			
Date 1940 Noon to Noon	Main Channel at Lockport	Metropolitan Pumpage	Diversion from Lake Michigan	Des Plaine River (Enters Belo Lockport
		Before Test		
Nov. 27-28	2,866	1,497	1,369	97
28-29	3,214	1,498	1,716	87
29-30	2,849	1,488	1,361	50
30- 1	2,994	1,432	1,562	75
Dec. 1- 2	2,708	1,450	1,258	70
		During Test		
Dec. 2- 3	10,770	1,539	9,231	75
3- 4	9,828	1,566	8,262	75
4- 5	10,246	1,554	8,692	70
5- 6	9,857	1,550	8,307	67
6- 7	9,645	1,557	8,088	65
7- 8	9,679	1,486	8,193	75
8- 9	9,949	1,498	8,451	98
9-10	9,843	1,565	8,278	112
10-11	9,819	1,553	8,266	127
11-12	10,090	1,551	8,539	155
		After Test		
Dec. 12-13	3,772	1,541	2,231	175
13-14	2,543	1,523	1,020	160
14-15	2,356	1,466	890	135
15-16	4,534	1,545	2,989	115
16-17	3,148	1,637	1,511	90

Note: Des Plaines River enters below Lockport, but above Cass St.

The flow at Cass Street (Joliet) and at Brandon Dam was the sum of the flows from the Main Channel and Des Plaines River.

Samples were collected and analyses made at practically all stations, from noon Nov. 27, 1940, until noon, Dec. 17, 1940. The most important stations were those at Cass St. and at Brandon Bridge, the latter being about a thousand feet downstream from Brandon Dam. Results of analyses at Cass St. showed the condition of the water just above Brandon Pool, and those at Brandon Bridge showed the condition just below the Pool. Samples at Lockport were collected from the Main Channel at the Ninth Street Bridge, some 8,800 feet above the Power House.

Upstream from Lockport, samples were collected in Chicago as follows:

Locks, Mouth of Chicago River
North Branch, Chicago Ave.
South Branch, Eighteenth St.
South Branch, Halsted St.
Main Channel, Damen Ave.
Main Channel, Kedzie St.
Main Channel, Summit

Downstream from Brandon Bridge, samples were collected from the Illinois River at Marseilles and Chillicothe. Nine special samples were collected daily, from Dec. 6 to 17, in Brandon Pool above the Dam, for determination only of dissolved oxygen.

The sampling schedule at the more important stations comprised collection of samples for suspended solids hourly; for dissolved oxygen hourly; for biochemical oxygen and turbidity every four hours. The total number of analyses made was approximately as follows:

Dissolved Oxygen	5,365
Suspended Solids	2,285
B.O.D.	727
Turbidity	573
Sludge Analyses	20
	8,970

SUSPENDED SOLIDS AND TURBIDITY.

As the purpose of the test was to flush sludge out of the Main Channel and Brandon Pool by increasing the velocity, determinations of suspended solids, and especially volatile suspended solids, were of particular importance. Therefore hourly samples were collected at Lockport, Cass St., Brandon Bridge and Marseilles, and at less frequent intervals at Summit, Chillicothe and other stations.

Determinations of turbidity were made at intervals of four hours, or less often. The results are of little significance because the solids transported by the increased velocities were for the most part too coarse to be measured as turbidity, but their actual concentration was shown by the results of suspended solids determinations.

SUSPENDED SOLIDS.

Lockport, Cass St., Brandon Bridge. The results for 24-hour averages, in parts per million, are shown in Tables I, II, and III, and individual hourly results are plotted in Fig. 1 for Cass St. and Brandon Bridge.

Results in tons per 24 hours are shown in Tables IV, V, and VI.

AVERAGE 24-HOUR RESULTS

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER

PARTS PER MILLION

DISSOLVED OXYGEN AND OXYGEN DEMANDS
AND
SUSPENDED SOLIDS

Station Lockport Dates Nov. 27-Dec. 17, 1940

TABLE I.

Date		Hour	Dis-charge Sec. Ft.	Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand 20° C., p.p.m.	Susp. Solids	
						5 Days	Total	Volatile
			Results Before Test					
Nov.	27-28	1 P.M. 12 Noon	2,866	7.0	1.2	14.8	16	8
	28-29		3,214	6.6	0.7	16.4	19	8
	29-30		2,849	6.7	0.5	16.8	17	11
	30- 1		2,994	6.9	0.8	13.0	15	8
Dec.	1- 2		2,708	6.9	0.5	15.5	18	10
			Results During Test					
Dec.	2- 3		10,770	5.0	1.6	55	327	83
	3- 4		9,828	3.5	5.6	59	491	168
	4- 5		10,246	3.5	6.6	46	489	147
	5- 6		9,857	2.5	8.0	35	319	116
	6- 7		9,645	3.0	8.7	32	264	108
	7- 8		9,679	3.0	9.2	27	193	65
	8- 9		9,949	3.5	9.7	17.7	179	53
	9-10		9,843	3.5	9.8	20	172	60
	10-11		9,819	2.5	9.9	21	161	53
	11-12		10,090	3.0	10.0	20	148	47
			Results After Test					
Dec.	12-13		3,772	2.5	10.7	12.5	48	17
	13-14		2,543	2.0	10.2	12.7	19	6
	14-15		2,356	2.5	7.9	15.1	17	8
	15-16		4,534	3.0	3.1	22	39	20
	16-17		3,148	2.5	2.6	18.0	23	13

AVERAGE 24-HOUR RESULTS

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER

PARTS PER MILLION

DISSOLVED OXYGEN AND OXYGEN DEMANDS
AND
SUSPENDED SOLIDS

Station Cass St. Dates Nov. 27-Dec. 17, 1940

TABLE II.

Date		Hour	Discharge Sec. Ft.	Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand 20° C., p.p.m.	Susp. Solids	
						5 Days	Total	Volatile
				Results Before Test				
Nov.	27-28	1 P.M. 12 Noon	2,963	5.7	1.9	13.0	—	—
	28-29		3,301	5.5	0.6	22.0	—	—
	29-30		2,929	6.5	0.6	17.3	21	12
	30- 1		3,069	6.9	0.6	15.6	22	13
Dec.	1- 2		2,778	5.6	1.1	13.4	20	11
				Results During Test				
Dec.	2- 3		10,845	4.0	0.7	59	440	89
	3- 4		9,903	2.0	4.3	61	504	184
	4- 5		10,316	3.5	5.2	47	482	168
	5- 6		9,924	3.0	6.8	34	379	138
	6- 7		9,710	4.3	7.5	31	282	95
	7- 8		9,754	4.0	8.4	26	216	74
	8- 9		10,047	4.5	8.6	17.0	216	71
	9-10		9,955	4.5	8.8	20	198	64
	10-11		9,946	4.5	9.0	21	188	61
	11-12		10,245	5.0	8.9	19.4	177	57
				Results After Test				
Dec.	12-13		3,947	4.5	9.7	12.4	63	25
	13-14		2,703	4.0	10.0	9.2	30	13
	14-15		2,491	4.5	8.6	14.8	28	14
	15-16		4,649	4.5	3.9	18.8	46	24
	16-17		3,238	4.5	2.3	18.5	30	16

AVERAGE 24-HOUR RESULTS

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER

PARTS PER MILLION

DISSOLVED OXYGEN AND OXYGEN DEMANDS

AND

SUSPENDED SOLIDS

Station Brandon Bridge Dates Nov. 27-Dec. 17, 1940

TABLE III.

Date	Hour	Discharge Sec. Ft.	Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand 20° C., p.p.m.	Susp. Solids	
					5 Days	Total	Volatile
			Results Before Test				
ov. 27-28	1 P.M. 12 Noon	2,963	5.9	9.4	8.8	19	12
28-29		3,301	5.9	8.5	11.8	18	11
29-30		2,929	6.5	8.4	15.3	14	10
30- 1		3,069	7.3	8.1	13.5	15	9
ec. 1- 2		2,778	6.3	8.5	11.5	14	7
			Results During Test				
ec. 2- 3		10,845	5.0	8.1	13.9	75	18
3- 4		9,903	2.5	10.3	14.5	65	23
4- 5		10,316	3.0	11.0	16.9	73	24
5- 6		9,924	3.5	11.4	15.4	91	37
6- 7		9,710	4.0	11.4	18.5	79	31
7- 8		9,754	4.0	11.5	22.4	109	37
8- 9		10,047	4.5	11.9	14.3	78	28
9-10		9,955	4.5	12.2	12.6	69	25
10-11		9,946	3.5	12.2	16.1	64	21
11-12		10,245	4.0	12.1	14.9	77	34
			Results After Test				
ec. 12-13		3,947	4.0	12.2	12.0	31	13
13-14		2,703	3.5	12.7	9.2	21	6
14-15		2,491	3.5	12.0	12.1	23	10
15-16		4,649	4.5	9.9	17.9	36	19
16-17		3,238	4.5	8.8	18.7	48	20

AVERAGE 24-HOUR RESULTS

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER

TONS PER 24 HR.

DISSOLVED OXYGEN AND OXYGEN DEMANDS
AND
SUSPENDED SOLIDS

Station Lockport Dates Nov. 27-Dec. 17, 1940

TABLE IV.

Date	Discharge Sec. Ft.	Diss. Oxygen	Tons per 24 Hr. Oxygen Demand 20° C., p.p.m.	Suspended Solids	
			5 Days	Total	Volatile
Results Before Test					
Nov. 27-28	2,866	9.2	114	124	62
28-29	3,214	6.1	142	165	69
29-30	2,849	3.8	130	132	85
30- 1	2,994	6.5	105	121	65
Dec. 1- 2	2,708	3.6	113	131	73
Total	14,631	29.2	604	673	354
Avg.	2,926	5.8	121	135	71
Results During Test					
Dec. 2- 3	10,770	46.4	1,596	9,490	2,408
3- 4	9,828	148.4	1,562	13,000	4,450
4- 5	10,246	182.1	1,269	13,490	4,057
5- 6	9,857	212.5	928	8,470	3,080
6- 7	9,645	226.0	832	6,860	2,810
7- 8	9,679	240.0	704	5,035	1,695
8- 9	9,949	280.0	474	4,800	1,421
9-10	9,843	260.0	531	4,565	1,592
10-11	9,819	262.0	556	4,260	1,401
11-12	10,090	272.0	544	4,020	1,276
Total	99,726	2,109.4	8,996	73,990	24,190
Avg.	9,973	211	900	7,400	2,420
Results After Test					
Dec. 12-13	3,772	108.8	127	478	173
13-14	2,543	70.0	87	130	41
14-15	2,356	50.1	96	108	51
15-16	4,534	37.9	269	476	244 (Rain)
16-17	3,148	22.0	153	195	110
Total, 13-14, 14-15, 16-17	8,047	142.1	336	433	202
Avg. 13-14, 14-15, 16-17	2,682	47.4	112	144	67

AVERAGE 24-HOUR RESULTS

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER

TONS PER 24 HR.

DISSOLVED OXYGEN AND OXYGEN DEMANDS
SUSPENDED SOLIDS

Station Cass St. Dates Nov. 27-Dec. 17, 1940

TABLE V.

Date	Discharge Sec. Ft.	Diss. Oxygen	Tons per 24 Hr.		
			Oxygen Demand 20° C., p.p.m.	Suspended Solids	
			5 Days	Total	Volatile
Results Before Test					
Nov. 27-28	2,963	15.2	104	—	—
28-29	3,301	5.3	195	—	—
29-30	2,929	4.8	137	166	95
30- 1	3,069	5.0	129	182	108
Dec. 1- 2	2,778	8.2	100	150	82
Total	15,040	38.5	665	498	285
Avg.	3,008	7.7	133	166	95
Results During Test					
Dec. 2- 3	10,845	20.5	1,724	12,850	2,600
3- 4	9,903	115	1,612	13,450	4,910
4- 5	10,316	144	1,306	13,400	4,670
5- 6	9,924	182	910	10,145	3,690
6- 7	9,710	197	813	7,400	2,410
7- 8	9,754	221	683	5,680	1,945
8- 9	10,047	233	460	5,850	1,920
9-10	9,955	236	537	5,310	1,717
10-11	9,946	241	563	5,040	1,635
11-12	10,245	245	535	4,885	1,570
Total	100,645	1,834.5	9,143	84,010	27,067
Avg.	10,065	183	914	8,401	2,707
Results After Test					
Dec. 12-13	3,947	103	132	670	266
13-14	2,703	73	67	218	95
14-15	2,491	57.7	99	188	94
15-16	4,649	48.8	236	576	301 (Rain)
16-17	3,238	20.0	162	261	140
Total, 13-14, 14-15, 16-17	8,432	150.7	328	667	329
Avg. 13-14, 14-15, 16-17	2,810	50.2	109	222	110

AVERAGE 24-HOUR RESULTS

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER

TONS PER 24 HR.

DISSOLVED OXYGEN AND OXYGEN DEMANDS

Station Brandon Bridge Dates Nov. 27-Dec. 17, 1940

TABLE VI.

Date	Discharge Sec. Ft.	Diss. Oxygen	Tons per 24 Hr.		
			Oxygen Demand 20° C., p.p.m.	Suspended Solids *	
			5 Days	Total	Volatile
Results Before Test					
Nov. 27-28	2,963	75	70	152	96
28-29	3,301	76	105	160	98
29-30	2,929	66	121	110	79
30- 1	3,069	67	112	124	74
Dec. 1- 2	2,778	64	86	109	52
Total	15,040	348	494	655	399
Avg.	3,008	70	99	131	80
Results During Test					
Dec. 2- 3	10,845	237	406	2,192	526
3- 4	9,903	275	387	1,735	613
4- 5	10,316	306	470	2,030	668
5- 6	9,924	305	412	2,435	990
6- 7	9,710	298	484	2,069	812
7- 8	9,754	302	589	2,861	974
8- 9	10,047	322	387	2,112	758
9-10	9,955	327	338	1,850	670
10-11	9,946	327	431	1,715	563
11-12	10,245	334	412	2,124	938
Total	100,645	3,033	4,316	21,123	7,512
Avg.	10,065	304	432	2,112	751
Results After Test					
Dec. 12-13	3,947	130	128	330	138
13-14	2,702	93	67	153	44
14-15	2,491	80	81	154	67
15-16	4,649	124	225	457	238 (Rain)
16-17	3,238	77	163	419	175
Total, 13-14, 14-15, 16-17	8,432	250	311	726	286
Avg. 13-14, 14-15, 16-17,	2,810	83	104	242	95

AVERAGE 24-HOUR RESULTS

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER

PARTS PER MILLION

DISSOLVED OXYGEN AND OXYGEN DEMANDS
AND
SUSPENDED SOLIDS

Sation Marseilles Dates Nov. 27 to Dec. 17, 1940

TABLE IX.

Date		Hour	Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand 20° C., p.p.m. 5 Days	Susp. Solids* Total	Susp. Solids* Volatile
			Results Before Test				
Nov.	27	1 A.M.-12 Mdn.	6	10.5	4.6	29	6
	28		5	11.0	4.3	25	6
	29		4	11.2	4.3	19	7
	30		5	11.5	3.8	19	7
Dec.	1		5	11.7	4.6	17	5
			Results During Test				
Dec.	2		3	11.4	4.5	86	13
	3		3	10.1	8.0	75	20
	4		5	10.1	7.6	58	13
	5		4	11.6	7.3	53	27
	6		5	12.0	7.3	46	16
	7		5	12.1	7.3	63	17
	8		5	12.0	7.3	57	22
	9		5	12.0	8.1	51	18
	10		5	12.3	7.3	57	16
	11		5	12.3	5.9	53	18
			Results After Test				
Dec.	12		5	12.2	8.5	39	15
	13		4	12.0	7.3	16	5
	14		4	12.1	4.6	14	5
	15		4	12.0		18	8
	16		3	12.3		15	6

* 1 P.M. to 12 Noon.

AVERAGE 24-HOUR RESULTS

THE SANITARY DISTRICT OF CHICAGO
MAIN CHANNEL AND ILLINOIS RIVER

PARTS PER MILLION

DISSOLVED OXYGEN AND OXYGEN DEMANDS
AND
SUSPENDED SOLIDS

Station Chillicothe Dates Nov. 27 to Dec. 17, 1940

TABLE X.

Date	Hour	Temp. C°	Diss. Oxygen p.p.m.	Oxygen Demand 20° C. p.p.m.	Suspended Solid	
				5 Days	Total	Volatil
		Results Before Test				
Nov. 27		4.1	11.9	5.1	—	—
28		3.4	11.9	3.9	25	7
29		3.3	12.1	3.7	32	9
30		3.5	12.0	3.0	23	6
Dec. 1		2.3	12.5	4.5	24	5
		Results During Test				
Dec. 2		2.3	12.6	3.7	26	6
3		0.6	12.9	4.7	34	7
4		1.4	12.7	5.2	73	12
5		1.7	12.8	6.4	59	11
6		2.5	12.2	6.0	49	9
7		3.8	11.5	6.5	61	12
8		3.4	12.1	5.0	52	11
9		3.7	11.8	7.1	47	9
10		3.7	11.7	6.6	55	13
11		3.5	11.6	5.8	39	10
		Results After Test				
Dec. 12		3.8	11.4	5.3	43	10
13		2.8	12.3	4.0	31	7
14		1.7	12.6	3.5	21	6
15		2.2	12.7	2.7	17	5
16		2.1	12.6	3.1	35	8

Dissolved Oxygen and Flow at Lockport

December, 1938, 1939 and 1940

Day	Dissolved Oxygen, P.P.M.			Flow, Cu. Ft. per Second		
Dec.	1938	1939	1940*	1938	1939	1940*
1	4.4	0.2	0.5	4,922	3,279	2,708
2	2.4	—	1.6	5,113	3,348	10,770
3	—	0.1	5.6	6,475	3,059	9,828
4	1.3	0.1	6.6	4,737	3,282	10,246
5	1.1	0.3	8.0	4,763	3,559	9,857
6	2.6	0.8	8.7	5,301	3,184	9,645
7	1.0	0.5	9.2	5,239	3,073	9,679
8	1.0	0.3	9.7	5,146	3,841	9,949
9	0.9	—	9.8	5,133	3,543	9,843
10	—	0.3	9.9	5,144	3,029	9,819
11	0.4	1.1	10.0	5,019	3,293	10,090
12	1.4	1.4	10.7	5,209	3,706	3,772
13	3.2	1.5	10.2	5,467	4,112	2,543
14	2.9	0.6	7.9	5,426	3,746	2,356
15	4.1	1.7	3.1	4,659	3,537	4,534
16	3.5	—	2.6	5,175	3,171	3,148
17	—	0.9	3.7	5,743	3,082	2,795
18	5.7	0.9	3.9	6,030	3,328	2,440
19	6.5	1.7	0.8	6,203	3,244	2,403
20	6.6	1.7	0.2	6,231	3,546	2,375
21	6.9	1.4	—	6,213	4,082	2,190
22	7.5	1.4	0.1	6,223	3,720	2,147
23	6.8	—	—	6,257	3,116	2,217
24	—	—	—	5,271	3,117	2,534
25	—	—	—	5,200	2,956	2,066
26	5.5	1.9	0.2	5,273	3,529	2,322
27	7.2	2.6	0.5	5,605	3,893	2,397
28	7.8	3.5	—	6,313	4,126	2,294
29	7.4	4.5	0.3	5,568	3,787	2,199
30	8.2	—	0.4	5,445	3,367	2,325
31	—	—	—	4,998	3,569	3,399
Avg.	4.3	1.3	4.9	5,469	3,469	4,996

* D.O. and flows from noon to noon through Dec. 16, thereafter midnight to midnight.

TABLE XIX.

DIVERSION TEST
THE SANITARY DISTRICT OF CHICAGO
BIOCHEMICAL OXYGEN DEMAND

	Tons 5-day Period of Test	B.O.D. Per Day
Cass. St.	9,143	914
Brandon Bridge	4,316	432
Reduction	4,827	
Per Ct. Reduction......	52.8	
Per Ct. Transported....	47.2	

Summit, Mouth of River, North Branch, South Branch. Average results of B.O.D. determinations at Summit and upstream stations are shown in Tables XI to XVIII, inclusive. At Summit the sludge deposits were washed out fairly completely during the first five days of the test, and thereafter the B.O.D. dropped to a low average of 13 p.p.m., because of the increased dilution, whereas the B.O.D. had averaged from 30 to 40 p.p.m. prior to the test. At stations above Summit, also, the B.O.D. results were considerably lower during the test than prior thereto.

SLUDGE IN BRANDON POOL

Samples of sludge were collected from the bottom of Brandon Pool before and after the test. The first set of samples was collected on November 1, 1940, and the second set on December 27, 1940. The procedure for sampling sludge from the depths of an Imhoff tank was used, namely, a pitcher pump with a calibrated suction hose extending down into the liquid. The hose was lowered until sludge was encountered, then the pump was operated until the sludge ran uniform in consistency, and the sample was taken. The depth was recorded. Then the hose was lowered farther and pumping continued until the sludge was quite dense and almost refused to flow, when another sample was collected.

During the first test, on November 1, 1940, the iron sounding disc used by the U. S. Engineer Corps was lowered until it came to rest, and the depth measured.

The record of the samplings and soundings is presented in Table XX. Samples were collected at McDonough St., in the center of the Pool opposite the U. S. Moorings, and at the north, center, and south ends of the Dam.

The results for November 1 show that in the Pool, thin sludge was encountered at about 18½ feet depth, thick sludge about 20 ft., and the sounding disc sank to 20½ ft. The thick sludge at 20 ft. depth in the sample at the center of the Dam contained 88.8 per cent moisture. This is a dense sludge in sewage works practice. The disc method of sounding is shown by these results to measure only the depth at which a dense, compact deposit is found, as the heavy disc sinks through the "flocculent active sludge deposits" referred to in the stipulation for the test. In the sample opposite the Moorings, the disc stopped at sludge with 93.7 per cent moisture, but at the south end of the Dam (left of Locks) it sank below 94 per cent moisture sludge, and at McDonough St. it came to rest at 87.3 per cent moisture sludge.

When sludge collections were made at the same stations on December 27, 1940, after the test ended, it was found that the sludge level had not changed at McDonough St., above the Pool in the narrower section, but at the Moorings the level had risen 2 to 2½ ft., at the center of the Dam, it had risen 1 to 1½ ft., and at the left of Locks (South End) it had risen 1½ ft., whereas it had fallen 2 ft. immediately north of the Dam.

TABLE XX.

THE SANITARY DISTRICT OF CHICAGO

SAMPLES OF SLUDGE COLLECTED FROM BRANDON POOL

	November 1, 1940—Before Test			Dec. 27, 1940—After Test	
Location	Clear Water at—Depth	Sludge Samples at Depth	Depth Sounding by U. S. Engrs. Disc	Sludge Samples at—Depth	Remarks
McDonough St.	24½ Ft.	1. 25 Ft.		1. 25 Ft.	Thin Sludge
		2. 25½ Ft.	25½ Ft.	2. 25½ Ft.	Thick Sludge
North of Dam	15½ Ft.	1. 16 Ft.		1. 18 Ft.	Thin Sludge
		2. 16½ Ft.	17 Ft.	2. 18½ Ft.	Thick Sludge
Middle of Dam	18½ Ft.	1. 19 Ft.		1. 18 Ft.	Thin Sludge
		2. 20 Ft.	20 Ft.	2. 18½ Ft.	Thick Sludge
Left of Locks	18 Ft.	1. 18½ Ft.		1. 17 Ft.	Thin Sludge
		2. 19 Ft.	19½ Ft.	2. 17½ Ft.	Thick Sludge
U. S. Moorings	19½ Ft.	1. 20 Ft.		1. 18 Ft.	Thin Sludge
		2. 21 Ft.	21 Ft.	2. 18½ Ft.	Thick Sludge

Samples collected by means of pitcher pump and hose. Depths given are from surface of water.

Considerable gassing, large bubbles. Had trouble holding Tug Gilbert from swinging, due to steady northeast wind.

These results indicate that over most of the Pool the sludge level had risen about 2 ft., except for some scouring action at the north end of the Dam, possibly because of local currents induced at this spot.

This estimate of 2 ft. more sludge introduced into the Pool checks with the tonnage shown by the tests for suspended solids. Table VII shows 62,887 tons (dry weight) of suspended solids deposited in the Pool. The specific gravity of the sludge averaged 1.17 at 88.9 per cent moisture. One ton of sludge containing around 12 per cent solids occupies approximately one cubic yard of space. At 88 per cent moisture, 62,887 tons of dry solids would produce 524,000 tons or cubic yards of wet sludge. The area of the Pool below Mc-

Donough St. is 5,456,000 square feet. A deposit of 524,000 cubic yards would fill this area to a depth of 2.6 ft., or at a lower moisture content of 85 per cent, to 2.0 ft. Considerably more sounding and sampling would be necessary to give accurate data on the amount of sludge deposited in the Pool during the test, but present available data indicate a fill of about 2 to 2½ feet.

Results of determinations of B.O.D. of the sludge are presented in Tables XXI and XXII. A comparison of results before and after the test computed to B.O.D. of dry sludge, total and volatile, is shown in the last two columns of these tables. The results show an increased B.O.D. after the test for all stations except one. However, eight samples out of ten had an increased B.O.D. of the volatile organic matter after the test, as shown below:

B.O.D. PER GRAM OF VOLATILE SOLIDS.

	McDonough St.		North of Dam		Center of Dam		Left of Locks		U. S. Moorings	
Sample	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom
Before	142	114	245	212	280	170	246*	168	222	181
After	154	127	294	273	307	219	287*	197	176	158

* Corrections.

These results indicate that the sludge deposited in the Pool during the test was slightly more putrescible, and not so well stabilized as the surface sludge present in the Pool before the test was made.

TABLE XXI.

THE SANITARY DISTRICT OF CHICAGO

SAMPLES FROM BRANDON POOL BEFORE FLUSHING EXPERIMENT

November 1, 1940

OXYGEN DEMAND OF SLUDGE—BRANDON POOL

		Solids		Volatile		B.O.D.			
Station and Depth (Ft.)	Moisture Per Cent (After Draining)	Per Cent	Gm. Dry	Per Cent	Gm. Dry	P.p.m.	Mg. Oxygen Used	Mg. Oxygen Per Gram Dry Sludge	Mg. Oxygen Per Gram Dry Volatile
McDonough St.									
25	92.4	7.6	0.76	26.6	0.20	2830	28.3	37.3	142
25.5	87.3	12.7	1.27	27.8	0.35	4000	40.0	31.5	114
North of Dam									
16	97.3	2.7	0.27	33.7	0.09	2200	22.0	81.5	245
16.5	95.1	4.9	0.49	33.3	0.16	3400	34.0	69.4	212
Middle of Dam									
19	98.5	1.5	0.15	34.4	0.05	1400	14.0	93.3	280
20	88.8	11.2	1.12	32.8	0.37	6300	63.0	56.2	170
Left of Locks									
18.5	96.0	4.0	0.40	33.2	0.13	3200	32.0	80.0	246
19	94.0	6.0	0.60	32.7	0.20	3350	33.5	55.8	168
U. S. Moorings									
20	95.0	5.0	0.50	34.5	0.18	4000	40.0	80.0	222
21	93.7	6.3	0.63	33.4	0.21	3800	38.0	60.4	181

Weight of Wet Sludge Used = 10 gms.

TABLE XXII.

THE SANITARY DISTRICT OF CHICAGO

SAMPLES FROM BRANDON POOL AFTER FLUSHING EXPERIMENT

December 27, 1940

OXYGEN DEMAND OF SLUDGE—BRANDON POOL

		Solids		Volatile		B.O.D.			
Station and Depth (Ft.)	Moisture Per Cent (Sample as Received)	Per Cent	Gm. Dry	Per Cent	Gm. Dry	P.p.m.	Mg. Oxygen Used	Mg. Oxygen Per Gram Dry Sludge	Mg. Oxygen Per Gram Dry Volatile
McDonough St.									
25	98.2	1.8	0.36*	39.6	0.14*	2150	21.5	59.8	154
25.5	87.9	12.1	1.21	40.4	0.49	6250	62.5	51.6	127
North of Dam									
18	95.1	4.9	0.49	32.0	0.16	4700	47.0	96.0	294
18.5	92.3	7.7	0.77	31.8	0.25	6830	68.3	87.6	273
Middle of Dam									
18	97.4	2.6	0.26	34.5	0.09	2850	28.5	110.0	307
18.5	86.7	13.3	1.33	31.0	0.41	9000	90.0	67.6	219
Left of Locks									
17	96.6	3.4	0.34	34.9	0.12	3450	34.5	101.5	287
17.5	86.6	13.4	1.34	31.7	0.42	8300	83.0	62.0	197
U. S. Moorings									
18	94.7	5.3	0.53	33.0	0.17	3000	30.0	56.6	176
18.5	85.5	14.5	1.45	29.4	0.43	6800	68.0	46.9	158

Wt. of Wet Sludge = 10 gms.

* Wt. of Wet Sludge = 20 gms.

4015 **MOHLMAN EXHIBIT NO. 18.**

THE SANITARY DISTRICT OF CHICAGO

REPORT ON ANALYSES OF SAMPLES FROM MAIN CHANNEL LOCKPORT AND SUMMIT

Month of January, 1938-1941

By F. W. MOHLMAN

Director of Laboratories

At the request of the Master, a report has been prepared on the results of analyses of samples from the Main Channel at Lockport and Summit for the years 1938 to 1941. The tabulations are attached hereto, marked, respectively—

Mohlman Exhibit 18a.	Dissolved Oxygen and B.O.D. at Lockport; January, 1938 and 1941.
Mohlman Exhibit 18b.	Total Discharge at Lockport; January, 1938-1941.
Mohlman Exhibit 18c.	Dissolved Oxygen and B.O.D. at Summit; January, 1938-1941.
Mohlman Exhibit 18d.	Dissolved Oxygen and B.O.D. at Lockport; January, 1938-1941.

4016 The following notes are explanatory of these four exhibits.

The actual conditions at *Lockport* in January, 1941, when compared with January, 1938 show that the dissolved oxygen was far less in 1941 than in 1938, with an average of 7.4 p.p.m. in 1938 and only 0.8 in 1941 (through January 21). The B.O.D. values were approximately the same, with an average of 21.2 p.p.m. in 1938 and 18.9 p.p.m. in 1941.

The great decrease in dissolved oxygen in 1941 was largely due to the longer time of flow from Chicago to Lockport, with the discharge of 2,781 c.f.s. in 1941, as compared with 6,408 in 1938. In 1941, the time from Damen Avenue to Lockport was approximately four days, as compared with about two days in 1938. Therefore, in 1941, the dissolved oxygen was depleted down to an average of 0.8 p.p.m. in spite of the low temperature of the water. This dissolved oxygen content is almost as low as in 1939, but because of the increased operation of the Southwest Plant, the B.O.D. in 1941 (18.9 p.p.m.) was considerably less than in 1939 (28.5 p.p.m.).

The complete data through January 21, 1941, are shown in Mohlman Exhibits 18a, 18b, and 18d for Lockport and Exhibit 18c for Summit, attached hereto. The daily 1941 results are compared with daily results in January in 1938, 1939, and 1940.

The very low dissolved oxygen content in January, 1941 is cause for alarm, with reference to the conditions to be expected a few months hence, when the temperature of the water rises. So far in 1941, the
4017 C.O. results are lower than in 1940, and the B.O.D. is higher, indicating a worse condition in 1941 than in 1940. This is partly explainable by the slightly lower flow at Lockport in 1941 (2,781 c.f.s.) as compared with 2,949 c.f.s. in 1940. The low average in January, 1941 is due to the effort to conserve diversion this winter in preparation for the demands next summer.

The results given herein are actual, from the actual analyses of samples collected at the respective points. Although some of the sludge deposits in the Main Channel were moved down into the Brandon Road Pool during the 10-day tests with 10,000 c.f.s., with the flow reduced again to the low discharge prior to the test, the conditions at Lockport are bad, in fact, the worst of any January on record, except 1939. If the conditions at Lockport are now worse than in January, 1940, Brandon Pool is certain to be worse, because of the sludge deposited therein during the flushing experiment. This disturbing result indicates that the only safe basis for determination of the amount of water needed in 1941 and 1942 to prevent nuisance at Lockport and in Brandon Pool is the "actual" analysis of the water.

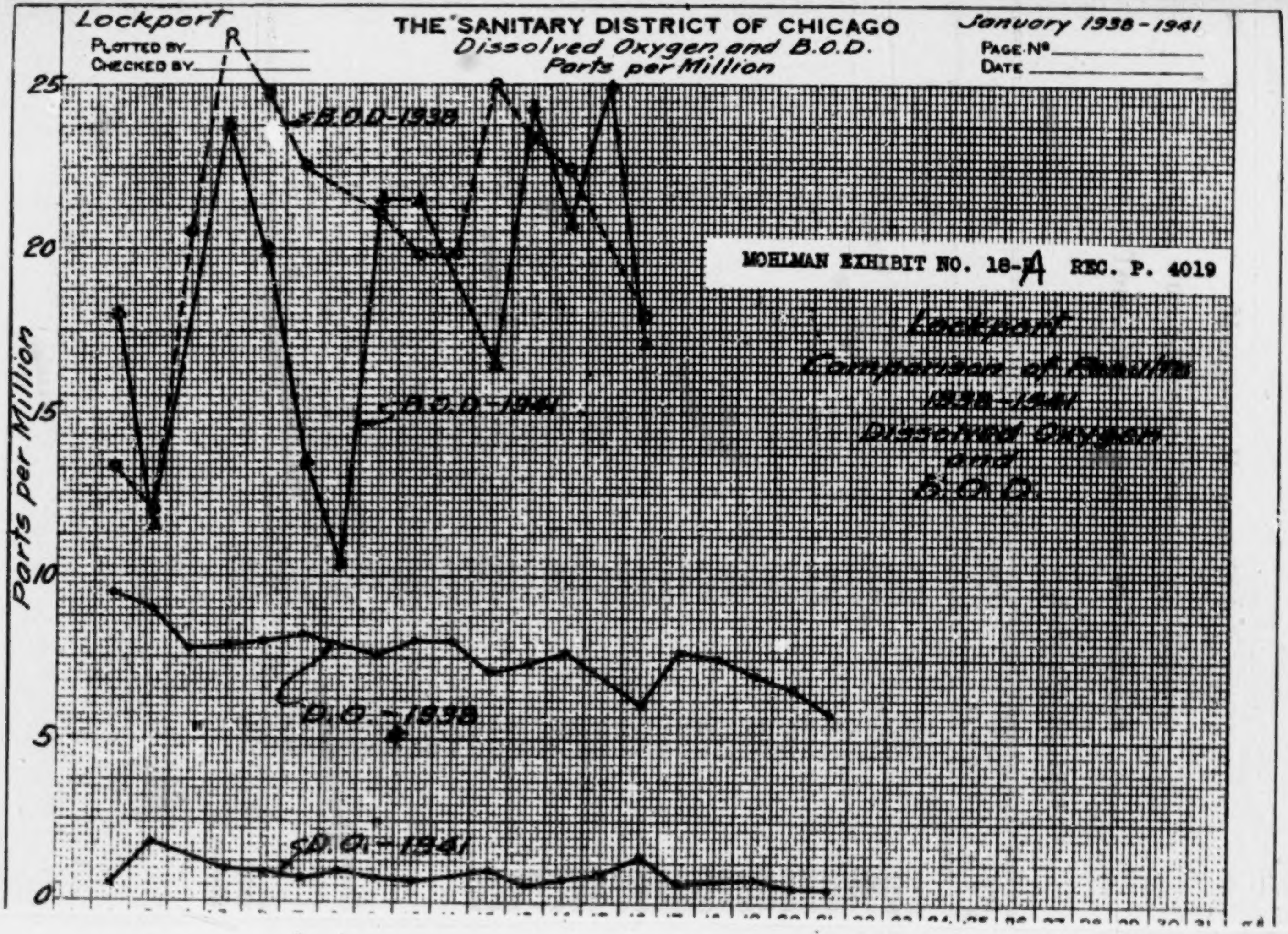
The modified petition of the State of Illinois requests diversion based solely on results of analysis and specifies the maintenance of at least 1.0 part per million of dissolved oxygen in the water of Brandon Pool. In 1938, routine analyses were not made in Brandon Pool, but were made at Lockport, just above the Pool, with the dissolved oxygen and B.O.D. results as follows (Illinois Exhibit 34):

4018

ANALYSES AT LOCKPORT, MAIN CHANNEL
YEAR 1938

Month	Dissolved Oxygen P. P. M.	5-Day B. O. D. P. P. M.
January	7.4	22.6
February	7.0	21.0
March	5.6	19.4
April	3.2	16.3
May	0.5	17.6
June	0.3	18.8
July	0.1	18.5
August	0.1	14.6
September	0.3	13.4
October	0.2	18.6
November	1.2	18.5
December	4.3	21.8
Average	2.5	18.4

Occasional samples in Brandon Pool in the summer of 1938 showed from 0.2 to 1.5 p.p.m. dissolved oxygen, and usually around 1.0 p.p.m. Maintenance of a minimum of 1.0 p.p.m. in 1941 and 1942 would therefore result in conditions approximately the same as in 1938, but better than in 1938 or 1940. It is impossible at this time to compute the specific amount of diversion needed to maintain this standard.



MOHLMAN EXHIBIT NO. 18-A REC. P. 4019

MOHLMAN EXHIBIT 18-b.

THE SANITARY DISTRICT OF CHICAGO

TOTAL DAILY DISCHARGE AT LOCKPORT

January 23, 1941.

Month	1938 C. F. S.	1939 C. F. S.	1940 C. F. S.	1941 C. F. S.
January				
1	6422	2774	2849	3573
2	6197	2674	2849	4196
3	6343	2830	2825	2812
4	6384	4525	2896	2450
5	6497	3952	2930	2327
6	6303	2807	2845	2418
7	6201	2793	2795	2463
8	6180	2872	2900	2331
9	6203	3360	2870	3106
10	6149	3020	2805	3007
11	6218	2759	2786	2326
12	6261	2835	2911	2242
13	6160	2841	2838	2339
14	6131	2854	6100	3496
15	6236	2711	4287	2679
16	6199	2797	3891	2471
17	6067	2711	2876	3188
18	6080	2817	2751	2579
19	6218	2776	2715	2357
20	6157	2817	2553	2344
21	6112	2795	2647	3474
22	6027	2728	2640	3008
23	6055	2739	2673	
24	9132	2788	2661	
25	6976	2751	2672	
26	7035	2693	2812	
27	7060	2815	2704	
28	6376	2751	2531	
29	6150	2672	2542	
30	6886	3302	2607	
31	6235	2695	2641	
Mean	6408	2911	2949	2781 (Jan. 1-22)

MOHLMAN EXHIBIT 18-c.

THE SANITARY DISTRICT OF CHICAGO

MAIN CHANNEL AND ILLINOIS RIVER

DISSOLVED OXYGEN AND OXYGEN DEMANDS

Station—Summit **Dates January, 1938-1941**

Date Jan.	Dissolved Oxygen, P. P. M. 1938	1939	1940	1941		5-day B. O. D., P. P. M. 1938	1939	1940	1941	
2	—	—	8.0	7.1		—	—	18	34	
3	9.5	6.4	6.3	6.1		21.0	26.4	24	47	
4	9.9	6.2	4.5	—		29.6	47.0	21	—	
5	10.2	7.0	4.5	3.6		28.5	29.8	28	26	
6	10.5	5.8	4.4	4.4		35.0	40.1	—	29	
7	9.9	—	6.0	5.2		28.9	—	27	37	
8	—	0.0	5.2	5.1		—	37.1	24	39	
9	10.0	1.1	4.2	5.2		22.6	28.0	25	41	
10	10.4	2.1	2.1	6.1		20.7	42.0	27	36	
11	9.3	1.0	1.4	—		28.1	51.0	23	—	
12	—	0.5	1.4	4.9		—	52.0	32	32	
13	10.3	0.1	—	5.5		—	50.0	—	31	
14	9.6	—	4.1	6.1		28.1	—	35	37	
15	—	0.2	6.2	5.4		—	—	19	40	
16	10.5	0.9	5.0	5.3		25.3	26.0	35	47	
17	10.0	0.8	4.1	5.5		22.9	42.0	30		
18	9.8	0.5	—	—		25.9	47.0	27		
19	9.4	1.0	—	1.0		23.8	47.0	—		
20	9.9	0.3	—	3.2		27.7	52.0	—		
21	9.6	—	4.6	4.6		25.8	—	22		
22	—	0.5	4.8			—	48.0	25		
23	9.7	1.1	5.0			21.9	26.0	20		
24	5.9	2.2	4.9			35.9	53.0	23		
25	10.0	3.9	3.5			26.5	40.0	29		
26	10.3	3.7	2.1			29.0	51.0	25		
27	10.3	2.1	—			30.1	51.0	22		
28	10.3	—	3.0			30.0	—	22		
29	—	3.7	3.7			—	39.0	24		
30	9.1	—	4.2			27.5	—	23		
31	10.0	6.9	3.0			20.4	22.0	27		
					(Jan. 1-21)					
Avg. Jan. 1-17				4.9		26.8	38.9	26	37	(Jan. 1-16)
Avg. Month	9.8	2.4	4.4	—		26.8	40.3	26	—	

Mohlman Exhibit 18-d.

The Sanitary District of Chicago

Main Channel and Illinois River

Dissolved Oxygen and Oxygen Demands

Station—Lockport

Dates January, 1938-1941

Date Jan.	Dissolved Oxygen, P. P. M. 1938	1939	1940	1941	5-day B. O. D., P. P. M. 1938	1939	1940	1941	
2	9.4	4.6	4.7	0.5	13.3	14.0	10.7	18.1	
3	9.0	2.6	5.3	1.8	12.0	15.8	10.3	11.6	
4	7.7	1.4	5.1	—	20.5	18.8	8.9	—	
5	7.8	0.7	3.0	1.0	26.3	24.3	12.2	23.8	
6	7.9	0.2	—	0.9	24.7	26.2	—	19.9	
7	8.2	—	1.8	0.7	22.5	—	14.5	13.5	
8	—	0.2	1.7	0.9	—	24.5	13.3	10.3	
9	7.6	0.1	1.7	0.7	21.1	30.4	13.5	21.6	
10	8.1	0.2	2.1	0.6	19.8	26.6	10.2	21.5	
11	8.0	0.2	0.9	—	19.9	22.5	14.5	—	
12	7.1	0.2	0.4	1.0	25.0	25.4	17.9	16.4	
13	7.3	0.2	—	0.5	23.4	33.6	—	24.3	
14	7.7	—	0.6	0.7	22.3	—	22.4	20.7	
15	—	0.2	1.6	0.8	—	33.8	20.6	25.0	
16	6.1	0.1	2.4	1.4	24.2	38.3	15.7	17.1	
17	7.7	0.2	4.0	0.6	18.0	32.5	18.0		
18	7.5	0.2	1.4	—	21.2	23.4	17.9		
19	7.0	0.2	1.9	0.7	21.3	32.2	15.6		
20	6.6	0.1	—	0.4	22.7	34.4	—		
21	5.8	—	1.1	0.3	24.0	—	17.0		
22	—	0.2	1.0		—	38.1	15.1		
23	5.8	0.1	1.0		21.3	38.1	15.6		
24	6.2	0.4	1.2		30.8	31.8	13.8		
25	3.6	0.2	1.6		31.4	23.0	11.9		
26	7.8	0.3	1.2		27.3	29.9	14.0		
27	8.6	0.2	—		24.1	29.7	—		
28	8.5	—	0.4		24.3	—	17.9		
29	—	0.2	0.5		—	34.0	16.3		
30	7.9	0.1	0.4		25.7	36.4	15.5		
31	7.4	0.5	0.7		20.4	21.7	12.8		
				Jan. 1-21)					
Avg., Jan. 1-16				0.8	21.2	25.7	14.2	18.9	(Jan. 1-16)
Avg. Month	7.4	0.5	1.8	—	22.6	28.5	14.8	18.9	(Month)

MOHLMAN EXHIBIT 20.

THE SANITARY DISTRICT OF CHICAGO

MAIN CHANNEL AND ILLINOIS RIVER

DISSOLVED OXYGEN AND OXYGEN DEMANDS

Station—Lockport

Date—January 1941

Date	Temp. C°	Diss. Oxygen p. p. m.	Oxygen Demand, 20°C., p. p. m.
			5 days
1			
2	7.0	0.5	18.1
3	6.0	1.8	11.6
5	3.5	1.0	23.8
6	3.5	0.9	19.9
7	2.0	0.7	13.5
8	3.0	0.9	10.3
9	3.5	0.7	21.6
10	4.0	0.6	21.5
12	5.5	1.0	16.4
13	5.0	0.5	24.3
14	4.0	0.7	20.7
15	4.0	0.8	25.0
16	4.5	1.4	17.1
17	4.5	0.6	
19	4.0	0.7	22.9
20	4.0	0.4	31.6
21	4.5	0.3	29.9
22	5.0	0.2	30.2
23	5.0	0.4	21.7
24	5.0	0.4	19.1
26	3.0	0.4	30.6
27	4.0	0.2	34.5
28	4.0	0.2	26.7
29	3.5	0.6	15.4
30	4.5	0.2	30.3
31	5.0	0.3	33.3
Average	4.5	0.6	22.9

3666 Pearse Exhibit 1-A.

The Sanitary District of Chicago

Activated Sludge Sewage Treatment Works

Record of Air Used—Cubic Feet Per Gallon of Sewage

Nitrites and Nitrates—p.p.m.

Average for Year 1928-1940

Year	North Side			Calumet			Southwest		
	Air	Nitrite	Nitrate	Air	Nitrite	Nitrate	Air	Nitrite	Nitrate
(a) 1928	0.97	0.2	4.5						
1929	0.80	0.2	5.0						
1930	0.52	0.7	2.0						
1931	0.47	0.4	2.2						
1932	0.44	0.4	3.3						
1933	0.37	0.6	2.7						
1934	0.38	0.3	2.3						
1935	0.36	0.6	1.6						
1936	0.36	0.3	1.0	0.41	0.5	1.3			
1937	0.35	0.3	0.6	0.38	0.4	1.0			
1938	0.35	0.3	1.1	0.36	0.6	1.2			
1939	0.37	0.2	0.7	0.38	0.7	1.9	(b) 0.46	(b) 1.2	(b) 1.2
1940	0.40	0.1	0.6	0.42	0.6	1.1	0.83	0.4	1.3

(a) Period 3 months, October to December, inclusive.
(b) Period 6 months, July to December, inclusive.

3320 Pearse Exhibit 7.

At the present time the U. S. Census figures for 1940 are not completely available. However, certain figures released in the newspapers are indicative of the probable population of The Sanitary District of Chicago in 1940. The following comparisons are of interest, from U. S. Census figures:

Locality	1930	1940	Increase
Chicago	3,376,438	3,384,556	8,118
Cook County	3,982,123	4,049,331	67,208
Sanitary District	3,901,569		

For 25 of the smaller municipalities within the Sanitary District (out of 61) a growth of 4.3 per cent was shown since 1930 by the 1940 census figures given out. Evidently this rate of growth was not sustained by the entire Sanitary District, because this would make a population estimate greater than Cook County, which contains the Sanitary District.

Taking from the 1930 census the population outside of the Sanitary District but within Cook County as 80,554, and assuming this as of 1940, the Sanitary District has in 1940 a population not to exceed 3,968,777, with a growth not exceeding 67,208. This upper limit is considerably under 4,815,000 estimated in 1930.

From the census releases to the press comes the additional information on municipalities within the Sanitary District:

Locality	Growth
Chicago	8,118
Towns over 10,000 (16)	12,688
Towns under 10,000 (12)	3,986
Actual increase from 29 municipalities reporting	24,792

If 24,792 be added to 3,901,569, a low limit of 3,926,361 may be established. It is probable the true population of the Sanitary District lies in between this figure and 3,968,777 and may be taken at 3,966,569, or, in round figures, 3,966,600.

The changes in the populations of the various project areas may be estimated as:

Area	1930 Census	Increase	1940 Estimate
Calumet	319,588	5,500	325,088
North Side	977,024	22.000	999,024
West Side	1,288,763	— 3,500	1,285,263
Southwest	1,311,637	40,031	1,351,668
Miscellaneous	4,557	1,000	5,557
	3,901,569	65,031	3,966,600

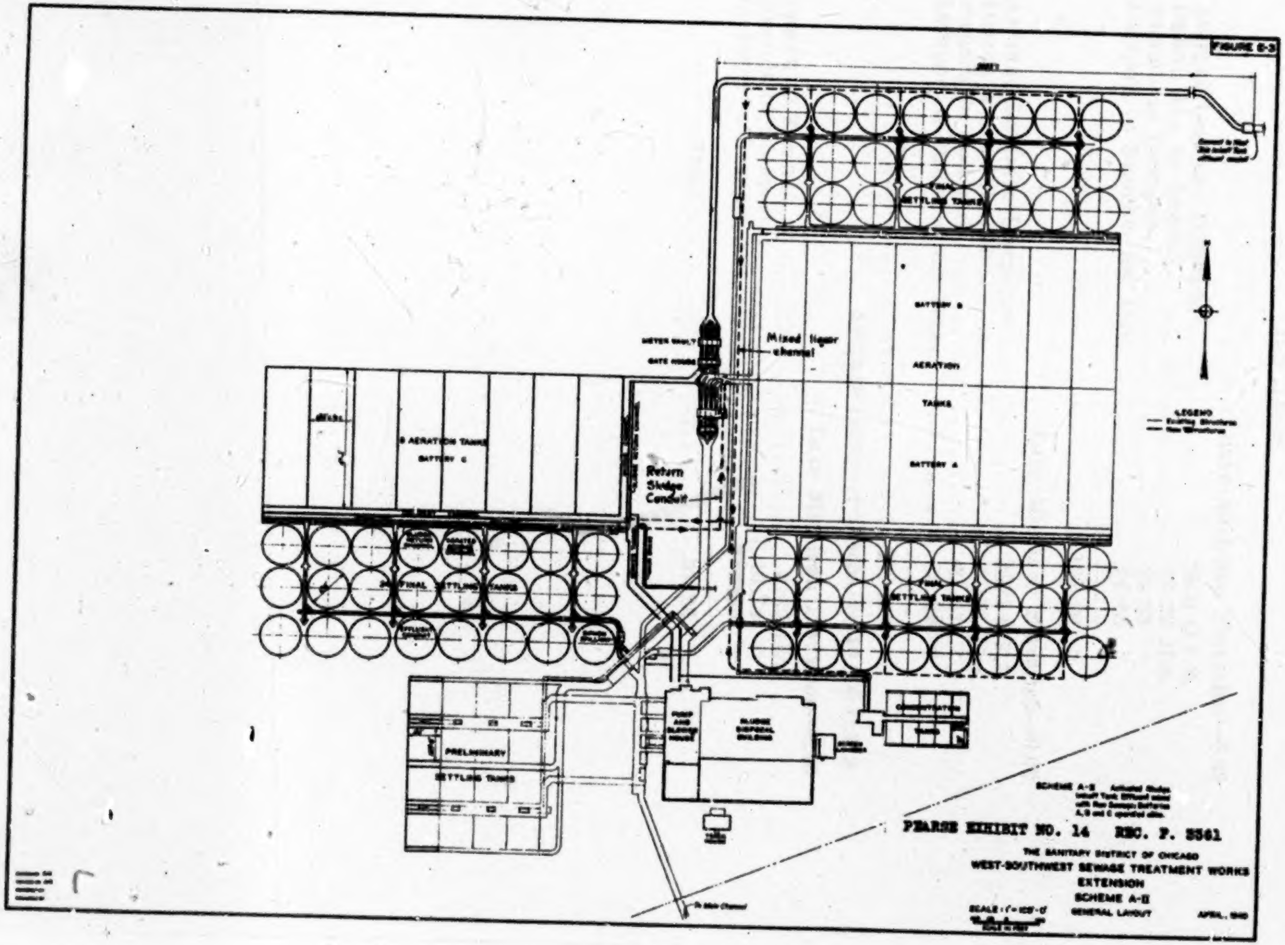


FIGURE 6-3
Mixed liquor channel
METER VAULT
GATE HOUSE
Return Sludge Conduit
BATTERY B
AERATION
TANKS
BATTERY A
FINAL SETTLING TANKS
8 AERATION TANKS
BATTERY C
FINAL SETTLING TANKS
PRELIMINARY
SETTLING TANKS
PUMP AND BLOWER HOUSE
SLUDGE DISPOSAL BUILDING
LEGEND
Existing Structures
New Structures
SCHEME A-II
THE SANITARY DISTRICT OF CHICAGO
WEST-SOUTHWEST SEWAGE TREATMENT WORKS
EXTENSION
SCHEME A-II
GENERAL LAYOUT
SCALE: 1" = 100'-0"
APRIL, 1940

PEARSE EXHIBIT NO. 14 REC. P. 5561

5

2220

Ramey—Exhibit No. 2.

Average Time of Flow—Damen Ave. to Brandon Rd. Dam.

Lake Michigan Elevation—0.60

Average Lockport Discharge	2200	C.F.S.
Damen Ave. to Summit	62:22	Hrs.
Summit to Lockport	78:58	"
Lockport to Brandon Rd. Dam	24:48	"
Total	166:08	"

Lake Michigan Elevation—0.60

Average Lockport Discharge	2800	C.F.S.
Damen Ave. to Summit	37:34	Hrs.
Summit to Lockport	61:13	"
Lockport to Brandon Rd. Dam	19:21	"
Total	118:08	"

Average Lockport Discharge 10,000 C.F.S.

Lake Michigan Elevation—0.60

Damen to Summit	9:32	Hrs.
Summit to Lockport	16:24	"
Lockport to Brandon Rd.	5:39	"
Total	31:35	"

OPPONENT'S EXHIBIT No. 6.

COMMUNICABLE DISEASES.

CASES AND DEATHS IN JOLIET AND WILL COUNTY.
(County Figures include City Figures.)

From Annual Reports of Illinois Department of Public Health.

	1939				1938				1937			
	Will Co.		Joliet		Will Co.		Joliet		Will Co.		Joliet	
	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths
Diptheria					7	2	4	2	8	1	3	1
Encephalitis			0		0	0	0	0	2	1	3	1
Influenza					10	10	2	5	56	43	14	24
Malaria					1	0	5	5	0	0	0	0
Measles					517	1	177	0	9	0	2	0
Meningitis					0	0	0	0	0	0	0	0
Pneumonia					56	46	15	19	113	64	46	29
Poliomyelitis					0	0	0	0	4	1	2	1
Scarlet Fever					535	6	166	5	277	1	107	0
Small Pox					14	0	0	0	3	0	1	0
Tuberculosis					96	45	57	11	111	54	78	15
Typhoid Fever					7	0	1	0	13	0	10	0
Whooping Cough					84	1	29	0	76	1	26	1

2127

	1936				1935				1934			
	Will Co.		Joliet		Will Co.		Joliet		Will Co.		Joliet	
	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths
Diptheria	12	0	3	0	18	2	3	2	18	2	9	1
Encephalitis	0	0	0	0	4	3	1	2	0	0	0	0
Influenza	24	24	14	15	12	23	7	13	15	15	9	6
Malaria	0	0	0	0	0	0	0	0	0	0	0	0
Measles	4	0	3	0	851	6	223	2	195	1	56	0
Meningitis	2	0	0	0	5	3	4	3	1	0	1	0
Pneumonia	63	51	21	24	80	61	30	23	101	86	38	1
Poliomyelitis	1	0	0	0	0	1	0	0	2	0	1	0
Scarlet Fever	79	0	20	0	214	7	69	5	1042	5	395	4
Small Pox	188	1	100	1	1	0	1	0	1	0	1	0
Tuberculosis	80	60	55	21	131	48	82	13	134	62	77	16
Typhoid Fever	24	3	11	3	20	0	10	0	23	1	12	1
Whooping Cough	39	2	5	1	132	7	39	4	63	1	7	0

2128

	1933				1932				1931			
	Will Co.		Joliet		Will Co.		Joliet		Will Co.		Joliet	
	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths	Cases	Dths
Diptheria	25	3	7	0	58	3	38	3	35	3	7	1
Encephalitis	Not Reported				Not Reported				Not Reported			
Influenza	41	30	15	13	86	63	22	32	36	37	17	16
Malaria	7	0	7	0	0	1	0	0	0	0	0	0
Measles	122	1	4	0	11	0	3	0	400	4	82	3
Meningitis	3	2	2	2	1	0	1	0	4	4	3	4
Pneumonia	101	79	39	35	118	81	68	44	118	82	61	43
Poliomyelitis	0	0	0	0	0	0	0	0	2	0	1	0
Scarlet Fever	231	6	91	3	208	10	84	3	190	6	84	3
Small Pox	1	0	0	0	1	0	1	0	31	0	12	0
Tuberculosis	99	48	70	20	141	62	90	22	137	79	79	17
Typhoid Fever	38	7	27	7	33	5	17	1	9	1	5	0
Whooping Cough	5	0	0	0	63	3	29	1	67	3	40	3

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2129

	1930			
	Will Co. Cases	Will Co. Dths	Joliet Cases	Joliet Dths
Diptheria	34	2	21	1
Encephalitis	Not reported			
Influenza	26	27	6	13
Malaria	0	0	0	0
Measles	19	0	11	0
Meningitis	3	0	2	0
Pneumonia	117	74	66	38
Poliomyelitis	1	0	0	0
Scarlet Fever	84	4	41	1
Small Pox	1	0	0	0
Tuberculosis	150	93	103	34
Typhoid Fever	25	3	20	2
Whooping Cough	43	4	18	2

2133

OPPONENT'S EXHIBIT No. 7.

CITY OF JOLIET.
State of Illinois.

January 6, 1940.

Honorable Mayor and City Commissioners,
City of Joliet, Illinois.

GENTLEMEN:

I wish to submit my report for the year ending as of December 31, 1939.

Communicable Cases Reported.

Chicken Pox	28
Diptheria	5
Infantile Paralysis	1
Influenza	6
Measles	1
Pneumonia	31
Scalet Fever	16
Typhoid Fever Pos.	9
Erysipelas	1
Venerial Diseases	63
Tuberculosis	41
Whooping Cough	11
Meningitis	1
Mumps	21
German Measles	1
Miscellaneous Inspections and Complaints	326
Dilapidated Homes Inspected	52
Barber Shops Inspected	167
Restaurants and Hotel Inspections	211

The health department also participated in a Weed, and Rat and Mice Exterminating Campaign, both proving very successful.

Respectfully submitted,

Frank Wedic,
City Sanitarian.

FW:rm

2641 and
2642

Opponent's Exhibit No. 7.

Culture plates were exposed to the air in the vicinity of the Des Plaines River and the Sanitary and Ship Canal from Lockport to Joliet. Ten locations were selected along the banks of the waterway and six locations about seven miles west and six locations about four miles east of the waterway. One plate of nutrient agar and one plate of Sabouraud's were exposed at east location for periods of from 3½ to 4¾ hours on July 16, 1940. After exposure the plates were collected, taken to the laboratory, and incubated for 48 hours at 37.5°C, after which colony counts were made.

Following is a description of the various bacteria together with the time of exposure at each location and results of colony counts:

	Colonies on Agar Plates		Hours of Exposure	Bacterial Forms
	Nutrient	Sabouraud's		
No. 1	100	3	4.63	1-2-4-5-8
No. 2	36	10	4.21	1-8
No. 3	38	6	4.15	1-2-6-8
No. 4	0	3	4.21	8
No. 5	35	30	4.23	1-6-8
No. 6	90	10	4.17	1-6-7-8
No. 7	23	15	3.81	1-5-8
No. 8	52	7	3.77	1-5-8
No. 9	8	5	3.81	1-7-8
No. 10	35	0	3.83	1-8
No. 11	32	11	3.63	1-7-8
No. 12	5	2	3.58	1-8
No. 13	27	5	3.55	1-7-8
No. 14	91	75	3.48	1-7-8
No. 15	5	12	3.51	1-7-8
No. 16	42	7	3.43	1-8
No. 17	0	13	4.83	8
No. 18	27	15	4.85	1-8
No. 19	147	2	4.85	1-3-7-8
No. 20	18	125	4.85	1-7-8
No. 21	overgrown	overgrown	4.91	1-8
No. 22	overgrown	overgrown	4.88	1-8

No. 1	Gram positive rods	(Hay Bacillus)
No. 2	Gram positive rods	(Diptheroid)
No. 3	Gram positive rods	(Streptobacilli)
No. 4	Gram positive cocci	(Staphylococci)
No. 5	Gram positive cocci	(Staphylococci)
No. 6	Gram negative threads	
No. 7	Gram negative rods	
No. 8	Molds	

DESCRIPTION OF LOCATIONS.

1. Plates exposed on window ledge of vacant house overlooking the Des Plaines River on the north side of Jefferson Street, Joliet, at the west end of the Jefferson Street bridge from 10:15 A. M. to 2:53 P. M.

2. Plates exposed on west bank of Des Plaines River south of Jackson Street bridge, Joliet, from 10:45 A. M. to 2:58 P. M.

3. Plates exposed on west bank of Des Plaines River east of factory sidings southeast of Phoenix Mfg. Co. plant, between Joliet and Lockport, from 10:35 A. M. to 3:04 P. M.

4. Plates exposed on top of concrete abutment out-

side rails of bridge approach at west end of 16th Street bridge over the Sanitary and Ship Canal on the south side of 16th Street, Lockport, from 11:00 A. M. to 3:13 P. M.

5. Plates exposed on top of south concrete wall of west approach to bridge over the Sanitary and Ship Canal at 9th Street, Lockport, from 11:08 A. M. to 3:22 P. M.

6. Plates exposed on top of concrete wall just outside of railing on east bank of Sanitary and Ship Canal just south of east end of 9th Street Bridge, Lockport, from 11:10 A. M. to 3:20 P. M.

2643 7. Plates exposed on top of concrete wall just outside of railing on east bank of Sanitary and Ship
2644 Canal just south of east end of 16th Street bridge, Lockport, from 11:25 A. M. to 3:14 P. M.

8. Plates exposed on top of concrete wall at east bank of Des Plaines River at the locks, about one mile south of 16th Street, Lockport, from 11:30 A. M. to 3:16 P. M.

9. Plates exposed on top of concrete wall just north of Cass Street bridge on east side of Des Plaines River at Joliet, from 11:45 A. M. to 3:34 P. M.

10. Plates exposed on roof of cabin of boat tied in the Des Plaines River north of Jefferson Street bridge on the east side of the river from 11:50 A. M. to 3:40 P. M.

11. Plates exposed in depression in earth around the base of a small tree on east bank of Plainfield-W. of Chicago Road beside the first gravel parking space just north of Troy Road, about six miles west of Joliet, from 12:10 A. M. to 3:45 P. M.

12. Plates exposed on top of concrete culvert at

northeast corner of intersection of Plainfield-W. Chicago Road and Black Road, from 12:15 P. M. to 3:50 P. M.

13. Plates exposed on top of concrete culvert at northeast corner of intersection of Plainfield-W. Chicago Road and cross road one mile north of Black Road, from 12:30 P. M. to 3:53 P. M.

14. Plates exposed on top of concrete culvert at northeast corner of intersection of Plainfield-W. Chicago Road and Caton Farm Road (175th St.) from 12:25 P. M. to 3:54 P. M.

15. Plates exposed on stump near northwest corner of intersection of Plainfield-W. Chicago Road and
2645 cross road 2 miles north of Caton Farm Road, opposite Bundy Farm, from 12:26 P. M. to 3:58 P. M.

2646 16. Plates exposed on top of concrete curb at the rear of (east) Johnson's Filling Station, Plainfield, on the east side of Plainfield-W. Chicago Road near Route U. S. 30, from 12:33 P. M. to 3:59 P. M.

17. Plates exposed in Pilcher Park about 3½ miles east of Joliet via Route U. S. 30, on top of sign reading "Short Way Out", from 1:10 P. M. to 6:00 P. M.

18. Plates exposed on stone under tree at southeast corner of intersection of Smith Road and Maple Road, from 1:15 P. M. to 6:05 P. M.

19. Plates exposed on top of concrete abutment on east side of north end of bridge over Spring Creek on road passing north and south through Gaugers, about 4½ miles east of Joliet, from 1:18 P. M. to 6:10 P. M.

20. Plates exposed on step of transformer shed at southeast corner of "Gaugers" road and 175th Street, from 1:23 P. M. to 6:15 P. M.

21. Plates exposed on top of John Lane memorial

stone at northeast corner of intersection of "Gaugers" road and 167th Street, from 1:27 P. M. to 6:22 P. M.

22. Plates exposed on top of concrete culvert at southeast corner of intersection of "Gaugers" road and 159th Street.

2828 OPPONENT'S EXHIBIT No. 10.

SOURCES OF OXYGEN
FOR
PREVENTION OF COMPLAINTS FROM BRANDON POOL.

	Pounds of Oxygen per 24 Hours
1. Increase of diversion from 1500 to 5000 c.f.s.—3500 c.f.s @ 8 p.p.m.	150,000
2. Increased air used to produce 15 p.p.m. of nitrate and nitrite oxygen and 7 p.p.m. of D.O. in effluents of N. Side and Calumet plants 370 M.G.D. @ 18 p.p.m.......	55,000
3. Reaeration at Lockport over properly designed cascades. Average flow 3130 c.f.s. D.O. pickup average of 6¾ p.p.m. .... (equivalent to 265[illegible] c.f.s. of lake water)	113,000
4. Reaeration at Lockport if flow is regulated to equalize D.O. rather than flow. Summer flow = 4200 c.f.s. @ Ave. D.O. pickup of 6¾ p.p.m. =....................	152,000
5. Regulation of annual diversion so as to equalize pounds of oxygen diverted rather than quantity of water. (Ave. D.O. of Lake Michigan water 10.75 p.p.m.) Equivalent to adding during the critical summer months.........	22,000

2832

Opponent's Exhibit No. 11.

Means of Reducing B.O.D. Load to Canal to Ameliorate or Remedy Conditions Complained of at Brandon's Pool.

B.O.D. of Brandon Pool 3130 c.f.s. @ 25 p.p.m. .420,000#/day

Major Sources of B.O.D. during summer of 1940

West Side effluent (June) 391 MGD @ 64 p.p.m.	208,000#	
S.W. Side (June) 365 MGD @ 71 p.p.m.	216,000#	
S.W. & N. Side sludge to canal 19,409 tons of total of 63,643 tons i.e. 30½% of 60% B.O.D. of 3,721,000 population @ .167# B.O.D./cap./day	105,000#	
		529,000#

Ameliorating Measures other than more Oxygen

(Activated sludge plant effluents assumed in oxygen balance)

1. Chemical treatment @ West Side reduce B.O.D. 21 p.p.m.—437 M.G.D. (May) (April 1940 report)	76,000#B.O.D./day
2. Activate entire West Side Imhoff effluent at S.W. plant	200,000#B.O.D./day
3. Eliminate by-passing of part of S.W. flow after primary treatment only	81,000#B.O.D./day
4. Keep all sludge out of canal	105,000#B.O.D./day
5. Chlorination @ 2 p.p.m. B.O.D. removal per p.p.m. of chlorine—6 p.p.m. chlorine on entire canal flow of 3130 c.f.s.	200,000#B.O.D./day
Total B.O.D. reduction by methods other than chlorination and chemical treatment (Nos. 2, 3 & 4)	386,000#/day
Total B.O.D. reduction by methods Nos. 1, 3, 4 & 5)	462,000#/day

2847

OPPONENT'S EXHIBIT No. 12.

ESTIMATED COST OF MEASURES TO ALLEVIATE OR REMEDY CONDITIONS COMPLAINED OF AT BRANDON'S POOL.

Description	Approx. Cost to Install	Approx. Annual Operating Cost	Time Required
1. Increased air used at N. Side and Calumet activated sludge plants			
(a) Based on 5 mos. operation	0	$ 89,000	None
(b) Based on 12 mos. operation	0	216,000	None
2. Chemical treatment at West Side Plant			
(a) Based on 5 mos. operation	$1,300,500	200,000	
(b) Based on 12 mos. operation	1,300,500	481,700	
3. Chlorination of Canal water	360,000	70,000 to 300,000	6 to 9 mos.
4. Aeration of Canal water above Lockport	50,000 to 100,000	0*	3 to 6 mos.
5. Regulate annual diversion to equalize D.O. rather than flow	0	0	None
6. Dredge Brandon Pool to remove more compact solids and some of the lighter material	400,000 to 750,000	0	
7. Flush Brandon Pool to remove active sludge and flocculent material	Nominal	0	1 to 2 wks.
8. Divert all of W. Side effluent to S.W. aeration plant—Conduit	341,300(a)	Nominal	6 months
16 Final settling tanks	1,059,700(a)		9 months
24 Final settling tanks	1,256,200(a)		9 months
Conduits, gatehouses, etc.	610,000(a)		6 months
9. Chlorination of W. Side effluent for 150 days	100,000	105,000	6 to 9 mos.

(a) Part of Permanent program.

* Exclusive of loss of power generated at Lockport @ $1,500/day for 100 days = $150,000.

OPPONENT'S EXHIBIT No. 13.

SOURCES OF D.O. AND B.O.D. OF CANAL AT LOCKPORT.

		1938	1939	1940	1941
1.	Flow (c.f.s.) (June)	6,701	4,227	2,876	3,130
2.	Diversion (Flow—1,650 c.f.s.)	5,051	2,577	1,226	1,480
3.	D.O. in diversion water @ 8 p.p.m.	216,000#	110,000#	52,500#	63,500#
4.	B.O.D. at Lockport (#per 24 hours)	685,000#	860,000#	430,000#	150,000# ±
5.	D.O. at Lockport p.p.m. ave.	.3	0	0	
6.	Excess of B.O.D. in Pool over D.O. in diversion water (Line 4-Line 3)	469,000#	750,000#	379,500#	
7.	Tons of sludge discharged to canal	4,744	4,316	2,287	0
Principal Sources of B.O.D.					
A.	Excess of B.O.D. over D.O. in effluents				
	(a) N. Side Plant	0	0	0	0
	(b) Calumet Plant	3,000	2,500	0	0
B.	North Side sludge @ 60% raw sewage	129,000#	139,000#	65,000#	0
C.	S.W. Side sewage	410,000#	266,000(b)	216,000#	0
D.	S.W. Side sludge to canal after activation	0	0	40,000(c)	0
E.	West Side effluent	115,000#	89,000#	208,000#	169,000(a)
F.	Calumet sludge to canal after activation	23,000#	0	0	0
	Total Principal Sources of B.O.D.	680,000#	496,500#	529,000# (e)	169,000#

(a) 356 M.G.D. @ 57 p.p.m. with Imhoff treatment only.
(b) 160 M.G.D. activated for 21 days taken as half of flow for 70% of month.
(c) 16.4% of total sludge @ 60% of raw sewage.
(d) 130 M.G.D. in oxygen balance.
(e) 410,000# in July.

Opponent's Exhibit No. 14.

Sources of Dissolved Oxygen and B.O.D. at Lockport.

(Ave. of June, July and August.)

		1938	1939	1940	1941	1942
1.	Ave. Flow—(c.f.s.)	6,752	3,336	3,552	3,800	3,800
2.	Diversion (Flow — 1650 c.f.s.)	5,102	1,686	1,902	2,150	2,150
3.	Dissolved Oxygen in diversion water @ 8 p.p.m.	220,000#	72,500#	82,000#	92,000#	92,000#
4.	B.O.D. @ Lockport (# per 24 hrs.)	627,000#	558,000#	389,000#	150,000# ±	100,000# ±
5.	D.O. (p.p.m. average)	.17	0	.03	Present	Present
6.	(This line of Op. Exh. 13 omitted as of no significance)					
7.	Tons of sludge discharged to canal from treatment plants	11,893	15,731	4,468	0	0
Principal Sources of B.O.D. except old sludge						
A.	Excess of B.O.D. over D.O. in effluents (Ave.)					
	(a) N. Side Plant	0	0	0	0	0
	(b) Calumet Plant	4,100#	3,400#	350#	0	0
B.	North Side Sludge @ 60% raw sewage	102,000#	112,000#	39,000#	0	0
C.	South West sewage @ .167# equiv. pop.	410,000#	240,000#	156,300#	0	0
D.	South West sludge to canal after activation	0	102,000#	21,400#	0	0
E.	West Side effluent	106,000#	82,000#	224,000#	160,000#	0
F.	Calumet sludge to canal after activation	23,000#	0	0	0	0
Total—Principal Sources of B.O.D. other than old sludge		645,000#	539,400#	421,050#	169,000#	0

3104 Opponent's Exhibit No. 15.

State Laboratory of Hygiene.

Laboratory of the State Board of Health.

Madison, Wis., October 1, 1940.

Wisconsin, *et al. vs.* Illinois, *et al.,*
1940 Hearings.
Mr. H. H. Naujoks,
c/o Ekern and Meyers,
No. 1 La Salle Street,
Chicago, Illinois.

Dear Mr. Naujoks:

Re: Joliet, Illinois, Air and Water Pollution.

On September 17, 1940, at your request Mr. L. F. Warrick and I visited Joliet, Illinois, and took air and water samples. The results of tests made on these materials constitute the first part of this report. There on September 27 and 28, 1940, at your request for additional data, ~~air~~ and water tests were conducted. Mr. William Z. Fluck, Chemical Engineer for Wisconsin Industrial Hygiene unit, accompanied me on this trip and assisted in the collection of the samples. The second part of this report will cover the results of tests made September 27 and 28, 1940.

Part I.

This part of this report covers work done at Joliet, Illinois on,

(a) Amount and type of bacterial present in the air near the canal and at other points somewhat distant;

(b) Nature of scum present at certain points in and adjacent to the canal waters, scrapings present on the walls at Brandon Locks, and test made on effluent from Texas Company Oil Refinery Plant which flows into a ditch adjacent to canal and enters Brandon Pool about 150 feet below the Lockport Locks.

(a) Bacterial Content of Air (9-17-40).

Culture plates containing both nutrient and malt agar, respectively were exposed for four hour periods at designated points in Joliet, Illinois; Lockport, Illinois; and environs. These plates were then transported to Madison, Wisconsin, and incubated for 24 hours at 37 deg. C. Colony counts were then made using a "Quebec" counter. Stains were made on ten separate colonies from each of the nutrient agar plates and smears examined for bacterial types. No attempt was made to identify species of bacteria which grew on these plates. Satisfactory results were obtained from five different locations as listed below.

3105 2. Joliet, Illinois. Yard at F. C. Burrow's home. Off highway in woods. Plates exposed from 11:50 A. M. to 3:50 P. M., 9-17-40. Height above ground 5 fee. This location is about 1.5 miles air line from Brandon Pool. Day bright. Plates on post top in shade. Light wind. Air temperature = 78 deg. F. noon.

3. Joliet, Illinois. Brandon Locks. In shade on ledge at side of steps. N. side of Control House, 3 feet above ground. Locks Illinois Waterway. Plates exposed, from 12:20 P. M. to 4:20 P. M., 9-17-40. Light wind.

6. Joliet, Illinois. St. Joseph's Hospital. In shade on wall 6 feet about street on North side of building. Two blocks from canal. Plates exposed from 12:56 P. M. to 4:56 P. M., 9-17-40.

12. Joliet, Illinois. In cornfield 1 mile west Stateville prison. Plates placed on cardboard support on ground in sunlight from 2:14 P. M. to 6:19 P. M., 9-17-40.

13. Joliet, Illinois. Guardian Angel home. About three miles from Joliet Court House on U. S. 30. Plates exposed in shade on window ledge from 2:20 P. M. to 6:30 P. M., 9-17-40.

In the following table are given the results of bacterial counts on the plates exposed as above described, the time of exposure, and the morphological type of bacteria found.

Description of plate and location number.	Colonies on Agar plates grown for 48 hours at 37.5 deg. C.				Hours of Exposure	*Bacterial Forms (See key below)
	Nutrient:		Malt			
	Bact.	Molds:	Bact.:	Molds		
No. 2 Burrow's home	66	40	35	50	4.0	6, 4, 1, 2, 10, 15
No. 3 Brandon Locks	63	37	5	110	4.0	7, 1, 15, 2, 5, 10
No. 6 St. Joseph's Hosp.	292	1	110	12	4.0	7, 12, 4, 6, 5, 10
No. 12 Cornfield	560	4	100	Many	4.1	5, 1, 6, 7, 10, 2
No. 13 Guardian Angel Heme	350	0	0	10	4.2	4, 2, 16, 1, 5

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* Key to morphological types.
1.—Gram positive rods (Similar to B. subtilis).
2.—Gram positive rods (Similar to B. flexus).
3.—Gram positive rods (Diphtheroids).
4.—Gram positive cocci (Staphylococci).
5.—Gram positive cocci (Large diplococci).
6.—Gram négative rods (Similar to Escherichia coli).
7.—Gram positive threads.
8.—Gram positive cocci (Streptococci).
9.—Yeast like fungi (Resembling Monilia Candida).
10.—Molds.
12.—Gram positive coccus (Resembling Diplococcus pneumoniae).
13.—Tetragenes (Gram positive cocci).
14.—Sarcina (Gram positive cocci).
15.—Gram positive bacillus (Streptobacillus).
16.—Gram negative threads.
17.—Gram negative bacillus (long rods).
18.—Gram negative cocci (similar to micrococcus catarrhalis).
19.—Small short Gram positive bacillus.

(b) Chemical Tests on Scrapings, Scum, and Effluent.

1. Sample of scrapings removed from canal wall just above upper lock gate at Brandon Locks, Joliet, Illinois. 6.8846 grams of moist scrapings yielded 3.5484 grams of dry substance of which 1.5044 grams was an "oily tar-like" material. This amount of chloroform soluble material represents 21.8 per cent by weight of moist scrapings or 42.3 per cent of the dry weight of the scrapings. Lab. No. 84100.

2. Scum inside future power development pool at Brandon Locks, Joliet, Illinois, near northwest corner. 140 ml. of scum yielded 3.9138 grams of dry oily tar-like material which amounts to 2.79 per cent by weight. Lab. No. 84101. Sample of this "oily tar-like" material saved.

3. Scum in eddy in ditch just below Texas Company Oil Refinery. This ditch serves as the channel to carry the effluent from this plant to a point about 150 feet below the downstream lock gate at Lockport Locks, Illinois Waterway near Lockport, Illinois. 130 ml. of this scum and water yielded 1.74 grams of "oily tar-like" material. This amounts to 1.34 per cent or 13,400 parts per million. Lab. No. 84103. Sample of this "oily tar-like" material saved.

4. Sample of Effluent flowing away from Texas Company Plant, Lockport, Illinois. This sample was collected at 5:00 P. M., September 17, 1940, from near the center of stream flow about 100 feet below wire fence enclosure of plant. The flow borders the canal at and above Lockport, Illinois, and enters Brandon Pool about 150 feet downstream from Lockport Locks.

The sample above referred to yielded the following results:

Oily tar-like extract	58.7 p.p.m.*
Sulphates (SO_4)	62.8 p.p.m.*
Hydrogen Sulphide (H_2S)	0 p.p.m.*
Phenolic Substances	0.2 p.p.m.*
p^H	7.1

Part II.

The following report covers tests made on the air and water at Illinois Waterway at Joliet, Illinois and environs. Certain other air samples were collected at points distant from this location for matter of comparison. The tests cover: 1. Chemical tests for hydrogen sulphide made on the site at which the samples of water were collected. 2. Air Tests for the number of live bacteria per cubic foot of air.

1. Chemical tests on the water collected at three separate points as indicated in the following tabulation yielded the result shown.

(a) Sample of water collected from west side of canal one block above Jefferson Street bridge showed 0.2 parts per million of hydrogen sulphide (H_2S).

3107 (b) Sample of water collected from canal at Brandon Locks just above upper gate on west side showed 0.2 parts per million of hydrogen sulphide (H_2S).

(c) Sample of water collected from canal at Lockport Locks just above upper gate on east side of canal showed 0.1 parts per million of hydrogen sulphide (H_2S).

2. Measured samples of air were examined for bacterial life in accordance with a method described by

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* p.p.m. = parts per million by weight. These results multiplied by 8.33 will convert these results to lbs. per million gallons.

Alexander Hollaender and J. M. Dalla Valle of the United States Public Health Service as described in Public Health Reports, Volume 54, Number 14 of April 7, 1939. In brief, this method makes use of the impingement principle in which a measured amount of air drawn by an ordinary impinger pump through an inverted funnel onto the surface of a sterial Petri plate containing an appropriate solid bacteriologic culture medium. The dust and bacteria are caught on the moist surface of the culture medium. The pump is calibrated to pump a definite volume of air per minute. A six volt motor and storage battery for power and a rubber hose connection of suitable length completes the apparatus and permits samples to be taken at convenient and suitable locations. Incubation of such exposed plates permits growth of bacteria caught and enumeration is then made by use of a "Quebec" type of bacteria colony counter. Three different sized air samples were taken at each sampling point namely, 1, 3, and 5 cu. ft. samples. This permitted enumeration of bacteria from air containing small numbers per cubic foot per minute. The results given are averages of the three determinations at each location selected.

Physical data taken and Location of place at which air samples were collected September 28, 1940.

A. Joliet, Illinois. One block north of Jefferson Street bridge on west side of canal. Air taken on canal structure at point about 5 feet above canal water level. Very slight SE wind. Sun shining. Cloudless sky. Odor slight of tarry waste. Slight oil film on canal water. 9:30 A. M., C. D. S. Time.

B. Joliet, Illinois. North end St. Joseph's Hospital, about one block from canal (west side). Sample taken 4 feet above ground about 15 feet from hospital structure. No air movement perceptible. Ne pedestrians. One car passed on gravel road during collection of 3 cu. ft. sample. 9:50 A. M., C. D. S. Time.

C. Joliet, Illinois. Brandon Locks. West side of upper gate. Samples taken above shelter block about 8 feet above surface of canal water. Lock chamber empty. No boats passed. Sun shining. Tarry odor distinctly perceptible. Light wind from SW. 10:45 A. M., C. D. S. Time.

D. Joliet, Illinois. Brandon dam at west end of proposed power dam. Sun shining. Mild SW wind. Odor negligible. Some oily scum on water below dam. Temperature 70° F. at Lockhouse (outside). 11:25 A. M., C. D. S. Time.

3108 E. Joliet, Illinois. Rural; five miles south of Hy. 66 then one mile west on Town line road to intersection with Ry. Sun shining, slight south wind. No activity on either road or Ry. Cornfield 500 feet NW. Gravel road 100 feet south of sampling point. Ry. 25 feet to west. 12:10 P. M., C. D. S. Time.

F. Joliet, Illinois. About three-fourths of a mile east of Old Joliet Prison. In valley near Ry. and about 200 feet N. of dusty street. Gravel road passed near sampling point. Rather untidy location. Samples taken on concrete foundation and wind from south fairly strong. Truck passed on gravel road during collection of 5 cu. ft. sample of air. 2:05 P. M., C. D. S. Time.

G. Lockport, Illinois. Near stone school house just off Hy. 6 and one block off Main N. and S. street. Four cars passed our location during the nine minute sampling period. Slight south wind. Samples taken in shade four feet above street. 2:30 P. M., C. D. S. Time.

H. Lockport, Illinois. Samples taken on east side of Lockport Locks of canal near upper lock gate. Fairly strong wind. No traffic. Concrete walls and walk. Air temperature 75 deg. F. 3:05 P. M., C. D. S. Time.

I. Romeo, Illinois. At canal just south of canal bridge Air was sampled four feet from ground. Mild breeze from south. No odors perceptible. Sun shining. 5:00 P. M., C. D. S. Time.

J. Plainfield, Illinois. Samples taken along side of Illinois street about 150 feet off Lincoln Hy. at a height of about 4 feet. Very light air movement. Very little traffic. 5:50 P. M., C. D. S. Time.

K. Aurora, Illinois. Taken in small park at entrance to city on Hy. 30 at site of elevated water tank. Flower garden surrounding. No noticeable air movements. Sun still shining. 6:14 P. M., C. D. S. Time.

L. Aurora, Illinois. On park side of street just across street from Park Place Baptist Church. Dusk. Not much traffic. 6:35 P. M., C. D. S. Time.

M. Rochelle, Illinois. Rural samples taken at Junction of Hys. U. S. 30 and 51 north of city where 30 meets 51 from East. This location is in open country. No air movement. Very little dust. Temperature 63 deg. F. 9:00 P. M., C. D. S. Time.

N. Rockford, Illinois. About one-half mile from business district toward N. side on U. S. 51. Four cars per minute passed as samples were being taken about 4 feet from ground on side of street. Location definitely residential. No air movement. Very little dust noticeable. 10:19 P. M., C. D. S. Time.

3109 The above locations for air sampling were selected with care to ascertain the comparative bacterial pollution of the air. No attempt was made to obtain very clean air or very polluted air. At the locks very little choice was to be had of sampling locations.

Table showing number of viable bacteria in air at various locations in and near Joliet, Illinois, as compared with numbers found in rural areas and some other Illinois cities:

Sampling Station	Description of Location (See descriptive matter under Station letter for details)	Bacteria count on Nutrient agar per cubic foot air 24 hrs.—37.5 deg. C.	Morphological Types of Bacteria Present
A	Near Jefferson St. Bridge, Joliet, Ill ..	21.	1, 5, 6, 3, 2, 19, 10
B	St. Joseph's Hospital, Joliet, Ill.	13.	4, 19, 1, 5, 2, 7, 10
C	Brandon Locks, Joliet, Ill.	2.1	17, 5, 18, 19, 6, 15, 1, 10
D	Brandon Dam, Joliet, Ill.	1.9	7, 6, 17, 2, 1, 4, 10
E	Rural, 5 miles S. Joliet, Ill	9.5	7, 6. 2, 1, 19, 10
F	Lockport, Ill. Near school............	47.0	19, 6, 7, 1, 4, 10
G	Lockport Locks, upper gate..........	13.6	7, 4, 19, 6, 8, 10
H	Romeo, Ill., near canal bridge........	1.3	17, 2, 19, 6, 15, 1, 10
I	Plainfield, Ill., side street............	26.1	15, 6, 19, 1, 17, 10
J	Aurora, Ill., Hy. 30.................	14.3	19, 4, 6, 8, 17, 10
K	Aurora, Ill., Baptist Church.........	22.0	7, 6, 5, 3, 19, 10
L	Rural, Jct. U. S. 30 and U. S. 51......	12.0	18, 2, 17, 19, 8, 6, 4, 10
M	Rockford, Ill., U. S. 51 res.	10.3	1, 17, 19, 6, 7, 10
N	....	35.0	1, 15, 6, 18, 2, 19, 10

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* For key to these morphological types kindly refer to page 2 of this report.

3454

Opponent's Exhibit No. 23.

Reported Cases and Deaths from Communicable Diseases.

Will County and State of Illinois.

1930-1939 Inclusive.

From Annual Reports Illinois Department of Public Health.

Rate per 100,000 calculated on basis of 1930 Population.

	WILL COUNTY				STATE TOTAL		
	1930 Pop. 110,732				1930 Pop. 7,620,544		
Year	Cases	Rate	Deaths	Rate	Cases	Rate	Deaths
				Dyphtheria			
1930	34	31.0	2	1.8	6843	89.8	543
1931	35	31.8	3	2.7	5413	71.0	383
1932	58	52.7	3	2.7	3811	50.0	240
1933	25	22.7	3	2.7	1695	22.2	134
1934	18	16.4	2	1.8	2092	27.5	153
1935	18	16.4	2	1.8	2663	35.0	208
1936	12	10.9	0	.0	1784	23.4	170
1937	8	7.3	1	.9	1671	21.9	153
1938	7	6.4	2	1.8	1634	21.4	120
9 Yr. Ave.	24	21.8	2	1.8	3067	40.3	234
1939	8	7.3	1	.9	1446	19.0	118
				Encephaiitis			
1930				Not Reported			
1931				Not Reported			
1932				Not Reported			
1933				Not Reported			
1934	0	.0	0	.0	297	3.9	81
1935	4	3.6	3	2.7	123	1.6	35
1936	0	.0	0	.0	74	1.0	35
1937	2	1.8	1	.9	103	1.4	36
1938	0	.0	0	.0	67	.9	31
5 Yr. Av.	1	.9	1	.9	133	1.7	44
1939	0	.0	0	.0	48	.6	19
				Influenza			
1930	26	23.6	27	24.5	1239	16.3	946
1931	36	32.7	37	33.6	3562	48.7	1673
1932	86	78.2	63	57.3	3908	51.3	1900
1933	41	37.3	30	27.3	2179	28.6	1200
1934	15	13.6	15	13.6	1168	15.3	838
1935	12	10.9	23	20.9	2034	26.7	1255
1936	24	21.9	24	21.9	2065	27.1	1140
1937	56	50.9	43	40.0	3597	47.2	1331
1938	10	9.1	10	9.1	727	9.5	439
9 Yr. Av.	34	30.9	30	27.3	2295	30.1	1191
1939	36	32.7	25	22.7	6445	84.6	967

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Malaria

	WILL COUNTY				STATE TOTAL			
ar	Cases	Rate	Deaths	Rate	Cases	Rate	Deaths	Rate
0	0	.0	0	.0	366	4.8	50	.7
1	0	.0	0	.0	561	7.4	61	.8
2	0	.0	1	.9	130	1.7	39	.5
3	0	.0	0	.0	253	3.3	62	.8
4	0	.0	0	.0	322	4.2	60	.8
5	0	.0	0	.0	378	5.0	71	.9
6	0	.0	0	.0	221	2.9	55	.7
7	0	.0	0	.0	207	2.7	38	.5
8	1	.9	0	.0	263	3.5	35	.5
Yr. Av.	.11	.001	.11	.001	300	3.9	52	.7
9	3	2.7	9	.0	423	5.6	35	.5
				Measles				
0	19	17.3	0	.0	16678	218.9	91	1.2
1	400	363.6	4	3.6	39206	514.5	339	4.4
2	11	10.0	0	.0	16070	210.9	51	.7
3	122	111.0	1	.9	1. 57	162.2	52	.7
4	195	177.3	1	.9	44679	586.3	210	2.8
5	851	778.6	6	5.5	58103	762.5	286	3.8
6	4	3.6	0	.0	1228	16.1	9	.1
7	9	8.2	0	.0	12432	163.1	95	1.2
8	517	470.0	1	.9	88150	1156.8	207	2.7
r. Av.	236	214.5	1.44	.13	32100	421.3	149	2.0
9	4	3.6	0	.0	1269	16.6	3	.0
				Meningitis				
0	3	2.7	0	.0	445	5.8	208	2.7
1	4	3.6	4	3.6	490	6.4	257	3.4
2	1	.9	0	.0	323	4.2	153	2.0
3	3	2.7	2	1.8	557	7.3	208	2.7
4	1	.9	0	.0	337	4.4	119	1.6
5	5	4.5	3	2.7	554	7.3	207	2.7
6	2	1.8	0	.0	436	5.7	175	2.3
7	0	.0	0	.0	226	3.0	95	1.2
8	0	.0	0	.0	91	1.2	21	.3
r. Av.	2	1.8	1	.9	384	5.4	160	2.1
9	0	.0	0	.0	76	1.0	13	.2

3456

	WILL COUNTY				STATE TOTAL			
Year	Cases	Rate	Deaths	Rate	Cases	Rate	Deaths	Rate
				Pneumonia				
1930	117	106.4	24	21.8	11829	155.2	5179	68.0
1931	118	107.3	82	74.2	13467	176.8	5564	73.0
1932	118	107.3	81	73.6	12295	161.3	5332	70.0
1933	101	91.8	79	71.8	10933	143.5	4966	65.2
1934	101	91.8	86	78.2	12423	163.0	5906	78.8
1935	80	72.7	61	55.5	13159	172.7	5984	78.5
1936	63	57.3	51	46.4	15926	209.0	6312	82.8
1937	113	102.7	64	58.2	14970	196.4	5512	72.3
1938	56	51.0	46	41.8	12834	162.5	4595	60.3
9 Yr. Av.	96	87.3	64	58.2	13095	171.8	5485	72.0
1939	85	77.3	35	31.8	13472	176.8	4193	55.0
				Poliomyelitis				
1930	1	.9	0	.0	402	5.3	61	.8
1931	2	1.8	0	.0	700	9.2	102	1.3
1932	0	.0	0	.0	202	2.6	40	.5
1933	0	.0	0	.0	207	2.7	29	.4
1934	2	1.8	0	.0	213	2.8	27	.4
1935	0	.0	1	.9	243	3.2	40	.5
1936	1	.9	0	.0	689	9.0	70	.9
1937	4	3.6	1	.9	779	10.2	90	1.2
1938	0	.0	0	.0	106	1.4	16	.2
9 Yr. Av.	1	.9	.22	.02	393	5.2	52	.7
1939	2	1.8	0	.0	192	2.5	21	.3
				Scarlet Fever				
1930	84	76.4	4	3.6	17352	227.7	306	4.0
1931	190	172.7	6	5.5	16775	220.2	360	4.7
1932	308	189.1	10	9.1	14876	195.2	263	3.5
1933	231	210.0	6	5.5	16604	217.9	277	3.6
1934	1042	947.3	5	4.5	21403	280.9	306	4.0
1935	214	194.5	7	6.4	34727	455.7	407	5.3
1936	79	71.8	0	.0	22451	294.6	233	3.1
1937	277	251.8	1	.9	21525	282.5	160	2.1
1938	535	486.4	6	5.5	18245	239.4	136	1.8
1939	102	92.7	0	.0	15060	197.6	74	1.0
9 Yr. Av.	318	289.1	5	4.5	20440	268.2	272	3.6

457

	WILL COUNTY				STATE TOTAL			
ear	Cases	Rate	Deaths	Rate	Cases	Rate	Deaths	Rate
				Small Pox				
930	1	.9	0	.0	3782	49.6	7	.1
931	31	28.2	0	.0	1766	23.2	4	.1
932	1	.9	0	.0	318	4.2	2	.0
933	1	.9	0	.0	248	3.3	3	.0
934	1	.9	0	.0	88	1.2	0	.0
935	1	.9	0	.0	83	1.1	1	.0
936	188	170.9	1	.9	422	5.5	2	.0
937	3	2.7	0	.0	919	12.1	0	.0
938	14	12.7	0	.0	965	12.7	1	.0
Yr. Av.	27	24.5	.11	.01	935	12.5	2	.03
939	0	.0	0	.0	376	4.9	0	.0
				Tuberculosis				
1930	150	136.4	93	84.5	11179	146.7	4789	62.9
1931	137	124.5	79	71.8	10423	136.8	4799	63.0
1932	141	128.2	62	56.4	10465	137.3	4291	56.3
1933	99	90.0	48	43.6	9193	120.6	4174	54.8
1934	134	121.8	62	56.4	9734	127.7	4124	54.1
1935	131	119.1	48	43.6	9911	130.1	4075	53.5
1936	88	80.0	60	54.5	8506	111.6	4050	53.2
1937	111	100.9	54	49.1	9064	119.0	3995	52.4
1938	96	87.3	45	40.9	8222	107.9	3686	48.4
9 Yr. Av.	121	110.0	61	55.5	9633	126.4	4220	55.4
1939	82	74.5	38	34.5	7752	101.7	3608	47.4
				Typhoid Fever				
1930	25	22.7	3	2.7	960	12.6	154	2.0
1931	9	8.2	1	.9	804	10.6	127	1.7
1932	33	30.0	5	4.5	1045	13.7	125	1.6
1933	38	34.5	7	6.4	770	10.1	113	1.5
1934	23	20.9	1	.9	1085	14.2	131	1.7
1935	20	18.2	0	.0	775	10.2	91	1.2
1936	24	21.8	3	2.7	566	7.4	73	1.0
1937	13	11.8	0	.0	540	7.0	61	.8
1938	7	6.4	0	.0	523	7.0	59	.8
9 Yr. Av.	21	19.1	2	1.8	785	10.3	104	1.4
1939	8	7.3	1	.9	906	11.9	105	1.4

3458

Whooping Cough

	WILL COUNTY				STATE TOTAL			
Year	Cases	Rate	Deaths	Rate	Cases	Rate	Deaths	Rate
1930	43	39.1	4	3.6	8573	112.5	181	2.4
1931	67	60.9	3	2.7	10911	143.2	223	2.9
1932	63	57.3	3	2.7	11786	154.7	228	3.0
1933	5	4.5	0	.0	6439	84.5	81	1.1
1934	63	57.3	1	.9	15352	201.5	307	4.0
1935	132	120.0	7	6.4	11064	145.2	210	2.8
1936	39	38.5	2	1.8	10171	133.5	146	1.9
1937	76	69.1	1	.9	7906	103.8	149	2.0
1938	84	76.4	1	.9	15137	198.6	169	2.2
9 Yr. Av.	64	58.2	2	1.8	10615	139.3	188	2.5
1939	56	50.9	1	.9	12922	169.6	157	2.1

3460

OPPONENT'S EXHIBIT No. 24.

	Will Co. Average compared with State Average—per 100,000				Will County 1939 compared with Will County Average			
	Cases		Deaths		Cases		Deaths	
	Over	Under	Over	Under	Over	Under	Over	Under
Whooping Cough		81.8		.7		7.3		.9
Typhoid	8.8		.4			11.8		.9
Tuberculosis		16.4	.1			27.2		19.0
Small Pox	12.0			.02		24.5		.01
Scarlet Fever	20.9		.9			196.4		4.5
Poliomyelitis		4.3		.68	.9			.02
Pneumonia		84.5		13.8		10.0		26.4
Meningitis		3.6		1.2		1.8		.9
Measles		206.8		1.87		210.0		.13
Malaria		3.899		.699	2.699			.001
Influenza	.8		11.7		1.8			4.6
Encephalitis		.8	.3			.9		.9
Dyphtheria		18.5		1.3		14.5		.9

3985 OPPONENT'S EXHIBIT No. 30.

AMERICAN HOSPITAL ASSOCIATION,
Incorporated 1920
Eighteen East Division Street,
Chicago, Ill.

Bert W. Caldwell, M. D.
Executive Secretary,
December 11, 1940

Mr. H. H. Naujoks,
Ekern and Meyers,
One North La Salle Street,
Chicago, Illinois.

Received
Dec 12 1940
Ekern & Meyers

DEAR MR. NAUJOKS:

Referring to our conversation of the 10th according to the records of the 1940 issue of Hospital Service 3986 in the United States of the American Medical Association there were 9.018.316 patients admitted to general hospitals in the United States during 1939 and that the average census in these hospitals was 307.991. Computed from this the average day stay of patients was 12.46 per patient. From the same source the St. Joseph's Hospital at Joliet, Illinois had 5.561 admissions and an average census of 175 patients which computed in the same manner would show an average days stay of patients of 11.48.

Yours very truly,

W. P. MORRILL,
M. D.

WPM:FSK

4476 HOWSON EXHIBIT No. 6.

ALVORD, BURDICK & HOWSON
John W. Alvord Donald H. Maxwell
Chas. B. Burdick Louis R. Howson
ENGINEERS
Suite 1401 Civic Opera Building
Chicago

Feb. 18, 1941.

Mr. Herbert H. Naujoks,
c/o Hotel Monteleone,
New Orleans, La.

DEAR NAUJOKS:

I have analyzed Pearse's Exhibit 61-A. It seems to me it is just as much in error as the original. On the enclosed table I have shown what I believe to be a proper analysis of this table.

The first three years 1938, 1939 and 1940 have actual recorded data of the C.O.D. at Lockport. This is shown in my line 6. Pearse's table has estimated the total B.O.D. exclusive of sludge (my line 1) and the B.O.D. of the sludge deposits (my line 2). The sum 4477 of these two is the total B.O.D. (my line 3).

Pearse's table also shows the sources of dissolved oxygen (my line 4). Oxygen balance is the difference between the total B.O.D. and the total D.O. That is line 3 minus line 4 shown on my table as line 5. The relation between the actual recorded B.O.D. at Lockport (my line 6) and the excess in line 7. The relation of the actual to the computed has varied from 50% to 61% with a year average of 57%.

If this average of 57% was applied to the critical years of 1941 and 1942 as shows in my line 8, the resulting B.O.D. at the pool would be 233,000 lbs. in

1941, the equivalent of 13.5 p.p.m., and 198,000 lbs. in 1942, the equivalent of 11.5 p.p.m.

Actually, Pearse for 1941 had a per cent of pool B.O.D. to the excess which he computed in the ratio of 361,500 to 409,000 or 88½% and in 1942 the relation of 303,000 to 347,000 or 67½%. Certainly I see no reason why for these two years the percentage of error should have been any greater than in the former
4478 years and certainly actual experience as recorded by analytical data in the past is the best foundation for future predictions. I believe the facts are closely represented by the figures in line 8 of my table and these you will note do not differ a great deal from Pearse's original Exhibit 61-A figures.

Another way to look at it would be to find what Pearse's error amounted to. That is, line 5 minus line 6. These errors were:

1938	405,300 lbs.
1939	559,800
1940	262,800
3 yr. Ave.	409,300

While the variation will be somewhat less than these three years would indicate due to partial satisfaction of the oxygen demand, there will certainly be a material credit for reaeration in any period in the future and that Mr. Pearse has wholly ignored. There is much discussion of reaeration in part 3, appendix 1 of the 1925 investigation.

Yours very truly,
Alvord, Burdick & Howson,
By L. R. Howson,

LEH:VB

Andrew Exhibit No. 1

Respectfully submitted,

George F. Barrett,
Attorney General of the State of Illinois,

John E. Martin,
Attorney General of Wisconsin,

J. A. A. Burnquist,
Attorney General of Minnesota,

Thomas J. Herbert,
Attorney General of Ohio,

Claude T. Reno,
Attorney General of Pennsylvania,

Harrington Adams,
Deputy Atty. General of Pennsylvania,

Herbert J. Rushton,
Attorney General of Michigan,

James W. Williams,
Asst. Attorney General of Michigan,

John J. Bennett, Jr.,
Attorney General of New York,

Timothy F. Cohan,
Asst. Attorney General of New York,

Herbert H. Naujoks,
Special Assistant to the Attorneys General.

O.T. 1930 ORIGINAL NOS.6,10 & 11,

Office Supreme Court, U. S.
FILED
JUL 1[illegible] 1922
WM. R. STANSBUR
CLERK

IN THE

Supreme Court of the United States

October Term, [redacted] 1922

No. ..[redacted] 7

In Equity

STATE OF WISCONSIN,
Complainant,

v.

STATE OF ILLINOIS and
SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION FOR LEAVE TO FILE BILL OF COMPLAINT

WILLIAM J. MORGAN,
Attorney General of Wisconsin.

RALPH M. HOYT,
Deputy Attorney General of Wisconsin.
Solicitors for Complainant.

BLIED PRINTING COMPANY, MADISON, WIS.

IN THE

Supreme Court of the United States

October Term, 1921

No. .... Original

In Equity

STATE OF WISCONSIN,

Complainant,

v.

STATE OF ILLINOIS and
SANITARY DISTRICT OF CHICAGO,

Defendants.

MOTION FOR LEAVE TO FILE BILL OF COMPLAINT

Now comes the State of Wisconsin, by its solicitors, William J. Morgan, Attorney General of said State, and Ralph M. Hoyt, Deputy Attorney General of said State, and moves the Court for leave to file the bill of complaint herewith exhibited in a controversy which has arisen between the State of Wisconsin, the complainant therein, and the State of Illinois and the Sanitary District of Chicago, the defendants therein, concerning the obstruction by said defendants of the navigable capacity of certain waterways of the United States in violation of the legal rights of the complainant and its citizens, and further moves that the proper process directed to the defendants may be issued in said action.

William J. Morgan

Attorney General of Wisconsin.

Ralph M. Hoyt

Deputy Attorney General of Wisconsin.
Solicitors for Complainant.

FILE COPY

Office Supreme Court, U. S.
FILED
JUL 14 1922
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

October Term, 1921

No. ~~83~~ ~~70~~ 18 Original 7

6

In Equity

STATE OF WISCONSIN,
Complainant,
v.
STATE OF ILLINOIS and
SANITARY DISTRICT OF CHICAGO,
Defendants.

BILL OF COMPLAINT

WILLIAM J. MORGAN,
Attorney General of Wisconsin.

RALPH M. HOYT,
Deputy Attorney General of Wisconsin.
Solicitors for Complainant.

BLIED PRINTING COMPANY, MADISON, WIS.

4

IN THE

Supreme Court of the United States

October Term, 1921

No. .... Original

In Equity

STATE OF WISCONSIN,

Complainant,

v.

STATE OF ILLINOIS and
SANITARY DISTRICT OF CHICAGO,

Defendants.

BILL OF COMPLAINT

To The Honorable, the Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of Wisconsin, one of the United States of America, by its solicitors, William J. Morgan, Attorney General of said State, and Ralph M. Hoyt, Deputy Attorney General of said State, brings this bill of complaint against the State of Illinois and the Sanitary District of Chicago, and your orator complains and alleges:

1. The State of Wisconsin is one of the States of the United States of America, and this action is brought on its behalf pursuant to resolutions adopted severally by the two houses of its legislature at the regular sesion thereof held in the year 1921.

2. The defendant, State of Illinois, is also one of the States of the United States of America, and the defendant, Sanitary District of Chicago, is a public corporation organized and existing under and by virtue of the laws of the said State of Illinois and is a citizen of said last named State.

3. This action is brought in the Supreme Court of the United States in the exercise of the original jurisdiction of said Court, on the ground that it is an action in equity relating to a controversy between two States of the United States and also between a State of the United States and a citizen of another State.

4. The State of Wisconsin has approximately 350 miles of shore line along Lake Michigan, and included in the said shore line are thirteen harbors with facilities for the loading and unloading of vessels navigating the said Lake Michigan and the other Great Lakes. The said harbors are as follows: Milwaukee, Manitowoc, Green Bay, Sheboygan Marinette, Racine, Kenosha, Port Washington, Kewaunee, Algoma and Sturgeon Bay. The total amount of freight received at and shipped from the said thirteen harbors during the year 1920, exclusive of freight received or shipped by carferry, was in excess of 6,400,000 tons.

5. The State of Illinois has approximately 60

miles of shore line along Lake Michigan, comprising the eastern boundary of the counties of Lake and Cook in said State. Up to the year 1900, a natural stream of water called the Chicago River flowed through said Lake and Cook counties, one branch in a northerly direction and the other in a southerly direction, and emptied into Lake Michigan at a point in the city of Chicago.

6. In the year 1889 the legislature of the State of Illinois enacted a statute entitled "An act to create sanitary districts and remove obstructions in the Des Plaines and Illinois Rivers", approved May 29th, 1889 and published in the Laws of Illinois for the year 1889 commencing at page 186; which act authorized the organization of public corporations to be known as sanitary districts, with power, among other things, to construct, maintain and operate drainage canals or channels for the disposal of drainage and sewage. By sections 23 and 24 of the said act, it was further provided as follows, to-wit:

> "Sec. 23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers, such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such

rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water. If the population of the district drained into such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district costructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel. * * *

"Sec. 24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the Des Plaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes."

7. In November and December of the year 1889, defendant, the Sanitary District of Chicago, was organized as a sanitary district under the act of 1889 hereinbefore referred to, and has since continuously existed as such sanitary district under the said act of 1889 and the acts amenda-

tory thereof and supplementary thereto. At the time of its organization said defendant district consisted of a territory about 185 square miles in area. By successive acts of the legislature of Illinois the area of said defendant district has been increased from time to time, and as your orator is informed and verily believes and therefore avers its area is now approximately 395 square miles, extending from the Illinois-Indiana State line on the south and east to the northerly boundary of Cook county on the north, with about 33 miles of frontage on Lake Michigan, and comprises the entire city of Chicago together with large areas of land to the south, west and north of said city.

8. On or about the 3rd day of September 1892, defendant Sanitary District of Chicago, acting as a subordinate agency of the defendant, State of Illinois, pursuant to the act of 1889 hereinbefore referred to, commenced the construction of a canal or channel commencing at a point in the west fork of the south branch of the Chicago river about 6 miles above the mouth of said river, and extending in a general westerly direction for a distance of about 32 miles to a point near the city of Joliet, Illinois. At its westerly terminus said canal was made to connect with the Des Plaines river, a stream flowing in a westerly and southwesterly direction and forming a tributary of the Illinois river, which latter river in turn flows in a westerly and southwesterly direction and forms a tributary of the Mississippi river.

9. In the construction of said canal it was at all times the plan of the defendant, State of Illinois, and the defendant, Sanitary District of Chicago, that the said canal should be used as a passage-way for the sewage of the territory comprising the Sanitary District of Chicago, to the end that such sewage might be carried down the said canal into the Des Plaines and Illinois rivers; and in order to accomplish the said purpose it was the intention of said defendants at and prior to the commencement of the construction of said canal to divert from Lake Michigan, and pass through the said canal, such amounts of water as might be deemed by said defendants to be necessary for the proper dilution of the said sewage and its propulsion through the canal and the Des Plaines and Illinois rivers. In pursuance of such intention, and prior to the completion of said canal, the legislature of the defendant State of Illinois enacted in the year 1895 an amendment to section 20 of the act of 1889 hereinbefore referred to, which amendment is published in the Laws of Illinois for the year 1895 commencing at page 168 thereof, and provides that any sanitary district organized under the provisions of the act of 1889 and maintaining a channel which causes the discharge of sewage into or through any river beyond the limits of such district, "shall, at the time any sewerage is turned into or through any such channel or channels, turn into such channel or channels not less than 20,000 cubic feet of water per minute for every 100,000 inhabitants of said

district, and shall thereafter maintain the flow of such quantity of water."

10. Upon the completion of the said canal, the defendant, Sanitary District of Chicago, in compliance with section 27 of the said act of 1889, applied to the Governor of the State of Illinois for authority to commence the use of said canal, and such authority was granted by the said governor on behalf of the defendant State of Illinois, and thereupon, on or about the second day of January, 1900, said defendant District commenced the diversion of water from Lake Michigan into the Chicago river, and thence into and through the said canal, in such amounts and at such velocity as to reverse the flow of the Chicago river and create a steady and uninterrupted flow of water, from said day down to the present time, from Lake Michigan through the Chicago river to the said canal, thence through the said canal to the Des Plaines river near Joliet, and thence down the Des Plaines and Illinois rivers to the Mississippi river.

11. The primary object and purpose of the act of 1889 hereinbefore referred to, as said act was construed by the highest court of the State of Illinois in the case of *People v. Nelson*, 133 Ill. 565, 27 N. E. 217, and *Beidler v. Sanitary District of Chicago*, 211 Ill. 628, 71 N. E. 1118, was to provide a method of disposing of the sewage of the city of Chicago and contiguous territory, and the canal constructed by the defendant district as hereinbefore described has been continuously used for such purpose since the month of January, 1900. By the terms of the act of 1895 referred to in

paragraph 9 hereof, defendant State of Illinois has undertaken to make it the legal duty of the defendant, Sanitary District of Chicago, to pass water through the said canal at the rate of 20,000 cubic feet per minute, or 333 1-3 cubic feet per second, for every 100,000 inhabitants of the territory composing the Sanitary District of Chicago. At the time of the passage of said act of 1895, and at all times since, it was well known to the legislature of the State of Illinois and to the officers of the defendant Sanitary District of Chicago, that the only source from which water in such quantities are required by said act could be obtained was by the diversion of water from Lake Michigan, and it was at all of said times the intention of said legislature that the duty which it sought to impose upon the defendant District by the said act of 1895 should be performed by means of such diversion. According to the census of 1920, the population of the Chicago Sanitary District was 2,963,090 in that year, and as your orator is informed and verily believes and therefore avers, the population of said district is now in excess of said number, so that the effect of the said act of 1895 is to direct the defendant, Sanitary District of Chicago, to divert water from Lake Michigan at the present time at the rate of not less than 9,876 cubic feet per second.

12. Subsequent to the opening of the said canal, and in the year 1903, the defendant, State of Illinois, by an act of its legislature approved May 14th, 1903, and published in the Laws of Illinois for the year 1903 commencing on page 113, under-

took to authorize the defendant, Sanitary District of Chicago, to construct and operate a plant for the generation of electrical energy by hydraulic power derived from the water passing from Lake Michigan through the said canal. The provisions of said act with reference to said subject are as follows, to-wit:

> "Sec. 5. That the said sanitary district of Chicago is hereby authorized to construct all such dams, water-wheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now, or hereafter, constructed by said district.
>
> "Sec. 6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy, and shall be transmitted to the various cities, villages and towns within said sanitary district, or adjacent to the main channel of said sanitary district, and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said sanitary district: *Provided, however,* that it shall be the duty of said sanitary district to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said sanitary district."

13. Under and by virtue of the authority attempted to be conferred on the defendant District by the defendant State of Illinois in said act of 1903, said District constructed and placed in operation a hydro-electric power plant at Lockport, near the western terminus of the said canal, and has continuously operated the same since its completion in the month of November, 1907. The said power plant is capable of developing in excess of 36,000 horsepower of electrical energy and does in fact develop and generate, as your orator is informed and verily believes and therefore avers, in excess of 20,000 horsepower continuously throughout the year. The electrical energy thus generated is mainly transmitted to the city of Chicago and there sold for municipal and commercial purposes, and, as your orator is informed and verily believes and therefore avers, the operations of said plant since the year 1907 have produced many millions of dollars of gross revenue to the defendant Sanitary District of Chicago and have earned for the said District many millions of dollars of profits over and above the cost of operating the said plant, including proper allowances for depreciation and a reasonable return upon the investment therein.

14. Since the completion of said hydro-electric development near the western terminus of said canal, the object and purpose of the defendants in the operation of the said canal and in the diversion of water from Lake Michigan through the same has been and now is two-fold, to-wit: the disposition of the sewage of the defendant Sanitary

District of Chicago, and the generation and sale of electrical energy.

15. According to the reports of the engineers of the defendant, Sanitary District of Chicago, the yearly mean amount of water passing through the said canal at its westerly terminus, practically all of which is water diverted from Lake Michigan, is as follows for the years 1900 to 1917, inclusive:

Year	Cubic Feet per Second	Year	Cubic Feet per Second
1900	2,900	1909	2,766
1901	4,046	1910	3,458
1902	4,302	1911	6,445
1903	4,971	1912	6,424
1904	4,793	1913	7,191
1905	4,480	1914	7,105
1906	4,473	1915	6,971
1907	5,116	1916	7,325
1908	4,421	1917	7,786

—which figures, as your orator is informed and believes and therefore avers, are based on methods of calculation which result in very considerably underestimating the actual amounts of flow through the canal. Your orator is informed and verily believes and therefore avers that the actual mean diversion of water from Lake Michigan through said canal for the year 1917 was about 8,800 cubic feet per second, and that the mean annual flow through the canal during the years 1918, 1919, 1920 and 1921, and the mean monthly flow for the first four months of the year

1922, has been in excess of 8,800 cubic feet per second.

16. All of the water diverted from Lake Michigan by the defendants in the manner hereinbefore set forth is carried into the Mississippi valley and hence is permanently abstracted from the Great Lakes system. As the result of such diversion, the mean level of the water in Lakes Michigan, Huron, Erie and Ontario and in the various waterways connecting said lakes, and in the St. Lawrence River above tide-water, has been lowered not less than six inches below the level that would exist in said lakes and waterways in the absence of such diversion; and as the amount of diversion in cubic feet per second becomes greater, the amount of lowering of the level of said lakes and waterways increases in proportion.

17. At no time during the period of at least six years last past has it been necessary for the protection of the health of the people of defendant district, or for any other purpose, that the sewage of the Sanitary District of Chicago be disposed of by means of the said canal. On the contrary, it has been entirely feasible during all of said period, and is now feasible, for said District to adopt and use scientific methods of sewage disposal, such as are in practical and successful operation in many large cities throughout the world, which would involve no permanent diversion of water from Lake Michigan and no pollution of the waters of said lake.

18. The lowering of the level of Lake Michi-

gan, as described in paragraph 16 hereof, has seriously diminished the utility of the ports of Wisconsin located on said lake and enumerated in paragraph 4 hereof, in that it has reduced by at least six inches in each of said ports the draft of vessels which can be accommodated therein for loading and unloading. Over eighty per cent. of the tonnage of freight received at the said ports consists of coal which is shipped in from the eastern States and which, except for the amount consumed at the said ports themselves, is thence carried by rail to a large number of cities, villages and towns in the State of Wisconsin and in other states to the west of Wisconsin, and constitutes the principal source of supply of coal for the State of Wisconsin in its proprietary capacity, as owner of many public buildings and institutions, and for many thousands of individuals and industrial plants located in said State. The said coal is brought to the said ports in vessels of a type peculiar to the Great Lakes, known as bulk freighters, having an enormous carrying capacity and capable of being operated at very low rates of freight when loaded to maximum capacity; but for every inch of their normal draft which said vessels are unable to utilize, their cargo-carrying capacity is reduced by many tons, and the resulting increase in freight cost per ton becomes and is a burden upon the State of Wisconsin in its proprietary capacity and upon many thousands of the people of said state. The only method that lies within the power of said state to relieve itself and its people of the said burden is by accepting the alternative burden of dredging its said harbors to a sufficient additional depth to offset the effect of defendants' acts; but such dredging if undertaken would necessitate the expenditure of large sums of money, not once only but year after year, on account of the constant tendency of the dredged lake bed to become filled in and restored to its natural level.

19. In addition to the Wisconsin ports hereinbefore enumerated, located on the shore of Lake Michigan, there are a large number of ports located on the shore of Lake Michigan in the States of Illinois, Indiana and Michigan, on Lake Huron in the State of Michigan and the Dominion of Canada, on Lake Erie in the States of Michigan, Ohio, Pennsylvania and New York and the Dominion of Canada, and on Lake Ontario in the State of New York and the Dominion of Canada. The lowering of the level of all of said lakes by the acts of defendants, as above set forth, has lessened the utility of all of the ports on the said lakes, and of the waterways connecting said lakes, in the same manner as hereinbefore described with reference to the Wisconsin ports on Lake Michigan, with the result that in the conduct of transportation between Wisconsin ports and the said ports in other States, the possible loading of vessels bound to or from such other ports is reduced by many tons, for each trip of each vessel to or from a port whose harbor is not deep enough to accommodate the maximum draft of such vessel, below the loading which would be possible if the levels of said

lakes had not been lowered by the acts of the defendants. Such lowering of the water levels in ports of other States and in the said connecting waterways affects not only the traffic between said States and the Lake Michigan ports of Wisconsin, but also the traffic between said States and the Wisconsin ports of Superior, Ashland and Washburn located on Lake Superior. The commerce between the three Wisconsin ports last named and the various ports on Lakes Michigan, Huron, Erie and Ontario amounts to many millions of tons each year, the principal commodities thus transported being iron ore, coal and grain. As your relator is informed and verily believes, the total annual loss due to the lowered carrying capacity of lake vessels and chargeable directly to the diversion of water by the defendants, amounts to many millions of dollars, and a large part of said loss falls upon the people of the State of Wisconsin and is widely distributed through all parts of said State.

20. In addition to lowering the levels of Lakes Michigan, Huron, Erie and Ontario in the manner hereinbefore set forth, the diversion of water by the defendants has seriously impaired the navigability of the Chicago River, a navigable waterway of the United States, by introducing into said river a current so swift as to make the navigation thereof exceedingly difficult and dangerous. Prior to the commencement of said diversion of water, the Chicago River constituted an inner harbor of great importance, handling between six and eight millions of tons of inbound and outbound freight each

year, a considerable portion of which constituted commerce between citizens of Wisconsin and citizens of Illinois; but since the commencement of said diversion, the commerce of said harbor has become reduced to less than one-third of the said tonnage, largely because of the difficulties of navigation resulting from the said diversion; and, in addition, certain portions of the Chicago river have become entirely closed up by reason of the said diversion and are no longer accessible to the commerce of the people of Wisconsin.

21. Prior to the construction of the said canal by the defendant Sanitary District of Chicago, the Chicago, Des Plaines and Illinois rivers constituted a navigable waterway of the United States extending from Lake Michigan on the east to the Mississippi river on the west. In the construction of the said canal, the defendant District modified and altered the said navigable waterway by diverting portions of the Des Plaines river from its original bed, and in the operation of said canal said defendant has further modified and rendered the said natural waterway practically inaccessible from Lake Michigan by causing the west fork of the south branch of the Chicago river, west of the commencement of said canal, to become filled up and useless. As a result of said acts of said defendant, the said canal has become in fact a substitute for the old navigable waterway hereinbefore referred to, and is now the only practicable means of navigation by water from Lake Michigan to the Mississippi river; but in spite of the fact that the defendants have thus destroyed and rendered use-

less a navigable waterway of the United States, said defendants have always expressly refused to concede that the canal thus substituted for the said waterway is itself a navigable waterway of the United States, and on the contrary the defendant State of Illinois, in section 24 of the act of 1889 quoted in paragraph 6 hereof, has undertaken to bar the government of the United States from all control or authority over the said canal until such time as said government shall comply with certain conditions therein named, and has undertaken to make the control and authority of said government, upon compliance with said conditions, subordinate to the uses of the said canal for sanitation and drainage purposes.

22. The amount of water necessary to permit the said canal to be operated for navigation purposes only, as your orator is informed and verily believes and therefore avers, does not at the present time exceed 500 cubic feet per second, and the amount of water which may in the future be required for the operation of said canal for navigation purposes only, if permitted to be operated for such purposes, will not exceed one thousand cubic feet per second, as your orator is informed and verily believes and therefore avers, even if the said canal should come to be utilized to the fullest extent to which it is physically capable of being used for the purposes of navigation.

23. Prior to the opening of the said canal, and on the 8th day of May, 1899, the Secretary of War of the United States, the Honorable Russell A. Alger, at the instance of the defendant, Sanitary

District of Chicago, issued a document purporting to authorize said defendant to open a channel connecting the Chicago River with the said canal and to cause the waters of the Chicago River to flow through the same, which document is in the following words and figures, to-wit:

> "Whereas by section 10 of an act of Congress approved March 3, 1899, entitled 'An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to alter or modify the course, location, condition, or capacity of the channel of any navigable water of the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same; and
>
> "Whereas the sanitary district of Chicago, a municipal corporation organized under the laws of the State of Illinois, has constructed an artificial channel from Robey Street, Chicago, to Lockport, and has been heretofore granted permission by the Secretary of War to make certain improvements in the Chicago River for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of 1¼ miles an hour, it being intended to connect the said artificial channel with the West Fork of the South Branch of Chicago River at Robey Street in the said city of Chicago; and
>
> "Whereas the said sanitary district of Chicago has now applied to the Secretary of War for permission to divert the waters of the said

Chicago River and cause them to flow into the said artificial channel at Robey street, as aforesaid; and

"Whereas the said sanitary district of Chicago represents that such movable dams and sluice gates as are necessary to at all times secure absolute and complete control of the volume and velocity of flow through the Chicago River have been constructed;

"Now, therefore, the Chief of Engineers having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said sanitary district of Chicago to open the channel constructed and cause the waters of Chicago River to flow into the same, subject to the following conditions:

"1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the sanitary district of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"2. That if at any time it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"3. That the sanitary district of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago River.

"Witness my hand this 8th day of May, 1899.

"R. A. Alger, Secretary of War.

"John M. Wilson,
"Brigadier General, Chief of
Engineers, United States Army."

On the 9th day of April, 1901, the Secretary of War of the United States, the Honorable Elihu Root, issued a document purporting to direct that the flow of water in the Chicago River be reduced to 200,000 cubic feet per minute, which document is in the following words and figures, to-wit:

> "Whereas under date of May 8, 1899, the Secretary of War granted permission unto the sanitary district of Chicago to open the artificial channel from Robey street, Chicago, to Lockport and cause the waters of Chicago River to flow into the same upon the following condition, inter alia:
>
> "'2. That if at any time it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch;'
>
> "And whereas it is alleged by various commercial and navigation interests that the present discharge from the river into the drainage canal sometimes exceeds 300,000 cubic feet per minute, causing a velocity of nearly 3 miles per hour, which greatly endangers navigation in the present condition of the river;

"Now therefore this is to certify that the Secretary of War, upon the recommendation of the Chief of Engineers, hereby directs said sanitary district to regulate the discharge from the river into the drainage canal so that the maximum flow through the Chicago River and its South Branch shall not exceed 200,000 cubic feet per minute.

"Witness my hand this 9th day of April, 1901.

"Elihu Root, Secretary of War."

On the 23rd day of July, 1901, the Secretary of War, the Honorable Elihu Root, issued a document purporting to increase the permitted flow in the Chicago river during certain hours of the day to 300,000 cubic feet per minute, which document is in the following words and figures, to-wit:

"Office Chief of Engineers, U. S. Army.
"July 22, 1901.

"Respectfully returned to the Secretary of War.

"By an instrument dated April 9, 1901, the Secretary of War directed the sanitary district of Chicago to regulate the discharge from the Chicago River into the drainage canal so that the maximum flow through the Chicago River and its South Branch shall not exceed 200,000 feet per minute.

"The sanitary district now asks that this order be so amended as to permit an increase of the flow into the canal to 300,000 cubic feet per minute between 4 P. M. and 12 midnight, daily.

"It is the opinion of Major Willard, expressed in the accompanying letter of the 16th instant, that the request should be granted, subject to revocation by the Secretary of War in case the increase be found dangerous to navigation.

"I concur in this opinion and recommend that the order of April 9, 1901, be modified accordingly.

"G. L. Gillespie,
"Brigadier-General, Chief of Engineers,
U. S. Army.

"War Department,
"July 23, 1901.

"Approved as recommended by the Chief of Engineers.

"E. Root, Secretary of War."

On the 5th day of December, 1901, the Assistant Secretary of War, the Honorable William Cary Sanger, issued a document purporting to change the permitted flow in the Chicago river to 250,000 cubic feet per minute throughout the day, which document is in the following words and figures, to-wit:

> "Whereas under date of May 8, 1899, the Secretary of War granted permission unto the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport and cause the waters of Chicago River to flow into the same upon the following condition, inter alia:
>
> "'2. That if at any time it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to

modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch;'

"And whereas the Secretary of War subsequently directed said sanitary district of Chicago to regulate the discharge of water into the Chicago Drainage Canal so that the maximum flow through the Chicago River shall not exceed 200,000 cubic feet per minute from midnight to 4 p. m., nor 300,000 cubic feet per minute from 4 p. m., to midnight; and whereas said sanitary district of Chicago has applied to the Secretary of War for permission to increase the flow between midnight and 4 p. m. to 250,000 cubic feet per minute, and the Chief of Engineers has recommended that the increase applied for be granted, but that the rate of flow from 4 p. m to midnight be reduced to 250,000 cubic feet per minute, so that the flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day;

"Now therefore this is to certify that in accordance with the recommendation of the Chief of Engineers the Secretary of War hereby gives unto said sanitary district of Chicago permission to regulate said discharge so that the maximum flow through the Chicago river shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day upon the following conditions:

"1. That this permission shall be in lieu of the present authorized rates of flow as stated above.

"2. That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"3. That said sanitary district of Chicago shall be responsible for all damages inflicted upon navigation interests by reason of the increase in flow herein authorized.

"Witness my hand this 5th day of December, 1901.

"Wm. Cary Sanger,
"Assistant Secretary of War."

On the 17th day of January, 1903, the Assistant Secretary of War, the Honorable William Cary Sanger, issued a document purporting to change the permitted rate of flow in the Chicago River to 350,000 cubic feet per minute until March 31, 1903, which document is in the following words and figures, to-wit:

> "Whereas under date of December 5, 1901, by an instrument supplementary to the original permission granted by the Secretary of War May 8, 1899, to the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport and cause the waters of the Chicago River to flow into the same, the Secretary of War, pursuant to authority reserved in said permission of May 8, 1899, gave permission to the Sanitary District of Chicago to regulate said discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, upon the following conditions, inter alia:
>
> "'That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require;' and
>
> "Whereas the said Sanitary District of Chicago has applied for permission to in-

crease the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute during the closed season of navigation, in order to carry off the accumulations of sewage deposit which line the shores along said city;

"Now, therefore, this is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto said Sanitary District of Chicago permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute until the 31st day of March, 1903, after which date it shall be reduced to 250,000 cubic feet per minute, as now authorized, upon the following conditions:

"1. That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"2. That said Sanitary District of Chicago shall be responsible for all damages inflicted upon navigation interests by reason of the increase in flow herein authorized.

"Witness my hand this 17th day of January 1903.

"Wm. Cary Sanger,
"Assistant Secretary of War."

On the 30th day of June, 1910, the Acting Secretary of War, the Honorable Robert Shaw Oliver, issued a document purporting to authorize a modification in the method of passing water into the canal of the defendant District, the permitted amount of flow remaining the same as theretofore fixed by the Secretary of War; which document is in the following words and figures, to-wit:

"War Department,
"Washington, June 30, 1910.

"Sir: Referring to your application of 27th instant on behalf of the board of trustees of the sanitary district of Chicago to open a channel from the Calumet River to its existing main channel so as to substitute two routes instead of one between Lake Michigan and its canal, I have the honor to advise you to the following effect:

"It appears from the records of the department that by an instrument executed May 8, 1899, the sanitary district of Chicago was given permission to connect its drainage canal with the south branch of the Chicago River at Robey Street, in the city of Chicago, and to divert the waters of Lake Michigan through the Chicago River into said canal subject to certain specified conditions designed to limit the amount of such diversion and in other ways to protect the public interests. The permission so granted was subsequently modified at various times and by an instrument executed December 5, 1901, the amount of flow was fixed at not exceeding 250,000 cubic feet per minute; equivalent to 4,167 cubic feet per second, which is the present rate allowed. At the time the original permit was given a connection with Calumet River was not mentioned, but if it had been it is probable that a connection with that river as well as with the Chicago River would have been allowed.

"So long as the water flow remains unchanged there seems to be no special objection to its extension to both rivers instead of confining it to a single one, especially since if the new (Calumet) route be developed later to a navigable state the double route will be advantageous to navigation interests. Accordingly, in view of the favorable recommendation of the Chief of Engineers and of the consent thereto by the Attorney General, under the conditions hereinafter prescribed, the department here modifies the existing permission so as to allow the diversion of the already permitted water flow in such manner as to reach the sanitary district canal by way of the Calumet River and a connecting channel, as well as by way of its present route through the Chicago River, subject to all pertinent conditions of the existing permission and to other express conditions, as follows:

"*(a)* That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the sanitary district of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"*(b)* That if at any time it becomes apparent that the current created by such drainage work in the Calumet, as well as Chicago Rivers, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close the discharge through said channels or rivers, or to modify it to such an extent as may be demanded by navigation and property interests along said rivers.

"*(c)* That the sanitary district of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in the Calumet River as well as the Chicago River.

"*(d)* That the amount of water withdrawn from Lake Michigan, through the Chicago and Calumet Rivers together, shall not exceed the total amount of 250,000 cubic feet per minute (4,167) cubic feet per second already authorized to be withdrawn through the Chicago River alone.

"*(e)* That the permission hereby given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"*(f)* That this permission shall in no wise affect or in any manner be used in the friendly suit now pending in the circuit court of the United States for the northern district of Illinois brought by the United States of America against the sanitary district of Chicago, to determine the right of the said sanitary district to divert from Lake Michigan for sanitary purposes an amount of water in excess of that now being diverted without having first obtained a permit from the Secretary of War.

"*(g)* That the War Department shall have free access at all times to the water-flow records of the sanitary district of Chicago and free access also to the regulating works and all other parts of its canals for the purpose of checking records or making water-flow measurements.

"*(h)* That the plans for the proposed work shall be submitted to and approved by the Chief of Engineers and the Secretary of War.

"*(i)* That the work shall be subject to the supervision and approval of the engineer officer of the United States Army in charge of the locality.

"Very respectfully,
"Robert Shaw Oliver,
"Acting Secretary of War.

"Mr. George M. Wisner,
"Chief Engineer, Sanitary District
of Chicago,
Washington, D. C.
"Office Chief of Engineers,
"War Department, June 30, 1910."

24. None of the documents referred to in paragraph 23 hereof are or ever have been of any force or effect as constituting an authorization to the defendants, or either of them, to withdraw water from Lake Michigan in such quantities as to obstruct its navigable capacity by lowering its level, or to obstruct the navigable capacity of the Chicago River by introducing a dangerously swift current into said river. On the contrary, all of said documents purport to be issued solely under and pursuant to the authority conferred on the Secretary of War by Section 10 of the Rivers and Harbors Act of March 3, 1899, which authority is limited by said Act to the approving of alterations and modifications of the various channels and waterways therein referred to, while by the terms of said Act the power to authorize obstructions to the navigable capacity of any and all waters of the United States is wholly and exclusively reserved to and retained by Congress. But if the diversion of water in the manner hereinbefore de-

scribed be held by this honorable Court to result in a mere change in the course, location, condition or capacity of the said lake and river, and not in an obstruction to the navigable capacity thereof, so that the granting of permission for such diversion was within the power of the Secretary of War under the provisions of the said Act of March 3, 1899, then and in that case your orator asserts that at no time since the 31st day of March, 1903, have the defendants, or either of them, been authorized by the Secretary of War to divert from Lake Michigan, or to pass through the Chicago River or the Calumet River, or both, into the canal of the defendant District, more than four thousand one hundred sixty-seven (4,167) cubic feet of water per second; whereas said defendant Sanitary District of Chicago, in violation of the permits thus granted by the Secretary of War, and acting under the express command of the defendant State of Illinois as set forth in the Act of 1895 referred to in paragraph 9 hereof, has been continuously for more than ten years last past, and is now, withdrawing from Lake Michigan and passing into its said canal an amount of water greatly in excess of the said limit of four thousand, one hundred sixty seven (4,167) cubic feet per second. Ever since the 6th day of October, 1913, there has been pending in the district court of the United States for the Northern District of Illinois an action wherein the United States is plaintiff and the defendant district is defendant, the object of said action being to restrain said defendant from diverting a greater amount of water from Lake Michigan than the amount authorized by the permits hereinbefore referred to; but although the said Court on or about the 19th day of June, 1920, announced a decision in said action favorable to the United States and against the defendant District, and further announced that a decree would be entered restraining said defendant from diverting more than 4,167 cubic feet of water per second from Lake Michigan, your orator is informed and believes and therefore avers that no such decree has ever been entered and your orator has no knowledge as to whether, or when, such decree will be entered, the judge who announced the said decision being now no longer a judge of the said court.

25. The acts of the defendants hereinbefore set forth and described, in the diverting of water from Lake Michigan into the canal of the defendant District, have never been authorized by Congress, and are in violation of the legal rights of the State of Wisconsin and the people of said State in the following respects to-wit:

(a) In that the defendants by said acts are interfering with the common-law right of said State of Wisconsin and its people to have the free and unobstructed use of Lake Michigan and the various ports and harbors thereof within the borders of said state, for purposes of navigation, trade and commerce, free from any and all interference with the natural navigable capacity of said lake or said harbors by any agency other than the State of Wisconsin or the United States Government.

(b) In that the defendants by said acts are interfering with the right of the people of Wisconsin to the free and unobstructed navigation of Lakes Michigan, Huron, Erie and Ontario, and the navigable waters between the said lakes and from said lakes into the Mississippi River and the Atlantic Ocean, which rights belong to the said people of Wisconsin both by the common law and by the express guaranty contained in the Ordinance for the Government of the Territory of the United States Northwest of the River Ohio, enacted by Congress on June 13, 1787.

(c) In that the defendants by said acts are violating the provisions of the Act of Congress of March 3, 1899, known as the Rivers and Harbors Act of 1899, and particularly the provisions of Section Ten (10) thereof.

26. The said violations of the legal rights of the State of Wisconsin and of its people have caused, are now causing, and will continue to cause so long as they are permitted to continue, serious interference with the trade and commerce of the people of Wisconsin, and of the State of Wisconsin in its proprietary capacity, resulting in large pecuniary losses to the said people and the said State which cannot be accurately estimated and for the recovery of which no adequate remedy exists at law. The State of Wisconsin therefore brings this action, on behalf of itself and of the people of said State, for the purpose of establishing and protecting the legal rights of said State and its people against the encroachments of the defendants, and of terminating a condition which

is inimical to the welfare and prosperity of the said State and of its people.

WHEREFORE, your orator prays that the defendants may be required to answer the allegations hereinbefore set forth in this bill of complaint, and that upon final hearing of this cause an injunction be issued, under the seal of this Court, restraining the defendants and each of them, and each of their officers, agents and servants, from taking or causing to be taken any water whatever from Lake Michigan in such manner as to permanently divert the same from the said lake, for the purpose of operating the canal hereinbefore referred to, until such time as the Congress of the United States shall give its valid consent to such taking and diversion of water.

But in the event that the said defendants shall, during the pendency of this action, expressly recognize and concede that the canal constructed by the defendant District is a navigable waterway of the United States and subject to the same control on the part of the United States as the other navigable waterways thereof, then and in that case your orator prays that upon the final hearing of this cause an injunction be issued, under the seal of this court, restraining the defendants and each of them, and each of their officers, agents and servants from taking or causing to be taken any water from Lake Michigan, in such manner as to permanently divert the same from the said lake, for the purpose of operating the said canal, in excess of the amount which the Court shall determine to be reasonably required for the purpose of navigation in and through said canal, until such time as the Congress of the United States shall give its valid consent to the taking and diversion of a larger amount of water.

And in the event that this Court shall hold and determine that it is within the lawful power of the Secretary of War to permit the taking of water from the said Lake Michigan for the operation of the said canal, and to determine the amount and conditions of such taking, then and in that case your orator prays that upon the final hearing of this cause an injunction be issued, under the seal of this Court, perpetually restraining the defendants and each of them, and each of their officers, agents, and servants, from taking or causing to be taken any water from Lake Michigan, in such manner as to permanently divert the same from the said lake, for the purpose of operating the said canal, in excess of two hundred fifty thousand (250,000) cubic feet per minute, or four thousand one hundred sixty-seven (4,167) cubic feet per second, until such time as the Congress of the United States, or the Secretary of War acting upon the recommendation of the Chief of Engineers of the United States Army, shall give valid permission for the taking and diversion of a larger amount of water.

And your orator also prays for such other and further relief as to this honorable Court may seem meet and consistent with equity and good conscience.

May it please your Honors to grant unto your orator a writ of subpoena under the seal of this honorable Court, directed to the Governor and Attorney General of the defendant, the State of Illinois, and to the Sanitary District of Chicago, commanding them and each of them, on a day certain to be therein named and under a certain penalty, to be and appear in this honorable Court, then and there to answer, but not under oath (answer under oath being expressly waived) all and singular the matters and things hereinbefore set forth, and to abide such further order and decree of the Court as may be made against the said defendants or either of them.

William J. Morgan

Attorney General of the State of Wisconsin,

Ralph M. Hoyt

Deputy Attorney General
of the State of Wisconsin,

Solicitors for Complainant, the State of Wisconsin.

United States of America,
State of Wisconsin, } ss.
County of Dane,

WILLIAM J. MORGAN, being first duly sworn, on oath says that he is the duly elected, qualified and acting Attorney General of the State of Wisconsin; that he has read the foregoing bill of complaint and knows the contents thereof, and that the same is true to his own knowledge except as to the matters therein stated on information and belief, and as to such matters he believes it to be true; and that as such Attorney General he is duly authorized to pray leave to file the said bill of complaint.

William J Morgan

Subscribed and sworn to before me
this 26th day of May, 1922.

Notary Public in and for
Dane County, Wisconsin.

My commission expires May 13, 1923.

O.T. 1930 ORIGINAL NOS.6,10 & 11,

Office Supreme Court, U. S.
FILED
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CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1922.

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STATE OF WISCONSIN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 23. Original.
In Equity.

JOINT AND SEVERAL ANSWER OF DEFENDANTS, THE STATE OF ILLINOIS, AND THE SANITARY DISTRICT OF CHICAGO TO THE BILL OF COMPLAINT FILED HEREIN

EDWARD J. BRUNDAGE,
Attorney General of Illinois, Solicitor for Defendant, State of Illinois.

WM. F. MULVIHILL,
Attorney, The Sanitary District of Chicago, Solicitor for said Defendant District.

CLYDE L. DAY,
MORTON S. CRESSY, and
EDMUND D. ADCOCK,
Solicitors for said Defendants and each of them.

HAWKINS & LOOMIS CO., LAW PRINTERS, CHICAGO.

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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1922.

STATE OF WISCONSIN, *Complainant,* *vs.* **STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,** *Defendants.*	No. 23. Original. In Equity.

JOINT AND SEVERAL ANSWER OF DEFENDANTS, THE STATE OF ILLINOIS, AND THE SANITARY DISTRICT OF CHICAGO TO THE BILL OF COMPLAINT FILED HEREIN.

These defendants, the State of Illinois by Edward J. Brundage, Attorney General of Illinois, its solicitor, and The Sanitary District of Chicago by William F. Mulvihill, Attorney, The Sanitary District of Chicago, its solicitor, and by Clyde L. Day, Morton S. Cressy and Edmund D. Adcock, solicitors for said defendants, and each of them, reserving to themselves all right of exception to said bill of complaint for answer thereunto jointly and severally allege, aver and say as follows:

1. These defendants admit that the State of Wisconsin is one of the states of the United States of America, and that this action is brought pursuant to resolutions adopted severally by the two houses of the Legislature of said state at the regular session thereof held in the year 1921.

2. These defendants admit that the State of Illinois is one of the states of the United States of America, and the defendant, The Sanitary District of Chicago, is a public corporation organized and existing under and by virtue of the laws of said State of Illinois and is a citizen thereof.

3. These defendants and each of them deny that this court has jurisdiction thereof, and that there is a controversy set forth in the bill of complaint between two states of the United States and between a state of the United States and a citizen of another state. On the contrary, these defendants and each of them aver and charge that no controversy is set forth in the bill of complaint herein between two states of the United States and between a state of the United States and a citizen of another state; that the matters and things alleged and set forth in the bill of complaint upon which the said complainant seeks to base a cause of action relate and pertain to those matters and things over which the United States of America has exclusive jurisdiction, with which matters and things the State of Wisconsin is not concerned,—that is to say,—the harbors located along the shores of Lake Michigan and Lake Superior in Wisconsin mentioned in the said bill of complaint are part and parcel of the Great Lakes system, and they and each of them are navigable waters of the United States over which the United States has jurisdiction under Article 1, Section 8, Clause Third of the Constitution of the United States wherein Congress is given power to

> "regulate commerce with foreign nations and among the several states and with the Indian tribes";

and the United States has taken jursidiction of each and every of said harbors by appropriating money for the improvement of each of them and by making improvements therein pursuant to various and sundry Acts of

Congress passed during the period of upwards of eighty years last past; that the said supposed interference with navigation upon the said harbors and each of them alleged in said bill of complaint by the alleged acts and doings of the said defendants, or one of them, can be complained of, if at all, only by the United States of America. For the reasons in this paragraph stated these defendants and each of them do here and now move that the bill of complaint be dismissed for want of equity.

4. These defendants admit that along the shores of Lake Michigan in Wisconsin there are approximately 350 miles of shore line and that along said shore line there are approximately 13 harbors with facilities for the loading and unloading of vessels navigating the said Lake Michigan and the other Great Lakes. In this connection these defendants aver that the facilities for the loading and unloading of vessels in certain of said harbors are meagre and of little consequence and the commerce carried on through certain of said harbors is small and in some instances does not extend beyond the immediate vicinity of the harbor. These defendants admit that harbors known as Milwaukee, Manitowoc, Green Bay, Sheboygan, Marinette, Racine, Kenosha, Port Washington, Kewaunee, Algoma and Sturgeon Bay are located on said shore line. These defendants are not informed as to the total amount of freight received at and shipped from the said harbors during the year 1920 exclusive of freight received and shipped by car ferry, and, therefore, ask strict proof as to the amount of such tonnage during said year 1920, or any other year or years that may be designated. These defendants and each of them aver that the principal freight received at and shipped from certain of said harbors is freight received and shipped by car ferry; that very little tonnage comparatively is received and shipped from said

harbors in any other way than by car ferry; that the car ferry is a craft or boat which draws a very small amount of water and the draft thereof is small and the depth of water in each and every of said harbors is by several feet more than necessary to permit said car ferries to enter and leave them and each of them.

5. These defendants admit that the shore line along Lake Michigan in the State of Illinois is approximately 60 miles in length, and that said shore line comprises the eastern boundary of Cook and Lake Counties in the said state.

These defendants and each of them deny the allegation of said bill of complaint to the effect that up to the year 1900 the Chicago river emptied its waters into Lake Michigan at a point in the City of Chicago. These defendants admit, however, that prior to the time or times hereinafter mentioned, long prior to said year 1900, the said Chicago river flowed through said Lake and Cook Counties, one branch in a northerly direction, and the other in a southerly direction, and emptied into Lake Michigan at a point in the City of Chicago.

These defendants and each of them further aver as follows:

The Continental Divide separating the water-shed of the St. Lawrence river basin and the water-shed of the Mississippi river basin passes within approximately eight miles of the shore line of Lake Michigan at Chicago. Said Continental Divide at the point mentioned is insignificant and its summit is but a few feet above the mean surface elevation of Lake Michigan. Originally, in a state of nature, the west fork of the south branch of the Chicago river emptied into the south branch of said Chicago river. Said south branch in confluence with the north branch formed the Chicago river. The west fork of the south branch passed within a short distance of the DesPlaines river, which in confluence with the Kankakee river forms the Illinois river which flows through a large and fertile valley and empties into the Mississippi. At times, originally, the waters of the west fork of the south branch of the Chicago river flowed across the said Continental Divide and into the DesPlaines river and mingled with the waters thereof. Prior to the admission of the State of Illinos into the Union in 1818, and subsequent thereto, said Lake Michigan, Chicago river, south branch thereof and the west fork of the south branch, and said Des Plaines and Illinois rivers were navigated by fur traders and others and formed a continuous line of water navigation upon which a large and extensive commerce was carried on. Boats in such commerce passed from Lake Michigan through and along said Chicago river to the south branch and west fork thereof, and by means of a small portage channel across said divide continued to the DesPlaines and thence to the Illinois river. Boats used in said commerce passed along and through said Illinois river to the said DesPlaines river and across said divide as aforesaid to the west fork and the south branch of the Chicago river through the Chicago river itself and thence into Lake Michigan.

Appreciating the usefulness of the waterway for commerce and the advantage to the country of its enlargement and improvement, the Congress of the United States on March 30, 1822, passed an Act concerning the Illinois and Michigan Canal which among other things provided:

> "Section 1: The State of Illinois be, and is hereby, authorized to survey and mark through the public lands of the United States the route of the canal connecting the Illinois river with the southern bend of Lake Michigan."

Said act further provided that certain lands on each said of the canal should be reserved for the State of Illinois for the purpose of aiding it in constructing the canal, and that the reservation and grant thereby made should be void if the State did not within three years thereafter survey and direct by law said canal to be opened and return a complete map thereof within three years to the Treasury Department. The State failed to fully perform these conditions.

However, on March 2, 1827, Congress passed another Act relating to the same subject matter which among other things provided:

> "Section 1: There be, and hereby is, granted to the State of Illinois, for the purpose of aiding the said state in opening a canal to unite the waters of the Illinois River with those of Lake Michigan a quantity of land equal to one-half of five sections in width on each side of said canal, and reserving each alternate section to the United States, to be selected by the Commissioner of the Land Office, under the direction of the President of the United States, from one end of the said canal to the other; and the said lands shall be subject to the disposal of the Legislature of said state, for the purpose aforesaid and no other: Provided that the said canal when completed shall be and forever remain a public highway for the use of the government of the United States, free from any toll or other charge whatever, for any property of the United States or persons in their service, passing through the same:"

Prior to the year 1830, and for sometime thereafter, water routes existed from the Great Lakes to the Atlantic Ocean along the St. Lawrence River. Great Britain refused to the people of the United States free navigation of these water routes, which made it necessary that the United States obtain an outlet to the Atlantic ocean from the Great Lakes for navigation purposes, by way of the Chicago river, DesPlaines, Illinois, Mississippi rivers and Gulf of Mexico. In order to provide for this necessity, the said Acts of Congress of March 30, 1822 and March 2, 1827 were passed. It was also considered that this waterway would have a tendency to bind the states together and thus remove the danger of dissolution, which was then a subject greatly discussed, as is shown by the Memorial of the General Assembly of Illinois made just prior to the passage of the Act of March 2, 1827, which said memorial is, in part, as follows:

> "To the Honorable the Senate and House of Representatives of the United States of America in Congress assembled: The memorial of the General Assembly of the State of Illinois respectfully represents that the construction of a canal uniting the waters of Lake Michigan with the Illinois river, will form an important addition to the connecting links in the chain of internal navigation, which will effectually secure the indissoluble union of the confederate members of this great and powerful Republic. By the completion of this great and valuable work, the connection between the north and the south, the east and the west, would be strengthened by the ties of commercial intercourse and social neighborhood, and the union of the states might bid defiance to internal commotion, sectional jealousy and foreign invasion. All the states of the Union would then feel the most powerful motives to resist every attempt at dissolution. To effect so great and desirable an object, your memorialists believe to be of sufficient importance to engage the attention and awaken the munificent patronage of a government whose principle of action is the promotion of the general welfare."

Pursuant to the said Act of Congress of March 2, 1827 mentioned, the State of Illinois through its General Assembly and executive officers constructed and completed in the year 1848 a canal extending in a southwesterly direction from the west fork of the south branch of the Chicago river at or near Robey street in said City of Chicago, to Joliet, Illinois, through the city of Joliet, thence along the DesPlaines and Illinois rivers, through Morris and Ottawa, to Utica, Illinois, where it connected with the Illinois river. To extend and improve navigation upon said Illinois river from said southern terminus of said Illinois & Michigan Canal the State of Illinois built two dams with locks in the Illinois river at the City of Henry and at Copperas Creek, and in the lower regions of the said Illinois river the United States for the same purpose constructed two dams with locks at the cities of Kampsville and LaGrange, Illinois.

The Act for the construction of the Illinois & Michigan Canal, being the one under which said canal was constructed and completed, was passed by the Illinois General Assembly on January 9, 1836. Section 16 of said Act provided, among other things that

> "The said canal shall not be less than forty-five feet wide at the surface, thirty feet at the base, and of sufficient depth to insure a navigation of at least four feet, to be suitable for ordinary canal boat navigation, to be supplied with water from Lake Michigan and such other sources as the canal commissioners may think proper, and to be constructed in the manner best calculated to promote the permanent interest of the country."

The Illinois and Michigan Canal, as originally planned pursuant to said Act of Congress of March 2nd, 1827, and the said Act of the General Assembly of Illinois of January 9th, 1836, contemplated the construction of the canal in such manner that the water necessary for its operation should be withdrawn by gravity from the west fork of the south branch of the Chicago river at the canal's northern terminus. This was known as the deep cut plan. Lack of funds, however, made it impossible for the canal to be so constructed, and it was finally completed in 1848 under what is known as the shallow cut plan—that is, the bottom of the canal was of higher elevation than it was intended it should be under the deep cut plan. The water for the operation of the canal was taken from the west fork of the south branch of the Chicago river at the canal's northern terminus by means of water wheels, and also there was obtained from the Little Calumet river, in the watershed of Lake Michigan by means of the Calumet feeder, a certain amount of water for the canal's operation. This water was fed to the canal at or near Sag, Illinois.

Chicago's sewers were from the beginning, and until the times hereinafter mentioned, debouched into the Chicago river or into Lake Michigan. After the canal was completed in 1848, the volume of sewage from the rapidly growing population of Chicago very shortly caused noisome and unwholesome conditions to exist in the Chicago river which, during a large portion of each year, had but a small flow of water. This condition affected the health of the people, so that on February 16th, 1865, the General Assembly of Illinois passed an act which, in part, is as follows:

> "Whereas, it has been represented that the City of Chicago, in order to purify or cleanse Chicago river, by drawing a sufficient quantity of water from Lake Michigan, directly through it, and through the summit division of the Illinois and Michigan canal, would advance a sufficient amount of funds to accomplish this desirable object; and, whereas, the original plan of the said canal was to cut down the summit so as to draw a supply of water for navigation directly from Lake Michigan, which plan was abandoned, for the time being, after a large part of the work had been completed, only in consequence of the inability of the state to procure funds for its further prosecution; and, whereas, under the law creating the trust the plan of the summit division of the canal was changed, the level being raised so as to require the principal supply of water to be obtained through the Calumet feeder, subject to ser-

> ious contingencies, and by pumping on to the summit with the hydraulic works at Bridgeport; now, therefore,
>
> "Section 1. Be it Enacted by the People of the State of Illinois, Represented in the General Assembly, That to secure the completion of the summit division of the Illinois and Michigan Canal, upon the original 'deep cut' plan, with such modifications and changes of line, if necessary, as will most effectually secure the thorough cleansing or purification of the Chicago river, and facilitate the execution of the work, the City of Chicago through its constituted authorities, may at once enter into an arrangement with the board of trustees of said canal, with a view to the speedy accomplishment of the work."

Said Act provided, further, that the canal should be built as originally planned by the Canal Commissioners in 1836, and that the money expended by the City of Chicago should be a vested lien upon the Illinois and Michigan Canal and its revenues, and that the State might relieve the lien by refunding to the City the amount expended.

Thereafter and pursuant to said Act of the General Assembly the City of Chicago passed an ordinance on or about June 5, 1865, which in part provided:

> "Section 1. Be it ordained by the Common Council of the City of Chicago, that the plan of the Board of Public Works for cleansing the Chicago river and its branches by cutting down the summit of the Illinois and Michigan Canal below the level of Lake Michigan so as to draw from it at a low stage of water in the lake not less than twenty-four thousand (24,000) cubic feet of water per minute, is hereby approved, and said Board are hereby authorized to execute said work."

The ordinance further authorized the making of a contract with the trustees of the Illinois and Michigan Canal and appropriated money for the purpose of improving said canal. Pursuant to said Act of the General Assembly and said City Ordinance, the City of Chicago did cut down the summit level of said canal and reconstructed and completed it upon the deep cut plan whereby not less than twenty-four thousand (24,000) cubic minute feet of water was drawn through said canal from the west fork of the south branch of the Chicago river and the said Great Lakes system of waterways, and the City of Chicago in performing said work expended the sum of approximately $3,000,000.

In 1861, the General Assembly of Illinois passed a resolution providing:

> "That the board of trustees of the Illinois and Michigan Canal be and are hereby authorized and instructed to cause prompt and thorough surveys, examination and estimates to be made of the Illinois river, and of the Illinois and Machigan Canal, and also of portions of the Des Plaines and Chicago rivers, and of the portage between said rivers, for the purpose of accurately ascertaining the comparative value, cost, efficiency, benefits and advantages, direct, prospective and incidental, of the different methods proposed or desirable for improving the navigation of the Illinois river, by dredging or excavation of the channel and wing dams, or by supplying water from Lake Michigan, through the enlargement and deepening of the Illinois and Michigan Canal, or otherwise, or by opening a channel from Lake Michigan, by way of the south branch of the Chicago river and Mud lake to the Des Plaines river, and down said canal to a point that will secure a free, flowing, ample and never-failing supply of water, sufficient for the navigation of the Illinois river at all seasons and times, when not obstructed by ice. Such surveys, examinations and estimates to include a plan of enlargement of the Illinois and Michigan Canal, sufficient for the introduction and use of stern-wheel river steamers and propellers upon it, and also of side-wheel river steamers, and to include also an estimate for the channel hereinbefore mentioned, of sufficient size to admit of full and free steamboat navigation from the Illinois river to Chicago and Lake Michigan, as well as a size sufficient

for supplying water for all the deficiencies of navigation in the Illinois river, at all seasons."

The said Illinois and Michigan Canal was completed about the year 1871 by the City of Chicago upon the deep cut plan so that a large amount of water was withdrawn by gravity from the west fork of the south branch of the Chicago river for the purpose of relieving the said Chicago river and the south branch of the unhealthy condition in which it then existed. The metropolitan area of which the City of Chicago was the center increased rapidly in population so that in the year 1881 this increased flow through said canal and consequent withdrawal of water from the west fork of the south branch ceased to cleanse and purify the river, and it became necessary to adopt some other expedient not only for sanitary purposes, but also with the purpose of navigation in view. Therefore, the General Assembly of Illinois in 1881 adopted the following resolution:

"JOINT RESOLUTION OF ILLINOIS LEGISLATURE.

ADOPTED 1881.

"Concerning Chicago Sewage in Illinois and Michigan Canal.

"WHEREAS, the State of Illinois, in General Assembly, did, on the sixteenth day of February, 1865, grant and authorize the City of Chicago, in the State of Illinois, to deepen the Illinois and Michigan Canal for the purpose of, and with the intent to better, the system of sewage of the said City of Chicago by permitting a free flow of water from Lake Michigan through the Chicago river and said canal to the Desplaines and Illinois rivers; and, the City of Chicago did perfect said improvement in conformity with said permission; and,

"WHEREAS, the great fire in the said City of Chicago on the eighth and ninth days of October, A. D. 1871, did so greatly damage the assessable property of a very large number of its citizens and taxpayers, and the People of the State of Illinois did, by its General Assembly, refund to the said City of Chicago the amount of the cost of deepening the Illinois and Michigan Canal, said sum refunded being in gross two millions, nine hundred and fifty-five thousand, three hundred and forty dollars; and,

"Whereas, the deepening of the canal as aforesaid, has proved to be totally inadequate for the purposes intended, and the large amount of sewage of the City of Chicago being far greater than the capacity of the canal and the water passing through it to deodorize and render innocuous; and,

"Whereas, the foulness of the water annually causes the death of millions of fish in the Desplaines and Illinois rivers, that float to the shores and decay; and,

"Whereas, said sewage, in an entirely undecomposed and putrid mass, is carried by the current of the canal into the Desplaines river, and thence into the Illinois river, and in its foulest condition is thus transported to and below the City of Peoria, in said State, rendering the air, at all points along its passage, so impure and foul as to be exceedingly offensive, and taking with it germs of disease of all kinds prevalent in the City of Chicago, and thus spreading them broadcast through the entire Desplaines and Illinois river valleys, causing thereby much illness as well as poisoning of the blood, and debilitating the systems of 200,000 people; and,

"Whereas, careful investigation leads our people to fear that an epidemic may spread over said section of the State of Illinois from the causes above stated; and,

"Whereas, in addition to the above distress, there has been a great loss to property, business industries, and to the communities in said region, by reason of the causes herein mentioned; and,

"Whereas, prior to the deepening of said Illinois and Michigan Canal, the water necessary for all purposes of navigating said canal and propelling of machinery was obtained from the Desplaines river and the Calumet feeder, through Lane's lake; and,

"Whereas, the bed of the Desplaines river, at the summit and thence westward along the line of and adjacent to the canal, is, at a low stage of water, eight (8) feet above the surface level of the canal, and will average a supply of water sufficient for all canal and power purposes during the seasons of navigation; and,

"WHEREAS, the supplying of the canal from these sources will so dilute and weaken the sewage of the City of Chicago, as to greatly relieve it of its foulness and stench, to the great delight, relief and health of the people near to and bordering upon the line of the canal, the Desplaines and Illinois rivers; therefore, be it

"RESOLVED BY THE SENATE, THE HOUSE OF REPRESENTATIVES CONCURRING HEREIN, that the Board of Canal Commissioners of the Illinois and Michigan Canal be, and they are hereby, directed to cause sluiceways of sufficient capacity, with the proper guard-gates, to be opened from the Desplaines river to the canal, at or near the summit, in Cook County, and at or near Lemont, in Cook County, and also to construct a dam across the former Calumet feeder at such suitable point as will cause the waters from Lane's lake to flow into the canal; that said Canal Commissioners shall immediately commence, to construct and improve said sluices and feeders in the order named, and pay for the same out of any moneys in their hands or control as Canal Commissioners, resulting from the earnings of the canal. The amount to be expended as above designated in the prosecution of said improvement shall not, however, exceed the sum of ten thousand dollars: Provided, that the Canal Commissioners shall first confer with the Mayor or other proper authorities of the City of Chicago, and if said City shall proceed without delay to cause a flow into the canal from the Chicago river sufficient to dilute and purify the waters, and thus remedy the evils complained of, said flow to be not less than 60,000 cubic feet per minute, including the ordinary flow into the canal from the Chicago river, or so much thereof as in their judgment said canal can carry, and if this shall be accomplished by the first day of September, 1881, the Commissioners shall accept it in lieu of obtaining a supply of water from the other sources named: Provided, further, that said Commissioners are hereby directed

> to take care of the 60,000 cubic feet per minute, above contemplated, if so furnished by the City of Chicago: Provided, further, that the adoption of this resolution shall not commit the State to a system of permanent drainage of Chicago sewage through either the canal or Desplaines or Illinois rivers, but that the State reserves the right to require the City of Chicago in future years to take care of its sewage through other channels: And provided, further, that if the said City of Chicago shall erect pumping works for the purpose of causing such flow as aforesaid, the Canal Commissioners shall allow the said city to erect said pumping works upon the canal lands in Bridgeport; and said City shall support, control and manage said pumping works subject to the direction of the Canal Commissioners, relative to the amount of water to be received into the canal from time to time, as the exigencies of the canal may require, but at the expense of the said City of Chicago: Provided, further, that the City of Chicago, its officers, agents or employes shall derive from this resolution no right to control or exercise any authority over any of the gates, locks or dams of said canal.''

The pumping works provided to be constructed under said resolution were thereafter by the City of Chicago placed in operation at the northern terminus of said Illinois and Michigan Canal, whereupon until the opening of the Sanitary District channel in 1900 they were operated, resulting in the withdrawal by means of said pumps and said gravity flow of not less than 60,000 cubic minute feet of water from the west fork of the south branch of the Chicago river and said Great Lakes system of waterways. Shortly after said pumps had been installed and placed in operation it was ascertained that the water so withdrawn was not sufficient to cleanse the said Chicago river and eliminate the unhealthy conditions existing. The Chicago river and its north and south branches, and the west fork thereof became odious to the nostrils, injurious to the health of the community, and its mass of undigested sewage sludge was at times of high water and when the Chicago river was at flood stage, carried out into Lake Michigan, polluting the water supply of the people of Chicago and its suburbs and surrounding communities. This caused great epidemics of typhoid fever and other water-born diseases. Frequent epidemics of typhoid fever were often of such violence that in each such epidemic as many as 190 persons per 100,000 of population died therefrom. The average death rate from typhoid fever per year prior to the opening of the drainage channel was approximately 75 per 100,000 persons. Consequently, the City Council of the City of Chicago on or about January 26, 1887, passed an ordinance appropriating money for and authorizing the Mayor to appoint a commission to make a complete and comprehensive study of the best means and method to be adopted to protect the water supply of Chicago, its suburbs and surrounding communities.

The water of Lake Michigan furnished the only source of drinking water supply for the people of Chicago and its surrounding territory from the beginning of its existence to the present time.

On or about January 30, 1887, said commission, so appointed by the Mayor of Chicago, known as the Drainage and Water Supply Commission, made a complete and comprehensive report with recommendations as to the best method to be pursued in solving the problems placed before it, pursuant to said ordinance. Various plans for the protection of the said water supply were suggested and considered. The one recommended was the one that was embraced and provided to be carried out under the Act of the Illinois General Assembly entitled:

> "An Act to create Sanitary Districts and to remove obstructions in the Desplaines and Illinois rivers." Approved May 29, 1889. In force July 1, 1889.

For the convenience of the Court the said Act of the General Assembly, including the amendments of June 10, 1895, May 13, 1901 and May 14, 1903, are attached hereto as Exhibits A, A1, A2 and A3, respectively and are made a part of this answer.

The said Act provided for building and The Sanitary District of Chicago, organized thereunder, constructed a canal across the Continental Divide, of a capacity in the rock sections thereof of upwards of 10,000 cubic seconds feet of water. The Act provided that the canal in such rock sections should have a capacity of not less than 10,000 cubic seconds feet of water. This canal is known as the Main Channel of The Sanitary District of Chicago, and was provided to be and is constructed for such maximum capacity so that the Chicago river may at all times be reversed and flow from Lake Michigan to the Desplaines river. The maximum flood run-off of the Chicago river drainage area was and is 10,000 cubic seconds feet of water.

The Act provided also that there should always be diverted through said canal for sanitary purposes at least 20,000 cubic feet of water per minute for each 100,000 of population of the district in order to properly oxidise and digest the sewage thus diverted. The diversion from Lake Michigan of the Chicago river at all time would prevent, and did and does prevent any sewage that should be or is emptied into the Chicago river and its branches by sewers, from entering Lake Michigan and thus polluting the drinking water supply.

The Act further provided for the construction of intercepting sewers, and they were so constructed to divert to the Main Channel of The Sanitary District all of the sewage that formerly emptied directly into Lake Michigan. Various other works supplementary to the main diversion works were included in the construction to make the main diversion works of The Sanitary District operate more effectively, thus preventing any pollution of the water supply of the people of The Sanitary District from sewage and other refuse contained in sewers.

The said Act further provided that the Main Channel of The Sanitary District should be constructed not less than 18 feet in depth, and that the current in said Main Channel should not exceed three miles per hour. The channel actually constructed is upwards of 200 feet in width, 24 feet in depth, with a current much less than the current permitted by statute. It is capable of allowing the largest boats navigating the Great Lakes to pass freely and without hindrance. Railroad and highway bridges across the said Main Channel have been so constructed and completed, that they may be moved, swung or raised, so that boats or other water craft may pass without obstruction by said bridges.

The said Act also provided that the Main Channel should be when constructed, used as a highway of commerce and considered a navigable stream. At the northern terminus of the said Main Channel at Lockport, locks have been constructed, connecting it with the Illinois and Michigan Canal at that point, so that for years past the said canal has been used as a navigable waterway in place of the old Illinois and Michigan Canal, which lies parallel to it from its northern terminus at the west fork of the south branch of the Chicago river to a point at or near Lockport, Illinois and just north of the City of Joliet.

The said Act under which The Sanitary District was organized and under which the said Main Channel was constructed was passed pursuant to the authority of the said Act of Congress of March 2, 1827 hereinbefore mentioned.

The construction of said Main Channel of The Sanitary District providing for the diversion of water and for navigation thereon was also pursuant to various reports and recommendations made by the engineer officers of the United States army, which reports and recommendations were made under the direction of various Rivers and Harbor acts of Congress. Coincident with activities of the State of Illinois and the City of Chicago looking towards the construction of a channel across the Continental Divide of larger dimensions than the old Illinois and Michigan Canal, heretofore described, for the purpose of navigation and also to serve the sanitary needs of Chicago, were the activities of the Engineer Corps of the United States army. Said Engineer Corps, as before stated, recommended in various reports the construction of a large canal, withdrawing from Lake Michigan a large amount of water, across the Continental Divide, to form the most important link or section of the Deep Waterway from Lake Michigan to the Gulf of Mexico. The said Act of the General Assembly of Illinois, under which The Sanitary District was organized and constructed its works, was reported to Congress by the Secretary of War through the annual report of the Chief of Engineers of the United States army for the year said Act was passed by said General Assembly; and the said Chief of Engineers, of the United States army, also reported to Congress from year to year the progress of the construction of the Main Channel of said Sanitary District.

The said annual reports of said Chief of Engineers, United States Army, were printed and largely distributed in the State of Wisconsin and in other states.

The flow of the Chicago river and its north and south branches in a state of nature was small and insignificant and did not exceed 30 cubic seconds feet at low water which existed during a large portion of each year. The diversion of 24,000 cubic minutes feet of water by the deep cut plan of construction of the Illinois and Michigan Canal, and the additional diversion resulting from the operation of said pumps at Bridgeport in the year 1881, caused the reversal of the current and flow of the Chicago river during the greater portion of each year. Thus, for years prior to the opening of the main channel of the Sanitary District on January 17, 1900, the said Chicago river did not flow generally into Lake Michigan, but flowed in a reversed direction to the Illinois and Michigan Canal, and to the Desplaines river.

There is appended hereto as Exhibit "B" (following page 113), a map showing the territorial limits of the Sanitary District of Chicago and the location of said Main Channel with its intercepting sewers and adjuncts.

6. These defendants and each of them admit that the General Assembly of Illinois passed an act, entitled "An Act to create sanitary districts and remove obstructions in the Desplaines and Illinois rivers," approved May 29, 1889, in force July 1, 1889, as is alleged in paragraph 6 of said bill of complaint, and that Sections 23 and 24 of said Act are set forth *in haec verba* in said paragraph 6 of said bill of complaint.

7. These defendants admit that in November and December of the year 1889, The Sanitary District of Chicago was organized under said act of the General Assembly of Illinois, and that it has since continuously existed as such Sanitary District under said acts of 1889 and acts amendatory and supplementary thereto; that at the time of its organization, the defendant, The Sanitary District of Chicago, comprised a territory of about 185 square miles in area; that by various acts of the General Assembly of Illinois, the area of said defendant, The Sanitary District, has been increased, and the area of said Sanitary District now comprises approximately 395

square miles, extending from the Illinois state line, on the south and east to the northern boundary of Cook county on the north with about 33 miles of frontage on Lake Michigan.

These defendants, however, aver that the additions to the territory of the said Sanitary District, made pursuant to acts of the General Assembly of Illinois, passed since the organization of said district, were made for the purpose of preventing contamination of the water supply and thus enabling The Sanitary District of Chicago to better and more effectively accomplish the main purpose of its organization; that the population added to it by said acts of the General Assembly is small and of little consequence compared with the population then and now existing within the area which originally comprised the territory of The Sanitary District prior to the passage of said acts, adding area to said territory.

8. These defendants admit the allegations of paragraph 8 of said bill of complaint, with reference to the construction of the main channel of The Sanitary District, except as to the time when said construction was commenced. As to such allegation these defendants aver that the construction of the main channel of said The Sanitary District of Chicago was commenced in the year 1890, and long prior to said 3rd day of September, 1892.

9. These defendants admit that the allegations of Paragraph 9 of said bill of complaint, and that Section 20 of the said Act of the General Assembly of Illinois of 1889, under which The Sanitary District of Chicago was organized, was amended in 1895 by the General Assembly of Illinois, as is alleged. But these defendants aver that without said amendment the said section of said original act provided for the diversion and flow continuously through the main channel of "at least 200 cubic feet per

minute for each 1,000 population of the district drained thereby,'' which is equivalent in amount to 20,000 cubic feet per minute for each 100,000 population.

10. These defendants admit the allegations of Paragraph 10 of said bill of complaint, except as to the date when the said main channel of The Sanitary District was opened. These defendants aver that said main channel was opened on or about January 17, 1900.

11. These defendants admit the allegations of Paragraph 11 of said bill of complaint, except as to the effect of said act of 1895 in said bill of complaint mentioned. As to said act of 1895, these defendants aver that the duty of diverting 20,000 cubic feet per minute of water for each 100,000 population of the Sanitary District, through the main channel, was imposed by the original act passed in 1889 and was not solely provided for by said amendment of 1895 mentioned.

12. These defendants admit the allegations of Paragraph 12 of said bill of complaint.

13. These defendants admit the allegations of Paragraph 13, of said bill of complaint, with reference to the construction of a hydro-electric power plant at Lockport, Illinois, and the capacity thereof.

14. These defendants and each of them deny that the object and purpose of operating said main channel of said Sanitary District since the completion of said hydro-electric plant in the year 1907 has been and is two-fold. On the contrary, these defendants aver that the primary purpose of operating said works is to divert water from Lake Michigan for sanitary purposes; that water has not been diverted at any time for the operation of said hydro-electric works in excess of the amount required for sanitation and navigation, and the use of said waters for generating electrical energy has in no way affected

navigation upon any navigable water of the United States, or the use of such waters for sanitation; that the amount of water diverted from time to time has been and is as near as possible the amount provided to be diverted according to the population of the Sanitary District as provided by said Sanitary District Act; that at no time has the mean daily, or mean monthly, or mean yearly flow or diversion exceeded the said amount; that prior to the construction of the said hydro-electric plant, the energy produced by said water as it passed from the southern terminus of the said main channel to the Desplaines river was entirely wasted and served no purpose; that the only purpose of constructing and operating said hydro-electric plant was to conserve this energy to be used in the operation of the various plants and works of the Sanitary District requiring the use of electrical energy, and the surplus energy has been and is sold; that a large amount of such electrical energy so produced has been and is used for the purpose of lighting the streets of the City of Chicago and its suburbs, and also for lighting the boulevards and parks of the various park systems of Chicago; that the energy so used for such public purposes has been and is sold by the Sanitary District at the cost of production.

15. These defendants, and each of them, admit that the mean yearly amount of water passing through said Sanitary District canal, at its westerly terminus, for the years 1900 to 1917, both inclusive, was approximately the amount for said years set forth in said Paragraph 15 of said bill of complaint. These defendants deny that the said figures are based on methods of calculation which result in very considerably, or to any extent underestimating any amounts of actual flow through said canal. On the contrary these defendants aver that the methods used to calculate said yearly mean

flow of water are methods which should produce results as nearly accurate as could be produced by any method of calculation. These defendants further say that the flow of water through said canal for the first four months of the year 1922 has been approximately the amount required by the Sanitary District Act, according to the population of the Sanitary District, namely—twenty thousand cubic feet per minute for each one hundred thousand population.

16. These defendants admit that all the water diverted from Lake Michigan by defendants through and by means of the Sanitary District main channel, is carried into the Mississippi Valley, but these defendants deny that said water is permanently extracted from the Great Lakes system.

These defendants and each of them deny that the mean level or surface elevation of the water of Lakes Michigan, Huron, Erie and Ontario, and the various waterways connecting said lakes and the St. Lawrence river above tide-water has been or will be lowered 6 inches, or any other amount below the level that would have existed or would exist in said lakes and waterways in the absence of such diversion. On the contrary these defendants and each of them aver that the surface elevation of said Lakes Michigan, Huron, Erie and Ontario and their connecting channels has not been lowered by said diversion; that if there has been any lowering of the surface level of water of said lakes, it has been and is only a theoretical lowering, and that by reason of said diversion, if there has been actually any lowering of said lake levels below what they would have been had such diversion not existed, such lowering has not been to any appreciable extent and has been so small and inconsequential that it has not, and will not, have any effect upon the said

Great Lakes system of waterways, or any of said harbors, or navigation thereon.

These defendants further aver that the water diverted to the Gulf of Mexico or the Mississippi river valley returns to the Great Lakes system by processes of nature which are continuously going on, by which the water flowing from the Great Lakes system from any and all outlets is returned to said Great Lakes system, so that the amount of water stored in the Great Lakes system and each of said lakes and waterways is approximately the same from one period of years to another.

17. These defendants, and each of them, deny the allegation of said bill of complaint to the effect that at no time during the period of at least six years last past, or at any other time has it been necessary, for the protection of the health of the people of the district, or for any other purpose, that sewage of The Sanitary District of Chicago be disposed of by means of said canal; that it has been entirely feasible or to any extent feasible during all of said period, or during any period, or is now feasible for said district to adopt and use so-called scientific methods of sewage disposal. These defendants further deny that there is in successful or practical operation for a large metropolitan population, such as exists in Chicago and its suburbs, and surrounding urban communities so-called artificial or scientific sewage purification works that do not have as a basis the disposition of sewage by the so-called dilution method of sewage disposal provided for by the diversion works of The Sanitary District of Chicago.

These defendants aver that it would be impossible or impracticable to construct and operate works for the disposition of sewage of The Sanitary District of Chicago without the use of substantially the amount of water provided to be diverted under said Sanitary District Act;

that works for the disposition of sewage of the Sanitary District, to be operated with the diversion of an amount of water from Lake Michigan of substantially less than that required by the Sanitary District Act, above mentioned, or the amount of 4,167 cubic seconds feet, would cost to construct and complete, upwards of one hundred and fifty million dollars, and the cost of operation of such works per year, over the cost of operating the diversion works of the Sanitary District, as now constructed and in operation, would equal the sum of approximately five million dollars; that The Sanitary District of Chicago is without funds or resources with which to construct such works within any reasonable period of time; that the method provided for under the said Sanitary District Act for the disposition of sewage, within the territorial limits of the Sanitary District, was, and it was at the time of the passage of said Act, and has been since and now is the only practicable and feasible means by which said sewage may be disposed of and the water supply for the people of the Sanitary District protected; that the art of sewage disposal, by so-called scientific means, other than by dilution, has been for a long period of years in a state of change; that various methods have been suggested and recommended by eminent sanitary engineers, and they have been used and tried for a period of time, only to be shortly discarded as impracticable and some other method or system adopted in their stead, which system or method, in turn, followed the same course as the previous ones; that to keep the water supply free from pollution any method for the disposal of sewage which may be adopted for Chicago must necessarily have, as its basis, the condition that no sewage or effluent coming from so-called artificial sewage purification works shall, at any time, or by any possibility should find its way into Lake Michigan by way of the Chicago river, or from any other source; that a diversion of water from Lake Michigan of less than the maximum run-off of the Chicago river drainage area, or the maximum flow of the Chicago river would make it possible for the Chicago river to at times flow toward Lake Michigan, thus carrying with it any sewage or effluent from sewage purification works, which must necessarily be in said river under any plan of sewage disposal; that The Sanitary District of Chicago has expended in the construction of its various diversion works, above described, the sum of about ninety million dollars; that the substantial reduction in the amount of the flow or diversion of water from Lake Michigan, below that provided for by said Sanitary District Act would render useless the said works for sanitary purposes, and therefore the larger portion of said sum would be lost to the people of the Sanitary District; that the following table shows the expenditures made by defendant Sanitary District on its various works for diversion of water to December 31, 1915:

SANITARY DISTRICT OF CHICAGO
COST OF RIGHT OF WAY AND CONSTRUCTION OF PLANTS, CHANNELS AND BRIDGES.

Calumet Sag Channel construction prior Dec. 31, 1915	$ 5,220,766.35
Calumet Sag Channel bridge construction prior Dec. 31, 1915	154,323.44
Calumet Sag Channel "right of way" channel and bridge construction	7,891,798.61
Chicago River main outlet and South Branch cost of right of way improvement and bridge construction	782,412.77
Chicago River North Branch, bridge construction prior Dec. 31, 1915	26,078.10
Chicago River North Branch, dredging, Docking, etc., prior Dec. 31, 1915	382,124.52
Chicago River North Branch, cost of right of way, improvement and bridge construction	5,894.03
Chicago River South Branch, bridge construction, prior to Dec. 31, 1915	3,579,041.30
Chicago River South Branch, dredging, docking, etc., prior to Dec. 31, 1915	2,518,526.61
Calumet River improvements, construction	4,985.35
Conduit and sewer outfall construction	9,308,588.07
Controlling works Calumet Sag Channel, construction, Dec. 31, 1915	16,715.44
Controlling works and Des Plaines River improvement and construction (Joliet project), Dec. 31, 1915	161,830.70
Controlling works at Lockport, main channel, Dec. 31, 1915	332,143.86
Controlling works, main channel, bridge construction, Dec. 31, 1915	8,572.87
Des Plaines River diversion bridge, construction, Dec. 31, 1915	152,892.42
Des Plaines River improvement bridge construction (Joliet project), Dec. 31, 1915	344,112.17
Des Plaines River diversion construction, Dec. 31, 1915	1,066,214.04
Des Plaines River improvement (Joliet project), Dec. 31, 1915	1,309,164.21
Des Plaines River improvement, cost of right of way, improvement and dredge construction	3,383.84
Kampsville and La Grange dams, improvements	24,349.36
Machinery and tools, Dec. 31, 1915	110,442.07
Main channel extension and Des Plaines River diversion construction, Dec. 31, 1915	860,601.24
Main channel construction, Dec. 31, 1915	19,600,122.71
Main channel, bridge construction, Dec. 31, 1915	2,630,627.58
Main channel, cost of right of way, channel and bridge construction	263,751.08
Main channel extension, construction, Dec. 31, 1915	2,269,509.22
Main channel extension, bridge construction, Dec. 31, 1915	151,998.93
Main channel extension, cost of right of way, channel and bridge construction	127,849.30
Miscellaneous structures and equipment	60,340.68
North shore channel, construction, prior Dec. 31, 1915	1,304,516.61
North shore channel, bridge construction, prior Dec. 31, 1915	634,303.14
North shore channel, cost of right of way, channel and bridge construction	135,061.80
Pumping station structures and equipment	3,710,878.80
Real estate, Calumet-Sag pumping station, Dec. 31, 1915	2,710.36
Real estate, Calumet sewer, pumping station, Dec. 31, 1915	12,423.40
Real estate, Fifty-second avenue sewage disposal works, Dec. 31, 1915	39,505.88
Real estate, Lawrence avenue intake crib, Dec. 31, 1915	22,500.32
Real estate, Morton Grove experimental sewage plant	12,946.64
Real estate, Thirty-ninth street pumping station, Dec. 31, 1915	633,917.96
Real estate, stock yards testing station, Dec. 31, 1915	920.68
Real estate, Wilmette pumping station, Dec. 31, 1915	386,461.74
Right of way, Calumet sag channel, Dec. 31, 1915	611,272.68
Right of way, Desplaines River Diversion, Dec. 31, 1915	227,541.89
Right of way, Desplaines River Improvement, Dec. 31, 1915	680,440.32
Right of way, main channel, Dec. 31, 1915	2,139,565.58
Right of way, main channel extension, Dec. 31, 1915	29,520.70
Right of way, North Branch Chicago River, Dec. 31, 1915	17,150.00
Right of way, North Shore Channel, Dec. 31, 1915	1,218,705.59
Right of way and easements, North Shore Conduits, Dec. 31, 1915	6,362.32
Right of way, South Branch Chicago River, Dec. 31, 1915	5,484,956.34
Sewage Treatment Plant Construction	5,901,499.27
Sewer construction, Calumet, Dec. 31, 1915	73,011.82
Sewer construction, Fifty-second Avenue and disposal project	260,682.43
Sewer construction, Niles Center sewer, Dec. 31, 1915	319.27
Sewer construction, North Shore Conduits, Dec. 31, 1915	614,746.04
Sewer construction, sewer outfalls at Summit, Ill., Dec. 31, 1915	745.00
Sewer construction, Stock Yards sewer, Dec. 31, 1915	1,067.12
Sewer construction, West Thirty-ninth Street & Western Ave., Dec. 31, 1915	162,249.79
Special construction works	163,709.67
Structures and equipment for Sanitary Improvements, sewage & Special Investigations & experiments	95,837.07
Water power development at Hickory Creek	14,663.35
	$83,969,354.45

18. These defendants, and each of them, deny that the diversion of waters by way of said main channel of the Sanitary District has diminished the utility of the ports of Wisconsin, described in paragraph 4 of said bill of complaint, and in paragraph 4 of this answer, and that it has reduced, by six inches or any other amount in each of said ports, the draft of vessels which can be accommodated therein for loading and unloading. These defendants are not informed as to the per cent of tonnage of freight received at said ports which consists of coal shipped from eastern states, and which coal, except for the amount consumed at the ports themselves, is then carried by rail to the large number of cities, villages and towns in the State of Wisconsin and in other states to the west of Wisconsin, and constitutes the principal source, or any other source of supply of coal for the State of Wisconsin in its proprietary capacity as owner of many public buildings and institutions, and for many thousands, or any number of individuals, and industrial plants located in said state, and therefore these defendants ask that complainant be required to make strict proof of such allegations. These defendants are not informed as to the character or type of vessels that carry coal to said ports, or the amount of their carrying capacity, or the rates of freight that they are capable of being operated upon when loaded to maximum capacity, or to any other capacity, and therefore ask that strict proof be required. These defendants admit that every inch of normal draft which vessels are unable to utilize reduces their cargo carrying capacity by a number of tons. These defendants, and each of them, aver that the diversion of water from the Great Lakes by means of the Sanitary District works has not in any way affected the draft which vessels entering the said ports are able to utilize and that their cargo carrying capacity has not

been, and is not, reduced because of any such diversion. These defendants further aver that the commerce described in paragraph 18 of said bill of complaint is interstate commerce and is carried on upon navigable waters of the United States, over which the United States has exclusive jurisdiction, and the complainant herein has no jurisdiction to complain of any supposed interference with said navigable waters, and therefore these defendants, and each of them, move that the allegations with reference to said commerce and with reference to any supposed interference by said diversion of water upon said navigable waters of the United States be stricken and dismissed from said bill of complaint. These defendants further aver that all of the said harbors or ports described in said bill of complaint require, for their maintenance, constant dredging each year under normal conditions, and any dredging made necessary by virtue of any supposed effect of said diversion upon said ports or harbors would be and is negligible and of no consequence.

19. These defendants admit that in addition to the Wisconsin ports enumerated, located on the shores of Lake Michigan, there are a large number of ports located on the shores of Lake Michigan in the states of Illinois, Indiana and Michigan, on Lake Huron in the states of Michigan and the Dominion of Canada, on Lake Erie in the states of Michigan. Ohio, Pennsylvania and New York and the Dominion of Canada, and on Lake Ontario in the State of New York and the Dominion of Canada. These defendants deny that the diversion of water from the Great Lakes by The Sanitary District works has caused, or will cause the lessening of the utility of all or any of said ports on said lakes, and of the waterways connecting said lakes in the same, or any other manner described with reference to the Wisconsin ports on Lake Michigan; that in the conduct of

transportation between Wisconsin ports and the said ports in other states the possible loading of vessels bound to, or from such other ports is reduced by many tons, or by any number of tons because of said diversion. These defendants further deny that the diversion of water through The Sanitary District works has affected or injured the traffic between said states and the Wisconsin ports of Superior, Ashland and Washburn, or either one of them, located on Lake Superior. These defendants are not informed as to the amount or character of the commodities carried by boats or vessels between the said Wisconsin ports located on Lake Superior, and the various ports located on Lakes Michigan, Huron, Erie and Ontario in other states, and ask that strict proof be required. These defendants deny that the said diversion of water through the said Sanitary District works has caused or will cause loss of many millions of dollars, or any other sum of money to the people of the State of Wisconsin, or any of the people of Wisconsin, or any other person whomsoever.

These defendants aver that the commerce described in said paragraph 19 of said bill of complaint is commerce carried on over and upon navigable waters of the United States, over which Congress has assumed and has exclusive jurisdiction; that the supposed injury and damage, so alleged in said bill of complaint, concerns and relates to interference with navigable waters of which the said complainant has no right or jurisdiction to complain, and therefore these defendants, and each of them move that the said allegations in paragraph 19 of said bill of complaint be stricken and that the said bill of complaint as to such allegations be dismissed.

20. These defendants, and each of them, deny that the diversion of water, as aforesaid, has impaired navigation upon the Chicago river; that a current thereby has

been introduced into said river so swift as to make navigation thereof difficult or dangerous. But on the contrary these defendants, and each of them aver that there is no current in the Chicago river, or the south branch thereof or its fork, or the north branch of the Chicago river injurious to, or materially affecting navigation upon said river or its said branches; that to properly provide for said diversion so that there would be no current injurious to, or materially affecting navigation on said rivers and its branches, the defendant, The Sanitary District of Chicago, pursuant to authority from the Secretary of War, deepened, widened and straightened said river and its branches, and replaced old center pier bridges with new and improved bascule type of bridges; that the said Chicago river and its south branch, and the west fork was, before The Sanitary District improved same, as aforesaid, narrow, tortuous and shallow, being at points less than ninety feet in width and only seventeen feet deep, over practically the entire course; that the said defendant The Sanitary District, has widened the said river and its branches so that it is now, at all points, upwards of two hundred feet in width, and has deepened the channel of said river and its branches to twenty-six feet at all points; that in making said improvements, the said defendant, The Sanitary District of Chicago, has expended upwards of thirteen million dollars, as will be hereinafter more specifically described; that the Chicago river and its said branches, to the terminus of the said main channel of The Sanitary District is of such depth and width that the largest boats navigating the Great Lakes may traverse the course of said rivers, and the bridges across the said rivers are so constructed that they may be moved out of the way of any such boats so desiring to pass. These defendants deny that the said diversion has had any effect whatsoever upon the commerce of said Chicago river and its branches, or has in any manner, or to any extent, reduced the tonnage carried thereon. Upon the contrary, these defendants aver that the improvement of the Chicago river and its branches, by The Sanitary District, has had the effect to increase the possible tonnage on said Chicago river and its branches over what it would have been had the said defendant, The Sanitary District, not created said diversion and made the improvement in navigation on said rivers, as stated. These defendants further aver that no part of the said Chicago river and its said branches has become closed by reason of said diversion, or has been made inaccessible to the commerce of the people of Wisconsin, or any other person or persons.

21. These defendants, and each of them admit, that prior to the construction of said canal of The Sanitary District of Chicago, the Chicago, DesPlaines and Illinois rivers constituted navigable waterways of the United States, extending from Lake Michigan on the east, to the Mississippi river on the west. These defendants admit that the defendant, The Sanitary District, diverted certain portions of the DesPlaines river from its original bed; but deny that said defendant modified or altered the navigable capacity of said waterway by any of such diversions. These defendants further deny that the said Sanitary District diversion has had any effect upon the navigable capacity of the west fork of the south branch of the Chicago river west of the commencement of said canal. These defendants deny that said canal has become in fact a substitute for the old navigable waterway as defined in said bill of complaint and that said canal is now the only practical means of navigation by water from Lake Michigan to the Mississippi river. In this connection these defendants aver that said canal of the Sanitary

District has become practically a substitute for the Illinois and Michigan Canal from Chicago to Joliet and is now the only practical means of navigation between the Chicago river and the Illinois and Michigan Canal at Joliet; that that portion of the Illinois and Michigan Canal extending north from Joliet as originally constructed is in its present state useless as a means of navigation on account of the lack of sufficient water therein and because of various obstructions in the bed of said Canal; that the portion of said Illinois and Michigan Canal extending from Joliet to the Illinois river at LaSalle is, however, now used and operated for navigation purposes. And these defendants aver that since the construction of said main channel of said district commerce has used the modern, complete and practicable waterway provided by The Sanitary District's main channel to the City of Joliet and the old Illinois and Michigan Canal to the Illinois river near LaSalle where it follows the Illinois river to the Mississippi; that said Canal of The Sanitary District is six times as deep and four times as wide as the old Illinois and Michigan canal as it existed, and as it was operated prior to the completion of the main channel of the District. These defendants further deny that they, or either of them have refused expressly, or otherwise, to concede that the said canal is a navigable waterway of the United States, or that they or either of them have undertaken to bar the Government of the United States from the use of same for its purposes, or for interstate commerce. These defendants aver that the said canal of the District has been used, and is now used and operated in such manner as to make navigation thereon free, easy and convenient, and that it serves the purposes of navigation, as well as sanitation, and that the use for sanitation has not conflicted with, and does not conflict with, has not impaired and does not impair the use for navigation. These defendants further aver that the conditions provided for under said Section 24 of said Act of 1889 have been nullified and eliminated by Section 3 of said Act of May 14, 1903, in force July 1, 1903, as follows:

> "Said Sanitary District shall permit all watercraft navigating, or proposing to navigate said Illinois and Michigan Canal, to navigate the water of all said channels of said Sanitary District promptly, without delay, or payment of any tolls at locks, or charges for so navigating in said channel. The rules of the United States Government now in force regulating navigation on the Chicago river shall govern navigation on the channels of The Sanitary District of Chicago. * * *"

These defendants, and each of them further aver that the matters and things complained of in said paragraph 21 relate to navigation upon navigable waterways of the United States, over which the United States has assumed, or has exclusive jurisdiction, and of which the said complainant has no jurisdiction or authority to complain, and therefore these defendants, and each of them move that said allegations of paragraph 21 be stricken from said bill of complaint and dismissed therefrom.

22. These defendants deny that the amount of water necessary to permit said canal of said Sanitary District to be operated for navigation purposes only, does not at the present time exceed 500 cubic feet per second, or that the amount of water which may, in the future be required for the operation of said canal for navigation purposes only, if permitted to be operated for such purposes and to the fullest extent of its capacity, will not exceed one thousand cubic feet per second. Upon the contrary, these defendants, and each of them, aver that the amount of water required for navigation on said

canal, and upon the Illinois Waterway (hereinafter described), extending from the southern terminus of said canal at or near Joliet, on the DesPlaines and Illinois rivers, is approximately the amount of ten thousand cubic seconds feet of water, which said amount of water can only be obtained from Lake Michigan by means of the diversion works of The Sanitary District.

23. These defendants admit that paragraph 23 of said bill of complaint contains correct and true copies of various documents, or so-called permits, signed by the Secretary of War, Assistant Secretary of War or acting Secretary of War, upon the dates therein indicated.

24. These defendants, and each of them, deny the allegations of said bill of complaint to the effect that all said documents mentioned in paragraph 23 of said bill of complaint are not nor never have been of any force or effect as constituting an authorization for the defendants, or either of them, to withdraw water from Lake Michigan; that the abstraction or diversion of water by the defendant, The Sanitary District, has obstructed or in any manner affected the navigable capacity of Lake Michigan, or any other navigable water of the United States; that the said abstraction or diversion has obstructed or in any manner affected the navigable capacity of the Chicago river by introducing a dangerously swift current, or any current obstructive or to any extent affecting navigation in and on said river.

These defendants further deny the allegations of said bill of complaint concerning the authority given by said Rivers and Harbors Act of March 3, 1899, to the Secretary of War relating to the approval and placing of structures or other works in or in such manner as to affect the navigable capacity of navigable waters of the United States.

These defendants, and each of them, further deny that at no time since the 31st day of March, 1903, or at any other time have the defendants, or either of them, been authorized by the Secretary of War to divert from Lake Michigan or to pass through the Chicago river, the Calumet river, or both into the canal of The Sanitary District more than 4,167 cubic feet of water per second; but, on the contrary, these defendants and each of them aver that the defendant, The Sanitary District of Chicago, has been and is now authorized to divert the amount of water required by The Sanitary District Act according to the population of said defendant.

These defendants further deny that the defendant, The Sanitary District of Chicago, has withdrawn within the last ten years, or at any other time, any water from Lake Michigan in violation of the permits of the Secretary of War above mentioned.

These defendants admit that the defendant, The Sanitary District of Chicago, has drawn and diverted through its diversion works during the period of ten years last past water in excess of 4,167 cubic feet per second.

These defendants further admit that since the 6th day of October, 1913, there has been pending in the District Court of the United States for the Northern District of Illinois, an action wherein the United States is plaintiff and The Sanitary District is defendant; that the object and purpose of said action is to restrain said defendant from diverting a greater amount of water from Lake Michigan than 4,167 cubic seconds feet; that on or about the 19th day of June, 1920, the judge of the District Court of the United States before whom the said cause was pending informally and orally announced that he would enter a decree granting the prayer of the United States and restraining the defendant from diverting more than 4,167 cubic feet of water per second from Lake Michigan; that the judge who thus informally and orally announced his decision is no longer judge of said court. These defendants and each of them further aver as follows:

Immediately upon the said decision being announced the defendant, The Sanitary District of Chicago, by written motion, moved that the Court modify its oral announcement and that the Court direct the entry of a decree in such manner that the defendant, The Sanitary District, should only be enjoined and restrained from thereafter abstracting or withdrawing water from Lake Michigan in excess of 10,000 cubic seconds feet, on the condition that the defendant, The Sanitary District of Chicago, pay the United States the cost of constructing and maintaining compensating or regulating works to off-set for the alleged lowering of the surface elevation of the Great Lakes except Lake Superior, including their connecting channels, harbors, and other connecting navigable waters. Defendant Sanitary District pursuant to ordinance of its corporate authorities offered to pay said cost. The said motion, in addition to other defenses originally made, alleged that it is an admitted fact undisputed in the record in said cause that such compensating or regulating works could be constructed which would wholly and entirely off-set for any claimed lowering of lake surfaces; that the construction and operation of said works had been recommended by various commissions and boards appointed pursuant to Acts of Congress to study and report upon and make recommendations concerning diversions of water from the Great Lake System,—not only the diversion at Chicago, but also the various and numerous other diversions at other points and places upon the Great Lakes and their connecting waters. The said motion, partly heard, was postponed for further argument and hearing. With the matter in this condition the judge who thus orally and informally made said announcement resigned about March 1, 1922, and thereafter has been no longer judge of said Court. The defendant, The Sanitary District, has been at all times since the presentation of said motion ready to proceed and finish the hearing thereon, and at no time has it asked for delay or for a continuance of any hearing upon said motion.

These defendants further aver as follows:

Substantially coincident with the passage of the Sanitary District Act of May 29, 1889, the General Assembly of Illinois passed a resolution stating the waterway policy and plans of the State, tying up to said waterway policy and plans, the said Sanitary District Act. This resolution also clearly shows that the State, in pursuing said policy and in passing said Sanitary District Act, assumed to act pursuant to the Act of Congress of March 2nd, 1827. Said resolution, passed May 28, 1889, is, in part, as follows:

> "WHEREAS, it is contemplated to increase the volume from Lake Michigan three hundred thousand cubic feet per minute within a few years, and ultimately to add six hundred thousand cubic feet, or more, thus enabling a large depth for navigation to be obtained by an improved channel, and that said channel will be self-sustaining and self-improving, and will discharge flood waters more readily, thus benefiting the bordering lands and increasing the healthfulness of the valleys, and
>
> WHEREAS, the works now projected by the City of Chicago form part of the waterway of large proportions from Lake Michigan via the DesPlaines and Illinois rivers to the Mississippi river, of which the dams and locks upon the alluvial section of the Illinois river can form no part, and which, if allowed to remain, will increase the overflow and will be detrimental to the Illinois valley, in the interest of the

> State, therefore, be it resolved by the Senate and House of Representatives concurring herein:
>
> (1) That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practical depth and usefulness for navigation from Lake Michigan via the DesPlaines and Illinois rivers to the Mississippi river, and to encourage the construction of feeders thereto in like proportions and usefulness."

The said resolution was included in the Chief of Engineer's Report to the Secretary of War, and the Secretary of War to Congress for said year 1889.

On or about April 21, 1891, The Board of Trustees of the Defendant, The Sanitary District, passed a resolution in regard to the use of the Chicago river. Certified copy of same was sent to the Secretary of War, which said resolution is in words and figures as follows, to-wit:

> "Resolved that this Board hereby ordains that The Sanitary District of Chicago do, forthwith, enter upon, use, widen, deepen and improve the Chicago river from its mouth at Lake Michigan to the south branch thereof and also the south branch thereof together with the south and west forks thereof so as to make the same a proper and sufficient supply channel for the main channel heretofore surveyed from the Chicago river to Joliet and further, that the acting Chief Engineer be and he is hereby directed immediately to investigate and report upon the capacity of said river and its said south branch and forks for that purpose, and also as to any changes that should be made therein and that a copy of this resolution, certified by the clerk be, forthwith, transmitted to the mayor and common council of the City of Chicago and the Secretary of War of the United States."

It was then contemplated that the Sanitary District main channel would be opened about the year 1900; that the population of the metropolitan drainage area which would be drained at that time by the main channel of The Sanitary District would be approximately 1,500,000 requiring a diversion of approximately 5,000 cubic seconds feet of water based upon the amount of water according to population as specified by The Sanitary District Act. Therefore, during the period of the construction of the main channel and in contemplation of its opening and operation the defendant, The Sanitary District of Chicago, made certain comparatively small improvements in the Chicago river, its south branch and west fork thereof by removing obstructions, and enlarging the channels, in order to accommodate temporarily the said flow through said rivers to the main channel. The said ordinance above quoted generally stated the plan and purpose of the defendant, The Sanitary District of Chicago, in connection with said Chicago river and its branches. The said improvements in said rivers made prior to the year 1900 were pursuant to permits and authority of the Secretary of War. The requests for said permits made by the defendant, The Sanitary District, stated the purpose for which said permits were desired—namely the enlargement of the channels to accommodate the flow of water required.

On or about June 16, 1896 The Sanitary District in writing requested the Secretary of War for permission to do work in the Chicago river necessary to this project. Among other things the request stated:

> "The work of The Sanitary District has progressed so far that it is now necessary for us to enter upon that which must be done in the Chicago river to make available the artificial channel which we have under construction from Robey street, Chicago, to Lockport in Will county, twenty-eight miles distant. Our connection with Lake Michigan must be through the Chicago river with the west fork of the south branch with which we make a junction at Robey street.

On or about June 24, 1896 the division engineer of the United States Army at Chicago reported to the Chief of Engineers upon the advisability of granting the permit to the Sanitary District. Among other things the report stated:

> "As far as the work itself is concerned there can be no objection to it, as in every case the navigation channel of the Chicago river will be improved and at this stage I am unable to do otherwise than to recommend the granting of the authority sought."

On or about July 3, 1896, the Acting Secretary of War granted the permission desired. Various other permits were granted pursuant to similar requests. At the time said channel was opened the defendant, The Sanitary District of Chicago, had expended on the improvement of the Chicago river and its branches for the purposes mentioned approximately $1,918,130.21. No sooner, however, had the channel of The Sanitary District been opened and water caused to pass through same from Lake Michigan by way of the Chicago river and its branches than it was ascertained that the narrowness and shallowness of the channels of said rivers were such that the current in said rivers obstructed navigation thereon. Thereupon the Secretary of War attempted to limit the diversion through the said Chicago river and its branches. Such limitations were made solely and entirely because of said current. The permits or documents referred to in Paragraph 23 of said bill of complaint except the one dated May 8, 1899 and the one dated June 30, 1910, show that such limitations were based upon that ground and upon no other.

On or about April 26, 1900 in order to obtain a permit for complete improvement of the Chicago river and its said branches so as to permit the withdrawal by means of The Sanitary District diversion works of 10,000 cubic seconds feet of water, The Sanitary District of Chicago made of the Secretary of War the following request:

"THE SANITARY DISTRICT OF CHICAGO

Security Building
Chicago, April 26, 1900.

To the Honorable
The Secretary of War.

Sir:

The Sanitary District of Chicago, a municipal corporation organized and existing under the laws of the State of Illinois, respectfully represents that, by the laws of the State of Illinois and the charter of this petitioner, it is authorized to enter upon, widen, deepen and otherwise improve any navigable stream, river or other water-way. That in pursuance of the power conferred upon it by the statutes of the State of Illinois, and in the performance of the duties enjoined upon it by the act of the Legislature authorizing its creation, and under which it is acting, it has been determined to improve the Chicago river by widening and deepening the same and to the end that such action on the part of your petitioner may be conformable to law and the statutes of the United States in that behalf, it hereby makes application for permission to make the changes, alterations and improvements in said Chicago river from or near Lake street in the City of Chicago to or near Ashland avenue in the City of Chicago, said work to conform to the plan and specifications as follows:

(*a*) A map herewith exhibits the existing boundaries of that part of the south branch of the Chicago river which it purposes and desires to improve.

(*b*) The work to be done contemplates widening the river to a width of two hundred (200) feet between dock lines, except in so far as bridge abutments may project into the stream outside of the new dock lines; said widening in all cases to be made with a view of improving the navigability of the stream.

(*c*) The work to be so done as to ultimately permit excavation of the river bed to a depth of thirty (30) feet below water surface throughout the central portion of the stream.

(*d*) The widening of the river is to be so disposed that the effect will be to produce a straighter channel than now exists and, furthermore, to result in a continuous dock line having straighter alignment and being better disposed for navigation than the docks which now exist.

(*e*) The work to be done is to be prosecuted progressively as to time. The rate of progress being limited by the rapidity with which right of way may be acquired and the resources for the execution of the work to be made available. The modification and alteration of said river as above indicated will greatly benefit navigation in said river. Your petitioner, therefore, respectfully requests that the plan of improvement as above outlined be approved by you.

Awaiting as early a reply as practicable under the circumstances, your petitioner has the honor to be,

Very respectfully yours,
THE SANITARY DISTRICT OF CHICAGO,
By WILLIAM BOLDENWECK,
President.

Attest:
JOSEPH F. HAAS,
Clerk."

In connection with the same project on or about June 7, 1900, the defendant, The Sanitary District of Chicago made of the Secretary of War the following request:

"Chicago, June 7, 1900.

To the Honorable,
The Secretary of War.

Sir:

Under date of April 26, 1900, the Sanitary District of Chicago had the honor to address a communication to you containing an outline of the proposed improvement of a portion of the south branch of the Chicago river. Accompanying the letter was a map showing the location of the south branch of the Chicago river, the bridges spanning said river and, also the width of the stream along the entire course of the south branch of the river. Since that date The Sanitary District of Chicago passed an ordinance for the improvement of the south branch of the Chicago river from the south line of Twelfth street to the east line of Ashland Avenue, so as to make said south branch, between the lines aforesaid, of a uniform width of two hundred (200) feet; the work to be done so as to ultimately permit excavation of the river bed to a depth of thirty (30) feet below water surface throughout the central portion of said stream, in accordance with the plans adopted by the Board of Trustees of The Sanitary District of Chicago, a copy of which plans is hereto annexed. The ordinance referred to being marked Exhibit 'A' with this letter; and the maps showing the plans of the proposed improvement being marked Exhibit 'B.' The maps are in two sections, known respectively as No. 2 and No. 3.

The Sanitary District of Chicago is a municipal corporation, organized and existing under the laws of the State of Illinois and by the laws of said State and the charter of said Sanitary District, it is authorized to enter upon, deepen, widen and otherwise improve any navigable stream, river or other water-way; and that in pursuance of the power conferred upon it by the statutes of the State of Illinois and in performance of the duties enjoined upon it by the act of the Legislature authorizing its creation, and under which it is acting, it determined upon said plans outlined in the enclosed ordinance and further illustrated by the maps hereto annexed; and the said Sanitary District in compliance with the Statutes of the United States, hereby makes application to you for permission to make the changes, alterations and improvements in said south branch of the Chicago river, from the south line of Twelfth street to the east line of Ashland avenue.

Awaiting as early a reply as practicable under the

the circumstances, your petitioner has the honor to be,

Very respectfully yours,
THE SANITARY DISTRICT OF CHICAGO,
By WM. BOLDENWECK,
President.

Attest:
JOSEPH F. HAAS, *Clerk.*"

The maps mentioned in said requests for permits are, for convenience, attached at the end of the appendix to this Answer, and are made a part hereof.

On July 11, 1900 two permits were issued pursuant to said requests of April 26th and June 7th, 1900, respectively. Pursuant to said permits of July 11, 1900, The Sanitary District proceeded to draw detailed plans for the said improvement of the channel of the Chicago river and the channels of its branches mentioned, whereby said channels would be deepened at all points to 26 feet and widened at all points to not less than 200 feet, straightened, and old and obstructive center pier bridges replaced with new modern bascule bridges, leaving the river channel free for the flow of water and navigation. All these improvements permit and allow the diversion through The Sanitary District diversion works of not less than 10,000 cubic seconds feet with a current not obstructive to navigation and not exceeding a mile and a quarter per hour. The said plans were approved by the Secretary of War on or about January 17, 1902, and The Sanitary District thereupon entered upon the work required to complete said Chicago river improvement project. The work proceeded from time to time so that the project is now completed and has been so completed for a number of years last past, and the defendant, The Sanitary District, expended in the making of said improvement of the Chicago river and the channels of its branches mentioned, upwards of $13,000,000. Said improvement in said rivers has had the effect of eliminating any and all current obstructive to navigation and of permitting a withdrawal of water required by The Sanitary District Act according to the population of the District through said rivers so that the current has not, does and will not exceed one and a quarter miles per hour, and said current is not obstructive to navigation on the said rivers. Congress has directly authorized said diversion of water and the operation of the Sanitary District works for the purposes mentioned by said Act of March 2, 1827, and by resolution passed April 21, 1904, to permit the lowering of the crest of the government dams in the Illinois river at Kampsville and LaGrange, which said resolution is in part as follows:

> "The Secretary of War is authorized to permit The Sanitary District of Chicago at the expense of said corporation to lower the crest of the government dams in the Illinois river at Kampsville and LaGrange."

Said dams at Kampsville and LaGrange were government dams and had been constructed prior to the opening of said main channel. The increase in the flow of the Illinois river at the said dams by reason of the then diversion and the enlarging diversion as the population of The Sanitary District increased would raise the elevation of water in the Illinois river at and above said dams to an extent which might cause overflow or damage to lands. In order to eliminate such conditions Congress authorized the lowering of the dams, thus removing obstructions to the continuance of the diversion from Lake Michigan.

The said permit of May 8, 1899, authorized the opening and operation of the channel of the defendant, The Sanitary District with no limitation as to the amount of flow or diversion. The material conditions of said permit were and are that (1) If Congress should act, then of course, the permit should be of no further force or effect, and (2) that the Secretary of War might limit the flow or withdrawal of water if a current were created in the Chicago river unreasonably obstructive of navigation. Prior to said improvement of the Chicago river and its branches, made subsequent to the opening of said main channel, the Secretary of War did from time to time change and limit the diversion solely and only because of the current in the Chicago river. The improvement of the Chicago river and its branches by The Sanitary District at an expense of upwards of $13,000,000 was made for the purpose of eliminating this objection. The cause of the limitation or objection having been removed, the limitation thus ceased to have any effect, and said permit of May 8, 1899 has now its full force as if there were no conditions thereto except the one having reference to Congressional action in the premises.

In 1895 a Commission of Engineers appointed by the Secretary of War, of which Commission General O. M. Poe was Chairman, made a report to the Secretary of War, in substance, that it was the opinion of said Commission that the withdrawal of ten thousand cubic seconds feet of water from Lake Michigan, through the Sanitary District Canal, then under construction, would have the effect of lowering the surface elevations of Lakes Michigan, Huron, Erie and Ontario approximately six inches. The Secretary of War had before him the said report at the time the permit of May 8, 1899 was granted.

The Sanitary District is fully and completely authorized and empowered by the United States, through Acts of Congress and in addition by permission of the Secretary of War pursuant to Congressional acts, to use the Chicago river in the manner that it has been, and is using it to divert the amount of water from Lake Michigan required by The Sanitary District Act to the capacity of its diversion works,—namely, 10,000 cubic seconds feet.

25. These defendants, and each of them, deny the allegation of said bill of complaint to the effect that the alleged acts of the defendants, or either one of them, in diverting water from Lake Michigan into the canal of the defendant District, have never been authorized by Congress and are in violation of the legal rights of the complainant and the people thereof. On the contrary, these defendants and each of them aver that the said diversion has been authorized by Congress and is legal and proper. These defendants further deny that they, or either of them are in any manner, or by any acts interfering, or have been or will interfere with the common law right, or any other right of the said complainant and its people, to have the free and unobstructed use of Lake Michigan and the various ports and harbors thereof within the borders of said State, for purposes of navigation, trade and commerce, or for any other purpose, free from any and all interference with the natural navigable capacity of said lake or said harbors. On the contrary, these defendants, and each of them aver that said alleged acts of said defendants have not in any manner affected the common law right or any other right of the State of Wisconsin, or its people, to the natural navigable capacity of said harbors and said lakes.

These defendants further deny that they, or either of them, in any manner or by any acts have or will interfere with the right of the people of Wisconsin to the free and unobstructed navigation of Lakes Michigan, Huron, Erie and Ontario, and the navigable waters between the said lakes and from said lakes into the Mississippi river and the Atlantic ocean; that these defendants, or either of them are interfering with, or are affecting any rights, if any there be, belonging to said people of Wisconsin by common law or by the ordinance for the government of the Territory of the United States northwest of the River Ohio, of June 13, 1787. These defendants, and each of them deny that by any acts herein alleged, or otherwise they or either of them violated or are violating the provisions of the Act of Congress of March 3, 1899, known as the Rivers and Harbors Act of said date, or of any other acts of Congress, or of any provisions or sections of said Act.

26. These defendants further deny that they, or either of them, by any acts herein alleged, or by any other acts, have caused, are causing or will cause serious or any interference with the trade and commerce of the people of Wisconsin, or of the State of Wisconsin in its proprietary capacity; that these defendants, or either one of them, by any acts whatsoever have caused, are causing or will cause pecuniary or any other loss to the people of Wisconsin, or to the said state.

27. These defendants, and each of them, further aver and state, as follows:

(a) The diversion works of the defendant, The Sanitary District of Chicago, are so constructed as to provide ultimately for the diversion direct from Lake Michigan through the Chicago river to its confluence with the north and south branches of said river, of six thousand cubic feet of water per second. Said diversion is or may-be augmented there, as it enters the south branch of the Chicago river, by two thousand cubic feet of water per second, diverted from Lake Michigan by way of the Lawrence avenue pumping station and intake from Lake Michigan, and also through the Wilmette, Illinois, pumping station at the northern terminus of the north shore channel, running from Lake Michigan at said Wilmette to the north branch of the Chicago river. Thus there is or is to be drawn through the south branch of the Chicago river approximately eight thousand cubic seconds feet of water, which is or is to be further augmented by approximately two thousand cubic seconds feet of water entering the said south branch by way of the south fork of said south branch. Said two thousand cubic seconds feet is drawn from Lake Michigan by the Thirty-ninth street pumping station and fresh water intake. From said point approximately ten thousand cubic seconds feet of water will flow through said south branch to the said west fork and thence to the northern terminus of said main channel. The Calumet-Sag Channel, an adjunct of the main channel, runs from the Little Calumet river at Blue Island, Illinois, to the main channel of the Sanitary District at Sag, Illinois, and is constructed to a maximum capacity of flow and withdrawal of two thousand cubic seconds feet of water which may be diverted from Lake Michigan by way of the Calumet and Little Calumet rivers. As ten thousand cubic seconds feet is the maximum diversion contemplated and provided, the Calumet-Sag Channel is designed to, and may be used from time to time to relieve or lessen the amount of direct diversions through the Chicago river and its branches, as conditions may require; and said Calumet-Sag channel will thus take care of the volume of water indirectly reaching said outlets, which water is taken from Lake Michigan by means of cribs and intakes hereafter described and used for drinking, potable and domestic purposes. Said diversion works are so constructed that the amount of diversion from any or all sources is or may be controlled. The locations of the various diversion works, above mentioned, are shown upon said map attached as Exhibit "B" hereto.

The waters of Lake Michigan uncontaminated by sewage pollution furnish an excellent, pure and only drinking, potable and domestic water supply for the people of Chicago and its suburbs and surrounding communities. Said water is withdrawn from Lake Michigan by means of a number of intakes located in Lake Michigan, three to four miles from the shore line. Such intakes are known as and called cribs. The water is conveyed from said cribs by means of conduits located beneath the bottom of Lake Michigan to pumping stations on the shore opposite the respective cribs. The water is thus pumped into water mains conveying water to homes, residences, industrial and other places, consuming fresh and pure water. The volume of water thus pumped and furnished to the people of Chicago and its surrounding communities for said purposes is approximately 1,000 cubic feet of water per second.

(b) The said diversion works constructed, completed and in operation by the defendant, The Sanitary District of Chicago, together with the improvements heretofore described and made upon the Chicago river and its branches, provide a complete and comprehensive system by which an outlet has been and is provided for the sewage and drainage accumulating in the metropolitan district comprised within the limits of The Sanitary District of Chicago, and said works were, and are necessary to preserve the health of the people within said territory and to protect their lives. Comprised within the boundaries of said defendant, The Sanitary District, as shown by said map, Exhibit "B," is located the great city of Chicago, Illinois, with its various suburbs, including the cities, towns and villages of Evanston, Glencoe, Winnetka, Wilmette, Shermerville, Glenview, Morton Grove, Niles, Cicero, Stickney, Evergreen Park, Morgan Park, Blue Island, Riverdale, Oak Park, Berwyn, Forest Park, River Forest, Maywood, Riverside, Brookfield, Bellwood, Franklin Park, Melrose Park, River Grove, Dolton, Harvey, West Hammond, Worth, Bremen and Calumet. The population within the limits of said Sanitary District of Chicago is now approximately three million.

At the time the said defendant, The Sanitary District's main channel was opened and placed in operation, January 17, 1900, and for a number of years prior thereto, the annual death rate from typhoid fever, per one hundred thousand population in the City of Chicago, was approximately seventy-five. At times said City of Chicago was devastated by epidemics of typhoid fever. Since the opening of said channel the annual death rate from typhoid fever, per one hundred thousand population, has steadily decreased with no epidemics, until the present time the death rate from typhoid fever for the year 1921, for the City of Chicago, per one hundred thousand population, was approximately one and seven one-hundredths, and similar conditions exist in its suburbs. The death rate from typhoid fever, per one hundred thousand population, for the City of Chicago, for the year 1920, was next to the lowest of any city in the United States of a population of one hundred thousand or over, said death rate for Chicago, being one and one-tenth per one hundred thousand, and the death rate at Rochester, New York, one per one hundred thousand. Said death rate for said year from typhoid fever, per one hundred thousand, was very much lower than any city located on the Great Lakes, or their connecting waters. The death rate from typhoid fever furnishes a criterion by which the health of a community may be determined, and it is estimated that where there is a decrease in the death rate of one, per one hundred thousand of population, from typhoid fever, there is also a corresponding decrease of three, per one hundred thousand, from other diseases. The said plan or method so long followed by the people of Chicago and its surrounding communities, and by these defendants, for the protection of the only water supply for said people, and to dispose of the sewage and drainage arising in said metropolitan drainage area was the only method or plan that could have been adopted to effectively accomplish said purpose. Since said time when the Sanitary District Act was passed, said plan or method has been the only method which would effectively and completely accomplish said purpose, and said works of the defendant, The Sanitary District, above described and operated by it, have effectively accomplished the purpose for which they were primarily constructed, namely—the protection of said water supply and furnishing an outlet for said sewage and drainage.

(c) The United States has not only, as heretofore shown, expressly by congressional act, or acts, authorized the construction of said works, but it has also invited and acquiesced in their construction and operation. The said channels and works of the Sanitary District are so constructed that they may be navigated by boats and other watercraft, and the Sanitary District Act, and acts amendatory thereof, and supplementary thereto, provide that boats navigating the Illinois and Michigan Canal shall be permitted to use the channels of the Sanitary District free and without charge. The right-of-way along the main channel of the Sanitary District reserved and now being used for the locations of industrial and manufacturing plants requiring or desiring water communication, is accessible to the largest boats navigating the Great Lakes passing through the Chicago river and its branches to the main channel and to such plants. When the Desplaines and Illinois rivers are further improved for navigation, such boats may pass from said main channel along said rivers to the Mississippi and Gulf of Mexico. The said channels of the Sanitary District and the said Chicago river and its branches, so enlarged by deepening and widening same by the Sanitary District, as hereinbefore stated, form a complete system of internal waterways and an extensive inner harbor for the vast population and numerous industries located within said metropolitan district, the population of which equals almost one-half of that of the entire State of Illinois and is nearly equal to the combined population of all the other cities, towns and villages located upon the shores of the Great Lakes and their appurtenant waters. The navigation facilities provided, as above set forth, were in accordance with the policy for improvement of navigation, and such facilities, as expressed by said reports of Government Engineers made pursuant to Congressional acts and as indicated by the various acts of Congress under which said reports were made.

On or about December 14th, 1909, the United States caused suit to be instituted in its name against the Economy Light & Power Company in the Circuit Court of the United States, Northern District of Illinois, Eastern Division, to enjoin the defendant, Economy Light & Power Company, from constructing a dam in the Desplaines river to develop water power. In said suit, and by said bill of complaint, the United States recognized the right of the defendant, Sanitary District, to divert water from Lake Michigan provided for by said Sanitary District Act. In said bill of complaint it was alleged:

> "That in connection with the construction of said Sanitary District Canal, and in creating the system of waterways resulting from the construction of said canal, said State of Illinois has caused the quantity of water flowing through the said Desplaines river below the point at which it connects with said canal to be largely increased, and that said portion of said river has been continuously since the opening of said canal, and is now, water navigable in fact and a part of the navigable waters of the United States and subject to the jurisdiction and control of the federal government. * * *

> That in connection with and as a result of the construction of said Sanitary District Canal and the diversion of said water from Lake Michigan, said Sanitary District of Chicago, acting under authority of said State of Illinois, has largely increased the navigability of said Desplaines river and that continuously since the opening of said canal there has been, and is, in said portion of said Desplaines river below the point at which it connects with said canal, a body of water navigable in fact and which, by virtue of its connection with other navigable waters is to be deemed a part of the navigable waters of the United States and subject to the jurisdiction and control of said United States."

The said cause was tried and the United States obtained a decree in said Court restraining and enjoining the defendant therein, Economy Light & Power Company from constructing said dam and said decree was affirmed by the Circuit Court of Appeals for the Seventh Circuit, and by this Court. The United States sustained in said suit the position thus taken, as above alleged.

On or about January 11th, 1909, the United States and Great Britain concluded a treaty known as the Boundary Waters Treaty, which related to the uses of the waters of the Great Lakes system along the international boundary. Said treaty established that the order of use of said waters should be:

(1) Uses for domestic and sanitary purposes.

(2) Uses for navigation, including service of canals for purpose of navigation.

(3) Uses for power and irrigation purposes.

The said treaty also expressly recognized, as valid, existing diversions, of which the Sanitary District diversion was one, to the amount as provided by the Sanitary District Act as the population of Chicago should increase, so that ultimately there would be required to be diverted, under said Sanitary District Act, the maximum of ten thousand cubic seconds feet of water. The said Act also specified the maximum amount of diversions that should be allowed from the Niagara river, at Niagara Falls, on the Canadian side of the boundary, and also upon the American side. The maximum was fixed for Canada at thirty-six thousand cubic seconds feet of water for power purposes and that for the United States was fixed at twenty thousand cubic seconds feet of water. The said twenty thousand cubic seconds feet diversion on the American side was arrived at by considering that ten thousand cubic seconds feet of water was diverted by the United States at Chicago. The reports of the International Waterways Commission, organized pursuant to the joint acts of Congress and the Parliament of the Dominion of Canada, upon which said treaty was based, so state this to be a fact. Likewise, the representations of the State Department to the Senate of the United States in connection with the confirmation of said treaty so specified.

(d) There are many diversions of the Great Lakes system of waterways, and particularly from Lake Erie. The United States, in addition to its exclusive jurisdiction over said navigable waters has expressly assumed jurisdiction of diversions by legislative acts as well as by acts of executive officers. On or about June 30, 1917, Congress, by resolution, provided for a complete survey and report to be made to it upon the diversions of waters from the Great Lakes for all purposes, and a report has been made pursuant to said resolution after investigations by engineers and officers of the United States army, extending over a period of upwards of two and one-half years.

By said report pursuant to said resolution of June 30, 1917, and by other reports made pursuant to Acts of Congress, the engineer officers of the United States

Army have found that it is feasible to construct compensating works in the St. Clair, Detroit and Niagara rivers, to offset for the claimed lowering of the surface elevations of said lakes due to said diversion of water at Chicago, and have recommended that such compensating works be constructed.

If said diversion of water from Lake Michigan has or will lower to the amount claimed, the levels of either or all of the waters of Lake Michigan, Lake Huron, Lake St. Clair, Lake Erie, Lake Ontario, Sault Ste. Marie, St. Mary's river, St. Clair river, Detroit river, Niagara river, and St. Lawrence river, and of all or any of the harbors, channels, canals or rivers connected therewith, it is feasible and practicable to compensate for the lowering of such levels by the building of proper works in either the St. Clair river, Detroit river, Niagara river, St. Lawrence river or of all of them. The cost of constructing and maintaining such compensating or regulating works will be small in comparison with the value and cost of the Sanitary District Works, above described, for the protection of said water supply. The defendant, The Sanitary District of Chicago, does hereby offer to defray the expense of constructing and maintaining compensating works to off-set for the claimed lowering due to said diversion by the Sanitary District, and heretofore, by ordinance of its corporate authorities it has provided for and assumed said obligation.

(e) Said Desplaines and Illinois rivers have become by virtue of the operation of the said defendant, Sanitary District's works, comparatively clear and wholesome, which rivers, prior to the opening of said main channel, were sluggish, slow-moving streams, badly polluted by sewage discharged by the City of Chicago and by many towns situated along said Illinois river. By virtue of said diversion of water to said Illinois river, fish life in said Illinois river has increased rapidly and it has become more healthful to the people living thereon.

If an injunction were granted by this Court, as prayed by the said bill of complaint, and the diversion of water from Lake Michigan were wholly cut off and restrained, or limited to the amount of 4,167 cubic feet per second, or any amount substantially less than that required by the said Sanitary District Act, the only water supply for the people of the Sanitary District would become polluted and rendered injurious and unfit for use, and the people of the Sanitary District would be without the ability to obtain a proper and healthful water supply. Such pollution would exist at times of heavy rains upon the Chicago river drainage area, causing a large amount of water to flow in said Chicago river and its branches, into Lake Michigan, carrying with it the sewage and drainage contained in the sewers within the limits of the Sanitary District. All this would cause a return to the unhealthy conditions in Chicago as such conditions existed prior to the opening of said main channel and accentuated now by the present vastly greater population. The flood flow of said Chicago river is 10,000 cubic seconds feet and a diversion limited to less than said amount would permit said river to flow into Lake Michigan at such times. Also, if the said flow were entirely restrained, or limited, as aforesaid, there would not be water with which to digest, dilute or oxidize the sewage, as it would be discharged into the Desplaines and Illinois rivers. The Desplaines and Illinois rivers would become polluted, the ozygen content of the waters would be entirely eliminated and a septic condition would exist in the Desplaines and Illinois rivers along the entire course of said rivers, producing results unhealthful to the people along said rivers and wholly destroying fish life therein.

(f) The so-called artificial sewage disposal works that would be made necessary to construct, if said injunction were granted, and thereby the flow or diversion of water through the main channel of the Sanitary District were limited to 4,167 cubic feet per second, or any amount of water substantially less than the amount required by the Sanitary District Act, or said flow or diversion were entirely prevented, would be inadequate, ineffective and impracticable to provide for the disposition of sewage of the said Sanitary District.

(g) The City of Chicago constitutes one of the greatest railroad and industrial centers of the United States. It is visited each year by a vast number of persons residing in other parts of the United States and the world. Many of such persons are required to come to Chicago and remain for various lengths of time in order to transact business. Others visit said city for pleasure and recreation. The health conditions of Chicago are, therefore, of great importance not only to the people of Chicago and those residing in its immediate vicinity, but generally to the people of the United States.

28. These defendants, and each of them, further aver as follows:

(a) The cutting through the Continental Divide by means of the canal to withdraw water from Lake Michigan and emptying same into the Desplaines and Illinois rivers, pursuant to said Act of Congress of March 2nd, 1827, and other acts herein in this answer mentioned, and pursuant to the invitation and acquiescence of the United States, and the use of such waters for sanitary purposes in order to furnish an outlet for the drainage of Chicago and its environs, and surrounding territory, thus protecting the water supply of the people within said area, has been during all of said period well known to people residing throughout the United States, and particularly to those people residing within the states bordering upon the Great Lakes, including Wisconsin, and in the vicinity thereof. At the time the Sanitary District's main channel was being projected and was being constructed, it was known as a great engineering feat. The method to be used in its construction and the purpose to be thereby accomplished, namely,—the diversion of a large quantity of water from the St. Lawrence river to the Mississippi river—received great publicity in the great newspapers published in the city of Chicago, circulated to a large extent in the State of Wisconsin, and in other cities throughout the country. The facts with reference to the construction of said canal and the purpose thereof were also published at various times during said period of construction by newspapers published in and circulated from the great cities of Milwaukee, La Crosse, Madison, Janesville, Superior, Ashland, Manitowoc, Sheboygan, Kenosha, Racine, Eau Claire, Fond du Lac, Oshkosh, Menasha, Fort Atkinson and Neenah, located in Wisconsin, as well as other cities thereof. The people residing within the territorial limits of complainant, and the members of its legislature, its governor, attorney general and other executive officers knew and had the opportunity to know of the construction and purpose of said works, namely, the diversion of water from the Great Lakes. Congress was notified by the Secretary of War of the passage of the Act of May 29th, 1889, called the Sanitary District Act, and of the progress of construction of said main channel by the annual reports of said chief of engineers of the United States army, hereinbefore mentioned.

(b) On or about December 30th, 1907, suit was instituted on the relation of Charles S. Deneen, Governor of the State of Illinois, and William H. Stead, its Attorney General, in the name of the People of the State of Illinois against the Economy Light & Power Company, in the Circuit Court of Grundy County, to enjoin the construction by the Economy Light & Power Company of the dam across said Desplaines river for the purpose of creating electrical energy by water power. In the said suit, evidence was produced as to the use of the water route in early times, hereinbefore described, from Lake Michigan along the Chicago River and its south branch and west fork, and said portage to the Desplaines and Illinois rivers; as to the construction of the Illinois and Michigan Canal, its uses for navigation, as well as for sanitary purposes, as herein described; and as to the construction, operation and use of the main channel of The Sanitary District and the diversion of water therefor, as hereinbefore mentioned. A decree was entered in said Circuit Court of Grundy County and an appeal was taken therefrom to the Supreme Court of Illinois. The transcript and abstract of record were filed in the Supreme Court of Illinois on or about December 30, 1908. On or about April 13, 1909 the Attorney General of Wisconsin filed, in said court, a petition to intervene as a party to said cause, in which petition various facts with reference to said litigation were alleged, and said Attorney General of Wisconsin then knew of the proceedings and said evidence and facts produced in the record in said cause instituted in said Circuit Court of Grundy County.

(c) Complainant, during all of said period when said canal was being constructed, while The Sanitary District of Chicago was improving the Chicago river, and constructing the various intercepting sewers and adjuncts to the main channel at a cost to it of about ninety million dollars, as heretofore alleged, made no protest or objection to the construction of said works, or to the operation of same, and made no protest or objection to the diversion of water from Lake Michigan for the purposes mentioned. Said complainant remained thus quiescent notwithstanding the knowledge by the said complainant of the provisions made by the State of Illinois pursuant to said acts of Congress for the construction of a canal across the Continental Divide for navigation purposes, and the use of same for sanitary purposes, pursuant to various acts and resolutions of the General Assembly of Illinois, and the said Act of May 29, 1889, known as The Sanitary District Act, and notwithstanding also the knowledge by it of the vast expenditures of money made by The Sanitary District, in the construction of the various works herein mentioned, for the purpose of furnishing an outlet for the sewage and drainage of said territory, and in connection therewith the diversion of water from Lake Michigan to the amount herein mentioned.

(d) When Wisconsin was admitted to the Union as a state in 1848, she entered said Union subject to any and all rights granted by said acts of Congress of March 30, 1822, and March 2, 1827, and the action and rights of the State of Illinois thereunder. The complainant has acquiesced in the said diversion of water from Lake Michigan, contemplated and made necessary by the construction of said works, in the construction of said works herein described and in the expenditure of moneys necessary to be expended to provide said works and to make possible the diversion mentioned, and therefore complainant is estopped from maintaining this suit. Wherefore, these defendants, and each of them, move that the said suit be dismissed because of said laches, acquiescence and estoppel.

29. These defendants, and each of them aver that pursuant to said Acts of Congress hereinabove mentioned, and to said waterway policy of the State of Illinois as expressed by resolutions and acts of its General Assembly, said General Assembly passed an Act entitled;

> "An Act in relation to the construction, operation and maintenance of a deep waterway from the water power plant of The Sanitary District of Chicago at or near Lockport, Illinois, to a point in the Illinois river at or near Utica, and for the development and utilization of the water power thereof;" approved June 17, 1919; in force July 1, 1919;

that under said Act the waterway to be constructed is to be known and called "The Illinois Waterway"; that said Act provided for the route of the said waterway, as stated in the title thereof, from the southern terminus of the main channel of The Sanitary District of Chicago at or near Lockport along the Desplaines and the Illinois rivers to Utica on said latter named river; that the channel of the waterway is to be according to said Act not less than 150 feet bottom width and the minimum depth not less than 8 feet in the earth sections and 10 feet in the rock sections; that the minimum depth over mitre sills not less than 14 feet and minimum width of locks is to be not less than 110 feet with minimum length not less than 600 feet useable length; that the purpose of making the depth over mitre sills not less than the depth provided and the length and width of locks as stated, was to permit of the enlargement of said waterway to a 14 foot depth; that the diversion of water from Lake Michigan to the amount provided for by said Sanitary District Act will enable the said waterway to be constructed at less cost and to be operated with less annual expense; that said diversion to said amount will permit of the extension of said waterway from Utica on said Illinois river to its mouth, and thence along the Mississippi river to Cairo, Illinois, by the United States Government in conjunction with said Illinois waterway construction at less expense and less cost, and will permit of its operation at less annual expense; that such reduction in cost of construction and in annual operation expense by virtue of the use of said waters diverted from Lake Michigan in the amount mentioned will amount to a large sum of money; that in addition the use of said waters so diverted will permit of the removal of the state dams at Henry and Copperas Creek on the Illinois river and the government dams at Kampsville and LaGrange on the Ilinois river, thus permitting navigation on said Illinois river from Utica to its mouth to be free and unobstructed by locks or dams.

30. These defendants further aver that the improvements made by the United States of said harbors mentioned in said bill of complaint, as located on the shore of Lake Michigan in Wisconsin, and on the shore of Lake Superior in Wisconsin, the original depth of water, the project depth as provided by the United States, and the present depth of water in said harbors, and other facts relating thereto are as follows:

Marinette Harbor.

Marinette, Wisconsin, is located across the Menominee river from Menominee, Michigan. Both cities, industrial plants and persons, firms and corporations desiring water communication or transportation use the Menominee river as their inner harbor. This river discharges into Green Bay, about sixteen miles northwesterly from the mouth of Sturgeon Bay. The river is navigable only to a dam about two miles above its mouth.

It is this portion that forms said inner or commercial harbor for said two cities. The United States has improved the inner harbor as well as the outer harbor by various works. Originally, the outer harbor and the Menominee river were shallow, the depth of water therein being only a few feet. The first improvements made by the United States were conducted separately as to Menominee Harbor and Menominee river. The original project for the harbor was provided by the Act of Congress of March 3, 1871. Under this Act two parallel piers four hundred feet apart were constructed and a channel thirteen feet deep was provided. The Act of Congress of September 19, 1890 increased said depth to fifteen feet, and the Act of March 3, 1899 increased it to eighteen feet. The Act of Congress of September 19, 1890, as modified by the Act of July 13, 1892, and by the Act of June 3, 1896, provided for a project depth of channel of fifteen feet, with a turning basin at the upper end of said commercial harbor. By the Act of Congress of June 13, 1902, the improvement of the harbor and river was consolidated, and by the Act of March 4, 1913 the said harbor was improved to an eighteen-foot depth, including also a large portion of the inner harbor. The project depth of water, as provided by the acts of Congress for both the harbor and the river, so far as it is navigated, was and is eighteen feet, which depth has been and is maintained. The total amount expended by the United States in the improvement of said harbor and river, to and including the year 1920, is the sum of approximately $499,320. Since the opening of The Sanitary District channel, January 17, 1900, there was expended in the improvement and maintenance of said harbor and river approximately the sum of $174,670.

GREEN BAY HARBOR.

Said harbor comprises the Fox river, below DePere, Wisconsin, a section about six and one-half miles long, discharging into the southern end of Green Bay, about one mile below the City of Green Bay, and an entrance channel about four and one-half miles long dredged through the shoals in the head of the bay from the river mouth to nineteen feet depth in Lake Michigan. In the river, the lower three miles, extending through the City of Green Bay, is a naturally deep pool, requiring no improvement, and the upper three and one-half miles, thence to DePere is a dredged channel connecting at its head with a turning basin at DePere. Originally, and before the United States made improvements in this harbor, Green Bay was narrow and tortuous, with an available depth of about ten feet, and the entrance was blocked by Grassy Island situated about one and one-half miles out from the river mouth. The improvement was begun by the United States under a plan adopted by the Act of Congress of June 23, 1866. This Act provided for dredging an outer channel eleven feet deep, including a cut with revetted sides through Grassy Island. This project depth was increased by the Act of Congress of June 23, 1874, to thirteen feet, and by the Act of Congress of July 13, 1892 to fifteen feet. The latter Act also adopted a project for the inner channel for a depth of eleven feet, which was increased by the Act of Congress of June 3, 1896 to fifteen feet. This work was completed in 1899. The Act of Congress of June 13, 1902, provided for the maintenance of the existing works and the fifteen foot channel in Fox river below DePere, and for a channel eighteen feet deep from the mouth of Fox river to that depth in Green Bay. The Act of Congress of June 25, 1910, provided for a turning basin at the upper end of the river channel at De-Pere to be fifteen feet deep and of sufficient area to permit vessels not exceeding three hundred and fifty feet in length to turn readily without the assistance of a tug. All this work was completed about the year 1910 and has been maintained to the project depths above mentioned and the actual depth of water has been and is the amount provided for by said improvement projects. The total expenditure made by the United States in the improvements above mentioned of the said harbor, to and including the year 1920, is approximately the sum of $689,078.39, of which amount $301,028.39 has been expended since the date of the opening of The Sanitary District main channel.

STURGEON BAY HARBOR.

Originally, and before the United States commenced improving this harbor, navigation was controlled by a depth of water of about eight feet over a shoal guarding the entrance to the harbor. Sturgeon Bay is entered by means of the Sturgeon Bay and Lake Michigan Ship Canal. This canal is a revetted canal connecting Lake Michigan and Sturgeon Bay. A basin having an area of about twelve acres enclosed by break waters is located at the Lake Michigan end of the canal, and there is a dredged channel connecting the western end of the canal with deep water in Sturgeon Bay. The canal and connecting channel form a thorough waterway from Lake Michigan to Green Bay, Sturgeon Bay being an arm of the latter, and said canal thereby shortens the distance of vessels plying between Green Bay ports and those on the shores of Lake Michigan to the southward. The port and City of Sturgeon Bay is located on both sides of the bay about four miles northwesterly from the canal, the population of said city being about four thousand five hundred.

By an Act of Congress of April 10, 1866, two hundred thousand acres of public lands of the United States were granted to the State of Wisconsin for the purpose of aiding said State in constructing and completing a breakwater and harbor and a ship canal connecting the waters of Green Bay with the waters of Lake Michigan. Sturgeon Bay and Lake Michigan Ship Canal and Harbor Company, organized pursuant to acts of the legislature of Wisconsin, between 1872 and 1881, constructed a canal without locks or gates seven thousand two hundred feet long and one hundred feet wide at water surface and fourteen feet deep below mean level, and in continuation of the canal, dredged a channel in Sturgeon Bay six thousand one hundred feet long of about the same dimensions as the canal. Works constituting what is known as a harbor of refuge at the Lake Michigan entrance to the canal were constructed by the United States. The River and Harbors Act of Congress of July 13, 1892 provided for the acquisition of the canal by the United States, pursuant to which the United States assumed control on or about April 25, 1893, and the United States paid for said canal and works the sum of approximately $81,333. By the Act of Congress of June 13, 1902, the canal and harbor of refuge projects were consolidated. The said Act of June 13, 1902 also provided for a depth in the canal and throughout the entire waterway of nineteen feet—that is, from Lake Michigan through said canal into and throughout said Sturgeon Bay. This work was completed in 1904. The Act of March 2, 1919 provided for the formation of the turning basin near the westerly end of the revetted canal, and the work was completed in 1919. The present operations consist in maintaining the said works with a depth of nineteen feet throughout. The United States has maintained and is maintaining the depth of water for navigation throughout said works at nineteen feet and the actual depth of water has been and is said amount. The total expenditures made by the United States in the improvements above mentioned of the said harbor to and including the year 1920, is approximately $662,614.21, of which amount $347,281.21 has been expended since January 17, 1900. An additional operation expense up to and including March 4, 1915 of $396,559.61, has also been expended by the Government.

ALGOMA HARBOR.

This harbor is at the mouth of the Ahnapee river. Originally, and before the United States entered upon the improvement of said harbor the depth of water at its entrance was three feet, and within the harbor about five hundred feet from its entrance was a stone ledge with a depth of water over it of about four feet. The Acts of Congress of March 3, 1871, March 3, 1873, March 3, 1875, July 5, 1884 and March 3, 1899 provided for and resulted in the construction of two piers extending into Lake Michigan at the mouth of the river and the dredging of a channel eleven feet deep between the piers, extending approximately fifteen hundred feet inside the river mouth. The Act of March 2, 1907 provided for the construction of an outer harbor with a depth of fourteen feet in the harbor and the channel above described between said piers and inside the river mouth. The present work of the Government consists in maintaining same. The depth of water is the project depth above mentioned, and is and has been maintained by the United States. The United States has expended in the construction and maintenance of its works in said harbor, approximately the sum of $351,771.21, of which sum $178,-

777.21 has been expended since the opening of The Sanitary District's main channel.

KEWAUNEE HARBOR.

In 1880 the Kewaunee river flowed about due south toward Kewaunee, and made a sharp bend in Kewaunee and thence flowed northward parallel to Lake Michigan about three hundred feet therefrom for a distance of about two thousand feet to its mouth, which was about twenty-five feet wide and had a depth of about three feet. Under the Act of Congress of March 3, 1881, a channel thirteen feet deep, the project depth, was cut through the above mentioned bend in said river and extended into Lake Michigan between parallel piers which form the present harbor entrance. The natural mouth of the river is closed and the part of the old river bed which led northward to the natural mouth is a portion of the inner harbor. This project was completed in 1898. Under the Act of Congress of June 25, 1910, the depth of water in said entrance channel was increased to eighteen feet, with a turning basin of the same depth made by cutting off part of the point of land included between the old and the present river channels. Said depth of water has been and is maintained by the United States. The United States has expended, in the construction and maintenance of said works, approximately the sum of $276,800, of which said sum approximately $126,800 has been expended since the opening of The Sanitary District channel in 1900.

MANITOWOC HARBOR.

This harbor is located at the mouth of the Manitowoc river. Originally, and before the United States improved said harbor, a bar over which there was only four feet of water, obstructed the entrance. The depth of water in the river for a short distance from its mouth was about ten feet. Under the Act of Congress of August 30th, 1852, two parallel piers were constructed extending into Lake Michigan on either side of the mouth of the Manitowoc river, and a channel between said piers approximately ten feet deep was dredged to connect the said river and lake. Under the Acts of Congress of March 3, 1881, September 19, 1900, June 3, 1896 and June 13, 1902, piers were extended and the channel depths were increased to eighteen feet and a breakwater was also constructed eight hundred feet long. The entire project was completed in 1903. Under the Act of Congress of March 2nd, 1907, it was provided that the channel between said piers and up said river for a short distance should be maintained at eighteen feet in depth, and under said act there was constructed a stilling basin at the harbor entrance. This was completed in 1910. The present work consists in the maintenance of said works. The United States has maintained and is maintaining the said harbor at the above mentioned project depth, and it has expended in the construction and maintenance of said works, approximately the sum of $938,560.00, of which said sum there has been expended, since the opening of the Sanitary District channel in 1900, the sum of $568,300.

Sheboygan Harbor.

This harbor is located at the mouth of the Sheboygan river. In its original condition the entrance to the harbor was guarded by a bar over which there was only three to four feet of water. Before the United States assumed control of said harbor, Sheboygan built two parallel piers one hundred and seventy-five feet apart, extending into Lake Michigan at the mouth of the Sheboygan river, and it dredged a channel between them approximately twelve feet deep. Under the Acts of Congress of June 23, 1866, March 3, 1873, March 3, 1881, August 18, 1894, March 3, 1899 and June 13, 1902, the piers were extended several times, the width between them increased, the project depth increased by stages to nineteen feet and a north breakwater was constructed six hundred feet long. This work was completed in 1904. The Act of Congress of March 2, 1907, provided for maintaining a nineteen foot channel and works between said breakwater and in said river and for extending the north breakwater shoreward; for building a south breakwater; and for removing the outer portions of the piers for the purpose of forming a stilling basin. This was completed in the year 1915. The United States is and has been maintaining said harbor works at said project depth and has expended in the construction and maintenance of said works approximately the sum of $1,054,268.12, of which amount it has expended since the opening of said drainage channel the sum of $659,819.21.

PORT WASHINGTON HARBOR.

This is an artificial "Y" shaped harbor consisting of a dredged and jettied entrance channel and two dredged basins. Prior to the time when the United States improved said harbor the depth of water was but a few feet. By the Acts of Congress of July 11, 1870, and August 14, 1876, two parallel piers were constructed into the lake and two basins forming the present harbor were excavated inside the shore line and dredging between the piers and in the basin was done to a depth of 11 feet. This improvement was completed in 1895. By the Act of Congress of June 25, 1910, the project depth in the channel and basins was increased to 16 feet and the work of the United States is now confined to maintenance of said depth and works. The United States has maintained and is maintaining said project depth of water and has expended in the construction and maintenance to the year 1920 the sum of approximately $258,400.00, of which sum approximately $63,900.00 has been expended since the opening of said drainage channel.

MILWAUKEE HARBOR.

The natural mouth of the Milwaukee river was about 3000 feet southerly from the present artificial outlet and the depth of water at the mouth of said river prior to the time the United States improved said harbor was approximately 4½ feet. The said artificial outlet was formed by the construction of piers and dredging between them and thence through the low and narrow neck of land that separated the river and lake at this point. The Milwaukee river flowing down from the north is joined about ⅝ mile above the inner ends of the piers by the Menominee river, entering from the west, and, about 3000 feet south of the piers, where the natural mouth formerly discharged, the Kinnickinnic river empties from the south. The channels of said rivers are narrow, tortuous and not provided with turning basins; and navigation thereon is difficult. For a short distance in said river channels the City of Milwaukee has maintained a depth and is now maintaining a depth of water of approximately 19 feet. The Act of Congress of March 3, 1843, and the Act of Congress of August 30, 1852, provided for improving the original mouth by parallel piers and dredging and the formation of the jettied channel at the present outlet of 11 feet depth. The Act of April 10, 1869, provided for pier extensions. The Act of March 3, 1899, provided for the deepening of the channel between said piers and to the Milwaukee river to 19 feet as the project depth. The Act of Congress of March

2, 1907, provided for the maintenance of the 19 foot entrance channel to the said Milwaukee river, rebuilding certain piers and doing other work. This work was completed in 1910. The harbor of refuge was adopted by the United States under the Act of Congress of March 3, 1881. The breakwater for said harbor of refuge was extended under said Act of 1907, 1,000 feet south. The Act of June 13, 1902, consolidated the work on the project for the harbor of refuge with the project for the Milwaukee outer and inner harbors. The Acts of Congress of June 25, 1910, provides for the improvement of the river channels, construction of turning basins and the maintenance of all channels to 19 feet; also for the widening of the river channels. This work has not been completed owing to the failure of the City of Milwaukee to perform certain conditions necessary to make available the appropriation for said work by the United States. The United States has maintained and is maintaining said project depth of 19 feet in the said outer and inner harbors and has expended in the construction and maintenance of said works at said harbor the sum of approximately $2,473,975.36, of which said sum there has been expended by it $1,323,150.00 since the opening of the main channel of the Sanitary District.

Racine Harbor.

This harbor is located at the mouth of Root river. Originally the discharge of the river was variable and the depth of water at the lake outlet was from 2 to 3 feet which was increased by freshets to approximately 7 feet and at times there was absolute closure. Prior to the year 1844 local enterprise in participation with the United States government improved this harbor which consisted of a channel approximately 10 feet deep between piers 160 feet apart. By the Act of Congress of June 23, 1866, piers were extended and the channel between them was deepened to the project depth of 14 feet. By the Act of March 3, 1899, the channel was widened and the depth was increased to the project depth of 19 feet and by the Act of June 13, 1902, a breakwater was constructed 600 feet long. The said projects were completed in 1905. The Acts of Congress of March 2, 1907, and June 25, 1910, provided for the maintenance of the 19 foot entrance channel and works incident thereto; for the formation of an outer harbor or wave-stilling basin by extending the old north breakwater to the shore line and removing the outer portion of the north pier, also for constructing a south concrete breakwater and removing the present south pier. Work upon the breakwater was commenced in 1916 and was completed in 1919. The United States is maintaining and has maintained the project depth of 19 feet in said harbor and channels and has expended in the construction and maintenance of said harbor approximately the sum of $1,169,742.21, of which said sum there has been expended $832,957.21 since the opening of the drainage channel.

KENOSHA HARBOR.

This harbor is located at the mouth of Pike creek. Originally at the discharge of Pike creek the depth of water was approximately 2 feet. By the Act of Congress of August 30, 1852, a channel 10 feet deep between two parallel piers 150 feet apart and said piers were constructed to the outlet of Pike creek. By the Act of Congress of June 23, 1866, the depth of said channel was increased to 14 feet and by the Act of Congress of September 19, 1890, the basin or inner harbor was dredged to said depth. By the Act of Congress of March 3, 1899, the north pier to widen the channel was removed and rebuilt and the channel and basin was dredged to a depth of 19 feet and 18 feet respectively; and, also a breakwater 600 feet long was constructed. This work was completed in 1900. By the Act of Congress of March 2, 1907, the landward end of the breakwater was extended 200 feet and the maintenance of the 19 feet entrance channel and the 18 feet basin in depth was provided for. The United States has been and is maintaining the said project depth of water in said harbor and has expended in the said improvement the sum of approximately $630,807.41 of which said sum $331,500.00 has been expended since the opening of the drainage channel.

Superior Harbor or Bay.

The harbor of Duluth, Minn., and Superior, Wisconsin, have been for a number of years treated by the United States and Congress as one harbor. The work of improvement of the harbor of Duluth and Superior was combined as one project in the River and Harbor Act of Congress of June 3, 1896. Said harbor embraces all the navigable waters lying inside of Minnesota point and along the fronts of the cities of Duluth and Superior and includes the Duluth canal, Superior Entry, Superior bay, Allonez bay, St. Louis bay, and St. Louis river, for a certain distance from its mouth. The bays were originally and before improvement expanses of shallow water with a general depth of only 8 to 9 feet. The United States began the improvement of Superior entry in 1867 and its operations at Duluth in 1871. The Duluth canal was cut through Minnesota point by the City of Duluth in 1870 and 1871 and in 1873 its maintenance and improvement were undertaken by the United States providing an inner harbor of easy access in place of the exterior harbor which was formed by breakwater theretofor constructed by the United States. The project of the United States of 1883 completed in 1887 provided 16 feet depth of water for navigation through the two entries in Duluth harbor basin and in channels paralleling dock lines of Superior and St. Louis bays and up St. Louis river. The depth of water at some points has been and is maintained by the United States at 20 feet and at other points in said harbor the depth of water is greater. The United States has expended in the improvement of said harbor approximately the sum of $8,235,028.00 of which said sum there has been expended since the opening of the drainage channel approximately $5,430,195.00.

ASHLAND HARBOR.

This harbor is located near the head of Chequamegon bay. The natural depth of water in said harbor to the lower docks is approximately 19 feet. Under an Act of Congress passed in the year 1889 a breakwater was constructed and a channel was dredged along the dock front. In 1896 the United States established a harbor line along the city front at a distance of approximately 2,000 feet from the shore line and in 1897 dredged a channel 20 feet deep outside the harbor line. In 1903 and in 1907 the United States extended said channel. The depth of water provided by the improvement projects of the United States in said harbor is approximately 20 feet, which depth has been provided and is maintained by the United States. The United States has expended in the improvement and maintenance of said harbor works $650,500.00, of which said sum $411,000.00 has been expended since the opening of the drainage channel.

WASHBURN HARBOR.

This harbor is located on the west side of Chequamegon bay and about 4½ miles north of Ashland and is a part of Ashland harbor, and the depth of water in said harbor is less than that maintained in Ashland harbor, above mentioned. The depth of water in said harbor, as it now exists, has been created by the appropriations and expenditures made by the United States in dredging and improving said harbor.

(*a*) The facilities for navigation in said harbors located on Lake Michigan in Wisconsin and in those located on Lake Superior in Wisconsin have been provided by the United States under improvement projects specified by various Acts of Congress. The depth of water in all such harbors has been increased from time to time under said improvement projects, so that the project depth now maintained by the United States in each and every of said harbors is many feet greater than the original depth, and such improvements in facilities of navigation including width of channels, safety of entrance to harbors, depth of harbor basins and channels were all made solely and only at the expense of the United States to which neither the complainant nor any of its people have directly contributed. The said facilities for navigation in the various forms mentioned have been provided by the United States to suit the demands of commerce in said harbors. Each and every one of said harbors has been improved in some of the various ways mentioned since the defendant, The Sanitary District of Chicago, projected its work for the diversion of water from Lake Michigan, or since the main channel of The Sanitary District of Chicago has been opened. The United States in making said improvements and fixing the project depth determined upon the project depth and such project depths for each of said harbors, taking into consideration effects upon the surface elevation of the water of Lake Michigan, if any there were or should be, due to the diversion of water by the defendant, The Sanitary District of Chicago; and the said project depths of water in each of said harbors would not have been greater had there been no diversion of water at Chicago.

In connection with the improvements as above stated in said harbors and each of them, the United States improved harbors located upon Lake Michigan within various other states, those harbors located upon lakes Huron and Erie and the harbors or ports located upon connecting channels of said lakes, including also the connecting channels themselves. This was done by the United States so that commerce carried on between any one of the harbors located upon the said lakes within any of the states or upon said connecting channels or through said connecting channels would be accommodated. Boats, for instance, desiring to ply between harbors located in Wisconsin and harbors located on Lake Erie in Ohio could do so without finding the depth of water in one harbor less than the depth in the other and without finding obstruction to their navigation in said connecting channels. Thus the United States by its improvement of navigation facilities upon the Great Lakes system has kept pace with the demands of commerce for such facilities of navigation as such commerce is carried on between the various ports or harbors and through the various connecting channels above mentioned. All such improvements have been made with due consideration to the lowering, if any there be, of the surface elevations of Lakes Huron and Michigan and Erie and connecting channels by the diversion at Chicago; and the said depth of water so provided by the United States at the various harbors and ports upon the Great Lakes and the depth in the connecting channels in the Great Lakes, would not have been greater had there been no diversion of water by The Sanitary District of Chicago. Said improvement in said harbors and ports and in said connecting channels have been made with due consideration to the effects, if any, upon the surface elevations of the Great Lakes of the diversions of waters from the Great Lakes system other than that of the diversion of water by The Sanitary District of Chicago. The commerce carried on through or in said harbors located upon Lake Michigan in Wisconsin, and upon Lake Superior in Wisconsin, has been, is and will be accommodated fully by the facilities for navigation now or which may be provided by the United States without any undue or unjust burden being cast upon said commerce by reason of the depths of water in said harbors. Neither the State of Wisconsin, nor the people of Wisconsin, nor any one of them have been or are injured by lack of sufficient depth of water in said harbors or in any one of them.

(*b*) The United States about the year 1894 provided for and caused the installation of certain works at the outlet of Lake Superior, whereby the out flow through the St. Mary's river has been controlled and said out flow has at times been greatly diminished, thus causing a decrease in the supply of water to Lake Michigan, Huron and Erie. The United States has and has assumed jurisdiction of navigation and of the facilities for navigation upon the entire Great Lakes system by the various works and improvements that it has constructed including said controlling works at the outlet of Lake Superior and also by the improvement of the channels connecting the Great Lakes.

The United States constructed at the Galops rapids a dam known the Galops dam, wherby one of the channels of the St. Lawrence river was entirely cut off thus causing the raising of the surface elevation of Lake Ontario to an amount in inches more than the claimed lowering of the surface elevation of said lake due to the diversion of water by the defendant, The Sanitary District of Chicago. Said dam was constructed about the year 1903.

The shallowness of the channels connecting Lake Erie with Lake Ontario is such that boats of the maximum draft that may enter any of the harbors located on Lake Michigan in Wisconsin, or located upon Lake Superior in Wisconsin, prevents and will prevent such boats from passing through said channels to Lake Ontario; so that any effect of the diversion of water at Chicago upon Lake Ontario can have no effect upon commerce in said Wisconsin harbors.

31. These defendants, and each of them, deny that complainant is entitled to the relief or any part thereof as in said bill of complaint demanded, and these defendants and each of them state that said bill of complaint is inadequate and insufficient in law and does not on its face entitle the said complainant to the relief prayed for in and by said bill of complaint; and these defendants furthermore move that the bill of complaint be dismissed for want of equity; and these defendants and each of them as to each and every allegation of the said bill of complaint not herein admitted, answered or specifically denied, hereby expressly deny; and these defendants and each of them pray the same advantage in this answer as if they had pleaded or demurred to said bill of complaint and pray that it be dismissed with defendants'

reasonable costs and charges in this behalf most wrongfully sustained.

STATE OF ILLINOIS, *Defendant*,

By Edward J. Brundage

Attorney General of Illinois,
Its Solicitor.

THE SANITARY DISTRICT OF CHICAGO, *Defendant*,

By Wm. F. Mulvihill

Attorney, The Sanitary District of
Chicago, Its Solicitor.

Clyde L. Day

Morton S. Cressy

Edmund D. Adcock

Solicitors for said Defendants and
each of them.

APPENDIX.

EXHIBIT A.

An Act to create sanitary districts, and to remove obstructions in the DesPlaines and Illinois rivers. Approved May 29, 1889, in force July 1, 1889.

Section 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly*: That whenever any area of contiguous territory within the limits of a single country shall contain two or more incorporated cities, towns, or villages, and shall be so situated that the maintenance of a common outlet for the drainage thereof will conduce to the preservation of the public health, the same may be incorporated as a sanitary district under this Act, in the manner following: Any 5,000 legal voters resident within the limits of such proposed sanitary district may petition the county judge of the county in which they reside, to cause the question to be submitted to the legal voters of such proposed district whether they will organize as a sanitary district under this Act. Such petition shall be addressed to the county judge, and shall contain a definite description of the territory intended to be embraced in such district, and the name of such proposed sanitary district: *Provided However,* that no territory shall be included in any municipal corporation formed hereunder which is not situated within the limits of a city, incorporated town or village, or within three miles thereof, and no territory shall be included within more than one sanitary district under this Act. Upon the filing of such petition in the office of the county clerk of the county in which such territory is situated, it shall be the duty of the county judge to call to his assistance two judges of the Circuit Court, and such judges shall constitute a board of commissioners which shall have power and authority to consider the boundaries of any such proposed sanitary district, whether the same shall be described in such petition or otherwise. Notice shall be given by such county judge of the time and place where such commissioners will meet, by a publication inserted in one or more daily papers published in such county at least twenty days prior to such meeting. At such meeting, the county judge shall preside, and all persons in such proposed sanitary district shall have an opportunity to be heard touching the location and boundary of such proposed district and make suggestions regarding the same, and such commissioners, after hearing statements, evidence and suggestions, shall fix and determine the limits and boundaries of such proposed district and for that purpose and to that extent, may alter and amend such petition. After such determination by said commissioners or a majority of them, the county judge shall submit to the legal voters of the proposed sanitary district the question of the organization and establishment of the proposed sanitary district, as determined by said commissioners at an election to be held on the first Tuesday after the first Monday in November thence next ensuing, notice whereof shall be given by said commissioners, at least twenty days prior thereto, by publication in one or more daily papers published within such proposed sanitary district, such notice to specify briefly the purpose of such election, with a description of such proposed district. Each legal voter resident within such proposed sanitary district shall have the right to cast a ballot at such election, with the words thereon, "For Sanitary District," or, "Against Sanitary District." The ballots so cast shall be received, returned and canvassed in the same manner and by the same officers as is provided by law in the case of ballots cast for county officers. The County Judge shall cause a statement of the result of such election to be spread upon the records of the county court. If a majority of the votes cast upon the question of the incorporation of the proposed sanitary district shall be in favor of the proposed sanitary district, such proposed district shall thenceforth be deemed an organized sanitary district under this Act.

2. All courts in this State shall take judicial notice of the existence of all sanitary districts organized under this Act. Upon the organization of any sanitary district under this Act, the county judge shall call an election to elect officers, and cause notice thereof to be posted or published, and perform all other acts in reference to such election in like manner as nearly as may be as he is required to perform in reference to the election of officers in newly organized cities under the provisions of an act entitled "An Act to provide for the incorporation of cities and villages," approved April 10, 1872.

3. In each sanitary district organized under this Act, there shall be elected nine trustees who shall hold their offices for five years, and until their successors are elected and qualified, except the term of office of the first trustees elected, shall be until five years after the first Monday in December after their election. The election of trustees, after the first, shall be on the Tuesday next after the first Monday in November, in every fifth year. In all elections for trustees, each qualified voter may vote for as many candidates as there are trustees to be elected, or he may distribute his vote among not less than five-ninths of the candidates to be elected, giving to each of the candidates among whom he distributes the same, the same number of votes or fractional parts of votes.

The trustees shall choose one of their number president, and such sanitary district shall, from the time of the first election held by it under this Act, be construed in law and equity a body corporate and politic and by the name and style of The Sanitary District of ———, and by such name and style may sue and be sued, contract and be contracted with, acquire and hold real estate and personal property necessary for corporate purposes, and adopt a common seal and alter the same at pleasure.

4. The trustees elected in pursuance of the foregoing provisions of this Act shall constitute a board of trustees for the district by which they are elected, which board of trustees is hereby declared to be the corporate authorities of such sanitary district, and shall exercise all the powers and manage and control all the affairs and property of such district. Said board of trustees shall have the right to elect a clerk, treasurer, chief engineer and attorney for such municipality, who shall hold their respective offices during the pleasure of the board, and who shall give such bond as may be required by said board. Said board may prescribe the duties and fix the compensation of all the officers and employes of said sanitary district: *Provided, However,* that the salary of the president of said board of trustees shall in no case exceed the sum of four thousand dollars per annum; and the salary of the other members of said board shall not exceed three thousand dollars per annum: *And Provided, Further,* that the amount received by any attorney shall not exceed the sum of five thousand dollars ($5,000) per annum. Said board of trustees shall have full power to pass all necessary ordinances, rules and regulations for the proper management and conduct of the business of said board of trustees and of said corporation and for carrying into effect the objects for which such sanitary district is formed.

5. All ordinances making any appropriations shall, within one month after they have passed, be published at least once in a newspaper published in such district, or if no such newspaper of general circulation is published therein, by posting copies of the same in three public places in the district; and no such ordinance shall take effect until ten days after it is so published, and all other ordinances, orders and resolutions, shall take effect from and after their passage unless otherwise provided therein.

6. All ordinances, orders and resolutions, and the date of publication thereof may be proven by the certificate of the clerk, under the seal of the corporation, and when printed in book or pamphlet form, and purporting to be published by the board of trustees, and such book or pamphlet shall be received as evidence of the passage and legal publication of such ordinances, orders and resolution, as of the dates mentioned in such book or pamphlet, in all courts and places without further proof.

7. The board of trustees of any sanitary district organized under this Act shall have power to provide for the drainage of such district by laying out, establishing, constructing and maintaining one or more main channels, drains, ditches and outlets for carrying off and disposing of the drainage (including the sewage) of such district, together with such adjuncts and additions thereto as may be necessary or proper to cause such channels or outlets to accomplish the end for which they are designed in a satisfactory manner; also to make and establish docks adjacent to any navigable channel made under the provisions hereof for drainage purposes, and to lease, manage and control such docks, and also to control and dispose of any water-power which may be incidentally created in the construction and use of said channels or

outlets, but in no case shall said board have any power to control water after it passes beyond its channel, waterways, races or structures into a river or natural waterway or channel, or water-power, or docks, situated on such river or natural waterway or channel: *Provided, However,* nothing in this Act shall be construed to abridge or prevent the State from hereafter requiring a portion of the funds derived from such water power, dockage or wharfage to be paid into the State Treasury to be used for State purposes. Such channels or outlets may extend outside the territory included within such sanitary district, and the rights and powers of said board of trustees over the portion of such channel or outlet lying outside of such district shall be the same as those vested in said board over that portion of such channels or outlets within the said district.

8. Such sanitary district may acquire, by purchase, condemnation, or otherwise, any and all real and personal property, right of way and privilege, either within or without its corporate limits that may be required for its corporate purposes: *Provided,* all moneys for the purchase and condemnation of any property, shall be paid before possession is taken or any work done on the premises damaged by the construction of such channel or outlet, and in case of an appeal from the county court taken by either party, whereby the amount of damages is not finally determined, the amount of judgment in such court shall be deposited at some bank, to be designated by the judge thereof, subject to the payment of such damages on orders signed by such county judge, whenever the amount of damages is finally determined; and, when not longer required for such purposes, to sell, convey, vacate and release the same, subject to the reservation contained in section 7, relating to water powers and docks.

9. The corporation may borrow money for corporate purposes, and may issue bonds therefor, but shall not become indebted, in any manner or for any purpose, to an amount to the aggregate to exceed five per centum on the valuation of taxable property therein, to be ascertained by the last assessment for state and county taxes previous to the incurring of such indebtedness: *Provided, However,* that said five per centum shall not exceed the sum of fifteen million dollars ($15,000,000).

10. At the time or before incurring any indebtedness, the board of trustees shall provide for the collection of a direct annual tax sufficient to pay the interest on such debt as it falls due, and also to pay and discharge the principal thereof as the same shall fall due, and at least within twenty years from the time of contracting the same: *Provided,* that the net earnings from water power and docks may be appropriated and applied to the purpose of paying the interest or principal of such indebtedness or both, and to the extent that they will suffice, the direct tax may be remitted.

11. All contracts for work to be done by such municipality, the expense of which will exceed five hundred dollars, shall be let to the lowest responsible bidder therefor, upon not less than sixty days public notice of the terms and conditions upon which the contract is to be let having been given by publication in a newspaper of general circulation published in said district, and the said board shall have the power and authority to reject any and all bids, and re-advertise. *Provided,* no person shall be employed on said work unless he be a citizen of the United States or has in good faith declared his intentions to become such citizen. In all cases where an alien, after filing his declaration of intention to become a citizen of the United States shall for the space of three months after he could lawfully do so, fail to take out his final

papers and complete his citizenship, such failure shall be *prima facie* evidence that his declaration of intentions, was not made in good faith, and that eight hours shall constitute a day's work.

12. The board of trustees may levy and collect taxes for corporate purposes upon property within the territorial limits of such sanitary district, the aggregate amount of which in any one year shall not exceed one-half of one percentum of the value of the taxable property within the corporate limits, as the same shall be assessed and equalized for state and county taxes of the year in which the levy is made. Said board shall cause the amount required to be raised by taxation in each year to be certified by the county clerk, on or before the second Tuesday in August, provided in section one hundred and twenty-two of the general revenue law. All taxes so levied and certified shall be collected and enforced in the same manner and by the same officers as state and county taxes, and shall be paid over by the officer collecting the same to the treasurer of The Sanitary District, in the manner and at the time provided by the general revenue law.

13. The board of trustees shall have power to defray the expenses of any improvement made by it in the execution of the powers hereby granted to such incorporation, by special assessment, or by general taxation, or partly by special assessment and partly by general taxation as they shall by ordinance prescribe. It shall constitute no objection to any special assessment that the improvement for which the same is levied is partly outside the limits of such incorporation, but no special assessment shall be made upon property situated outside of such sanitary district, and in no case shall any property be assessed more than it will be benefited by the improvement for which the assessment is levied. The proceedings

for making, levying, collecting and enforcing of any special assessment levied hereunder shall be the same as nearly as may be as is prescribed by article nine of an Act entitled "An Act to provide for the incorporation of cities and villages," approved April 10, 1872. Whenever in said Act the words "city council" are used, the same shall apply to the board of trustees constituted by this Act, and the words applying to the City or its officers in that article shall be held to apply to the corporation hereby created and to its officers.

14. When any assessment is made under this Act, the ordinance authorizing such assessment may provide that it be divided into equal annual installments, not more than twenty in number, and fix the amount and time of payment of each installment, and that the installment shall bear interest at a rate not exceeding six per cent, per annum, payable annually, from the date fixed in said ordinance and the several installments and interest thereon may be collected and enforced, as they shall become due, in the manner provided for the enforcement of assessments under said article 9. No more of any assessment need be returned or certified to the county collector than will show the amount due and unpaid at the time of such return, and no sale of any parcel of land for any installment of an assessment shall discharge the premises from any subsequent installment of the same or any other assessment. Anyone or all of the installments may be paid any time after the assessment is confirmed, with accrued interest, if any, to the date of payment.

15. Where any assessment is made payable in installments, the board of trustees may issue bonds or certificates not exceeding in amount eighty per centum of the unpaid portion of such assessment at the date of the issue thereof, payable only out of such assessment, and bearing interest at a rate not exceeding the rate

of interest upon the installments of such assessments. The board of trustees shall have the right to call in and pay off said bonds or certificates as fast as there is money received into the treasury from the assessment against which the same are issued, and all moneys received upon such assessment shall be applied to the payment of said certificates or bonds until they are fully satisfied.

16. Whenever the board of trustees of any sanitary district shall pass an ordinance for the making of any improvement which such district is authorized to make, the making of which will require that private property should be taken or damaged, such district may cause compensation therefor to be ascertained and condemn and acquire possession thereof in the same manner, as nearly as may be, as is provided in an Act entitled "An Act to provide for the exercise of the right of eminent domain," approved April 10, 1872: *Provided, However,* that proceeding to ascertain the compensation to be paid for taking or damaging private property shall in all cases, be instituted in the county where the property sought to be taken or damaged is situated: *And, Provided,* that all damages to property, whether determined by agreement or by final judgment of court, shall be paid out of the annual district tax prior to the payment of any other debt or obligation.

17. When it shall be necessary in making any improvements which any district is authorized by this Act to make, to enter upon any public property or property held for public use, such district shall have the power so to do, and may acquire the necessary right of way over such property held for public use in the same manner as is above provided for acquiring private property, and may enter upon, use, widen, deepen and improve any navigable or other waters, waterways, canal or lake: *Provided,*

the public use thereof shall not be unnecessarily interrupted or interfered with, and that the same shall be restored to its former usefulness as soon as practicable: *Provided, However,* that no such district shall occupy any portion of the Illinois and Michigan Canal outside of the limits of the county in which such district is situated, for the site of any such improvement, except to cross the same, and then only in such a way as not to impair the usefulness of said canal or to the injury of the right of the State therein, and only under the direction and supervision of the canal commissioners: *And, Provided, Further,* that no district shall be required to make any compensation for the use of so much of said canal as lies within the limits of the county in which said district is situated, except for transportation purposes.

18. In making any special assessment for any improvement which requires the taking or damaging of property, the cost of acquiring the right to damage or take such property may be estimated and included in the assessment as a part of the cost of making such improvement.

19. Every sanitary district shall be liable for all damages to real estate within or without such district which shall be overflowed or otherwise damaged by reason of the construction, enlargement or use of any channel, ditch, drain, outlet or other improvement under the provisions of this Act; and actions to recover such damages may be brought in the county where such real estate is situated, or in the county where such sanitary district is located, at the option of the party claiming to be injured. And in case judgment is rendered against such district for damage the plaintiff shall also recover his reasonable attorney's fees, to be taxed as costs of suit: *Provided, However,* it shall appear on the trial that the plaintiff notified the trustees of such district, in

writing, at least 60 days before suit was commenced by leaving a copy of such notice with some one of the trustees of such district stating that he claims damages to the amount of ——— dollars, by reason of (here insert the cause of damage) and intends to sue for the same: *And, Provided, Further,* that the amount recovered shall be larger than the amount offered by said trustees (if anything) as a compromise for damages sustained.

20. Any channel or outlet constructed under the provisions of this Act, which shall cause the discharge of sewages into or through any river or stream of water beyond or without the limits of the district constructing the same, shall be of sufficient size and capacity to produce a continuous flow of water of at least two hundred cubic feet per minute for each one thousand of the population of the district drained thereby, and the same shall be kept and maintained of such size and such condition that the water thereof shall be neither offensive or injurious to the health of any of the people of this State, and before any sewage shall be discharged into such channel or outlet all garbage, dead animals, and parts thereof, and other solids shall be taken therefrom.

21. In case any sanitary district in this State formed under the provisions of this Act shall introduce sewage into any river or stream of water, or natural or artificial water course, beyond or without the limits of such district, without conforming to the provisions of this Act or having introduced such sewage into such water course, shall fail to comply with any of the provisions of this Act, an action to enforce compliance shall be brought by the Attorney General of this State, in the Courts of any county wherein such water course is situated, or he may authorize the State's Attorney of any such county to commence and prosecute such action in any such county: *Provided,* that nothing in this section

contained shall be construed to prevent the prosecution of any action or proceeding by individuals or bodies corporate or politic against such district.

22. Nothing in this Act contained shall be so construed as to constitute a contract or grant between the State of Illinois and any sanitary district formed under its provisions, or to prevent, debar or deprive the State of Illinois from, at any time in the future, altering, amending or repealing this Act, *Or* imposing any conditions, restrictions or requirements other, different or additional to any herein contained upon any sanitary district which may be formed hereunder.

23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the DesPlaines or Illinois rivers such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet, and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water. If the population of the district drained into such channel shall at any time exceed 1,500,000, such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a cur-

rent of not more than three miles per hour, and if at any time the general government shall improve the DesPlaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said DesPlaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed in the DesPlaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the DesPlaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas creek in the Illinois river, before any water shall be turned into the said channel.

And the Canal Commissioners, if they shall find at any time that an additional supply of water has been added to either of said rivers, by any drainage district or districts, to maintain a depth of not less than six feet from any dam owned by the State to and into the first lock of the Illinois and Michigan Canal at LaSalle, without the aid of any such dam, at low water, then it shall be the duty of said Canal Commissioners to cause such dam or dams to be removed. This act shall not be construed to authorize the injury or destruction of existing water-power rights.

24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the DesPlaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes.

25. Any district formed hereunder shall have the right to permit territory lying outside its limits and within the same county to drain into and use any channel or drain made by it, upon such payments, terms and conditions as may be mutually agreed upon, and any district formed hereunder is hereby given full power and authority to contract for the right to use any drain or channel which may be made by any other sanitary district, upon such terms as may be mutually agreed upon, and to raise the money called for by any such contract in the same way and to the same extent as such district is authorized to raise money for any other corporate purposes: *Provided*, that where the united flow of any sanitary districts thus co-operating shall pass into any channel constructed within the limits of the county wherein such districts are located and which passes into the DesPlaines or Illinois rivers, such united flow shall in no

case and at no time be less than 20,000 cubic feet of water per minute for each one hundred thousand of the aggregate of the population of the districts co-operating: *Provided*, nothing in this act shall in any wise be so construed as to diminish, impair or remove any right or rights of any city, village, township or corporation, body politic or individual situated on the DesPlaines or Illinois rivers or their tributaries within the valleys of the same to use the channel for drainage or otherwise not inconsistent with the rights of the district constructing the same as expressed in this act.

26. Whenever in any such sanitary district there shall be a city, incorporated town or village, which owns a system of waterworks and supplies water from a lake or other source which will be saved and preserved from sewage pollution, by the construction of the main channel, drain, ditch, or outlet herein provided for; and the turning of the sewage, of such city and district therein, and there shall be in such sanitary district, any territory bordering on any such city, incorporated town or village, within the limits of another city incorporated town or village which does not own any system of waterworks at the time of the creation of such sanitary dsitrict, then upon application by the corporate authorities of such latter named city, incorporated town or village, the corporate authorities of such city, incorporated town or village, having such system of waterworks shall furnish water at the boundary line between such municipalities by means of its waterworks to the corporate authorities asking for the same in such quantities as may be required to supply consumers within said territory, at no greater price or charge than it charges and collects of consumers within its limits for water furnished through meters in like large quantities.

27. If any channel shall be constructed under the provisions of section 23 of this act, it shall be the duty of the trustees of such district, when such channel shall be completed, and before any water or sewage shall be admitted therein to duly notify in writing, the Governor of this State of such fact, and the Governor shall thereupon appoint three discreet persons as commissioners, one of whom shall be a resident of the city of Joliet, or between said city and the city of LaSalle and one a resident of the city of LaSalle, or between said city and the city of Peoria, and one a resident of the city of Peoria or between said city and the mouth of the Illinois river, to inspect said work. The said commissioners shall, within ten days after such appointment, meet at the City of Chicago and shall appoint a competent civil engineer, and they may employ such other assistance as they may require to expeditiously perform their duties. The said commission shall take as their datum line for the survey, the datum established by the Illinois and Michigan canal trustees in 1847, and shall make such examination and surveys of Chicago river and of the channel or channels authorized by this act as shall enable them to ascertain whether said channel is of the character and capacity required by this act. And in case they shall find the work in all respects in accordance with the provisions of section 23 of this act, they shall so certify to the Governor, who shall thereupon authorize the water and sewage to be let into said channel. But in case said commissioners shall find said channel is not constructed in accordance with the provisions of this act, it shall be their duty to file in any court of competent jurisdiction, on the chancery side thereof, in their name as such commissioners, a bill against said corporation, which bill shall set forth wherein said work is deficient and fails to comply with the provisions of this act; and said court thereupon issue

an injunction without bond against said defendant, enjoining and restraining it from admitting water or sewage into said channel until the final order of the court. And in case said court, upon hearing, shall determine that said channel is not constructed in accordance with the provisions of this act, said injunction shall be continued until the provisions of this act shall have been fully complied with.

Such commissioners and engineer shall receiver for their services ten dollars per day each, and their reasonable expenses and outlays for the time by them necessarily employed in the discharge of their duties, which shall be paid to them from the State Treasury; and the said Sanitary District shall reimburse the State for all expenses and disbursements on account of said commission.

In any channel is constructed under the provisions of this act, which shall discharge the sewage of a population of more than 300,000 into or through any river beyond or without the limits of the district constructing it, the same shall be constructed in accordance with the provisions of Section 23 of this Act, and if any such channel receives its supply of water from any river or channel connecting with Lake Michigan, it shall be construed as receiving its supply of water from Lake Michigan.

Approved May 29, 1889.

EXHIBIT A-1.

AN ACT to amend Section 12 and 20 of "An act to create sanitary districts and to remove obstructions in the Desplaines and Illinois rivers," approved May 29, 1889, in force July 1, 1889. Approved June 10, 1895. In force July 1, 1895.

Section 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly,* That Sections 12 and 20 of "An Act to create sanitary districts, and to remove obstructions in the Desplaines and Illinois rivers," approved May 29th, 1889, in force July 1, 1889, be and the same are hereby amended to read as follows:

354. TRUSTEES MAY LEVY AND COLLECT TAXES, ETC.) §12. The board of trustees may levy and collect taxes for corporate purposes upon property within the territorial limits of such sanitary district, the aggregate amount of which for each of the years 1895, 1896 and 1897, shall not exceed one and one-half per centum of the value of the taxable property within the corporate limits, as the same shall be assessed and equalized for the state and county taxes of the year in which the levy is made, and the aggregate amount of which in any one year after the year 1897 shall not exceed one-half of one per centum of such value. Said board shall cause the amount required to be raised by taxation in each year to be certified to the county clerk on or before the second Tuesday in August, as provided in section one hundred and twenty-two of the general revenue law. All taxes so levied and certified shall be collected and enforced in the same manner and by the same officers as state and county taxes, and shall be paid over by the officer collecting the same to the treasurer of The Sanitary District in the manner and at the time provided by the general revenue law.

362. Capacity of Channel or Outlet.) §20. Any channel or outlet constructed under the provisions of this Act which shall cause the discharge of sewage into or through any river or stream of water beyond or without the limits of the district constructing the same shall be of sufficient size and capacity to produce a continuous flow of water of at least two hundred cubic feet per minute for each one thousand of the population of the district drained thereby, and the same shall be kept and maintained of such size and in such condition that the water thereof shall be neither offensive or injurious to the health of any of the people of this State; and before any sewage shall be discharged into such channel or outlet, all garbage, dead animals and parts thereof, and other solids shall be taken therefrom, and said district shall, at the time any sewage is turned into or through any such channel or channels, turn into said channel or channels not less than twenty thousand cubic feet of water per minute for every one hundred thousand inhabitants of said district, and shall thereafter maintain the flow of such quantity of water.

EXHIBIT A-2.

An Act extending the powers of sanitary districts organized under an act entitled, "An Act to create sanitary districts and to remove obstructions in the DesPlaines and Illinois rivers," approved May 29, 1889, *in force* July 1, 1889, *to enable such districts to improve certain navigable streams within or auxiliary to such district and to build bridges across such stream. Approved May* 13, 1901, *in force July* 1, 1901.

Section 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That any sanitary district organized under an act entitled, "An Act to create sanitary districts and remove obstructions in the DesPlaines and Illinois rivers," approved May 29, 1889, in force July 1, 1889, which heretofore has or may hereafter use any navigable stream or river for a portion of its channel, or as an adjunct thereto, or auxiliary to its main channel, may for the purpose of widening, deepening or improving the same, for the purposes set forth in the act aforesaid, acquire by purchase, or under and pursuant to the eminent domain laws of this State, or otherwise, sufficient land for the purpose of making such improvement by widening and deepening said stream, as aforesaid.

§2. That wherever it has or may become necessary by reason of the widening, deepening or improving of such river, to construct bridges to meet the altered or changed condition of such stream or river, such sanitary district or districts may construct such bridge or bridges as such improvements, heretofore made or hereafter to be made, may require.

§3. Nothing herein contained shall be construed as depriving any city, village or town situated wholly or partly within the limits of said sanitary district of any power now exercised in the operation of said bridges; and any bridges built under the provisions of this act to supply or replace a public street or highway bridge, now or hereafter existing, shall, after the construction of said bridge, be operated and controlled for municipal purposes by said city, village or town within which it is located.

Approved May 13, 1901.

EXHIBIT A-3.

AN ACT in relation to The Sanitary District of Chicago, to enlarge the corporate limits of said District and to provide for the navigation of the channels created by such District and to construct dams, waterwheels and other works necessary to develop and render available the power arising from the water passing through its channels and to levy taxes therefor. Approved May 14, 1903. In force July 1, 1903.

369e. SANITARY DISTRICT OF CHICAGO EXTENDED.) Par. 1. *Be it enacted by the People of the State of Illinois represented in the General Assembly:* That the corporate limits of The Sanitary District of Chicago, be, and the same are hereby extended so as to embrace and include within the same, the territory and tracts of land situated in the County of Cook and State of Illinois, hereinafter described, as follows, viz:

First. The territory or tract of land bounded as follows: Beginning at the intersection of the county line between Lake and Cook counties, State of Illinois, with the west shore of Lake Michigan, running thence west along the said county line to the northwest corner of Section three (3), Township forty-two (42) north, Range twelve (12), east of the third principal meridian; thence south to the southeast corner of Section thirty-three

(33), Township forty-two (42) north, Range twelve (12), east of the third principal meridian; thence east to the northwest corner of Section twelve (12), Township forty-one (41) north, Range twelve (12), east of the third principal meridian; thence south to the northwest corner of Section twenty-five (25), in said town and range; thence east to the northeast corner of the west half (½) of the west (½) of said Section twenty-five (25); thence south to the southeast corner of the west half (½) or the west half (½) of Section thirty-six (36) in said town and range; thence east to the northeast corner of the west half (½) of Section one (1), Township forty (40) north, Range twelve (12), east of the third principal meridian; thence south to the southeast corner of the west half (½) of Section thirteen (13) in said township and range; thence east to the southeast corner of Section thirteen (13); thence east, north, northwest and east along the present boundary line of said Sanitary District of Chicago to the shore of Lake Michigan; thence northwesterly along the shore of Lake Michigan to the place of beginning.

Second. The territory or tract of land bounded as follows, to-wit: Commencing at the northeast corner of Section three (3) in Township thirty-seven (37) north, Range thirteen (13), east of the third principal meridian; running thence south to the southwest corner of Section eleven (11), Township thirty-six (36) north, Range thirteen (13), east of the third principal meridian; thence east and south along the boundary lines of Section fourteen (14), in said Township thirty-six (36) to the southeast corner of said Section fourteen (14), thence east to the southeast corner of Section seventeen (17), in Township thirty-six (36) north, Range fifteen (15), east of the third principal meridian; thence north along the east boundary line of the State of Illinois to its intersection with the shore of Lake Michigan, thence along the shore of Lake Michigan to the south boundary line of the present Sanitary District of Chicago; thence west along the present south boundary line of the said Sanitary District of Chicago to the place of beginning.

369f. PROVISION FOR DRAINAGE OF ADDITIONAL TERRITORY — CHANNEL ACROSS MICHIGAN AND ILLINOIS CANAL—LAND FOR USE OF CANAL COMMISSIONERS.) Par. 2. The board of trustees of said Sanitary District shall have the right to provide for the drainage of the additional territory added to said Sanitary District by this act by laying out, establishing, constructing and maintaining one or more channels, drains, ditches and outlets for carrying off and disposing of the drainage (including the sewage) of such district, together with such adjuncts and additions thereto as may be necessary or proper to cause such channels or outlets to accomplish the end for which they are designed in a satisfactory manner, and shall have the right to use what is known as the "Calumet feeder" of the Illinois and Michigan Canal and lands adjacent to such feeder belonging to the State of Illinois for the site of any such channel, within the limits of the county in which such district is situated, in such manner as said district may elect, and shall also have the right to construct a channel across said Illinois and Michigan Canal, without being required to restore said Illinois and Michigan Canal or said feeder to its former usefulness. If, by reason of said abandonment, a stagnant stream or pool of water shall remain upon the deposits of Chiago sewage, accumulated in said Illinois and Michigan Canal by reason of its years of usefulness by the City of Chicago as a sewage outlet, said Sanitary District shall fill up said canal to a depth sufficient to remove said condition and prevent the spread of pestilence and disease throughout the territory in which said Illinois and Michigan Canal is abandoned; and the other powers and jurisdiction of said Sanitary District of Chicago over and in connection with such added territory shall be the same as that vested in it over the territory included within the limits of said Sanitary District as originally organized. Before said Calumet Channel is connected with the present main sanitary channel, gates of suitable pattern for shutting off the flow of water into said Calumet Channel shall be installed at or near the connection of said Calumet Channel with the Calumet river and forever maintained for use in case of emergency, and for the protection of the property and lives of residents of the Illinois Valley, and shall maintain the same proportion of dilution of sewage through such auxiliary channels as it may construct and join to its main channel as is now required by the act creating said Sanitary District: *Provided, however,* that before any such channel is constructed across said Illinois and Michigan Canal, or the navigation of said canal in any manner interfered with, said Sanitary District of Chicago shall connect its present main channel from the controlling works at Lockport with the upper basin of the Illinois and Michigan Canal at Joliet by a channel of a depth of not less than ten (10) feet and a width of not less than one hundred and sixty (160) feet through its entire length, in which channel so to be constructed, said Sanitary District shall provide and construct a lock or locks of the size of at least twenty-two (22) feet in width by one hundred and thirty (130) feet in length between mitre sills, connecting upper and lower levels, and provide suitable protection for water craft in using said locks and channel. Said locks shall be constructed of the most approved pattern of their size, and be perfectly safe for use and be equipped with machinery to operate the same; and if only one lock is constructed it shall be provided with double gates to prevent accident, and said Sanitary District shall forever maintain and operate the same. *Provided, further,* that said Sanitary District shall furnish and provide at said lock a site of the dimensions of at least twenty by thirty feet upon which the state through the canal commissioners shall have the right to erect a suitable office building and keep an agent therein, and the canal commissioners shall have such authority in and about said lock as is necessary to enforce the rules and regulations prescribed by them pertaining to and governing navigation on the Illinois and Michigan Canal: *Provided, further,* that said Sanitary District shall furnish, free of all expense, for the perpetual use of the canal commissioners, at some point in the Township of Lockport to be agreed upon by the canal commissioners and the Sanitary District trustees, a strip or parcel of land bordering upon said sanitary channel, eight hundred (800) feet in length and one hundred and thirty (130) feet in width, filling the same to a suitable depth to provide suitable roadways for approaches, whereon may be located, constructed and operated docks, shops, barns and other buildings controlled by the canal commissioners and used in connection with the operation of the Illi nois and Michigan Canal.

369g. NAVIGATION ON SAID SANITARY DISTRICT.) Par. 3. Said Sanitary District shall permit all water craft navigating or purposing to navigate said Illinois and Michigan Canal to navigate the water of all said channels of said Sanitary District promptly, without delay and without payment of any tolls or lockage charges for so navigating in said channels. The rules of the United States government now in force, regulating navigation on the Chicago river shall govern navigation on the channels of said Sanitary District of Chicago: *Provided, however,* that the speed of all vessels while passing through the earth sections shall not exceed eight (8) miles per hour.

368h. SANITARY DISTRICT—NO TAX UPON ANY PART OF ADDED TERRITORY.) Par. 4. Said Sanitary District of Chicago shall have no power to levy and collect any special assessment or special tax upon any part of said added territory to defray or pay any part of the cost, either of the work heretofere done by said Sanitary District or any main channel hereafter to be constructed in said added territory.

369i. AUTHORITY TO CONSTRUCT DAMS, ETC.—POWER.) Par. 5. That the said Sanitary District of Chicago is hereby authorized to construct all such dams, waterwheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now or hereafter constructed by said district.

369j. HOW SUCH POWER MAY BE UTILIZED.) Par. 6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy and shall be transmitted to the various cities, villages and towns within said Sanitary District or adjacent to the main channel of said Sanitary District and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said Sanitary District; *Provided, however,* that it shall be the duty of said Sanitary District to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said Sanitary District.

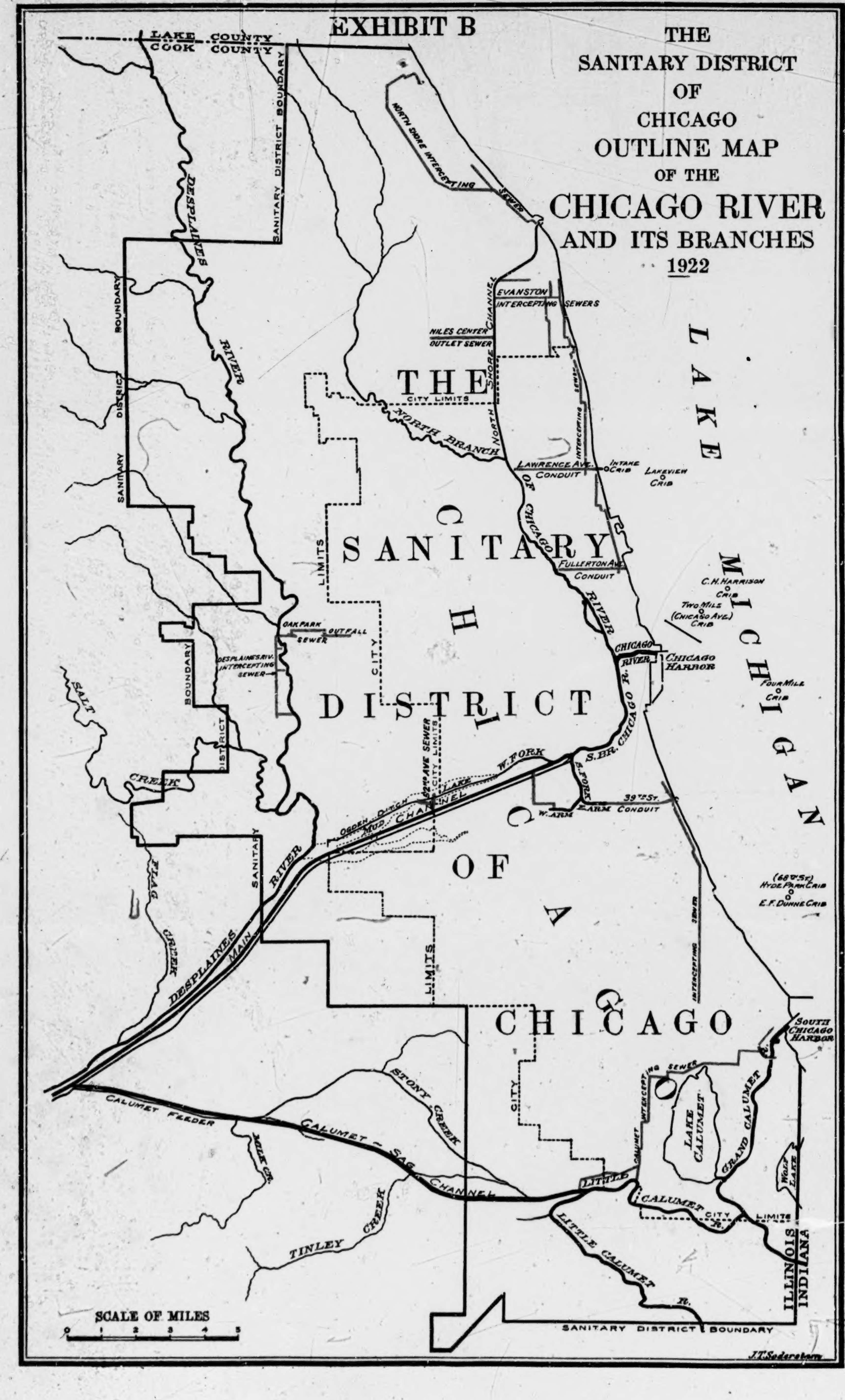
369k. Authority to Levy Taxes.) Par. 7. That for the purpose of meeting the expenditures arising from the exercise of the powers conferred by sections five and six of this act upon the said Sanitary District, the said Sanitary District of Chicago is hereby authorized to levy and collect in each year, for a period of three years (in addition to the taxes which said district is now by law authorized to levy and collect) a tax of not exceeding one-fourth of one per cent of the value of the taxable property within the corporate limits of said district, as the same shall be assessed and equalized for the state and county taxes of the year in which the levy is made; *Provided, further,* that the county clerk, in extending said one-fourth of one per cent tax upon the taxable property within said Sanitary District, shall not in any event reduce the same, but in that respect said one-fourth of one per cent shall not be subject to the provisions of and act entitled, "An Act concerning the levy and extension of taxes," approved May 9, 1901.

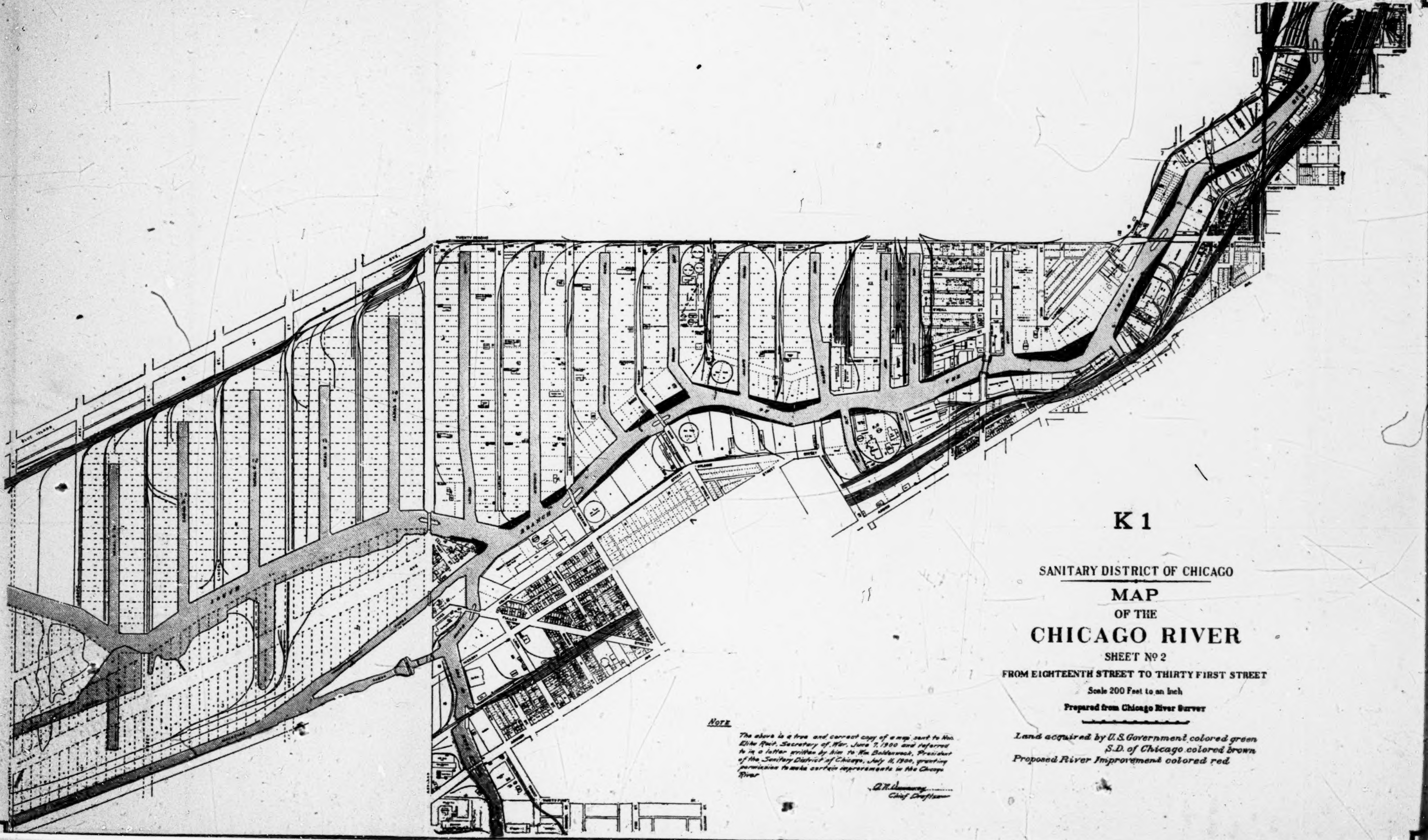
369l. Comply with Acts of Congress as to Illinois and Michigan Canal.) Par. 8. The said Sanitary District shall, at the expense of said district, in all respects comply with the provisions of the Acts of Congress of March 22, 1822, and March 2, 1827, as construed by the courts of last resort of the State of Illinois and of the United States, in relation to the Illinois and Michigan canal, so far as it affects that portion of the Illinois and Michigan canal vacated or abandoned by the terms of this act.

369m. Petition for Question to be Submitted—Election.) Par. 9. If within sixty (60) days after the passage of this act a petition signed by not less than three per cent of the legal voters of the territory within the limits of The Sanitary District of Chicago, as the same are enlarged by the terms of this act, praying that the question of the adoption of this act shall be submitted to a vote of the electors of the territory within the said limits of the said Sanitary District of Chicago shall be filed with the clerk of said Sanitary District, then and in such case the question of the adoption of this act shall be submitted to a vote of the said electors as in said petition prayed, at the general election to be held in the County of Cook in November, 1904, and in such case this act shall not be in force unless a majority of the votes cast at said election upon the question of the adoption of this act shall be in favor of the adoption thereof. It shall be the duty of the election officers having charge of the preparation of the ballots and the giving of the notices of election and of the counting, canvassing and making return of the ballots to take all necessary steps and do all necessary acts to cause the said question of the adoption of this act to be submitted to a vote as hereinbefore provided, and to cause the result of such election to be canvassed and certified, as provided by law in other similar cases.

EXHIBIT B

THE
SANITARY DISTRICT
OF
CHICAGO
OUTLINE MAP
OF THE
CHICAGO RIVER
AND ITS BRANCHES
1922


LAKE COUNTY
COOK COUNTY
SANITARY DISTRICT BOUNDARY
NORTH SHORE INTERCEPTING SEWER
DESPLAINES RIVER
EVANSTON INTERCEPTING SEWERS
NILES CENTER OUTLET SEWER
NORTH SHORE CHANNEL
THE SANITARY DISTRICT OF CHICAGO
CITY LIMITS
NORTH BRANCH
INTERCEPTING SEWER
LAWRENCE AVE. CONDUIT
INTAKE CRIB
LAKEVIEW CRIB
LAKE MICHIGAN
OF CHICAGO RIVER
FULLERTON AVE. CONDUIT
C.H. HARRISON CRIB
TWO MILE (CHICAGO AVE.) CRIB
CHICAGO RIVER
CHICAGO HARBOR
FOUR MILE CRIB
OAK PARK OUTFALL SEWER
DESPLAINES RIV. INTERCEPTING SEWER
SALT CREEK
S. BR. CHICAGO R.
W. FORK
S. FORK
W. ARM
E. ARM
39TH ST. CONDUIT
52ND AVE SEWER
OGDEN DITCH
MUD LAKE CHANNEL
(68TH ST.) HYDE PARK CRIB
E.F. DUNNE CRIB
FLAG CREEK
DESPLAINES RIVER
MAIN CHANNEL
SOUTH CHICAGO HARBOR
STONY CREEK
CALUMET FEEDER
CALUMET-SAG CHANNEL
MILK CR.
LAKE CALUMET
GRAND CALUMET
WOLF LAKE
CALUMET INTERCEPTING SEWER
LITTLE CALUMET R.
TINLEY CREEK
ILLINOIS
INDIANA
SCALE OF MILES
0
1
2
3
4
5
J.T. Soderstrom



K 1

SANITARY DISTRICT OF CHICAGO

MAP
OF THE
CHICAGO RIVER

SHEET Nº 2

FROM EIGHTEENTH STREET TO THIRTY FIRST STREET

Scale 200 Feet to an Inch

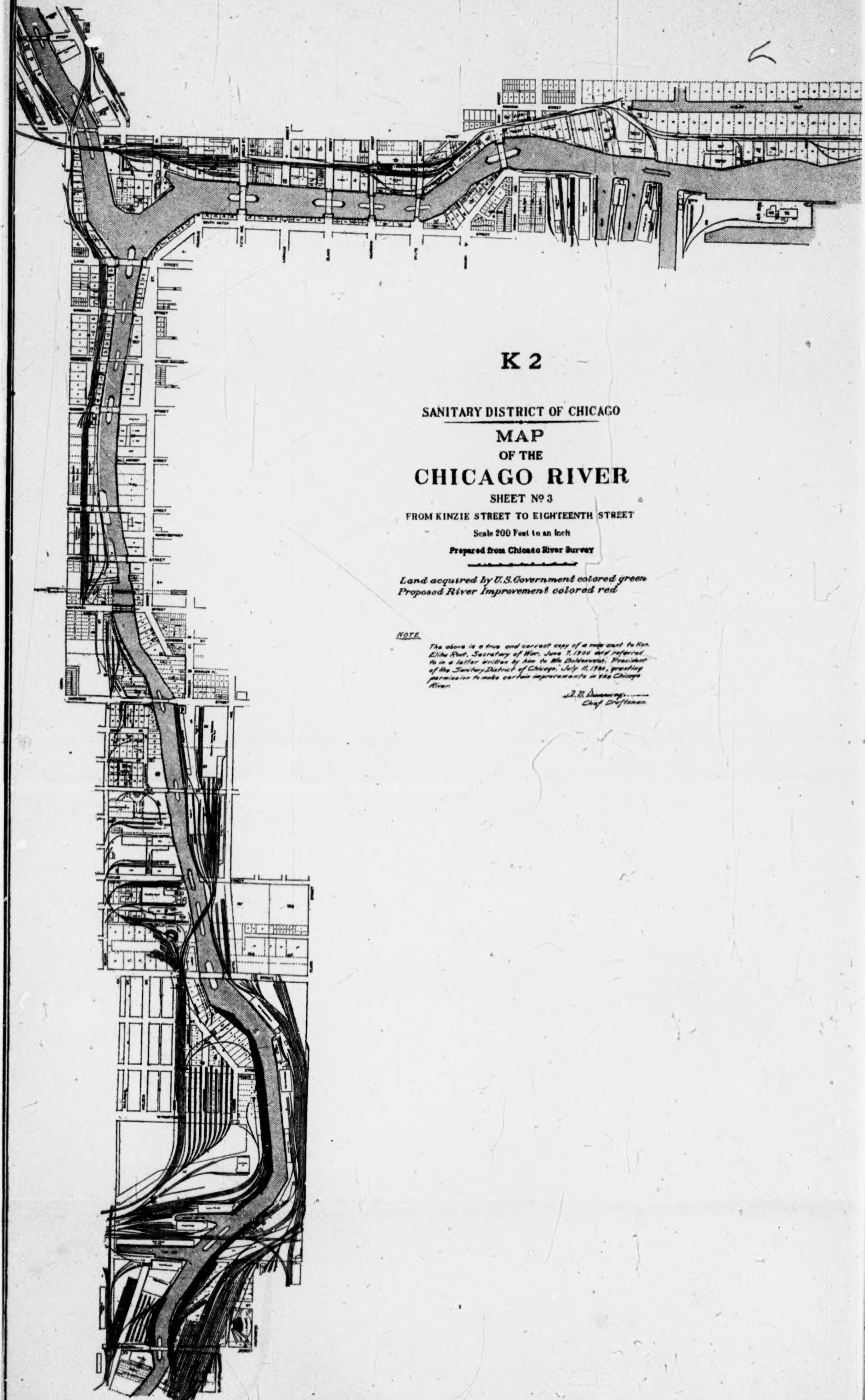
Prepared from Chicago River Survey

Land acquired by U. S. Government colored green
S. D. of Chicago colored brown
Proposed River Improvement colored red

Note

The above is a true and correct copy of a map sent to Hon. Elihu Root, Secretary of War, June 7, 1900 and referred to in a letter written by him to Wm. Boldenweck, President of the Sanitary District of Chicago, July 11, 1900, granting permission to make certain improvements in the Chicago River

Chief Draftsman



K 2

SANITARY DISTRICT OF CHICAGO

MAP
OF THE
CHICAGO RIVER

SHEET Nº 3
FROM KINZIE STREET TO EIGHTEENTH STREET
Scale 200 Feet to an Inch
Prepared from Chicago River Survey

Land acquired by U.S. Government colored green
Proposed River Improvement colored red

NOTE

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J. N. Dunaway
Chief Draftsman.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11.

Office Supreme Court, U. S.
FILED
OCT 5 1925
WM. R. STANSBURY
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, 1925

No. —— Original

In Equity ~~No. 16~~

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,

Complainants.

#7

v.

STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,

Defendants.

MOTION TO AMEND BILL OF COMPLAINT

HERMAN L. EKERN,
Attorney General of the State of Wisconsin.

CLIFFORD L. HILTON,
Attorney General of the State of Minnesota.

C. C. CRABBE,
Attorney General of the State of Ohio.

GEORGE W. WOODRUFF,
Attorney General of the State of Pennsylvania.

Solicitors.

7

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, 1925

No. ——Original
In Equity

STATE OF WISCONSIN, STATE OF
MINNESOTA, STATE OF OHIO, and
STATE OF PENNSYLVANIA,

Complainants,

v.

STATE OF ILLINOIS and SANITARY
DISTRICT OF CHICAGO,

Defendants.

Notice of Motion For Leave to Amend and to Join as Complainants

To

OSCAR E. CARLSTROM,
Attorney General of the State of Illinois,
Solicitor for Defendant State of Illinois,

CLYDE L. DAY and
EDMUND D. ADCOCK,
Solicitor for Defendants and each of them:

Please take notice that the annexed motion for leave to amend and to join as complainants will be submitted at the opening of court on the fifth day of October, 1925, or as soon thereafter as counsel can be heard.

HERMAN L. EKERN,
Attorney General of the State of Wisconsin.

CLIFFORD L. HILTON,
Attorney General of the State of Minnesota.

C. C. CRABBE,
Attorney General of the State of Ohio.

GEORGE W. WOODRUFF,
Attorney General of the State of Pennsylvania.

Solicitors.

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, 1925

No. —— Original

In Equity

STATE OF WISCONSIN, STATE OF
MINNESOTA, STATE OF OHIO, and
STATE OF PENNSYLVANIA,

Complainants,

v.

STATE OF ILLINOIS and SANITARY
DISTRICT OF CHICAGO,

Defendants.

MOTION TO AMEND

And now comes the state of Wisconsin, complainant, and begs leave to file in this cause the amended bill, a copy of which is hereto attached, and the state of Minnesota, the state of Ohio and the state of Pennsylvania beg leave to be joined as complainants in said action.

HERMAN L. EKERN,
Attorney General of the State of Wisconsin.
CLIFFORD L. HILTON,
Attorney General of the State of Minnesota.
C. C. CRABBE,
Attorney General of the State of Ohio.
GEORGE W. WOODRUFF,
Attorney General of the State of Pennsylvania.
Solicitors.

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, 1925

No. ——Original
In Equity

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,

Complainants,

v.

STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,

Defendants.

BILL OF COMPLAINT

To The Honorable, The Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of Wisconsin, one of the United States of America, by its solicitor, Herman L. Ekern, Attorney General of said state, the State of Minnesota, by its solicitor, Clifford L. Hilton, Attorney General of said State, the State of Ohio, by its solicitor, C. C. Crabbe, Attorney General of said state, and the State of Pennsylvania, by its solicitor, George W. Woodruff, Attorney General of said state, bring this bill of complaint against the State of Illinois and the Sanitary District of Chicago, and your orators complain and allege:

1. The State of Wisconsin, the State of Minnesota, the State of Ohio and the State of Pennsylvania each is one of the States of the United States of America, and this action is brought on its and their behalf as such States of the United States of America.

2. The defendant, State of Illinois, is also one of the States of the United States of America, and the defendant, Sanitary District of Chicago, is a public corporation organized and existing under and by virtue of the laws of the said State of Illinois and is a citizen of said last named State.

3. This action is brought in the Supreme Court of the United States in the exercise of the original jurisdiction of said Court, on the ground that it is an action in equity relating to a controversy between two or more states of the United States and also between States of the United States and a citizen of another State.

4. The State of Wisconsin has approximately 350 miles of shore line along Lake Michigan, and included in the said shore line are thirteen harbors with facilities for the loading and unloading of vessels navigating the said Lake Michigan and the other Great Lakes. The said harbors are as follows: Milwaukee, Manitowoc, Green Bay, Sheboygan, Marinette, Racine, Kenosha, Port Washington, Kewaunee, Algoma and Sturgeon Bay. The total amount of freight received at and shipped from the said thirteen harbors during the year 1923, exclusive of freight received or shipped by carferry, was in excess of 9,000,000 tons. The State of Wisconsin has approxi-

mately 150 miles of shore line along Lake Superior, and included in the said shore line are the harbors of Duluth-Superior, Port Wing, and Ashland, the total traffic of which including the Duluth-Superior harbor in 1923 was in excess of 67,000,000 tons.

5. The State of Minnesota has approximately 75 miles of shore line along Lake Superior and included in said shore line are the harbors of Duluth-Superior, Grand Marais, Warroad, Zippel Bay and Baudette, which said harbors had a combined tonnage during the year 1923 of about 60,000,000 tons.

6. The State of Ohio has approximately 230 miles of shore line along Lake Erie, and included in the said shore line are the harbors of Toledo, Put-In-Bay, Marblehead, Kelleys Island, Port Clinton, Sandusky, Huron, Vermilion, Lorain, Cleveland, Fairport, Astabula and Conneaut, which during the year 1923 had a combined tonnage, exclusive of freight received or shipped by carferry, of more than 76,000,000 tons.

7. The State of Pennsylvania has approximately 40 miles of shore line along Lake Erie, and included in the said shore line is the harbor of Erie. The total amount of freight ~~received at~~ and shipped from said harbor during the year 1923 was 3,766,389 tons.

8. The State of Illinois has approximately 60 miles of shore line along Lake Michigan, comprising the eastern boundary of the counties of Lake and Cook in said State. Up to the year 1900, a natural stream of water called the Chicago River flowed through said Lake and Cook counties, one branch in a northerly direction and the other in a southerly direction, and emptied into Lake Michigan at a point in the city of Chicago.

9. In the year 1889 the legislature of the State of

Illinois enacted a statute entitled "An act to create sanitary districts and remove obstructions in the Des Plaines and Illinois Rivers," approved May 29th, 1889 and published in the Laws of Illinois for the year 1889 commencing at page 186; which act authorized the organization of public corporations to be known as sanitary districts, with power, among other things, to construct, maintain and operate drainage canals or channels for the disposal of drainage and sewage. By sections 23 and 24 of the said act, it was further provided as follows, to-wit:

> "Sec. 23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers, such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water. If the population of the district drained into such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all lia-

> bility therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel. * * *
>
> "Sec. 24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the Des Plaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes."

10. In November and December of the year 1889, defendant, the Sanitary District of Chicago, was organized as a sanitary district under the act of 1889 hereinbefore referred to, and has since continuously existed as such sanitary district under the said act of 1889 and the acts amendatory thereof and supplementary thereto. At the time of its organization said defendant district consisted

of a territory about 185 square miles in area. By successive acts of the legislature of Illinois the area of said defendant district has been increased from time to time, and as your orators are informed and verily believe and therefore aver, its area is now approximately 395 square miles, extending from the Illinois-Indiana State line on the south and east to the northerly boundary of Cook county on the north, with about 33 miles of frontage on Lake Michigan, and comprises the entire city of Chicago together with large areas of land to the south, west and north of said city.

11. On or about the 3rd day of September 1892, defendant Sanitary District of Chicago, acting as a subordinate agency of the defendant, State of Illinois, pursuant to the act of 1889 hereinbefore referred to, commenced the construction of a canal or channel commencing at a point in the west fork of the south branch of the Chicago river about 6 miles above the mouth of said river, and extending in a general westerly direction for a distance of about 32 miles to a point near the city of Joliet, Illinois. At its westerly terminus said canal was made to connect with the Des Plaines river, a stream flowing in a westerly and southwesterly direction and forming a tributary of the Illinois river, which latter river in turn flows in a westerly and southwesterly direction and forms a tributary of the Mississippi river.

12. In the construction of said canal it was at all times the plan of the defendant, State of Illinois, and the defendant, Sanitary District of Chicago, that the said canal should be used as a passage-way for the sewage of the territory comprising the Sanitary District of Chicago, to the end that such sewage might be carried down the said canal into the Des Plaines and Illinois

rivers; and in order to accomplish the said purpose it was the intention of said defendants at and prior to the commencement of the construction of said canal to divert from Lake Michigan, and pass through the said canal, such amounts of water as might be deemed by said defendants to be necessary for the proper dilution of the said sewage and its propulsion through the canal and the Des Plaines and Illinois rivers. In pursuance of such intention, and prior to the completion of said canal, the legislature of the defendant State of Illinois enacted in the year of 1895 an amendment to section 20 of the act of 1889 hereinbefore referred to, which amendment is published in the Laws of Illinois for the year 1895 commencing at page 168 thereof, and provides that any sanitary district organized under the provisions of the act of 1889 and maintaining a channel which causes the discharge of sewage into or through any river beyond the limits of such district, "shall, at the time any sewerage is turned into or through any such channel or channels, turn into such channel or channels not less than 20,000 cubic feet of water per minute for every 100,000 inhabitants of said district, and shall thereafter maintain the flow of such quantity of water."

13. Upon the completion of the said canal, the defendant, Sanitary District of Chicago, in compliance with section 27 of the said act of 1889, applied to the Governor of the State of Illinois for authority to commence the use of said canal, and such authority was granted by the said governor on behalf of the defendant State of Illinois, and thereupon, on or about the second day of January, 1900, said defendant District commenced the diversion of water from Lake Michigan into the Chicago river, and thence into and through the said canal,

in such amounts and at such velocity as to reverse the flow of the Chicago river and create a steady and uninterrupted flow of water, from said day down to the present time, from Lake Michigan through the Chicago river to the said canal, thence through the said canal to the Des Plaines river near Joliet, and thence down the Des Plaines and Illinois rivers to the Mississippi river.

14. The primary object and purpose of the act of 1889 hereinbefore referred to, as said act was construed by the highest court of the State of Illinois in the case of *People v. Nelson*, 133 Ill. 565, 27 N. E. 217, and *Beidler v. Sanitary District of Chicago*, 211 Ill. 628, 71 N. E. 1118, was to provide a method of disposing of the sewage of the city of Chicago and contiguous territory, and the canal constructed by the defendant district as hereinbefore described has been continuously used for such purpose since the month of January, 1900. By the terms of the act of 1895 referred to in paragraph 12 hereof, defendant State of Illinois has undertaken to make it the legal duty of the defendant, Sanitary District of Chicago, to pass water through the said canal at the rate of 20,000 cubic feet per minute, or 333 1-3 cubic feet per second, for every 100,000 inhabitants of the territory composing the Sanitary District of Chicago. At the time of the passage of said act of 1895, and at all times since it was well known to the legislature of the State of Illinois and to the officers of the defendant Sanitary District of Chicago, that the only source from which water in such quantities as required by said act could be obtained was by the diversion of water from Lake Michigan, and it was at all of said times the intention of said legislature that the duty which it sought to impose upon the defendant District by the said act of 1895 should be

performed by means of such diversion. According to the census of 1920, the population of the Chicago Sanitary District was 2,963,090 in that year, and as your orators are informed and verily believe and therefore aver, the population of said district is now in excess of said number, and therefore the effect of the said act of 1895 is to direct the defendant, Sanitary District of Chicago, to divert water from Lake Michigan at the present time at the rate of not less than 9,876 cubic feet per second.

15. Subsequent to the opening of the said canal, and in the year 1903, the defendant, State of Illinois, by an act of its legislature approved May 14th, 1903, and published in the Laws of Illinois for the year 1903 commencing on page 113, undertook to authorize the defendant, Sanitary District of Chicago, to construct and operate a plant for the generation of electrical energy by hydraulic power derived from the water passing from Lake Michigan through the said canal. The provisions of said act with reference to said subject are as follows, to-wit:

> "Sec. 5. That the said sanitary district of Chicago is hereby authorized to construct all such dams, waterwheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now, or hereafter, constructed by said district.
>
> "Sec. 6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy, and shall be transmitted to the various cities, villages and towns within said sanitary district, or adjacent to the main channel of said sanitary district, and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public

service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said sanitary district: *Provided, however,* that it shall be the duty of said sanitary district to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said sanitary district."

16. Under and by virtue of the authority attempted to be conferred on the defendant District by the defendant State of Illinois in said act of 1903, said District constructed and placed in operation a hydro-electric power plant at Lockport, near the western terminus of the said canal, and has continuously operated the same since its completion in the month of November, 1907. The said power plant is capable of developing in excess of 36,000 horsepower of electrical energy and does in fact develop and generate, as your orators are informed and verily believe and therefore aver, in excess of 20,000 horsepower continuously throughout the year. The electrical energy thus generated is mainly transmitted to the city of Chicago and there sold for municipal and commercial purposes, and, as your orators are informed and verily believe and therefore aver, the operations of said plant since the year 1907 have produced many millions of dollars of gross revenue to the defendant Sanitary District of Chicago and have earned for the said District many millions of dollars of profits over and above the cost of operating the said plant, including proper allowances for depreciation and a reasonable return upon investment therein.

17. Since the completion of said hydro-electric development near the western terminus of said canal, the object and purpose of the defendants in the operation of the said canal and in the diversion of water from Lake

Michigan through the same has been and is now twofold, to-wit: the disposition of the sewage of the defendant Sanitary District of Chicago, and the generation and sale of electrical energy.

18. According to the reports of the engineers of the defendant, Sanitary District of Chicago, the yearly mean amount of water passing through the said canal at its westerly terminus, practically all of which is water diverted from Lake Michigan, is as follows for the years 1900 to 1917, inclusive:

Year	Cubic Feet per Second	Year	Cubic Feet per Second
1900	2,900	1909	2,766
1901	4,046	1910	3,458
1902	4,302	1911	6,445
1903	4,971	1912	6,424
1904	4,793	1913	7,191
1905	4,480	1914	7,105
1906	4,473	1915	6,971
1907	5,116	1916	7,325
1908	4,421	1917	7,786

—which figures, as your orators are informed and believe and therefore aver, are based on methods of calculation which result in very considerably underestimating the actual amounts of flow through the canal. Your orators are informed and verily believe and therefore aver that the actual mean diversion of water from Lake Michigan through said canal for the year 1917 was about 8,800 cubic feet per second, and that such diversion beginning with the year 1918 and taken down to the present time has been in excess of 8,800 cubic feet per second.

19. All of the water diverted from Lake Michigan by the defendants in the manner hereinbefore set forth is carried into the Mississippi valley and hence is permanently abstracted from the Great Lakes system. As the result of such diversion, the mean level of the water in Lakes Michigan, Huron, Erie and Ontario and in the various waterways connecting said lakes, and in the St. Lawrence River above tide-water, has been lowered not less than six inches below the level that would exist in said lakes and waterways in the absence of such diversion; and as the amount of diversion in cubic feet per second becomes greater, the amount of lowering of the level of said lakes and waterways increases in proportion.

20. At no time during the period of at least ten years last past has it been necessary for the protection of the health of the people of defendant district, or for any other purpose, that the sewage of the Sanitary District of Chicago be disposed of by means of the said canal. On the contrary, it has been entirely feasible during all of said period, and is now feasible, for said District to adopt and use scientific methods of sewage disposal, such as are in practical and successful operation in many large cities throughout the world, which would involve no permanent diversion of water from Lake Michigan and no pollution of the waters of said lake.

21. The lowering of the level of Lake Michigan, as described in paragraph 19 hereof, has seriously diminished the utility of the ports of Wisconsin located on said Lake and enumerated in paragraph 4 hereof, in that it has reduced by at least six inches in each of said Lake Michigan ports in Wisconsin the draft of vessels which can be accommodated therein for loading and unloading. Over eighty per cent of the tonnage of freight received

at said Lake Michigan ports consists of coal which is shipped in from the eastern States and which, except for the amount consumed at the said ports themselves, is thence carried by rail to a large number of cities, villages and towns in the State of Wisconsin in other states to the west of Wisconsin, and constitutes the principal source of supply of coal for the State of Wisconsin in its proprietary capacity, as owner of many public building and institutions, and for many thousands of individuals and industrial plants located in said state. The said coal is brought to the said ports in vessels of a type peculiar to the Great Lakes, known as bulk freighters, having an enormous carrying capacity and capable of being operated at very low rates of freight when loaded to maximum capacity; but for every inch of their normal draft which said vessels are unable to utilize, their cargo-carrying capacity is reduced by many tons, and the resulting increase in freight cost per ton becomes and is a burden upon the State of Wisconsin in its proprietary capacity and upon many thousands of the people of said state. The only method that lies within the power of said state to relieve itself and its people of the said burden is by accepting the alternative burden of dredging its said harbors to a sufficient additional depth to offset the effect of defendants' acts; but such dredging if undertaken would necessitate the expenditure of large sums of money, not once only but year after year, on account of the constant tendency of the dredged lake bed to become filled in and restored to its natural level.

22. In addition to the ports hereinbefore enumerated, there are a large number of ports located on the shore of Lake Michigan in the States of Illinois, Indiana and Michigan, on Lake Huron in the State of Michigan and

the Dominion of Canada, on Lake Erie in the States of Michigan, Ohio, Pennsylvania and New York and the Dominion of Canada, and on Lake Ontario in the State of New York and the Dominion of Canada. The lowering of the level of all of said lakes by the acts of defendants, as above set forth, has lessened the utility of all of the ports on the said lakes, and of the waterways connecting said lakes, in the same manner as hereinbefore described with reference to the Wisconsin ports on Lake Michigan, with the result that in the conduct of transportation between Wisconsin, Minnesota, Ohio and Pennsylvania ports and the said ports in other states, the possible loading of vessels bound to or from such other ports is reduced by many tons, for each trip of each vessel to or from a port whose harbor is not deep enough to accommodate the maximum draft of such vessel, below the loading which would be possible if the levels of said lakes had not been lowered by the acts of the defendants. Such lowering of the water levels in ports of other States and in the said connecting waterways affects not only the traffic between said States and the Lake Michigan ports of Wisconsin, but also the traffic between said States and the Wisconsin-Minnesota ports of Duluth-Superior, Ashland, Washburn, Grand Marais and Port Wing located on Lake Superior. The commerce between the Wisconsin ports last named and the various ports on Lakes Michigan, Huron, Erie and Ontario amounts to many millions of tons each year, the principal commodities thus transported being iron ore, coal and grain, As your orators are informed and verily believe, the total annual loss due to the lowered carrying capacity of lake vessels and chargeable directly to the diversion of water by the defendants, amounts to many million of dollars, and a large part of said loss falls upon the people of the states of Wisconsin, Minnesota, Ohio and Pennsylvania, and is widely distributed through all parts of said states.

23. In addition to lowering the levels of Lakes Michigan, Huron, Erie and Ontario in the manner hereinbefore set forth, the diversion of water by the defendants has seriously impaired the navigability of the Chicago River, a navigable waterway of the United States, by introducing into said river a current so swift as to make the navigation thereof exceedingly difficult and dangerous. Prior to the commencement of said diversion of water, the Chicago River constituted an inner harbor of great importance, handling between six and eight millions of tons of inbound and outbound freight each year, a considerable portion of which constituted commerce between citizens of Wisconsin and citizens of Illinois; but since the commencement of said diversion, the commerce of said harbor has become reduced to less than one-third of the said tonnage, largely because of the difficulties of navigation resulting from the said diversion; and, in addition, certain portions of the Chicago river have become entirely closed up by reason of the said diversion and are no longer accessible to the commerce of the people of Wisconsin.

24. Prior to the construction of the said canal by the defendant Sanitary District of Chicago, the Chicago, Des Plaines and Illinois rivers constituted a navigable waterway of the United States extending from Lake Michigan on the east to the Mississippi river on the west. In the construction of the said canal, the defendant District modified and altered the said navigable waterway by diverting portions of the Des Plaines river from its original

bed, and in the operation of said canal said defendant has further modified and rendered the said natural water waterway practically inaccessible from Lake Michigan by causing the west fork of the south branch of the Chicago river, west of the commencement of said canal, to become filled up and useless. As a result of said acts of said defendant, the said canal has become in fact a substitute for the old navigable waterway hereinbefore referred to, and is now the only practicable means of navigation by water from Lake Michigan to the Mississippi river; but in spite of the fact that the defendants have thus destroyed and rendered useless a navigable waterway of the United States, said defendants have always expressly refused to concede that the canal thus substituted for the said waterway is itself a navigable waterway of the United States, and on the contrary the defendant State of Illinois, in section 24 of the act of 1889 quoted in paragraph 9 hereof, has undertaken to bar the government of the United States from all control or authority over the said canal until such time as said government shall comply with certain conditions therein named, and has undertaken to make the control and authority of said government, upon compliance with said conditions, subordinate to the uses of the said canal for sanitation and drainage purposes.

25. The amount of water necessary to permit the said canal to be operated for navigation purposes only, as your orators are informed and verily believe and therefore aver, does not at the present time exceed 500 cubic feet per second, and the amount of water which may in the future be required for the operation of said canal for navigation purposes only, if permitted to be operated for such purposes, will not exceed one thousand cubic feet

per second, as your orators are informed and verily believe and therefore aver, even if the said canal should come to be utilized to the fullest extent to which it is physically capable of being used for the purposes of navigation.

26. Prior to the opening of the said canal, and on the 8th day of May, 1899, the Secretary of War of the United States, the Honorable Russell A. Alger, at the instance of the defendant, Sanitary District of Chicago, issued a document purporting to authorize said defendant to open a channel connecting the Chicago River with the said canal and to cause the waters of the Chicago River to flow through the same, which document is in the following words and figures, to-wit:

> "Whereas by section 10 of an act of Congress approved March 3, 1899, entitled 'An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to alter or modify the course, location, condition, or capacity of the channel of any navigable water of the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same; and
>
> "Whereas the sanitary district of Chicago, a municipal corporation organized under the laws of the State of Illinois, has constructed an artificial channel from Robey Street, Chicago, to Lockport, and has been heretofore granted permission by the Secretary of War to make certain improvements in the Chicago river for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of 1¼ miles an hour, it being intended to connect the said artificial channel with the West Fork of the South Branch of Chicago River at Robey Street in the said city of Chicago; and
>
> "Whereas the said sanitary district of Chicago has now applied to the Secretary of War for permission to divert the waters of the said Chicago River and

cause them to flow into the said artificial channel at Robey street, as aforesaid; and

"Whereas the said sanitary district of Chicago represents that such movable dams and sluice gates as are necessary to at all times secure absolute and complete control of the volume and velocity of flow through the Chicago River have been constructed;

"Now, therefore, the Chief of Engineers having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said sanitary district of Chicago to open the channel constructed and cause the waters of Chicago River to flow into the same, subject to the following conditions:

"1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the sanitary district of Chicago to Congress for the consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"2. That if at any time it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such an extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"3. That the sanitary district of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago River.

"Witness my hand this 8th day of May, 1899.

"R. A. Alger, Secretary of War.

"John M. Wilson,
"Brigadier General, Chief of
Engineers, United States Army."

On the 9th day of April, 1901, the Secretary of War of the United States, the Honorable Elihu Root, issued a document purporting to direct that the flow of water in the Chicago River reduced to 200,000 cubic feet per minute, which document is in the following words and figures, to-wit:

> "Whereas under date of May 8, 1899, the Secretary of War granted permission unto the sanitary district of Chicago to open the artificial channel from Robey street, Chicago, to Lockport and cause the waters of Chicago River to flow into the same upon the following condition, inter alia:
>
> " '2. That if at any time it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch;'
>
> "And whereas it is alleged by various commercial and navigation interests that the present discharge from the river into the drainage canal sometimes exceeds 300,000 cubic feet per minute, causing a velocity of nearly 3 miles per hour, which greatly endangers navigation in the present condition of the river;
>
> "Now therefore this is to certify that the Secretary of War, upon the recommendation of the Chief of Engineers hereby directs said sanitary district to regulate the discharge from the river into the drainage canal so that the maximum flow through the Chicago River and its South Branch shall not exceed 200,000 cubic feet per minute.
>
> "Witness my hand this 9th day of April, 1901.
>
> "Elihu Root, Secretary of War."

On the 23rd day of July, 1901, the Secretary of War, the Honorable Elihu Root, issued a document purporting to increase the permitted flow in the Chicago river during certain hours of the day to 300,000 cubic feet per minute, which document is in the following words and figures, to-wit:

"Office Chief of Engineers, U. S. Army.

"July 22, 1901.

"Respectfully returned to the Secretary of War.

"By an instrument dated April 9, 1901, the Secretary of War directed the sanitary district of Chicago to regulate the discharge from the Chicago River into the drainage canal so that the maximum flow through the Chicago River and its South Branch shall not exceed 200,000 feet per minute.

"The sanitary district now asks that this order be so amended as to permit an increase of the flow into the canal to 300,000 cubic feet per minute between 4 P. M. and 12 midnight, daily.

"It is the opinion of Major Willard, expressed in the accompanying letter of the 16th instant, that the request should be granted, subject to revocation by the Secretary of War in case the increase be found dangerous to navigation.

"I concur in this opinion and recommend that the order of April 9, 1901, be modified accordingly.

"G. L. Gillespie,
"Brigadier-General, Chief of Engineers,
U. S. Army.
"War Department,

"July 23, 1901.

"Approved as recommended by the Chief of Engineers.

"E. Root, Secretary of War."

On the 5th day of December, 1901, the Assistant Secretary of War, the Honorable William Cary Sanger, issued a document purporting to change the permitted flow in the Chicago river to 250,000 cubic feet per minute throughout the day, which document is in the following words and figures, to-wit:

"Whereas under date of May 8, 1899, the Secretary of War granted permission unto the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport and cause the waters of Chicago River to flow into the same upon the following condition, inter alia:

" '2. That if at any time it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such an extent as may be demanded by navigation and property interests along said Chicago River and its South Branch;'

"And whereas the Secretary of War subsequently directed said sanitary district of Chicago to regulate the discharge of water into the Chicago Drainage Canal so that the maximum flow through the Chicago River shall not exceed 200,000 cubic feet per minute from midnight to 4 p. m., nor 300,000 cubic feet per minute from 4 p. m., to midnight; and whereas said sanitary district of Chicago has applied to the Secretary of War for permission to increase the flow between midnight and 4 p. m. daily to 250,000 cubic feet per minute, and the Chief of Engineers has recommended that the increase applied for be granted, but that the rate of flow from 4 p. m. to midnight be reduced to 250,000 cubic feet per minute, so that the flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day;

"Now therefore this is to certify that in accordance with the recommendation of the Chief of Engineers the Secretary of War hereby gives unto said sanitary district of Chicago permission to regulate said discharge so that the maximum flow through the Chicago river shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day upon the following conditions:

"1. That this permission shall be in lieu of the present authorized rates of flow as stated above.

"2. That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"3. That said sanitary district of Chicago shall be responsible for all damages inflicted upon navigation interests by reason of the increase in flow herein authorized.

"Witness my hand this 5th day of December, 1901.

"Wm. Cary Sanger,
"Assistant Secretary of War."

On the 17th day of January, 1903, the Assistant Secretary of War, the Honorable William Cary Sanger, issued a document purporting to change the permitted rate of flow in the Chicago River to 350,000 cubic feet per minute until March 31, 1903, which document is in the following words and figures, to-wit:

> "Whereas under date of December 5, 1901, by an instrument supplementary to the original permission granted by the Secretary of War May 8, 1899, to the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport and cause the waters of the Chicago River to flow into the same, the Secretary of War, pursuant to authority reserved in said permission of May 8, 1899, gave permission to the Sanitary District of Chicago to regulate said discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, upon the following conditions, inter alia:
>
> " 'That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require;' and
>
> "Whereas the said Sanitary District of Chicago has applied for permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute during the closed season of navigation, in order to carry off the accumulations of sewage deposit which line the shores along said city;
>
> "Now, therefore, this is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto said Sanitary District of Chicago permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute until the 31st day of March, 1903, after which date it shall be reduced to 250,000 cubic feet per minute, as now authorized, upon the following conditions:
>
> "1. That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.
>
> "2. That said Sanitary District of Chicago shall be responsible for all damages inflicted upon navigation

interests by reason of the increase in flow herein authorized.

"Witness my hand this 17th day of January, 1903.

"Wm. Cary Sanger,
"Assistant Secretary of War."

On the 30th day of June, 1910, the Acting Secretary of War, the Honorable Robert Shaw Oliver, issued a document purporting to authorize a modification in the method of passing water into the canal of the defendant District, the permitted amount of flow remaining the same as theretofore fixed by the Secretary of War; which document is in the following words and figures, to-wit:

"War Department,
"Washington, June 30, 1910.

"Sir: Referring to your application of 27th instant on behalf of the board of trustees of the sanitary district of Chicago to open a channel from the Calumet River to its existing main channel so as to substitute two routes instead of one between Lake Michigan and its canal, I have the honor to advise you to the following effect:

"It appears from the records of the department that by an instrument executed May 8, 1899, the sanitary district of Chicago was given permission to connect its drainage canal with the south branch of the Chicago River at Robey Street, in the city of Chicago, and to divert the waters of Lake Michigan through the Chicago River into said canal subject to certain specified conditions designed to limit the amount of such diversion and in other ways to protect the public interests. The permission so granted was subsequently modified at various times and by an instrument executed December 5, 1901, the amount of flow was fixed at not exceeding 250,000 cubic feet per minute; equivalent to 4,167 cubic feet per second, which is the present rate allowed. At the time the original permit was given a connection with Calumet River was not mentioned, but if it had been it is probable that a connection with that river as well as with the Chicago River would have been allowed.

"So long as the water flow remains unchanged there seems to be no special objection to its extension to both rivers instead of confining it to a single one, especially since if the new (Calumet) route be developed later to a navigable state the double route will be advantageous to navigation interests. Accordingly, in view of the favorable recommendation of the Chief of Engineers and of the consent thereto by the Attorney General, under the conditions hereinafter prescribed, the department here modifies the existing permission so as to allow the diversion of the already permitted water flow in such manner as to reach the sanitary district canal by way of the Calumet River and a connecting channel, as well as by way of its present route through the Chicago River, subject to all pertinent conditions of the existing permission and to other express conditions, as follows:

"(*a*) That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the sanitary district of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"(*b*) That if at any time it becomes apparent that the current created by such drainage work in the Calumet, as well as Chicago Rivers, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close the discharge through said channels or rivers, or to modify it to such an extent as may be demanded by navigation and property interests along said rivers.

"(*c*) That the sanitary district of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in the Calumet River as well as the Chicago River.

"(*d*) That the amount of water withdrawn from Lake Michigan, through the Chicago and Calumet Rivers together, shall not exceed the total amount of 250,000 cubic feet per minute (4,167) cubic feet per second already authorized to be withdrawn through the Chicago River alone.

"(*e*) That the permission hereby given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"(*f*) That this permission shall in no wise affect or in any manner be used in the friendly suit now pending in the circuit court of the United States for the northern district of Illinois brought by the United States of America against the sanitary district of Chicago, to determine the right of the said sanitary district to divert from Lake Michigan for sanitary purposes an amount of water in excess of that now being diverted without having first obtained a permit from the Secretary of War.

"(*g*) That the War Department shall have free access at all times to the water-flow records of the sanitary district of Chicago and free access also to the regulating works and all other parts of its canals for the purpose of checking records or making water-flow measurements.

"(*h*) That the plans for the proposed work shall be submitted to and approved by the Chief of Engineers and the Secretary of War.

"(*i*) That the work shall be subject to the supervision and approval of the engineer officer of the United States Army in charge of the locality.

"Very respectfully,

"Robert Shaw Oliver,
"Acting Secretary of War.

"Mr. George M. Wisner,
"Chief Engineer, Sanitary District
of Chicago,
Washington, D. C.
"Office Chief of Engineers,
"War Department, June 30, 1910."

None of the documents referred to in paragraph 26 hereof are or ever have been of any force or effect or either of them, to withdraw water from as constituting an authorization to the defendants, Lake Michigan in such quantities as to obstruct its navigable capacity by lowering its level, or to obstruct the navigable capacity of the Chicago River by introducing a dangerously swift current into said river. On the contrary, all of said documents purport to be issued solely under and pursuant to the authority conferred on the Secretary of War by Section 10 of the Rivers and Harbors Act of March 3, 1899, which authority is limited by said Act to the approving of alterations and modifications of the various channels and waterways therein referred to, while by the terms of said Act the power to authorize obstructions to the navigable capacity of any and all waters of the United States is wholly and exclusively reserved to and retained by Congress. But if the diversion of water in the manner hereinbefore described be held by this honorable Court to result in a mere change in the course, location, condition or capacity of the said lake and river, and not in an obstruction to the navigable capacity thereof, so that the granting of permission for such diversion was within the power of the Secretary of War under the provisions of the said Act of March 3, 1899, then and in that case your orators assert that at no time since the 31st day of March, 1903, have the defendants, or either of them, been authorized by the Secretary of War to divert from Lake Michigan, or to pass through the Chicago River or the Calumet River, or both, into the canal of the defendant District, more than four thousand one hundred sixty-seven (4,167) cubic feet of water per second; whereas said defendant Sanitary District of Chicago, in violation of the permits thus granted by the Secretary of War, and acting under the express command of the defendant State of Illinois as set forth in the Act of 1895 referred to in paragraph 12 hereof, has been continuously for more than ten years last past, and is now, withdrawing from Lake Michigan and passing into its said canal an amount of water greatly in excess of the said limit of four thousand, one hundred sixty seven (4,167) cubic feet per second.

Ever since the 6th day of October, 1913, there has been pending in the district court of the United States for the Northern District of Illinois an action wherein the United States is plaintiff and the defendant district is defendant, the object of said action being to restrain said defendant from diverting a greater amount of water from Lake Michigan than the amount authorized by the permits hereinbefore referred to.

That in the aforesaid action on June 18, 1923, the said court announced a decision granting a decree for an injunction as follows viz:

> "That the defendant, the Sanitary District of Chicago, its Board of Trustees, officers, agents, attorneys, representatives, employees and servants, and all other persons acting or claiming or assuming to act under its authority, be, and they hereby are, and each of them hereby is, enjoined from diverting or abstracting any waters from Lake Michigan over and above or in excess of 250,000 cubic feet per minute.
>
> "The operation of this injunction is hereby stayed for a period of six months to enable the defendant to present the record herein to the Supreme Court of the United States."
>
> "That on June 29, 1923, an order was made and entered allowing appeal as follows:
>
> "It is ordered that an appeal be allowed to said defendant herein from the decree of June 18, 1923, rendered against said defendant in the above entitled and numbered cause, and that said appeal shall be returnable to the Supreme Court of the United States, and that, upon the execution, filing and approval of a bond in the penal sum of Five Thousand Dollars ($5,000), said appeal shall operate as a supersedeas of said decree and shall suspend during the pendency of said appeal the effect and operation of the injunction herein."

That on said appeal the Supreme Court of the United States on January 5, 1925 made and entered its decision as follows:

> "The decree for an injunction is affirmed, to go into effect in sixty days, without prejudice to any permit that may be issued by the Secretary of War according to law."

That thereupon an order and judgment was accordingly made and entered by the District Court in said action.

28. That on application of said defendant, the Sanitary District of Chicago, on March 3, 1925, Major General H. Taylor, Chief of Engineers, and the Honorable Joseph W. Weeks, Secretary of War, made and entered an order as follows:

> "Whereas, By Section 10 of an Act of Congress, approved March 3, 1899, entitled 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any part, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same;
>
> "And Whereas, Application has been made to the Secretary of War by The Sanitary District of Chicago, Illinois, for authority to divert an annual average of 10,000 cubic feet of water per second from Lake Michigan through the channels of said Sanitary District;
>
> "And Whereas, In the judgment of the Secretary of War an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

"Now Therefore, This is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provision of the aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

"1. That there shall be no unreasonable interference with navigation by the work herein authorized.

"2. That if inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.

"3. That no attempt shall be made by the permittee, or the owner, to forbid the full and free use by the public of any navigable waters of the United States.

"4. That the Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

"5. That the Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

"6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approval plans and shall be completed and ready for operation by July 1, 1929.

"7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the United States District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

"8. That if, within six months after the issuance of this permit, the city of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum, thereafter this permit may be revoked without notice.

"9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice.

"10. That this permit is revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress.

"11. That this permit, if not previously revoked or specifically extended, shall cease and be null and void on December 31, 1929.

"WITNESS my hand this 3rd day of March, 1925.

(Signed) H. TAYLOR,
Major General, Chief of Engineers.

"WITNESS my hand this 3rd day of March, 1925.
JOHN W. WEEKS, Secretary of War."

That as your orators are informed and believe said order has not been complied with by the defendant, The Sanitary District of Chicago, in this, viz:

(1). That there has been unreasonable interference with navigation.

(2). That the full and free use by the public of navigable waters of the United States has been prevented by the defendant Sanitary District of Chicago.

(3). That the Sanitary District has not posted any guarantee to pay its share of the cost of regulating or compensating works.

(4). That the Sanitary District has not submitted any plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms.

(5). That the Sanitary District of Chicago has not and is not carrying out a program of sewage treatment as required by said order.

(6). That the City of Chicago has not complied and is not making provision generally for compliance with said order for the termination of said diversion of water from Lake Michigan.

29. The acts of the defendants hereinbefore set forth and described, in the diverting of water from Lake Michigan into the canal of the defendant District, have never been authorized by Congress, and are in violation of the legal rights of the States of Wisconsin, Minnesota, Ohio and Pennsylvania and the people of said States in the following respects to-wit:

(a) In that the defendants by said acts are interfering with the common-law right of said States of Wisconsin, Minnesota, Ohio and Pennsylvania and its people to have the free and unobstructed use of Lake Michigan and the various ports and harbors thereof within the borders of said states, for purposes of navigation, trade and commerce, free from any and all interference with the natural navigable capacity of said lake or said harbors by any agency other than the States of Wisconsin, Minnesota, Ohio and Pennsylvania or the United States Government.

(b) In that the defendants by said acts are interfering with the right of the people of Wisconsin, Minnesota, Ohio and Pennsylvania to the free and unobstructed navigation of Lakes Michigan, Huron, Erie and Ontario, and the navigable waters between the said lakes and from said lakes into the Mississippi River and the Atlantic Ocean, which rights belong to the said people of Wisconsin, Minnesota, Ohio and Pennsylvania both by the common law and by the express guaranty contained in the Ordinance for the Government of the Territory of the United States Northwest of the River Ohio, enacted by Congress on June 13, 1787.

(c) In that the defendants by said acts are violating the provisions of the Act of Congress of March 3, 1899, known as the Rivers and Harbors Act of 1899, and particularly the provisions of Section ten (10) thereof.

30. That the defendants, the State of Illinois and The Sanitary District of Chicago, have continuously since the opening of said Sanitary District Drainage Canal authorized and directed the City of Chicago and other municipalities within said district and the people thereof, and large industries located therein, to dump and drain into said Sanitary District Drainage Canal the sewage and waste from said municipalities and from said large industries; that this includes the domestic sewage and waste from a population of more than 3,000,000 inhabitants living within said district, and includes an additional industrial sewerage and waste principally from the stockyards and other large industries, which latter sewerage and waste is estimated by the Sanitary District engineers as the equivalent of an additional population of 1,800,000 inhabitants; that the defendants the State of Illinois authorized the said Sanitary District Drainage Canal to be designed and constructed for the disposal of said sewerage and waste by carrying the same into the Chicago, DesPlaines, Illinois and Mississippi Rivers; that the dumping and draining of said sewerage and waste into said Sanitary District Drainage Canal and carrying the same into said rivers has greatly polluted the waters of said rivers and has created a highly offensive, unsanitary, disease breeding and pestilential condition in,

upon and along the said navigable waterways from Lake Michigan through the said Sanitary District Drainage Canal and the Chicago, DesPlaines and Illinois Rivers into the Mississippi River, and has made undesirable and largely impossible the use of said navigable rivers for passenger traffic whether for business, recreation or pleasure, and has made such navigation very offensive and dangerous to the health and lives of persons engaged in the conveyance by and over such waterways of freight and passengers; that there is a large amount of passenger traffic and a large amount of interchange of commodities and business between the territory adjacent to and served by and which is and could be served by navigation on said rivers and the states of Wisconsin, Minnesota, Ohio and Pennsylvania and the people thereof, and that the condition of said waterways so created by the said defendants constitutes a public nuisance which impairs and violates the rights of the complainants and the people thereof in the navigation of said rivers.

31. The said violations of the legal rights of the States of Wisconsin, Minnesota, Ohio and Pennsylvania and of their people have caused, are now causing, and will continue to cause so long as they are permitted to continue, serious interference with the trade and commerce of the people of said States, and of the States of Wisconsin, Minnesota, Ohio and Pennsylvania in their proprietary capacities, resulting in large pecuniary losses to the said people and the said States which cannot be accurately estimated and for the recovery of which no adequate remedy exists at law. The States of Wisconsin, Minnesota, Ohio and Pennsylvania therefore bring this action, on behalf of themselves and in their proprietary capacities and on behalf of the people of said several

States, for the purpose of establishing and protecting the legal rights of said States and their people against the encroachments of the defendants, and of terminating a condition which is inimical to the welfare and prosperity of the said States and of their people.

WHEREFORE, your orators pray that the defendants may be required to answer the allegations hereinbefore set forth in this bill of complaint, and that upon final hearing of this cause an injunction be issued, under the seal of this Court, restraining the defendants and each of them, and each of their officers, agents and servants, from taking or causing to be taken any water whatever from Lake Michigan in such manner as to permanently divert the same from the said lake.

But in the event that the canal constructed by the defendant district shall be used as a navigable waterway of the United States and subject to the same control on the part of the United States as the other navigable waterways thereof, then and in that case your orators pray that upon the final hearing of this cause an injunction be issued, under the seal of this court, restraining the defendants and each of them, and each of their officers, agents and servants from taking or causing to be taken any water from Lake Michigan, in such manner as to permanently divert the same from said lake for any purpose, in excess of the amount which the court shall determine to be reasonably required for the purpose of navigation in and through said canal and the connecting waters to the Illinois and Mississippi Rivers without injury to the navigable capacity of the Great Lakes and the connecting waters thereof.

Your orators pray that upon the final hearing of this cause an injunction be isued under the seal of this Court, restraining the defendants and each of them and each of their officers, agents and servants from dumping and draining into the said Sanitary District Canal any sewerage or waste in such quantity and manner as to excessively pollute and render the Sanitary District Drainage Canal, the Chicago, DesPlaines and the Illinois Rivers unsanitary, pestilential and dangerous to the health, safety and comfort of people of the complainant states navigating said rivers, or to injure or destroy the property of the people of the complainant states navigating said rivers and waterways.

And your orators also pray for such other and further relief as to this honorable Court may seem meet and consistent with equity and good conscience.

May it please your Honors to grant unto your orators a writ of subpoena under the seal of this honorable Court, directed to the Governor and Attorney General of the defendant, the State of Illinois, and to the Sanitary District of Chicago, commanding them and each of them, on a day certain to be therein named and under a certain penalty, to be and appear in this honorable Court, then and there to answer, but not under oath (answer under oath being expressively waived) all the singular the matters and things hereinbefore set forth, and to abide such further order and decree of the Court as may be made against the said defendants or either of them.

HERMAN L. EKERN,
Attorney General of the State of Wisconsin.

CLIFFORD L. HILTON,
Attorney General of the State of Minnesota.

C. C. CRABBE,
Attorney General of the State of Ohio.

GEORGE W. WOODRUFF,
Attorney General of the State of Pennsylvania.

Solicitors.

United States of America, }
State of Wisconsin, } ss.
County of Dane, }

HERMAN L. EKERN, being first duly sworn, on oath says that he is the duly elected, qualified and acting Attorney General of the State of Wisconsin; that he has read the foregoing bill of complaint and knows the contents thereof, and that the same is true to his own knowledge except as to the matters therein stated on information and belief, and as to such matters he believes it to be true; and that as such Attorney General he is duly authorized to pray leave to file the said bill of complaint.

HERMAN L. EKERN.

Subscribed and sworn to before me
this 12th day of September, 1925.

Suel O. Arnold,
Notary Public.

In and for Dane County, Wisconsin.
My commission expires July 24, 1927.

O.T. 1930 ORIGINAL NOS. 8, 10 & 11,

Office Supreme Court, U. S.
FILED
JAN 4 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

Number ~~16~~ Original in Equity.

7

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

ANSWER OF DEFENDANT, THE SANITARY DISTRICT OF CHICAGO, TO THE AMENDED BILL OF COMPLAINT.

HECTOR A. BROUILLET,
Attorney, The Sanitary District of Chicago.

GEORGE F. BARRETT,
EDMUND D. ADCOCK,
LOUIS J. BEHAN,
MORTON S. CRESSY,
Solicitors for Defendant, The Sanitary District of Chicago.

BARNARD & MILLER PRINT, CHICAGO

8

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

Number 16 Original in Equity.

STATES OF WISCONSIN, MINNESOTA, OHIO
AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

ANSWER OF DEFENDANT, THE SANITARY DISTRICT OF CHICAGO, TO THE AMENDED BILL OF COMPLAINT.

This defendant, The Sanitary District of Chicago, by Hector A. Brouillet, Attorney, The Sanitary District of Chicago, George F. Barrett, Edmund D. Adcock, Louis J. Behan and Morton S. Cressy, its solicitors, reserving to itself all right of exception to said amended bill of complaint, for answer thereunto alleges, avers and says, as follows:

(1) This defendant admits that the States of Wisconsin, Minnesota, Ohio and Pennsylvania are, and each of them is one of the, states of the United States of America, and that they bring this action in this court as such states of the United States of America.

(2) This defendant admits that the State of Illinois is one of the states of the United States of America, and the defendant The Sanitary District of Chicago is

a public municipal corporation organized and existing under and by virtue of the laws of the State of Illinois, and is a citizen of Illinois.

(3) This defendant denies that a controversy exists between the said complainants and the defendants cognizable in this court and over which this court has jurisdiction. These defendants aver that the matters and things, in the said amended bill of complaint set forth and upon which the said complainants seek relief, relate to the regulation of the Great Lakes System of Waterways and the channels and harbors connected therewith, including the channels and harbors located along the shores of the Great Lakes; that the said Great Lakes system of waterways, channels and harbors connected with it, are interstate or national waters, over which the United States has and has assumed exclusive jurisdiction; that the said supposed interference with navigation, in said amended bill of complaint alleged, upon said Great Lakes system of waterways and harbors and channels connected with it due to the supposed acts and doings of the said defendants, or one of them, can be complained of, if at all, only by the United States, and that the United States is a necessary and indispensable party. For the reasons in this paragraph stated, this defendant does now hereby move that the said amended bill of complaint be dismissed.

Third. This defendant admits that the action is brought in the Supreme Court of the United States in the exercise of the original jurisdiction of said Court, on the claimed ground that it is an action in equity relating to an alleged controversy between two or more states of the United States and also between States of the United States and a citizen of another State.

Fourth. This defendant admits that the State of Wisconsin has approximately 350 miles of shore line along Lake Michigan, and that along said shore line are thirteen harbors but this defendant denies that said harbors or any of them are included in said shore line and aver that none of them are intrastate waters. This defendant admits said harbors have facilities for loading and unloading of vessels navigating the said Lake Michigan and other Great Lakes. This defendant admits that the said harbors are as follows: Milwaukee, Manitowoc, Green Bay, Sheboygan, Marinette, Racine, Kenosha, Port Washington, Kewaunee, Algoma and Sturgeon Bay. This defendant is not informed as to the total amount of freight received at and shipped from the said thirteen harbors during the year of 1923, exclusive of freight received and shipped by car ferry, and therefore ask strict proof, so far as the same may be material or relevant, as to the amount of such tonnage during the said year of 1923, or any other year or years that may be designated. This defendant is not informed as to whether or not the State of Wisconsin has approximately 150 miles of shore line along Lake Superior, but admit that along said shore line of Wisconsin are the harbors of Duluth-Superior, Port Wing and Ashland. This defendant is not informed as to what the total traffic of said harbors was in the year of 1923. This defendant denies that all of said harbors are in or within said shore line and aver that none of them are intrastate waters. This defendant respectfully shows that the allegation as to the shore line of the State of Wisconsin along the shore of Lake Superior and the harbors of Wisconsin on Lake Superior, and the total traffic on said harbors on Lake Superior is immaterial for the reason that the amended Bill of Complaint does not allege that the alleged diversion of water at Chicago from Lake Michigan has had or could have had any effect upon said harbors situated on Lake Superior.

Fifth. This defendant is not informed as to whether or not the State of Minnesota has approximately 75 miles of shore line along Lake Superior but admit that along the short line of Minnesota are the harbors of Duluth-Superior, Grand Marais, Warroad, Zippel Bay and Baudette. This defendant denies that all of said harbors are in or within said shore lines and avers that none of them are intrastate waters. This defendant is not informed what the combined tonnage in said harbors was during the year of 1923, but this defendant respectfully shows unto the Court that the allegation as to the shore line of the State of Minnesota along the shore of Lake Superior and the harbors of Minnesota on Lake Superior, and the total traffic on said harbors on Lake Superior is immaterial for the reason that the amended Bill of Complaint does not allege that the alleged diversion of water at Chicago on Lake Michigan, has had or could have had any effect upon said harbors situated on Lake Superior.

Sixth. This defendant admits that the State of Ohio has approximately 230 miles of shore line along Lake Erie and that along said shore line are the harbors of Toledo, Put-In-Bay, Marblehead, Kellys Island, Port Clinton, Sandusky, Huron, Vermilion, Lorain, Cleveland, Fairport, Ashtabula and Conneaut. But this defendant denies that all of said harbors are located in or within said shore line and aver that none of them are intrastate waters. This defendant is not informed as to the tonnage of said harbors, exclusive of freight received or shipped by car ferry during the year 1923, and therefore ask strict proof, so far as the same is material, as to the amount of such tonnage during the said year of 1923, or any year or years that may be designated.

Seventh. This defendant admits that the State of Pennsylvania has approximately 40 miles of shore line along Lake Erie, and that along said shore line is the harbor of Erie. This defendant denies said harbor is located in or within said shore line and aver that said harbor is not intrastate water. This defendant is not informed as to the total amount of freight received at or shipped from said harbor, during the year of 1923, and therefore asks strict proof, so far as same is material, as to the amount of such tonnage during the year of 1923 or any other year or years that may be designated.

Eighth. This defendant admits that the State of Illinois has approximately 60 miles of shore line along Lake Michigan, comprising the eastern boundary of the counties of Lake and Cook in said State.

This defendant admits that there exists and has existed a stream of water connected with Lake Michigan, known as the Chicago River, extending from Lake Michigan westerly for approximately a mile in the City of Chicago, and that one branch, known as the North Branch of the Chicago River, extends north from said point, and that another branch of said Chicago River extends in a southerly and southwesterly direction, known as the South Branch of the Chicago River, and that there extends from the said South Branch in a westerly direction what is known as the West Fork of the South Branch, and in a southerly direction what is known as the South Fork of the South Branch of the Chicago River. But this defendant denies that at all times up to the year 1900, the said Chicago River and its various branches above mentioned, flowed into Lake Michigan.

This defendant avers that beginning with the year 1848, by reason of the construction of the Illinois and Michigan Canal and its enlargement thereafter, during a large part of each year a large amount of water finding its way into the Chicago River and the various branches above mentioned did not flow into Lake Michigan, but flowed through the said Illinois and Michigan Canal to the Desplaines, thence to the Illinois and Mississippi Rivers.

Ninth. This defendant admits that the General Assembly of Illinois passed an act entitled "An Act to create Sanitary Districts and to remove obstructions in the Desplaines and Illinois Rivers," approved May 29, 1889, in force July 1, 1889, as is alleged in paragraph 9 of said amended bill of complaint, and that sections 23 and 24 of said act are set forth *in haec verba* in paragraph 9 of said amended bill of complaint. And this defendant avers that the said entire act and various acts passed as amendments of or supplementary to said original act, are set forth as Exhibits A, A1, A2 and A3, to the answer to the original bill herein, which said exhibits, including the other exhibits to the answer to said original bill, are made a part of this answer the same as if set forth *in haec verba* herein.

Tenth. This defendant admits that in November and December of the year 1889, the Sanitary District of Chicago was organized under the said act of 1889, hereinbefore referred to, and that it has since continuously existed as said Sanitary District under said act of 1889. and acts amendatory thereof and supplementary thereto. This defendant admits that at the time of its organization, said defendant District consisted of a territory of about 185 square miles in area. This defendant admits that by successive acts of the Legislature of Illinois, the area of said defendant District has been increased from time to time, and that the area of said Sanitary District now comprises approximately 438 square miles, extending from the Illinois State line on the South and East to the Northern boundary of Cook County on the North, with about 34 miles of frontage on Lake Michigan and comprises the entire City of Chicago and approximately 49 other cities and villages located near said City of Chicago, together with large areas of land to the South, West and North of said City. This defendant avers that Exhibit B to the answer to the original bill shows the territorial limits of defendant district at various times and also the various diversion works of said defendant.

Eleventh. This defendant admits the allegations of paragraph 11 of said amended Bill of Complaint with reference to the construction of the main channel of the Sanitary District, except as to the time when said construction was commenced. As to such allegations this defendant avers that the construction of the main channel of said Sanitary District of Chicago was commenced during the year of 1890 and long prior to said 3d day of September, 1892.

Twelfth. This defendant denies that in the construction of said canal it was at all times, or that it is now, the plan of defendant that said canal should be used as a passageway for the sewage of the territory comprising The Sanitary District of Chicago, as, and in the manner, alleged in paragraph 12 of said amended bill; and avers that it never was, and is not now, the intention of this defendant to use said canal in any manner, or to divert water from Lake Michigan, except as authorized or permitted by the United States; and admits that section 20 of the said act of the General Assembly of 1889, by which the Sanitary District was organized, was amended in 1895 by the General Assembly of Illinois as is in said paragraph alleged, but this defendant avers that without said amendment said section of said original act provided for the diversion and flow continuously through the main channel of "at least 200 cubic feet per minute for each 1,000 population of the district drained thereby," which is equivalent in amount to 20,000 cubic feet per minute for every 100,000 population, which is the specification contained in the 1895 amendment referred to in said paragraph 12.

Thirteenth. This defendant admits the allegations of paragraph 13 of said amended Bill of Complaint except as to the date when the main channel of the Sanitary District was opened, and avers that said main channel was opened on January 17, 1900.

Fourteenth. This defendant denies that the primary object and purpose of the Act of 1889, as alleged in said amended bill of complaint, was to provide a method of disposing of the sewage of the City of Chicago and contiguous territory, but admits that that was one of the objects and purposes of said act; and this defendant avers in this respect that the principal object or purpose of the said Act of 1889 was to provide for the construction of a ship canal to connect the Chicago River with the Desplaines and Illinois Rivers, and for the construction of other canals and waterways connected with it, and to provide for the quantity of water necessary for navigation upon the said ship canal and upon the Desplaines and Illinois Rivers, and to further carry out the plan and program of the State of Illinois for the construction of a deep waterway between the Great Lakes and the Mississippi River in accordance with various acts of Congress and acts of the State of Illinois, as hereinafter more specifically set forth.

This defendant admits that by the said Act of 1889 and acts amendatory and supplementary thereto, it is the legal duty of the defendant Sanitary District of Chicago, subject to the authority and permission of the United States, to pass through said canal water at the rate of 20,000 cubic feet per minute, or 33⅓ cubic feet per second, for every 100,000 inhabitants within the territory of the defendant Sanitary District of Chicago, and that the only source from which said quantities of water may be obtained was by the diversion of water from Lake Michigan.

This defendant avers that at the time of the passage of said Act of 1889, the Congress of the United States had not passed any act or acts by which it had assumed or had sought to assume general regulation of navigable waters of the United States; that the General Assembly of Illinois, in passing said Act of 1889 providing for said diversion in the amounts required according to population of the said Sanitary District, believed that it was acting not only in pursuance of the express power granted by Congress under the Acts of Congress of March 30, 1822, and March 2, 1827, relating to the construction of the Illinois and Michigan Canal hereinafter more particularly mentioned, but also in pursuance of the power then existing in the State of Illinois to regulate its navigable waters; that the said Act of 1895 above mentioned and as heretofore alleged, did not change in any respect the intent of the Legislature of Illinois as expressed by said Act of 1889 with reference to the quantity of water according to population of the Sanitary District of Chicago to be diverted from Lake Michigan; that upon the passage of the Rivers and Harbors Act of September 19, 1890, and The Rivers and Harbors Act of March 3, 1899, under which the Congress of the United States assumed jurisdiction to regulate generally navigable waters of the United States, the said defendant The Sanitary District of Chicago, in exercising the power and authority granted by the said Act of 1889 and acts amendatory thereof and supplementary thereto, sought to act and did act, at all times, in conjunction with and by the authority of the United States according to law.

This defendant admits that the population of the territory of the Sanitary District of Chicago according to the census of 1920, was 2,963,090, and admits that the said Act of 1889 of the General Assembly of Illinois and acts amendatory thereof and supplementary thereto, require the diversion of water from Lake Michigan at the rate of approximately 9,876 cubic feet per second; but this defendant avers that it cannot divert said quantity of water and does not intend to divert said quantity of water or any other quantity, except by and with the authority of the United States according to law.

Fifteenth. This defendant admits that subsequent to the opening of said canal, and in the year 1903, the defendant State of Illinois, by an act of its legislature approved May 14th, 1903, and published in the Laws of Illinois for the year 1903, commencing on page 113, undertook to authorize and did authorize the defendant, the Sanitary District of Chicago, to construct and operate a plant for the generation of electrical energy by hydraulic power derived from the water passing through the said canal. The provisions of sections 5 and 6 of said act are set forth *in haec verba* in said paragraph 15 of said amended Bill of Complaint.

Sixteenth. This defendant admits the allegations of paragraph 16 of said amended Bill of Complaint, with reference to the construction and operation of the hydroelectric power plant at Lockport. Illinois, and the capacity thereof; that the electrical energy thus generated is mainly transmitted to the City of Chicago and there sold for municipal and commercial purposes; but denies that the operations of said plant have earned for the Sanitary District of Chicago, many millions of dollars of profit over and above the cost of operating said plant, including proper allowance for depreciation and a reasonable return upon the investment therein.

Seventeenth. This defendant denies that since the completion of said hydro-electric development near the western terminus of said canal, the object and purpose of the defendant in the operation of the said canal and in the diversion of water from Lake Michigan through the same has been and is now two-fold, to-wit: The disposition of the sewage of the defendant Sanitary District of Chicago, and the generation and sale of electrical energy as alleged in paragraph 17 of said amended Bill of Complaint. This defendant avers that the amount of water diverted from time to time has been and is reasonably necessary for the purposes of navigation and is as near as may be determined the amount provided to be diverted according to law; that at no time has the mean daily, or mean monthly, or mean yearly flow or diversion exceeded that amount; that prior to the construction of the said hydro-electric plant, the energy produced by said water as it passed from the southern terminus of the said main channel to the Desplaines river was entirely wasted and served no purpose; that the only purpose of constructing and operating said hydro-electric plant was to conserve this energy; that said energy so produced has been and is used for the purpose of lighting the streets of the City of Chicago and its suburbs, and also for lighting the boulevards and parks of the various park systems of Chicago according to law; and that the energy so used for such public purposes has been and is sold at approximately the cost of production.

Eighteenth. This defendant denies the allegations of said amended bill of complaint contained in paragraph 18 thereof in respect to the mean yearly amount of water passing through said Sanitary District Canal at its western terminus for the years 1900 to 1917, both inclusive, and denies that the statements of said amended bill of complaint with respect to said amounts are correct, but avers that the said mean yearly amount of water (including drainage) passing through said Sanitary District Canal at its western terminus for said years, and in addition for the years from 1918 to 1924, both inclusive, is as follows:

Year	*Cubic Feet Per Second*
1900	2,990
1901	4,046
1902	4,302
1903	4,971
1904	4,793
1905	4,480
1906	4,473
1907	5,116
1908	6,443
1909	6,495
1910	6,833
1911	6,896
1912	6,938
1913	7,839
1914	7,815
1915	7,738
1916	8,200
1917	8,726
1918	8,826
1919	8,595
1920	8,346
1921	8,355
1922	8,858
1923	8,348
1924	9,465

Nineteenth. This defendant admits that all the water diverted from Lake Michigan by the defendant through and by means of the Sanitary District channel, is carried into the Mississippi Valley; that said water is permanently abstracted from the Great Lakes system, but deny that, as the result of such diversion, the mean level of the water in Lake Michigan, Huron, Erie and Ontario, and in the various waterways connecting said lakes, and in the St. Lawrence River above tidewater, has been lowered six inches below the level that would exist in said lakes and waterways in the absence of such diversion. This defendant avers that the lowering of the surface elevation of the waters of said lakes and their connecting channels as a result of said diversion or diversions as authorized by said permit of March 3, 1925, does not and will not exceed four and three-quarters inches on any of said lakes or waterways; and this defendant avers that it does not intend to divert any amount of water in excess of that authorized by the United States.

Twentieth. This defendant denies the allegation of said amended bill to the effect that at no time during the period of at least ten years last past has it been necessary for the protection of the health of the people of defendant district, or for any other purpose, that the sewage of the Sanitary District of Chicago be disposed of by means of said canal; and this defendant denies that it has been entirely feasible during all of said period, or is now feasible for said District to adopt and use the so-called scientific methods of sewage disposal, such as are alleged in said paragraph 20 of said amended bill, beyond the extent such methods are now or are provided to be employed by said permit of March 3, 1925 and adopted by defendant District; and that such methods are in practical and successful operation in many of the large cities throughout the world. This defendant denies that the use of the so-called scientific methods would require no diversion of water from Lake Michigan. This defendant denies that there is in successful operation for a large metropolitan population such as exists in Chicago and its suburbs and surrounding urban communities, so-called artificial or scientific sewage purification works that do not have as a basis the disposition of sewage by the so-called dilution method of sewage disposal provided for by the diversion works of the Sanitary District of

Chicago. This defendant avers that the flood flow of the Chicago River is approximately 10,000 cubic feet of water per second, and that unless there is permitted to be withdrawn 10,000 cubic feet of water per second at times when the rain is falling on Chicago area, the Chicago River will flow back into Lake Michigan, carrying with it the sewage of the City of Chicago, and thereby Lake Michigan will become polluted, a situation which actually existed prior to the opening of the Sanitary District canal in 1900, so that the flow of water as authorized in the Federal permit of March 3, 1925, of 8500 cubic feet per second annual average with instantaneous maximum of not to exceed 11,000 cubic feet per second, was and is necessary in order to prevent the sewage and drainage of the Chicago River Drainage basin from flowing into and polluting the water of Lake Michigan. This defendant avers that within the period of the said permit of the Secretary of War of March 3, 1925, set forth in said amended bill of complaint and above mentioned, it would not only be impossible to provide from public funds the moneys necessary, but also it would be physically impossible if moneys could be provided, to construct so-called scientific disposal works to take care of the sewage of the population of the territory of defendant The Sanitary District of Chicago, so that the water supply of the people of the Sanitary District would not be polluted without the diversion of the amount of water authorized by said permit of March 3, 1925. This defendant avers that until recently the art of sewage disposal by so-called scientific means other than solely by dilution, has been in a state of change; that the defendant The Sanitary District of Chicago has expended upwards of $500,000 in experimenting and in studying methods of sewage disposal used or attempted to be used in various parts of the United States and in Europe, and with reference to the adaptation of such methods to the conditions of sewage disposal and protection of water supply existing at Chicago and within the limits of the Sanitary District; that after such experimentation and study, the said defendant The Sanitary District of Chicago adopted on or about the year 1919, a program and plan for the construction, installation and operation of works designed when operated to artificially purify sewage and wastes arising within the limits of the Sanitary District of Chicago, so there would be removed from sewage by the operation of said works substantially all or the greater amount of the impurities existing in the raw and natural sewage arising from the population within the limits of The Sanitary District; that said so-called scientific or artificial purification works provided to be constructed under said plan and program so adopted by said defendant, when operated, will so purify the natural sewage treated by said works, that there will be discharged from said works an effluent that will be innocuous and non-putrescible, and will not require the addition of fresh water for the purpose of oxidation; that said effluent, however, would not be fit or proper to be discharged into Lake Michigan, the drinking water supply of the population of Chicago and other cities and towns within the territory of said defendant District; and that it is not practically possible to construct works for the artificial purification of natural or raw sewage which when operated will have discharging from them an effluent so purified that it could be discharged into Lake Michigan, the drinking water supply as aforesaid; that the construction of the works provided for by the said plan or program adopted by defendant The Sanitary District in the year 1919, has gone forward as fast as such works could be physically built, and the defendant The Sanitary District of Chicago has already expended in the construction of such artificial sewage disposal works, upwards of $39,000,000, and within the period of said permit of March 3, 1925, proposes to expend upwards of $55,000,000 upon the construction of such artificial sewage disposal works; that works have already been constructed and placed in operation under said plan and program, by which the sewage of upwards of 200,000 people has been, to a large extent treated and purified; and that the following table shows the expenditures made by the said defendant in the construction of its various channels, canals, so-called artificial sewage purification works and for other purposes:

COST OF CANAL SYSTEM AND APPURTENANCES TO DECEMBER 31, 1924.

Main Drainage Channel and Extension	$ 31,585,217.83
Chicago River Improvement	12,903,773.66
Desplaines River Improvement	2,333,571.72
North Shore Channel	4,138,105.25
Calumet-Sag Channel	14,159,215.51
Sewage Pumping Stations	980,622.76
Auxiliary Sewers	2,229,012.08
North Shore Sewers	2,453,996.55
Miscellaneous Construction	1,389,238.15
Bare Construction Cost	72,172,753.51
Administration, legal, clerical, etc., expense	5,729,813.46
Interest on bonds for construction	17,055,898.00
City of Chicago expenditures	6,706,804.37
Power house at Lockport	1,395,712.95
Total to December 31, 1924	$103,060,982.29

COST OF SEWAGE TREATMENT PROJECTS TO DECEMBER 31, 1924.

Sanitary improvements	$ 282,117.52
Desplaines River Project	3,357,669.23
Calumet Project	17,853,719.45
North Side Project	7,119,620.93
West Side Project	295,164.28
Miscellaneous Plants and Sewer	387,484.50
Bare Construction Cost	29,295,775.91
Administration, legal, clerical, etc., expense	2,325,799.06
Interest on Construction Bonds	6,923,188.71
Total cost for sewage treatment plants	$ 38,544,763.68

Twenty-first. This defendant denies that the diversion of water by way of said main channel has to any extent diminished the utility of the ports of Wisconsin, located on Lake Michigan, as enumerated in paragraph 4 in the amended bill, and this defendant denies that the diversion of water has reduced, by six inches in each or in any of said Lake Michigan ports along the shore of Wisconsin, the draft of vessels which can be accommodated therein for loading and unloading. On the contrary this defendant avers that at no time have vessels loading or unloading at said ports or intending to unload or load at said ports been hindered or will be hindered by said diversion so authorized. This defendant is not informed as to the percent of tonnage of freight received at said ports which consists of coal shipped from eastern states, and which coal, except for the amount consumed at the ports themselves, is then carried by rail to a large number of cities, villages and towns in the State of Wisconsin and in other states to the west of Wisconsin, and denies that said ports constitute the principal source of supply of coal for the State of Wisconsin in its proprietary capacity as owner of many public buildings and institutions or for any other purpose, or for many thousands of individuals and industrial plants located in the said State, and therefore this defendant asks that the complainants be required to make strict proof of such allegations so far as said allegations may be material or relevant. This defendant is not informed as to the character or type of vessels that carry coal to said ports, or as to the amount of their carrying capacity, or the rates of freight that they are capable of being operated at when loaded to the maximum capacity, or to any other capacity, and therefore ask that strict proof be required so far as same may be material or relevant. This defendant admits that every inch of normal draft which vessels are unable to utilize reduces their cargo carrying capacity by a number of tons, provided the draft of such vessels is greater than depths of water in harbors or other waters sought to be navigated by them. This defendant avers that the diversion of water from the great lakes by means of the Sanitary District works has not in any way affected the draft which vessels entering said ports are able to utilize and that their cargo carrying capacity has not been, and is not, reduced because of any such diversion. This defendant further avers that the commerce described in paragraph 21 of said amended bill, is interstate commerce and is carried on, over and upon those navigable waters of the United States, over which the United States has, and has assumed, exclusive jurisdiction, and that the complainants herein have no right to complain of any supposed interference with said navigable waters of the United States. This defendant further avers that all of said harbors or ports described in said amended bill require, for their maintenance, constant dredging each year under normal conditions, and any dredging made necessary by virtue of any supposed effect of said diversion upon said ports or harbors would be and is negligible and of no consequence, and this defendant avers that all of said harbors have been dredged and the channels improved by the United States Government since the opening of said Sanitary District channel and such dredging operations have been made under the supervision and direction of the United States and at the cost of the United States; and have been made upon the basis of the withdrawal of 10,000 cubic feet of water per second at Chicago, and that, therefore, the withdrawal of water at Chicago has not had any effect upon the navigable depth of water in said harbors.

Twenty-second. This defendant admits that in addition to the Wisconsin ports enumerated, located along the shore of Lake Michigan, there are a large number of ports located along the shores of Lake Michigan adjacent to the States of Illinois, Indiana and Michigan, on Lake Huron in the State of Michigan and the Dominion of Canada, on Lake Erie in the States of Michigan, Ohio, Pennsylvania and New York and the Dominion of Canada, and on Lake Ontario in the State of New York and the Dominion of Canada.

This defendant denies that the diversion of water from the Great Lakes by the Sanitary District works has caused or will cause a lessening of the utility of all or any of said ports on said lakes and of the waterways connecting said lakes in the same, or in any other, manner described with reference to the Wisconsin ports on Lake Michigan; that in the conduct of transportation between Wisconsin ports and the said ports in other states, the possible loading of vessels bound to or from such other ports, is reduced by many tons, or by any number of tons, because of said diversion. This defendant further denies that the diversion of water through the Sanitary District Works has affected or injured the traffic between said States and the Wisconsin Ports of Superior, Ashland and Washburn, or either one of them, located on Lake Superior. This defendant is not informed as to the amount or character of the commodities carried by boats or vessels between said Wisconsin ports located on Lake Superior and the various ports located on Lakes Michigan, Huron, Erie and Ontario in other states, and in so far as such allegations may be material or relevant, this defendant asks that strict proof be required. This defendant denies that the said diversion of water through said Sanitary District Works has caused or will cause the loss of many millions of dollars, or any other sum of money, to the people of the State of Wisconsin, or any of the people of Wisconsin, or to the States of Minnesota, Ohio, Pennsylvania, or either one of them, or to any of the people of any of the said states, or to any other person whomsoever. This defendant avers that the commerce described in said paragraph 22 of said amended bill of complaint, is commerce carried on over and upon navigable waters of the United States, over which Congress has assumed and has exclusive jurisdiction; that the supposed injury and damage so alleged in said amended bill of complaint, concerns and relates to interference with navigable waters of which the said complainants have no right or jurisdiction to complain, and therefore this defendant moves that the said allegations in paragraph 22 of said amended bill of complaint be stricken, and that the said bill of complaint as to such allegations be dismissed.

Twenty-third. This defendant denies that the diversion of water, as aforesaid, has seriously impaired the navigability of the Chicago River; that a current has been introduced into said river so swift as to make the navigation thereof exceedingly difficult or dangerous, but on the contrary, this defendant avers that there is no current in the Chicago River, or its branches, injurious to, or materially affecting, navigation thereon; that to properly provide for said diversion so that there would be no current injurious to, or materially affecting navigation upon said river, or its branches, defendant Sanitary District, pursuant to the authority of the Secretary of War, deepened, widened and straightened said river and its branches, and replaced old center pier bridges with a new and improved bascule type of bridge; that the said Chicago River and its south branch, and the West Fork was, before the Sanitary District improved same, narrow, tortuous and shallow, being at points less than 90 feet in width and only 17 feet deep over practically the entire course; that the said defendant has widened the said river and its branches so that it is now at all points, upwards of 200 feet in width, and it has deepened the channel of said river and its branches to 26 feet at all points; that in making said improvements said defendant expended upwards of $13,000,000.00, and that the Chicago River and its said branches, to the terminus of the said main channel of the Sanitary District is of such depth and width that the largest boats navigating the Great Lakes may traverse the course of said rivers, and the bridges across said rivers and its branches are so constructed that they may be moved out of the way of any boats desiring to pass. This defendant denies that said diversion has had any injurious effect whatsoever upon the commerce of said Chicago River and its branches, or has in any manner, or to any extent, reduced the tonnage carried thereon. This defendant further avers that no part of the Chicago River or its said branches has become entirely closed up by reason of said diversion, or has been made inaccessible to the commerce of the people of Wisconsin, or any other person or persons.

Twenty-fourth. This defendant admits that prior to the construction of the said canal of the Sanitary District of Chicago, the Chicago, Desplaines and Illinois Rivers constituted navigable waterways extending from Lake Michigan on the east, to the Mississippi River on the West, and aver that the said rivers still are and always have been such navigable waterways, and that said canal forms an integral and essential part of such waterways. This defendant denies that in the construction of the said canal, defendant District materially modified or altered said navigable waterway by diverting certain portions of the Desplaines River from its original bed. This defendant denies that the said diversion has had any injurious effect upon the navigable capacity of the West Fork of the South Branch of the Chicago River. This defendant admits that said canal has become in fact a substitute for said old navigable waterway referred to in said amended bill, and that said canal is now the only practicable means of navigation by water from Lake Michigan to the Mississippi River.

This defendant avers in this connection that about the year 1848 the Illinois and Michigan Canal, constructed by the State of Illinois pursuant to Acts of Congress hereinbefore and hereinafter mentioned, extending from the West Fork of the South Branch of the Chicago River along the line of the waterway referred to in said amended bill, to and through the City of Joliet and along the Desplaines and Illinois River to the Illinois River at LaSalle, Illinois, took the place of the said old natural waterway referred to in said amended bill, and that the said Illinois and Michigan Canal, until the times hereinafter mentioned, was used and still is used solely for navigation and as a substitute for the said old natural waterway referred to. And this defendant avers that said canal of the Sanitary District has become a substitute also for the Illinois and Michigan Canal from Chicago to Joliet and is now the only practical means of navigation between the Chicago River and the Illinois and Michigan Canal at Joliet; that that portion of the Illinois and Michigan Canal extending north from Joliet as originally constructed, is in its present state useless as a means of navigation on account of lack of sufficient water therein and because of various obstructions in the bed of said canal; that the portion of said Illinois and Michigan Canal extending from Joliet to the Illinois River at La Salle is, however, now used and operated for navigation purposes. And this defendant avers that since the construction of said main channel of said district, commerce has used the modern, complete and practicable waterway provided by the Sanitary District's main channel to the City of Joliet and the old Illinois and Michigan Canal to the Illinois River near LaSalle where it follows the Illinois River to the Mississippi; that said Canal of the Sanitary District is six times as deep and four times as wide as the old Illinois and Michigan canal as it existed, and as it was operated, prior to the completion of the main channel of the Sanitary District of Chicago. This defendant denies that it has always expressly, or in any manner, refused to concede that the said canal, thus substituted for the said waterway, is itself a navigable waterway of the United States; and this defendant further denies that under section 24 of the Act of 1889, quoted in paragraph 9 of said amended bill, or in any other manner, it has undertaken to bar the Government of the United States from all or any control or authority over said canal, as alleged in paragraph 24 of said amended bill, and further denies that it has undertaken to make the control and authority of said government subordinate to the use of said canal for sanitary and drainage purposes, or otherwise. But this defendant avers that the said Sanitary District canal has been used and is now used and operated in such a manner as to make navigation thereon free, easy and convenient, that it serves all the purposes of navigation, and that the use for sanitation has not conflicted, and does not conflict, with the use for navigation, and that the use for sanitation has not impaired and does not impair the use for navigation.

This defendant further avers that the conditions provided for under said section 24 of said Act of 1889 have been modified by section 3 of said Act of May 14, 1903, in force July 1, 1903, as follows:

> "Said Sanitary District shall permit all watercraft navigating, or proposing to navigate said Illinois and Michigan Canal, to navigate the water of all said channels of said Sanitary District promptly, without delay, or payment of any tolls at locks, or charges for so navigating in said channel. The rules of the United States Government now in force regulating navigation on the Chicago River shall govern navigation on the channels of the Sanitary District of Chicago."

This defendant further avers that the matters and things complained of in paragraph 24 of said amended Bill of Complaint, relate to navigation upon the navigable waterways of the United States over which the United States has assumed and has exclusive jurisdiction, and concerning which the said complainants have no right or authority to complain.

Twenty-fifth. This defendant denies that the amount of water necessary to permit said canal to be operated for navigation purposes only, does not at the present time exceed 500 cubic feet per second, or that the amount of water which may in the future be required for the operation of said canal for navigation purposes only, if permitted to be operated for such purposes, will not exceed 1000 cubic feet per second. Upon the contrary, this defendant avers that the amount of water required for navigation on said canal and upon the Illinois waterway (hereinafter described), extending from the southern terminus of said canal, along the Des Plaines River and on the Illinois River, is at least the amount authorized by said permit of March 3, 1925, which said amount of water can only be obtained from Lake Michigan by means of said canal.

Twenty-sixth. This defendant admits that paragraph 26 of the said amended Bill of Complaint contains correct and true copies of various documents, and permits, signed by the Secretary of War, Assistant Secretary of War or acting Secretary of War, upon the dates therein indicated.

This defendant denies the allegations of said amended Bill of Complaint to the effect that none of said documents mentioned in said Paragraph 26 are, or ever have been, of any force or effect as constituting an authorization for the said defendant to withdraw water from Lake Michigan; that the abstraction or diversion of water by said defendant has injuriously obstructed or affected the navigable capacity of Lake Michigan, or any other navigable water of the United States; that that the said abstraction or diversion of water has injuriously obstructed or in any manner affected the navigable capacity of the Chicago River by introducing a dangerously swift current into said river.

This defendant further denies the allegation of said amended Bill of Complaint concerning the authority given by said Rivers and Harbors Act of March 3, 1899, to the Secretary of War relating to the approval and placing of structures or other works in such manner as to affect the navigable capacity of navigable waters of the United States.

This defendant further denies the allegation to the effect that at no time since the 31st day of March, 1903, this defendant has been authorized by the Secretary of War to divert from Lake Michigan or to pass through the Chicago River, the Calumet River or both, into the canal of defendant District more than 4167 cubic feet of water per second; but, on the contrary, this defendant avers that said defendant District has been and is now authorized and directed by the Act of the State Legislature of 1889, hereinbefore referred to, to divert the amount of water required by said act, according to population of said defendant District and as now authorized by the United States. This defendant admits that the defendant District, has continuously, for more than ten years last past, been withdrawing from Lake Michigan and passing into said canal, an amount of water in excess of 4,167 cubic feet per second.

Twenty-seventh. This defendant further admits the allegations of paragraph 26 as to the suit instituted by the United States against defendant District and lately pending in the District Court of the United States, for the Northern District of Illinois, and decided in this court on appeal, January 5, 1925.

Twenty-eighth. This defendant admits that on the application of defendant District on March 3, 1925, Major General H. Taylor, Chief of Engineers, and the Honorable Joseph W. Weeks, Secretary of War, made and entered the order as set out on page 30 of paragraph 28 of said amended bill of complaint.

This defendant denies each and every of the averments contained in sub-paragraphs 1 to 6, inclusive, of paragraph 28 of said amended bill of complaint, and denies that the said Sanitary District of Chicago has violated or failed to keep any of the terms, provisions and conditions of the said permit of March 3, 1925, and avers that the said Sanitary District of Chicago has at all times complied with all of the terms, provisions and conditions of said permit in every particular, and in this connection this defendant further avers:

(1) There has been no unreasonable interference with navigation by these defendants, or either one of them, by any work authorized by said permit.

(2) The expenses of the United States, connected with the inspections or with any other operations by the United States in the interests of navigation connected with the said permit, have all been paid.

(3) No attempt has been made by these defendants, or either one of them, to forbid the full and free use by the public of any navigable waters of the United States, and the channels of the defendant District and of the defendant State of Illinois have been at all times open to the full and free use of the public.

(4) The defendant Sanitary District has carried out and is carrying out a program of sewage treatment by artificial processes which will provide the equivalent of the complete 100 per cent treatment of the sewage of a human population of at least 1,200,000 before the expiration of said permit. At the time the said permit was issued, the defendant Sanitary District had expended on works for the treatment of sewage by artificial processes, the sum of $39,200,000, and was under contractual obligation for the expenditure of $9,700,000 additional for the same purpose; that at the time said permit was issued, the bonding capacity of the defendant District under the state law had been substantially exhausted. About June 19, 1925, through the efforts of the defendant District, the General Assembly of Illinois passed an act authorizing the increase of the bonding limit of defendant District from 3 to 4 per cent of the assessed valuation of property within defendant District, which said act

was in force June 19, 1925, and made available an additional amount through the issuance of bonds of approximately $19,650,000 for construction purposes. Between March 3, 1925, and December 3, 1925, defendant District awarded contracts for the sewage treatment projects, required under said permit, of $5,873,057.14, for dredging the Calumet River as authorized by the Secretary of War, being a part of treatment, diversion and navigation projects, approximately $1,080,000, and for the construction of bridges authorized by the Secretary of War, $1,437,707.63. During the said period from March 3, 1925, to December 3, 1925, the defendant District actually expended and paid out the sum of $7,521,590.59 on sewage treatment projects, and approximately $2,194,708.54 on the construction of bridges, as authorized by the Secretary of War.

At the time of the issuance of said permit defendant District had in operation sewage treatment plants serving approximately 154,000 people, being equivalent to complete 100 per cent treatment of 87,000 people. The said program and plan for the construction of sewage treatment plants as mentioned in said permit has been approved by the United States Engineers and when built will provide for the complete treatment of the sewage of upwards of two million people, and the progress in the performance of the work of constructing said treatment plants under said program, has been such that the works provided by said program will be completed on or before December 31, 1929, the date of the expiration of said permit.

(5) The defendant Sanitary District, by order of its Board of Trustees, being the corporate authorities of said District under said Acts of 1889 and acts amendatory thereof and supplementary thereto, has agreed to pay its share of the cost of regulating or

compensating works to restore lake levels or compensate for the lowering of the Great Lakes system if and when constructed, and did on or before the 17th day of September, 1925, post and deposit and file with the Secretary of War a bond in the amount of one million dollars, which said bond was acceptable to and was received by the said Secretary of War.

(6) Upon the said permit of March 3, 1925, being issued, the defendant Sanitary District entered upon the preparation of plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms, which plans it proposes to submit to the Chief of Engineers and the Secretary of War for their approval. The said plans are about completed, and are about ready to be submitted to the said Chief of Engineers and the Secretary of War. The construction of said controlling works will not require more than two years for their construction, and such plans will be submitted to and approved by the Chief of Engineers and Secretary of War and work commenced so that the work will be completed by the date of the expiration of said permit, as therein required.

(7) The United States District Engineer at Chicago has from time to time inspected the sewage treatment construction and has had supervision of the diversion of water from Lake Michigan, and the defendant District has carried out all directions and orders of the said engineer, and the said engineer has approved the said construction work and plans.

(8) The City of Chicago, at a meeting of the City Council of the City of Chicago on or about September 1, 1925, adopted a program for metering at least 90 per cent of its water service and provided for the execution of said program at the average rate of 10 per cent per annum, and such program so adopted was evidenced

by an ordinance duly adopted by the said City Council on said date. All of which was and is acceptable to the United States.

(9) Neither the Chief of Engineers nor the Secretary of War has suggested that sufficient progress has not been made at this date in the program of sewage treatment provided in said permit so as to insure full compliance with the provisions of condition 4 thereof, and these defendants show that such progress has been made so as to insure full compliance with said condition 4.

This defendant avers that the matters and things complained of in said paragraph 28 of said amended bill of complaint, relate to the permit of the Secretary of War of March 3, 1925, and that the complainants in said amended bill have no right or authority to complain as to whether or not defendant District has complied with said permit, and that such matters are within the exclusive jurisdiction of the United States.

Twenty-ninth. This defendant denies the allegation in said amended bill to the effect that the acts of defendant District in the diverting of water from Lake Michigan into the canal of the defendant District, have never been authorized by Congress, and deny that said acts are in violation of the legal rights of the States of Wisconsin, Minnesota, Ohio and Pennsylvania, and/or the people of said states.

(a) This defendant denies that, by the alleged acts, or by any other acts, it is interfering with the common law rights, if any there be, of the States of Wisconsin, Minnesota, Ohio and Pennsylvania, and/or its or their people, to have the free and unobstructed use of Lake Michigan and the various ports and harbors thereof, within or without the borders of said states, for the purposes of navigation, trade and commerce, or for any other purpose, free from any and all interference with the natural navigable capacity of said lake or said harbors by any agency other than the States of Wisconsin, Minnesota, Ohio, Pennsylvania or the United States Government.

(b) This defendant denies that by any acts mentioned in the said amended bill of complaint, or by any other acts, is it interfering with the right, if any such right there be, of the people of Wisconsin, Minnesota, Ohio and Pennsylvania to the free and unobstructed navigation of Lakes Michigan, Huron, Erie, Ontario and the navigable waters between said lakes and from said lakes into the Mississippi River and the Atlantic Ocean, which rights, if any there be, belong to said people of Wisconsin, Minnesota, Ohio and Pennsylvania by the common law or by guarantee, if there be any common law right, or if there be any guarantee, contained in the ordinance for the government of the territory of the United States northwest of the Ohio River, enacted by Congress on June 13, 1787.

(c) This defendant denies that it is violating provisions of the Act of Congress of March 3, 1899, known as the Rivers & Harbors Act of 1899, or any of the provisions of said act, or any other act of Congress, and further that it is violating the provisions of Section 10 of said Act of March 3, 1899.

(d) And in this connection this defendant avers that it has not done or performed any act or thing interfering with said States of Wisconsin, Minnesota, Ohio and Pennsylvania, and/or their people, in the navigation of the waterways or any of the waterways mentioned in paragraph 29 of said amended bill, or in any other paragraph thereof, and that those matters and things relating to the navigation of the waterways mentioned in said amended bill are within the exclusive jurisdiction of the United States concerning the regulation of which neither said complainants, nor any one of them, have any right to make complaint.

Thirtieth. This defendant admits that since the opening of said Sanitary District canal, the City of Chicago and other municipalities within said District, and the people thereof, and large industries located therein, have been permitted to drain into said Sanitary District canal the sewage and waste from the said municipalities and from said large industries; that this included domestic sewage and waste from a population of more than 3,300,000 inhabitants living within said District, and includes an additional industrial sewage and waste principally from the stockyards and other large industries, which latter sewage and waste has been estimated as equivalent of an additional population of about 1,500,000 and not of 1,800,000 as alleged in paragraph 30 of said amended bill; that the defendant the State of Illinois authorized defendant District to construct said canal for the purposes of navigation and also for the purpose of diverting sewage and waste by carrying the same into the Chicago, Desplaines, Illinois and Mississippi Rivers; but this defendant denies that the draining of said sewage and waste into the said Sanitary District Drainage Canal and carrying the same into said river, along with the amount of water authorized, and subject to the conditions imposed by the United States, has greatly polluted, is greatly polluting or will pollute the waters of said rivers, and, under such authority and conditions, has created, is creating or will create a highly offensive, unsanitary, disease breeding and pestilential condition in, upon or along the said navigable waterways from Lake Michigan through the Sanitary District Canal and the Chicago, Desplaines and Illinois Rivers into the Mississippi River, or, under such authority and conditions, has made, is making or will make undesirable and largely impossible the use of said navigable rivers for passenger traffic either for business, recreation or pleasure, or, under such authority and conditions, has made, is making or will make such navigation offensive and dangerous to the health and lives of persons engaged in the conveyance by and over such waterways of freight and passengers. This defendant admits that there is a large amount of interchange of commodities and business between the territories adjacent to and served by, and which is or could be served by, navigation on said rivers and the States of Wisconsin, Minnesota, Ohio and Pennsylvania and the people thereof. This defendant denies that the condition of said waterways constitutes a public nuisance which impairs and violates the rights or any rights of the complainants and/or the people thereof, in the navigation of said rivers.

This defendant avers that the matters and things complained of in said paragraph 30 of the said amended bill of complaint, in so far as they relate to the alleged pollution of the waters of the Chicago, Desplaines and Illinois Rivers, are matters and things which lie entirely within the concurrent jurisdiction of the State of Illinois and the United States, about which complainants have no concern.

Thirty-first. This defendant denies that the legal rights of the States of Wisconsin, Minnesota, Ohio and Pennsylvania, or of their people, have been violated, and deny that said alleged acts of defendants, or either of them, are now causing or will cause any serious interference with the trade and commerce of the people of said states and of the States of Wisconsin, Minnesota, Ohio and Pennsylvania in their proprietary capacities, or otherwise, and deny that said alleged acts will result in large or in any pecuniary losses to the said people, and deny that no adequate remedy exists at law.

Thirty-second. This defendant avers:

(a) The Continental Divide separating the watershed of the Great Lakes basin and the watershed of the Mississippi River basin, passes within approximately eight miles of the shore line of Lake Michigan at Chicago. Said Continental Divide at the point mentioned is insignificant and its summit is but a few feet above the mean surface elevation of Lake Michigan. Originally, in a state of nature, the West Fork of the South Branch of the Chicago River emptied into the South Branch of said Chicago River. Said South Branch in confluence with the North Branch formed the Chicago River. The West Fork of the South Branch passed within a short distance of the Desplaines River, and it in confluence with the Kankakee River forms the Illinois River which flows through a large and fertile valley and empties into the Mississippi. Originally at times the waters of the West Fork of the South Branch of the Chicago River flowed across the said Continental Divide and into the Desplaines River and mingled with the waters thereof. Prior to the admission of the State of Illinois into the Union in 1818, and subsequent thereto, said Lake Michigan, Chicago River, South Branch thereof and the West Fork of the South Branch, a small portage in dry weather times of the year across said Continental Divide, and said Desplaines and Illinois Rivers were navigated by the early explorers, fur traders and others, and formed a continuous line of water navigation accommodating a large and extensive commerce. In wet times or times of high water, the connection in said water route between the West Fork of the South Branch of the Chicago River and said

Desplaines River, was made through an expanse of water known as Mud or Portage Lake, and at such times boats passed to and from the Desplaines to the West Fork of the South Branch, entirely by water.

(b) The above mentioned water route between the Great Lakes and the Mississippi River and its connection with the Great Mississippi River Navigation System extending to the Gulf of Mexico, early determined the policy of the United States Government with reference to the division of the Northwest Territory. The cession of Virginia of 1783 provided that the Northwest Territory should be divided into states of not less than 100 square miles and not more than 150 square miles in area. A report made to and adopted by Congress, dated March 24, 1786, recommended the division to conform to the possibilities of navigation routes in the Northwest Territory, and among other things stated:

> "Whereas it appears * * * that the laying it out and forming it into states of the extent mentioned in the resolution of Congress of the tenth of October, 1780, and in one of the conditions contained in the cession of Virginia, will be productive of many and great inconveniences; that by such a division of the country, some of the new states will be deprived of the advantages of navigation, some will be improperly intersected by lakes, rivers and mountains, and some will contain too great a proportion of barren, unimproved land, and of consequence will not for many years if ever have sufficient number of inhabitants to form a respectable government, and entitle them to a seat and voice in the federal council: And whereas in fixing the limits and dimensions of the new states, due attention ought to be paid to natural boundaries and a variety of circumstances which will be pointed out by a more perfect knowledge of the country, so as to provide for the future growth and prosperity of each state, as well as for the accommodation and security of the first adventurers."

Pursuant to said report, article 5 of the Ordinance of 1787 was made to provide that the said Northwest Territory should be divided into not less than three nor more than five states, and that the northern boundary of three of said states might be fixed by Congress to be a line drawn through the southern bend or extreme of Lake Michigan, and that the territory north might be divided into one or two states, and, further, in contemplation of the importance of navigation, article 4 was by Congress made to provide

> "the navigable waters leading into the Mississippi and St. Lawrence and the carrying places between them, shall be common highways and forever free as well to the inhabitants of the said territory as to the citizens of the United States and those of any other states that may be admitted into the Confederacy, without any tax, impost or duty therefor."

The State of Virginia on December 30, 1788, ratified the said Ordinance of 1787. The Illinois Territory prior to the passage by Congress of the Enabling Act, only extended north to an east and west line drawn through the southern end of Lake Michigan. On April 3, 1818, when this Enabling Act was being considered by the House of Representatives in Committee of the Whole, the said act was amended, defining the boundaries of Illinois Territory, or of the new state, to be the boundaries as they exist today, and Mr. Pope in support of said amendment, among other things said (as shown by the proceedings of Congress):

> "The object of this amendment, Mr. P. said, was to gain, for the proposed State a coast on Lake Michigan. This would afford additional security to the perpetuity of the Union, inasmuch as the State would thereby be connected with the States of Indiana, Ohio, Pennsylvania and New York, through the Lakes. The facility of opening a canal between Lake Michigin and the Illinois River, said Mr. P.,

> is acknowledged by every one who has visited the place, giving to the proposed State the port of Chicago (embraced in the proposed limits), will draw its attention to the opening of communication between the Illinois River and that place, and the improvement of that harbor."

(c) Shortly after Illinois became a State of the Union, a report was made by Graham and Phillips of April 4, 1819, and by Major Stephen H. Long, and transmitted to Congress by John C. Calhoun, Secretary of War, December 28, 1819, describing said water route from Lake Michigan to the Illinois River and recommending its improvement. The necessity of the improvement of said water route was further emphasized by the refusal of Great Britain to permit the citizens of the United States the free navigation of the St. Lawrence River, and the controversy as to the navigation of the St. Lawrence River extended from about the year 1822 until about the year 1854, when by treaty the privilege only was granted to the citizens of the United States. Consequently, on March 30, 1822, to authorize the construction of a canal to connect Lake Michigan with the Illinois River, Congress passed the following act:

> "An Act to Authorize the State of Illinois to Open a Canal Through the Public Lands to Connect the Illinois River with Lake Michigan. (Approved and in force March 30, 1822.)
>
> Section 1. Be it enacted by the Senate and the House of Representatives of the United States of America, in Congress Assembled: That the State of Illinois be, and is hereby authorized to survey and mark, through the public lands of the United States, the route of the canal connecting the Illinois River with the southern bend of Lake Michigan; and ninety feet of land on each side of said canal shall be forever reserved from any sale to be made by the United States, except in the cases hereinafter provided for, and the use thereof for-

> ever shall be, and the same is hereby vested in the said State for a canal, and for no other purpose whatever; on condition, however, that if the said State does not survey and direct by law said canal to be opened, and return a complete map thereof to the treasury department, within three years from and after the passage of this act; or, if the said canal be not completed, suitable for navigation within twelve years thereafter; or, if said ground shall ever cease to be occupied by, and used for, a canal suitable for navigation; the reservation and grant hereby shall be void and of none effect; Provided, always, and it is hereby enacted and declared, that nothing in this act contained, or that shall be done in pursuance thereof, shall be deemed or construed to imply any obligation on the part of the United States to appropriate any money to defray the expenses of surveying or opening said canal; Provided, also, and it is hereby further enacted and declared, that the said canal, when completed, shall be and forever remain a public highway for the use of the Government of the United States, free from any toll or other charge whatever, for any property of the United States, or persons in their service passing through the same."

On or about January 20, 1825, Edward Coles, as Governor of Illinois, transmitted to James Monroe as President of the United States, a complete map showing the survey made by the State of Illinois for the location of the canal provided by said act. The letter accompanying the delivery of said map to the President of the United States, is in part as follows:

> "In compliance with request of the Legislature of this State, I have the honor to transmit to you a copy of the 'Report of the Canal Commissioners of the State of Illinois,' together with a map of the country between the headwaters of the Illinois River and Lake Michigan on which is delineated the proposed canal to connect these navigable waters."

The General Assembly of the State of Illinois had theretofore provided by law for the making of said survey by the Canal Commissioners and for the opening of said canal, and had within the three years provided by said act, performed all things required of it, and the said Act of March 30, 1822, has been since its passage and is now in full force and effect. The importance of constructing said canal was further called to the attention of Congress in a memorial by the General Assembly of Illinois in the year 1826, which, among other things, asked the United States to aid the State of Illinois to build said canal. Consequently, on March 2, 1827, for such purposes, the Congress of the United States passed an act, the title of which and the act are as follows:

> "An Act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan. (Approved and in force March 2, 1827.)
>
> Section 1. Be it enacted by the Senate and House of Representatives of the United States of America, in Congress Assembled, That there be and hereby is granted to the State of Illinois, for the purpose of aiding the said State in opening a canal to unite the waters of the Illinois River with those of Lake Michigan, a quantity of land equal to one-half of five sections in width, on each side of said canal, and reserving each alternate section to the United States, to be selected by the Commissioner of the Land Office, under the direction of the President of the United States, from one end of the said canal to the other; and the said land shall be subject to the disposal of the Legislature of the said State, for the purpose aforesaid, and no other; *Provided, That the said canal when completed, shall be and forever remain a public highway for the use of the Government of the United States, free from any toll, or other charge, whatever, for any property of the United States, or persons in their service passing through the same;* Provided, That said canal shall be commenced within five years and completed in twenty years, or the State shall be bound to pay

> to the United States the amount of any lands previously sold, and that the title to purchasers under the State shall be valid."

Said act has been, since its passage, and is now, in full force and effect.

After surveys, investigation and reports made by engineers and others for the State of Illinois, on January 9, 1836, the General Assembly of Illinois passed an act providing for the construction of said canal, and under that act and certain acts amendatory thereof, the canal was finally completed in 1848. Section 16 of said act, among other things, provided:

> "Sec. 16 (Description-Proviso.) The said canal shall not be less than forty-five feet wide at the surface, thirty feet at the base and of sufficient depth to insure a navigation of at least four feet, to be suitable for ordinary canal boat navigation, to be supplied with water from Lake Michigan and such other sources as the Canal Commissioners may think proper, and to be constructed in the manner best calculated to promote the permanent interest of the country; reserving ninety feet on each side of said canal, to enlarge its capacity, whenever in the opinion of the Board of Canal Commissioners, the public good shall require it."

The original plan for the construction of said canal provided for its being so built that water for its operation would be taken from Lake Michigan by gravity through that portion of the canal which cut through the said Continental Divide. This plan was known as the Deep Cut Plan. For lack of funds, that portion of the canal between the West Fork of the South Branch of the Chicago River and the Desplaines River at or near Joliet, was completed upon what was called the Shallow Cut Plan, by which water for its operation was taken partly from said West Fork and partly by way of a feeder known as the Calumet Feeder, extending from the said canal at Sag, Illinois, about twenty miles below its northern terminus, to the Little Calumet River, at or near what is now Blue Island, Illinois.

In 1861, the General Assembly of Illinois, with the view of enlarging the entire waterway from Lake Michigan to the Mississippi River, and to supply additional water for the Illinois River to provide greater depths for navigation in said river, passed a resolution directing the Trustees of the Illinois and Michigan Canal to make a survey and report as to the best methods of improving said waterway which should be supplied with water from Lake Michigan "through the enlargement and deepening of the Illinois and Michigan Canal, or otherwise, or by opening a channel from Lake Michigan, by way of the South Branch of the Chicago River and Mud Lake to the Desplaines River, and down said canal to a point that would secure a free, flowing, ample and never-failing supply of water, sufficient for the navigation of the Illinois River at all seasons and times." It was further provided by said resolution that the channel to be constructed should be of "sufficient size to admit of full and free steamboat navigation from the Illinois River to Chicago and Lake Michigan, as well as a size sufficient for supplying water for all the deficiencies of navigation in the Illinois River at all seasons." The said resolution contemplated either the enlargement of the Illinois and Michigan Canal in the stretch extending across the Continental Divide or the construction of an entirely new canal substantially parallel with it at such place and places to withdraw from Lake Michigan for navigation purposes a large quantity of water. This enlargement was provided for by both the Act of Congress of 1822, which reserved a strip of land 90 feet on each side of the canal, and by the Act of Illinois, under which the canal was constructed, reserving the same number of feet on each side of the canal for the purpose of enlargement. In the furtherance of this plan for the enlargement of said waterway, the General Assembly of Illinois, on February 16, 1865, passed an act providing for the enlargement of said canal between Chicago and Joliet upon the original deep cut plan. The said Act is in part as follows:

> "Whereas, it has been represented that the City of Chicago, in order to purify or cleanse Chicago River, by drawing a sufficient quantity of water from Lake Michigan, directly through it, and through the summit division of the Illinois and Michigan Canal, will advance a sufficient amount of funds to accomplish this desirable object; and, whereas, the original plan of the said canal was to cut down the summit so as to draw a supply of water for navigation directly from Lake Michigan, which plan was abandoned for the time being, after a large part of the work had been completed, only in consequence of the inability of the State to procure funds for its further prosecution; and, whereas, under the law creating the trust the plan of the summit division of the canal was changed, the level being raised so as to require the principal supply of water to be obtained through the Calumet feeder, subject to serious contingencies, and by pumping on to the summit with the hydraulic works at Bridgeport; now, therefore,
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> "Section 1. Be it Enacted By the People of The State of Illinois, Represented in the General Assembly, That to secure the completion of the summit division of the Illinois and Michigan Canal, upon the original 'deep cut' plan, with such modifications and changes of line, if necessary, as will most effectually secure the thorough cleansing or purification of the Chicago River, and facilitate the execution of the work, the City of Chicago, through its constituted authorities, may at once enter into an arrangement with the Board of Trustees of said

> canal, with a view to the speedy accomplishment of the work."

Purusant to said Act of the General Assembly of Illinois last mentioned, the City of Chicago, pursuant to an ordinance of its City Council passed June 5, 1865, in 1871 completed said canal on said deep cut plan, whereby water was drawn for its operation and for the purpose of reversing the Chicago River at substantially all times of the year except in flood times. About the year 1872 Chicago was reimbursed by defendant, State of Illinois, for its expenditure of about $3,000,000 to complete said canal. The Congress, by its Rivers and Harbors Act of June 23, 1866, took cognizance of the desire and joined in the plan of the General Assembly of Illinois to enlarge said waterway—and the necessity therefor—by directing a survey to be made. Thereupon, on February 12, 1867, a report was made by the Engineer Corps of the United States Army known as the Report of General Wilson, which report was transmitted to Congress, concerning the improvement of this waterway. The report describes the waterway. Among other things, the said report stated:

> "* * * The data herein contained, together with the existence of a canal of limited capacity already in operation, demonstrate beyond a doubt that the waters of the lake may be carried into the Illinois River through a navigable channel of any required dimensions, and at a cost which cannot be regarded as excessive when the objects to be obtained are duly considered."

After the said Illinois and Michigan Canal had been completed by the City of Chicago upon the deep cut plan, a report was made on January 9, 1875, by Assistant Engineer F. C. Doran, which report was transmitted to Congress, and it recited the completion of said canal upon the deep cut plan. This report was followed on May 10, 1880, by a report made by General Lydecker pursuant to the Rivers and Harbors Act of March 3, 1879, which said Lydecker report was submitted to Congress. Among other things, the said report stated:

> "The question of a through line of water communication from the Mississippi to Lake Michigan, via the Illinois River, has been before Congress since an early date. In 1822, the State of Illinois was authorized to make through the public lands of the United States a route for a navigable canal connecting the Illinois River with Lake Michigan, and between that date and 1854, Congress had granted to the State 321,760 acres of land to assist in its construction. The canal was first opened to navigation in 1848, its cost up to that time being $6,409,509.95; since then the State has spent a great deal towards its enlargement and maintenance. In the meantime several surveys, having in view the improvement of the Illinois River, have been made, the first in 1838 by Capt. Howard Stansbury, Topographical Engineers; the next of any considerable importance was made under the direction of General J. H. Wilson, in 1866, the object of which was 'to obtain such specific and accurate information in regard to obstructions to navigation in that river as will enable you to submit estimates for its improvement, so that the largest boats navigating the Illinois and Michigan Canal, and steamboats drawing four feet of water, will be enabled to pass through the river to St. Louis during the season of extreme low water without breaking cargo.'
>
> His report on this survey led Congress to direct a more complete survey in 1867 (act approved March 2), the object of which was to prepare plans and estimates 'for a system of navigation by way of the Illinois River, between the Mississippi and Lake Michigan, adapted to *military, naval*, and *commercial* purposes.' This duty was committed to a Board of Engineers composed of General J. H. Wilson and Mr. William Gooding, Civil Engineer, the latter having been for a long time the Chief Engineer of the

'Illinois and Michigan Canal.' The report of this board was submitted to the Chief of Engineers under date of December 17, 1867, and is published in his annual report for 1868, pages 438 to 468. It recommended that the Illinois River be improved by the construction of five locks and dams, creating thereby a slack water system with a navigable depth of 7 feet at the lowest stage, from the mouth of the river at Grafton to Utica, 227 miles above; the lock chambers were to be 350 feet long, 75 feet wide, and the estimated cost of the entire work was $1,953,600. To complete the through line to Lake Michigan, an enlargement of the canal was recommended, the estimated cost of this enlargement being, in round numbers, $16,250,000.

No appropriations were made by Congress to carry out the plan of improvement above indicated, but the State of Illinois, in substantial conformity with that plan, has constructed *two* of the proposed locks and dams (viz., at Henry and Copperas Creek), at a cost of $747,747, while the annual appropriations by Congress for improving the Illinois River (aggregating to date $589,150) have been applied mainly to ameliorating its navigable condition by dredging channels through the worst bars, and constructing dikes and wing-dams for contracting the waterway. For a more detailed description of these operations I would respectfully refer to my report dated August 30, 1878 (which was published as House Ex. Doc. No. 81, 45th Congress, 3rd Session), a copy of which is transmitted herewith.

The several surveys and reports above referred to gives so complete a description of the physical characteristics of the route, and present the arguments in favor of its improvement so forcibly, that it seems unnecessary to extend this report by repeating what has been so fully set forth before * * *.

* * * * *

The laws of Congress require that reports of surveys of rivers and harbors shall contain 'statements of all existing facts tending to show to what extent the general commerce of the country will be promoted by the several works of improvements con-

> templated by such examinations and surveys. In fulfillment of this requirement it seems only necessary to note that the improvement of the Illinois River, supplemented by the enlargement of the Illinois and Michigan Canal as heretofore proposed, will furnish a reliable and commodious channel of water communication from the Mississippi River to the Northwestern lakes; by this means the vast Mississippi Valley, and all the country tributary thereto, is brought into direct water communication with Lake Michigan, at the great City of Chicago, with its flood of commerce eastward and westward; the route exists as a practicable one of considerable importance today, and the question is simply one of enhancing its value by increasing its capacity to a degree commensurate with the important interests involved.
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> Considering this simple statement, the facts so fully set forth in previous elaborate reports, and noting the wonderfully rapid development of the entire western country, it would seem that nothing further is necessary to indicate 'to what extent the general commerce of the country will be promoted' by the contemplated improvement, nor to show how desirable it is that the work should be accomplished with the least delay practicable.''

In 1881, the General Assembly of Illinois authorized the City of Chicago to install pumps at Bridgeport, the northern terminus of the Illinois and Michigan Canal. These pumps were installed by the City of Chicago about the year 1884, and thereby a larger quantity of water was taken from the West Fork of the South Branch of the Chicago River into and through said Illinois and Michigan Canal.

(d) The agitation for the enlargement of the waterway from Lake Michigan to the Illinois River continued; the necessity therefor was recognized by officials of the State and Federal Government; and, further, during the decade beginning with 1880, there was a great demand for not only the enlargement of the waterway from Lake Michigan to the Illinois River, whereby a sufficient quantity of water would be withdrawn from Lake Michigan to provide a never-failing supply of water in the Illinois River, but also for the enlargement and deepening of the Mississippi River to the Gulf of Mexico, and organizations called "Deep Waterway Associations" were formed to further this project. The interest of the United States Government in the project is shown by the Acts of Congress and by reports of the Engineer Corps, transmitted to Congress. Major Benyaurd made two reports upon this subject—one dated September 2, 1882, and the other dated March 5, 1884, respectively, and Major Handbury, in 1887, pursuant to the Rivers and Harbors Act of August 5, 1886, made a report upon the same subject. Among other things, the said report of Major Handbury stated:

> "The United States and the State of Illinois have long been committed to the project of opening a water communication between the Mississippi River and the northern lakes of capacity sufficient for the wants of commerce and for the exigencies of our national defense, should these ever arise.
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> The distance by this route from the Gulf of Mexico to the southern end of Lake Michigan is about 1,620 miles. When the projected improvement of the Illinois River below Copperas Creek, on which we are now working, has been finished, more than 1,520 miles of this distance will be available for the water transportation of commerce in bulk between these points. Pushing this improvement through to the lake, the connecting link will be formed which will join the northern lakes with the vast network of navigable rivers whose waters flow commensurate with the importance of the commerce that will be affected by it. The mere fact that such a route is available will serve as a wholesome regu-

> lator to the rates that would be exacted by other methods of transportation were this one not in existence. Besides the immense commercial advantages that may be expected from the completion of the project, there are military and naval exigencies that might easily arise where it would figure as a prominent factor in the problem of our national defenses. From whatever point we look at the subject there is nothing local or sectional in it. It is true that all the work to be done happens to be in the State of Illinois. The benefits to be derived belong to the nation at large. It is fortunate, too, that at this time the subject is unencumbered by any phase of a political character. The problem of connecting Lake Michigan with the Mississippi River by a commodious waterway, that could be used for commercial, military and naval purposes, has received attention from our most thoughtful statesmen from the day of Albert Gallatin to the present."

During the said decade beginning with the year 1880, the population of the City of Chicago and its adjoining suburbs had increased to approximately 1,000,000 people. While the Chicago River and its branches into which principally the sewage of Chicago was emptied, had been, since the enlargement of the Illinois and Michigan Canal upon the deep cut plan, to some extent cleansed by reason of said reversal of the Chicago River during dry weather times, nevertheless, the principal amount of the drainage of Chicago, including its sewage, found its way into Lake Michigan, which was the only drinking water supply for the people of Chicago. About the year 1885 a very extraordinary and extensive rain occurred during which, in a short time, a vast amount of water was delivered to the Chicago River from its drainage area, carrying into the lake and to the water supply an unusual amount of the accumulated sewage and filth deposited in the river. While on the occasion of rains a certain amount of the sewage and filth was washed into the lake from the river, by reason of the fact that the Illinois and Michigan Canal was not of sufficient capacity to keep the Chicago River at all times reversed in its flow, this flood of 1885 caused an extraordinary large number of deaths from water-borne diseases—such as typhoid, and others—causing the people of Chicago and Illinois to be greatly alarmed.

The agitation and demand for a deep waterway to the Gulf and the health conditions at Chicago caused the City Council of Chicago, pursuant to an ordinance passed on January 27, 1886, to appoint a commission known as "The Drainage and Water Supply Commission," composed of the most eminent engineers of the United States, to make investigations and surveys and to report upon the best method of solving the waterway and water supply problems. The members of said Drainage and Water Supply Commission, after making complete investigation and survey, made a report to the City Council on January 30, 1887. The said report reviewed the conditions then existing as to drainage and water supply and the demands and the necessities for the enlargement of the waterway from Lake Michigan to the Mississippi River. An estimate was made by the said committee, as stated in its report, of the future population of Chicago and its environs. The said commission also considered, as shown by said report, the adaptation of the various then known means of disposing of sewage—among others, discharging the sewage into Lake Michigan at one end of the city and taking water from the lake at the other for drinking purposes, the disposal of the sewage on land and the diversion of the sewage and drainage to the Desplaines River by way of a canal, which would serve the purpose of providing a deep waterway from the West Fork of the South Branch of the Chicago River to the Desplaines River at or near Joliet, and the use of the water from Lake Michigan to provide a never-failing water supply for navigation on the Illinois River and for the purpose of oxidizing the sewage and drainage so that such sewage and drainage, when passing through the Desplaines and Illinois Rivers, would not be injurious to the health of the people residing along the said rivers or to fish life therein. The commission recommended the diversion method mentioned as stated in its report as follows:

> "Besides the economical advantages of the Desplaines scheme, its superiority is still further emphasized by advantages of another kind. The proposed canal will, from its necessary dimensions and its regular discharge, produce a magnificent waterway between Chicago and the Mississippi River, suitable for navigation of boats having as much as 2,000 tons burden. It will establish an available water power between Lockport and Marseilles fully twice as large as that of the Mississippi River at Minneapolis, which will be of great commercial value to the State. The Calumet region will be much enhanced in value by having a direct navigable channel to the Desplaines River and by a lowering of the flood heights of Calumet Lake and River. Within the city the water of the Chicago River and its South Branch will get a much better circulation if it flows by gravity than if it has to be pumped, the necessity for which would remain even if the sewage should be discharged through intercepting sewers, either into the lake or upon land. Upon either of the latter conditions an occasional overflow from the sewers into the river during heavy rains would be more objectionable than a constant discharge of sewage into a more rapidly flowing stream. Flood waters entering the lake by way of the Chicago River would carry into it much filthy matter, either suspended or deposited, notwithstanding the existence of intercepting sewers, but the proposed diversion of such waters before reaching the populated districts will for all time obviate this undesirable occurrence.

> Lowering the level of the North Branch at Bowmanville by its diversion to the lake will be equivalent to raising the low prairie extending towards Evanston and Niles and greatly benefit parts of these towns.
>
> ### The Water Supply.
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> In reaching the conclusion that the sewage of the city should be discharged into the Mississippi Valley the question of water supply is materially simplified, because the lake will then at all times furnish good water wherever intakes are desired for an extension of the works."

The subject-matter of the said report of the Drainage and Water Supply Commission of Chicago, above mentioned, was considered by the General Assembly of Illinois at its session held during the year 1887, but no act was passed. Instead, a committee of the House and Senate was appointed to make further investigations of the subject *ad interim* and to make a report to the 1889 session of the General Assembly. In the meantime, the agitation and demand for a deep waterway to the Gulf of Mexico of a depth not less than 14 feet, depths of 20 to 24 feet being proposed, increased, so that Congress provided in the Rivers and Harbors Act of August 11, 1888, for an engineering survey and report, as follows:

> "And for the purpose of securing a continuous navigable waterway between Lake Michigan and the Mississippi River, having capacity and facilities adequate for the passage of the largest Mississippi River steamboats, and of naval vessels suitable for defense in time of war, the Secretary of War is authorized and directed to cause to be made the proper surveys, plans, and estimates for a channel improvement and locks and dams in the beds of the Illinois and Desplaines rivers from LaSalle to Lockport, so as to provide a navigable waterway, not less than one hundred and sixty feet wide, and

> not less than fourteen feet deep, and to have surveyed and located a channel from Lockport to Lake Michigan, at or near the City of Chicago, such channel to be suitable for the purposes aforesaid; the necessary expenses of such surveys, estimates, plans and location to be paid out of the sum herein appropriated for the improvement of the Illinois River."

Thereafter, and in line with the general plan and program of the defendant, the State of Illinois, and the United States, to enlarge and complete the said Lakes-to-the-Gulf Waterway, the Act of May 29, 1889, was passed, providing for the creation of the defendant District and specifically providing that the canal to be constructed under and pursuant to the act should be of such dimensions and capacity to allow the passage along it of the largest boats, not only then navigating the Great Lakes, but such boats as would probably be used upon the Great Lakes in the future. And the said act provided also for the passage through the said canal from Lake Michigan of a sufficient quantity of water to provide a never-failing water supply for navigation. The said act also provided for the removal of dams constructed by the State in the Illinois River, intending thus to free the Illinois River of such obstructions and to provide free river navigation. The said act substantially carried out the recommendations of the said Drainage and Water Supply Commission concerning navigation between Lake Michigan and the Mississippi River, and relating the protection of the water supply for the people of Chicago. In providing for the construction of said works, the Drainage and Water Supply Commission, the committee above mentioned appointed by the Legislature to investigate and sit *ad interim* as above mentioned, and the General Assembly of Illinois, intended that the works to be constructed for navigation and incidentally to furnish an outlet for the drainage and sewage arising at Chicago, should be of sufficient extent and size to take care of the conditions that might arise in the future.

At the time of the passage of said Act of 1889 making provision for the construction of said works, the General Assembly of Illinois understood that it was acting in pursuance of the Acts of Congress of March 30, 1822, and March 2, 1827, aforesaid, and the various other acts of Congress above mentioned, providing for surveys and reports upon the building of a deep waterway from Chicago to the Gulf of Mexico. At that time and for a great number of years thereafter, the sewage and drainage of metropolitan populations in the United States were disposed of by discharging the same into rivers and streams, wherein the sewage and drainage would be oxidized and purified by what is known as the dilution method of sewage disposal, and no other method was then known or used which could be adapted to the conditions at Chicago.

The said waterway policy of the State of Illinois, then immediately to be carried out under the said Act of May 29, 1889, and future then contemplated legislation, is indicated by the joint legislation of the House and Senate of said defendant State of Illinois, passed on May 28, 1889.

Among other things, the said resolution stated:

> "That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practicable depth and usefulness for navigation from Lake Michigan via the Desplaines and Illinois Rivers to the Mississippi River. * * * That the United States is requested to aid in the construction of a channel not less than 160 feet wide and 22 feet deep with such a grade as to give a velocity of 3 miles per hour from Lake Michigan at Chicago to Lake Joliet, a pool of the Desplaines

River, immediately below Joliet, and to project a channel of similar capacity and not less than 14 feet deep from Lake Joliet to LaSalle, all to be designed in such manner as to permit future development to a greater capacity."

(e) Immediately after the passage of said Act of 1889, the Sanitary District of Chicago was organized by vote of the people, and defendant District continued and completed the surveys for the Main Channel, known as the Sanitary and Ship Canal, extending parallel to and but a short distance from the Illinois and Michigan Canal from the West Fork of the South Branch of the Chicago River, twenty-eight miles, to Lockport, and construction of said canal was immediately commenced, and it was finally completed about the year 1898 with a depth of 24 feet, 160 feet wide in its rock sections and approximately 225 feet in width at the top in the earth sections, and the declivity was such that it was capable of passing through it pursuant to the express provisions of Section 23 of said Act of May 29, 1889, a maximum of 600,000 cubic feet of water per minute, or 10,000 cubic feet per second. Said volume of water was the amount then considered necessary and required for the construction and development of a deep waterway of the depths contemplated through and along the Desplaines and Illinois Rivers to the Mississippi River. The said volume of water is the amount now required for the Illinois Waterway now under construction and hereinafter more particularly mentioned. It was also contemplated that the said volume of water so to pass through said Sanitary and Ship Canal, would reverse at all times the flow of the Chicago River, thus preventing pollution of the water supply of the people of Chicago. At the time the said Sanitary and Ship Canal was laid out and projected, at the time of the passage of the said Act of May 29, 1889, and at the time the construction work on said canal was commenced, it was contemplated and provided that the Chicago River, the South Branch and the West Fork thereof to the northern terminus of said Sanitary and Ship Canal, should be so deepened and widened that the necessary water could pass through same without creating a current injurious to navigation, and of a depth sufficient to accommodate vessels capable of navigating the Great Lakes and the said Sanitary and Ship Canal when constructed. Such intention to so improve the Chicago River and its branches mentioned, and the project therefor, was shown by resolution of the Board of Trustees of defendant district passed April 21, 1891, a copy of which was sent to the Secretary of War and the Congress of the United States. Pursuant to said resolution and other ordinances of said district and the authority of the United States and the State of Illinois, the said Chicago River, its South Branch and West Fork to the northern terminus of said Sanitary and Ship Canal, was deepened from 17 to 26 feet, widened at all points to 200 feet, obstructive center pier bridges were replaced with modern bascule type of bridges, also the bridges over the said Sanitary Ship Canal were built so that they could be moved or swung to permit the free passage of boats, the cost of enlarging Chicago River and its said branches being approximately $13,000,000. During the construction of said Sanitary and Ship Canal, the Congress of the United States was informed, each year, through the Chief of Engineer's reports of the progress of its construction.

Defendant District deepened and widened the South Branch of the Chicago River and the West Fork thereof to the northern terminus of the Sanitary and Ship Canal, as above mentioned. The United States, pursuant to various acts of Congress passed beginning with the year 1892, deepened and widened the Chicago River proper to connect with the said improvement of the South Branch and said West Fork made, and then being carried out by the defendant District. Plans and specifications for the enlargement of said South Branch of the Chicago River were submitted to and approved by the Chief of Engineers and the Secretary of War, and permits were from time to time issued by said Chief of Engineers and Secretary of War authorizing said enlargement and improvement of said river.

May 8, 1899, the Secretary of War, by permit, authorized the opening of said canal and the withdrawal of water through it to its capacity, subject only to limitation of the volume of water in the event a current should be created in the Chicago River, the South Branch and West Fork, unreasonably obstructive to navigation thereon.

Thereupon, pursuant to said permit of May 8, 1899, defendant District, on January 17, 1900, placed in operation the Sanitary and Ship Canal.

At the southern terminus of said Sanitary and Ship Canal, locks have been constructed connecting it with the Illinois and Michigan Canal and with the Illinois Waterway now under construction, and the said Sanitary and Ship Canal has taken the place for navigation of the old Illinois and Michigan Canal between the West Fork of the South Branch and the southern terminus of said Sanitary and Ship Canal. Since the issuance of said permit of May 8, 1899, and the opening of said Sanitary and Ship Canal, appellant District has expended upwards of fifty million dollars in and about the deepening and widening of the South Branch and West Fork of the South Branch of the Chicago River and in the construction and completion of intercepting sewers, pumping stations and diversion works supplementary to the Sanitary and Ship Canal, and in the construction of sewage purification and treatment works used in connection with the maintenance of said waterway.

The enlargement of the said South Branch of the Chicago River and the West Fork thereof, as made by defendant district and the enlargement of the Chicago River as made by the United States, has been such that the volume of water authorized by said permit of the Secretary of War of March 3, 1925, may be withdrawn from Lake Michigan through said river channels without creating a current in said rivers, interfering with navigation or objectionable to the Chief of Engineers and the Secretary of War.

(f) During the years beginning with the year 1899 when the said Sanitary and Ship Canal was completed, up to almost the present time, the Congress of the United States had passed many acts providing for surveys and reports to be made, and such surveys and reports have been made in relation to a deep waterway from the Great Lakes to the Gulf of Mexico, which waterway, according to those surveys and in accordance with the directions evpressly provided by acts of Congress, was to be built with the diversion from Lake Michigan to be used in its operation of at least the amount authorized by said permit of March 3, 1925, and also Congress provided for surveys and reports to be made, and such surveys and reports were made with reference to the construction of what are known as compensatory or regulatory works to be built at the outlets of various lakes for the purpose not only of offsetting for the theoretical effect of the diversion at Chicago, but also for the effect of diversions from Lake Erie by way of the Welland Canal, New York Barge Canal and for power purposes at Niagara Falls.

All the reports made under all the said acts of Congress relating to the construction of compensating or regulating works, which reports were transmitted to Congress, find that the supposed lowering of the water surfaces of the Great Lakes system due to the said diversions, may be compensated for or offset by the construction of either fixed weirs or movable dams at the outlets of Lakes Huron, Erie and Ontario, and recommended that such works be installed. Defendant District a number of years ago offered to defray such expense to offset or compensate for the diversion at Chicago, and in accordance with the condition of said permit of March 3, 1925, it has posted a guarantee of a million dollars with the Secretary of War, as heretofore alleged.

The treaty of January 11, 1909, between the United States and Great Britain relating to Canadian boundary waters, provides that jurisdiction as to the diversions of water from Lake Michigan is reserved to the United States and the various states; that the treaty should have no effect upon diversions from said lake then existing; that the order of precedence of the uses of boundary waters should be:

(1) Uses for domestic and sanitary purposes;
(2) Uses for navigation, including service of canal for purpose of navigation;
(3) Uses for power and irrigation purposes.

Thirty-third: This defendant, further answering, says:

The construction of the said Sanitary and Ship Canal at the time it was projected and being constructed, was known as a great engineering feat, and when said canal was constructed it was the largest artificial canal in the world. The fact that said canal was to be and was being constructed, was known to the people and officials of all the complainant states and to the people of the United States generally. Likewise was known to the same people and persons the purpose of the construction of said canal, namely, as the important link in the deep waterway to the Gulf of Mexico, furnishing by its operation water from Lake Michigan ultimately to its capacity, 10,000 cubic second feet, for the purpose of providing a water supply for the Illinois River and for the operation of the proposed enlarged waterway. The acts of Congress and the surveys and reports made thereunder with reference to the use of the Sanitary and Ship Canal and the water diverted by it for navigation and for sanitary purposes, were likewise known to the complainants and each of them. Yet no one of the said complainants, until the filing of the original bill of complaint herein, made any protest or complaint or instituted any suit with reference to the construction of said Sanitary and Ship Canal and its supplementary works, and permitted the defendant District to expend upwards of ninety millions of dollars in the construction of said works without any objection from said complainants, or either of them. And the said complainants, and each of them, have long acquiesced in the carrying out by these defendants of the plan and program herein mentioned for the construction of said waterway, and in the use of the waters to be diverted for navigation and for sanitary purposes, and are therefore estopped from obtaining any of the relief sought by said amended bill.

Wherefore, this defendant moves that this suit be dismissed because of the laches, acquiescence and estoppel above alleged.

Thirty-fourth: This defendant avers that pursuant to said Acts of Congress hereinabove mentioned, and to said waterway policy of the State of Illinois as expressed by resolutions and acts of its General Assembly, said General Assembly passed an Act entitled:

> "An Act in relation to the construction, operation and maintenance of a deep waterway from the water power plant of The Sanitary District of Chicago at or near Lockport, Illinois, to a point in the Illinois River at or near Utica, and for the development and utilization of the water power thereof;" approved June 17, 1919; in force July 1, 1919.

that under said Act the waterway to be constructed is to be known and called "The Illinois Waterway"; that said Act provided for the route of the said waterway, as stated in the title thereof, from the southern terminus of the Main Channel of the Sanitary District of Chicago at or near Lockport along the Desplaines and the Illinois Rivers to Utica on said latter named river; that the channel of the waterway is to be according to said Act not less than 150 feet bottom width and the minimum depth not less that 8 feet in the earth sections and 10 feet in the rock sections: that the minimum depth over mitre sills not less that 14 feet and minimum width of locks is to be not less that 110 feet with minimum length not less than 600 feet usable length; that the purpose of making the depth over mitre sills not less than the depth provided and the length and width of the locks as stated, was to permit of the enlargement of said waterway to a 14 foot depth; that the diversion of water from Lake Michigan to the amount provided for by said permit of March 3, 1925, is necessary for the operation of said waterway not only at the said depth of 14 feet, but also at the depth of 9 feet, which will be provided by the excavation for said waterway now being carried on; that said diversion to said amount will permit of the extension of said waterway from Utica on said Illinois River to its mouth, and thence along the Mississippi River to Cairo, Illinois, by the United States Government or by said State of Illinois, in conjunction with said Illinois

Waterway construction and said diversion to the amount of said permit is necessary for the construction and operation of said waterway through said Illinois River to the Mississippi River; that in addition, the use of said waters so diverted will permit of the removal of the state dams at Henry and Copperas Creek on the Illinois River and the government dams at Kampsville and LaGrange on the Illinois River, thus permitting navigation on said Illinois River from Utica to its mouth, to be free and unobstructed by locks or dams.

The plans of the State of Illinois for the construction of said Illinois Waterway from the southern terminus of the Sanitary and Ship Canal to the Illinois River at or near LaSalle, Illinois, have been approved by the Chief of Engineers and the Secretary of War, and permits for such construction have been issued by the Secretary of War. The defendant State of Illinois has, pursuant to amendment to its constitution and acts passed thereunder, issued the necessary bonds for the construction of said Illinois Waterway and has in such construction work built certain of the locks of the dimensions above described and has performed a vast amount of other work necessary for the construction of said waterway, and has at this time expended in the construction of said waterway, upwards of $3,000,000.

The said defendant State of Illinois has in the construction of said Illinois Waterway and the expenditure of said moneys therefor, constructed and completed the lock located at Marseilles, Illinois, in the Illinois River, of the dimensions above specified. The said lock provided to be built as above stated at the southern terminus of the Sanitary and Ship Canal to connect with the Illinois Waterway in the Desplaines River, is now 60 per cent completed, and will be entirely completed within the year 1926. Bids have been invited to be received January 6, 1926, for the letting of the contracts for the construction of the dam and lock at Starved Rock, in the Illinois River, of the size and dimensions above described, and the construction of retaining walls in the Desplaines River through the City of Joliet required to be built to carry out said plans for the construction of said Illinois Waterway. The remaining two dams, one at the mouth of the Desplaines River and the other at Brandon's Road Bridge, just south of the City of Joliet, across the Desplaines River, and each of the locks connected with the respective dams, will be placed under construction during the year 1926—all with the approval of and by the authority of, the United States.

Thirty-fifth. This defendant further answering says:

Upwards of forty years ago the defendant State of Illinois constructed two dams with locks in the Illinois River in the reaches of said river immediately south of La Salle, Illinois. One of said dams with its locks was constructed at Henry and the other at Copperas Creek, Illinois. The United States constructed two dams with locks in the lower reaches of the said Illinois River. One of said dams with its lock is located at Kampsville, and the other one is located with its lock at La Grange, Illinois. The United States and the said State of Illinois in constructing said dams, sought thereby to improve navigation in said Illinois River below La Salle, Illinois, for the purpose of enabling the maintenance by the United States and State of Illinois of at least seven feet in depth of water at all points in said river. About the same time, the United States constructed what is known as the Hennepin Canal, extending from the Illinois River at or near Bureau, to Rock Island, Illinois. The project depth of water in said canal for navigation was and is seven feet. Since the construction of the said Sanitary and Ship Canal and the placing of the same in operation, with its diversion of water from Lake Michigan, the said United States and the said defendant State of Illinois, have sought to provide and to so improve navigable conditions upon said Illinois River below La Salle, Illinois, that navigation could be carried on on said river to its mouth without the use of the said dams and locks therein built as aforesaid. The addition to the Illinois River of the amount of water authorized by said permit of March 3, 1925, increases to a number of feet the depths of water in said river for the purposes of navigation, and said water insures better and greater depths for navigation. The said volume of water provided by said permit added to the said Illinois River, increases from three to five feet for navigation purposes the low water depths at the critical points of navigation or where the water is ordinarily shallow. During practically all of each year when navigation is carried on upon the Illinois River, the said additional water authorized by said permit makes it possible for boats navigating the said river to pass over said dams without being required to consume the time necessary in passing through the locks adjacent to said dams. Thereby navigation is greatly facilitated. The addition of said volume of water has made it possible and will make it possibe to maintain said project depths in said Illinois River without the expenditure of the amount of money for dredging that would be required if said volume of water authorized by said permit were not in said river. The said volume of water provided by said permit added to the Mississippi River below the mouth of said Illinois River, materially increases the navigable depths of water in said river, and insures and makes more easy the maintenance of the project depths fixed by the Congress of the United States for navigation in said river. From the mouth of the said Illinois River to Cairo, Illinois, the low water depths in said Mississippi River are increased and will be increased thereby at low water times upwards of one foot, and in greater amounts at certain so-called critical points of navigation. The said volume of water also increases the depths for navigation in said Mississippi River at various points below Cairo, Illinois.

The natural run-off of the drainage area of the said Illinois River produces, when delivered to said Illinois River, variable volumes of water. At times the volume of water flowing in said Illinois River in a state of nature, did not exceed 500 cubic feet per second, and at times it has been known to be higher than 100,000 cubic feet per second. To maintain depths for navigation and insure such depths to persons navigating said Illinois River, it is necessary and required that a volume of water such as the amount authorized by said permit of the Secretary of War be added to the natural and ordinary flow in said river for and in the interest of navigation and interstate commerce. The said volume of water added when the run-off is great is but a small percentage of the total amount, but when the run-off is slight, said added volume from Lake Michigan provides better and greater depths for navigation than would exist if said volume of water were not turned into said Illinois River.

The addition of said volume of water, authorized by said permit, to the Desplaines River, also increases by upwards of one foot and a half, the project depth of water in said Illinois Waterway now under construction between the southern terminus of the Sanitary and Ship Canal to the Illinois River at La Salle, Illinois. It will not be practicable or feasible to construct and maintain a waterway from the southern terminus of the Sanitary and Ship Canal to the mouth of the Illinois River of nine feet depth to connect with waterways of similar depth in the Ohio River and in the Mississippi

River, without the use of substantially the volume of water authorized by said permit of March 3, 1925.

The amount of water authorized by said permit of March 3, 1925, improves and facilitates navigation and makes navigation more convenient upon the said waterway extending from Lake Michigan on the Chicago River, its South Branch and the West Fork of its South Branch, on the Sanitary and Ship Canal, on the Illinois and Michigan Canal and therefrom upon the Illinois River to the Mississippi River, and upon the Mississippi River substantially to its mouth.

Thirty-sixth. This defendant avers that in addition to the sewage and drainage of Chicago and its environments, being that arising within the limits of the territory of the defendant Sanitary District, there are many cities, towns and villages located upon the Desplaines and Illinois Rivers, such as Joliet, Morris, Ottawa, La Salle, Peru, Bureau, Peoria, Pekin and Beardstown, and many others whose sewage, drainage and wastes are discharged into said Desplaines and Illinois Rivers; that the volume of water authorized to be withdrawn, and under the conditions imposed, by said permit of March 3, 1925, is necessary and required for said Desplaines and Illinois Rivers, in order that the sewage, drainage and wastes now being discharged into said rivers, may be oxidized and diluted so that the said Illinois River may thereby be maintained in such condition that navigation may be carried on thereon conveniently and without injury to the health of the persons so navigating said river, and that fish life may be preserved in said river, and that the health of people residing along said rivers may not be injured; that the withdrawal of said water, in the amount and under the conditions provided by said permit, is required in order that navigation may be carried on upon the Chicago River, its North Branch, South Branch and

West Fork, and on the Sanitary and Ship Canal, without inconvenience or injury to the health of persons navigating same; that if the said volume of water were not withdrawn from Lake Michigan, or if an amount materially less than said volume were so withdrawn the said Chicago River, its North Branch, South Branch, West Fork, the Sanitary and Ship Canal, the Illinois and Michigan Canal, the Desplaines River and the Illinois River would be in such condition that noisome and disagreeable odors would arise therefrom, disease breeding conditions would exist, the health of people residing along same would be injured and navigation thereon could not be carried on with any convenience, if at all, and fish life in said Illinois River would be absolutely destroyed; that, furthermore, at times the Chicago River would flow into Lake Michigan, carrying with it its sewage and drainage pollution, polluting Lake Michigan, injuring navigation thereon and injuring the health of the people using Lake Michigan for a water supply; that within the period of said permit, to-wit, December 31, 1929, it would be impossible for the people residing within the limits of the defendant District or the people residing along the said Desplaines and Illinois Rivers, to so artificially treat or purify the sewage arising from said cities, towns and villages, that there would not be required to be withdrawn from Lake Michigan to the said Desplaines and Illinois Rivers substantially the amount fixed by said permit.

Thirty-seventh. This defendant avers that in issuing the said permit of March 3, 1925, the Secretary of War was acting pursuant to the authority granted by the Rivers and Harbors Act of March 3, 1899, in the regulation of interstate commerce and that the said Secretary's action in issuing said permit was pursuant to said act and was connected with the regulation of interstate commerce.

Thirty-eighth. This defendant further avers that the improvements made by the United States of said harbors mentioned in said amended bill, the original depth of water, the project depth as provided by the United States, and the present depth of water in said harbors, and other facts relating thereto are as follows:

WISCONSIN HARBORS.

Marinette Harbor.

Marinette, Wisconsin, is located across the Menominee River from Menominee, Michigan. Both cities, industrial plants and persons, firms and corporations desiring water communication or transportation use the Menominee River as their inner harbor. This river discharges into Green Bay, about 16 miles northwesterly from the mouth of Sturgeon Bay. The river is navigable only to a dam about two miles above its mouth. It is this portion that forms said inner or commercial harbor for said two cities. The United States has improved the inner harbor as well as the outer harbor by various works.

Originally, the outer harbor and the Menominee River were shallow, the depth of water therein being only a few feet. The first improvements made by the United States were conducted separately as to Menominee Harbor and Menominee River. The original project for the harbor was provided by the Act of Congress of March 3, 1871. Under this Act two parallel piers 400 feet art were constructed and a channel 13 feet deep was provided. The Act of Congress of September 19, 1890 provided for the increase of said depth to 15 feet and the Act of March 3, 1899 increased it to 18 feet. The Act of Congress of September 19, 1890, as modified by the Act of July 13, 1892, and by the Act of June 3, 1896, provided for a project depth of channel of 15 feet, with a turning basin at the upper end of said commercial harbor. By the Act of Congress of June 13, 1902, the improvement of the harbor and river was consolidated and by the Act of March 4, 1913, the said harbor was improved to an 18-foot depth, including also a large portion of the inner harbor. The project depth of water, as provided by the acts of Congress for both the harbor and the river, so far as it is navigated, was and is 18 feet, which depth has been and is maintained. The total amount expended by the United States in the improvement of said harbor and river, to and including the year 1924, is the sum of approximately $552,820. Since the opening of the Sanitary District channel, January 17, 1900, there was expended in the improvement and maintenance of said harbor and river approximately the sum of $228,170.

Green Bay Harbor.

Said harbor comprises the Fox River, below De Pere, Wisconsin, a section about six and one-half miles long, discharging into the southern end of Green Bay, about one mile below the City of Green Bay, and an entrance channel about four and one-half miles long dredged through the shoals in the head of the bay from the river mouth to 19 feet depth in Lake Michigan. In the river, the lower three miles, extending through the City of Green Bay, is a naturally deep pool, requiring no improvement, and the upper three and one-half miles, thence to De Pere is a dredged channel connecting at its head with a turning basin at De Pere. Originally, and before the United States made improvements in this harbor, Green Bay was narrow and tortuous, with an available depth of about 10 feet, and the entrance was blocked by Grassy Island situated about one and one-half miles out from the river mouth. The improvement was begun by the United States under a plan adopted by the Act of Congress of June 23, 1866. This Act provided for dredging an outer channel 11 feet deep, including a cut with revetted sides through Grassy Island. This project depth was increased by Act of Congress of June 23, 1874, to 13 feet, and by the Act of Congress of July 13, 1892 to 15 feet. The latter act also adopted a project for the inner channel for a depth of 11 feet, which was increased by the Act of Congress of June 3, 1896 to 15 feet. This work was completed in 1899. The Act of Congress of June 13, 1902, provided for the maintenance of the existing works and the 15-foot channel in Fox River below De Pere, and for a channel 18 feet deep from the mouth of Fox River to that depth in Green Bay. The Act of Congress of June 25, 1910, provided for a turning basin at the upper end of the river channel at De Pere to be 15 feet deep and of sufficient area to permit vessels not exceeding 350 feet in length to turn readily without the assistance of a tug. All this work was completed about the year 1910 and has been maintained to the project depths above mentioned and the actual depth of water has been and is the amount provided for by said improvement projects. The total expenditure made by the United States in the improvements above mentioned of the said harbor, to and including the year 1924, is approximately the sum of $945,078.39, of which amount $557,028.39 has been expended since the date of the opening of the Sanitary District main channel.

Sturgeon Bay Harbor.

Originally, and before the United States commenced improving this harbor, navigation was controlled by a depth of water of about eight feet over a shoal guarding the entrance to the harbor. Sturgeon Bay is entered by means of the Sturgeon Bay and Lake Michigan Ship Canal. This canal is a revetted canal connecting Lake Michigan and Sturgeon Bay. A basin having an area of about 12 acres enclosed by breakwaters is located at the Lake Michigan end of the canal, and there is a dredged channel connecting the western end of the canal with deep water in Sturgeon Bay. The canal and connecting channel form a through waterway from Lake Michigan to Green Bay, Sturgeon Bay being an arm of the latter, and said canal thereby shortens the distance of vessels plying between Green Bay ports and those on the shores of Lake Michigan to the southward. The port and City of Sturgeon Bay is located on both sides of the bay about four miles northwesterly from the canal, the population of said city being about 4,500.

By an Act of Congress of April 10, 1866, 200,000 acres of public lands of the United States were granted to the State of Wisconsin for the purpose of aiding said State in constructing and completing a breakwater and harbor, and a ship canal connecting the waters of Green Bay with the waters of Lake Michigan. Sturgeon Bay and Lake Michigan Ship Canal and Harbor Company, organized pursuant to acts of the Legislature of Wisconsin, between 1872 and 1881, constructed a canal without locks or gates 7,200 feet long and 100 feet wide at water surface and 14 feet deep below mean level, and in continuation of the canal, dredged a channel in Sturgeon Bay 6,100 feet long of about the same dimensions as the canal. Works constituting what is known as a harbor of refuge at the Lake Michigan entrance to the canal were constructed by the United States. The River and Harbors Act of Congress of July 13, 1892, provided for the acquisition of the canal by the United States, pursuant to which the United States assumed control on or about April 25, 1893, and the United States paid for said canal and works the sum approximately $81,333. By the Act of Congress of June 13, 1902, the canal and harbor of refuge projects were consolidated. The said Act of June 13, 1902 also provided for a depth in the canal and throughout the entire waterway of 19 feet—that is, from Lake Michigan through said canal into and throughout said Sturgeon Bay. This work was completed in 1904. The Act of March 2, 1919, provided for the formation of the turning basin near the westerly end of the revetted canal, and the work was completed in 1919. The present operations consist in maintaining the said works with a depth of 19 feet throughout. The United States has maintained and is maintaining the depth of water for navigation throughout said works at 19 feet and the actual depth of water has been and is said amount. The total expenditures made by the United States in the improvements above mentioned of the said harbor to and including the year 1924, is approximately $759,614.21, of which amount $444,281.21 has been expended since January 17, 1900. An additional operation expense up to and including March 4, 1915, of $396,559.61, has also been expended by the Government.

Algoma Harbor.

This harbor is at the mouth of the Ahnapee River. Originally, and before the United States entered upon the improvement of said harbor the depth of water at its entrance was three feet, and within the harbor about 500 feet from its entrance was a stone ledge with a depth of water over if of about four feet. The Acts of Congress of March 3, 1871, March 3, 1873, March 3, 1875, July 5, 1884 and March 3, 1899 provided for and resulted in the construction of two piers extending into Lake Michigan at the mouth of the river and the dredging of a channel 11 feet deep between the piers, extending approximately 1,500 feet inside the river mouth. The Act of March 2, 1907 provided for the construction of an outer harbor with a depth of 14 feet in the harbor and the channel above described between said piers and inside the river mouth. The present work of the Government consists in maintaining same. The depth of water is the project depth above mentioned, and is and has been maintained by the United States. The United States has expended in the construction and maintenance of its works in said harbor, approximately the sum of $359,777.21, of which sum $186,777.21 has been expended since the opening of The Sanitary District's main channel.

Kewaunee Harbor.

In 1880 the Kewaunee River flowed about due south toward Kewaunee, and made a sharp bend in Kewaunee and thence flowed northward parallel to Lake Michigan about 300 feet therefrom for a distance of about 2,000 feet to its mouth, which was about 25 feet wide and had a depth of about three feet. Under the Act of Congress of March 3, 1881, a channel 13 feet deep, the project depth, was cut through the above mentioned bend in said river and extended into Lake Michigan between parallel piers which form the present harbor entrance. The natural mouth of the river is closed and the part of the old river bed which led northward to the natural mouth is a portion of the inner harbor. This project was completed in 1898. Under the Act of Congress of June 25, 1910, the depth of water in said entrance channel was increased to 18 feet, with a turning basin of the same depth made by cutting off part of the point of land included between the old and the present river channels. Said depth of water has been and is maintained by the United States. The United States has expended, in the construction and maintenance of said works, approximately the sum of $323,800, of which said sum approximately $173,800 has been expended since the opening of the Sanitary District channel in 1900.

Manitowoc Harbor.

This harbor is located at the mouth of the Manitowoc River. Originally, and before the United States improved said harbor, a bar over which there was only four feet of water, obstructed the entrance. The depth of water in the river for a short distance from its mouth was about 10 feet. Under the Act of Congress of August 30, 1852, two parallel piers were constructed extending into Lake Michigan on either side of the mouth of the Manitowoc River, and a channel between said piers approximately 10 feet deep was dredged to connect the said river and lake. Under the Acts of Congress of March 3, 1881, September 19, 1890, June 3, 1896 and June 13, 1902, the piers were extended and the channel depths were increased to 18 feet and a breakwater was also constructed 800 feet long. The entire project was completed in 1903. Under the Act of Congress of March 2, 1907, it was provided that the channel between said piers and up said river for a short distance should be maintained at 18 feet in depth, and under said act there was constructed a stilling basin at the harbor entrance. This was completed in 1910. The present work consists in the maintenance of said works. The United States has maintained and is maintaining the said harbor at the above mentioned project depth, and it has expended in the construction and maintenance of said works, approximately the sum of $1,062,060, of which said sum there has been expended, since the opening of the Sanitary District channel in 1900, the sum of $691,800.

Sheboygan Harbor.

This harbor is located at the mouth of the Sheboygan River. In its original condition the entrance to the harbor was guarded by a bar over which there was only three to four feet of water. Before the United States assumed control of said harbor, Sheboygan built two parallel piers 175 feet apart, extending into Lake Michigan at the mouth of the Sheboygan River, and it dredged a channel between them approximately 12 feet deep. Under the Acts of Congress of June 23, 1866, March 3, 1873, March 3, 1881, August 18, 1894, March 3, 1899 and June 13, 1902, the piers were extended several times, the width between them increased, the project depth increased by stages to 19 feet and a north breakwater was constructed 600 feet long. This work was completed in 1904. The Act of Congress of March 2, 1907, provided for maintaining a 19-foot channel and works between said breakwater and in said river and for extending the north breakwater shoreward; for building a south breakwater; and for removing the outer portions of the piers for the purpose of forming a stilling basin. This was completed in the year 1915. The United States is and has been maintaining said harbor works at said project depth and has expended in the construction and maintenance of said works approximately the sum of $1,091,268.12, of which amount it has expended since the opening of said drainage channel the sum of $696,819.21.

Port Washington Harbor.

This is an artificial "Y" shaped harbor consisting of a dredged and jettied entrance channel and two dredged basins. Prior to the time when the United States improved said harbor the depth of water was but a few feet. By the Acts of Congress of July 11, 1870, and August 14, 1876, two parallel piers were constructed into the lake and two basins forming the present harbor were excavated inside the shore line and dredging between the piers and in the basin was done to a depth of 11 feet. This improvement was completed in 1895. By the Act of Congress of June 25, 1910, the project depth in the channel and basins was increased to 16 feet and the work of the United States is now confined to maintenance of said depth and works. The United States has maintained and is maintaining said project depth of water and has expended in the construction and maintenance to the year 1924 the sum of approximately $269,400, of which sum approximately $74,900 has been expended since the opening of said drainage channel.

Milwaukee Harbor.

The natural mouth of the Milwaukee River was about 3,000 feet southerly from the present artificial outlet and the depth of water at the mouth of said river prior to the time the United States improved said harbor was approximately 4½ feet. The said artificial outlet was formed by the construction of piers and dredging between them and thence through the low and narrow neck of land that separated the river and lake at this point. The Milwaukee River flowing down from the north is joined about five-eighths mile above the inner ends of the piers by the Menomonee River, entering from the west, and, about 3,000 feet south of the piers, where the natural mouth formerly discharged. The Kinnickinnic River empties from the south. The channels of said rivers are narrow, tortuous and not provided with turning basins; and navigation thereon is difficult. For a short distance in said river channels there has been maintained a depth and is now maintaining a depth of water of approximately 19 feet. The Act of Congress of

March 3, 1843, and the Act of Congress of August 30, 1852, provided for improving the original mouth by parallel piers and dredging and the formation of the jettied channel at the present outlet of 11 feet depth. The Act of April 10, 1869, provided for pier extensions. The Act of March 3, 1899, provided for the deepening of the channel between said piers and to the Milwaukee River to 19 feet as the project depth. The Act of Congress of March 2, 1907, provided for the maintenance of the 19-foot entrance channel to the said Milwaukee River, rebuilding certain piers and doing other work. This work was completed in 1910. The harbor of refuge was adopted by the United States under the Act of Congress of March 3, 1881. The breakwater for said harbor of refuge was extended under said Act of 1907, 1,000 feet south. The Act of June 13, 1902, consolidated the work on the project for the harbor of refuge with the project for the Milwaukee outer and inner harbors. The Acts of Congress of June 25, 1910, provides for the improvement of the river channels, construction of turning basins and the maintenance of all channels to 19 feet; also for the widening of the river channels. This work has not been completed owing to the failure of the City of Milwaukee to perform certain conditions necessary to make available the appropriation for said work by the United States. The United States has maintained and is maintaining said project depth of 19 feet in the said outer and inner harbors and has expended in the construction and maintenance of said works at said harbor the sum of approximately $3,979,475.36, of which said sum there has been expended by it $2,828,650 since the opening of the main channel of the Sanitary District.

Racine Harbor.

This harbor is located at the mouth of Root River. Originally the discharge of the river was variable and the depth of water at the lake outlet was from 2 to 3 feet, which was increased by freshets to approximately 7 feet, and at times there was absolute closure. Prior to the year 1844 local enterprise in participation with the United States government improved this harbor, which consisted of a channel approximately 10 feet deep between piers 160 feet apart. By the Act of Congress of June 23, 1866, the piers were extended and the channel between them was deepened to the project depth of 14 feet. By the Act of March 3, 1899, the channel was widened and the depth was increased to the project depth of 19 feet, and by the Act of June 13, 1902, a breakwater was constructed 600 feet long. The said projects were completed in 1905. The Acts of Congress of March 2, 1907, and June 25, 1910, provided for the maintenance of the 19-foot entrance channel and works incident thereto; for the formation of an outer harbor or wave-stilling basin by extending the old north breakwater to the shore line and removing the outer portion of the north pier, also for constructing a south concrete breakwater and removing the present south pier. Work upon the breakwater was commenced in 1916 and was completed in 1919. The United States is maintaining and has maintained the project depth of 19 feet in said harbor and channels and has expended in the construction and maintenance of said harbor approximately the sum of $1,329,742.21, of which said sum there has been expended $992,957.21 since the opening of the drainage channel.

Kenosha Harbor.

This harbor is located at the mouth of Pike Creek. Originally at the discharge of Pike Creek the depth of water was approximately 2 feet. By the Act of Congress of August 30, 1852, a channel 10 feet deep between two parallel piers 150 feet apart and said piers were constructed to the outlet of Pike Creek. By the Act of Congress of June 23, 1866, the depth of said channel was increased to 14 feet and by the Act of Congress of September 19, 1890, the basin or inner harbor was dredged to said depth. By the Act of Congress of March 3, 1899, the north pier to widen the channel was removed and rebuilt and the channel and basin was dredged to a depth of 19 feet and 18 feet, respectively; and, also, a breakwater 600 feet long was constructed. This work was completed in 1900. By the Act of Congress of March 2, 1907, the landward end of the breakwater was extended 200 feet and the maintenance of the 19 feet entrance channel and the basin 18 feet in depth was provided for. The United States has been and is maintaining the said project depth of water in said harbor and has expended in the said improvement the sum of approximately $681,807.41, of which said sum $382,500 has been expended since the opening of the drainage channel.

Superior Harbor or Bay.

The harbor of Duluth, Minnesota, and Superior, Wisconsin, have been for a number of years treated by the United States and Congress as one harbor. The work of improvement of the harbor of Duluth and Superior was combined as one project in the River and Harbor Act of Congress of June 3, 1896. Said harbor embraces all the navigable waters lying inside of Minnesota point and along the fronts of the cities of Duluth and Superior and includes the Duluth Canal, Superior Entry, Superior Bay, Allouez Bay, St. Louis Bay, and St. Louis River, for a certain distance from its mouth. The bays were originally and before improvement expanses of shallow water with a general depth of only 8 to 9 feet. The United States began the improvement of Superior Entry in 1867 and its operations at Duluth in 1871. The Duluth Canal was cut through Minnesota point by the City of Duluth in 1870 and 1871 and in 1873 its maintenance and improvement were undertaken by the United States providing an inner harbor of easy access in place of the exterior harbor which was formed by breakwater theretofore constructed by the United States. The project of the United States of 1883 completed in 1887, provided 16 feet depth of water for navigation through the two entries in Duluth harbor basin and in channels paralleling dock lines of Superior and St. Louis Bays and up St. Louis River. The depth of water at some points has been and is maintained by the United States at 20 feet and at other points in said harbor the depth of water is greater. The United States has expended in the improvement of said harbor approximately the sum of $8,466,528, of which said sum there has been expended since the opening of the drainage channel approximately $5,661,695.

Ashland Harbor.

This harbor is located near the head of Chequamegon Bay. The natural depth of water in said harbor to the lower docks is approximately 19 feet. Under an Act of Congress passed, August 5, 1886, a breakwater was constructed and a channel was dredged along the dock front. In 1896 the United States established a harbor line along the city front at a distance of approximately 2,000 feet from the shore line and in 1897 dredged a channel 20 feet deep outside the harbor line. In 1903 and in 1907 the United States extended said channel.

The depth of water provided by the improvement projects of the United States in said harbor is approximately 20 feet, which depth has been provided and is maintained by the United States. The United States has expended in the improvement and maintenance of said harbor works $683,500, of which said sum $444,000 has been expended since the opening of the drainage channel.

Washburn Harbor.

This harbor is located on the west side of Chequamegon Bay and about 4½ miles north of Ashland and is a part of Ashland harbor, and the depth of water in said harbor is less than that maintained in Ashland harbor, above mentioned. The depth of water in said harbor, as it now exists, has been created by the appropriations and expenditures made by the United States in dredging and improving said harbor.

MINNESOTA HARBORS.

Grand Marais.

This harbor is situated on the north shore of Lake Superior, 106 miles northeasterly from Duluth. It is a bay one-half mile long, and one-fourth mile wide, with a natural opening of 1,035 feet, reduced by breakwaters to 480 feet, and with an area of 61 acres. Originally there was a maximum depth of 14 feet over a very limited area, the general depth being from 8 to 9 feet at mean low water.

The existing project contemplates dredging an anchorage area of 26 acres to a depth of 16 feet, and certain other protected works. See River and Harbor Act of March 3, 1879 (H. Ex. Doc. No. 75, 43d Cong. 2d Sess.).

The United States has maintained and is maintaining said project at the depth of 16 feet and has expended in the construction and maintenance of said works at said harbor the sum of approximately $203,350, of which sum there has been expended by it $177,350 since the opening of the main channel of the Sanitary District.

Agate Bay.

This harbor is situated on the north shore of Lake Superior, 26 miles northeast from Duluth. It is a natural bay or indentation three-fourths of a mile long by one-half mile wide, protected by breakwaters. The original depth was ample for navigation, with 18 feet at mean low water, over the greater portion of its entire area of 109 acres.

The existing project was adopted by the River and Harbor Act of August 5, 1886 (H. Ex. Doc. No. 94, 48th Cong., 2d Sess.); the construction of two breakwater piers was approved by the Secretary of War January 4, 1887.

The United States has maintained and is maintaining said project of 18 feet in the said harbor and has expended in the construction and maintenance of said works the sum of approximately $275,708, of which said sum there has been expended by it $257,208 since the opening of the main channel of the Sanitary District.

OHIO HARBORS.

Toledo.

Toledo Harbor comprises the lower 7 miles of Maumee River and the channel about 9 miles long through Maumee Bay to Lake Erie, and has a width of from 650 to 1,800 feet in the river and of 400 feet in the bay. The harbor is located at the westerly end of Lake Erie, 99 miles westerly from Cleveland. Originally the general depth in Maumee Bay was about 10 feet below low water datum, but frequent shoals with a minimum depth of 6.5 feet rendered navigation difficult. A well defined channel existed in Maumee River. For about 6 miles above the mouth of the river the minimum depth of this channel was 12 feet. Improvement projects were adopted by the River and Harbor Acts of June 23, 1866, July 5, 1884, August 5, 1886, July 13, 1892, and August 18, 1894, and the existing project adopted in 1899 provides for a channel 400 feet wide and 21 feet deep from deep water in Lake Erie through Maumee Bay and Maumee River to Fassett Street Bridge, a distance of 15 miles; thence 200 feet wide and 19 feet deep for a distance of 1 mile. Ordinary fluctuations of water level vary from 4 feet above to 2 feet below low-water datum, and extreme fluctuations, produced by winds and other causes, are from 9 feet above to 6.5 feet below that plane.

The existing project was adopted by the Act of March 3, 1899 (H. Doc. No. 198, 55th Cong. 2d Sess.).

The United States has been and is maintaining the said project depth of water in said harbor and has expended in the said improvement and its maintenance the sum of approximately $3,538,700, of which said sum $1,759,500 has been expended since the opening of the Drainage Channel.

Port Clinton.

Port Clinton Harbor comprises the lower half mile of the Portage River, which empties into Lake Erie at a point 72 miles westerly from Cleveland. It is from 200 to 300 feet wide. Originally the natural depths in the Portage River varied from about 10 feet near its mouth to 6 feet at Oak Harbor, about 12 miles above the mouth. The channel varied 50 to 150 feet. Prior to improvement little use was made of the river for navigation purposes, for the reason that its mouth was partially obstructed by a sand bar, over which the depth was variable, but seldom more than 5 feet.

The existing project adopted by River and Harbor Act of June, 1872, provides for the dredging of a channel to a depth of 10 feet and certain other collateral works. The United States has been and is maintaining said project depth of water in said harbor and has expended in said improvement the sum of approximately $109,089.69, of which said sum $17,089.69 has been expended since the opening of the Drainage Channel.

Sandusky.

Sandusky Harbor is located in the southeasterly portion of Sandusky Bay, a natural harbor some 22½ square miles in area, which opens into Lake Erie, and is 55 miles by water westerly from Cleveland. It comprises the channel through the outer bar and through the bay, a distance of about 3 miles, and along the city front, which is developed for a distance of about 1½ miles. Originally Sandusky Bay was generally about 10 feet deep below low-water datum, but shoal areas reduced the available depth for vessels approaching the city to a minimum of 7 feet. The existing project provided for a channel 400 feet wide and 21 feet deep from deep water in Lake Erie through Sandusky Bay; reduced to a 20-foot depth and 300 feet width along the city front.

The existing project was adopted by the following River and Harbor Acts: March 3, 1899, March 2, 1919.

The United States is maintaining and has maintained project depth of 20 and 21 feet in this harbor and channel and has expended in the construction and maintenance of said harbor approximately $1,961,039.45, of which said sum there has been expended $1,345,847.45 since the opening of the Drainage Channel.

Huron Harbor.

Huron Harbor is located at the mouth of Huron River which flows into Lake Erie 47 miles by water westerly from Cleveland. It comprises the lower mile of Huron River, from 150 to 300 feet wide; an outer harbor somewhat triangular in shape, 14 acres in area, about 1,000 feet long and from 300 to 900 feet wide, and a channel of approach from deep water to the entrance between the pierheads, about 2,000 feet long and 300 feet wide. Natural depths in Huron River were about 18 feet below low water datum for about one mile above its mouth thence to Milan, the head of navigation, 10 miles above the mouth, there was an available depth of about 8 feet. The channel had a general width of about 100 feet. The mouth of the river was, however, closed by a sand bar, which prevented entrance during the greater part of the time. The present project provides for the dredging of an area of about 14 acres sheltered by a pier and jetty to a depth of 19 feet, and has been prosecuted under acts of Congress of March 3, 1905 and March 2, 1919.

The United States has been and is maintaining project depth of 19 feet in Huron Harbor and has expended in construction and maintenance approximately the sum of $663,273.71, of which sum there has been expended $465,862.33 since the opening of the Drainage Channel.

Vermilion.

Vermilion Harbor is located at the mouth of Vermilion River, which empties into Lake Erie at a point 37 miles by water westerly from Cleveland. It comprises the lower 3,000 feet of Vermilion River, which is about 125 feet wide, and a channel of approach from the lake about 500 feet long and 100 feet wide.

Only the lower reach of the river, about 1 mile in length had sufficient natural depth to accommodate even small craft. For about 3,000 feet above the mouth the river channel was 75 feet wide and from 6 to 10 feet deep below low-water datum, but the mouth itself was obstructed by a sand bar, over which the usual depth was about 2 feet. The existing project provides for dredging a channel to a depth of 12 feet below low-water between the piers and beyond them to deep water in the lake. This project was adopted by the following River and Harbor Acts, to-wit: July 4, 1836 and March 3, 1875, (authorizing 12 feet depth).

The United States has maintained and is maintaining project depth of 12 feet in said Harbor and channel and has expended in the construction and maintenance of said Harbor approximately $177,622.73, of which sum there has been expended $46,245.18 since the opening of the Drainage Channel.

Lorain.

Lorain Harbor is located at the mouth of Black River, which flows into Lake Erie 28 miles by water westerly from Cleveland. It comprises an outer harbor formed by breakwaters, which is some 60 acres in area, about 1,900 feet long, with an average width of 1,450 feet, and the lower three miles of Black River, which is from 160 to 350 feet wide. Originally a natural channel about 100 feet wide and 8 to 13 deep below low-water datum extended from the mouth of the river upstream for about 3 miles. The mouth of the river was, however, obstructed by a sand bar, over which the depth was usually about 3 feet. The original improvement project was adopted by the River and Harbor Act of May 23, 1828, and the existing project by acts of March 3, 1899, March 2, 1907, and August 8, 1917, providing for an outer harbor about 60 acres in area formed by converging rubble-mound breakwaters and an entrance 500 feet wide between pier heads of timber cribs with concrete superstructure located at the outer ends of the breakwaters, and certain other works including dredging the outer harbor and channel 250 feet wide to a depth of 20 feet.

The United States is maintaining and has maintained project of 20 feet in said harbor and channel and has expended in the construction and maintenance of said harbor approximately the sum of $1,306,854.77, of which sum there has been expended $964,560.40 since the opening of the Drainage Channel.

Cleveland.

Cleveland Harbor is on the south shore of Lake Erie at the mouth of the Cuyahoga River, 176 miles by water southwesterly from Buffalo, N. Y. The harbor comprises the lower 5½ miles of Cuyahoga River, which is from 150 feet to 325 feet wide; the "Old River", which is about one mile long and an outer harbor formed by breakwaters, which is about five miles long and from 1,600 to 3,800 feet wide. The river near its mouth was about 15 feet deep at ordinary stage, but was obstructed by a sand bar over which a depth of about three feet only was available. The old mouth was about 700 feet west of the present outlet. Little use was made of the river for purposes of navigation. Improvements have been made under acts of Congress of March 3, 1825, June 23, 1866, March 3, 1875, August 5, 1886, and August 11, 1888, and the existing projects under acts of June 3, 1896, March 3, 1899, June 13, 1902, July 27, 1916, and August 8, 1917, providing for, among other things, the formation of an outer harbor 5 miles long and 1,600 to 2,000 feet wide, 19 feet deep, with provisional dredging to 23 feet. The River and Harbor Act of August 8, 1917, appropriated $5,000 to enable the United States to co-operate with the City of Cleveland in the preparation of final plans for the improvement of the Cuyahoga River, with the provision that the Government's share in the cost of improvement, in accordance with the final plans adopted, shall not exceed $400,000. (Final plans have not been adopted to July 1, 1924.)

The United States is maintaining and has maintained a project depth of 19 feet in said harbor and channel and has expended in the construction and maintenance of said harbor and works approximately the sum of $7,970,566.60, of which said sum there has been expended $5,397,899.83 since the opening of the Drainage Channel.

Fairport.

Fairport Harbor is located at the mouth of the Grand River, which empties into Lake Erie, 33 miles by water, easterly from Cleveland. It comprises an outer harbor some 40 acres in area, 1,600 feet long with a maximum width of 1,800 feet and an average width of 1,100 feet, and the lower mile of Grand River, which is from 180 to 300 feet wide. The outer harbor will be increased to 65 acres when work under the existing project is completed. The original channel in the Grand River extended about 2 miles above the mouth. It was 75 feet wide and 6 to 8 feet deep at low-water datum. The mouth of the river was, however, entirely closed by a sand bar during the greater part of each year.

The original project was adopted by the River and Harbor Act of March 3, 1825, and modified by the River and Harbor Act of May 20, 1826. The existing project calling for a harbor 19 feet deep was provided for in the Acts of March 3, 1905 and March 2, 1919.

The United States is maintaining and has maintained project depth of 19 feet in said harbor, and has expended in the construction and maintenance of said harbor approximately $1,459,275.08, of which said sum there has been expended $947,758.93 since the opening of the Drainage Channel.

Ashtabula.

Ashtabula Harbor is located at the mouth of Ashtabula River, which flows into Lake Erie, 59 miles by water easterly from Cleveland. It comprises the lower 1¾ miles of the river, which is from 150 to 300 feet wide, and an outer harbor protected by breakwaters, which is some 175 acres in area, about 3,600 feet long and 2,100 feet wide. In its natural condition the Ashtabula River was little suited to the requirements of navigation. A narrow channel with an available depth of 4 feet below low-water datum extended for about 2 miles above the month of the river, but the month itself was obstructed by a sand bar over which the depth was usually but 2 feet, overlying shale rock which was encountered at a minimum depth of 5 feet below low-water datum. The original project was adopted by the River and Harbor Act of May 20, 1826, and was modified by the River and Harbor Acts of March 3, 1829, July 3, 1832, March 2, 1867, June 10, 1872, March 3, 1881, and July 8, 1890. The existing project was adopted by acts of June 3, 1896, March 3, 1905, June 25, 1910, and March 2, 1919, which provides among other things for an outer harbor 20 feet in depth.

The United States is maintaining and has maintained project depth of 20 feet in said harbor and has expended in the construction and maintenance approximately the sum of $2,397,074.31, of which said sum there has been expended $560,106.40 since the opening of the Drainage Channel.

Conneaut.

Conneaut Harbor is located at the mouth of Conneaut River which flows into Lake Erie 73 miles by water easterly from Cleveland. It comprises the lower 300 feet of Conneaut River, which is from 200 to 400 feet wide, and an outer harbor some 200 acres in area formed by breakwaters. The outer harbor is about 4,000 feet long and 2,000 feet wide. Conneaut River was but little suited to the requirements of navigation. A channel about 13 feet deep below low-water datum and 75 feet wide extended for about one-half mile above the mouth of the river, but the mouth itself was obstructed by a sand bar over which the depth was usually about 2 feet. Improvements have been prosecuted under acts of March 2, 1829, July 13, 1892, February 24, 1893, and March 24, 1896. Later acts providing for an harbor 20 feet deep were adopted July 25, 1910, and August 8, 1917.

The United States is maintaining and has maintained project depth of 20 feet in said harbor, and has expended in construction and maintenance of said harbor approximately the sum of $1,966,865.59, of which said sum there has been expended $1,629,383.57 since the opening of the Drainage Channel.

PENNSYLVANIA HARBORS.

Erie.

Erie Harbor is located in Presque Isle Bay, formed by Presque Isle Peninsula, on the south shore of Lake Erie, 78 miles by lake westerly from Buffalo Harbor, N. Y. The Bay is 4½ miles long from east to west and 1 to 1½ miles wide, from north to south. The harbor basin is 2 miles long, one-half to 1½ miles wide, and 18 to 24 feet deep. The original harbor was nearly landlocked, the only entrance being at the eastern end and through a channel which was narrow, tortuous, and variable in position, with a depth of about 6 feet. The harbor has been developed under acts of March 26, 1824, March 2, 1867, August 5, 1886, September 19, 1890, March 3, 1899 and June 25, 1910, providing among other things for deepening the harbor basin over certain areas at the east and west ends to 20 feet, and the basin off the public dock to 18 feet.

The United States is maintaining and has maintained said depth of 18 feet to 20 feet in said harbor and channel, and has expended in the construction and maintenance of said harbor approximately the sum of $1,948,776.56, of which sum there has been expended $875,894.28, since the opening of the Drainage Channel.

(a) The facilities for navigation in said harbors have been provided by the United States under improvement projects specified by various Acts of Congress. The depth of water in all such harbors has been increased from time to time under said improvement projects, so that the project depth now maintained by the United States in each and every of said harbors is many feet greater than the original depth, and such improvements in facilities of navigation, including width of channels, safety of entrance to harbors, depth of harbor basins and channels were all made solely and only at the expense of the United States, to which neither the complainants nor any of their people have directly contributed. The said facilities for navigation in the various forms mentioned have been provided by the United States to suit the demands of commerce in said harbors. Each and every one of said harbors has been improved in some of the various ways mentioned since said Sanitary and Ship Canal was opened. The United States, in making said improvements, determined the project depths for each of said harbors, and took into consideration, in so doing, effects upon the surface elevation of the water of Lake Michigan, if any there were or should be due to diversions of water for all purposes, at all points.

(b) The United States about the year 1894 provided for and caused the installation of certain works at the outlet of Lake Superior, whereby the out flow through the St. Mary's River has been controlled, and said out flow has at times been greatly diminished, thus causing a decrease in the supply of water to Lakes Michigan, Huron, Erie and Ontario. The United States has and has assumed jurisdiction of navigation and of the facilities for navigation upon the entire Great Lakes system by the various works and improvements that it has constructed, including said controlling works at the outlet of Lake Superior, and also by the improvement of the channels connecting the Great Lakes.

The Canadian Government with the consent of the United States, constructed at the Galops Rapids a dam known as the Gut Dam, whereby one of the channels of the St. Lawrence River was entirely cut off, thus causing the raising of the surface elevation of Lake

Ontario to an amount greater than the claimed lowering of the surface elevation of said lake due to the diversion of water at Chicago. Said dam was constructed about the year 1903.

The United States, in providing a complete system for navigation upon all of the Great Lakes, including their harbors and conecting channels, in addition to the matters above stated, has deepened at various points the St. Clair River, Lake St. Clair and the Detroit River, whereby the surface elevations of the waters of Lakes Michigan and Huron have been lowered upwards of one foot, that is, the surface elevation of the water of said lakes is upwards of one foot lower than it would have been had such improvements not been made, and to a certain extent thereby, the surface elevation of the waters of Lake Erie has been increased, and the United States has, in the interest of navigation, further permitted diversions from Lake Erie by way of the Welland Canal, to the extent of approximately 4.500 cubic second feet and from Lake Erie for the operation of the New York Barge Canal, of approximately 1,500 cubic second feet. The United States has permitted the use of waters at Niagara Falls for power purposes. The said uses of the waters of Lake Erie for navigation and power purposes mentioned, have decreased the ordinary surface elevation of Lake Erie an amount almost equal to the claimed effect of the Chicago diversion upon Lake Erie. In making the said improvements in navigation upon the Great Lakes system, the United States has changed, as above set forth, the ordinary and natural flow of rivers connecting said lakes, and thereby the ordinary surface elevations of the said lakes. The United States has expended upwards of one hundred and six million dollars in making said improvements and providing said system of navigation upon said Great Lakes, their harbors and connecting channels, and has assumed exclusive jurisdiction and control of navigation upon said Great Lakes and the harbors located thereon, including each and every of the harbors mentioned in said amended bill.

(c) As heretofore alleged, the United States has assumed jurisdiction in this matter and has provided for the building of compensating or regulatory works to offset, and compensate for, any such diversion, by inserting in the permit of March 3, 1925, a requirement that the defendant Sanitary District should file a bond for the cost of such regulating works and the defendant Sanitary District, has, as heretofore set out, executed and filed said bond in accordance with said permit, so that upon the completion of such regulating and controlling works there will be no lowering of the levels of said lakes, because of any diversion therefrom.

Thirty-ninth. This defendant denies that the complainants are entitled to the relief, or any part thereof, as in said amended bill of complaint demanded, and this defendant states that said amended bill of complaint is inadequate and insufficient in law and does not on its face entitle the said complainants to the relief, or any part thereof, prayed for in and by said amended bill of complaint; and this defendant furthermore moves that the amended bill of complaint be dismissed; and this defendant, as to each and every allegation of said amended bill of complaint not herein admitted, answered or specifically denied, hereby expressly denies the same; and this defendant prays the same advantage in this answer as if it had pleaded or demurred to said amended bill of complaint, and prays that it be dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

SANITARY DISTRICT OF CHICAGO,
By Hector A. Brouillet,
Attorney, The Sanitary District of Chicago.

George F. Barrett,
Edmund D. Adcock,
Louis J. Behan,
Morton S. Cressy,
Solicitors for Defendant, The Sanitary District of Chicago.
Its Solicitors.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

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No. 16, Original Jurisdiction.

IN THE

SUPREME COURT OF THE UNITED STATES.

TO THE OCTOBER TERM, A. D. 1925.

THE STATE OF WISCONSIN, THE STATE OF OHIO, THE STATE OF PENNSYLVANIA and THE STATE OF MINNESOTA, Complainants, vs. THE STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, Defendants.	Bill in Equity Original Jurisdiction. N[redacted] 7

DEMURRER OF THE STATE OF ILLINOIS TO THE AMENDED BILL OF COMPLAINT.

OSCAR E. CARLSTROM,
Attorney-General of Illinois.

JOHN T. KENWORTHY, Rock Island, Illinois,
CYRUS E. DIETZ, Moline, Illinois,
Solicitors for the Defendant, the State of Illinois.

St. Louis Law Printing Co., 415 North Eighth Street, Central 4477.

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THE STATE OF WISCONSIN, THE STATE OF OHIO, THE STATE OF PENNSYLVANIA and THE STATE OF MINNESOTA, Complainants, vs. THE STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, Defendants.	Bill in Equity Original Jurisdiction. No. 16.

DEMURRER OF THE STATE OF ILLINOIS TO THE AMENDED BILL OF COMPLAINT.

And now comes the State of Illinois, by Oscar E. Carlstrom, its Attorney-General, and demurs to the amended bill of complaint filed herein, and says that the said amended bill of complaint and the matters therein contained, in manner and form as the same are therein set forth and stated, are not sufficient in law for the said States of Wisconsin, Ohio, Pennsylvania and Minnesota, or either or any of them, to have and maintain their aforesaid action against the State of Illinois, and that the State of Illinois is not bound by the law of the land to answer the same; and the said State of Illinois states and shows to the Court here the following causes of demurrer to said amended bill of complaint:

First. That it appears upon the face of said amended bill of complaint that this is not a case justiciable in this Honorable Court when exercising its original and exclusive jurisdiction under the Constitution of the United States.

Second. That it appears upon the face of said amended bill of complaint that the subject matter thereof relates to the navigability of navigable waters of the United States, over which the United States has superior, supreme and exclusive jurisdiction; and that the United States has assumed and is exercising such jurisdiction.

Third. That it appears upon the face of the amended bill that the diversion complained of therein is being made pursuant to a written permit therefor, duly issued and "authorized by the Secretary of War" and "recommended by the Chief of Engineers" of the United States, acting pursuant to the authority and provisions of the "Rivers and Harbors Act" of Congress of 1899, by which Act the Congress of the United States, as this Honorable Court has held in respect of this same diversion, in the case of Sanitary District v. United States, 266 U. S. 405, has validly conferred upon said officials the power, exclusive of any action by any state, to permit, regulate and control the amount and conditions of such diversion; and that said permit constitutes a valid and legal authorization by the United States of said diversion.

Fourth. That the amended bill does not state facts sufficient to entitle the complainants to the equitable relief prayed for, or any part thereof, for the reasons:

(a) That, in so far as said amended bill seeks an injunction to restrain the permanent diversion from Lake Michigan of any water whatever, it relates solely to a subject matter over which the Congress, as this Honorable Court has held, has exclusive jurisdiction, which has been assumed, and is being exercised, by the United States.

(b) That, in so far as said amended bill seeks to have this Honorable Court determine the amount of diversion "reasonably required" for navigation, it calls for a usurpation by this Honorable Court of powers and functions vested by the Constitution in the Congress and by the Congress delegated to the Secretary of War with the approval of the Chief of Engineers.

(c) That, in so far as said amended bill seeks relief against an alleged impairment, through pollution, of the navigability of navigable waters of the United States, neither of the complainant states, nor any of their respective citizens, suffer any direct or special injury, because all of such waters, alleged to be polluted, lie wholly without and below all of the complaining states; that none of said states have any direct or proprietary interest in the navigable condition of such waters, and that the exclusive power to protect the navigable condition of these navigable waters is vested in the United States, and, in respect of the alleged pollution complained of, such power is being exercised by the United States, and that none of said states, nor any of the citizens thereof, have any remedy in equity to control, or interfere with, the said exclusive power of the United States.

Fifth. That none of the complainant states have any right of action in equity to complain of any alleged breach or breaches of the conditions of said permit of March 3, 1925, because the power to enforce such conditions is vested solely and exclusively in the United States, because said permit is revocable by the Secretary of War if and when the conditions thereof are breached and because said Rivers and Harbors Act of 1899 itself provides adequate, available, special and exclusive remedies for violations of said act.

Sixth. That it affirmatively appears from the face of the amended bill that the United States is a necessary and indispensable party to this suit.

Seventh. That the rights asserted and the relief sought in and by the amended bill are contrary to, and inconsistent with, the rights asserted and the relief sought in and by the original bill herein, in the respect that the original bill conceded and admitted the right of the defendants to a diversion not in excess of four thousand one hundred and sixty-seven (4,167) cubic feet per second, and also to a diversion in excess of said amount if and when the Congress of the United States or the Secretary of War, acting upon the recommendation of the Chief of Engineers, should give a permit therefor, whereas, the amended bill denies such rights of the defendants, and that, therefore, the complainants are now estopped from denying the said rights of the defendants and from seeking the relief as prayed for in said amended bill.

Eighth. That it appears upon the face of said amended bill of complaint that the States of Wisconsin, Ohio, Pennsylvania and Minnesota have no lawful right to join in the prosecution of this action; that if there be, in fact, any legal cause of complaint against this defendant in said amended bill stated, which this defendant denies, it is a separate and independent cause, peculiar to each complaining state, and not a joint cause; that said bill is multifarious.

Ninth. That the said amended bill of complaint is in other respects uncertain, informal and insufficient, and it does not state facts sufficient to entitle the said States of Wisconsin, Ohio, Pennsylvania and Minnesota to the equitable relief prayed for in said bill.

WHEREFORE, for want of a sufficient bill of complaint in this behalf, the said defendant, the State of Illinois, demurs to said bill and to all the matters and things therein contained, and prays the judgment of this Honorable Court whether it shall be compelled to make any further or other answer to said bill, and that the said States of Wisconsin, Ohio, Pennsylvania and Minnesota may be barred from having or maintaining the aforesaid action against the defendant, the State of Illinois, and that this Honorable Court will not take further cognizance of this cause, but dismiss this bill, and that the defendant, the State of Illinois, be hence dismissed with its costs.

And this defendant, being not certainly advised as to whether the insufficiency of the amended bill, in the respects herein set forth, should be tested by demurrer or by motion to dismiss, respectfully requests, in case this Honorable Court should hold that such insufficiency should be tested by motion to dismiss, that then this Honorable Court will treat this demurrer as a motion to dismiss.

Oscar E. Carlstrom,
Attorney-General of Illinois.

John T. Kenworthy,
Rock Island, Illinois,
and

Cyrus E. Dietz,
Moline, Illinois,
Solicitors for the State of
Illinois in this case.

We, the undersigned solicitors for the defendant, the State of Illinois, do hereby state that we have each read the foregoing demurrer; that upon the instructions laid before us regarding this cause there is good ground for the same, and that the foregoing demurrer is not interposed for delay, and that it is well taken.

John T. Kenworthy and
Cyrus E. Dietz,
Solicitors for the Defendant, the
State of Illinois.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11.

Office Supreme Court, U. S.
FILED
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CLERK

IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

OCTOBER TERM, 1925.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS, SANITARY DISTRICT OF CHICAGO, STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY, and STATE OF LOUISIANA,
Defendants.

In Equity.
Original Jurisdiction.
[redacted] 7

MOTION OF THE STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA, TO DISMISS THE AMENDED BILL OF COMPLAINT.

NORTH T. GENTRY,
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FRANK E. DAUGHERTY,
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IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

OCTOBER TERM, 1925.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS, SANITARY DISTRICT OF CHICAGO, STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY, and STATE OF LOUISIANA, Defendants.	In Equity. Original Jurisdiction. No. 16.

MOTION OF THE STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA, TO DISMISS THE AMENDED BILL OF COMPLAINT.

These defendants, the States of Missouri, Tennessee, Kentucky and Louisiana, respectfully move the Court to dismiss the amended bill of complaint heretofore filed in the above entitled cause, for want of jurisdiction and upon other grounds that appear upon the face of said amended bill, and for the specific grounds of this motion, show:

First. That it appears upon the face of said amended bill of complaint that this is not a case justiciable in this Honorable Court when exercising its original jurisdiction under the Constitution of the United States.

Second. That it appears upon the face of said amended bill of complaint that the subject matter thereof relates to the navigability of certain of the navigable waters of the United States, over which the United States has superior, supreme and exclusive jurisdiction; and that the United States has assumed and is exercising such jurisdiction.

Third. That it appears upon the face of the amended bill that the diversion complained of therein is being made pursuant to a written permit therefor, duly issued and "authorized by the Secretary of War" and "recommended by the Chief of Engineers" of the United States, acting pursuant to the authority and provisions of the "Rivers and Harbors Act" of Congress of 1899, by which Act of Congress of the United States, as this Honorable Court has held in respect of this same diversion, in the case of Sanitary District v. United States, 266 U. S. 405, has validly conferred upon said officials the power, exclusive of any action by any state, to permit, regulate and control the amount and conditions of such diversion; and that said permit constitutes a valid and legal authorization by the United States of said diversion.

Fourth. That the amended bill does not state facts sufficient to entitle the complainants to the equitable relief prayed for, or any part thereof, for the reasons:

(a) That, in so far as said amended bill seeks an injunction to restrain the permanent diversion from Lake Michigan of any water whatever, it relates solely to a subject matter over which the Congress, as this Honorable Court has held, has exclusive jurisdiction which has been assumed, and is being exercised, by the United States.

(b) That, in so far as said amended bill seeks to have this Honorable Court determine the amount of diversion "reasonably required" for navigation, it calls for a usurpation by this Honorable Court of powers and functions vested by the Constitution in the Congress and by the Congress delegated to the Secretary of War upon the recommendation of the Chief of Engineers.

(c) That insofar as said amended bill seeks relief against alleged damage to navigation on the Great Lakes from alleged lowering of the levels thereof, alleged to be due to said diversion of water from Lake Michigan, or against alleged damage to navigation on the Chicago River, on the Sanitary and Ship Canal of defendant District, or on the DesPlaines, Illinois and Mississippi Rivers, from alleged pollution thereof, it appears from said amended bill that complainants are merely private litigants who seek to restrain an alleged public nuisance, although neither of said complainant states, nor any of their respective citizens, suffer or can suffer any direct, peculiar or special injury different from the alleged injury to the general public. That the exclusive power to protect the navigable condition of all these navigable waters is vested in the United States, and such power is being exercised by the United States; and that none of the complainant states, nor any of the citizens thereof, have any remedy in equity to control or interfere with the said exclusive power of the United States.

(d) That as to alleged pollution of the waterway leading from Lake Michigan to the Gulf of Mexico, by the use of the same for the disposal of the sewage of the City of Chicago, such waterway lies wholly without and below all of the complaining states, and none of said states have any direct or proprietary interest in the navigable condition of said waterway; that the exclusive power to protect the navigable condition of these navigable waters is vested in the United States, and in respect of said alleged pollution, such power is being exercised by the United States; and that none of the complainant states, nor any of the citizens thereof, have any remedy in equity to control or interfere with the said exclusive power of the United States.

Fifth. That none of the complainant states have any right of action in equity to complain of any alleged breach or breaches of the conditions of said permit of March 3, 1925, because the power to enforce such conditions is vested solely and exclusively in the United States, because said permit is revocable by the Secretary of War if and when the conditions thereof are breached, and because said Rivers and Harbors Act of 1899 itself provides adequate, available, special and exclusive remedies for violations of said act.

Sixth. That it affirmatively appears from the face of the amended bill that the United States is a necessary and indispensable party to this suit.

Seventh. That the rights asserted and the relief sought in and by the amended bill are contrary to, and inconsistent with, the rights asserted and the relief sought in and by the original bill herein, in the respect that the original bill conceded and admitted the right of the defendants to a diversion not in excess of four thousand one hundred and sixty-seven (4,167) cubic feet per second, and also to a diversion in excess of said amount, if and when the Congress of the United States or the Secretary of War, acting upon the recommendation of the Chief of Engineers, should so permit, whereas, the amended bill denies such right of the defendants, and that, therefore, the complainants are now estopped from denying the said right of the defendants and from seeking the relief as prayed for in said amended bill.

Eighth. That it appears upon the face of said amended bill of complaint that the States of Wisconsin, Ohio, Pennsylvania and Minnesota have no lawful right to join in the prosecution of this action; that if there be, in fact, any cause of action stated in said amended bill, which this defendant denies, it is a separate and independent cause, peculiar to each complaining state, and not a joint cause; that said bill is multifarious.

Ninth. That the said amended bill of complaint is in other respects uncertain, informal and insufficient, and it does not state facts sufficient to entitle the said States of Wisconsin, Ohio, Pennsylvania and Minnesota, or either of them, to the equitable relief prayed for in said bill.

Wherefore, these defendants, the States of Missouri, Tennessee, Kentucky and Louisiana, respectfully pray that this Honorable Court will not take further cognizance of this cause, but will dismiss said amended bill of complaint, and that these defendants be hence dismissed with their costs.

And these defendants not being certainly advised whether the insufficiency of said amended bill in the respects herein set forth, should be tested by motion to dismiss or by demurrer, respectfully request, in case it be held that such insufficiency should be tested by demurrer, that then this Honorable Court will treat this motion to dismiss as a demurrer.

North T. Gentry

Attorney General of Missouri.

Frank M. Thompson

Attorney General of Tennessee.

Frank E. Daugherty

Attorney General of Kentucky.

Percy Saint

Attorney General of Louisiana.

Daniel N. Kirby.

Solicitors for said States.

.T. 1930 ORIGINAL NOS.6.,10 & 11,

Office Supreme Court, U. S.
FILED
JAN 25 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

OCTOBER TERM, 1925.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

Bill in Equity.
Original Jurisdiction.
No. [redacted] 7

PETITION OR MOTION OF THE STATE OF MISSOURI, BY NORTH T. GENTRY ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT, TO FILE A MOTION TO DISMISS THE AMENDED BILL AND TO OTHERWISE PARTICIPATE IN THE DEFENSE.

NORTH T. GENTRY,
Attorney General of Missouri;
DANIEL N. KIRBY;
Solicitors for the State of Missouri.

J. W. Steele & Co., Printers, 101-103 S. Seventh St., St. Louis, Mo.

11

IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

OCTOBER TERM, 1925.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, Defendants.	Bill in Equity. Original Jurisdiction. No. 16.

PETITION OR MOTION OF THE STATE OF MISSOURI, BY NORTH T. GENTRY ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT, TO FILE A MOTION TO DISMISS THE AMENDED BILL AND TO OTHERWISE PARTICIPATE IN THE DEFENSE.

The State of Missouri by North T. Gentry, its Attorney General, respectfully states, that:

(1) North T. Gentry, Attorney General of the State of Missouri, duly authorized to appear in any proceeding or tribunal in which the interests of said state are involved,

—on behalf of said state respectfully presents this petition for leave to the State of Missouri to intervene and become a defendant in the above entitled cause, and to file therein the motion to dismiss the amended bill therein, a copy of which motion accompanies this petition.

(2) Said cause is a suit in equity, wherein the states of Wisconsin, Minnesota, Ohio and Pennsylvania, as joint complainants against the State of Illinois and the Sanitary District of Chicago, as defendants, seek to invoke the original jurisdiction of this Honorable Court for the purposes:

(a) Of enjoining the defendants from diverting any water whatever from Lake Michigan into the "Lakes-To-The-Gulf" water-way, which water-way consists of the Chicago River that opens into Lake Michigan, the canal of the Sanitary District of Chicago that connects the Chicago River with the Des Plaines River, and the Des Plaines, Illinois and Mississippi Rivers.

(b) Of asking this Honorable Court to usurp the powers and functions that this Court has held to be vested in the Secretary of War, acting upon the recommendation of the Chief of Engineers, in respect of the navigable waters of the United States, by determining and decreeing in this cause, what quantity of water to be diverted from Lake Michigan "is reasonably required for the purpose of navigation" in said "Lakes-To-The-Gulf" water-way; and by enjoining all such diversion of water in excess of the quantity so to be determined by this Honorable Court; and

(c) Of asking this Honorable Court, by its decree herein, to exercise control over the navigable condition of said water-way, by enjoining the injection into the Chicago, Des Plaines and Illinois Rivers of such sewage or waste as would render them unsanitary for navigation, and to do so at the request of complainant states, none of which are located upon or below the said rivers alleged to be polluted.

(3) The State of Missouri is located in the Mississippi Valley, with the center of the Mississippi River as the eastern boundary of said state, and said state and the people thereof are respectively interested in the subject matter of said cause, and would be prejudiced by the granting of the relief therein prayed by complainants in respect of the diversion of water from Lake Michigan into the "Lakes-To-The-Gulf" water-way—a part of the navigable waters of the United States.

(4) The State of Missouri, and the inhabitants of said state are interested in the subject matter and issues of said cause in two respects, to-wit: first, in respect of the navigability of said water-way; and second, in respect of the protection from dangerous pollution, of that part of said water-way which borders the State of Missouri and constitutes the water supply of many of the communities and people of said state.

(5) The State of Missouri, in its proprietary capacity, is itself a receiver of freight purchased for its own use, moving in interstate commerce and shipped to it via said "Lakes-To-The-Gulf" water-way; and said state is thereby interested on its own account in the mainte-

nance of a continuous diversion from Lake Michigan into said water-way, of a sufficient quantity of water to insure a depth and flow of water through said water-way adequate to protect and maintain the navigability thereof for the purpose of commerce via said water-way, and to and from said state.

(6) There are many individuals, partnerships and corporations residing within the State of Missouri and doing business at various points in said state, who are shippers and receivers of freight via said "Lakes-To-The-Gulf" water-way, who have developed their respective businesses and industries, and have heretofore conducted and are now conducting the same, relying upon the assumptions: That the navigable channel that has for many years constituted the said public highway or water route between Lake Michigan and the Gulf of Mexico would forever be maintained as a navigable water route with an adequate flow of water, part of which is necessary to be diverted for said purpose from Lake Michigan into said water-way; and that the quantity of water necessary to be so diverted for said purpose would not at any time be permitted by the United States to be substantially lessened to the prejudice or impairment of the navigability of said water route, nor so as to prevent the same from being kept adequate to meet the constantly growing needs of the common carriers by water and of the shippers and receivers by freight, doing business in the State of Missouri and in other parts of the Mississippi Valley who may wish to use said route as a highway of interstate commerce.

The State of Missouri is informed and believes, and upon information and belief avers the fact to be, that for many years last past, to-wit, more than fifteen years, the water so diverted as aforesaid from Lake Michigan through said "Lakes-To-The-Gulf" water-way, has constituted more than one-fourth of the low water flow in the Mississippi River at St. Louis, and that if such diversion were to be discontinued, there are many points in the Mississippi River between Grafton, Illinois, and Cairo, Illinois, where the low water navigable depths would be thereby reduced at least one foot and a half; and that any material reduction in said diversion would correspondingly interfere with navigation throughout said "Lakes-To-The-Gulf" water-way, including many points in the Mississippi River in the States of Missouri, Tennessee and Kentucky, above Memphis; and the State of Missouri avers, that the relief sought by the complainants in the above entitled cause, to enjoin and prevent the lowering of the levels of the navigable waters in which said complainants claim as riparian owners to have some title or interest, would necessarily inflict upon the State of Missouri to a much greater extent, the same kind of injury in respect of which said complainants seek relief in the above entitled cause.

(7) On, to-wit, March 3, 1925, after the decision by this Honorable Court on January 5, 1925, in the case of Sanitary District v. United States (266 U. S. 405), the Secretary of War, upon the recommendation of the Chief of Engineers, has (pursuant to the power held by said decision to have been vested in him by the "Rivers and Harbors Act" of Congress of 1899), granted a permit to the defendant Sanitary District of Chicago, to divert (upon certain stated conditions), from Lake Michigan into and

through the said canal that constitutes a part of said water-way, "an annual average diversion of not to exceed 8500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second." The granting of said permit appears upon the face of said amended bill.

(8) Since the granting of said permit, and pursuant thereto, the defendant Sanitary District of Chicago, has been continuing to divert water from Lake Michigan into said water-way, but within the quantity specified in said permit, and it is this diversion, thus lawfully authorized by the United States, that said amended bill seeks to enjoin.

(9) The development and maintenance of this waterway from Lake Michigan to the Gulf of Mexico, has long been a subject of public consideration and of great public importance to the United States, particularly to the states and their peoples, in and tributary to the Mississippi Valley, whose commerce is served by it.

By the "Federal Control Act" of Congress (40 Stat. L. 451), the President of the United States was authorized to spend such amounts as he deemed necessary for the utilization of waterways and the creation of water transportation agencies; and the policy of the Congress to encourage inland water transportation services and facilities, was declared in Section 500 of the "Transportation Act" of 1920 (41 Stat. L. 499); and by Section 201 of said Act, the Federal facilities for such transportation, that had been acquired pursuant to the Federal Control Act, were transferred to the Secreatry of War, who was directed to operate the same. Thereafter and pursuant thereto, the Secretary of War successfully operated a barge line freight service on the Mississippi River from St. Louis to New Orleans, and on the Black Warrior River in Alabama, which barge line was known as the "Mississippi-Warrior Barge Line." This service was subsequently taken over by the "Inland Waterways Corporation," organized pursuant to an Act of Congress entitled "An Act to create the Inland Waterways Corporation for the purpose of carrying out the mandate and purpose of Congress as expressed in Section 201 and 500 of the Transportation Act and for other purposes," approved June 3, 1924. Said "Inland Waterways Corporation" now operates such barge line, and in the fiscal year ending June 30, 1925, it earned a gross revenue of $3,339,542.00, and carried on the Mississippi River, approximately 100,000 tons of freight per month, a substantial part of which freight moved to or from points in the State of Missouri, through the harbor of the City of St. Louis.

(10) The President of the United States has recommended the maintenance and development of this waterway, in a recent message to the Congress.

(11) The Department of War of the United States has long been proceeding with its work of river improvement and channel maintenance in the critical portion of said "Lakes-To-The-Gulf" channel, i. e. between St. Louis, Missouri, and Cairo, Illinois, upon the correct assumption that at least a nine foot channel between said points is necessary for the reasonable needs of navigation.

(12) The State of Missouri is informed and believes, and upon information and belief avers the fact to be, that

the said quantities of diversion allowed by said permit, when supplemented by certain engineering works of channel improvements that said War Department has planned, and for the carrying out of which it is dependent upon congressional appropriations, will be reasonably adequate for the needs of navigation.

(13) If said permitted diversion should be wholly enjoined, or substantially diminished in quantity, as said complainants seek by their amended bill to do, then the navigability of said water-way would be substantially impaired and obstructed, to the prejudice of the State of Missouri and of many of its inhabitants who use said water-way.

(14) The pendency of said suit, while the same remains undetermined, questioning, as it seeks to do, the power of the Secretary of War to permit said diversion,—constitutes an obstacle in the way of prompt congressional action in accord with the said recommendations of the President's Message for the development and maintenance of said water-way, and it is therefore of public importance that as speedy a determination as possible be had of the legal questions presented by said suit, which was filed by the State of Wisconsin as sole complainant on, to-wit, June 5, 1922, and, although it involved matters of great public importance, was thereafter permitted by said state to slumber until quite recently.

(15) The water constituting said water-way is now used, and for many years has been used with the knowledge of the United States, for the further purpose—incident to its existence as a public navigable water-way route

—of carrying off the sewage of the City of Chicago and the surrounding territory. The volume of said water constituting said water-way, is now adequate for said purposes of navigation and sanitation by the addition thereto of the water now being diverted from Lake Michigan pursuant to said permit, and with the aid of said water thus diverted said sewage matter has heretofore been sufficiently diluted so as not to cause injury to the health of the people of Missouri.

(16) So long as said water-way continues to be used for said additional purpose of sanitation, water to be diverted from Lake Michigan will continue to be needed to dilute said sewage matter and to render it less harmful to the health of the persons who live along said water-way, including especially the inhabitants of the State of Missouri, whose health would be endangered if the diversion of said water should be enjoined as prayed for in said amended bill.

(17) No greater quantity of water is being thus diverted than is necessary for the reasonable requirements of navigation; but if said diversion should be wholly enjoined, or should be reduced substantially below the amount that the Secretary of War upon the recommendation of the Chief of Engineers, has decided to be requisite for the needs of navigation, then the navigability of said water-way as the same exists and has for a long time heretofore existed, would be seriously impaired and obstructed; and so long as said water-way continues to be used for said additional purpose of sanitation, the health and water supplies of the communities and people located along the Mississippi River below the mouth of the Illinois River, would be seriously endangered.

(18) The State of Missouri is advised that its presence as a party defendant would be proper and states that if permitted to intervene as a defendant, it will attempt (by its said motion to dismiss) to show, that the amended bill in said cause is subject to challenge on controlling jurisdictional grounds, which, if held to be well founded, will result in a speedy final determination of said cause and in the removal of said suit as a further obstacle to much needed congressional action.

Wherefore, petitioner prays that this Honorable Court will grant leave to petitioner to file this its petition for leave to intervene as a party defendant to said cause, and for an order making it a defendant therein, and for leave to file its motion to dismiss which accompanies this petition, and for leave thereafter to participate in the defense of said cause as it may be advised; and for such other and further relief as to the Court may seem proper in the premises.

STATE OF MISSOURI,

By North T. Gentry

Attorney General of Missouri;

Daniel N. Kirby

Solicitors for the State of Missouri.

O.T. 1930 ORIGINAL NOS.6,10 & 11,

Office Supreme Court, U. S.
FILED
JAN 25 1926
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IN THE

Supreme Court of the United States.

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OCTOBER TERM, 1925.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, Defendants.	Bill in Equity Original Jurisdiction. N[redacted] 7

PETITION OR MOTION OF THE STATE OF KENTUCKY, BY FRANK E. DAUGHERTY, ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT, TO FILE A MOTION TO DISMISS THE AMENDED BILL AND TO OTHERWISE PARTICIPATE IN THE DEFENSE.

FRANK E. DAUGHERTY,
Attorney General of Kentucky;
DANIEL N. KIRBY;
Solicitors for the State of Kentucky.

J. W. Steele & Co., Printers, 101-103 S. Seventh St., St. Louis, Mo.

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Supreme Court of the United States.

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The State of Kentucky by Frank E. Daugherty, its Attorney General, respectfully states, that:

(1) Frank E. Daugherty, Attorney General of the State of Kentucky, duly authorized to appear in any proceeding

or tribunal in which the interests of said state are involved,—on behalf of said state respectfully presents this petition for leave to the State of Kentucky to intervene and become a defendant in the above entitled cause, and to file therein the motion to dismiss the amended bill therein, a copy of which motion accompanies this petition.

(2) Said cause is a suit in equity, wherein the states of Wisconsin, Minnesota, Ohio and Pennsylvania, as joint complainants against the State of Illinois and the Sanitary District of Chicago, as defendants, seek to invoke the original jurisdiction of this Honorable Court for the purposes:

(a) Of enjoining the defendants from diverting any water whatever from Lake Michigan into the "Lakes-To-The-Gulf" water-way, which water-way consists of the Chicago River that opens into Lake Michigan, the canal of the Sanitary District of Chicago that connects the Chicago River with the Des Plaines River, and the Des Plaines, Illinois and Mississippi Rivers.

(b) Of asking this Honorable Court to usurp the powers and functions that this Court has held to be vested in the Secretary of War, acting upon the recommendation of the Chief of Engineers, in respect of the navigable waters of the United States, by determining and decreeing in this cause, what quantity of water to be diverted from Lake Michigan "is reasonably required for the purpose of navigation" in said "Lakes-To-The-Gulf" water-way;

and by enjoining all such diversion of water in excess of the quantity so to be determined by this Honorable Court; and

(c) Of asking this Honorable Court, by its decree herein, to exercise control over the navigable condition of said water-way, by enjoining the injection into the Chicago, Des Plaines and Illinois Rivers of such sewage or waste as would render them unsanitary for navigation, and to do so at the request of complainant states, none of which are located upon or below the said rivers alleged to be polluted.

(3) The State of Kentucky is located in the Mississippi Valley, with the center of the Mississippi River as the western boundary of a part of said state, and said state and the people thereof are respectively interested in the subject matter of said cause, and would be prejudiced by the granting of the relief therein prayed by complainants in respect of the diversion of water from Lake Michigan into the "Lakes-To-The-Gulf" water-way—a part of the navigable waters of the United States.

(4) The State of Kentucky, and the inhabitants of said state are interested in the subject matter and issues of said cause in two respects, to-wit: first, in respect of the navigability of said water-way; and second, in respect of the protection from dangerous pollution, of that part of said water-way which borders the State of Kentucky and constitutes the water supply of many of the communities and people of said state.

(5) There are many individuals, partnerships and corporations residing within the State of Kentucky and doing business at various points in said state, who are shippers and receivers of freight via said "Lakes-To-The-Gulf" water-way, who have developed their respective businesses and industries, and have heretofore conducted and are now conducting the same, relying upon the assumptions: that the navigable channel that has for many years constituted the said public highway or water route between Lake Michigan and the Gulf of Mexico would forever be maintained as a navigable water route with an adequate flow of water, part of which is necessary to be diverted for said purpose from Lake Michigan into said water-way; and that the quantity of water necessary to be so diverted for said purpose would not at any time be permitted by the United States to be substantially lessened to the prejudice or impairment of the navigability of said water route, nor so as to prevent the same from being kept adequate to meet the constantly growing needs of the common carriers by water and of the shippers and receivers by freight, doing business in the State of Kentucky and in other parts of the Mississippi Valley who may wish to use said route as a highway of interstate commerce.

(6) The State of Kentucky is informed and believes, and upon information and belief avers the fact to be, that for many years last past, to-wit, more than fifteen years, the water so diverted as aforesaid from Lake Michigan through said "Lakes-To-The-Gulf" water-way, has constituted more than one-fourth of the low water flow in the Mississippi River at St. Louis, and that if such diver-

sion were to be discontinued, there are many points in the Mississippi River between Grafton, Illinois, and Cairo, Illinois, where the low water navigable depths would be thereby reduced at least one foot and a half; and that any material reduction in said diversion would correspondingly interfere with navigation throughout said "Lakes-To-The-Gulf" water-way, including several points in the Mississippi River in the States of Kentucky, Missouri and Tennessee, above Memphis; and the State of Kentucky avers, that the relief sought by the complainants in the above entitled cause to enjoin and prevent the lowering of the levels of the navigable waters in which said complainants claim as riparian owners to have some title or interest, would necessarily inflict upon the State of Kentucky to a much greater extent, the same kind of injury in respect of which said complainants seeks relief in the above entitled cause.

(7) On, to-wit, March 3, 1925, after the decision by this Honorable Court on January 5, 1925, in the case of Sanitary District v. United States (266 U. S. 405), the Secretary of War, upon the recommendation of the Chief of Engineers, has (pursuant to the power held by said decision to have been vested in him by the "Rivers and Harbors Act" of Congress of 1899), granted a permit to the defendant Sanitary District of Chicago, to divert (upon certain stated conditions), from Lake Michigan into and through the said canal that constitutes a part of said water-way, "an annual average diversion of not to exceed 8500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second." The granting of said permit appears upon the face of said amended bill.

(8) Since the granting of said permit, and pursuant thereto, the defendant Sanitary District of Chicago, has been continuing to divert water from Lake Michigan into said water-way, but within the quantity specified in said permit, and it is this diversion, thus lawfully authorized by the United States, that said amended bill seeks to enjoin.

(9) The development and maintenance of this waterway from Lake Michigan to the Gulf of Mexico, has long been a subject of public consideration and of great public importance to the United States, particularly to the states and their peoples, in and tributary to the Mississippi Valley, whose commerce is served by it.

By the "Federal Control Act" of Congress (40 Stat. L. 451), the President of the United States was authorized to spend such amounts as he deemed necessary for the utilization of waterways and the creation of water transportation agencies; and the policy of the Congress to encourage inland water transportation services and facilities, was declared in Section 500 of the "Transportation Act" of 1920 (41 Stat. L. 499); and by Section 201 of said Act, the Federal facilities for such transportation, that had been acquired pursuant to the Federal Control Act, were transferred to the Secretary of War, who was directed to operate the same. Thereafter and pursuant thereto, the Secretary of War successfully operated a barge line freight service on the Mississippi River from St. Louis to New Orleans, and on the Black Warrior River in Alabama, which barge line was known as the "Mississippi-Warrior Barge Line." This service was subsequently taken over by the "Inland Waterways Corporation," organized pursuant to an Act of Congress entitled "An Act to create the Inland Waterways Corporation for the purpose of carrying out the mandate and purpose of Congress as expressed in Section 201 and 500 of the Transportation Act and for other purposes," approved June 3, 1924. Said "Inland Waterways Corporation" now operates such barge line, and in the fiscal year ending June 30, 1925, it earned a gross revenue of $3,339,542.00, and carried on the Mississippi River, approximately 100,000 tons of freight per month, a substantial part of which freight moved to or from points in the State of Kentucky.

(10) The President of the United States has recommended the maintenance and development of this waterway, in a recent message to the Congress.

(11) The Department of War of the United States has long been proceeding with its work of river improvement and channel maintenance in the critical portion of said "Lakes-To-The-Gluf" channel, i. e. between St. Louis, Missouri, and Cairo, Illinois, upon the correct assumption that at least a nine foot channel between said points is necessary for the reasonable needs of navigation.

(12) The State of Kentucky is informed and believes, and upon information and belief avers the fact to be, that the said quantities of diversion allowed by said permit, when supplemented by certain engineering works of channel improvements that said War Department has planned, and for the carrying out of which it is dependent upon congressional appropriations, will be reasonably adequate for the need of navigation.

(13) If said permitted diversion should be wholly enjoined, or substantially diminished in quantity, as said complainants seek by their amended bill to do, then the navigability of said water-way would be substantially impaired and obstructed, to the prejudice of the State of Kentucky and of many of its inhabitants who use said water-way.

(14) The pendency of said suit, while the same remains undetermined, questioning, as it seeks to do, the power of the Secretary of War to permit said diversion,—constitutes an obstacle in the way of prompt congressional action in accord with the said recommendations of the President's Message for the development and maintenance of said water-way, and it is therefore of public importance that as speedy a determination as possible be had of the legal questions presented by said suit, which was filed by the State of Wisconsin as sole complainant on, to-wit, June 5, 1922, and, although it involved matters of great public importance, was thereafter permitted by said state to slumber until quite recently.

(15) The water constituting said water-way is now used, and for many years has been used, with the knowledge of the United States, for the further purpose—incident to its existence as a public navigable water-way route—of carrying off the sewage of the City of Chicago and the surrounding territory. The volume of said water constituting said water-way, is now adequate for said purposes of navigation and sanitation by the addition thereto of the water now being diverted from Lake Michigan pursuant to said permit, and with the aid of said

water thus diverted said sewage matter has heretofore been sufficient diluted so as not to cause injury to the health of the people of Kentucky.

(16) So long as said water-way continues to be used for said additional purpose of sanitation, water to be diverted from Lake Michigan will continue to be needed to dilute said sewage matter and to render it less harmful to the health of the persons who live along said water-way, including the inhabitants of the State of Kentucky, whose health would be endangered if the diversion of said water should be enjoined as prayed for in said amended bill.

(17) No greater quantity of water is being thus diverted than is necessary for the reasonable requirements of navigation; and if said diversion should be wholly enjoined, or should be reduced substantially below the amount that the Secretary of War upon the recommendation of the Chief of Engineers, has decided to be requisite for the needs of navigation, then the navigability of said water-way as the same exists and has for a long time heretofore existed, would be seriously impaired and obstructed; and so long as said water-way continues to be used for said additional purpose of sanitation, the health and water supplies of the communities and people located along the Mississippi River below the mouth of the Illinois River, would be seriously endangered.

(18) The State of Kentucky is advised that its presence as a party defendant would be proper, and states that if permitted to intervene as a defendant, it will attempt (by its said motion to dismiss) to show, that the amended bill in said cause is subject to challenge on con-

trolling jurisdictional grounds, which, if held to be well founded, will result in a speedy final determination of said cause and in the removal of said suit as a further obstacle to much needed congressional action.

Wherefore, petitioner prays that this Honorable Court will grant leave to petitioner to file this its petition for leave to intervene as a party defendant to said cause, and for an order making it a defendant therein, and for leave to file its motion to dismiss which accompanies this petition, and for leave thereafter to participate in the defense of said cause as it may be advised; and for such other and further relief as to the Court may seem proper in the premises.

STATE OF KENTUCKY,

By Frank E. Daugherty
Attorney General of ~~Tennessee~~ Kentucky;

Solicitors for the State of Kentucky.

1930 ORIGINAL NOS. 6, 10 & 11,

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IN THE

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STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, Defendants.	Bill in Equity. Original Jurisdiction. N[redacted] 7

PETITION OR MOTION OF THE STATE OF LOUISIANA, BY PERCY SAINT, ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT, TO FILE A MOTION TO DISMISS THE AMENDED BILL AND TO OTHERWISE PARTICIPATE IN THE DEFENSE.

PERCY SAINT,
Attorney General of Louisiana;

DANIEL N. KIRBY;
Solicitors for the State of Louisiana.

J. W. Steele & Co., Printers, 101-103 S. Seventh St., St. Louis.

IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

OCTOBER TERM, 1925.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, Defendants.	Bill in Equity. Original Jurisdiction. No. 16.

PETITION OR MOTION OF THE STATE OF LOUISIANA, BY PERCY SAINT, ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT, TO FILE A MOTION TO DISMISS THE AMENDED BILL AND TO OTHERWISE PARTICIPATE IN THE DEFENSE.

The State of Louisiana by Percy Saint, its Attorney General, respectfully states, that:

(1) Percy Saint, Attorney General of the State of Louisiana, duly authorized to appear in any proceeding or tribunal in which the interests of said state are in-

volved,—on behalf of said state respectfully presents this petition for leave to the State of Louisiana to intervene and become a defendant in the above entitled cause, and to file therein the motion to dismiss the amended bill therein, a copy of which motion accompanies this petition.

(2) Said cause is a suit in equity, wherein the states of Wisconsin, Minnesota, Ohio and Pennsylvania, as joint complainants against the State of Illinois and the Sanitary District of Chicago, as defendants, seek to invoke the original jurisdiction of this Honorable Court for the purposes:

(a) Of enjoining the defendants from diverting any water whatever from Lake Michigan into the "Lakes-To-The-Gulf" water-way, which water-way consists of the Chicago River that opens into Lake Michigan, the canal of the Sanitary District of Chicago that connects the Chicago River with the Des Plaines River, and the Des Plaines, Illinois and Mississippi Rivers.

(b) Of asking this Honorable Court to usurp the powers and functions that this Court has held to be vested in the Secretary of War, acting upon the recommendation of the Chief of Engineers, in respect of the navigable waters of the United States, by determining and decreeing in this cause, what quantity of water to be diverted from Lake Michigan "is reasonably required for the purpose of navigation" in said "Lakes-To-The-Gulf" water-way; and by enjoining all such diversion of water in excess of the quantity so to be determined by this Honorable Court; and

(c) Of asking this Honorable Court, by its decree herein, to exercise control over the navigable condition of said water-way, by enjoining the injection into the Chicago, Des Plaines and Illinois Rivers of such sewage or waste as would render them unsanitary for navigation, and to do so at the request of complainant states, none of which are located upon or below the said rivers alleged to be polluted.

(3) The State of Louisiana is located in the Mississippi Valley, with the center of the Mississippi River as the western boundary of a part of said state, and said river flows through the southern part of said state, and the people thereof are respectively interested in the subject matter of said cause, and would be prejudiced by the granting of the relief therein prayed by complainants in respect of the diversion of water from Lake Michigan into the "Lakes-To-The-Gulf" water-way—a part of the navigable waters of the United States.

(4) The State of Louisiana, and the inhabitants of said state are interested in the subject matter and issues of said cause in respect of the navigability of said water-way which borders a part of the State of Louisiana and flows through another part of said state, and constitutes an important highway of commerce to said state and its people.

(5) The State of Louisiana, in its proprietary capacity, is itself a receiver of freight purchased for its own use, moving in interstate commerce and shipped to it via said "Lakes-To-The-Gulf" water-way; and said state is thereby interested on its own account in the maintenance of a continuous diversion from Lake Michigan into said water-way, of a sufficient quantity of water to insure a depth

and flow of water through said water-way adequate to protect and maintain the navigability thereof for the purpose of commerce via said water-way, and to and from said state.

(6) There are many individuals, partnerships and corporations residing within the State of Louisiana and doing business at various points in said state, who are shippers and receivers of freight via said "Lakes-To-The-Gulf" water-way, who have developed their respective businesses and industries, and have heretofore conducted and are now conducting the same, relying upon the assumptions: that the navigable channel that has for many years constituted the said public highway or water route between Lake Michigan and the Gulf of Mexico would forever be maintained as a navigable water route with an adequate flow of water, part of which is necessary to be diverted for said purpose from Lake Michigan into said water-way; and that the quantity of water necessary to be so diverted for said purpose would not at any time be permitted by the United States to be substantially lessened to the prejudice or impairment of the navigability of said water route, nor so as to prevent the same from being kept adequate to meet the constantly growing needs of the common carriers by water and of the shippers and receivers by freight, doing business in the State of Louisiana and in other parts of the Mississippi Valley, who may wish to use said route as a highway of interstate commerce.

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The State of Louisiana is informed and believes, and upon information and belief avers the fact to be, that for many years last past, to-wit, more than fifteen years, the water so diverted as aforesaid from Lake Michigan through said "Lakes-To-The-Gulf" water-way, has constituted more than one-fourth of the low water flow in the Mississippi River at St. Louis, and that if such diversion were to be discontinued, there are many points in the Mississippi River between Grafton, Illinois, and Cairo, Illinois, where the low water navigable depths would be thereby reduced at least one foot and a half; and that any material reduction in said diversion would correspondingly interfere with navigation throughout said "Lakes-To-The-Gulf" water-way, including several points in the Mississippi River in the States of Missouri, Tennessee and Kentucky, above Memphis and would interfere with the movement of freight via said water-way, from and to points in Louisiana, and points beyond the said places where navigable depths would thus be lessened; and the State of Louisiana avers, that the relief sought by the complainants in the above entitled cause to enjoin and prevent the lowering of the levels of the navigable waters in which said complainants claim as riparian owners to have some title or interest, would necessarily inflict upon the State of Louisiana to a much greater extent, the same kind of injury in respect of which said complainants seek relief in the above entitled cause.

(7) On, to-wit, March 3, 1925, after the decision by this Honorable Court on January 5, 1925, in the case of Sanitary District v. United States (266 U. S. 405), the Secretary of War, upon the recommendation of the Chief of Engineers, has (pursuant to the power held by said decision to have been vested in him by the "Rivers and Harbors Act" of Congress of 1899), granted a permit to the defendant Sanitary District of Chicago, to divert (upon

certain stated conditions), from Lake Michigan into and through the said canal that constitutes a part of said water-way, "an annual average diversion of not to exceed 8500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second." The granting of said permit appears upon the face of said amended bill.

(8) Since the granting of said permit, and pursuant thereto, the defendant Sanitary District of Chicago, has been continuing to divert water from Lake Michigan into said water-way, but within the quantity specified in said permit, and it is this diversion, thus lawfully authorized by the United States, that said amended bill seeks to enjoin.

(9) The development and maintenance of this waterway from Lake Michigan to the Gulf of Mexico, has long been a subject of public consideration and of great public importance to the United States, particularly to the states and their peoples, in and tributary to the Mississippi Valley, whose commerce is served by it.

By the "Federal Control Act" of Congress, (40 Stat. L. 451), the President of the United States was authorized to spend such amounts as he deemed necessary for the utilization of waterways and the creation of water transportation agencies; and the policy of the Congress to encourage inland water transportation services and facilities, was declared in Section 500 of the "Transportation Act" of 1920 (41 Stat. L. 499); and by Section 201 of said Act, the Federal facilities for such transportation, that had been acquired pursuant to the Federal Control Act, were transferred to the Secretary of War, who was directed to operate the same. Thereafter and pursuant thereto, the Secretary of War successfully operated a barge line freight service on the Mississippi River from St. Louis to New Orleans, and on the Black Warrior River in Alabama, which barge line was known as the "Mississippi-Warrior Barge Line." This service was subsequently taken over by the "Inland Waterways Corporation," organized pursuant to an Act of Congress entitled "An Act to create the Inland Waterways Corporation for the purpose of carrying out the mandate and purposes of Congress as expressed in Section 201 and 500 of the Transportation Act and for other purposes," approved June 3, 1924. Said "Inland Waterways Corporation" now operates such barge line, and in the fiscal year ending June 30, 1925, it earned a gross revenue of $3,339,542.00, and carried on the Mississippi River, approximately 100,000 tons of freight per month, a substantial part of which freight moved to or from points in the State of Louisiana, through the harbor of the City of New Orleans.

(10) The President of the United States has recommended the maintenance and development of this waterway, in a recent message to the Congress.

(11) The Department of War of the United States has long been proceeding with its work of river improvement and channel maintenance in the critical portion of said "Lakes-To-The-Gulf" channel, i. e. between St. Louis, Missouri, and Cairo, Illinois, upon the correct assumption that at least a nine-foot channel between said points is necessary for the reasonable needs of navigation.

(12) The State of Louisiana is informed and believes, and upon information and belief avers the fact to be, that

the said quantities of diversion allowed by said permit, when supplemented by certain engineering works of channel improvements that said War Department has planned, and for the carrying out of which it is dependent upon congressional appropriations, will be reasonably adequate for the needs of navigation.

(13) If said permitted diversion should be wholly enjoined, or substantially diminished in quantity, as said complainants seek by their amended bill to do, then the navigability of said water-way would be substantially impaired and obstructed, to the prejudice of the State of Louisiana and of many of its inhabitants who use said water-way.

(14) The pendency of said suit, while the same remains undetermined, questioning, as it seeks to do, the power of the Secretary of War to permit said diversion,—constitutes an obstacle in the way of prompt congressional action in accord with the said recommendations of the President's Message for the development and maintenance of said water-way, and it is therefore of public importance that as speedy a determination as possible be had of the legal questions presented by said suit, which was filed by the State of Wisconsin as sole complainant on, to-wit, June 5, 1922, and, although it involved matters of great public importance, was thereafter permitted by said state to slumber until quite recently.

(15) The water constituting said water-way is now used, and for many years has been used with the knowledge of the United States, for the further purpose—incident to its existence as a public navigable water-way route

—of carrying off the sewage of the City of Chicago and the surrounding territory. The volume of said water constituting said water-way, is now adequate for said purpose of navigation.

(16) No greater quantity of water is being diverted than is necessary for the reasonable requirements of navigation; and if said diversion should be wholly enjoined, or should be reduced substantially below the amount that the Secretary of War upon the recommendation of the Chief of Engineers, has decided to be requisite for the needs of navigation, then the navigability of said water-way as the same exists and has for a long time heretofore existed, would be seriously impaired and obstructed.

(17) The State of Louisiana is advised that its presence as a party defendant would be proper, and states that if permitted to intervene as a defendant, it will attempt (by its said motoin to dismiss) to show, that the amended bill in said cause is subject to challenge on controlling jurisdictional grounds, which, if held to be well founded, will result in a speedy final determination of said cause and in the removal of said suit as a further obstacle to much needed congressional action.

Wherefore, petitioner prays that this Honorable Court will grant leave to petitioner to file this its petition for leave to intervene as a party defendant to said cause, and for an order making it a defendant therein, and for leave to file its motion to dismiss which accompanies this petition, and for leave thereafter to participate in the defense of said cause as it may be advised; and for such other and further relief as to the Court may seem proper in the premises.

STATE OF LOUISIANA,

By Percy Saint
Attorney General of Louisiana;

Daniel W. Tiverly
Solicitors for the State of
Louisiana.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11.

Office Supreme Court, U. S.
FILED
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IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

OCTOBER TERM, 1925.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA,
Complainants,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

Bill in Equity.
Original Jurisdiction.
No. [illegible]. 7

PETITION OR MOTION OF THE STATE OF TENNESSEE, BY FRANK M. THOMPSON ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT, TO FILE A MOTION TO DISMISS THE AMENDED BILL AND TO OTHERWISE PARTICIPATE IN THE DEFENSE.

FRANK M. THOMPSON,
Attorney General of Tennessee;

DANIEL N. KIRBY,
Solicitors for the State of Tennessee.

J. W. Steele & Co., Printers, 101-103 S. Seventh St., St. Louis, Mo.

IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

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STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, STATE OF PENNSYLVANIA,
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Bill in Equity.
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PETITION OR MOTION OF THE STATE OF TENNESSEE, BY FRANK M. THOMPSON ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT, TO FILE A MOTION TO DISMISS THE AMENDED BILL AND TO OTHERWISE PARTICIPATE IN THE DEFENSE.

The State of Tennessee by Frank M. Thompson, its Attorney General, respectfully states, that:

(1) Frank M. Thompson, Attorney General of the State of Tennessee, duly authorized to appear in any proceeding

or tribunal in which the interests of said state are involved,—on behalf of said state respectfully presents this petition for leave to the State of Tennessee to intervene and become a defendant in the above entitled cause, and to file therein the motion to dismiss the amended bill therein, a copy of which motion accompanies this petition.

(2) Said cause is a suit in equity, wherein the states of Wisconsin, Minnesota, Ohio and Pennsylvania, as joint complainants against the State of Illinois and the Sanitary District of Chicago, as defendants, seek to invoke the original jurisdiction of this Honorable Court for the purposes:

(a) Of enjoining the defendants from diverting any water whatever from Lake Michigan into the "Lakes-To-The-Gulf" water-way, which water-way consists of the Chicago River that opens into Lake Michigan, the canal of the Sanitary District of Chicago that connects the Chicago River with the Des Plaines River, and the Des Plaines, Illinois and Mississippi Rivers.

(b) Of asking this Honorable Court to usurp the powers and functions that this Court has held to be vested in the Secretary of War, acting upon the recommendation of the Chief of Engineers, in respect of the navigable waters of the United States, by determining and decreeing in this cause, what quantity of water to be diverted from Lake Michigan "is reasonably required for the purpose of navigation" in said "Lakes-To-The-Gulf" water-way; and by enjoining all such diversion of water in excess of the quantity so to be determined by this Honorable Court; and

(c) Of asking this Honorable Court, by its decree herein, to exercise control over the navigable condition of said water-way, by enjoining the injection into the Chicago, Des Plaines and Illinois Rivers of such sewage or waste as would render them unsanitary for navigation, and to do so at the request of complainant states, none of which are located upon or below the said rivers alleged to be polluted.

(3) The State of Tennessee is located in the Mississippi Valley, with the center of the Mississippi River as the western boundary of said state, and said state and the people thereof are respectively interested in the subject matter of said cause, and would be prejudiced by the granting of the relief therein prayed by complainants in respect of the diversion of water from Lake Michigan into the "Lakes-To-The-Gulf" water-way—a part of the navigable waters of the United States.

(4) The State of Tennessee, and the inhabitants of said state are interested in the subject matter and issues of said cause in two respects, to-wit: first, in respect of the navigability of said water-way; and second, in respect of the protection from dangerous pollution, of that part of said water-way which borders the State of Tennessee and constitutes the water supply of many of the communities and people of said state.

(5) The State of Tennessee, in its proprietary capacity, is itself a receiver of freight purchased for its own use, moving in interstate commerce and shipped to it via said "Lakes-To-The-Gulf" water-way; and said state is thereby interested on its own account in the maintenance of a continuous diversion from Lake Michigan into said water-way, of a sufficient quantity of water to insure a depth and flow of water through said water-way ade-

quate to protect and maintain the navigability thereof for the purpose of commerce via said water-way, and to and from said state.

(6) There are many individuals, partnerships and corporations residing within the State of Tennessee and doing business at various points in said state, who are shippers and receivers of freight via said "Lakes-To-The-Gulf" water-way, who have developed their respective businesses and industries, and have heretofore conducted and are now conducting the same, relying upon the assumptions: that the navigable channel that has for many years constituted the said public highway or water route between Lake Michigan and the Gulf of Mexico would forever be maintained as a navigable water route with an adequate flow of water, part of which is necessary to be diverted for said purpose from Lake Michigan into said water-way; and that the quantity of water necessary to be so diverted for said purpose would not at any time be permitted by the United States to be substantially lessened to the prejudice or impairment of the navigability of said water route, nor so as to prevent the same from being kept adequate to meet the constantly growing needs of the common carriers by water and of the shippers and receivers by freight, doing business in the State of Tennessee and in other parts of the Mississippi Valley who may wish to use said route as a highway of interstate commerce.

The State of Tennessee is informed and believes. and upon information and belief avers the fact to be, that for many years last past, to-wit, more than fifteen years, the water so diverted as aforesaid from Lake Michigan through said "Lakes-To-The-Gulf" water-way, has constituted more than one-fourth of the low water flow in the Mississippi River at St. Louis, and that if such diversion were to be discontinued, there are many points in the Mississippi River between Grafton, Illinois, and Cairo, Illinois, where the low water navigable depths would be thereby reduced at least one foot and a half; and that any material reduction in said diversion would correspondingly interfere with navigation throughout said "Lakes-To-The-Gulf" water-way, including several points in the Mississippi River in the States of Tennessee and Kentucky, above Memphis; and the State of Tennessee avers, that the relief sought by the complainants in the above entitled cause to enjoin and prevent the lowering of the levels of the navigable waters in which said complainants claim as riparian owners to have some title or interest, would necessarily inflict upon the State of Tennessee to a much greater extent, the same kind of injury in respect of which said complainants seek relief in the above entitled cause.

(7) On, to-wit, March 3, 1925, after the decision by this Honorable Court on January 5, 1925, in the case of Sanitary District v. United States (266 U. S. 405), the Secretary of War, upon the recommendation of the Chief of Engineers, has (pursuant to the power held by said decision to have been vested in him by the "Rivers and Harbors Act" of Congress of 1899), granted a permit to the defendant Sanitary District of Chicago, to divert (upon certain stated conditions), from Lake Michigan into and through the said canal that constitutes a part of said water-way, "an annual average diversion of not to exceed 8500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second." The granting of said permit appears upon the face of said amended bill.

(8) Since the granting of said permit, and pursuant thereto, the defendant Sanitary District of Chicago, has

been continuing to divert water from Lake Michigan into said water-way, but within the quantity specified in said permit, and it is this diversion, thus lawfully authorized by the United States, that said amended bill seeks to enjoin.

(9) The development and maintenance of this waterway from Lake Michigan to the Gulf of Mexico, has long been a subject of public consideration and of great public importance to the United States, particularly to the states and their peoples, in and tributary to the Mississippi Valley, whose commerce is served by it.

By the "Federal Control Act" of Congress, (40 Stat. L. 451), the President of the United States was authorized to spend such amounts as he deemed necessary for the utilization of waterways and the creation of water transportation agencies; and the policy of The Congress to encourage inland water transportation services and facilities, was declared in Section 500 of the "Transportation Act" of 1920 (41 Stat. L. 499); and by Section 201 of said Act, the Federal facilities for such transportation, that had been acquired pursuant to the Federal Control Act, were transferred to the Secretary of War, who was directed to operate the same. Thereafter and pursuant thereto, the Secretary of War successfully operated a barge line freight service on the Mississippi River from St. Louis to New Orleans, and on the Black Warrior River in Alabama, which barge line was known as the "Mississippi-Warrior Barge Line." This service was subsequently taken over by the "Inland Waterways Corporation," organized pursuant to an Act of Congress entitled "An Act to create the Inland Waterways Corporation for the purpose of carrying out the mandate and purpose of Congress as expressed in Section 201 and 500 of the Transportation Act and for other purposes," approved June 3, 1924. Said

"Inland Waterways Corporation" now operates such barge line, and in the fiscal year ending June 30, 1925, it earned a gross revenue of $3,339,542.00, and carried on the Mississippi River, approximately 100,000 tons of freight per month, a substantial part of which freight moved to or from points in the State of Tennessee, through the harbor of the City of Memphis.

(10) The President of the United States has recommended the maintenance and development of this waterway, in a recent message to The Congress.

(11) The Department of War of the United States has long been proceeding with its work of river improvement and channel maintenance in the critical portion of said "Lakes-To-The-Gulf" channel, i. e. between St. Louis, Missouri, and Cairo, Illinois, upon the correct assumption that at least a nine foot channel between said points is necessary for the reasonable needs of navigation.

(12) The State of Tennessee is informed and believes, and upon information and belief avers the fact to be, that the said quantities of diversion allowed by said permit, when supplemented by certain engineering works of channel improvements that said War Department has planned, and for the carrying out of which it is dependent upon congressional appropriations, will be reasonably adequate for the needs of navigation.

(13) If said permitted diversion should be wholly enjoined, or substantially diminished in quantity, as said complainants seek by their amended bill to do, then the navigability of said water-way would be substantially impaired and obstructed, to the prejudice of the State of

Tennessee and of many of its inhabitants who use said water-way.

(14) The pendency of said suit, while the same remains undetermined, questioning, as it seeks to do, the power of the Secretary of War to permit said diversion,—constitutes an obstacle in the way of prompt congressional action in accord with the said recommendations of the President's Message for the development and maintenance of said water-way, and it is therefore of public importance that as speedy a determination as possible be had, of the legal questions presented by said suit, which was filed by the State of Wisconsin as sole complainant on, to-wit, June 5, 1922, and, although it involved matters of great public importance, was thereafter permitted by said state to slumber until quite recently.

(15) The water constituting said water-way is now used, and for many years has been used, with the knowledge of the United States, for the further purpose—incident to its existence as a public navigable water-way route—of carrying off the sewage of the City of Chicago and the surrounding territory. The volume of said water constituting said water-way, is now adequate for said purposes of navigation and sanitation by the addition thereto of the water now being diverted from Lake Michigan pursuant to said permit, and with the aid of said water thus diverted said sewage matter has heretofore been sufficiently diluted so as not to cause injury to the health of the people of Tennessee.

(16) So long as said water-way continues to be used for said additional purpose of sanitation, water to be diverted from Lake Michigan will continue to be needed to dilute said sewage matter and to render it less harmful

to the health of the persons who live along said water-way, including the inhabitants of the State of Tennessee, whose health would be endangered if the diversion of said water should be enjoined as prayed for in said amended bill.

(17) No greater quantity of water is being thus diverted than is necessary for the reasonable requirements of navigation; and if said diversion should be wholly enjoined, or should be reduced substantially below the amount that the Secretary of War upon the recommendation of the Chief of Engineers, has decided to be requisite for the needs of navigation, then the navigability of said water-way as the same exists and has for a long time heretofore existed, would be seriously impaired and obstructed; and so long as said water-way continues to be used for said additional purpose of sanitation, the health and water supplies of the communities and people located along the Mississippi River below the mouth of the Illinois River, would be seriously endangered.

(18) The State of Tennessee is advised that its presence as a party defendant would be proper, and states that if permitted to intervene as a defendant, it will attempt (by its said motion to dismiss) to show, that the amended bill in said cause is subject to challenge on controlling jurisdictional grounds, which, if held to be well founded, will result in a speedy final determination of said cause and in the removal of said suit as a further obstacle to much needed congressional action.

Wherefore, petitioner prays that this Honorable Court will grant leave to petitioner to file this its petition for leave to intervene as a party defendant to said cause, and for an order making it a defendant therein, and for leave to file its motion to dismiss which accompanies this petition, and for leave thereafter to participate in the defense of said cause as it may be advised; and for such other and further relief as to the Court may seem proper in the premises.

STATE OF TENNESSEE,

By Frank M. Thompson
Attorney General of Tennessee;

David M. Kirk

Solicitors for the State of Tennessee.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

Office Supreme Court, U.
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CLER

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No. ~~16~~, Original Jurisdiction.

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

Bill in Equity Original Jurisdiction. No. 16.

STATES OF WISCONSIN, MINNESOTA,
OHIO AND PENNSYLVANIA,
Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

BRIEF OF ILLINOIS IN SUPPORT OF MOTION TO DISMISS AMENDED BILL.

OSCAR E. CARLSTROM,
Attorney-General of Illinois.

JOHN T. KENWORTHY, Rock Island, Illinois,
CYRUS E. DIETZ, Moline, Illinois,
Solicitors for Illinois,

HUGH S. JOHNSON, Moline, Illinois,
Of Counsel.

BARNARD & MILLER PRINT, CHICAGO

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IN THE

Supreme Court of the United States

October Term, A. D. 1925.

Number 16 Original in Equity.

No. 16, Original Jurisdiction.

Bill in Equity Original Jurisdiction. No. 16.

STATES OF WISCONSIN, MINNESOTA, OHIO
AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

BRIEF OF ILLINOIS IN SUPPORT OF MOTION TO DISMISS AMENDED BILL.

STATEMENT OF THE CASE.*

This is a bill in equity by four of the ~~seven~~ eight states littoral of the Great Lakes (but not by all) against a fifth littoral state, Illinois. It joins, as defendant, the Sanitary District of Chicago, an Illinois public corporation, and invokes the original jurisdiction of this court, as a suit by states against another state and a citizen thereof. It seeks to regulate the quantity and manner of sewage

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*All of the facts recited herein, which do not affirmatively appear from the face of the amended bill, are of such a nature that this Court will take judicial notice of them. (*Jones* v. *United States*, 137 U. S. 202, 212, 215; *South Ottawa* v. *Perkins*, 94 U. S. 260; *Brown* v. *Piper*, 91 U. S. 37, *Jenkins* v. *Collard*, 145 U. S. 546; *Armstrong* v. *U. S.*, 3 Wallace 154.)

disposal by the State of Illinois in the Illinois and Des Plaines rivers and to enjoin, or failing that, to have reduced, a diversion of water from Lake Michigan and the Great Lakes-St. Lawrence system, through a deep, wide and continuous channel—the Illinois-Michigan and the Ship and Sanitary canals—into the Missouri-Mississippi system. The channel is the only link between those systems and a single glance at the map discloses the creation thereby of a great, continuous waterway, from the Gulf of Mexico to the North-Atlantic, which, with its tributary fluvial ramifications, forms a net-like arterial pattern reaching practically every state, province and territory of the United States and Canada, east of the Rocky Mountains: There is here concerned an area, a commerce and an empire so much greater than was ever before possible in a single system of inland waterways that comparison fails of its purpose. This system presents problems and policies of tremendous national and international concern, both economic and political. These waterways are arteries of irrigation, sources of power, highways of commerce, conduits of drainage, and avenues of defense, for two great nations.

The right and interest, in every aspect of this suit, of the littoral states of Michigan and New York, which are ~~not~~ complainants, is in all respects equal to that of the states complainant. No less is the interest and right of every state of the Union and above and controlling all is the paramount and vital right and interest of the nation. The rights and interests failing of representation here are such that no decree can enter without seriously and adversely affecting them. The existence and operation of the canal which have become the subject of this suit are, therefore, of perhaps the greatest national and international importance,

liand

present or potential, of any of the inland artificial works of the United States. The bill asks that its effective use be abated in the tenuous interest of thirty-two (but not of all) "harbors" on the Great Lakes, many of which are little more than landings. It avers no ponderable injury to any of these harbors but prefers a complaint that could be properly based only on an *absolute* right to the *status quo* in what the bill calls the "*natural*" navigable capacity of the Great Lakes.

From the foregoing recitation we must conclude that the entire subject matter of this suit—not only the canal in question but also all of the lakes, rivers, harbors, and waters involved—are among the principal instrumentalities of the interstate and foreign commerce of the United States, and therefore, we would expect to learn that the federal government has already assumed complete control, not only of the diversion of waters through the canal, but of every matter or thing that could possibly bear upon this controversy. And such is indeed the case.

Of the named harbors in the states complainant, Congress has taken every single one under its fostering care and control by various general statutes and regulations controlling navigation on the lakes, by particular "River and Harbor" Acts and by works and improvements therein made by the United States in accordance with an integral plan of river and harbor improvements (see partial list of acts and regulations in apendix I) in such sense as was said by this court in respect of one of them (Duluth), in a case in which one of the states complainant here (Wisconsin) sought to interfere with a diversion of water from its natural channel at Duluth on the same ground it here avers: "* * * We (the United States) take upon ourselves the burden of this improvement which properly belongs to us and that hereafter this work for the public good is in our hands and subject to our control." (*Wisconsin* v. *Duluth*, 96 U. S. 379.) In the same way it has legislated and acted in respect of the Chicago, Desplaines and Illinois Rivers.

The Federal Government regulates these waters and navigation in the Great Lakes and has assumed to Canada responsibility for acts affecting the levels of the Great Lakes and otherwise (*Treaty of January* 11, 1909, proclaimed May 13, 1910, 36 Stat. at L. 2448).

The particular subjects of dispute—the Michigan-Illinois and the Sanitary and Ship Canals, the diversion of water through them, and their enormous strategic, economic and political importance—have been the objects of concern, encouragement, supervision and control of the Federal Government for more than a century. The water route that later became these canals was very early recognized by two Federal Treaties with the Ottawa Indians (*Treaty of Greenville,* 1795 *and Treaty of* 1816). The act enabling Illinois to organize as a state was amended in 1818 (32 *Annals of Congress,* p. 1677) to add a narrow strip of land, including this route, for the purpose of linking the port of Chicago and the waters of Lake Michigan with the Illinois River by a proposed canal. Acting on engineers' reports of 1819, Congress by Act of March 30, 1822 (3 *U. S. Stat. at L.* 659), authorized Illinois to survey through this strip a route for this canal and reserved public land, ninety feet on either side of said canal, from sale by the United States. Illinois complied with the conditions of this Act of 1822, and on January 20, 1825, Governor Coles wrote to President Monroe, in part, as follows:

"In compliance with request of the Legislature of this State, I have the honor to transmit to you a copy of the 'Report of the Canal Commissioners of the State of Illinois,' together with a map of the country between the headwaters of the Illinois River and Lake Michigan on which is delineated the proposed canal to connect these navigable waters."

By Act of March 2, 1827 (4 *U. S. Stat. at L.* 234) Congress granted land, "one-half of five sections in width on each side of said canal" to Illinois, for the purpose of "aiding said state in opening a canal *to unite the waters of the Illinois River with those of Lake Michigan.*" Accordingly the State of Illinois in 1836 (Session Laws of Illinois for 1836, p. 98) enacted legislation providing for the construction of the canal, which was completed in pursuance thereof in 1848, substantially on the route of the present Sanitary and Ship Canal and, for a considerable distance, identical therewith. This canal was to be supplied "*with water from Lake Michigan* and such other sources as the canal commissioners may think proper" and was to be constructed in the manner "best calculated to promote the *permanent interest of the country,* reserving ninety feet on each side of said canal to enlarge its capacity." (Section 16, Illinois Act of 1836 *supra.*)

The funds thus jointly provided by Illinois and the United States proved inadequate to the original engineers' plan and the requirements of the Act to provide a depth sufficient to take waters from Lake Michigan by gravity, and water was, for a time, secured for the canal by dams and pumps from the Chicago River. In his message of December 1, 1862, to Congress (Messages and Papers of the Presidents, Vol. 5, p. 3334) President Lincoln called attention of Congress to the "military and commercial importance of enlarging it (the canal)". In 1866 (14 Stat. at L. 7) Congress appropriated funds for a survey of the project of enlarging it and, on Feb. 12, 1867, the Chief of Engineers reported enthusiastically thereon. In 1871, pursuant to an enabling Act of the Illinois Legislature, Feb. 16, 1865, the State of Illinois deepened this canal on the original plan and at last the objects of the Acts of Congress of 1822 and 1827 (*supra*) were accomplished and water flowed into the canal by gravity from the lake, thus *"uniting the waters of the Illinois River with those of Lake Michigan."*

This original flow by gravity from the lake was small. In addition to its use and purpose as "a public highway for the use of the government of the United States" (Act of March 30, 1822, *supra*), the City of Chicago was also using the Illinois and Desplaines Rivers, *via* the canal, for sanitary purposes. By 1884, the rapid growth of the city had created, in the lake, the canal and the two rivers just mentioned, a dangerous condition, resulting from sewage disposal. To remedy this condition and to enlarge and improve the waterway, the Illinois Legislature, in 1889 passed an "Act to Create Sanitary Districts and to *Remove Obstructions in the Illinois and Desplaines Rivers*" (Laws of Illinois for 1889, p. 186). Under this act the defendant Sanitary District was created. This Act provided for construction of the canal much in its present form and for greatly increasing the capacity of, and improving, its precedent form. It declared the canal a navigable waterway of the United States under control of the Government for navigation purposes. It contemplated the diversion by gravity of waters from Lake Michigan through the canal into the Illinois and Desplaines Rivers, and the creation of the present great commercial waterway linking the Missouri-Mississippi and Great Lakes-St. Lawrence systems.

It is important to note that, at the time of the passage of this Act, there was no *general* federal statute, controlling navigable waters. Congress by the Acts of 1822 and 1827, *supra,* had authorized and aided Illinois in the construction of a canal "to unite the waters of the Illinois River with those of Lake Michigan." Congress had also kept in constant touch with every development of the original canal as above narrated, by reports and elaborate surveys by the Corps of Engineers, which surveys and reports were appropriated for and required by River and Harbor Acts of 1866, 1875, 1879, 1882, and 1886. These surveys and reports had, without exception, enthusiastically approved the expanding projects of Illinois, as being of the utmost benefit and importance to the navigation, the commerce, and to the navigable waters of the United States. The then state of the law, as established by the decisions and pronouncements of this court, was that, as to improvements and modifications in navigable waters, wholly within the boundaries of a state, the state was free to act subject to the paramount control of Congress (See Point V 2 and 3 *infra*). In this case, both the state, by the Acts of 1836 and 1865, had acted, and by the Act of 1889 was about to act, and Congress, by the Acts of 1818, 1822 and 1827 had authorized the canal, and by necessary implication, the diversion from Lake Michigan to unite its waters with the lower waters of the Illinois River.

Almost upon the heels of the State Act authorizing the present canal and diversion, Congress, by the Act of September 19, 1890, legislated in such fashion as to modify the prior rule and to prohibit obstructions to navigable capacity of the navigable waters of the United States not "*affirmatively authorized by law*" or the alteration or modification of the capacity of said navigable waters of the United States, "*unless approved and authorized by the Secretary of War.*" In the case of *United States*

v. *Bellingham Bay Boom Co.,* 176 U. S. 211, this court held that a *state statute* satisfied the requisite authorization by law. No new duty was therefore as yet imposed upon the State of Illinois by the Act of September 19, 1890, since the state act of authorization and the federal statutes cited satisfied the federal act of 1890.

Construction began in 1893 and proceeded under the constant surveillance of the U. S. Corps of Engineers. (See reports, Chief of Engineers to Congress, for year 1890, elaborately detailing and reporting upon the work projected by Illinois, and for the year 1892 reporting the progress of the work, and for the year 1893, discussing the work in great detail, and for the year 1895 reporting the imminence, amount and effect of the new diversion and the great national importance thereof.) On June 16, 1896, the work had progressed so far that "modification" of the channel of the Chicago River was imminent and the Sanitary District, in compliance with the federal statute, applied for a permit and for the approval of the works constructed, and asked the co-operation of the War Department. The permit and approval of the general plan was granted by the Secretary of War July 3rd, 1896. Other permits covering advancing portions of the work were granted by the Secretary of War, November 16, 1897, November 30, 1898, January 13, March 10 and May 12, 1899. On February 23, 1898, the House Committee of Congress on Rivers and Harbors inspected the works.

Moved apparently by the decision in the *Bellingham Bay* case, Congress enacted the Act of March 3, 1899, which has been repeatedly construed as such an assumption, by the United States, of sovereignty in national navigable waters as to exclude the sovereignty of states and to vest in the federal government the exclusive right to say both what shall and what shall not be done in respect thereof. The practical effect of this statute is discussed in Points V-3 and VI *infra*.

On April 22, 1899, the work of the canal had progressed so far that the Sanitary District was ready to begin the greatly increased diversion of waters from Lake Michigan through the new and enlarged canal. Accordingly, on May 8, 1899, a permit therefor was issued by the Secretary of War. It recited the necessity under the Act of 1899 for federal authorization for such alterations in navigable capacity as was proposed, the government's previous approval of the works constructed, the extent of the purposed diversion of waters and the consent of the Chief of Engineers and the permission of the Secretary of War for a diversion to operate it.

In the vicissitudes of experience and operation and to accommodate further improvements in the waterway made by Chicago and (in the Chicago River proper) by the United States, modifications of this permit were made by succeeding Secretaries of War in April, July and December, 1901, January, 1903, and June, 1910, the last named permit authorizing the diversion of 4167 cubic feet per second. These permits are all set forth in the bill of complaint and an examination of them will demonstrate that the Chief of Engineers and the Secretary of War were constantly alert to observe the effect of the diversion on navigation and to require modification whenever, and to the extent that, the United States determined that navigation was injuriously affected by acts of the State of Illinois.

During all this time, as is shown by reports to Congress and the Secretary of War (Appendix II), the Chief of Engineers and the Secretary of War exercised constant supervision and surveillance of all that was being done and projected by the defendants. A report (H.

R. document 333, 54th Congress, 2nd Session, March 3, 1897) was laid before Congress showing the depth and width of the canal, its availability as a national waterway and the fact that it would eventually require 600,000 cubic feet per minute and affect the levels of the lakes, the action of Congress thereon was (River and Harbors Act, 1899), to appropriate for and require a report from the War Department, on a project for improvements of the Illinois and Desplaines Rivers, with a view to the extension of navigation by channels 7 and 8 feet deep from the Illinois River to Lake Michigan, at or near Chicago, in pursuance of the recommendations of the report. By Act of June 6, 1890 (31 Stat. at L. 578) estimates of cost of channels 10, 12 and 14 feet deep were called for, including *"connection at Lockport with the Sanitary and Ship Canal constructed by the Sanitary District of Chicago."*

By Act of June 25, 1900 (36 Stat. at L., p. 630) Congress appropriated $1,000,000.00 for the construction of a waterway from Lockport, the southern terminus of the Sanitary and Ship Canal, via the Desplaines and Illinois Rivers to the mouth of the Illinois, and provided for a Board of five members to report upon the feasibility of this waterway, and its most advisable depth and dimensions, upon such measures as may be required to preserve the levels of the Great Lakes from the effects of diversion for maintenance of the waterway or for any other purpose, and upon the influence on volume and height of water in the Mississippi River below Cairo.

By Act of 1902 (32 Stat. at L. 573) Congress provided $200,000.00 for surveys to determine the *feasibility of a channel* 14 *feet deep from Lockport, via the Illinois, Desplaines and Mississippi Rivers to St. Louis.* This Act addressed itself to the whole subject of the waterway from the Mississippi to and in the Great Lakes, and by

Section 4, provided for the creation of an International Waterways Commission, to make a study and report to Congress upon the regulation and diversion of waters from the Lakes. Members of the Commission appointed under this Act were to co-operate with members of the same Commission appointed by the Government of Canada, and they were to investigate and report upon the boundary waters, upon the maintenance and regulation of *suitable* levels therein, upon the effects of diversion and the necessary measures to regulate such diversion. They were to make recommendations for such improvements and regulation as should best subserve the interests of navigation in those waters.

By Act of June 29, 1906, (34 Stat. at L. p. 626), Congress prohibited diversion of waters from the Niagara River but were express in providing that this prohibition should *not be interpreted as prohibiting the diversion of waters from the Great Lakes for sanitary, domestic or navigation purposes, in amounts fixed from time to time by Congress or "by the Secretary of War of the United States under its direction."* By Act of March 2, 1907 (34 Stat. at L. p. 1703) Congress provided for the appointment of a Board *to survey a channel* 14 *feet deep from St. Louis to the mouth of the Mississippi* and authorized the Board to consider the proposed waterway "from Chicago to St. Louis, heretofore reported," and to determine "what increase of depth will be obtained over the natural flow of water in such regulated channel by an added volume of *10,000* cubic feet per second."

On June 30, 1907 (40 Stat. at L., p. 241), Congress by joint resolution appropriated for and required the Secretary of War to make an investigation of the entire subject of water diversion through the Great Lakes and the Niagara River. The Boards of Engineers reporting, in pursuance of said Acts, assumed and stated that they assumed, presumably from the history just recited, a diversion of 10,000 feet per second at Chicago through the canal. They recommended the location of a deep waterway along the canal and the utilization of the diversion through the canal in connection with the improvement of the waterway from Chicago to St. Louis.

On January 4, 1907, the International Waterways Commission reported to Congress. Referring to the waterway to and in the Mississippi River, they concluded that "the diversion of 10,000 cubic feet of water per second at Chicago will render practicable the waterway to the Mississippi River 14 feet deep"—the depth contemplated by the latter acts of Congress cited above. The Commission accepted the canal as designed and built, "with its attendant diversion of 10,000 c. s. f." as a "fixed fact" and said that it did not wish to reopen the case. Based upon and guided by this report, the treaty with Canada (Great Britain) of January 11, 1909, discussed in Point V-2 *infra* was negotiated. It preserved the diversion then existing and it undertook obligations to Canada not to disturb the natural levels of the Great Lakes, either by obstructions raising the levels or by further diversion, without approval by an International Joint Commission.

Indeed, a survey of all the administrative and legislative acts of the United States will disclose a carefully considered and deliberate purpose to connect the Great Lakes-St. Lawrence with the Missouri-Mississippi systems, by a project which latterly contemplates and utilizes the canal as it exists and a diversion of 10,000 cubic feet per second from Lake Michigan, as one link in a national and international waterway, connecting the Great Lakes via the Illinois, Desplaines and Mississippi Rivers, with the Gulf of Mexico, 14 feet deep and requiring to attain and maintain that depth, not only in the canal but also in the rivers below the canal, a diversion of water from Lake Michigan of 10,000 cubic feet per second. There will not be found in all the recent voluminous surveys, reports and deliberations of Governmental agencies, any other or different information or advice to the Secretary of War or to the Congress, and it is impossible to avoid the conclusion that the canal, and the diversion of water from Lake Michigan to that extent, are necessary incidents in this great project of the federal government to improve and regulate this most important segment of the navigable waters of the United States.

In 1908, and in connection with an improvement in the works by opening an additional intake in the Calumet River, a friendly suit was instituted by the United States by a bill filed March 23rd, in the U. S. District Court, for the Northern District of Illinois, Eastern Division, against the Sanitary District, to enjoin reversal of the direction of the Calumet River and the withdrawal of water from Lake Michigan *in a different way or in larger amount than that authorized by the Secretary of War.* Work on the Calumet project was suspended. On June 30, 1910, the Secretary of War granted a permit for withdrawal through the Calumet River but on the express condition that it should not be used in the friendly suit. Work on the Calumet project was then resumed and was completed in 1922. During the month of January, 1913, the United States complained that more water than was authorized by the Secretary of War's permits was being withdrawn through the canal and, at the suggestion of the Sanitary District, another bill of complaint was filed in the same District Court seeking to enjoin the Sanitary District from diverting water in excess of the amount authorized by the permits (4167 c. s. f.) While these two suits were pending, there was accumulated and placed before the court an exhaustive, imposing and conflicting mass of evidence covering every purpose, aspect and effect of the diversion and requiring years to compile.

It is of the utmost importance to note that the resultant of both of these suits by the United States, after all the evidence was in, did not seek, as does the present bill, to enjoin the diversion of *"any water whatever"* from Lake Michigan. It did not seek, as does the present bill, *to have the court determine* what amount of water is required for navigation through the canal and connecting waters to the Mississippi River *"without injury to the navigable capacity of the Great Lakes and connecting waters"* and to restrain diversion of any excess. It did not seek, as does the present bill, *to have the court determine* what quantity and manner of sewage disposal in these waters would not interfere with navigation and to restrain a greater quantity or a different manner of such disposal. On the contrary, the bill of the United States assumed that Congress and its instrumentalities were vested with exclusive authority to determine these questions and to regulate commerce among the states in respect thereof. The complainant was the United States, suing in its sovereign capacity and its exclusive right on all subjects and questions here involved. The suit was based on an alleged violation, by the state, of a specific determination and order by the United States, and it sought only for a restriction of withdrawal to the amount determined by the Secretary of War to be consistent with the proper regulation of navigation. It asked the court—not to *regulate commerce* as does this bill—but to *vindicate a regulation by Congress.* It did not ask for the abatement of the diversion and it did not do so for reasons that must be obvious from the facts in the foregoing recital—reasons which were aptly surmised by this court, after referring to those facts, (*Sanitary District* v. *U. S.*, 266 U. S. 405) to be; "* * * This suit is not for the purpose of doing away with the channel which the United States, we have no doubt, would be most unwilling to see closed, but solely for the purpose of limiting the amount of water to be taken through it from Lake Michigan."

On June 18, 1923, the District Court entered a decree as prayed. The Sanitary District appealed to this court which, on January 5, 1925, approved the decree for an injunction as prayed "*without prejudice to any permit that may be issued by the Secretary of War according to law.*" On March 3, 1925, the Chief of Engineers recommended and the Secretary of War authorized, diversion from Lake Michigan, by the Sanitary District, subject to certain conditions, of an annual amount of 8,500 c. s. f. but not to exceed an instantaneous maximum of 11,000 c. s. f. The conditions may be epitomized as follows: No unreasonable interference with navigation—expenses of necessary inspection by the United States in the interests of navigation to be borne by the permittee —no attempt by the permittee to forbid the full and free use of any navigable waters of the United States—the carrying out by the Sanitary District of a specified sewage disposal program—payment by the District of its share of the cost of works to restore or compensate the lowering of levels of the Great Lakes—construction by the Sanitary District before July 1, 1929, on plans to be approved by the Secretary of War, of controlling works to prevent the discharge of the Chicago River into Lake Michigan—program for metering of at least 90% of the water service by the City of Chicago within six months—and most important of all to *this* suit that the "* * * *diversion of water from Lake Michigan shall be under the supervision of the United States District Engineer at Chicago and * * * under his direct control in times of flood in the Illinois and Desplaines Rivers.*"

All of the conditions of this permit have been fully complied with. This is established by official records, of which this court will take judicial notice. (See appendix I.)

Prior to the decree of this court in *Sanitary District* v. *United States, supra,* and the permit of the Secretary of War of March 3, 1925, *i. e.,* in June, 1925, the State of Wisconsin, had filed here a bill the prayer of which was practically the same as that of the United States in the Sanitary District case. As soon as practicable, after that decree and permit, *i. e.,* on October 5th, 1925, Wisconsin amended her bill to its present form and the other states complainant joined as complainants and subscribed the amended bill. In view of the long delay in the decision on the suit of the United States below, it is comprehensible why the State of Wisconsin might try to invoke the original jurisdiction of this court in a bill identical in purpose with that of the United States. But now, considering the decision by this court in the federal case and the comprehensive action by every department of the Federal Government, and considering also the grotesque inappropriateness of the amended prayer asking this court (in derogation of the constitutional function of Congress and the statutory function of the Secretary of War), to permit or refuse diversion, or to determine the amount of diversion, or the amount and manner of sewage disposal, that will not interfere with navigation, the prayer and pursuit of the amended bill are unique.

ARGUMENT.

The bill makes no case justiciable here because the relief prayed for is not within the jurisdiction of the court, because all indispensable parties are not before the court, and because the bill well avers neither juridical right nor any injury.

I.

The bill asks the court to regulate navigation—a constitutional function of Congress and not of this court.

This bill seeks not to restrain specific administrative acts of an officer of the United States averred to be in excess or derogation of his authority, or the act of a state or person averred to be in violation of specific law or valid regulation. On the contrary, it avers that acts done by the State of Illinois under decrees of this court and under authority of federal statutes, and of Congress acting through duly constituted and empowered administrative officers of the United States in the regulation of commerce and navigation, are not proper regulations thereof. It asks this court to make an administrative investigation among most complex and difficult facts to determine whether any, or what amount of, diversion of water, and what manner and amount of sewage disposal, *are* proper regulations of commerce and then, by a decree, to enforce that judicial regulation, thus made by the court in derogation of the functions of Congress and of administrative officers of the United States acting for Congress.

From the narration, *supra,* it will be obvious that the determination and resolution of the underlying questions here involve grave political considerations affecting the relations among states, between states and the United States and between the United States and Great Britain —in a word that the functions invoked are political, legislative and administrative and *not* judicial in character.

The relief sought is beyond the power of this court. In *Wisconsin* v. *Duluth,* 96 U. S. 379, in a suit by Wisconsin on a complaint similar to this, to enjoin diversion of national navigable waters by an artificial canal being constructed under color of authority of the United States, this court said: "If that body (Congress) sees fit to provide a way in which the great commerce of the countries west of them, even to Asia, shall be securely accommodated at the harbor of Duluth by this short canal of three or four hundred feet, can this court decree that it must forever pursue the old channel by the natural outlet * * * ? When Congress appropriates $10,000 to improve, protect and insure this canal, this court can have no powers to require it to be filled up or obstructed—." And in *U. S.* v. *Chandler-Dunbar Water Power Company,* 229 U. S. 53, in speaking of the power of Congress over navigation, this court said: "So unfettered is this control of Congress over navigable streams of the country that its judgment as to whether a construction in or over such a river is or is not an obstacle and a hindrance to navigation is conclusive. *Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control.*" (Italics ours.) And in *Southern Pacific Company* v. *Olympian Dredging Co.,* 260 U. S. 205, where, as here, the court was addressing an attack on the action of the Secretary of War in pursuance of the same congressional mandate we are considering here, this court said, quoting with approval *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177: "It is for Congress, under the Constitution, to regulate the right of navigation, by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction and to prescribe the way in which the question of obstruction shall be determined. *Its action in the premises cannot be revised or ignored by courts or by juries,* except that when *it* provides for an investigation of the facts * * * the courts can see to it that *executive officers conform their action to the mode prescribed by Congress.*" (Italics ours.)

To the same effect, that the power of regulation is exclusive in Congress and is legislative and not judicial in character, see *Second Wheeling Bridge case,* 18 How. 421; *Union Bridge Co.* v. *United States,* 204 U. S. 364; *Gibson* v. *United States,* 166 U. S. 269; *Scranton* v. *United States,* 179 U. S. 141; *Louisiana* v. *Texas,* 176 U. S. 1; *Chicago B. & Q. R. Co.* v. *Illinois,* 200 U. S. 561; *West Chicago Street Ry.* v. *Illinois,* 201 U. S. 506; *Hannibal Bridge Co.* v. *United States,* 221 U. S. 194.

If the conclusion were not thus amply supported by judicial pronouncement, it would stand on its own logic. As will be shown elsewhere herein, the subject is one that admits only of single and unified control; it is political in character and regards a nice balance of interests, rights, benefits and injuries between all the states of the Union and the relations of the United States with Great Britain; it can be properly concluded only upon a most abstruse technical and scientific determination of fact and can be administered only by a process of continuous regulation and supervision.

Such relief, as is here sought, would destroy unity of control because it would bifurcate control between this Court and Congress. Such political action is not within the province of this court. Such administration is beyond its facilities and is inconsistent with, and repugnant to, the judicial function. All this the Constitution astutely recognized when it placed the regulation of commerce and navigation within the exclusive province of Congress, and it is to Congress, and not to this court, that the states complainant should apply for modification, in their behalf, of the present great integral plan of the national government for the regulation of interstate and international navigation.

II.

The United States and other states are indispensable parties.

All persons materially interested in the subject matter of a suit in equity must be made parties to it. This rule applies to cases in the original jurisdiction of this court. *State of California* v. *Southern Pacific Co.*, 157 U. S. 229; *Minnesota* v. *Northern Securities Co.*, 184 U. S. 199.

The subject matter of this suit is the navigable capacity of navigable waters of the United States. Any finding of an interest of the states complainant in these waters, sufficient to maintain this action, would *ipso facto* establish the same interest of all states and *a fortiori* of the absent states littoral of the Great Lakes and of the states below Illinois bordering the Mississippi River. When the latter states were here as *amici curiae* in the case of the *Sanitary District* v. *U. S.*, 266 U. S. 405, this court decided against their inherent right in any *increase* in the diversion beyond that *authorized by law,* but there can be no doubt of their right to whatever diversion may be *authorized by law,* or of their right to be heard in a proceeding, such as this, which seeks a judicial investigation and determination of the question as to what amount of diversion has been, or may be, *authorized by law.*

As to the material and adverse interest of the United States, this is the identical subject matter which was involved in the suit instituted by the United States against the Sanitary District of Chicago. *Sanitary District* v. *United States,* 266 U. S. 405. In that case, this court held that the United States had, not only an interest, but the *paramount* and *controlling interest*—an interest "*imminent and direct*"—in that subject matter, and that the Sanitary and Ship Canal "has been * * * an object of attention to the United States as opening water communication between the Great Lakes and the Mississippi and the Gulf * * * which the United States, we have no doubt, would be most unwilling to see closed."

The amended bill asks that the taking of "*any water whatever* from Lake Michigan" be enjoined, that the amount of diversion "reasonably required for the purpose of navigation" be determined and that the determination of the Secretary of War, acting for Congress, of the amount of diversion proper in the regulation of navigation, be declared invalid and that the determination of this court be substituted therefor by a decree. Such a decree would injuriously affect the right of the United States, not only in its *exclusive* power to regulate interstate commerce in the Great Lakes, in the Sanitary and Ship Canal, and the Desplaines, Illinois and Mississippi Rivers, but also in all that has been done in creating the great national and international waterway of which the works here involved are a pivotal part. It would thus adversely affect the rights and interests of the United States in matters where, as this court said in the Sanitary District case, *supra, "the national importance is imminent and direct * * *."* The United States is thus a necessary and an indispensable party.

Whenever it appears "that to grant the relief prayed for would injuriously affect persons materially interested in the subject matter who are not made parties to the suit," the court will dismiss the cause, even where the point is "not raised by the pleadings or suggested by * * * counsel." (*Minnesota* v. *Northern Securities Co.,* 184 U. S. 189), and this, even though such other parties "cannot be joined without ousting jurisdiction." (*State of California* v. *Southern Pacific,* 157 U. S. 229.)

It is clear, therefore, that the amended bill is defective and should be dismissed, for want of essential parties, whose rights would be vitally and adversely affected if the relief sought were granted.

III.

The bill well avers no injury.

The burden of the bill is that the level of the lakes is lowered six inches. This is not, and is not asserted to be, the injury complained of, but the bill proceeds to name lake harbors within the states complainant and to describe some of the vessels plying those lakes as having "enormous carrying capacity." It explains that, with every inch of normal draft which a vessel is unable to use, freight costs proportionately increase above their lowest possible minimum. All this is no more than an obvious essay on the mechanics of buoyancy and the economics of freighting. It avers no injury. On the contrary it is meticulously careful not to specify, in any case, harbor depth, or vessel draft, or one single instance of an actual or threatened reduction in the carrying capacity of any vessel at any named port—in other words, one single instance of actual or threatened injury. Yet so cunning and so adept is the craftsmanship of the bill that, while saying nothing of the kind, it seems to say that *existing vessels* have actually had their capacity impaired *at the harbors named* by the diversion complained of, and that there has been loss to their people in freight rates due to reduced loading of existing vessels. What the finely fitted phrases actually say is that six inches deducted from a harbor's depth deducts six inches from the draft of the *largest vessel that could possibly enter it,* regardless of whether that vessel be built, building, or only imagined.

If this were the only consideration, what a field of dreams is here released! We do not know the depths of the named harbors, but to the extent that they *are* deep, vessels of "enormous carrying capacity" could be *imagined* more enormous still, until, for aught we know, freight rates would become infinitesimal. The true theory of the bill reduces to an absolute right in such musings and an actionable injury occasioned by six inches reduction in the field of fancy's flight. Remote is this and most illogical. For there *are* other considerations. In the first place, no argosy, sailing outside fiction, ever took or denied a harbor on the margin of a six-inch clearance. That aside, were harbors never so deep as those named, either before or after the claimed diversion, it by no means follows (as it must follow if this action is to lie on its own averments) that ships are or could or would be built to their measure. ***Many*** considerations control the draft of ships, for example, the minimum depths of their prospective route at whatever place that may be. There is nothing either in the bill or in the field of reason to argue that place, in this case, to be these harbors or any of them, and only the harbors are named as the locii of the injury. Ship design is also controlled by the character of waters, ship-canals, and of *all* ports, rapids and bars which they must ply—the purpose for which they were designed as to speed, cargoes and length of run—it were useless to go on with this. If lake ships ever reduced their cargoes to accommodate six inches lost at any of these harbors by act of the State of Illinois—if there were a single reasonable threat of such a result—it would have been a simple matter to ascertain the facts and state them with precision. Such an averment is not made even in general. We find here only words and phrases neatly arrayed to make them seem to say the thing they say not. The thing they do say is not even a *threatened injury*. It is a dissertation on irrelevant possibilities and fanciful at that. No injury at all is averred.

The State of Wisconsin (but none of the other states complainant) labors and attempts to produce an injury thus; if harbor depths are lessened, the largest ships that could enter them would take smaller cargoes, thus increasing lake freights and hence the cost of coal for public buildings. This is fanciful and remote. There is no showing that any freight rate ever had been so increased, or that lake rates control freight rates in Wisconsin. Even if such a showing were possible the injury would obviously be infinitesimal.

The injury of its citizens (if there were any such injury) is not the injury of the state and it cannot be made so for the purpose of conferring jurisdiction on this court. The state cannot make its citizens' case its own "*and compel the offending state and its authorities to appear as defendants in an action brought in this court.*" *Louisiana* v. *Texas*, 176 U. S. 1; *New Hampshire* v.

Louisiana, 108 U. S. 76; *Oklahoma* v. *A. T. & S. F. Ry.,* 220 U. S. 277; *Oklahoma ex rel West* v. *Gulf C. & S. F. Ry.,* 220 U. S. 290.

Even if there were just such a result as the one the bill seems to relate, it is such an incident of national progress as is not actionable. In *Miller* v. *Mayor of New York,* 109 U. S. 394, the court said, speaking of a similar result: "* * * However much it may * * * affect the business of private persons * * * it cannot on that ground be the subject of complaint before the courts. Every public improvement whilst adding to the convenience of the people at large affects, more or less injuriously the interests of some."

For the purpose of "making weight," the bill asserts that before the stupendous national project of linking the Great Lakes-St. Lawrence basin with the Mississippi system was consummated by the canal here complained of, there *was* a navigable waterway from Lake Michigan to the Mississippi, which this great engineering work has displaced. The court will take judicial notice of the map and of Holy Writ. Jacob was not "*injured*" in the exchange of birthrights and red pottage. Only complainants sore pressed for facts would conjure up an "injury" such as this and we notice it only to say that, if the exchange of a waterway 25 feet deep and 160 feet wide (*Sanitary District* v. *United States, supra*) for two reedy creeks and a portage across a continental divide be an injury to navigation, the federal government and not these states is the party to complain of it. If there *were* an injury it would not be to the states complainant but only to a few of their citizens and we have already shown that a state cannot make its citizens' case its own, in such matters as this.

Similar in weight, cogency and inappropriateness, is the averment of "injury" occasioned to these complainants through the use by Illinois of waters wholly within the state for sanitary purposes therein. The "injury" is an alleged pestilential condition in Illinois. The court will again take judicial notice of the map. There it will see populous, prosperous and rapidly growing communities, pleasure parks, and new and extensive residential districts starred all along this water course. It will see rail and state highways, the latter recently built, snugly paralleling the "pestilential" way. It will take judicial notice of its own proceedings. There it will observe (*Sanitary District* v. *United States, supra*) four states and six of the more progressive commercial associations in the United States, filing here in the name of Interstate Commerce, a brief seeking, no longer ago than last October, to perpetuate the precise conditions complained of. In *Missouri* v. *Illinois,* 200 U. S. 496, it will find itself deciding that the acts complained of create no such injury to commerce as is here averred. In the bill itself, and in the narrative above, it will learn that control of the acts complained of and their effect on commerce and navigation is and for many years has been under the supervision and control of the United States, a circumstance which should throw much light on the degree of substance in the assertions and which as shown elsewhere herein is, for other reasons, sufficient to abate even the hypothesis of injury to these states.

But, the foregoing sufficient considerations quite apart, to aver well a juridical injury in this alleged public nuisance these states complainant must show some *direct and special* injury. (*Northern Pac. R. Co.* v. *Whalen,* 149 U. S. 157; *Mississippi, etc., R. Co.* v. *Ward,* 2 Black 485; *Georgetown* v. *Alexandria Coal Co.,* 12 Pet. 91.)

The waters, alleged to be polluted, lie wholly without and below all of the complainant states. The alleged injury is the impairment, by pollution, of the navigability of certain navigable waters of the United States, lying wholly within the State of Illinois. It is not averred that any of the complainant states themselves navigate these waters. The injury averred is to the *citizens* of these states, and then only when they leave the states complainant and navigate waters wholly within Illinois. But the right of the citizens of the states complainant to navigate these foreign waters is a right common to the citizens of all the states and, as we have already shown, the state cannot make its citizens' case its own.

There is a further averment that the availability of certain portions of the Chicago River as an inner harbor has, by swift current and obstruction, been impaired and that freight once *there* accommodated can be *there* accommodated no longer, but since there is no averment that it is not elsewhere and better accommodated in the Chicago harbor (as it is) or that any state or person is in the slightest degree inconvenienced by the change (as none is), the averment recites no injury, and, indeed, there is none. And, if there were, it would be an injury to a few navigators, citizens of the states complainant, and not to the states.

Thus, both upon established legal principle and upon an analysis of the language of the complaint, it will be found that the element of injury, which is absolutely essential to the maintenance of this action, is altogether missing from the averments of the amended bill.

IV.

There was never a property right in the states complainant in the navigable capacity of these waters.

This action is based on a pretended "*common law right*" of the states complainant in the "*natural navigable capacity*" of Lake Michigan, and a pretended "*common law right*" of the people of those states in the navigation of four of the Great Lakes and the navigable waters between and from those lakes into the Mississippi River and the Atlantic Ocean. The bill avers that it is brought on behalf of those states "*in their proprietary capacities*" and "*on behalf of the people of said several states for the purpose of establishing and protecting the legal rights of said states and their people.*"

A juridical right is essential to the predication of a juridical injury and to sue in the original jurisdiction of this court, a state must show just such an element of right as an individual must show in order to maintain a suit in any proper jurisdiction. *South Carolina* v. *Georgia,* 93 U. S. 4; *New Hampshire* v. *Louisiana,* 108 U. S. 76; *Wisconsin* v. *Pelican Ins. Co.,* 127 U. S. 265; *Louisiana* v. *Texas,* 176 U. S. 1; *Cal.* v. *So. Pac.,* 157 U. S. 261; *Oklahoma* v. *A. T. & S. F. Ry.,* 220 U. S. 277; *Oklahoma Ex rel West* v. *Gulf C. & S. F. Ry.,* 220 U. S. 290. No such right is here averred. The pretended "common law right," of the states complainant, or of their people as citizens of those states, in the "natural navigable capacity" of the Great Lakes and other navigable waters of the United States as well as the characterization of the appearance here of those states as being in "their proprietary capacities," are all misconceptions of established law.

The rights of states in the commerce and navigability of their waters are *not proprietary rights* such as are certain aspects of ownership of lands under those waters or their riparian rights of user of waters along their shores; rather they are attributes of sovereignty such as the rights to coin money or keep troops and ships of war—*sovereign rights* held in trust by states for the peculiar and preferred benefit of their *own* peoples. (*Gibbons* v. *Ogden,* 9 Wheat. (U. S.) 1; *Long Sault Development Co.* v. *Kennedy,* 212 N. Y., 1; *Martin* v. *Wad-*

dell, 16 Pet. 367; *Illinois Cent. R. Co.* v. *Illinois,* 146 U. S. 387; *Shively* v. *Bowlby,* 152 U. S. 1; *The Daniel Ball,* 10 Wall. 557; *Hardin* v. *Jordan,* 140 U. S. 371.)

Whatever may be the role in which these states complainant appear, it is *not* in their "proprietary capacity" and the bill errs in so averring. Neither these states nor their people have any property rights in the navigable capacity of these inland seas. Nor does Wisconsin take anything by her labored and fanciful property right to lower freight rates on coal for public buildings. It is remote, insignificant (we believe non-existent) and it is not well averred. The other states complainant do not aver it at all. Even if it should exist in theory it is infinitesimal and too remote to be entertained here; (*New York* v. *New Jersey,* 256 U. S. 296; *Kansas* v. *Colorado,* 206 U. S. 117; 2 *Story Com. on Equity* 203, 204.)

They must demonstrate *some* right to predicate their injury or their action floats, like Mahomet's coffin, supported by naught. The right they *claim* is navigation. That they have misnamed it is important in this, that since it is the sole right on which they rest and is *not* proprietary, they are here in no *proprietary* capacity whatever. The right they claim, if right it be, is sovereign or it is nothing. But there is no such sovereign right. (See Point V. *infra.*)

V.

Sovereign rights of the states complainant in the navigable capacity of these navigable waters have been completely appropriated by the United States to the exclusion of the States.

1. By the Constitution.

That, at common law such attributes of sovereignty, as would support this suit—such rights in such waters—

subsisted in states, no one will deny, and, doubtless, the repeated reaching of the bill toward "common law rights" refers to this. But it is doctrine almost too familiar to require cited support that, upon their federation or admission, the states of *this* Union surrendered to the general government precisely that attribute of sovereignty relating to navigation upon which alone this bill is based. *Gibbons* v. *Ogden*, 9 Wheat. 1 pp. 187, 189, 198, 200, 201, 209; *Gilman* v. *Philadelphia*, 3 Wall. 713-724; *South Carolina* v. *Georgia*, 93 U. S. 4. The *Common law* and sovereign right of the several states became the *Constitutional* and sovereign right of the United States. That benefit held in trust for its people by each state broadened to all the navigable waters, and was conferred on all the people of the United States. Thereby the trustee and sole vindicator of these rights became the general government and ceased to be the states. There is thus no such right as that averred remaining, at common law or otherwise, in either these states complainant or their people as citizens of these states—no right—no injury—no cause of action justiciable in this court.

In the first Wheeling Bridge case, *supra*, the question of the right of the State of Pennsylvania to appear here to seek from this court regulation of navigation as against another state was not discussed. But in *Louisiana* v. *Texas*, 176 U. S. 1, this court in deciding that it had no jurisdiction to consider a cause such as the instant case said: "In *Pennsylvania* v. *Wheeling Bridge*, 13 How. 518, the court treated the suit as brought to *protect the property* of the State of Pennsylvania." In the first case the claimed obstruction was a low horizontal barrier thrown directly athwart an avenue of commerce. This court held that the nuisance complained of could "be ascertained by measurement * * * it is a nuisance * * * it is shown by mathematical demonstration." In such simple circumstance it may well be that there was involved no such "regulation of commerce" as would invoke the consideration so obvious here. But in this case the questions to be determined involve the fluctuation of waters from the Lower Mississippi to the Gulf of St. Lawrence, the relative rights of all the states, the relations of the government with foreign nations, and a constant and continuous regulation and administration—action that could not possibly be undertaken by this court without interfering with the express powers of Congress.

It is believed that all cases where a state has successfully invoked the original jurisdiction of this court to secure decrees affecting the regulation of commerce were based on some such unimpeachable right of state sovereignty as the protection of its property or the health and comfort of its people (*Missouri* v. *Illinois,* 180 U. S. 208; *New York* v. *New Jersey,* 256 U. S. 296; *Pennsylvania* v. *West Virginia,* 262 U. S. 553; *Kansas* v. *Colorado,* 206 U. S. 46; *Georgia* v. *Tennessee Copper Co.,* 206 U. S. 230.)

But where, as here, a state bases its injury on its alleged sovereign right to have a *status quo* preserved in navigable capacity of navigable waters of the United States, the court must answer in accord with its answer in the case of *Louisiana* v. *Texas,* 176 U. S. 1, dismissing a somewhat similar bill on demurrer; "* * * *the vindication of the freedom of interstate commerce is not committed to the State of Louisiana*" See also *Oklahoma* v. *A. T. & S. F. Ry.,* 220 U. S. 277; *Oklahoma Ex rel West* v. *G. C. & S. F. Ry., et al.,* 220 U. S. 209. In the case of *New York* v. *New Jersey,* 256 U. S. 296, the property and the health and comfort of the citizens of the complainant were directly involved and the United States intervened asserting its paramount right in navigation. In the first Wheeling Bridge case, as we have shown above, this court construed the case to rest on property rights of Pennsylvania and not on the right claimed here, *i. e.*, sovereign rights in the navigable capacity of national navigable waters. On whatever theory it rested, its outcome was not a very happy one for the contention for regulation of navigation by this court. In the interval between the first *Wheeling Bridge* case, 13 How. 518, and the second *Wheeling Bridge case*, 18 How. 421, Congress found to be *not* an obstruction the same bridge which this court had previously found to *be* an obstruction. This circumstance seems to argue strongly against the expediency of two tribunals regulating that which, by its nature requires singleness of control.

A projection of the contrary contention discloses it as subversive of the very purpose of the Constitution. The rights of all states in navigable capacity of national and international waters, are equal and the rights of the nation are paramount. If this action lies, so do 49 similar actions lie—one by the United States and one by each of the 48 states. But to avoid such a result was the prime if not the controlling purpose of the adoption of the Constitution itself and beyond question it was the precise purpose of the Constitution in establishing the United States as the true and only conservator of the rights of these states, and of all states, and of the people of these states, and of all states, in matters such as this. Contrary doctrine is a counsel of confusion and should not prevail.

2. Such sovereign rights of the states complainant as are indispensable to support this suit have been completely and exclusively appropriated to the United States by general acts of Congress assuming exclusive control of navigable waters of the United States.

The Great Lakes are navigable waters of the United States (*The Propeller Genessee Chief,* 12 How. 443; *U. S.* v. *Rodgers,* 150 U. S. 249; *Illinois Central R. R.* v. *Illinois,* 146 U. S. 387; *Escanaba and Lake Michigan Co.* v. *City of Chicago,* 107 U. S. 678; *Cummings* v. *Chicago,* 188 U. S. 410; *Economy Light & Power Co.* v. *U. S.,* 256 U. S. 113.) They are more—they are international waters (Moore International Law Digest Vol. 1, p. 675; Hyde International Law 1922, Vol. 1, pp. 320-321; *The Propeller Genessee Chief, supra,* pp. 453-454; *Moore* v. *American Transportation Co.,* 24 How. 1, pp. 37-38; *U. S.* v. *Rodgers,* 150 U. S. 249, p. 258; *Boundary Water Treaty of January* 11, 1909, 36 St. at L. 2448; *U. S.* v. *Chandler Dunbar Water Co.,* 229 U. S. 53, at p. 67.) Subjects of commerce which require a general system or uniformity of regulation are national in character and as to such subjects the right of the United States is exclusive of the right of states. (*Minnesota Rate Cases,* 230 U. S. 352; *Covington & Cincinnati Bridge Co.* v. *Kentucky,* 154 U. S. 204; (*summarizing cases on this principle*) *Wilmington Transportation Co.* v. *R. R. Commission of California,* 236 U. S. 151; *Sanitary District* v. *United States,* 266 U. S. 405.) Navigation of the Great Lakes being international in character (*cases supra*) requires uniformity of control and therefore exclusive right in the nation. *Lord* v. *Goodall S. S. Co.,* 102 U. S. 541, p. 544; *Henderson* v. *Mayor of N. Y.,* 92 U. S. 259, p. 273.

Prior to the enactment by Congress of the acts of September 19, 1890 (26 Stat. at L. 454) and March 3, 1899, (30 Stat. at L. 1151) it had been held by this court that there remained in states a vestigial right in the navigable capacity of the interstate navigable waters of the United States in matters purely local in character and incidental to and aiding commerce. (*Cooley* v. *Board of Wardens,* 12 How. 299; *Mobile County* v. *Kimball,* 102 U. S. 691; *Morgan's Co.* v. *Louisiana Board of Health,* 118 U. S. 455; *Parkersburg, etc., Trasnportation Co.* v. *Parkersburg,* 107 U. S. 691.) But by the enactment of these statutes, as this court has consistently and repeatedly held, *the United States assumed complete and exclusive right in respect of the navigable capacity of interstate waters.* "By the act of September, 1890, Congress inaugurated a new policy of general, direct control over the navigable waters of the United States." *Southern Pacific Co.* v. *Olympian Dredging Co.,* 260 U. S. 205; *U. S.* v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690; *Lake Shore and Michigan Southern Ry. Co.* v. *Ohio,* 165 U. S. 365; *Cummings* v. *Chicago,* 188 U. S. 410; *Union Bridge Co.* v. *U. S.,* 204 U. S. 364; *Philadelphia Co.* v. *Stimson,* 223 U. S. 605; *U. S.* v. *Chandler Dunbar Water Co.,* 229 U. S. 53. It is to be noted that the first *Wheeling Bridge* case, *supra,* was decided before this legislation.

Guided by the report of the Joint International Waterways Commission, January 4, 1907, the United States negotiated a treaty with Great Britain, proclaimed May 13, 1910 (36 Stat. at L. 2448). The report of the Commission had concluded, *inter alia*: that to avoid polluting Lake Michigan, Chicago must dispose of the sewage, otherwise than in the lake; that to reverse the rivers into which Chicago drains sewage during violent storms, 10,000 c. s. f. must be diverted through the Chicago River; that while not authorized by Congress "there seems to be a tacit general agreement that no objection will be made to the diversion of 10,000 c. s. f.;" that such diversion of 10,000 c. s. f. will render practicable a waterway to the Mississippi River 14 feet deep; that the diversion at Chicago has lowered and will lower the lake levels. The treaty provided (Article 2) that diversions *already existing* should not give rise to the international remedies provided for subsequent diversions and (Article 3); that, in addition to diversion already permitted, other *obstructions* or diversions *affecting the natural level of boundary waters on the other side* should be permitted *only with the approval of an International Joint Commission;* and (Article 4) that neither government will permit obstructions in "*waters flowing from boundary waters,*" the effect of which will be to *raise* the natural level of waters on the other side of the boundary, except with approval of the International Joint Commission; and (Article 4) that boundary waters *shall not be polluted* on either side to injury of health and property on the other. By concurrence of the executive and Senate of the United States, we have here an undertaking by the Government to a foreign government utterly inconsistent with any theory of residual right *in a state* to maintain such a bill as this and equally inconsistent with the relief sought by this bill. That treaty preserved the existing diversion by Illinois. That diversion could not now be abated by the decree sought without affecting the level of the lakes existing at the time of the treaty, or without polluting the waters of Lake Michigan, or without making a radical and violent change both in the state of facts and in the understanding of national plan and policy upon which the treaty was negotiated.

Thus, whatever may have been the right of a state to seek regulation of navigation at the hands of this court. prior to the affirmative assumption by Congress of its complete right of exclusive control of that subject by the general acts and the treaty cited above, it is abundantly apparent now that, with the integration and definition of the subject under the increasing complexities of modern economic and political relations, Congress has now, by general legislation and political engagements such as are cited above, appropriated such sovereignty and control of the subject, and given its administration such a political color, as to remove it entirely from the sovereignty of states and the adjudication of such questions as are here presented from the jurisdiction of this court.

3. The right of the states complainant to maintain this suit has been entirely obliterated by particular legislative, executive and judicial acts of the United States assuming complete control of the very acts complained of and of every matter or thing affected by them.

At the very beginning of its existence, the Federal Government recognized the route of the Sanitary and Ship Canal as of the utmost importance in any general plan of inland navigation of the United States (Treaties of 1795 and 1816) and contemplated Illinois as the locus and instrumentality of the work (Acts of 1818, 1822 and 1827). By the latter two acts is authorized *a* canal uniting the waters of the Illinois River with those of Lake Michigan, and, since the former is lower in altitude, the Act of 1827, by necessary implication, authorized the permanent diversion of water from Lake Michigan into the Missouri-Mississippi system. The amount of diversion was not specified but, since the Act was providing for a most important navigation and wisely allowed for the expansion of the canal to meet the expanding necessities of commerce and increasing magnitude of ships and other facilities of navigation, it cannot be doubted that this "affirmative authorization by Congress" was for the permanent diversion of a large amount of water. It is most difficult to suppose that such organic and fundamental authorization contemplated only the rudimentary canal first built or only the small amount of water necessary to float the slight craft then used in inland navigation. The Act employed no such limiting terms. Determination of the precise amount of water appropriate to a proper regulation of the changing requirements of navigation is inherently a legislative and administrative question which can find no place in this controversy. It is sufficient that Congress authorized the canal and diversion of water through it for the purpose of connecting Lake Michigan with the Illinois River, and that it did so in the exercise of its power to regulate commerce among the states and that it later entrusted to the Secretary of War the function of permitting or denying any increased diversion. "It is for Congress * * * to regulate the right of navigation by all appropriate means * * * . Its action in the premises cannot be revised or ignored by courts or by juries * * * ". *Monongahela Bridge Co.* v. *U. S.*, 216 U. S. 177; *Wisconsin* v. *Duluth*, 96 U. S. 379; *Southern Pacific* v. *Olympian Dredging Co.*, 260 U. S. 205; *Gilman* v. *Philadelphia*, 3 Wall 713; *U. S.* v. *Chandler Dunbar Co.*, 229 U. S. 53. These acts alone are sufficient to dispose of the complainants' claim to an absolute right in the natural navigable capacity of these waters and their prayer to abate the canal by forbidding the diversion of "any water whatever" through it or to have this court attempt to proportion diversion or to regulate navigation and sewage disposal to whatever measure the court may determine is appropriate to the requirements of commerce.

If it be said that the Ship and Sanitary Canal is not identical with the Illinois-Michigan canal, the history of both shows clearly that the former is a logical and orderly evolution of the latter; that what was contemplated by Congress was *a* canal to accommodate the growing requirements of navigation; that Congress never did specify a particular canal; that by successive developments, the rudimentary original canal became the present great waterway, and that every step and the effect of every step of those developments were alertly observed by the United States Corps of Engineers and promptly reported to Congress, which, to this day, has not complained of, or dissented from, any act of the State of Illinois in respect thereof. There can be no question of affirmative authorization by Congress of the project of the waterway and of the permanent diversion of water from Lake Michigan through it. The only conceivable question relates to the subsequent federal authorizations of increased *amounts of diversion* and whether they were consistent with proper regulation of commerce. While the latter question is not properly considered here, it is important to observe that the government, acting through all of its three great branches, has consistently authorized and controlled such diversion to such an extent that, *even had there been no statutes of* 1818, 1822 *and* 1827, *the states complainant would have no action here.*

The Act of 1899, about which so much has been said in this case, announced the general rule by which Congress elected to exercise its regulation of the navigable capacity of the navigable waters of the United States. Much has been said of its proper interpretation and that subject will be discussed in Point VI *infra.* Suffice it here to say that, under the alert and constant supervision of the officers of the United States, every act of the State of Illinois in the construction of the works of the canal and the diversion of waters through it, was observed by Congress and specifically authorized and approved by the Secretary of War, in precise accord with the method prescribed by Congress, in that statute, for the authorization and legitimization of works and acts affecting the navigable capacity of the waters of the United States. The decisions of this court are uniform that acts so authorized are acts done in the proper legislative and administrative regulation of interstate commerce and, as such, are beyond impeachment in this court, in any attempts to vindicate the claimed right of any state or person. (As to acts done under authorization of the Secretary of War as provided by the Acts of 1890 and 1899, see *Sanitary District* v. *United States,* 266 U. S. 405; *Southern Pacific* v. *Olympian Dredging Co.,* 260 U. S. 205; *Monongahela Bridge Co.* v. *U. S.,* 216 U. S. 177; *Louisville Bridge Co.* v. *United States,* 242 U. S. 407; *United States* v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690; *Cummings* v. *Chicago,* 188 U. S. 410; *Economy Light & Power Co.* v. *United States,* 256 U. S. 113. As to acts done in respect of navigation under color of other authority of the United States, *Wisconsin* v. *Duluth,* 96 U. S. 379; *South Carolina* v. *Georgia,* 93 U. S. 4; *Second Wheeling Bridge case,* 18 How. 421.)

In addition to acts by Congress and by administrative officers under the authority of Congress in respect of the canal and diversion through it, Congress has acted affirmatively in respect of each and every of the waters claimed to be affected by the canal and the diversion. (See Appendix I.) An examination of these acts will disclose that the same power (Congress and administrative officers acting thereunder), which projected and authorized the diversion of waters *away* from Lake Michigan and the ports of the Great Lakes were and constantly are, as alert to *improve and foster* those ports and waters. As a part of an integral plan to regulate and improve navigation for the nation, the Federal Government has assumed responsibility for those harbors and has so altered, modified and improved their "*natural navigable capacity*" as to make them practicable for shipping on the Great Lakes. This it did as part of the same great scheme of inland navigation which included diversion of waters through the canal. It is a curious contention that these states complainant have a right to have restored the "*natural* navigable capacity" of these waters by a frustration of one part of this integral plan, when it is obvious that they would assail high heaven with their protests if it were even suggested that the "*natural* navigable capacity" of these waters should be restored by a withdrawal of the benefits flowing from the same fostering hand through another part of the same plan.

Congress has covered the whole field, if not by the general acts discussed in Point V-2 *supra*, then surely by the particular acts discussed herein. These states complainant cannot have their cake and eat it. In this regard, as in all others, there appears the incongruity of the claim made with every principal theory of the government ordained by the Constitution.

But the particular acts of the United States in regulating and assuming control of all the modification in navigable capacity here complained of, are not confined to the legislative and executive branches of the Federal Government. It has acted upon them also through its judiciary. In *Missouri* v. *Illinois,* 180 U. S. 208, this court, at the suit of Missouri (based on a perfectly defensible sovereign right in the state and *not* the right here asserted) examined the state of affairs claimed in the instant bill to be an impairment of navigable capacity by pollution and decided against the contention. And in the case of *Sanitary District* v. *United States,* 266 U. S. 405, this court at the suit of the United States addressed itself to every object, right, matter or thing concerned in the present suit and sustained the authorization of Congress by the Secretary of War of the diversion here complained of and enforced that authorization by a decree. Thereafter the Secretary of War issued another permit, by the express terms of which every act of diversion by the defendant Sanitary District, is now, and in the future will be, done under the *supervision of the United States District Engineer at Chicago and at certain times under his direct control.* (See p. 31 amended bill of complaint.) The acts complained of are the acts of the United States.

There remains in the states complainant no scintilla of right on which to base this bill. The right they assert was aforetime sovereign in states. *That* attribute of sovereignty they surrendered to the United States. If any remnant for a time remained by consent or complaisance of the nation, the last vestigal shadow of it in respect of the subject here addressed has been absorbed by the vigorous action of the United States by every agency of its organization. By its legislature it has promulgated laws governing the very acts complained of and every object affected by them. By its judiciary, at the instance of its executive, it has examined and effectually controlled the very acts complained of. By concurrence of its executive and its Senate, it has undertaken obligations to foreign nations in respect of those acts and has submitted them to scrutiny (and even a measure of control) by a Joint International Commission. And finally, by its executive, under the authority of its legislature, it has undertaken actively and masterfully to regulate and direct those acts in general and particular, and, at this moment, has them under its own supervision.

VI.

Every act complained of was done by or under valid and proper authority of the United States.

In view of the comprehensive nature of the federal acts hitherto discussed governing every aspect of this case, it seems an act of supererogation to examine in further detail the nature of any particular act but, since there is an averment of the bill that the permits of the Secretary of War were invalid, under the Act of 1899 *supra,* for the purpose of authorizing the diversion complained of, it may be well to consider that question.

It should not be necessary to go beyond the decision in *Sanitary District* v. *United States,* 266 U. S. 405. There, with the full gravity of the case before it and with something of the same contention, this court, in addressing itself squarely to an interpretation of the act in question and affirming the validity of the authority and action of the Secretary of War, said: "This withdrawal is prohibited by Congress, *except so far as it may be authorized by the Secretary of War.*" It decreed an injunction of any diversion in excess of that permitted by the Secretary of War and limited its decree as "*without prejudice to any permit that may be issued by the Secretary of War according to law.*"

In *Louisville Bridge Co.* v. *United States,* 242 U. S. 407, the court said in construing the statute: "* * * The statute itself prescribed the general rule applicable to all navigable waters, and merely charged the Secretary of War with the duty of ascertaining in each case, upon notice to the parties concerned, whether the particular bridge came within the general rule." (See *Maine Water Co.* v. *Knickerbocker,* 99

Maine 473, cited with approval in *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, and in *Garrison* v. *Greenleaf Johnson Lumber Co.*, 215 Federal 578.) In *Monongahela Bridge Co.* v. *U. S.*, 216 U. S. 177, the court said: "Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject." (See also the opinion of the Attorney General of the United States of February 11, 1925, Appendix III.)

The contrary contention that the Act of 1899 requires *an Act of Congress* to satisfy the requirement of Section 10 that "any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited * * *," would make the succeeding provisions of that section meaningless and would paralyze the facilities of navigation in the United States. Obviously Congress cannot affirmatively authorize every obstruction and modification in the navigable capacity of the navigable waters of the United States. By the first clause of that section, obstructions are prohibited unless affirmatively authorized by Congress. By the second clause, certain specified structures are named and it is forbidden to *commence* building them without authority of the Secretary of War. By the third clause, modifications in navigable capacity are addressed, several species are named and they and modifications in general are prohibited without authority by the Secretary of War. The intendment seems clear and the only interpretation consonant with reason is that the question of whether particular works constitute obstructions in the sense of the statute is referred by the law to the Secretary of War. If he determines that they do *not* constitute "obstructions" in such sense, he may authorize them or not as the interests of navigation warrant. If he determines that they are obstructions in such sense only Congress can authorize them. If the Secretary of War determines that they are not obstructions and authorizes them, his act is the act of Congress under the statute. This is believed to be the meaning of the interpretation of the statute by this court in the *Louisville Bridge case, supra.* Neither in law nor logic does there seem to be any question of the authority of the Secretary to authorize this diversion.

But there is a faint suggestion in the bill that, regardless of what may be his statutory authority, the action of the Secretary is invalid as being a capricious or at least an inappropriate determination of the proper necessities of navigation. Every presumption is against this extravagant theory. In *Southern Pacific Co.* v. *Olympian Dredging Co.,* 260 U. S. 205, where it was contended that an authorization of the Secretary of War to leave sawed-off pilings of an old bridge athwart an avenue of commerce, was so obviously a conclusion not in the interests of navigation that the court should interfere, this court said: "Whether the limitation in this respect was grounded alone upon what the Secretary considered would be sufficient to secure the safety of navigation or upon the fact that, to leave the stumps in the bed of the river, would be of some positive service in stabilizing the shifting bed of the stream or useful in some other way, does not appear. *It was not for the petitioners, however, to question either his reasons or his conclusions.*" In *Martin* v. *Mott,* 12 Wheat., 19, this court said: "Whenever a statute gives a discretional power to any person to be exercised by him upon his own opinion of certain facts, it is a sound rule of construction that the statute constitutes him the sole and exclusive judge of the existence of those facts." See, also, *Mullan* v. *U. S.,* 140 U. S. 240.

Quite apart from this controlling principle, however, the history and circumstances of these works and their overwhelming importance to a great national project of inland navigation discloses that the suggestion of inappropriateness in the Secretary's action is entirely unwarranted. We find his action supported by the history of a century of development of a projected waterway from the Gulf of Mexico to the North Atlantic recommended by a profundity of technical reports, by agencies of the Federal Government and fostered by acts of Congress appropriating large amounts of money. Latterly, we find the plan taking the definite form of a projected 14 foot channel to and below St. Louis, and a diversion of 10,000 c. s. f. as necessary to maintain a practicable channel of that depth, not only in the link between Chicago and Lockport but equally for the free navigation of the Illinois, Desplaines and Mississippi Rivers north of St. Louis. We find a joint International Commission considering boundary waters between the United States and Canada, reporting favorably on a diversion far in excess of that complained of and for the purposes recited above. We find the Federal Government guided by that report negotiating a treaty with Canada which preserved the present diversion at Chicago and indeed undertook obligations toward the Dominion which are inconsistent with any theory of the right of a State to compel its abatement. With such information and history before him, there can be no doubt that the determination of the Secretary of War bore a just and reasonable relation to the regulation of navigation and was consonant with the purposes and the general plan of Congress for the regulation of commerce among the states and with foreign nations. Indeed, any other determination by the Secretary would have been such an obvious frustration of that purpose as to have invoked the immediate and serious consideration of Congress with a view to the revocation thereof.

CONCLUSION.

The tremendous gravity of the political and economic bearings of this case have only been hinted in this brief. They are doubtless fresh in the minds of the court from its recent consideration of all the facts in the case of the *Sanitary District* v. *United States,* 266 U. S. 405. Outstanding in that case, as in this, was the conclusion that the underlying questions involved were intrinsically political, legislative and administrative and certainly not judicial.

Surely the fate of a century-old national project of comprehensive water communications uniting two-thirds of the area of the United States with the Atlantic Ocean, or of a great sanitary establishment affecting the health and lives of a community of over three millions of people, or of the salubrity of that port and region through which filters the bulk of the commerce of our great inland empire, or of a matter inextricably concerned with our foreign relations with our most important neighbor, are not to be cavalierly resolved in the summary procedure of an injunction suit, brought by petitioners of tenuous and doubtful rights, even though those petitioners come clothed in the dignity of states of the Union.

The states complainant are, after all, merely four out of forty-eight, parties to a Federal compact. Their rights are not absolute. They are correlative of the complementary rights of all other states. The trustee of all rights in the navigable waters of the United States is the Federal Government which must administer them for the benefit and enjoyment of the whole nation. The arbiter of the nice balance between right and duty of the several states in matters such as this must necessarily be Congress, acting in its administrative and political capacity, and not this court in a judicial determination in a summary procedure, which must confine itself to the consideration of particular matters before it to the exclusion of all question of policy and expediency in adjusting the relations between sovereigns.

The bill is inappropriate to the subject matter of the suit, to the jurisdiction of the court, and to the nature of the questions involved and should now be dismissed without further proceedings.

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APPENDIX.

Appendix I.

Partial list of Acts of Congress and administrative acts of officers of the United States assuming control of the waters affected by this suit; also list of documents of which the court will take judicial notice, showing complete compliance by the Sanitary District with conditions of the permit of the Secretary of War of March 3, 1925.

The improvement and maintenance of navigation upon the Great Lakes system of waterways may be properly divided into two aspects:

(a) The improvement of the shallow and difficult waters connecting the lakes, in the absence of which they would not have been navigable at all:

(b) The dredging of harbors, building breakwaters and piers to accommodate such ships as could pass to and from the different lakes through their connecting waterways as they were from time to time improved. Upon this whole project, the United States has expended many millions of dollars.

I. CONNECTING WATERS.

Lake Superior and Michigan-Huron.

The low water depths in the original condition of the St. Mary's River, were from 5 to 17 feet: "Navigation past the Falls was entirely impracticable, except for down-bound canoes and log crafts." Previous projects for the improvement of navigation at the St. Mary's

River were provided by Acts of Congress of July 8, 1856 (11 Stat. L. 25), August 2, 1882 (22 Stat. L. 191), August 5, 1886 (24 Stat. L. 310). The existing project adopted in 1892, provides for 21 feet depth, low water. The navigable connection was provided by locks and canal and dredging various channels of the St. Mary's River below the Rapids. (Chief of Engineers Reports, 1924, p. 1457.)

Section 11 of the Rivers & Harbors Act of March 3, 1909, (35 Stat. L. 815, 820), provided for the freeing of the St. Mary's River of power plants to carry out fully the project of controlling the outflow of Lake Superior in order to prevent the surface elevation of Superior from being reduced as low or raised as high as would exist under natural conditions. This act and the project of the United States with reference to the St. Mary's River and the control of the outflow of Superior for the purposes mentioned, were considered by this court in

> *United States* v. *Chandler-Dunbar Water Power Company,* 229 U. S. 51, 57 L. Ed. 1063.

By the improvement of the United States at St. Mary's River and the control of the outflow of Lake Superior, the relation of the surface elevation of Lake Superior to that of Michigan and Huron, has been entirely changed by the impounding at various times of water in Superior, and the releasing of such water at other times. By this means, the surface elevation of Lake Superior with reference to that of Michigan-Huron, has been at times higher and at other times lower than it would have been under normal conditions. This has affected the relation, likewise, of the surface elevation of Michigan-Huron to that of Lake Erie. Various improvements at and in the St. Mary's River are further shown by the Chief of Engineers Reports for the year 1924 (p. 1459).

Connection between Huron and Erie.

The St. Clair River.

In its original condition, the St. Clair River was obstructed by shoals at the foot of Lake Huron. The least depths varied from 16 to 18 feet. The present depths provided by existing projects are from 19 to 21 feet, as authorized by Congressional Acts of July 13, 1892 (27 Stat. L. 88), and by the Act of July 27, 1916. (U. S. Engineers Report 1924, p. 1466.)

Lake St. Clair.

The entrance to this lake was obstructed by bars, over which the least depth of water was from 2 to 6 feet. The original projects were authorized by Acts of Congress of March 2, 1867 (14 Stat. L. 418), and by the Act of March 3, 1873 (17 Stat. L. 560), whereby depths were provided of approximately 16 feet by dredging channels through the lake. The present projects provide for deepening of the channels 20 to 21 feet, as authorized by Acts of Congress of August 5, 1886 (24 Stat. L. 310), July 13, 1892 (27 Stat. L. 88), June 13, 1902 (32 Stat. L. 331), March 2, 1919. (United States Engineers Reports 1924, p. 1469.)

Detroit River.

The low water depth in its original condition, was 12½ to 15 feet. Previous projects for the improvement of navigation in the Detroit River were authorized by the Acts of Congress of June 23, 1874 (18 Ph. 3 Stat. L. 237), July 5, 1884 (23 Stat. L. 133), August 5, 1886 (24 Stat. L. 310), August 11, 1888 (25 Stat. L. 400), July 13, 1892 (27 Stat. L. 88), March 3, 1899 (30 Stat. L. 1121), by which depths were provided of at least 20 feet.

The existing project provides for approximately 22 feet in depth, according to Acts of Congress of June 13, 1902 (32 Stat. L. 331), March 3, 1905 (33 Stat. L. 1117), June 25, 1910 (36 Stat. L. 630), March 4, 1913 (37 Stat. L. 801), March 2, 1907 (34 Stat. L. 1073), June 25, 1910 (36 Stat. L. 630), March 2, 1919. (Chief of Engineers Reports, 1924, p. 1473.)

Connection betwen Erie and Ontario.

The impossibility of passing from one lake to the other under natural conditions, and the necessity of providing such communication solely by canal, is so well known that it is unnecessary to call the court's attention to the various projects authorized by Congress for the construction of canals and for other improvements of navigation here.

II.

Harbor improvements by the United States.

All the harbors on the shores of these Great Lakes and their connecting channels, have been improved so as to provide depths from time to time as the navigable connections between the Great Lakes were improved, all pursuant to acts of Congress. Time and space will not permit our referring to all the different harbors showing the various improvements authorized by Congress. It will suffice to mention some of them, and the improvement of all of the various harbors on the shores of the Great Lakes are described in the various annual reports of the Chief of Engineers.

(a) *Marinette Harbor, Wisconsin.*

Thirteen feet depth was provided by Act of Congress of March 3, 1871 (16 Stat. L. 538), 15 feet by the Act of September 15, 1890 (26 Stat. L. 426), 18 feet by the Act of March 3, 1899 (30 Stat. L. 1121). Other improvements of the harbor were provided by Acts of July 13, 1892 (27 Stat. L. 88), June 13, 1896 (29 Stat. L. 202), June 13, 1902 (32 Stat. L. 331), March 4, 1913 (37 Stat. L. 801). (Chief of Engineers Reports, 1924, p. 1327.)

(b) *Green Bay.*

The original depth of this harbor was 10 feet. Congress has by its acts provided a depth of 18 feet. The Acts of Congress for the various improvements are June 23, 1866 (14 Stat. L. 70), June 23, 1874 (18 Ph. 3 Stat. L. 237), Sept. 19, 1890 (26 Stat. L. 426), June 3, 1896 (29 Stat. L. 202), June 13, 1902 (32 Stat. L. 331), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1330.)

(c) *Sturgeon Bay Harbor.*

Depths of 19 feet had been provided by Acts of Congress of July 13, 1892 (27 Stat. L. 88), July 13, 1892 (27 Stat. L. 88), June 13, 1902 (32 Stat. L. 331). (Chief of Engineers Reports, 1924, p. 1343.)

(d) *Algoma Harbor.*

From the original 3 feet depth, Congress by its acts has provided for 14 feet March 3, 1871 (16 Stat. L. 538), March 3, 1875 (18 Ph. 3 Stat. L. 456), July 5, 1884 (23 Stat. L. 133), March 3, 1899 (30 Stat. L. 1121), and March 2, 1907 (34 Stat. L. 1073). (Chief of Engineers Reports, 1924, p. 1347.)

(e) *Kewaunee Harbor.*

From an original depth of 13 feet, Congress has by its Acts provided a depth of 18 feet. See Acts of Congress of March 3, 1881 (21 Stat. L. 468), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1350.)

(f) *Manitowoc Harbor.*

From an original depth of 4 feet, Congress has provided a depth of 18 feet by its Acts of August 30, 1852 (10 Stat. L. 56), March 3, 1881 (21 Stat. L. 468), September 19, 1890 (126 Stat. L. 426), June 3, 1896 (29 Stat. L. 202), and June 13, 1902 (32 Stat. L. 331). (Chief of Engineers Reports, 1924, p. 1357.)

(g) *Sheboygan Harbor.*

From an original depth of 4 feet, Congress has provided a depth of approximately 19 feet by its acts of June 23, 1866 (14 Stat. L. 70), March 3, 1873 (17 Stat. L. 560), March 3, 1881 (21 Stat. L. 468), August 18, 1894 (28 Stat. L. 338), March 3, 1899 (30 Stat. L. 1121), June 13, 1902 (32 Stat. L. 331). (Chief of Engineers Reports, 1924, p. 1360.)

(h) *Port Washington Harbor.*

From an original depth of but a few feet, Congress has provided a depth in this harbor of 16 feet by its Acts of July 11, 1870 (16 Stat. L. 223), August 14, 1876 (19 Stat. L. 132), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1364.)

(i) *Milwaukee Harbor.*

From an original depth of 4½ feet, Congress has provided 19 feet depth and has made various other improvements by its Acts of March 3, 1843 (5 Stat. L. 619), August 30, 1852 (10 Stat. L. 56), April 10, 1869 (16 Stat. L. 44), March 3, 1881 (21 Stat. L. 468), March 3, 1899 (30 Stat. L. 1121), June 13, 1902 (32 Stat. L. 331), March 2, 1907 (34 Stat. L. 1073), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1367.)

(j) *Racine Harbor.*

From an original depth of 2 to 3 feet, Congress has provided a depth of 19 feet by its Acts of June 23, 1866 (14 Stat. L. 70), March 3, 1899 (30 Stat. L. 1121), June 13, 1902 (32 Stat. L. 331), March 2, 1907 (34 Stat. L. 1058), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1372.)

(k) *Kenosha Harbor.*

From an original depth of 2 feet, Congress has provided approximately 19 feet by its Acts of August 30, 1852 (10 Stat. L. 56), June 23, 1866 (14 Stat. L. 70), September 19, 1890 (26 Stat. L. 426), March 3, 1899 (30 Stat. L. 1121), March 2, 1907 (34 Stat. L. 1073). (Chief of Engineers Reports, 1924, p. 1376.)

(l) *Superior Harbor or Bay.*

From an original depth of 8 to 9 feet, Congress has provided depths of approximately 20 feet by its Acts of March 3, 1873 (17 Stat. L. 560), and March 2, 1867 (14 Stat. L. 418), and June 3, 1896 (29 Stat. L. 202). Under the latter act the improvement of the Harbors of Duluth and Superior was bound as one project. All the conditions here were considered by this court, and it was held that the United States had and had assumed exclusive jurisdiction over Duluth and this harbor. (See *Wisconsin* v. *Duluth*, 96 U. S., p. 379.) (Chief of Engineers Reports, 1924, p. 1282.)

(m) *Ashland Harbor.*

Congress has provided for improvement of this harbor by its Acts of August 5, 1886 (24 Stat. L. 310). The original depth was 19 feet and 20 feet is provided by the United States. (Chief of Engineers Reports, 1924, p. 1292.)

The harbors above mentioned, constitute all the harbors along the Wisconsin shores mentioned in the amended bill. It would seem unnecessary to pursue the subject further as to other harbors of other states mentioned in said amended bill. As to the other harbors, Congress authorized improvements apace with the navigable facilities it provided generally upon the Great Lakes.

The United States has also consented to the construction by the Dominion of Canada of a dam across a channel of the Galops Rapids.

The outlet of Lake Ontario known as the "Gut Dam," which had the effect of permanently raising the surface elevation of Lake Ontario over its natural condition about 5 inches, as is shown by report entitled "Diversion of Water from the Great Lakes and Niagara River," made pursuant to Resolution Number 8, 65th Congress, the letter of the Chief of Engineers transmitting said report to the Speaker of the House of Representatives being dated December 7, 1920, to which is attached letter of the Chief of Engineers of November 9, 1920, and report of the Board of Engineers August 24, 1920, and to which is also attached the report of Col. J. G. Warren of August 30, 1919. (See page 378 of said "Report on diversion of water from the Great Lakes and Niagara River." Also see H. R. 762, 63d Congress, Second session.)

The diversion through the Welland Canal in Canada, Black Rock Ship Canal, New York State Barge Canal at Niagara Falls for water power purposes, from Lake Erie, has the effect of lowering the surface elevation of the water of Lake Erie .35 foot, or 4.20 inches. (See said "Report on Diversion of Water of the Great Lakes and Niagara River," p. 23.)

III.

Table showing appropriations by Congress for the improvements, in the years 1923 and 1924, of certain harbors of the Complaining States, referred to in the amended bill, as follows:

TABLE OF FEDERAL HARBOR APPROPRIATIONS FOR 1923 AND 1924.

Name of Harbor.	1923	1924
Manitowoc	$120,000.00	$.......
Duluth-Superior	35,000.00	27,000.00
Port Wing	4,000.00	1,500.00
Ashland	10,000.00	5,000.00
Grand Marais	6,000.00	8,000.00
Agate Bay	2,000.00	2,000.00
Sandusky	230,000.00	100,000.00
Warroad	....	4,000.00
Baudette	....	1,500.00
Menominee	....	5,000.00
Green Bay	....	10,000.00
Sturgeon Bay	....	15,000.00
Algoma	....	3,000.00
Kewaunee	....	6,000.00
Port Washington	....	3,000.00
Milwaukee	....	600,000.00
Kenosha	....	3,000.00
Racine	....	10,000.00
Toledo	....	40,000.00
Huron	....	12,500.00
Vermilion	....	2,000.00
Loraine	....	19,000.00
Cleveland	....	45,000.00
Fairport	....	65.000.00
Ashtabula	....	7,000.00
Conneaut	....	47,000.00
Erie	....	20,000.00
Total	$407,000.00	$1,061,500.00
Grand Total		$1,468,500.00

Note: Similar appropriations by Congress for the improvement of all of the harbors of the complainant states, mentioned in the amended bill, have been made from year to year for more than a quarter of a century, but a tabulation of them here would be unnecessarily burdensome.

IV.

List of official acts and records and public documents showing that the conditions of the permit of the Secretary of War of March 3, 1925, have been complied with, as follows:

Under condition 2, the cost of inspections made by the Engineers Corps United States Army from March 3, 1925, to September 30, 1925, amounting to $614.28, was paid by defendant Sanitary District October 14, 1925; the cost of such inspection and supervisory work from October 1, 1925, to November 30, 1925, amounting to $224.24, was paid by defendant Sanitary District December 17, 1925.

Under condition 4, schedule of design and construction of sewage treatment plants for period from 1925 to 1929, was submitted by Sanitary Dustrict to and approved by the District Engineer at Chicago on July 28, 1925, and in pursuance of said program for sewage treatment works so approved, the following contracts were let by defendant Sanitary District for sewage treatment on the dates shown below. (See proceedings of the Board of Trustees of Sanitary District for the respective dates.)

August 6, 1925—95th Street Sewer Connection	$ 44,720.00
August 20, 1925—Operating Galleries, North Side Treatment Plant	316,090.00
Sept. 17, 1925—Preliminary Tanks and Grit Chambers, North Side Treatment Plant	801,665.80
Sept. 17, 1925—Dredging Calumet and Little Calumet Rivers	1,080,000.00
Oct. 1, 1925—Motors and Pumps, North Side Treatment Plant	35,475.00
Oct. 1, 1925 — Miscellaneous Electrical Equipment, North Side Treatment Plant	22,900.00
Oct. 8, 1925—Contract No. 7, North Side Sewer	384,560.00
Oct. 8, 1925—Contract No. 8, North Side Sewer	354,200.00
October 15, 1925—Elevators, North Side Treatment Plant	13,734.00
Oct. 22, 1925—Air Conditioning Equipment, North Side Treatment Plant	29,900.00
Nov. 19, 1925—Pump and Blower House, North Side Treatment Plant	3,791,320.00
Total	$6,874,564.80

NOTE—Total expended for sewage treatment plants, pumping stations and the like (not including maintenance and operation to January 1, 1926)—$42,563,300—as shown by defendant Sanitary District's public records and documents.

Under condition 5, the million dollar bond provided to guarantee the payment of the cost of regulating or compensating works was approved by the Board of Trustees of defendant Sanitary District at its meeting of September 17, 1925 (see proceedings for said date), and was thereafter filed with and approved by and is in the possession of the War Department.

Under condition 7, the supervision of the work has been and is under the United States District Engineer at Chicago, as shown by the bill for cost of inspections from October 1st to November 30, 1925.

Under condition 8, on September 1, 1925, the City Council of the City of Chicago passed an ordinance (see proceedings of City Council for that date), adopting a program for metering at least 90 per cent of its water service, and for the execution of said program at the average rate of 10 per cent per annum.

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
537 South Dearborn Street
Chicago, Ill.

Address reply to
THE DISTRICT ENGINEER.
Refer to File No. M. A. 25.
(Chi. R. 140/688).

December 8, 1925. HLP.

The Sanitary District of Chicago,
910 S. Michigan Ave.
Chicago, Ill.

	Dr.
To United States Engineer Office, Chicago, Ill. Oct. 1 to Nov. 30, 1925. Incl.	$2,224.24

To reimburse federal appropriations for the cost of supervising work done under permit signed by the Chief of Engineers, U. S. Army, and the Secretary of War on March 3, 1925, authorizing "The Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8500 cubic feet per second, the instantaneous maximum not to exceed 11000 cubic feet per second."

Services:		
The District Engineer, Major Rufus W. Putnam, 2 days at $15.55	$ 31.10	
Asst. Engr. J. W. Woermann, 8 days at $10.555	84.44	
Asst. Engr. F. H. Doddridge, 1⅓ months at $250.00	333.33	
Junior Engr. A. T. Grohmann, 1 month	200.00	
Inspector Harry Lallo, 1 month	153.33	
Survey Party, 6 men, 1 month	774.99	
Crew, Motor Launch, "Whistler," 6 days at $9.466	56.80	
		$1,633.99
Plant Rental:		
Survey Boat, "Calumet," 25 days at $7.47	186.75	
Motor Launch, "Whistler," 6 days at $8.40	50.40	
		237.15
Subsistence, survey party, 25 days at $4.80		120.00
Travel and per diem allowances:		
Lallo	$ 99.76	
Doddridge	99.76	
Grohmann	33.58	
		233.10
Total		$2,224.24

Certified correct:

RUFUS W. PUTNAM,
Major, Corps of Engineers,
District Engineer.

Please draw check payable to order of "Rufus W. Putnam, Major, Corps of Engineers, U. S. A."—and mail same to "U. S. Engineer Office, Room 1201, #537 S. Dearborn St., Chicago, Ill."

Appendix II.

The following citations of public documents and records is intended merely as a suggestion of the interest of the Federal Government and the constant and intimate information supplied to Congress. For the convenience of the court, a *precis* of the subject matter entitled, "Appellant's narrative," pp. 451 to 529 will be found in the record of *Sanitary District* v. *United States*, 266 U. S. 405.

See also the following:

Permit for changes and improvement of works by Secretary of War, July 11, 1900.

Report of U. S. District Engineers at Chicago, June 20, 1900.

Report Chief of Engineers to Congress in compliance with Rivers and Harbors Act of 1896, H. D. 333, 54th Congress, 2nd Session.

Exhaustive report by a Board of U. S. Engineers, in compliance with Rivers and Harbors Act of 1899 contained in report of Chief of Engineers for the year 1900.

Reports of Chief of Engineers for the years 1901, 1902.

Report of Chief of Engineers to Secretary of War, December 12, 1905.

House Document 6, 56th Congress 1st Session and report of International Waterways Commission to the governments of the United States and Canada, 1907, Senate Document 959, 62nd Congress, 3rd Session.

Appendix III.

Office of the Attorney General
Department of Justice
Washington, D. C.

February 13, 1925.

My dear Mr. Secretary:

I acknowledge receipt of your letter of the 27th ultimo, in which you enclose a memorandum prepared for you by the Chief of Engineers of the War Department, with reference to your authority to grant the Sanitary District of Chicago a permit for a diversion from Lake Michigan of a greater quantity of water than 4,167 cubic feet per second. You ask my opinion as to whether you have authority to grant such a permit.

The applicable law is Section 10, of the River and Harbor Act of March 3, 1899 (30 Stat. 1151), which provides as follows:

> "Sec. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or

> of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

As your memorandum indicates, the language of this statute permits two constructions.

The first would authorize you, pending specific direction by Congress and always subject thereto, to determine the circumstances, under which the construction of works can be undertaken which may affect the navigability of interstate waters.

The other construction, which your memorandum also submits for my consideration, is that any obstruction to the navigable capacity of such waters is unlawful *per se,* and that the only purpose of the latter part of the quoted statute is to require the submission of every project, which might affect such navigability, to the Chief of Engineers and the Secretary of War, and that no construction shall be begun until the assent of the War Department has been secured in the manner provided by the statute.

In reply to your inquiry, I am of opinion that the different sentences of this statute must be read together, and construed in such a reasonable way as to attain the objective which Congress had in mind. It is obvious that Congress, which is not always in session, could not assume the duty of determining in each specific case whether or not a construction or use of navigable waters so impaired navigable capacity as to be forbidden by the paramount authority of the Federal Government. If this were not so, no construction which might affect the navigable capacity, could be undertaken when Congress is not in session; and it seems to me unreasonable to assume that Congress meant that, not only should all public works be stopped when Congress was not in session, but that, even when it was in session, such construction or use of navigable waters should await the slow processes of Congressional action.

In my judgment, Congress intended, by the first section of the quoted statute, to assert its paramount authority over navigable waters,—and thus to serve notice that they could not be undertaken without Federal assent. I imagine that the section in question was due to the construction by the Supreme Court, of the prior statute of 1890, in the case of *United States* v. *Bellingham Bay Boom Co.,* 176 U. S. 211. That Act provided that the "creation of any obstruction not affirmatively authorized *by law* to the navigable capacity of any waters, in respect to which the United States has jurisdiction, is hereby prohibited," and it was held, in the decision above referred to, that such an obstruction could be authorized by the law of a State, in the first instance.

Congress evidently intended that works should not be begun, which might affect the navigable capacity of the waters of the United States, solely on the authority of any State law. Congress, by the Act of 1899, therefore assumed full governmental power over the subject by a comprehensive and definitive prohibition of "any obstruction not affirmatively authorized by Congress."

For the reasons that I have already given, it does not seem to me reasonable to suppose that this contemplated that no work should be undertaken until Congress had first passed a specific statute to authorize it.. The interest of the United States in the waters of the country under the Commerce Clause of the Constitution is confined to their navigability, and any construction, which may be erected, or any use of the waters, may be said, in a remote, but not very practical, sense, to affect these waters.[7] The Constitution gave to the United States paramount authority over the general subject of navigability, in order that the Federal Government, and not the States, might determine under what circumstances the use of navigable waters for the purposes of the citizen or of the States so prejudicially affected the great consideration of navigability as to require a prohibition. Navigable waters may be used for many purposes other than those of navigation, and thus there are many considerations that must be weighed to determine whether such use unduly impairs navigation, and the relative advantages and disadvantages of any such use, as compared with the interests of navigation, must be taken into consideration.

Congress did not intend that such a question should be primarily decided by either the States or the citizen. In view of prior decisions, which, as to navigable waters which were wholly intrastate in character, held that, in respect to purely local facilities, the States might act, in the absence of Federal legislation, Congress evidently intended, by the Act of 1899, to remove this implication by asserting that, with respect to the navigable capacity of the waters of the United States, its failure to legislate should not be regarded as an implied authority to the States or to the citizens thereof to proceed to use the waters; but that the Federal Government should determine to what extent, if any, the navigable capacity of the water highways of the country might be affected.

This seems to me obvious, when the vagueness of the phrase: "navigable capacity" is taken into consideration; for the phrase is a relative one. Navigable capacity could be impaired for vessels of large draft, without impairing it for vessels of small draft. This requires a certain balancing of the economic equities of the situation, and the Federal Government preferred itself to weigh these equities, and not permit the States or the citizens thereof to determine the advantages or disadvantages of any interference with navigable waters.

It was therefore necessary that, in some way, the question as to what interference would be permitted and what should be forbidden in any specific case should be determined by some one, and, as I have said, it was impossible for Congress to do so in all cases and at all times, as it would not be continuously in session.

I therefore interpret the latter part of the quoted statute as meaning that, within reasonable limits, Congress would delegate its power in the premises to the Chief of Engineers and the Secretary of War to determine—at least in the first instance—what interference with navigable waters could be permitted, until Congress should specifically act, and always subject thereto.

This policy of Congress was not a new policy, for it has found expression in much prior legislation. Thus, by the Act of March 3, 1869 (15 Stat. 336), Congress had provided, with respect to the proposed construction of a bridge between New York and Brooklyn—

> "That the said bridge shall be so constructed and built as not to obstruct, impair, or injuriously modify the navigation of the river; and in order to secure a compliance with these conditions the company, previous to commencing the construction of the bridge, shall submit to the secretary of war a plan of the bridge, with a detailed map of the river at the proposed site of the bridge, and for the distance of a mile above and below the site, exhibiting the depths and currents at all points of the same, together with all other information touching said bridge and river as may be deemed requisite by the secretary of war to determine whether the said bridge, when built, will conform to the prescribed conditions of the act, not to obstruct, impair, or injuriously modify the navigation of the river.
>
> Sec. 2. And be it further enacted, That the sec-

> retary of war is hereby authorized and directed, upon receiving said plan and map and other information, and upon being satisfied that a bridge built on such plan, and at said locality, will conform to the prescribed conditions of this act, not to obstruct, impair, or injuriously modify the navigation of said river, to notify the said company that he approves the same, and upon receiving such notification, the said company may proceed to the erection of said bridge, conforming strictly to the approved plan and location. But until the secretary of war approve the plan and location of said bridge, and notify said company of the same in writing, the bridge shall not be built or commenced; and should any change be made in the plan of the bridge during the progress of the work thereon, such change shall be subject likewise to the approval of the secretary of war."

Under this statute, the Secretary of War, upon the recommendation of the Chief of Engineers, approved the plan for the bridge, and it was subsequently contended that, as the bridge in fact impaired navigation of the river, the Secretary of War was without authority to permit it.

The Supreme Court, however, thus construed the Act of 1869:

(*Miller* v. *Mayer*, 109 U. S. 385.)

> "It is contended by the plaintiff with much earnestness that the approval of the secretary of war of the plan and location of the bridge was not conclusive as to its character and effect upon the navigation of the river, and that it was still open to him to show that, if constructed as proposed, it would be an obstruction to such navigation, as fully as though such approval had not been had. It is argued that Congress could not give any such effect to the action of the secretary, it being judicial in its character. There is in this position a misapprehension of the purport of the act. By submitting the matter to the secretary, Congress did not abdicate any of its au-

> thority to determine what should or should not be deemed an obstruction to the navigation of the river. It simply declared that, upon a certain fact being established, the bridge should be deemed a lawful structure, and employed the secretary of war as an agent to ascertain that fact. Having power to regulate commerce with foreign nations and among the several States, and navigation being a branch of that commerce, it has the control of all navigable waters between the States, or connecting with the ocean, so as to preserve and protect their free navigation. Its power, therefore, to determine what shall not be deemed, so far as that commerce is concerned, an obstruction, is necessarily paramount and conclusive. It may in direct terms declare absolutely, or on conditions, that a bridge of a particular height shall not be deemed such an obstruction; and, in the latter case, make its declaration take effect when those conditions are complied with. The act in question, in requiring the approval of the secretary before the construction of the bridge was permitted, was not essentially different from a great mass of legislation directing certain measures to be taken upon the happening of particular contingencies or the ascertainment of particular information. The execution of a vast number of measures authorized by Congress, and carried out under the direction of heads of departments, would be defeated if such were not the case. The efficiency of an act as a declaration of legislative will must, of course, come from Congress, but the ascertainment of the contingency upon which the act shall take effect may be left to such agencies as it may designate."

In my opinion, Congress had the same purpose in view in the Act of 1899. Having assumed paramount jurisdiction over all navigable waters and excluded the idea that any action of a State could legitimate an impairment thereof, and that any Federal assent thereto could be implied from Federal inaction, Congress proceeded to forbid the commencement of any such work, "unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War, prior to beginning the same."

In my opinion, Congress thus intended to delegate to the Chief of Engineers and the Secretary of War an administrative authority to determine a fact, and if they were of opinion that the use of navigable waters, in a certain case, was not such an impairment of their navigability as to require the prohibition of Congress, then the construction was "affirmatively authorized by Congress," because the administrative agency, to which Congress had delegated the ascertainment of the facts, had found the fact to be that such use was not, for the time being, an impairment of navigable capacity, such as Congress intended to prohibit.

I am informed that, for a long period of years, it has been the practice of the War Department to issue permits under Section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by special act of Congress, and that was the policy of the War Department in the specific case of the Sanitary District of Chicago.

The history of that prolonged controversy recognized an authority on the part of the Chief of Engineers and the Secretary of War to determine the facts of undue impairment in behalf of the Federal Government. The permits, which were given from time to time by the War Department, (the last of which permtited Chicago to divert water from Lake Michigan to the extent of 4,167 cubic feet per second), can only be explained on this theory; for, theoretically, the diversion of so great a volume of water affected the navigable capacity of the Great Lakes; but the legal question still remained whether, taking into consideration all of the economic factors—as, for example, the navigability of the Chicago and Calumet Rivers, to the south, and the navigability of the Great Lakes, to the east—and having in mind the depth of the various channels and the natural use of waters for sanitary and other purposes, there was such an undue impairment of navigability as to require that one use of these waters be restricted to a given amount, in order to make another use more effective. Your predecessors, having in mind the various elements of an extremely complicated economic and sanitary problem, reach the conclusion that there could be—at least until Congress provided otherwise—a permit to use the amount indicated, but no more; and this could only proceed upon the theory that, while Congress had made a general prohibition of all impairment of navigable waters, it had delegated to the War Department the duty of deciding the degree of impairment which would bring a specific case within the general prohibiton.

Certainly the suit which the United States brought against the Sanitary District of Chicago proceeded on this theory; for the Government sought to restrain the Sanitary District from taking any waters in excess of 4,167 cubic feet per second. The suit was thus based upon the permits of the War Department and assumed its authority to grant them. The lower court granted an injunction which forbade a greater diversion of the waters than the amount permitted by the War Department, and the Supreme Court, on January 5, 1925, affirmed this decree, and expressly added that its affirmance was "without prejudice to any permit that may be issued by the Secretary of War, according to law."

If it be suggested that the words "according to law" destroy the force of the proviso, it can be answered that such a proviso, deliberately written by the Supreme Court in its decree of affirmance, cannot be disregarded as meaningless. The Supreme Court apparently contemplated the possibility that it might be necessary, pending the final action of Congress and in order to prevent irreparable injury to life and property, to make some temporary provision, and its decree of affirmance sustaining a permit previously granted by the Secretary of War enforced an administrative decision of the Chief of Engineers and the Secretary of War, previously given under the authority of an Act of Congress, and as its instrument.

Unquestionably the War Department must take into account, in exercising its administrative discretion, the policy of Congress, as disclosed by the statute. The function of your department is to determine the facts, and not policies. In doing so, you must be guided by the clear intention of Congress that navigable waters shall not be so diverted for local purposes as to injure the just rights of the whole people in the navigability of such waters.

The present diversion by the City of Chicago of more than the amount permitted is, under the general prohibition, not authorzed by Congress, because it has not been authorized by the administrative agency to which Congress delegated the power of determination; but it would be authorized by Congress—subject, of course, to any change in the law at any time by that body—if and when the Chief of Engineers and the Secretary of War determine that the interests of navigation—having in mind all the complicated circumstances—would not be unfairly prejudiced by a temporary use of the waters to the extent that the War Department, in its sound discretion and having in mind the general policy of Congress, sees fit to permit.

In exercising this political discretion, it seems to me that the War Department should do what it believes

Congress would wish it to do under the circumstances. As a President of the United States once said: "It is a condition, and not a theory, that confronts" the Federal Government. The condition is that a great city, with over three millions of inhabitants and with mighty industries situated within its boundaries, has built important works for the diversion of water from Lake Michigan, and is in fact diverting such waters, to an amount in excess of the amount permitted by your predecessor.

You may conclude, in the exercise of your discretion, that such a situation, which has developed in a period of thirty-five years, during which the City of Chicago has greatly added to its population, cannot be changed in a day.

In the exercise of such discretion, you may conclude that, under present circumstances, the Sanitary District of Chicago should be permitted to take a greater quantity of water than that authorized by previous permits, or required to take less. The previous permits given by your predecessors in this matter were expressly revocable in terms, and, even if this were not the case, their revocability would, in my judgment, be implied from the continuing duty of the United States to preserve the navigability of its water highways.

You are therefore at liberty, as the administrative agency of Congress, to determine, under the circumstances which now exist, to what extent, if any, Chicago may continue to divert the waters of Lake Michigan, and, if you reach the conclusion that a greater diversion of such waters by the city of Chicago may be temporarily permitted, to enable that city to comply with the law, you are authorized not only to make such permit revocable, in your discretion, but also to grant it upon such terms and conditions as, in your judgment will effectively protect the interests of navigation in these great interstate highways.

You may also conclude, in the exercise of the same discretion, that any permit that you may grant may be expressly made subject, at all times, to the action of Congress, whose representative you are in the matter and whose judgment, with or without such express reservation, is final as to the policy of the nation in the premises.

This view as to the nature of your powers seems to me a reasonable construction of the pertinent Acts of Congress. It is, in any event, the only construction that would prevent irreparable harm, and, therefore, presumably, it is a construction which Congress itself would favor; and I therefore so advise you

Very respectfully,

JAMES M. BECK,
Acting Attorney General.

Assistant and Chief Clerk,
Feb. 14, 1925.
War Dept.
P. S.

The Honorable,
The Secretary of War.

O.T. 1930 ORIGINAL NOS.6,10 & 11,

Office Supreme Court, U. S.
FILED
JAN 25 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

Numbe[redacted]riginal in Equity.

7

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

Statement and Brief of Defendant, The Sanitary District of Chicago, in Support of Motion to Dismiss the Amended Bill of Complaint.

HECTOR A. BROUILLET,
Attorney, The Sanitary District of Chicago.

GEORGE F. BARRETT,
EDMUND D. ADCOCK,
LOUIS J. BEHAN,
MORTON S. CRESSY,
Solicitors for Defendant, The Sanitary District of Chicago.

BARNARD & MILLER PRINT, CHICAGO

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IN THE

Supreme Court of the United States

October Term, A. D. 1925.

Number 16 Original in Equity.

STATES OF WISCONSIN, MINNESOTA, OHIO
AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

STATEMENT AND BRIEF OF DEFENDANT, THE SANITARY DISTRICT OF CHICAGO, IN SUPPORT OF MOTION TO DISMISS THE AMENDED BILL OF COMPLAINT.

STATEMENT OF FACTS.

This case comes on for hearing upon two motions to dismiss. One is contained in the answer of defendant, The Sanitary District of Chicago, filed January 4, 1926. The other is a separate motion, in the form of a demurrer filed by the defendant, State of Illinois, on the same day.

The original bill of complaint was filed in June, 1922, by one of the present complainants, the State of Wisconsin, returnable to the October term, 1922, of this court, and upon the return day, the defendants, Illinois and Sanitary District, filed joint and several answer to said bill, which contained motion to dismiss.

The original bill, in effect, *conceded the validity of the then existing permits authorizing the diversion from Lake Michigan* and prayed principally (p. 35):

> "And in the event that this court shall hold and determine that it is within the lawful power of the Secretary of War to permit the taking of water from the said Lake Michigan for the operation of the said canal, and to determine the amount and conditions of such taking, then and in that case your orator prays that upon the final hearing of this cause an injunction be issued, under the seal of this court, perpetually restraining the defendants and each of them, and each of their officers, agents and servants, from taking or causing to be taken any water from Lake Michigan, in such manner as to permanently divert the same from the said lake, for the purpose of operating the said canal, *in excess of two hundred fifty thousand* (250,000) *cubic feet per minute, or four thousand one hundred sixty-seven* (4,167) *cubic feet per second, until such time as the Congress of the United States, or the Secretary of War acting upon the recommendation of the Chief of Engineers of the United States Army, shall give valid permission for the taking and diversion of a larger amount of water.*"

After the filing of said bill, on June 18, 1923, the District Court of the United States, for the Northern District of Illinois, Eastern Division, in the case of *United States* v. *The Sanitary District of Chicago,* entered its decree enjoining the defendant district from abstracting or withdrawing from Lake Michigan any amount of water in excess of said 4,167 cubic feet per second. Said decree was affirmed by this court by its order entered January 5, 1925, the said order providing:

> "The decree for an injunction, as prayed, is affirmed, to go into effect in 60 days—without prejudice to any permit that may be issued by the Secretary of War according to law." (*Sanitary District of Chicago* v. *U. S.*, 266 U. S. 405.)

Thereafter, on March 3, 1925, prior to the expiration of said 60-day period, the Secretary of War, pursuant to recommendations of the Chief of Engineers, issued a permit to the defendant Sanitary District—

> "to divert from Lake Michigan through its Main Drainage Canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second * * *",

upon certain conditions stated in said permit. (Amended bill of complaint, pp. 30-32.)

Prior to the issuance of said permit, the Secretary of War requested of and obtained from the Attorney General of the United States, an opinion as to his authority to issue a permit for the diversion of water from Lake Michigan at Chicago in an amount greater than the 4,167 seconds feet, the maximum amount theretofore authorized by the Secretary of War, pursuant to the recommendations of the Chief of Engineers. On February 13, 1925, acting Attorney General James M. Beck, advised the Secretary of War that he had such authority upon the recommendation of the Chief of Engineers. A full copy of said opinion appears as an appendix hereto (p. 59).

On October 5, 1925, an order was entered herein, permitting the States of Minnesota, Ohio and Pennsylvania to join as complainants, and with the original complainant to file an amended bill of complaint. The amended bill *for the first time questioned seriously the validity of permits of such nature,* and prayed (Amended Bill, p. 36):

(1) That the defendants be restrained

> "from taking or causing to be taken, any water from Lake Michigan in such manner as to permanently divert the same from said lake."

(2) That in the event that the Sanitary and Ship Canal constructed by the defendant Sanitary District shall be used as a navigable waterway of the United States and subject to the same control on the part of the United States as the other navigable waterways thereof, then that the defendants be

> "restrained from taking or causing to be taken any water from Lake Michigan in such manner as to permanently divert the same from said lake for any purpose, in excess of the amount which the court shall determine to be reasonably required for the purpose of navigation in and through said canal and the connecting waters, to the Illinois and Mississippi Rivers, without injury to the navigable capacity of the Great Lakes and the connecting waters thereof."

(3) That the defendants be restrained

> "from dumping and draining into the said Sanitary District Canal, any sewerage or waste in such quantity and manner as to excessively pollute and render the Sanitary District Drainage Canal, the Chicago, Desplaines and the Illinois Rivers, unsanitary, pestilential and dangerous to the health, safety and comfort of the complainant states navigating said rivers, or to injure or destroy the property of the people of this complainant states navigating the said rivers and waterways."

(*The said canal and rivers mentioned are entirely within the State of Illinois.*)

Motions to Dismiss.

Special grounds for dismissal urged:

(1) The case is not one justiciable in this court.

(2) The subject-matter is within the exclusive jurisdiction of the United States assumed and being exercised.

(3) The permit of March 3, 1925, is valid, and constitutes complete authorization for the diversion com-

plained of, and the permit regulates and controls the amount and conditions of such diversion; and no state has the right to complain.

(4) Complainants are not entitled to equitable relief, because—

> (a) In so far as the amended bill seeks to have this court determine the amount of diversion "reasonably required" for navigation, it calls for a usurpation by this court of powers and functions vested in Congress and by Congress delegated to the Secretary of War;
>
> (b) So far as said amended bill seeks relief against an alleged impairment through pollution of navigable waters of the United States, neither of the complainant states nor any of their respective citizens, suffer or can suffer any direct or special injury, because such waters lie wholly without and below the complaining states. None of the complainants have any direct or proprietary interest in the navigable condition of such waters.

(5) Complainants cannot complain of breach of any of the conditions of the permit of March 3, 1925, as the power to enforce such conditions is vested exclusively in the United States, because the permit is revocable by the Secretary of War for breach of any of the conditions, and because said Rivers and Harbors Act of 1899 provides adequate available, special and exclusive remedies for violations of said act.

(6) The United States is a necessary and indispensable party to this suit.

(7) The original bill of complaint admitted the right of defendants to divert 4,167 cubic feet per second, and to a diversion in excess of said amount if and when Congress or the Secretary of War, according to law, permitted it. But the amended bill denies such rights and upon such denial of such rights, the relief of the amended bill is based. Therefore, complainants are es-

topped from seeking the relief prayed for in said amended bill.

While the principal facts as to this controversy are likely fresh in the court's mind, due to its consideration of the case of *Sanitary District of Chicago v. United States,* 266 U. S. 405, yet for the convenience of the court we will in some detail state the facts alleged in the amended bill and also those appearing *aliunde* and within the court's judicial notice.

Amended Bill of Complaint.

(As the sections of the amended bill are numbered, the numbered paragraph will be indicated where the facts here stated may be found in said bill.)

The complainant states bring their action as states of the Union (1), against Illinois and the defendant Sanitary District, a public corporation organized and existing under the laws of Illinois, and a citizen of that state (2), and the action is instituted in the exercise of the original jurisdiction of this court in equity relating to a controversy between two or more states of the United States, and also between states of the United States and a citizen of another state (3).

The shore line of Wisconsin along Lake Michigan is approximately 350 miles, and thereon are located some thirteen harbors, the amount of freight received at and shipped from said harbors during the year 1923, exclusive of that carried by car ferry, being in excess of 9,000,000 tons. The shore line of Wisconsin along Lake Superior is approximately 150 miles, and located thereon are three harbors, traffic of which in 1923 was in excess of 67,000,000 tons (4).

The shore line of Minnesota along Lake Superior is approximately 75 miles, and located thereon are six harbors, the traffic of which during the year 1923 was about 60,000,000 tons (5).

The shore line of Ohio along Lake Erie is 230 miles, and located thereon are some thirteen harbors, traffic of which during the year 1923, exclusive of car ferry shipments, was more than 76,000,000 tons (6).

The shore line of Pennslyvania along Lake Erie contains Erie harbor, traffic of which during the year 1923 was 3,766,389 tons (7).

The shore line of Illinois along Lake Michigan is approximately 60 miles, comprising the eastern boundaries of the Counties of Lake and Cook. Prior to the year 1900, the Chicago River flowed through said Lake and Cook Counties, one branch in a northern direction and the other in a southerly direction, and emptied into Lake Michigan in the City of Chicago (8).

On May 29, 1889, the General Assembly of Illinois passed an act under which the defendant Sanitary District was organized, the said act granting power to construct, maintain and operate drainage canals or channels for the disposal of drainage and sewage. Sections 23 and 24 of said act are set out in said amended bill.

Section 23 of said act of Illinois provides that if a channel were constructed by which any of the waters of Lake Michigan should be caused to pass into the Desplaines or Illinois Rivers, it should be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of *not less than* 300,000 *cubic feet of water per minute* and to be of a depth of *not less than* 14 *feet,* and *a current not exceeding three miles per hour;* that if the channel should be cut through a territory with a rocky stratum where such rock is above a grade sufficient to produce a depth of water from Lake Michigan of *not less than* 18 *feet,* such portion of said channel shall have *double flowing capacity above provided for,* and a width of *not less than* 160 *feet at the bottom,* (the channel was cut through the rocky stratum and has a capacity of not less than 600,000 cubic feet per minute, and is more than 18 feet deep and is of the width provided); that if the population of the district drained into said channel shall exceed 1,500,000 inhabitants, that the flow through the channels shall be at all times equal to 20,000 cubic feet per minute for each 100,000 of the population; that *the current in said channel shall not be more than three miles per hour;* that the district constructing a channel to carry water from Lake Michigan of any amount authorized by the act, may correct, modify and *remove obstructions in the Desplaines and Illinois Rivers, and shall remove the dams at Henry and Copperas Creeks in the Illinois River before any water shall be turned into said channel.*

Section 24 of said act provides that, when the channel described shall be completed and the water turned therein, to the amount of 300,000 cubic feet per minute, *the same is declared a navigable stream* and whenever the General Government shall improve the Desplaines and Illinois Rivers for navigation to connect with this channel, it shall have full control over the same for navigation purposes, but not to interfere with its use for sanitary and drainage purposes (9).

Cognate sections of said Act of May 29, 1889, and acts amendatory and supplementary thereto, while not set forth in the amended bill, should be here called to the attention of the court. Section 12 of said act provides that *all bridges* built *over the channel* described in Section 23, shall *not* necessarily *interfere with* or *obstruct* navigation, and that when the same shall become a navigable stream, as provided in Section 24 of said act, *they shall be so constructed* that they can be *raised, swung or moved out of the way of vessels navigating the said channel.* (Callaghan's Revised Statutes of Illinois (1925), Chap. 42, Sec. 349.)

Section 27 of said act (Callaghan's Revised Statutes of Ill. (1925), Chap. 42, Sec. 367) provides that before the channel shall be opened, *the Governor* shall *certify* that it has been *completed* in all respects *in accordance with the provisions of Section* 23 *of said act.*

The act of Illinois supplementary to and amendatory of the original Sanitary District Act passed May 14, 1903, provides (Sec. 3 thereof) that said defendant District shall *permit all water-craft navigating or purposing to navigate said Illinois and Michigan Canal, to navigate the water of all said channels, free of any tolls, lockage charges, etc.*, and that the rules of the United States Government regulating navigation on the Chicago River shall govern navigation on the channels of said defendant District. Section 2 of said Act of May 14, 1903, provides that *a lock shall be constructed* (and it was so built) at the *southern terminus* of said canal for the *purpose of connecting it with the Desplaines River and the Illinois and Michigan Canal.* (Callaghan's Revised Statutes of Ill. (1925), Chap. 42, Sec. 381.)

June 17, 1919, *the General Assembly of Illinois* passed what is known as the "Illinois Waterway" Act, for the construction of the "Illinois Waterway" from the southern terminus of the said Main Channel of defendant District, through the Desplaines and Illinois Rivers, to a point on the Illinois River at or near Utica. The depth of the said waterway was to be not less than 8 feet and in the rock sections not less than 10 feet, minimum depth over-mitre sills of locks not less than 14 feet; minimum width of locks not less than 110 feet; minimum usable length not less than 600 feet. The waterway is to be connected with the said canal of defendant Sanitary District by means of a lock of said size and connections. (See Callaghan's Illinois Stat. Ann., Vol. 1, p. 753.) The first act with reference to the Illinois Waterway was passed in the year 1913, and the above act, June 17, 1919, replaced it.

The amended bill further alleges:

In November and December of the year 1889, the defendant, Sanitary District, was organized and has since continued in existence, the territorial limits of which originally were 185 square miles. Its area is now approximately 395, due to additions pursuant to Acts of Illinois, and extends along Lake Michigan for approximately 33 miles and comprises the City of Chicago, together with large areas of land to the South, West and North (10).

The construction of the Canal of defendant, The Sanitary District, was commenced on the 3d of September, 1892, and said Canal extends from the West Fork of the South Branch of the Chicago River, about six miles above its mouth, in a general westerly direction for a distance of approximately 32 miles to a point near Joliet, connecting there with the Desplaines River, that stream flowing in a westerly and southwesterly direction and forming a tributary of the Illinois River, the latter river flowing westerly and southwesterly to the Mississippi River (11).

In the construction of the Canal, it was the plan of the defendant that it should be a passageway for the sewage of defendant District, carried down the Canal into the Desplaines and Illinois Rivers; also, it was the intention to divert from Lake Michigan, through the Canal, such amounts of water as should be deemed to be necessary for the dilution of sewage. The original

Act of 1889 was amended in 1895 requiring 20,000 cubic feet of water per minute for every 100,000 inhabitants of the District (12).

The Governor of Illinois, pursuant to Section 27 of the Act, approved the construction of the Canal and authorized its opening, which was done about January 2, 1900, and thereafter defendant District diverted water from Lake Michigan into the Chicago River, and thence into and through the Canal, "*in such amounts and in such velocity as to reverse the flow of the Chicago River and create a steady and uninterrupted flow of water from said day down to the present time,*" from Lake Michigan, through the Chicago River, thence to the Desplaines, Illinois and Mississippi Rivers (13).

The primary purpose of the Act of 1889 as construed by the highest courts of Illinois is to provide a method of disposing of the sewage of the City of Chicago and contiguous territory, and so the Canal has been used in providing for diversion of water through the Canal at the rate of 20,000 cubic feet per minute for each 100,000 inhabitants. It was known to the defendants, and each of them, that the only source from which water in such quantities could be obtained was by diverting it from Lake Michigan. The census of 1920 shows the population of the defendant District to be 2,963,090, requiring, according to the ratio of diversion to inhabitants, 9,876 cubic feet of water per second (14).

Said Act of May 14, 1903, of Illinois authorized the construction and operation of a hypdro-electric plant for the generation of electrical energy from water passing through the Canal (15).

In November, 1907, the defendant District put in operation its hydro-electric plant, having a capacity of 36,000 horsepower of electrical energy, and there has been developed in excess of 20,000 horsepower continuously throughout the year. The energy produced is mainly transmitted to the City of Chicago for municipal and commercial purposes, and since 1907 many million dollars of profits have been realized from its operation (16). The object and purpose of the defendants in the operation of said Canal has been, since the completion of the hydro-electric plant, twofold, viz.: The disposition of the sewage of the defendant District and the generation of electrical energy (17).

The diversion of water from Lake Michigan from 1900 to 1917 has ranged from 2,900 cubic seconds feet in 1900 to 8,800 cubic seconds feet in 1917, and since 1918 the mean diversion each year has exceeded 8,800 cubic feet per second (18). All the water thus diverted is permanently abstracted from the Great Lakes system, resulting in the lowering of the surface elevations of all the great lakes (except Lake Superior) and their connecting channels, not less than 6 inches (19).

At no time during the last ten years has it been necessary for the protection of the health of the defendant District's people, or for any other purpose, that said sewage be disposed of by means of the Sanitary District Canal. On the contrary, it has been entirely feasible, and is now feasible, for defendant District to dispose of its sewage by the use of artificial sewage treatment works, which would require no permanent diversion of water from Lake Michigan and no pollution of the waters of the Lake (20).

The lowering of the level of Lake Michigan has seriously diminished the utility of the ports of Wisconsin and has reduced by at least 6 inches in each of the Lake Michigan ports in Wisconsin the draft of vessels which can be accommodated therein. Over 80% of the tonnage received at said Lake Michigan ports consists of coal shipped from Eastern States. This coal, except the amount consumed at the ports, is thence carried by rail to a large number of cities, villages and towns in Wisconsin and in other States to the West, and constitutes the principal source of supply for the State of Wisconsin in its proprietary capacity, as owner of many public buildings and institutions, and for many thousands of individuals and industrial plants located in the State. The type of vessels in which the coal is carried is known as "bulk freighters," having enormous capacity and capable of being operated at very low freight rates when loaded to their maximum. For every inch of draft unable to be utilized, the cargo-carrying capacity is reduced by many tons, resulting in increase in freight rate cost per ton, which is a burden upon the State of Wisconsin in its proprietary capacity and upon many thousands of the people of the State. The only method within the power of Wisconsin to relieve itself of the burden is by dredging its harbors. This dredging would necessitate the expenditure of large sums of money each year (21).

The utility of the ports of the complainant States located along the shores of Lake Michigan and Lake Huron, along the shores of Lake Erie, and along the shores of Lake Ontario, are lessened in the same way as the Wisconsin ports on Lake Michigan. The lowering of the surface elevations also affects traffic to and from ports located on Lake Superior. The traffic between the various ports mentioned amounts to many millions of tons each year, the principal commodities being iron ore, coal and grain. The annual loss in tonnage due to the diversion amounts to many millions of dollars, a large part of which falls upon the people of complainants (22).

Current is introduced into the Chicago River impairing its navigability. Prior to the commencement of the diversion, the Chicago River constituted an inner harbor of great importance, handling between six and eight millions of tons of inbound and outbound freight each year, a large portion of which constituted commerce between the citizens of Wisconsin and Illinois. Since the commencement of the diversion, the commerce of the Chicago harbor has become reduced to less than one-third of the said tonnage, because of the difficulty of navigation resulting from said diversion, and portions of the Chicago River have become closed up by reason of said diversion and are not accessible to commerce of the people of Wisconsin (23).

Prior to the construction of defendant District's Canal, the Chicago, Desplaines and Illinois Rivers constituted a navigable waterway of the United States, extending from Lake Michigan to the Mississippi River. The construction of the Canal modified and altered said navigable waterway by diverting portions of the Desplaines River from its original bed, and has modified and rendered said natural waterway practically inaccessible from Lake Michigan by causing the West Fork of the South Branch of the Chicago River, West of the commencement of the Canal, to become filled up and useless. *"As a result of said acts of said defendant, the said canal has become in fact a substitute for the old navigable waterway hereinbefore referred to, and is now the only practicable means of navigation by water from Lake Michigan to the Mississippi River."* Defendants have refused to concede said Canal to be a navigable waterway of the United States, and have undertaken to bar the United States from all control or authority over it until such time as the Government shall comply with the conditions of said Section 24 of the Act of 1889 (24).

The amount of water required to operate the Canal for navigation purposes only does not at the present time exceed 500 cubic feet per second, and the amount which may in the future be required for its operation for said purposes only will not exceed 1,000 cubic feet per second, even if said Canal should be utilized to its fullest extent (25).

On May 8, 1889, the Secretary of War, as recommended by the Chief of Engineers, issued a permit authorizing the opening of the Canal and the diversion of water from Lake Michigan for the canal's operation. limited by the following principal condition:

> "2. That if at any time it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such an extent as may be demanded by navigation and property interests along said Chicago River and its South Branch."

The amended bill sets forth various permits issued by the Secretary of War limiting the diversion from Lake Michigan due to current in the Chicago River, and pursuant to condition 2 of said May 8, 1899, permit, viz.:

April 9, 1901, 200,000 cubic feet per minute,

July 23, 1901, 300,000 cubic feet per minute,

December 5, 1901, 250,000 cubic feet per minute,

Jan. 17, 1903, 350,000 cubic feet per minute,

until March 31, 1903, and thereafter, to be limited to the amount fixed by the December 5, 1901, permit. There is also set forth the permit of June 30, 1910, authorizing the construction of the Calumet Sag Channel, an adjunct to the main Canal described in Section 23 of the original Act of 1889, extending from the said main channel at Sag Illinois, to the little Calumet River at or near Blue Island, Illinois, which said permit was subject to the condition that the total amount which should be diverted through the Calumet Sag Channel and the Calumet River, and through the main channel and the Chicago River, should not exceed 250,000 cubic feet per minute (4,167 cubic feet per second). One of the recitals of said permit of June 30, 1910, is:

> *"So long as the water flow remains unchanged there seems to be no special objection to its extension to both rivers instead of confining it to a single one, especially since if the new (Calumet) route be developed later to a navigable state the double route will be advantageous to navigation interests."*

It is then alleged that all of said permits, beginning with the one of May 8, 1899, have no force or effect to authorize defendants to withdraw water from Lake Michigan in such quantities as to obstruct its navigable capacity, or to obstruct the navigable capacity of the Chicago River by introducing a dangerously swift current into said river; that all of said documents purport to be issued solely under and pursuant to the authority conferred by Section 10 of the Rivers and Harbors Act of March 3, 1899, which authority is limited by said Act to the approving of alterations and modifications, of channels and waterways therein referred to, but by the terms of said Act the power to authorize obstructions to navigable capacity of navigable waters is exclusively reserved to, and retained by, Congress. If the permits are construed to be within the power of the Secretary of War under the March 3, 1899, Act, then complainants assert that at no time since March 31, 1903, have defendants been authorized by the Secretary to divert from Lake Michigan more than 4,167 cubic feet of water per second. Defendant, The Sanitary District, has violated said permits, continuously by withdrawing water largely in excess of said permits. The institution of the suit of the United States against

The Sanitary District in the District Court of the United States, for the Northern District of Illinois, Eastern Division, is alleged and said decree of June 18, 1923, is set forth, as well as the order of this court entered affirming said decree on January 5, 1925 (27).

The amended bill sets forth the permit of March 3, 1925, issued by the Secretary of War pursuant to the recommendation of the Chief of Engineers, which said permit, (omitting the recitals), is in words and figures as follows, to-wit:

> "Now, therefore, This is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provision of the aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:
>
> "1. That there shall be no unreasonable interference with navigation by the work herein authorized.
>
> "2. That if inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.
>
> "3. That no attempt shall be made by the permittee, or the owner, to forbid the full and free use by the public of any navigable waters of the United States.
>
> "4. That the Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.
>
> "5. That the Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed and post a guarantee in the way of a bond or cer-

tified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

"6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approval plans and shall be completed and ready for operation by July 1, 1929.

"7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the United States District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Desplaines Rivers.

"8. That if, within six months after the issuance of this permit, the city of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum, thereafter this permit may be revoked without notice.

"9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice.

"10. That this permit is revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress.

"11. That this permit, if not previously revoked or specifically extended, shall cease and be null and void on December 31, 1929."

The complainants allege that the conditions of said permit have not been complied with in that (1) there has been unreasonable interference with navigation, (2) full free use of navigable waters have been prevented by defendant District, (3) no guaranty has been provided by the defendant for payment of costs of regulating or compensating works, (4) no plans have been submitted for controlling works to prevent the discharge from the Chicago River into Lake Michigan in times of heavy storms, (5) defendant District has not, and is not, carrying out a program of sewage treatment as required, and (6) the City of Chicago is not making provision for compliance with the order for termination of said diversion (28).

The acts of the defendant in diverting water from Lake Michigan have never been authorized by Congress and are in violation of the rights of complainant states in the following respects:

(a) Interference with the common law rights of complainant States and their people to have free and unobstructed use of Lake Michigan and the harbors located thereon for the purpose of navigation, trade and commerce, free from any interference with the natural navigable capacity of said waters.

(b) It is alleged that the same rights are interfered with as to navigation on Lakes Huron, Erie and Ontario and their connecting channels.

(c) The acts of defendant violate said March 3, 1899 Act of Congress, particularly Section 10 thereof (29).

Defendants have continuously since the opening of said Canal authorized and directed the City of Chicago and other municipalities within defendant District and large industries to drain their sewage and waste into said Canal, which sewage and waste includes the sewage from a population of more than 3,000,000 inhabitants and the waste from industrial plants equivalent to the sewage of a population of 1,800,000 inhabitants. The said sewage and wastes pollute the waters of the Chicago, Desplaines, Illinois and Mississippi Rivers, creating a wholly offensive, unsanitary, disease-breeding and pestilential condition in, upon and along the waterways from Lake Michigan through the Sanitary District Drainage Canal and the Chicago, Desplaines and Illinois Rivers into the Mississippi. This condition has made undesirable and largely impossible the use of said waterways, whether for business, recreation or pleasure, and navigation thereon has been made offensive and dangerous to the health and lives of the persons engaged in the conveyance of freight and passengers thereon. There is a large amount of passenger traffic and a large amount of interchange of commodities and business between the territory adjacent to and served by said waterways, and the complainant States and their people, all of which constitutes a public nuisance, violating the rights of complainants (30).

Said violations of said legal rights have caused. and are now causing, and will continue to cause so long as they are permitted to continue, serious interference with the trade and commerce of the people of the complainant States and of the said States in their proprietary capacities, resulting in pecuniary losses to the people and to said States for which there is no adequate remedy at law. The complainant States bring the action in behalf of themselves in their proprietary capacity and also on behalf of the people of the several States (31).

The permit of March 3, 1925, has a direct and positive relation and connection with the regulation of interstate and foreign commerce as appears from facts shown by the amended bill and by those within the courts knowledge.

(1) Illinois provided by its laws for the construction of a canal (The Sanitary District Canal in controversy here) as a link in the waterway from Lake Michigan to the Mississippi River, to be operated with a diversion

from Lake Michigan of an amount of water up to 10,000 cubic feet per second.

Section 23 of the original Act of 1889, provides that the canal shall be not less than 18 feet deep, 162 feet wide at the bottom, capable of passing through it 600,000 cubic feet of water per minute (10,000 per second) and the velocity to be not greater than three miles per hour. These were requirements for navigation on the canal itself. Furthermore, Section 24 provides that it shall be a navigable waterway, and Section 3 of the Act of May 14, 1903, provides that all watercraft navigating the Illinois and Michigan Canal, a navigable water of the United States, shall be permitted to navigate all the channels of defendant District free of all tolls, charges, etc.

Section 12 provided that bridges over the Main Channel should not interfere with navigation, and that they should be so constructed that they might be moved, to leave the channel free when navigation required. The March 3, 1925 permit authorizing the diversion of 8,500 cubic seconds feet (mean yearly) provides the water for the operation of the Canal for navigation purposes *in the interest of navigation.* Likewise, in the interest of navigation, were all the other permits theretofore issued.

(2) The water so diverted pursuant to War Department permits, furnishes additional depths for navigation in the Desplaines and Illinois Rivers, in the interest of navigation; also this diverted water permits the removal of the dams and locks in the Illinois River for free river navigation. Section 23 of the Act authorizes the removal of the dams in view of the operation of the Sanitary Canal with the diversion.

The General Assembly of Illinois passed an act, approved June 4, 1889, in force July 1, 1889, in contemplation of the construction of the said Canal of defendant Sanitary District, providing that the state works, including dams at Henry and Copperas Creeks, which dams are mentioned in Section 23 of said act and the entire Illinois River slack-watered by said works, are ceded to the United States, on condition that the dams should be removed whenever the depth then available for navigation could be secured and maintained by channel improvement without the aid of said dams.

Section 4 of said Act provides (Session Laws of Illinois 1889, p. 227-8),

> "that the State of Illinois bases this act of session upon the condition that the plan of improving the Illinois River below La Salle by slack water, maintained by dams and locks, *be changed to a plan of improvement by means of an open channel, in conjunction with a water supply from Lake Michigan.*"

The water supply above mentioned is provided by the United States for the maintenance of navigation in the Illinois River, in the manner provided by Illinois, and thus approved by the United States.

(3) The Secretary of War, in the interest of navigation, has provided for this additional water specified in the permit of March 3, 1925, for the purpose of providing means by which the sewage and wastes discharged from various cities and towns into the Desplaines and Illinois Rivers, may be oxidized, the oxygen content of the fresh water of Lake Michigan causing the oxidation, it being well known that unless there is a certain percentage of oxygen at all times in water where wastes and sewage are present, it becomes noisome, malodorous and dangerous to the health of the people passing over such waters in boats or watercraft and/or living upon them; and, unless there is some oxygen content under such circumstances, fish life will be destroyed.

(4) The permit by the amount of its diversion including the instantaneous maximum provided, will keep the Chicago River reversed and flowing away from Lake Michigan, so that the wastes and sewage in it will not reach Lake Michigan, a navigable water of the United States, causing its pollution and interference with navigation thereon and other injury to the public, all having to do with the regulation of interstate commerce. The amended bill (p. 10) alleges that the defendant District has caused the waters of Lake Michigan to flow through its Canal in such manner as to reverse the flow of the Chicago River at all times. The amended bill (p. 13) alleges that that amount has been, in order to accomplish such reversal, approximately 8,800 cubic feet per second, being aproximately the amount of the mean yearly flow provided by the March 3, 1925, permit. The instantaneous maximum of 11,000 cubic feet per second allowed by the permit (amended bill, p. 31) was for the purpose of increasing the flow of the Chicago River to that amount in case of an extraordinary storm, which experience has shown to be necessary to keep the river from flowing into Lake Michigan at such time or times. This is necessary until the dam or controlling works provided to be constructed by July 1, 1929, at the mouth of Chicago River, according to condition 6 of said permit (amended bill, p. 31) is put in operation.

(5) Every condition of the permit shows its connection with the maintenance and interest of navigation.

Condition—

1. Requires that the work authorized shall not unreasonably interfere with navigation.
2. The United States may make inspections "in the interests of navigation" for which defendant Sanitary District shall pay.
3. Interference with the full free use by the public of "any navigable waters of the United States" is forbidden.

4. A program of sewage treatment by artificial processes shall be carried out so that the condition of the water in the Sanitary and Ship Canal of defendant District and in the Desplaines and Illinois Rivers will be better and navigation will thereby be convenienced and danger to the health of persons navigating these waterways will be removed.

5. The cost of regulating or compensating works to offset the lowering effect of the diversion shall be borne and guaranteed by the defendant in order that the program which has received the attention of the United States for a great many years of controlling within narrow limits the natural fluctuations of the lake surfaces may be provided. It is common knowledge that the outlet of Lake Erie (the Niagara River) would have to be enlarged in order that the plan of regulating the surface elevations of Lakes Erie, Huron and Michigan might be best carried out. The additional outlet maintained at Chicago through the diversion will make unnecessary this work for the enlargement of the Niagara River and thereby the Great Lakes surfaces may be controlled within narrower limits, all of which will benefit navigation, providing much greater depths of water in Lakes Erie, Huron, Michigan and their connecting channels at extreme low water.

6. The construction of controlling works at the mouth of the Chicago River to keep the Chicago River from flowing into Lake Michigan "in times of heavy storms" will prevent pollution of Lake Michigan, a navigable water of the United States thus benefitting navigation.

7. The control of the execution of the sewage treatment program and the diversion of water shall be under the control of the District Engineer at Chicago, a subordinate of the Chief of Engineers and the Secretary of War, in order that the sewage treatment program to remove noisome conditions in the navigable waterways below, such as the Sanitary and Ship Canal, Desplaines and Illinois Rivers, shall be properly carried out and the diversion of water from Lake Michigan shall be controlled at all times in the interest of navigation.

8. The metering of the water supply is provided to be adopted and carried out by Chicago in order

that there will be a lesser consumption of water by the vast population within its limits, thus making the sewage treatment program more effective.

9. If sufficient progress is not made by the end of each calendar year to insure compliance with condition 4, the permit may be revoked without notice.

10. And finally, the permit is revocable at will and it is subject to action by Congress.

Congress has occupied the entire field of navigation upon all of the Great Lakes, their connecting channels and the harbors along their respective shores as shown by Congressional acts and reports by law provided to be made to Congress.

(1) THE IMPROVEMENT AND MAINTENANCE OF NAVIGATION UPON THE GREAT LAKES SYSTEM OF WATERWAYS, NATIONAL WATERS, MAY BE PROPERLY DIVIDED INTO TWO ASPECTS.

The waterways from Lake Superior to Michigan-Huron, from Huron to Erie, through the St. Clair River, Lake St. Clair and the Detroit River, and from Erie to Ontario, of course in a state of nature were restricted, and the navigable connection between Superior and Michigan-Huron and between Erie and Ontario, due to the rapids and falls, was practically impassable.

It was necessary, therefore, in order that boats and watercraft engaged in commerce could pass from one lake to the other, that these connections be vastly improved.

The other aspect of the improvement of the Great Lakes system of navigation, constituted dredging of harbors, building breakwaters and piers to accommodate boats that could pass to and from the different lakes through their connecting waterways as they were from time to time improved. Upon this whole project, the United States has expended many millions of dollars.

(2) BETWEEN LAKE SUPERIOR AND MICHIGAN-HURON.

The low water depths in the original condition of the St. Mary's River, were from 5 to 17 feet. "Navigation past the Falls was entirely impracticable, except for down-bound canoes and log crafts." Previous projects for the improvement of navigation at the St. Mary's River were provided by Acts of Congress of July 8, 1856 (11 Stat. L. 25), August 2, 1882 (22 Stat. L. 191), August 5, 1886 (24 Stat. L. 310). The existing project adopted in 1892, provides for 21 feet depth, low water. The navigable connection was provided by locks and canal and dredging various channels of the St. Mary's River below the Rapids. (Chief of Engineers Reports, 1924, p. 1457.)

Section 11 of the Rivers & Harbors Act of March 3, 1909, (35 Stat. L. 815, 820), provided for the freeing of the St. Mary's River of power plants to carry out fully the project of controlling the outflow of Lake Superior in order to prevent the surface elevation of Superior from being reduced as low or raised as high as would exist under natural conditions. This act and the project of the United States with reference to the St. Mary's River and the control of the outflow of Superior for the purposes mentioned, were considered by this court in

> *United States* v. *Chandler-Dunbar Water Power Company,* 229 U. S. 51, 57 L. ed. 1063.

By the improvement of the United States at St. Mary's River and the control of the out-flow of Lake Superior, the relation of the surface elevation of Lake Superior to that of Michigan and Huron, has been entirely changed by the impounding at various times of water in Superior, and the releasing of such water at other times. By this means, the surface elevation of Lake Superior with reference to that of Michigan-Huron, has been at times higher and at other times lower than it would have been under natural conditions. This has affected the relation, likewise, of the surface elevation of Michigan-Huron to that of Lake Erie. Various improvements at and in the St. Mary's River are further shown by the Chief of Engineers Reports for the year 1924 (p. 1459).

(3) CONNECTION BETWEEN HURON AND ERIE.

(a) *The St. Clair River.*

In its original condition, the St. Clair River was obstructed by shoals at the foot of Lake Huron. The least depths varied from 16 to 18 feet. The present depths provided by existing projects are from 19 to 21 feet, as authorized by Congressional Acts of July 13, 1892 (27 Stat. L. 88), and by the Act of July 27, 1916. (Chief of Engineers Reports 1924, p. 1466.)

(b) *Lake St. Clair.*

The entrance to this lake was obstructed by bars, over which the least depth of water was from 2 to 6 feet. The original projects were authorized by Acts of Congress of March 2, 1867 (14 Stat. L. 418), and by the Act of March 3, 1873 (17 Stat. L. 560), whereby depths were provided of approximately 16 feet by dredging channels through the lake. The present projects provide for deepening of the channels 20 to 21 feet, as authorized by Acts of Congress of August 5, 1886 (24 Stat. L. 310), July 13, 1892 (27 Stat. L. 88), June 13, 1902 (32 Stat. L. 331), March 2, 1919. (United States Engineers Reports 1924, p. 1469.)

(c) *Detroit River.*

The low water depth in its original condition, was 12½ to 15 feet. Previous projects for the improvement of navigation in the Detroit River were authorized by the Acts of Congress of June 23, 1874 (18 Ph. 3 Stat. L. 237), July 5, 1884 (23 Stat. L. 133), August 5, 1886 (24 Stat. L. 310), August 11, 1888 (25 Stat. L. 400), July 13, 1892 (27 Stat. L. 88), March 3, 1899 (30 Stat. L. 1121), by which depths were provided of at least 20 feet. The existing project provides for approximately 22 feet in depth, according to Acts of Congress of June 13, 1902 (32 Stat. L. 331), March 3, 1905 (33 Stat. L. 1117), June 25, 1910 (36 Stat. L. 630), March 4, 1913 (37 Stat. L. 801), March 2, 1907 (34 Stat. L. 1073), June 25, 1910 (36 Stat. L. 630), March 2, 1919. (Chief of Engineers Reports, 1924, p. 1473.)

(d) *Connection between Erie and Ontario.*

The impossibility of passing from one lake to the other under natural conditions, and the necessity of providing such communication solely by canal, is so well known that it is unnecessary to call the court's attention to the various projects authorized by Congress for the construction of canals and for other improvements of navigation here.

(4) HARBOR IMPROVEMENTS BY THE UNITED STATES.

All the harbors on the shores of these Great Lakes and their connecting channels, have been improved so as to provide depths from time to time as the navigable connections between the Great Lakes were improved, all pursuant to acts of Congress. Time and space will not permit our referring to all the different harbors showing the various improvements authorized by Congress. It will suffice to mention some of them, and the improvement of all of the various harbors on the shores of the Great Lakes are described in the various annual reports of the Chief of Engineers.

(a) *Marinette Harbor, Wisconsin.*

Thirteen feet depth was provided by Act of Congress of March 3, 1871 (16 Stat. L. 538), 15 feet by the Act of September 15, 1890 (26 Stat. L. 426), 18 feet by the Act of March 3, 1899 (30 Stat. L. 1121). Other improvements of the harbor were provided by Acts of July 13, 1892 (27 Stat. L. 88), June 13, 1896 (29 Stat. L. 202), June 13, 1902 (32 Stat. L. 331), March 4, 1913 (37 Stat. L. 801). (Chief of Engineers Reports, 1924, p. 1327.)

(b) *Green Bay.*

The original depth of this harbor was 10 feet. Congress has by its acts provided a depth of 18 feet. The Acts of Congress for the various improvements are June 23, 1866 (14 Stat. L. 70), June 23, 1874 (18 Pt. 3 Stat. L. 237), Sept. 19, 1890 (26 Stat. L. 426), June 3, 1896 (29 Stat. L. 202), June 13, 1902 (32 Stat. L. 331), June 25, 1910 (36 Stat. L. 630). (Chief of Enginers Reports, 1924, p. 1330.)

(c) *Sturgeon Bay Harbor.*

Depth of 19 feet has been provided by Acts of Congress of July 13, 1892 (27 Stat. L. 88), July 13, 1892 (27 Stat. L. 88), June 13, 1902 (32 Stat. L. 331). (Chief of Engineers Reports, 1924, p. 1343.)

(d) *Algoma Harbor.*

From the original 3 feet depth, Congress by its acts has provided for 14 feet, March 3, 1871 (16 Stat. L. 538), March 3, 1875 (18 Pt. 3 Stat. L. 456), July 5, 1884 (23 Stat. L. 133), March 3, 1899 (30 Stat. L. 1121), and March 2, 1907 (34 Stat. L. 1073). (Chief of Engineers Reports, 1924, p. 1347.)

(e) *Kewaunee Harbor.*

From an original depth of 13 feet, Congress has by its acts provided a depth of 18 feet. See Acts of Congress of March 3, 1881 (21 Stat. L. 468), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1350.)

(f) *Manitowoc Harbor.*

From an original depth of 4 feet, Congress has provided a depth of 18 feet by its Acts of August 30, 1852 (10 Stat. L. 56), March 3, 1881 (21 Stat. L. 468), September 19, 1890 (126 Stat. L. 426), June 3, 1896 (29 Stat. L. 202), and June 13, 1902 (32 Stat. L. 331). (Chief of Engineers Reports, 1924, p. 1357.)

(g) *Sheboygan Harbor.*

From an original depth of 4 feet, Congress has provided a depth of approximately 19 feet by its acts of June 23, 1866 (14 Stat. L. 70), March 3, 1873 (17 Stat. L. 560), March 3, 1881 (21 Stat. L. 468), August 18, 1894 (28 Stat. L. 338), March 3, 1899 (30 Stat. L. 1121), June 13, 1902 (32 Stat. L. 331). (Chief of Engineers Reports, 1924, p. 1360.)

(h) *Port Washington Harbor.*

From an original depth of but a few feet, Congress has provided a depth in this harbor of 16 feet by its Acts of July 11, 1870 (16 Stat. L. 223), August 14, 1876 (19 Stat. L. 132), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1364.)

(i) *Milwaukee Harbor.*

From an original depth of 4½ feet, Congress has provided 19 feet depth and has made various other improvements by its Acts of March 3, 1843 (5 Stat. L. 619), August 30, 1852 (10 Stat. L. 56), April 10, 1869 (16 Stat. L. 44), March 3, 1881 (21 Stat. L. 468), March 3, 1899 (30 Stat. L. 1121), June 13, 1902 (32 Stat. L. 331), March 2, 1907 (34 Stat. L. 1073), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1367.)

(j) *Racine Harbor.*

From an original depth of 2 to 3 feet, Congress has provided a depth of 19 feet by its Acts of June 23, 1866 (14 Stat. L. 70), March 3, 1899 (30 Stat. L. 1121), June 13, 1902 (32 Stat. L. 331), March 2, 1907 (34 Stat. L. 1058), June 25, 1910 (36 Stat. L. 630). (Chief of Engineers Reports, 1924, p. 1372.)

(k) *Kenosha Harbor.*

From an original depth of 2 feet, Congress has provided approximately 19 feet by its Acts of August 30, 1852 (10 Stat. L. 56), June 23, 1866 (14 Stat. L. 70), September 19, 1890 (26 Stat. L. 426), March 3, 1899 (30 Stat. L. 1121), March 2, 1907 (34 Stat. L. 1073). (Chief of Engineers Reports, 1924, p. 1376.)

(l) *Superior Harbor or Bay.*

From an original depth of 8 to 9 feet, Congress has provided depths of approximately 20 feet by its Acts of March 3, 1873 (17 Stat. L. 560), March 2, 1867 (14 Stat. L. 418), and June 3, 1896 (29 Stat. L. 202). Under the latter act the improvement of the Harbors of Duluth and Superior were included as one project. All the conditions here were considered by this court, and it was held that the United States had and had assumed exclusive jurisdiction over Duluth and this harbor. (See *Wisconsin* v. *Duluth*, 96 U. S., p. 379.) (Chief of Engineers Reports, 1924, p. 1282.)

(m) *Ashland Harbor.*

Congress has provided for improvement of this harbor by its Acts of August 5, 1886 (24 Stat. L. 310). The original depth was 19 feet and 20 feet is provided by the United States. (Chief of Engineers Reports, 1924, p. 1292.)

The harbors above mentioned, constitute all the harbors along the Wisconsin shores mentioned in the amended bill. It would seem unnecessary to pursue the subject further as to other harbors of other states mentioned in said amended bill. As to such other harbors, Congress authorized improvements apace with the navigable facilities it provided generally upon the Great Lakes to the same extent and in the same manner it did as to said Wisconsin Harbors, as is shown by the annual reports of the Chief of Engineers of United States Army.

(5) THE UNITED STATES CONSENTED TO THE CONSTRUCTION BY THE DOMINION OF CANADA OF A DAM ACROSS A CHANNEL OF THE GALOPS RAPIDS AND AUTHORIZED THE DIVERSION OF WATER FROM LAKE ERIE FOR NAVIGATION AND WATER POWER PURPOSES HAVING THE EFFECT OF LOWERING ITS NATURAL SURFACE ELEVATION 4.2 INCHES.

The outlet of Lake Ontario known as the "Gut Dam," which had the effect of permanently raising the surface elevation of Lake Ontario over its natural condition about 5 inches, as is shown by report entitled "Diversion of Water from the Great Lakes and Niagara River," made pursuant to Resolution Number 8, 65th Congress, the letter of the Chief of Engineers transmitting said report to the Speaker of the House of Representatives being dated December 7, 1920, to which is attached letter of the Chief of Engineers of November 9, 1920, and report of the Board of Engineers August 24, 1920, and to which is also attached the report of Col. J. G. Warren of August 30, 1919. (See page 378 of said "Report on diversion of water from the Great Lakes and Niagara River." Also see H. R. 762, 63d Congress, Second session.)

The diversion through the Welland Canal in Canada, Black Rock Ship Canal, New York State Barge Canal at Niagara Falls for water power purposes, from Lake Erie, has the effect of lowering the surface elevation of the water of Lake Erie .35 foot, or 4.20 inches, (See said "Report on Diversion of Water of the Great Lakes and Niagara River," p. 23.)

ARGUMENT ON THE LAW.

Preliminary to discussing the points of law and the facts of this case to which the various propositions of law apply, we wish to call the attention of the court to certain facts of which it may take judicial notice.

This court will take judicial notice of all waterways making up the various navigation systems and connecting those systems one with the other, the condition of same, facts set forth in public documents of the United States, of the State of Illinois and of its agents, and will as to such knowledge disregard any allegations of the bill of complaint contrary to such facts.

Jones v. *United States,* 137 U. S. 202, 212, 215, 34 L. ed. 691, 695, 696 and cases there cited.

South Ottawa v. *Perkins,* 94 U. S. 260, 24 L. ed. 154.

Brown v. *Piper,* 91 U. S. 37, 23 L. Ed. 200.

Jenkins v. *Collard,* 145 U. S. 546, 36 L. ed. 812.

Armstrong v. *U. S.,* 3 Wallace 154, 20 L. ed. 614.

The original condition of the various waterways connecting the Great Lakes, the harbors along their shores, the improvement of the Great Lakes system of waterways from time to time by Congress, the acts of Congress relating to same, the acts of the General Assembly of Illinois, constituting the statute laws, are set forth in the statement of facts (herein, p. 25). The court will take judicial notice, notwithstanding the allegations of the amended bill, on information and belief, to the contrary, of the compliance by the defendant District with the conditions of the permit of March 3, 1925, if the facts of such compliance are deemed to be material, or in the event the court should consider that the allegations of the amended bill of complaint, (on information and belief and the merest conclusions) are such as to overcome the presumption that each and every of the conditions have been complied with. (The Secretary of War has not at any time revoked the permit, and it is now in full force and effect.) The facts of which the court may take judicial notice showing compliance with the conditions of the permit are:

Under condition 2, the cost of inspections made by the Engineers Corps United States Army from March 3, 1925, to September 30, 1925, amounting to $614.28, was paid by defendant Sanitary District October 14, 1925; the cost of such inspection and supervisory work from October 1, 1925, to November 30, 1925, amounting to $2,224.24, was paid by defendant Sanitary District December 17, 1925. (The bill for the said last items appears in appendix hereto, page 70).

Under condition 4, schedule of design and construction of sewage treatment plants for period from 1925 to 1929, was submitted by Sanitary District to and approved by the District Engineer at Chicago on July 28, 1925, and in pursuance of said program for sewage treatment works so approved, the following contracts were let by defendant Sanitary District for sewage treatment works on the dates shown below. (See proceedings of the Board of Trustees of Sanitary District for the respective dates.)

August 6, 1925—95th Street Sewer Connection	$ 44,720.00
August 20, 1925 — Operating Galleries, North Side Treatment Plant	316,090.00
Sept. 17, 1925—Preliminary Tanks and Grit Chambers, North Side Treatment Plant	801,665.80
Sept. 17, 1925—Dredging Calumet and Little Calumet Rivers	1,080,000.00
Oct. 1, 1925—Motors and Pumps, North Side Treatment Plant	35,475.00
Oct. 1, 1925—Miscellaneous Electrical Equipment, North Side Treatment Plant	22,900.00
Oct. 8, 1925—Contract No. 7, North Side Sewer	384,560.00
Oct. 8, 1925—Contract No. 8, North Side Sewer	354,200.00
October 15, 1925—Elevators, North Side Treatment Plant	13,734.00
Oct. 22, 1925—Air Conditioning Equipment, North Side Treatment Plant	29,900.00
Nov. 19, 1925—Pump and Blower House, North Side Treatment Plant	3,791,320.00
Total	$6,874,564.80

NOTE—Total expended for sewage treatment plants, pumping stations and the like (not including maintenance and operation), to January 1, 1926—$42,563,300—as shown by defendant Sanitary District's public records and documents.

Under condition 5, the million dollar bond provided to guarantee the payment of the cost of regulating or compensating works was approved by the Board of Trustees of defendant Sanitary District at its meeting of September 17, 1925 (see proceedings for said date), and was thereafter filed with and approved by and is in the possession of the War Department.

Under condition 7, the supervision of the work has been and is under the United States District Engineer at

Chicago, as shown by the bills for cost of inspections. (Appendix, page 70.)

Under condition 8, on September 1, 1925, the City Council of the City of Chicago passed an ordinance (see proceedings of City Council for that date), adopted a program for metering at least 90 per cent of its water service, and for the execution of said program at the average rate of 10 per cent per annum.

Condition 1 provides that the work provided to be done under the permit shall not unreasonably interfere with navigation, and condition 3 that the defendant Sanitary District shall not forbid full free use by the public of any of the navigable waters. It must be presumed that these two conditions have been observed, for there is no showing that there has been any complaint by the War Department.

Condition 6 provides for the submission of plans for and the completion (by July 1, 1929), of the controlling works at the mouth of the Chicago River to prevent the Chicago River from flowing into Lake Michigan at times of heavy storms. It must be presumed that these plans are being prepared and will be submitted and the work will be done as provided. There is no allegation that any complaint on this score has been made by the War Department.

Conditions 9 and 10 relate to revocation by the Secretary of War for cause or at will.

Condition 11 provides for the permit's termination December 31, 1929.

I.

THE PERMIT OF MARCH 3, 1925, ISSUED BY THE SECRETARY OF WAR UPON THE RECOMMENDATION OF THE CHIEF OF ENGINEERS, IS WITHIN THE AUTHORITY GRANTED TO SAID OFFICERS BY SECTION 10 OF THE RIVERS & HARBORS ACT OF MARCH 3, 1899. THE DIVERSION OF 8,500 CUBIC SECONDS FEET IS LAWFUL, AND SUCH DIVERSION IS IN LAW NO OBSTRUCTION TO NAVIGATION.

(a) Complainants contend that the Chief of Engineers was not authorized to recommend, and the Secretary of War was not empowered to approve, a permit allowing and affirmatively authorizing this diversion of water from Lake Michigan, because it is, in fact, as they allege, an obstruction to navigation, in that it lowers Lake Michigan, Huron, Erie, Ontario and their connecting channels and harbors, at least six inches, and thereby affects the carrying capacity of boats that might pass over these waters.

There ought not to be any question as to the authority of the Secretary of War to issue a permit under the March 3, 1899, Act, since the decision of this court in *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 69 L. Ed. 200. Speaking of this very diversion, the court said:

> "This withdrawal is prohibited by Congress, except so far as it may be authorized by the Secretary of War."

The very question was submitted to the acting Attorney General, Honorable James M. Beck, and his opinion was given February 13, 1925. (See appendix hereto, page 59). The opinion concluded that the secretary had the authority to grant a permit authorizing a diversion greater than the amount that had theretofore been allowed by his permits, and that Congress intended by the Act of March 3, 1899, to delegate complete, full and exclusive authority to the Secretary of War and the Chief of Engineers to determine what should or should not be done in connection with navigable waters, and that when the Secretary approved the doing of anything in connection with those waters, the act permitted was not in law an obstruction.

In support of his opinion, the acting Attorney General cites and quotes from the case of *Miller* v. *Mayor,* 109 U. S. 385, 27 L. ed. 971; see, also, *U. S.* v. *Rio Grande Dam & Irrigation Company,* 174 U. S. 690, 43 L. ed. 1136.

In

> *Maine Water Company* v. *Knickerbocker,* 99 Maine 473, (decided February 17, 1905),

the power of the Secretary of War under Section 10 of the Rivers and Harbors Act is analyzed. The water company brought suit against the Towage Company for damages sustained to the Water Company's pipe line across the Kennebec River at Bath, a tidal, navigable water wholly within the state. The pipe line was properly authorized by the state, and the Secretary of War had issued a permit, as recommended by the Chief of Engineers, for the placing of the pipe line in the river. It was claimed by the defendant that the pipe line was an obstruction and unlawfully occupied the river, and that the Secretary of War was not empowered to grant the permit for placing it in the river, and that the authority could only come from Congress direct. The court held (p. 481):

> "that such structures if built according to plans recommended and authorized, as provided in the section (10), are authorized by Congress—that they are affirmatively authorized,—though the affirmative authority arises by implication,—and that they are lawful without any further action by Congress".

The *Maine Water Company* case was cited with approval by this court in

> *Southern Pacific Company* v. *Olmypian Dredging Company,* 260 U. S. 205, 210, 67 L. ed. 213,

and by the Circuit Court of Appeals, 4th Circuit, in

> *Ganison* v. *Greenleaf Johnson Lumber Company,* 215 Fed. 578, 580.

In

> *Southern Pacific Company* v. *Olympian Dredging Company,* 260 U. S. 205, 207, 67 L. ed. 213, 215,

in referring to the similar act of September 19, 1890, this court said:

> "By the Act of September, 1890, (26 Stat. L. 453, 454, Chap. 907), Congress inaugurated a new policy of general, direct control over the navigable waters of the United States. * * * By this legislation Congress assumed jurisdiction of the subject of obstructions to navigtaion, and committed to the Secretary of War administrative power in so far as administration was necessary."

In

> *Monongahela Bridge Company* v. *U. S.,* 216 U. S. 177, 195, 54 L. ed. 435, 443,

this court, in construing the Act of March 3, 1899, said:

> "* * * Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject."

The Act of March 3, 1869, which was before the court in the case of

> *Miller* v. *Mayor,* 109 U. S. 385, 386, 387, 394, 27 L. ed. 971, 973, 974,

authorizing the construction of a bridge between New York and Brooklyn, so

> "as not to obstruct, impair or injuriously modify the navigation of the river",

provided that the plans of the bridge should be subject to the approval of the Secretary, upon the Secretary's being satisfied

> "that the bridge built on such plan"

will not

> "obstruct, impair or injuriously modify the navigation of said river".

This court, in holding the act and the action of the Secretary of War in approving the plans to be lawful, said:

> "Its (Congress') power, therefore, to determine what shall not be deemed, so far as that commerce is concerned, an obstruction, is necessarily paramount and conclusive * * *. The efficiency of an act as a declaration of legislative will, must, of course, come from Congress, but the ascertainment of the contingency upon which the act shall take effect may be left to such agencies as it may designate."

(b) The diversion authorized by the permit of March 3, 1925, is lawful, and it is not an obstruction to navigation. The determination of the amount of the diversion was and is delegated by the Act of 1899 to the Chief of Engineers and the Secretary of War and the action of the Secretary on the recommendation of the Chief of Engineers has the same force and effect as if such action had been taken directly by Congress. The power to act being exclusive in the United States (control of navigable waters), its action cannot be questioned.

The case of

> *Pennsylvania* v. *W. & B. Bridge Company*, 18 Howard 421, 430, 15 L. ed. 435, 437,

would seem to be conclusive of almost every question involved in this controversy. In that case suit had been instituted by the State of Pennsylvania in this court to enjoin the construction or maintenance of the bridge because, as it was proposed to be, or was built, it prevented boats passing up the river and into Pennsylvania, and caused an undue burden upon the State of Pennsylvania in its proprietary capacity, by preventing the full operation of various canals and works built by Pennsylvania to connect with the Ohio River and thereby the tolls and revenue of the state were and would be diminished, and the public improvements thus made would be rendered useless. This court entered a decree as set forth in its opinion in

13 Howard, 518, 14 L. ed. 249,

finding the bridge to be an obstruction and enjoining the maintenance of the bridge as it had been built. Later, August 31, 1852, Congress passed an act declaring the bridge to be a lawful structure in its then condition. When the matter came before this court upon motions of the complainant for attachment and sequestration of the property of the bridge company for contempt, the court said (p. 130):

> "So far, therefore, as this bridge created an obstruction to the free navigation of the river, in view of the previous acts of Congress they are to be regarded and modified in this subsequent legislation, and although it still may be an obstruction in fact, **is not so in the contemplation of law.** We have already said, and the principle is undoubted, that the Act of the Legislature of Virginia conferred full authority to erect and maintain a bridge, subject to the exercise of the power of Congress to regulate the navigation of the river. That body having, in the exercise of this power, regulated the navigation, consistent with its preservation and continuation, **the authority to maintain it would seem to be complete. That authority combines the concurrent powers of both governments, state and federal, which, if not sufficient, certainly none can be found in our system of government.** * * *
>
> The regulation of commerce includes intercourse

> and navigation, and, of course, the power to determine what shall or shall not be deemed in judgment of law an obstruction of navigation; and that power, as we have seen, has been exercised consistent with the continuance of the bridge."

The diversion authorized by the March 3, 1925, permit is lawful as to the maintenance of which during its existence no state can complain. It stands in exactly the same position as the bridge from New York to Brooklyn, considered by this court in

> *Miller* v. *Mayor of New York,* 109 U. S. 385, 396, 27 L. ed. 971, 975,

as to which bridge, built with the approval of the Secretary of War, this court said:

> "For its interference with the public use of the stream no individual could complain, as **the power which could control and regulate that use had made the structure creating the interference a lawful one.**"

(c) This court said in

> *Martin* v. *Mott,* 12 Wheaton, 19, 31, 6 L. ed. 537, 541,

> "Whenever a statute gives a discretionary power to any person to be exercised by him upon his own opinion of certain facts, it is a sound rule of construction that the statute constitutes him the sole and exclusive judge of the existence of those facts." See, also, *Mullan* v. *U. S.,* 140 U. S. 240, 35 L. ed., 489.

In

> *Interstate Commerce Commission* v. *Chicago, Rock Island & Pacific Railroad Company,* 218 U. S. 88, 110, 67 L. ed. 946, 958,

in speaking of the presumption indulged as to a decision of the Interstate Commerce Commission, this court said:

> " * * * its findings are fortified by presumptions of truth 'due to the judgments of a tribunal appointed by law and informed by experience.' "

The discretion of determining whether or not the diversion is or is not an obstruction to navigation and of controlling the amount of the diversion, was committed to the Secretary of War. His finding is conclusive. There is not the slightest suggestion that his action in granting the permit of March 3, 1925, was taken capriciously, nor was the authority unreasonably exercised. In fact, there are no allegations properly setting up facts upon which relief can be based. They are the merest conclusions of the pleader. Paragraph 25 of the amended bill merely states that 500 or a thousand cubic feet per second is the only amount necessary for the operation of the canal for navigation purposes. From what facts that conclusion may be obtained is not shown. More water may be required for the operation of the waterway on some other plan than the one the pleader had in mind when he stated that there was not required more than 500 to a thousand cubic feet per second. Whether he assumed this water was required for slack water navigation or for a free river plan of navigation for the Desplaines and Illinois Rivers, is not shown.

In

Pierce Oil Corporation v. *Hope,* 248 U. S. 498, 500, 63 L. ed., 381, 383,

this court said:

> "The averment that the ordinance is unnecessary and unreasonable if it be regarded as a conclusion of law upon the point which this court must decide is not admitted by the demurrer. If it be taken to allege that facts exist that lead to that conclusion, it stands no better. For if there are material facts of which the court would not inform itself, as in many cases it would, * * * an averment in this general form is not enough. * * * Only facts well pleaded are confessed."

The same principle applies to the allegations of the bill of complaint as to the supposed injury to complainants. (Paragraph 21, amended bill). There is the statement that coal and other commodities are carried in what are called bulk freighters of "enormous carrying capacity," and then the statement is made that "for every inch of their normal draft which said vessels are unable to utilize, their cargo carrying capacity is reduced by many tons." There is no allegation that any boats carrying coal or commodities used by the complainants, have been or will be prevented from carrying their full cargo. There is not even an allegation of conclusion as to injury or damage.

II.

THE MARCH 3, 1925, PERMIT RELATES DIRECTLY TO AND HAS DIRECT, POSITIVE AND SUBSTANTIAL CONNECTION WITH THE REGULATION OF INTERSTATE COMMERCE, AS SUCH PERMIT OPERATES DIRECTLY, AND PROVIDES FOR THE MAINTENANCE AND IMPROVEMENT, AND THE CONVENIENCE AND FACILITY, OF NAVIGATION UPON UNITED STATES NAVIGABLE WATERWAYS.

Treating, for the purpose of argument only, the conclusions of the pleader as properly presenting to the court facts which can be confessed by the motion to dismiss, the nub of complainant's case, as set forth by their amended bill, seems to be—first, the diversion lowers the surfaces of the Great Lakes approximately 6 inches, as well as their connecting channels and the harbors along their respective shores, resulting in the loss of draft, and consequent carrying capacity of boats engaged in interstate commerce and carrying coal, iron ore and other commodities; second, that portion of the diversion authorized by the permit of March 3, 1925, exceeding 500 or a thousand cubic seconds feet, admitted by the amended bill to be necessary for navigation, is unlawful; third, the only purpose of the Secretary of War in granting the permit was to take care of certain conditions relating to the health of approximately three million people residing within the territorial limits of defendant Sanitary District.

However, the various allegations of the amended bill and facts appearing *aliunde* within the court's judicial notice demonstrate, that the permit providing for the diversion in the amount named, really and substantially serves the interests of navigation, in that; (see statement of facts herein, p. 20 *et seq.*).

(a) The permit provides the water from Lake Michigan required under the laws of Illinois for the operation of defendant District's canal, a link in the waterway from Lake Michigan to the Gulf of Mexico, which waterway has received the attention of the government and Illinois from the very time Illinois became a state of the union, and which waterway and the diversion of water from Lake Michigan for its operation, was authorized by Congress under the Acts of March 30, 1822, and March 2, 1827. Said acts are entitled, respectively:

> "An Act to authorize the State of Illinois to open a canal through the public lands to connect the Illinois River with Lake Michigan,"

and

> "An Act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan"; (4 Stat. L., 234.)

The force and effect of these two acts were considered as consent by the United States that the drainage of Chicago should pass in to the Desplaines, Illinois, and Mississippi Rivers. (*Missouri* v. *Illinois,* 200 U. S. 496.) So, when Illinois built its canal and provided for its operation with a diversion up to 10,000 cubic seconds feet, the amount that could be diverted for such purposes was subject only to the recommendation of the Chief of Engineers and approval of the Secretary of War. (*Sanitary District of Chicago* v. *U. S.,* 266 U. S. 405, 69 L. ed. 200.)

(b) The water diverted serves the interests of navigation in providing oxygen for the oxidation of sewage and drainage in the Des Plaines and Illinois Rivers, preventing a nuisance and inconvenience to navigation thereon; likewise the diversion to the amount mentioned keeps out of Lake Michigan the sewage polluted Chicago River, thus preventing a condition in the water of Lake Michigan injurious to navigation;

(c) The diversion, in addition to providing navigation facilities upon the defendant Sanitary District's canal, makes for the maintenance of free river navigation in the Illinois River, and increases and insures navigable depths on said river.

So, the issuance of the permit is within the scope of the power not only delegated to Congress, but also that power and authority as we have seen properly committed to the Secretary of War under the Act of March 3, 1899. The exercise of the power to fix the amount of the diversion in the interests of navigation having been committed to the Secretary of War, the amount, manner and conditions of such diversion is therefore within his exclusive control. No court in the land has power to review or question the exercise by the Secretary of War of this authority.

In

> *Gilman* v. *Philadelphia,* 3 Wallace 713, 724, 18 L. ed. 96, 99,

this court said:

> "Commerce includes navigation. The power to regulate commerce comprehends the control for that purpose and to the extent necessary, of all the navigable waters of the United States which are accessible from a state other than those in which they lie. For this purpose they are the public property of the nation, and subject to all the requisite legislation by Congress. * * * **For these purposes Congress possesses all the powers which existed in**

> **the states before the adoption of the national constitution, and which have always existed in the Parliament in England.**"

In

> *United States* v. *Chandler Dunbar Water Power Co.*, 229 U. S. 51, 62, 64, 65, 57 L. ed. 1063, 1075, 1076,

this court, in speaking of the power of Congress over navigable waters, said:

> "That power of use and control comes from the power to regulate commerce between the states and with foreign nations. * * *
>
> **So unfettered is this control of Congress over navigable streams of the country, that its judgment as to whether a construction in or over such river is or is not an obstacle and a hindrance to navigation is conclusive.** Such judgment and determination is the exercise of legislative power in respect of a **subject wholly within its control.**
>
> "* * * And when Congress determined, as it did by the Act of March 3, 1909, that the whole river between the American bank and the international line, as well as all of the upland north of the present Ship Canal, throughout its entire length, was 'necessary for the purposes of navigation of said waters and the waters connected therewith,' that determination was conclusive."

Economy Light & Power Co. v. *U. S.*, 256 U. S. 113, 121, 65 L. ed. 847, 854:

> "Congress may exercise its authority through general as well as through special laws, its power in either case being supreme. The Act of 1899 * * * upon which the present bill is founded, is a due assertion of the authority of Congress over all navigable waters within its jurisdiction; and it must be accorded due weight as such."

Wisconsin **v.** ***Duluth*****, 96 U. S. 379, 24 L. ed. 668, 672:**

> **"While the engineering officers of the government are under the authority of Congress doing all they can to make this canal useful to commerce, and to**

> keep it in good condition, this court can have no duty to a state which requires it to order the City of Duluth to destroy it."

In

> *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, 209, 67 L. ed. 213, 216,

in speaking of the authority of the Secretary of War under the Act of March 3, 1899, this court said:

> "Whether the limitation in this respect was grounded alone upon what the Secretary considered would be sufficient to secure the safety of navigation, or upon the fact that to leave the stumps in the bed of the river would be of **some positive service in stabilizing the shifting bed of the stream, or useful in some other way, does not appear. It was not for the petitioners, however, to question either his reasons or his conclusions."**

So, in this case, whether the Secretary of War merely concluded that the diversion in the amount fixed by his permit secured "the safety of navigation," or whether he issued it for the purpose of improving and benefiting navigation, are not questions about which the complainants here may inquire.

The control of navigation being within the regulation of commerce, whatever the Secretary of War may do in connection with the control of navigable waters for the public good (for the protection of the water supply of three million inhabitants) is within his power, exclusive and conclusive, which no one can question.

In

> *Pensacola Telegraph Company* v. *Western Union Telegraph Company*, 96 U. S. 1, 24 L. ed. 708, 711,

this court said:

> "The government of the United States, within the scope of its powers, operates upon every foot of territory under its jurisdiction. It legislates for

> the whole nation, and is not embarrassed by state lines."

Mondou v. *N. Y. H. & H. R. Co.,* 223 U. S. 1, 47, 56 L. ed. 327, 345 (2d Employers' Liability cases):

> "3. 'To regulate' in the sense intended is to foster, protect, control and restrain, with appropriate regard for the welfare of those who are immediately concerned and of the public at large. * * *
>
> 4. Therefore, Congress may legislate about the agents and instruments of interstate commerce, and about the conditions under which those agents and instruments perform the work of interstate commerce, whenever such legislation bears, or, in the exercise of a fair legislative discretion, can be deemed to bear, upon the reliability or promptness or economy or security or utility of the Interstate Commerce Act."

III.

THE ENTIRE GREAT LAKES SYSTEM OF WATERWAYS, INCLUDING THE GREAT LAKES THEMSELVES, CONNECTING CHANNELS AND HARBORS, ARE UNDER THE EXCLUSIVE JURISDICTION OF THE UNITED STATES. IT HAS EXERCISED AND IS EXERCISING SUCH JURISDICTION AND HAS OCCUPIED THE ENTIRE FIELD. IT IS NOT WITHIN THE RIGHT OF COMPLAINANTS TO QUESTION SUCH REGULATION OF SAID WATERWAY SYSTEM IN ANY COURT, OR FOR THE COURT, AT THE SUIT OF COMPLAINANT STATES, TO CONTROL THE ACTION OF CONGRESS WITH RESPECT TO THEM.

In our statement of the facts herein (page 25) we have called the court's attention to the fact that Congress, through its various acts, beginning a century ago, commenced and has continued to exercise jurisdiction over the Great Lakes system by enlarging and improving the connecting waterways, and each and every of the harbors. Thereby Congress has provided within its exclusive jurisdiction the conditions of navigation upon such waterways. The improvement of these waterways has taken the form of expenditures under the direction of the Secretary of War and Engineer Corps, of large sums of money, pursuant to the various Rivers and Harbors Appropriation bills, as well as by other acts of Congress. The connecting channels which originally formed no waterway connection between certain lakes, have been completely changed or enlarged by dredging and widening, or by the construction of canals. The relation of the levels of the different lakes to one another have been entirely changed, as has resulted from the impounding and releasing of the waters of Lake Superior through the complete control of the out-flow of Lake Superior through the St. Mary's River and by the diversions of water from Lake Erie for navigation and water power purposes, including the raising of the surface elevation of Lake Ontario by building the Gut Dam in the Galops Rapids. The harbors likewise have been deepened and otherwise improved by the United States, so that whatever navigation facilities are maintained for interstate commerce upon the Great Lakes, has been provided entirely by the United States, as in fact it and it alone had the power to do under the Constitution.

The case of

Wisconsin v. *Duluth,* 96 U. S. 379, 24 L. ed. 668, 670, 671,

is conclusive, as Congress has taken upon itself the entire burden of the improvement of the Great Lakes system of waterways. Congress by these various acts with reference to the Great Lakes system of waterways and every harbor mentioned in the amended bill, has said, as this court stated that it said as to the Duluth harbor, in *Wisconsin* v. *Duulth, supra*:

> "It cannot be necessary to say that when a public work of this character has been inaugurated or

> adopted by Congress, and its management placed under the control of its officers, there exists no right in any other branch of the government to forbid the work, or to prescribe the manner in which it shall be conducted.
>
> * * * * *
>
> **We take upon ourselves the burden of this improvement, which properly belongs to us, and that hereafter this work for the public good is in our hands and subject to our control.**
>
> **If the merest recital of these acts of Congress, and the War Department under them, do not establish that proposition, we can have little hope of making it plain by elaborate argument.''**

IV.

THE AMENDED BILL DOES NOT MAKE A CASE JUSTICIABLE IN THIS COURT.

It is of national waters that complaint is made (*Sanitary District of Chicago* v. *U. S.*, 266 U. S. 405, 69 L. ed. 200), over which waters there is required the exercise of the exclusive jurisdiction of the Federal Government. *U. S.* v. *Chandler-Dunbar Water Co.,* 229 U. S. 53-67, 57 Law ed. 1063. The power of the United States as to such navigable waters is complete and exclusive, being all the power formerly in the several States. *Gilman* v. *Philadelphia,* 3 Wal. 723-724, 18 L. ed. 96; *Pensacola Telegraph Co.* v. *Western Union,* 96 U. S. 1, 24 L. ed. 701.

> "* * * The vindication of the freedom of interstate commerce is not committed to the State of Louisiana. * * *'' *Louisiana* v. *Texas,* 176 U. S. 1, 44 L. ed. 347.
>
> **"But in matters where the national importance is imminent and direct, even where Congress has been silent, the States may not act at all.''** *Sanitary District* v. *U. S.,* 266 U. S. 405, 69 L. ed. 200. See also *Kansas City & Southern* v. *Kaw Valley Drainage District,* 233 U. S. 75-79, 58 L. ed. 857; *Missouri* v. *Kansas Natural Gas Co.,* 265 U. S. 298, 68 L. ed. 1029.

V.

THE UNITED STATES IS A NECESSARY AND INDISPENSABLE PARTY, AND THE CASE CANNOT PROCEED WITHOUT IT.

No decree can be entered in this case without affecting the rights of the United States as provided by acts of Congress and by the action of its executive officers taken under congressional acts. The bill seeks either the absolute abatement of all diversion from the Great Lakes to the Desplaines and Illinois Rivers, or such portion of the diversion as the court should determine to be unnecessary for navigation. The acts of Congress of March 30, 1822, and March 2, 1827, directly provided for the construction and maintenance of the canal connecting Lake Michigan with the Illinois River and the consequent diversion of water from Lake Michigan to operate same. Under the latter act, the United States granted to the State of Illinois for the construction of this canal, and it was provided that it should be maintained by Illinois as a canal for the use of the United States, a vast quantity of land, equal to one-half of five sections in width, on each side of the canal. Therefore, the United States is interested in the operation of the defendant Sanitary District's canal, the condition of pollution of the waters of the Desplaines and Illinois Rivers, the depths for navigation in the Illinois River and the condition of pollution of Lake Michigan at and near Chicago.

The interest of the United States in the diversion was apparent to this court in

> *Sanitary District* v. *United States,* 266 U. S. 405, 69 L. ed. 200,

when it said:

> "This suit is not for the purpose of doing away with the channel which the United States, we have no doubt, would be most unwilling to see closed. * * *"

Hence a decree as to whether there should be any diversion, or as to the amount of diversion, would directly and positively affect the rights and interests of the United States. Under such circumstances the United States is a necessary party.

State of California v. *Southern Pacific Co.*, 157 U. S. 229, 39 L. ed. 683.

Minnesota v. *Northern Securities Company*, 184 U. S. 199, 46 L. ed. 499.

Sanitary District v. *United States*, 266 U. S. 405, 69 L. ed. 200.

VI.

COMPLAINANTS CAN BASE NO RIGHT IN THIS COURT UPON THE ALLEGED FAILURE OF DEFENDANT SANITARY DISTRICT TO CARRY OUT ANY OF THE CONDITIONS OF THE SAID PERMIT OF MARCH 3, 1925. THE PERMIT IS IN FULL FORCE AND EFFECT, HAS NOT BEEN REVOKED. NON-COMPLIANCE WITH THE CONDITIONS DOES NOT IPSO FACTO REVOKE IT. IF CONDITIONS SHOULD NOT BE COMPLIED WITH, ONLY THE SECRETARY OF WAR MAY REVOKE, AND THE BREACH OF ANY OF THE CONDITIONS DOES NOT AFFECT THE NAVIGABLE CONDITIONS OF THE GREAT LAKES AS TO WHICH COMPLAINANTS MAKE CLAIM OF INJURY.

Whether any conditions or what conditions should be imposed, was entirely within the discretion of the Secretary of War.

> "The power to approve implies the power to disapprove, and the power to disapprove necessarily includes the lesser power to condition an approval." *Southern Pacific* v. *Olympian Dredging Co.*, 260 U. S. 205, 208, 67 L. ed. 213, 216.

In the case of

Kuhne v. *Sanitary District*, 294 Ill. 430, 437,

Kuhne attempted to base a right of action upon the alleged wrongful act, as he claimed, of the Sanitary District in diverting from Lake Michigan water in excess of 4,167 cubic seconds feet, as provided by the permit of December 5, 1901, which was the subject of the case of

> *Sanitary District of Chicago* v. *United States*, 266 U. S. 405, 69 L. ed. 200.

There the Illinois Supreme Court held that enforcement by the Secretary of War of the limitation of his permit, was entirely and exclusively within his jurisdiction, and that the plaintiff, even though injured by failure of the Sanitary District to observe the limitation, could not complain

It being within the power of the Secretary of War in the first instance to impose such conditions as he chose or to impose no conditions, it is likewise within his power and discretion to revoke or not revoke the permit in the event the conditions, or any of them, are not observed by the defendant District.

According to the allegations of the amended bill, the permit now is in full force and effect, which is the only fact material in this controversy.

In any event, as heretofore shown, the court may take judicial notice from public documents and ordinances of the Board of Trustees of the Sanitary District and City Council of the City of Chicago, that all conditions of the permit have been complied with by defendant District. When the facts within the court's judicial knowledge are contrary to the allegations of the bill, the court should disregard such untruthful statements of the pleadings. (*Infra*, 34).

VII.

COMPLAINANTS ARE NOT CONCERNED WITH THE CONDITION OF POLLUTION OF THE DESPLAINES AND ILLINOIS RIVERS, OR WHETHER THERE IS A CURRENT IN THE CHICAGO RIVER. FURTHERMORE, THEY SHOW NO SPECIAL INJURY, AND THE INJURY CLAIMED IS COMMON AS MUCH TO OTHER STATES AND THEIR CITIZENS AS TO THE COMPLAINANT STATES AND THEIR CITIZENS.

The waters mentioned as polluted or in which there is a current created by the diversion are Chicago River, Chicago Sanitary and Ship Çanal, Desplaines and Illinois Rivers, which waters are navigable waters wholly within the confines of the State of Illinois. The alleged condition as to current and the alleged condition as to pollution, have been authorized by the State of Illinois and approved by the United States, acting through its constituted authorities.

These two governmental bodies have regulated navigation on the waterways mentioned, consistent with their preservation and continuation and

> "that authority combines the concurrent powers of both governments, state and federal, which if not sufficient, certainly none can be found in our system of government."
>
> 2d Wheeling Bridge Case, 18 Howard 421, 430, 15 L. ed. 435, 436.

In order that a complainant may be entitled to relief against a public nuisance, it must appear that he suffers some direct and special injury.

Northern Pacific Railroad Company v. *Whalen,* 149 U. S. 157, 37 L. ed. 686.

Mississippi, etc., v. *Ward,* 2 Black 485, 17 L. ed. 311.

Georgetown v. *Alexandria,* 12 Peters 91, 9 L. ed. 1012.

VIII.

THE COMPLAINANTS' POSITION TAKEN BY THEIR AMENDED BILL IS INCONSISTENT WITH THAT TAKEN IN THE ORIGINAL BILL OF COMPLAINT, AND THEY ARE THUS PRECLUDED FROM OBTAINING THE RELIEF PRAYED BY THE AMENDED BILL.

The original bill (Statement herein 2..) recognized the authority of the Secretary of War to authorize a diversion of 4,167 seconds feet provided by the December 5, 1901, permit, and also to later authorize a diversion in excess of that amount.

We respectfully submit that the amended bill of complaint should be dismissed.

HECTOR A. BROUILLET,
Attorney, The Sanitary District of Chicago.

GEORGE F. BARRETT,
EDMUND D. ADCOCK,
LOUIS J. BEHAN,
MORTON S. CRESSY,
Solicitors for Defendant, The Sanitary District of Chicago.

APPENDIX.

OFFICE OF THE ATTORNEY GENERAL
DEPARTMENT OF JUSTICE
WASHINGTON, D. C.

February 13, 1925.

My dear Mr. Secretary:

I acknowledge receipt of your letter of the 27th ultimo, in which you enclose a memorandum prepared for you by the Chief of Engineers of the War Department, with reference to your authority to grant the Sanitary District of Chicago a permit for a diversion from Lake Michigan of a greater quantity of water than 4,167 cubic feet per second. You ask my opinion as to whether you have authority to grant such a permit.

The applicable law is Section 10, of the River and Harbor Act of March 3, 1899 (30 Stat. 1151), which provides as follows:

> "Sec. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge,

> or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

As your memorandum indicates, the language of this statute permits two constructions.

The first would authorize you, pending specific direction by Congress and always subject thereto, to determine the circumstances, under which the construction of works can be undertaken which may affect the navigability of interstate waters.

The other construction, which your memorandum also submits for my consideration, is that any obstruction to the navigable capacity of such waters is unlawful *per se,* and that the only purpose of the latter part of the quoted statute is to require the submission of every project, which might affect such navigability, to the Chief of Engineers and the Secretary of War, and that no construction shall be begun until the assent of the War Department has been secured in the manner provided by the statute.

In reply to your inquiry, I am of opinion that the different sentences of this statute must be read together, and construed in such a reasonable way as to attain the objective which Congress had in mind. It is obvicus that Congress, which is not always in session, could not assume the duty of determining in each specific case whether or not a construction or use of navigable waters so impaired navigable capacity as to be forbidden by the paramount authority of the Federal Government. If this were not so, no construction which might affect the navigable capacity, could be undertaken when Congress is not in session; and it seems to me unreasonable to assume that Congress meant that, not only should all public works be stopped when Congress was not in session, but that, even when it was in session, such construction or use of navigable waters should await the slow processes of Congressional action.

In my judgment, Congress intended, by the first section of the quoted statute, to assert its paramount authority over navigable waters,—and thus to serve notice that they could not be undertaken without Federal assent. I imagine that the section in question was due to the construction by the Supreme Court, of the prior statute of 1890, in the case of *United States* v. *Bellingham Bay Boom Co.,* 176 U. S. 211. That Act provided that the "creation of any obstruction not affirmatively authorized *by law* to the navigable capacity of any waters, in respect to which the United States has jurisdiction, is hereby prohibited," and it was held, in the decision above referred to, that such an obstruction could be authorized by the law of a State, in the first instance.

Congress evidently intended that works should not be begun, which might affect the navigable capacity of the waters of the United States, solely on the authority of any State law. Congress, by the Act of 1899, therefore assumed full governmental power over the subject by a comprehensive and definitive prohibition of "any obstruction not affirmatively authorized by Congress."

For the reasons that I have already given, it does not seem to me reasonable to suppose that this contemplated that no work should be undertaken until Congress had first passed a specific statute to authorize it. The interest of the United States in the waters of the country under the Commerce Clause of the Constitution is confined to their navigability, and any construction, which may be erected, or any use of the waters, may be said, in a remote, but not very practical, sense, to affect these waters. The Constitution gave to the United

States paramount authority over the general subject of navigability, in order that the Federal Government, and not the States, might determine under what circumstances the use of navigable waters for the purposes of the citizen or of the States so prejudicially affected the great consideration of navigability as to require a prohibition. Navigable waters may be used for many purposes other than those of navigation, and thus there are many considerations that must be weighed to determine whether such use unduly impairs navigation, and the relative advantages and disadvantages of any such use, as compared with the interests of navigation, must be taken into consideration.

Congress did not intend that such a question should be primarily decided by either the States or the citizen. In view of prior decisions, which, as to navigable waters which were wholly intrastate in character, held that, in respect to purely local facilities, the States might act, in the absence of Federal legislation. Congress evidently intended, by the Act of 1899, to remove this implication by asserting that, with respect to the navigable capacity of the waters of the United States, its failure to legislate should not be regarded as an implied authority to the States or to the citizens thereof to proceed to use the waters; but that the Federal Government should determine to what exent, if any, the navigable capacity of the water highways of the country might be affected.

This seems to me obvious, when the vagueness of the phrase: "navigable capacity" is taken into consideration; for the phrase is a relative one. Navigable capacity could be impaired for vessels of large draft, without impairing it for vessels of small draft. This requires a certain balancing of the economic equities of the situation, and the Federal Government preferred itself to weigh these equities, and not permit the States or the citizens thereof to determine the advantages or disadvantages of any interference with navigable waters.

It was therefore necessary that, in some way, the question as to what interference would be permitted and what should be forbidden in any specific case should be determined by some one, and, as I have said, it was impossible for Congress to do so in all cases and at all times, as it would not be continuously in session.

I therefore interpret the latter part of the quoted statute as meaning that, within reasonable limits, Congress would delegate its power in the premises to the Chief of Engineers and the Secretary of War to determine—at least in the first instance—what interference with navigable waters could be permitted, until Congress should specifically act, and always subject thereto.

This policy of Congress was not a new policy, for it had found expression in much prior legislation. Thus, by the Act of March 3, 1869 (15 Stat. 336), Congress had provided, with respect to the proposed construction of a bridge between New York and Brooklyn—

> "That the said bridge shall be so constructed and built as not to obstruct, impair, or injuriously modify the navigation of the river; and in order to secure a compliance with these conditions the company, previous to commencing the construction of the bridge, shall submit to the secretary of war a plan of the bridge, with a detailed map of the river at the proposed site of the bridge, and for the distance of a mile above and below the site, exhibiting the depths and currents at all points of the same, together with all other information touching said bridge and river as may be deemed requisite by the secretary of war to determine whether the said bridge, when built, will conform to the prescribed conditions of the act, not to obstruct, impair, or injuriously modify the navigation of the river.
>
> Sec. 2. And be it further enacted, That the secretary of war is hereby authorized and directed,

> upon receiving said plan and map and other information, and upon being satisfied that a bridge built on such plan, and at said locality, will conform to the prescribed conditions of this act, not to obstruct, impair, or injuriously modify the navigation of said river, to notify the said company that he approves the same, and upon receiving such notification, the said company may proceed to the erection of said bridge, conforming strictly to the approved plan and location. But until the secretary of war approve the plan and location of said bridge, and notify said company of the same in writing, the bridge shall not be built or commenced; and should any change be made in the plan of the bridge during the progress of the work thereon, such change shall be subject likewise to the approval of the secretary

Under this statute, the Secretary of War, upon the recommendation of the Chief of Engineers, approved the plan for the bridge, and it was subsequently contended that, as the bridge in fact impaired navigation of the river, the Secretary of War was without authority to permit it.

The Supreme Court, however, thus construed the Act of 1869:

(*Miller* v. *Mayor,* 109 U. S. 385.)

> "It is contended by the plaintiff with much earnestness that the approval of the secretary of war of the plan and location of the bridge was not conclusive as to its character and effect upon the navigation of the river, and that it was still open to him to show that, if constructed as proposed, it would be an obstruction to such navigation, as fully as though such approval had not been had. It is argued that Congress could not give any such effect to the action of the secretary, it being judicial in its character. There is in this position a misapprehension of the purport of the act. By submitting the matter to the secretary, Congress did not abdicate any of its authority to determine what should or should not be deemed an obstruction to the navigation of the river.

> It simply declared that, upon a certain fact being established, the bridge should be deemed a lawful structure, and employed the secretary of war as an agent to ascertain that fact. Having power to regulate commerce with foreign nations and among the several States, and navigation being a branch of that commerce, it has the control of all navigable waters between the States, or connecting with the ocean, so as to preserve and protect their free navigation. Its power, therefore, to determine what shall not be deemed, so far as that commerce is concerned, an obstruction, is necesarily paramount and conclusive. It may in direct terms declare absolutely, or on conditions, that a bridge of a particular height shall not be deemed such an obstruction; and, in the latter case, make its declaration take effect when those conditions are complied with. The act in question, in requiring the approval of the secretary before the construction of the bridge was permitted, was not essentially different from a great mass of legislation directing certain measures to be taken upon the happening of particular contingencies or the ascertainment of particular information. The execution of a vast number of measures authorized by Congress, and carried out under the direction of heads of departments, would be defeated if such were not the case. The efficiency of an act as a declaration of legislative will must, of course, come from Congress, but the ascertainment of the contingency upon which the act shall take effect may be left to such agencies as it may designate."

In my opinion, Congress had the same purpose in view in the Act of 1899. Having assumed paramount jurisdiction over all navigable waters and excluded the idea that any action of a State could legitimate an impairment thereof, and that any Federal assent thereto could be implied from Federal inaction, Congress proceeded to forbid the commencement of any such work, "unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War, prior to beginning the same."

In my opinion, Congress thus intended to delegate to the Chief of Engineers and the Secretary of War an administrative authority to determine a fact, and if they were of opinion that the use of navigable waters, in a certain case, was not such an impairment of their navigability as to require the prohibition of Congress, then the construction was "affirmatively authorized by Congress," because the administrative agency, to which Congress had delegated the ascertainment of the facts, had found the fact to be that such use was not, for the time being, an impairment of navigable capacity, such as Congress intended to prohibit.

I am informed that, for a long period of years, it has been the practice of the War Department to issue permits under Section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by special act of Congress, and that was the policy of the War Department in the specific case of the Sanitary District of Chicago.

The history of that prolonged controversy recognized an authority on the part of the Chief of Engineers and the Secretary of War to determine the facts of undue impairment in behalf of the Federal Government. The permits, which were given from time to time by the War Department, (the last of which permitted Chicago to divert water from Lake Michigan to the extent of 4,167 cubic feet per second), can only be explained on this theory; for, theoretically, the diversion of so great a volume of water affected the navigable capacity of the Great Lakes; but the legal question still remained whether, taking into consideration all of the economic factors—as, for example, the navigability of the Chicago and Calumet Rivers, to the south, and the navigability of the Great Lakes, to the east—and having in mind the depth of the various channels and the natural use of waters for sanitary and other purposes, there was such an undue impairment of navigability as to require that one use of these waters be restricted to a given amount, in order to make another use more effective. Your predecessors, having in mind the various elements of an extremely complicated economic and sanitary problem, reach the conclusion that there could be—at least until Congress provided otherwise—a permit to use the amount indicated, but no more; and this could only proceed upon the theory that, while Congress had made a general prohibition of all impairment of navigable waters, it had delegated to the War Department the duty of deciding the degree of impairment which would bring a specific case within the general prohibition.

Certainly the suit which the United States brought against the Sanitary District of Chicago proceeded on this theory; for the Government sought to restrain the Sanitary District from taking any waters in excess of 4,167 cubic feet per second. The suit was thus based upon the permits of the War Department and assumed its authority to grant them. The lower court granted an injunction which forbade a greater diversion of the waters than the amount permitted by the War Department, and the Supreme Court, on January 5, 1925, affirmed this decree, and expressly added that its affirmance was "without prejudice to any permit that may be issued by the Secretary of War, according to law."

If it be suggested that the words "according to law" destroy the force of the proviso, it can be answered that such a proviso, deliberately written by the Supreme Court in its decree of affirmance, cannot be disregarded as meaningless. The Supreme Court apparently contemplated the possibility that it might be necessary, pending the final action of Congress and in order to prevent irreparable injury to life and property, to make some temporary provision, and its decree of affirmance sustaining a permit previously granted by the Secretary of War enforced an administrative decision of the Chief of Engineers and the Secretary of War, previously given under the authority of an Act of Congress, and as its instrument.

Unquestionably the War Department must take into account, in exercising its administrative discretion, the policy of Congress, as disclosed by the statute. The function of your department is to determine the facts, and not policies. In doing so, you must be guided by the clear intention of Congress that navigable waters shall not be so diverted for local purposes as to injure the just rights of the whole people in the navigability of such waters.

The present diversion by the City of Chicago of more than the amount permitted is, under the general prohibition, not authorized by Congress, because it has not been authorized by the administrative agency to which Congress delegated the power of determination; but it would be authorized by Congress—subject, of course, to any change in the law at any time by that body—if and when the Chief of Engineers and the Secretary of War determine that the interests of navigation—having in mind all the complicated circumstances—would not be unfairly prejudiced by a temporary use of the waters to the extent that the War Department, in its sound discretion and having in mind the general policy of Congress, sees fit to permit.

In exercising this political discretion, it seems to me that the War Department should do what it believes Congress would wish it to do under the circumstances. As a President of the United States once said: "It is a condition, and not a theory, that confronts" the Federal Government. The condition is that a great city, with over three millions of inhabitants and with mighty industries situated within its boundaries, has built important works for the diversion of water from Lake Michigan, and is in fact diverting such waters, to an amount in excess of the amount permitted by your precedessor.

You may conclude, in the exercise of your discretion, that such a situation, which has developed in a period of thirty-five years, during which the City of Chicago has greatly added to its population, cannot be changed in a day.

In the exercise of such discretion, you may conclude that, under present circumstances, the Sanitary District of Chicago should be permitted to take a greater quantity of water than that authorized by previous permits, or required to take less. The previous permits given by your predecessors in this matter were expressly revocable in terms, and, even if this were not the case, their revocability would, in my judgment, be implied from the continuing duty of the United States to preserve the navigability of its water highways.

You are therefore at liberty, as the administrative agency of Congress, to determine, under the circumstances which now exist, to what extent, if any, Chicago may continue to divert the waters of Lake Michigan, and, if you reach the conclusion that a greater diversion of such waters by the city of Chicago may be temporarily permitted, to enable that city to comply with the law, you are authorized not only to make such permit revocable, in your discretion, but also to grant it upon such terms and conditions as, in your judgment will effectively protect the interests of navigation in these great interstate highways.

You may also conclude, in the exercise of the same discretion, that any permit that you may grant may be expressly made subject, at all times, to the action of

Congress, whose representative you are in the matter and whose judgment, with or without such express reservation, is final as to the policy of the nation in the premises.

This view as to the nature of your powers seems to me a reasonable construction of the pertinent Acts of Congress. It is, in any event, the only construction that would prevent irreparable harm, and, therefore, presumably, it is a construction which Congress itself would favor; and I therefore so advise you.

Very respectfully,
JAMES M. BECK,
Acting Attorneu General.

Assistant and Chief Clerk,
Feb. 14, 1925.
War Dept.
P. S.
The Honorable,
The Secretary of War.

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
537 South Dearborn Street
Chicago, Ill.

Address reply to
THE DISTRICT ENGINEER.
Refer to File No. M. A. 25.
(Chi. R. 140/688).

December 8, 1925. HLP.

The Sanitary District of Chicago,
910 S. Michigan Ave.
Chicago, Ill.

Dr.

To United States Engineer Office, Chicago, Ill. . $2,224.24
Oct. 1 to
Nov. 30, 1925.
Incl.

To reimburse federal appropriations for the cost of supervising work done under permit signed by the Chief of Engineers, U. S. Army, and the Secretary of War on March 3, 1925, authorizing "The Sanitary District of Chi-

> cago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8500 cubic feet per second, the instantaneous maximum not to exceed 11000 cubic feet per second."

Services:		
The District Engineer, Major Rufus W. Putnam, 2 days at $15.55	$ 31.10	
Asst. Engr. J. W. Woermann, 8 days at $10.555	84.44	
Asst. Engr. F. H. Doddridge, 1⅓ months at $250.00	333.33	
Junior Engr. A. T. Grohmann, 1 month	200.00	
Inspector Harry Lallo, 1 month	153.33	
Survey party, 6 men, 1 month	774.99	
Crew, Motor Launch, "Whistler," 6 days at $9.466	56.80	
		$1,633.99
Plant Rental:		
Survey Boat, "Calumet," 25 days at $7.47	$186.75	
Motor Launch, "Whistler," 6 days at $8.40	50.40	
		237.15
Subsistence, survey party, 25 days at $4.80		120.00
Travel and per diem allowances:		
Lallo	$ 99.76	
Doddridge	99.76	
Grohmann	33.58	
		233.10
Total		$2,224.24

Certified correct:

Rufus W. Putnam,
Major, Corps of Engineers,
District Engineer.

Please draw check payable to order of "Rufus W. Putnam, Major, Corps of Engineers, U. S. A."—and mail same to "U. S. Engineer Office, Room 1201, #537 S. Dearborn St., Chicago, Ill."

Office Supreme Court, U.
FILED
FEB 15 1926
WM. R. STANSBUR
CLERK

IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

OCTOBER TERM, ~~1925.~~ 1926

THE STATE OF WISCONSIN, THE STATE OF OHIO, THE STATE OF PENNSYLVANIA AND THE STATE OF MINNESOTA,
Complainants,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF [redacted]
STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,
Intervening Defendants.

Bill in Equity.
Original Jurisdiction.
No. ~~16.~~ [redacted]

BRIEF IN SUPPORT OF MOTION TO DISMISS FILED ON BEHALF OF THE STATES OF MISSOURI, KENTUCKY, TENNESSEE, AND LOUISIANA, INTERVENING DEFENDANTS.

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IN THE

Supreme Court of the United States.

ORIGINAL JURISDICTION.

OCTOBER TERM, 1925.

THE STATE OF WISCONSIN, THE STATE OF OHIO, THE STATE OF PENNSYLVANIA AND THE STATE OF MINNESOTA, Complainants, vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, Defendants. STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA, Intervening Defendants.	Bill in Equity. Original Jurisdiction. No. 16.

BRIEF IN SUPPORT OF MOTION TO DISMISS FILED ON BEHALF OF THE STATES OF MISSOURI, KENTUCKY, TENNESSEE, AND LOUISIANA, INTERVENING DEFENDANTS.

STATEMENT.

In this brief, we shall refer to the complainant states as the "Lake" states, and to the intervening defendants as the "Valley" states.

General Nature of Case.

The subject matter of the amended bill herein, is the diversion of water from Lake Michigan into the Mississippi Valley water-shed, through the "Lakes-to-the-Gulf" waterway, a subject with which the Court is already familiar through its decision on January 5, 1925, in the case of *Sanitary District of Chicago vs. United States* (266 *U. S.* 405).

In the briefing and argument in this Honorable Court of said Sanitary District case, the Lake states, complainants in the instant case, participated as amici curiae on the side of the United States.

The United States, as complainant in the Sanitary District case, attacked this diversion of water, then as now being made by the Sanitary District of Chicago, as unlawful to the extent that the quantity of water diverted had not been authorized by the then permit of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of 1899 (30 Stat. at Large 1151).

This Honorable Court upheld this contention of the United States, thereby conclusively determining (as we understand the decision) that a diversion of water from Lake Michigan into the Mississippi Valley water-shed, may lawfully be made by said Sanitary District, if the making, quantity and conditions of such diversion have been authorized by permit of the Secretary of War upon the recommendation of the Chief of Engineers.

The amended bill herein shows on its face, that on March 3, 1925, since said decision and within the time allowed therefor by said decision, the Secretary of War upon the recommendation of the Chief of Engineers, issued a permit allowing the Sanitary District of Chicago, upon certain conditions, to divert specified quantities of water from Lake Michigan into the said "Lakes-to-the-Gulf" waterway.

It is this diversion that the Lake states seek in said amended bill, to attack as unlawful.

So that the effort of the Lake states in the instant case, is to have this Honorable Court reconsider and reverse its fundamental conclusions announced in the Sanitary District case, by enjoining any diversion whatever.

It is also an effort to have this Honorable Court usurp the powers and functions held by this Court in said Sanitary District case to be vested by the Constitution in the Congress, and by the Congress lawfully delegated to the Secretary of War upon the recommendation of the Chief of Engineers.

Against such effort of the Lake states, these Valley states, each of which is vitally interested in preserving the navigability of the entire "Lakes-to-the-Gulf" waterway, have moved to dismiss the amended bill on grounds which are chiefly jurisdictional in nature.

Since the grounds of this motion include the contentions (a) that the amended bill does not disclose the kind of case of which this Court will take original jurisdiction under the Constitution, and (b) that the entire subject matter of the amended bill, including the relief sought, involves the exercise of control and regulation of navigable waters of the United States, in respect of which the United States has already assumed complete jurisdiction (Sanitary District vs. United States, supra), it is important that this brief contain a sufficient anaylsis of the amended bill and a sufficient statement of the earlier history of this controversy to explain these contentions.

The Sanitary District Case; Early History of Controversy.

We understand it to be the established doctrine of this Court (Butler v. Eaton, 141 U. S. 240, 244; Bienville Water Co. v. Mobile, 186 U. S. 212, 217; Craemer v. Washington, 168 U. S. 124, 129); that it will take judicial notice of its own prior records and decisions, either where there is a practical similarity of parties or a specific reference in the pleadings to a prior record.

In the instant case there is a substantial similarity of parties and a specific reference (in the amended bill) to the record and decision in the Sanitary District case both in the District Court and in this Court. Therefore, we shall make reference to these records in order to inform the Court of essential facts.

The original bill in the Sanitary District case was filed by the United States in the Circuit Court of the United States in 1908, to prevent any diversion from Lake Michigan through the Calumet-Sag channel, one of the lesser channels through which the Sanitary District was preparing to divert water from Lake Michigan. The effect of this diversion upon the levels of the Great Lakes was pleaded, as well as the absence of any authority from Congress or from the Secretary of War, under Section 10 of the Rivers and Harbors Act of March 3, 1899. The prayer of the bill was for an injunction restraining the Sanitary District from diverting any water from Lake Michigan through the Calumet-Sag channel, or otherwise,

> "in any channel other than the Chicago River as authorized by the said Secretary of War, unless, prior to beginning any of said work, or doing or attempting to do any of said things, the Chief of Engineers of the said United States shall have recommended, and the Secretary of War of the said United States shall have authorized, the doing of said work. * * *" (Volume VIII, Transcript of Record No. 529, October Term, 1924, Supreme Court of the United States, Sanitary District Case, Page 6.)

In 1913, a separate bill was filed by the United States, with which the former bill was later consolidated, seeking to enjoin a diversion through the Chicago River, of water in excess of the amount theretofore permitted by the Secretary of War. It was similarly claimed that this excess diversion would tend to lower the levels of the Great Lakes, and would thus create an obstruction to the navigable capacity of all of said waters. It was alleged that these waters had been deepened under authorization of the Congress, and that this diversion would therefore tend to annul the orders of Congress expressed in the various Rivers and Harbors Acts. The prayer in this later bill was for an injunction restraining the defendants

> "from diverting or abstracting any waters from Lake Michigan over and above and in excess of 250,000 cubic feet per minute, as already authorized by said Secretary of War. * * *" (Volume VIII, Sanitary District Record, Page 44.)

A decree in accordance with the prayer last above quoted, was entered, and on appeal was affirmed by this Court (266 U. S. 405), without prejudice to any permit lawfully to be granted by the Secretary of War. The scope and effect of this decision upon the instant case, we shall discuss later.

The Interests of the Valley States.

The "Lakes-to-the-Gulf" waterway, frequently a subject of congressional action, now consists of the Chicago River, the Sanitary and Ship Canal of the Sanitary District, the DesPlaines, Illinois and Mississippi Rivers. All of these waters, are navigable waters of the United States, and all to some extent have been improved as the result of congressional action. These defendants, the States of Missouri, Kentucky, Tennessee and Louisiana, and, of course, the State of Illinois, border on this waterway, and are deeply interested in the preservation and improvement of its navigability.

The development and maintenance of this waterway has long been a subject of public consideration and of national importance, particularly to the Mississippi Valley States whose commerce is served by it.

By the Federal Control Act of Congress (40 Stat. at Large, 451), the President of the United States was authorized to spend such amounts as he deemed necessary for the utilization of waterways and the creation of water transportation agencies, and the policy of the Congress to encourage inland transportation services and facilities, was declared in Section 500 of the Transportation Act of 1920 (41 Stat. at Large, 499). By Section 201 of said Act (41 St. at L. p. 458), the Federal facilities for such transportation that had been previously acquired pursuant to the Federal Control Act, were transferred to the Secretary of

War who was authorized and directed to conduct them. As a result, the Secretary of War successfully inaugurated and operated a barge line freight service on the Mississippi River from St. Louis to New Orleans, and on the Black Warrior River in Alabama, known as the "Mississippi-Warrior Barge Line." This instrumentality of the government was subsequently taken over by the "Inland Waterways Corporation" organized pursuant to an Act of Congress entitled "An Act to create the Inland Waterways Corporation for the purpose of carrying out the mandate and purpose of Congress as expressed in Sections 201 and 500 of the Transportation Act, and for other purposes," approved June 3, 1924 (43 St. at L. p. 360). This corporation now carries a substantial volume of freight, and renders an important commercial service, particularly to the Mississippi Valley, and in many instances, forms a part of through transportation from points as far east as Western New York and Pennsylvania to and from points as far West as Western Texas and Arizona.

The President of the United States has recently recommended in a Message to Congress, the maintenance and development of this waterway.

The commerce of the Valley states has been built up, in reliance upon the continued existence of water transportation over this route. It is a well recognized fact that water transportation in the upper Mississippi, particularly at most points North of the City of Memphis, Tennessee, is dependent upon a sufficient volume of water, and in times of low water, navigation is interfered with, and frequently interrupted, due to insufficient depths at critical points in the channel. Similar conditions exist at several points in the Illinois and DesPlaines Rivers. The volume of water diverted from Lake Michigan through the Sanitary District Canal, forms a very substantial part of the low water flow, of both the Illinois and Mississippi Rivers at these critical points of navigation, and this water so diverted from the Great Lakes, is essential to the adequate navigability of the "Lakes-to-the-Gulf" waterway. The well-known natural conditions of this waterway make a determination of the proper amount of water to be diverted from Lake Michigan, the vital factor in its maintenance as well as in its development.

The amended bill herein shows as the main theory of the complainant states, that they are lower riparian owners along a waterway of which Lake Michigan is the upper stretch, and they claim injury as such lower riparian owners, from the diversion of water, which, in the course of nature would flow to them. The injury complained of, is an interference with interstate commerce conducted over this lake waterway.

If the relief sought in the amended bill be granted, and all diversion from Lake Michigan enjoined, the Valley States, each of whom is a riparian owner along the "Lakes-to-the-Gulf" waterway, will suffer injury identical in nature with that complained of in the amended bill.

The Valley states are interested in the instant case not only upon this question of the navigability of the "Lakes-to-the-Gulf" waterway, but also because the water supply of the river communities in several of the states, including the City of St. Louis, Missouri, would become dangerously polluted in case the diversion were substantially enjoined while the pollution of the Chicago River continued.

SUMMARY OF ARGUMENT;

POINTS AND AUTHORITIES.

The amended bill should be dismissed, because:

I.

The Supreme Court of the United States, in exercising its constitutional grant of original jurisdiction, has only entertained an original suit in which a State was complainant, (a) when such State sued on its own account to protect a direct property interest of such State in the subject matter of the suit, or to protect a sovereign right of the State, or (b) when such State sued in its representative or quasi-sovereign capacity, to protect or enforce rights of its citizens held because of their citizenship in such State.

Constitution of U. S., Article III, Sec. 2.
Amendment XI to Constitution of U. S.
Missouri v. Illinois, 180 U. S. 208, at 241, 239.
New Hampshire and New York v. Louisiana, 108 U. S. 76, 91.
Kansas v. Colorado, 185 U. S., 124, 142.
Georgia v. Tennessee Copper Co., 206 U. S. 230, 237.
North Dakota v. Minnesota, 263 U. S. 365, 372-374.
New York v. New Jersey, 256 U. S. 296, 301, 302.
Wyoming v. Colorado, 259 U. S. 419.
Louisiana v. Texas, 176 U. S. 1, 16, 19, 24-25.
Oklahoma v. A. T. & S. F. Ry., 220 U. S. 277, 286, 289.
Oklahoma v. G. C. & S. F. Ry. Co., 220 U. S. 290, 300-301.

(a) The amended bill seeks to prevent alleged interference with "interstate commerce" caused by alleged obstructions to the navigable capacity of the Great Lakes, a matter in which the states complaining have no direct proprietary or sovereign interest.

(b) The amended bill shows that the complainant states have no right in this case to sue in their representative capacity, because the subject matter of the bill consists of an attempt to control the navigability of navigable waters of the United States, in respect of which such rights as are possessed by the citizens of the complaining states, arise from their citizenship in the United States, and not from their state citizenship; and because the United States has the sole and exclusive power and responsibility to protect for the benefit of all citizens of the United States, the navigability of its navigable waters. To permit a state to sue for this purpose would constitute an interference with the sovereign power of the United States.

Louisiana v. Texas, 176 U. S. 1, 16, 19, 24-25.

Oklahoma v. A. T. & S. F. Ry., 220 U. S. 277, 286, 289.

Oklahoma v. G. C. & S. F. Ry., 220 U. S. 290, 300-301.

II.

The constitutional power of the Congress to regulate interstate commerce, whether exercised or not, as to all matters of national scope and importance, is exclusive of all state action. And where, as in the instant case, the Congress has once assumed to regulate any particular instrumentality of interstate commerce, no state can act upon the same subject matter.

Sanitary District v. U. S., 266 U. S. 405, 426.

(a) It has been decided that the navigability of the Great Lakes is a matter of such national importance as to be within the exclusive power of Congress to regulate.

Sanitary District v. U. S., 266 U. S. 405 at 426.

(b) The effect of a decree in the instant case as sought by the complainant states, would be a regulation by these states of interstate commerce over the Great Lakes, a subject matter that this Court has held to be not within their constitutional powers or authority.

Sanitary Dist. v. U. S., 266 U. S. 405, 426.

III.

It appears upon the face of the amended bill, that the diversion complained of therein is being made pursuant to a written permit therefor, duly issued and "authorized by the Secretary of War" and "recommended by the Chief of Engineers" of the United States, acting pursuant to the authority and provisions of the Rivers and Harbors Act" of 1899, by which Act, the Congress of the United States, as this Court has held in respect of this same diversion, in the case of Sanitary District v. United States, 266 U. S. 405, has validly conferred upon said officials the power, exclusive of any action by any state, to permit, regulate and control the amount and conditions of such diversion; and said permit constitutes a valid and legal authorization by the United States of said diversion.

Sanitary District v. U. S., 266 U. S. 405, 428-429.

IV.

The grant of power to the Secretary of War made by the Rivers and Harbors Act of March 3, 1899, "repeatedly has been held to be constitutional."

Sanitary District v. U. S., 266 U. S., 405 at 428.

V.

There is no "common law right" in respect of the waters of the Great Lakes, as claimed in the amended bill, which can supersede, or have the affect of limiting, the exclusive power of Congress to regulate the navigability of these waters, or to permit the diversion from Lake Michigan of which the amended bill complains. The wisdom or expediency of a permit issued by the Secretary of War pursuant to the power granted him by the Rivers and Harbors Act of March 3, 1899, is not subject to review by the Courts.

Sanitary District v. U. S., 266 U. S. 405.

U. S. v. Rio Grande Dam Co., 174 U. S. 690, 702.

I. C. C. v. Ill. Cent. Ry., 215 U. S. 452, 470.

U. S. v. Chandler-Dunbar Water P. Co., 229 U. S. 53, 64.

So. Pac. Co. v. Olympian Dredging Co., 260 U. S. 205, 210.

Monongahela Bridge Co. v. U. S., 216 U. S. 177, 195.

VI.

The nature of the alleged cause of action as shown by the amended bill, and reflected in its prayer for relief, is not such as to entitle complainants to any of the equitable relief sought, because:

(a) Insofar as said amended bill seeks an injunction to restrain the permanent diversion from Lake Michigan of any water whatever, it relates to a subject matter over which the Congress has exclusive jurisdiction, which jurisdiction has been assumed, and is being exercised.

Sanitary District v. U. S., 266 U. S. 405.

(b) In seeking to have this Court determine the amount of diversion "reasonably required" for navigation purposes, the amended bill attempts to impose upon this Court the exercise of a power not judicial in its nature, but essentially legislative and heretofore constitutionally delegated by Congress to the Secretary of War upon recommendation of the Chief of Engineers in the Rivers and Harbors Act of March 3, 1899.

Ill. Cent. Ry. Co. v. I. C. C., 215 U. S. 452, 470.

Simpson v. Shepard, 230 U. S. 352, 433.

Miller v. Mayor, etc., 109 U. S. 385, 393-394.

(c) In seeking an injunction against alleged damage to navigation on the Great Lakes claimed to result from alleged lowering of the levels thereof, and alleged damage to navigation on the "Lakes-To-The-Gulf" waterway claimed to result from the alleged pollution thereof, it appears from the amended bill that the complainant states sue as mere private litigants who seek to restrain an alleged public nuisance, and it further appears that none of the complainant states, nor any of their respective citizens, suffer or can suffer any direct, peculiar or special injury different in kind or degree from the alleged injury to the general public. The exclusive power to prevent this character of public nuisance, except only in the case of a complainant suffering special and irreparable damage, different in kind from that suffered by the general public, is vested in the United States. Such power is being exercised by the United States in respect of this waterway, and the relief sought, would conflict therewith.

Sanitary District v. U. S., 266 U. S. 405.
Georgetown v. Alexandria Canal Co., 12 Pet. 91, 99.
Penn. v. Wheeling Bridge Co., 13 How. 518, 566.
Arizona Copper Co. v. Gillespie, 230 U. S. 46, 57.

(d) In seeking relief from alleged pollution of the "Lakes-To-The-Gulf" waterway, it appears on the face of the amended bill, that the waterway alleged to be polluted, lies wholly below all of the complainant states, and that none of said states have any direct or proprietary interest in the navigable condition thereof, the exclusive power to protect such navigable condition being vested in the United States, which is now exercising the same.

VII.

The United States alone can complain of any alleged failure of the Sanitary District to comply with the conditions of the permit issued to said District by the Secretary of War, March 3, 1925. Other adequate remedies are provided to protect against breaches of such conditions, thus making relief in equity unnecessary and inappropriate.

> Texas Pac. Ry. v. Abilene Cotton Oil Co., 204 U. S. 426, 437.

(a) The permit is expressly made revocable by the Secretary of War at any time, with or without cause; and by other express provisions of the permit, the diversion complained of is being made under the supervision, and at times under the control, of the United States Engineer at Chicago. So this complete remedy to prevent or protect breaches of the permit, is always available.

(b) The Rivers and Harbors Act of March 3, 1899 (Sections 12 and 17 thereof), creates new liabilities and provides special and adequate remedies for violations of the Act, including failures to comply with the conditions of permits issued under the Act. These special remedies provided by statute, to be exercised by Federal authorities, are exclusive of all other remedies, and preclude complainants from any relief in equity in this particular.

> Rivers and Harbors Act of Cong., March 3, 1899, Secs. 12, 17.
>
> Texas Pac. Ry. Co. v. Abilene Cotton Oil Co., 204 U. S. 426, 437.

Pollard v. Bailey, 20 Wall. 520.
Fourth Nat. Bank v. Francklyn, 120 U. S. 747, 756.

(c) It must be presumed that in issuing and recommending said permit of March 3, 1925, the Secretary of War and the Chief of Engineers took full cognizance of the extent to which lake levels would be lowered, and navigability obstructed, if at all, by the diversion authorized in said permit. The Secretary of War being the agent of Congress in determining these matters, his conclusions are not subject to review by the Courts.

Monongahela Bridge Co. v. U. S., 216 U. S. 177, 195.
Pennsylvania v. Wheeling & B. B. Co., 59 U. S. 421.
U. S. v. Chandler-Dunbar Co., 229 U. S. 53, 64.
So. Pac. Ry. v. Olympian Dr. Co., 260 U. S. 205, 210.
I. C. C. v. Ill. Cent. R. R., 215 U. S. 452, 470.

VIII.

The rights asserted and the relief sought in and by the amended bill, are contrary to, and inconsistent with, the rights asserted and the relief sought in and by the original bill herein, in the respect that the original bill conceded and admitted the right of the defendants to a diversion not in excess of four thousand one hundred and sixty-seven (4,167) cubic feet per second, and also to a diversion in excess of said amount, if and when the Congress of the United States or the Secretary of War, acting upon the recommendation of the Chief of Engineers, should so permit, whereas, the amended bill denies such right of the defendants; therefore, the complainants are now estopped from denying the said right of the defendants and from seeking the relief prayed for in the amended bill.

North. Pac. Ry. Co. v. Slaght, 205 U S. 122.

ARGUMENT.

THE MOTION TO DISMISS SHOULD BE SUSTAINED, BECAUSE:

I.

THE SUPREME COURT OF THE UNITED STATES, IN EXERCISING ITS CONSTITUTIONAL GRANT OF ORIGINAL JURISDICTION, HAS ONLY ENTERTAINED AN ORIGINAL SUIT IN WHICH A STATE WAS COMPLAINANT, (A) WHEN SUCH STATE SUED ON ITS OWN ACCOUNT TO PROTECT A DIRECT PROPERTY INTEREST OF SUCH STATE IN THE SUBJECT MATTER OF THE SUIT, OR TO PROTECT A SOVEREIGN RIGHT OF THE STATE, OR (B) WHEN SUCH STATE SUED IN A REPRESENTATIVE CAPACITY, TO PROTECT OR ENFORCE RIGHTS OF ITS CITIZENS HELD BECAUSE OF THEIR CITIZENSHIP IN SUCH STATE.

(a) The amended bill seeks to prevent alleged interference with "interstate commerce" caused by alleged obstructions to the navigable capacity of the Great Lakes, a matter in which the States complaining have no direct proprietary or sovereign interest.

(b) The amended bill shows that the complainant States have no right in this case to sue in their representative capacity, because the subject matter of the bill consists of an attempt to control the navigability of navigable waters of the United States, in respect of which such rights as are possessed by the citizens of the complaining States, arise from their citizenship in the United States, and not from their State citizenship; and because the United States has the sole and exclusive power and responsibility to protect for the benefit of all citizens of the United States, the navigability of its naviga-

ble waters. To permit a State to sue for this purpose would constitute an interference with the sovereign power of the United States.

Section 2, of Article III of the Constitution of the United States provides:

> "The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the United States * * *; to controversies between two or more States; between a State and citizens of another State; * * *
>
> In all cases * * * in which a State shall be party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned the Supreme Court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as the Congress shall make."

The jurisdiction of this Court in original cases involving controversies between States rests entirely on the above provisions; and the sole power to recognize or, by definition, to limit, such jurisdiction rests in this Court.

In *Missouri vs. Illinois,* 180 U. S. 208, at page 241, it was said:

> "It would be objectionable, and, indeed, impossible, for the Court to anticipate by definition what controversies can and what cannot be brought within the original jurisdiction of this Court."

In attempting to discuss the nature of this original constitutional jurisdiction, counsel are aware that the

Court itself has hesitated to define it or to prescribe its limitations. The Court has, however, in taking or denying such jurisdiction in various cases, announced certain general principles, and has disclosed certain features treated as essential to the exercise of such jurisdiction and certain other features as precluding such jurisdiction. So the only aid possible to be given by counsel in discussing whether a particular case does or does not fall within this original jurisdiction, is to endeavor to point out the nature of the case under consideration, the extent to which general principles announced by this Court seem applicable, and the extent to which the particular case is analogous in principle to other cases in which the Court has taken or denied such jurisdiction.

Nature of Case at Bar.

In the case at bar, the entire subject matter of the controversy as disclosed by the amended bill, is the regulation and control of navigable waters of the United States, instrumentalities of interstate commerce.

None of the complainant States have any proprietary, sovereign or quasi-sovereign interest in this subject matter. The United States is exclusive sovereign over it, yet the wrong of which the amended bill complains, is an alleged obstruction to the navigability of these highways of interstate commerce.

The legal theory of the amended bill, as stated in its paragraph 29, pages 33-34, is that the complainant States are suing to protect the following alleged rights:

(a) A supposed "common law right" of each of the Lake States *"and its people,"* that the "natural navigable capacity" of the lakes for navigation, shall be maintained free from all interference by any one except the complainant states "*or the United States* Government."

Since it is clear that no State has any such "common law" *property* or *sovereign* right in respect of protecting the navigability of the navigable waters of the United States,—all sovereign power over this subject matter being vested exclusively in the Congress,—a suit by a State to protect this alleged right, is necessarily representative in character,—a suit by a quasi-sovereign on behalf of its people.

(b) An alleged right "*of the people*" of the Lakes States "to the free and unobstructed navigation" of the Great Lakes waterways, and also of the "Lakes-to-the-Gulf" waterway.

A suit by the complainant States to protect such a right is also representative in character.

(c) A supposed right to sue to prevent or correct alleged violations of Section 10, of the "Rivers and Harbors Act" of Congress of March 3, 1899, i. e. to protect the navigability of navigable waters of the United States.

A suit to protect such a right, is representative in character.

It thus appears that as to all of the alleged rights claimed, and as to all of the alleged wrongs complained of, the complainant States are suing solely in a representative capacity, to redress alleged wrongs and injuries *to their citizens*, caused by alleged interference with the instrumentality of commerce in question, i. e. the use for purposes of navigation of the waters of the Great Lakes, and of the "Lakes-to-the-Gulf" waterway.

Cases Illustrating Grounds of Original Jurisdiction.

Decisions of this Court in cases where jurisdiction was taken, or denied, in original controversies between States, indicate that limitations upon the jurisdiction have arisen in several ways: first, through the requirement that the Court give full and proper effect to other provisions of the Constitution, which would be denied if such original jurisdiction of the particular controversy were taken; second, from the nature of the power invoked, that is, limitations necessarily existing by reason of the fact that the controversy must present a justiceable issue (*Louisiana vs. Texas,* 176 *U. S.* 1, *at* 15, 18)—must call for such a remedy as a Court of law or equity is authorized to grant; and third, through the requirement that the controversy must in fact, in its essential nature, be one *directly* "between two or more States," or "between a State and citizens of another State." When it was sought to use a State by suing in its name to litigate a controversy in which the State had no real interest, jurisdiction was denied.

That cases might arise in which a repugnance between different provisions of the Constitution might impose limitations on the original jurisdiction of this Court, was foreseen by Chief Justice Marshall, in *Cohens vs. Virginia,* 6 *Wheat.* 264, *at* 393. In this opinion, he pointed out that the Constitution gave the Supreme Court original jurisdiction in certain cases and appellate jurisdiction in others, among which latter are cases arising under the Constitution and laws of the United States; that, of course, a controversy between States might involve a case arising under the Constitution and laws of the United States; and that, therefore, there might be a conflict between these grants of jurisdiction.

This dictum was noted in *Missouri vs. Illinois,* 180 *U. S.* 208, *at* 239.

By Amendment XI to the Constitution of the United States the original jurisdiction was expressly limited, by excluding suits against a State, brought by citizens:

> "The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the States of the United States by citizens of another State, or by citizens and subjects of any foreign State."

In *New Hampshire and New York vs. Louisiana,* 108 *U. S.* 76, 91, citizens of the complainant States owning money claims against Louisiana, had lawfully assigned such claims in such a way as to vest the complainant States with full legal title to the claims, which they sought to enforce by an original suit in this Court. Jurisdiction was denied because the Eleventh Amendment denied such original jurisdiction to *the citizens* with whom the controversies had arisen, and because this Court held that notwithstanding the assignments, the complainant States "could not create a controversy with another State," and had no such genuine interest in the claim as would permit the Court to take jurisdiction.

It was the opinion in these cases that seems to have first pointed out the requirement, repeated in many later cases, that a State must have *an interest of its own,* i. e. the controversy must be *directly* with the State, or the original jurisdiction will be denied.

The case at bar also presents an instance of repugnance between constitutional provisions, i. e. the original jurisdiction of this Court under the Constitution is sought to be invoked for the purpose of intruding upon the paramount and exclusive power of the Congress to regulate interstate commerce.

And we respectfully contend that this repugnance should cause a denial of jurisdiction in the case at bar.

Turning now to the question,—when a controversy is "direct" in respect of the State or States involved, we respectfully venture the assertion that so far as the decisions have disclosed, a State cannot qualify as a complainant unless it sues for its own account to protect a direct property interest of the State in the subject matter of the suit, or to protect a sovereign right of the State, or as a represenative or quasi-sovereign of its citizens to protect their rights held because of their citizenship in such State pursuant to its sovereignty.

We shall endeavor to support the above contention by a reference to decided cases, the reasoning and authority of which (as we respectfully contend) should cause a denial of jurisdiction in the case at bar.

In *Missouri vs. Illinois,* 180 *U. S.* 208, Missouri filed its original bill in this Court, to enjoin threatened pollution of the waters of the Mississippi River through the use of the defendant Sanitary District's canal as a means of disposing of sewage of the City of Chicago by emptying it into the Illinois River, which, it was claimed, would convey it into the Mississippi, thereby poisoning the water supply of St. Louis and other river communities.

In this case the Court took jurisdiction upon a construction of its constitutional power, which (as we understand) is expressed in the following quotation from the opinion (180 U. S. at 241):

> "An inspection of the bill discloses that the nature of the injury complained of is such that an adequate remedy can only be found in this Court at the suit of the State of Missouri. It is true no question of boundary is involved, nor of direct property rights belonging to the complainant State. But it must surely be conceded that, if the health and comfort of the inhabitants of a State are threatened, the State is the proper party to defend them. If Missouri were an independent or sovereign State all must admit she could seek remedy by negotiation, and, that failing, by force. Diplomatic powers and the right to make war having been surrendered to the general government, it was to be expected that upon the latter would be devolved the duty of providing a remedy and that remedy, we think, is found in the Constitutional provisions we are considering.
>
> The allegations of the bill plainly present such a case. The health and comfort of the large communities inhabiting those parts of the State situated on the Mississippi River are not alone concerned, but contagious and typhoidal diseases may spread themselves throughout the territory of the State. Moreover, substantial impairment of the health and prosperity of the towns and cities of the State situated

> on the Mississippi River, including its commercial metropolis, would injuriously affect the entire State."

In other words, the jurisdiction was based upon *the sovereign interest* of *the State* of Missouri in the health and comfort of its citizens, a subject matter which the State alone could exercise sovereign power to regulate and protect, as a part of its retained police power. Its sovereignty over this subject matter was unimpaired by any constitutional grant of power to the United States. The State itself, therefore, had a direct and sovereign interest in the real subject matter of the litigation, and its only possible remedy against injury threatened by another State, lay in the original jurisdiction of this Court, which was allowed.

In *Kansas vs. Colorado,* 185 *U. S.* 124, 142, the State of Kansas filed its bill to enjoin the diversion of water from the Colorado River, being made under authority of the State of Colorado, at a point above that part of the river which runs through the State of Kansas.

The State sued in both a representative capacity on behalf of the citizens of Kansas, whose lands were claimed to have suffered from a diminished flow in the river, and also for its own benefit to protect direct property rights of the State itself in Kansas lands bordering upon the Colorado River. There was no averment that the United States had assumed jurisdiction over the waters as "navigable," so the question of State control as in conflict with the control of Congress over interstate commerce, did not arise.

The controversy was "direct."

To the extent that this case is an authority for such a suit being filed in a representative capacity, it is apparent that the alleged rights of the citizens of Kansas were rights which such citizens claimed to have *under the sovereign power* of the State of Kansas, and to protect which, the State therefore had a "direct interest and responsibility."

In *Georgia v. Tennessee Copper Company,* 206 *U. S.* 230, the State of Georgia sued to prevent pollution of the air over territory in Georgia, near the works of the Tennessee Copper Company in Tennessee, which works emitted obnoxious fumes dangerous to health and destructive to vegetation, in the State of Georgia. In discussing the question of jurisdiction the Court said (206 U. S. at 237):

> "The State owns very little of the territory alleged to be affected, and the damage to it capable of estimate in money, possibly, at least, is small. This is a suit by a State for an injury to it in its capacity of *quasi*-sovereign. In that capacity the State has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air. * * *
>
> The alleged damage to the State as a private owner is merely a make-weight, and we may lay on one side the dispute as to whether the destruction of forests has led to the gullying of its roads. * * *
>
> The caution with which demands of this sort, on the part of a State, for relief from injuries analogous to torts, must be examined, is dwelt upon in Missouri v. Illinois, 200 U. S. 496, 520, 521. But it is plain

> that some such demands must be recognized, if the grounds alleged are proved.
>
> When the States by their union made the forcible abatement of outside nuisances impossible to each, they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the grounds of their still remaining *quasi*-sovereign interests; and the alternate to force is a suit in this Court."

Jurisdiction was taken; and the above quotation seems to indicate that the substantial basis which the Court held sufficient in above case, was the *sovereign* power and responsibility of the State of Georgia to protect the health and comfort of its citizens. While to some extent the State sued in a representative capacity, the substantial reason for the taking of jurisdiction was the *quasi*-sovereign right of the State; and this ground of jurisdiction seems to be more clearly explained in the above case than in the others above cited.

The cases of *North Dakota v. Minnesota,* 263 *U. S.* 365, *at* 372, 374; *New York v. New Jersey,* 256 *U. S.* 296, *at* 301, 302, and *Wyoming v. Colorado,* 259 *U. S.* 419, were all suits brought by the respective complainant States to enjoin the commission of alleged wrongs by the defendant States, either by the diversion of water from interstate streams, or into such streams so as to flood lands in the complainant States, or by the pollution of waters on which the complainant State bordered. No question of interstate commerce seems to have been present in these cases.

In each of these cases, it is clear that the subject matter of the complaint was within the scope of the sovereignty of the complaining State. While the property rights of citizens were alleged to have been impaired by the acts complained of, these rights were held pursuant to their citizenship in their respective States, and subject to the supervising protection of the police power of their respective States, so that in these cases, both property and quasi-sovereign rights were involved, and jurisdiction was taken.

In marked contrast to the grounds on which jurisdiction existed and has been taken, as illustrated by the above cases, the decision in *Louisiana v. Texas,* 176 *U. S.* 1, discloses a class of cases in which the jurisdiction does not exist and has been denied. This decision is of special importance in the case at bar, in support of our contention that jurisdiction should be denied to the complainant States, because they have no power, sovereign, quasi-sovereign or property, to regulate interstate commerce.

Louisiana filed its bill to prevent injuries alleged to result to its citizens engaged in interstate commerce with persons in Texas, which commerce was entirely shut off by an alleged unreasonable embargo imposed by officers of Texas, to preventing the spread of yellow fever. The bill was demurred to partly on the ground that the only issues presented were between Texas and certain persons in the City of New Orleans engaged in interstate commerce, which issues did not in any manner concern the State of Louisiana as a corporate body or state. Concerning the requisites to jurisdiction, Mr. Chief Justice Fuller, in the opinion of the Court (176 U. S. 1, at page 16), said (italics ours):

> "In order then to maintain jurisdiction of this bill of complaint as against the State of Texas, it must appear that the controversy to be determined, is a

> controversy arising *directly* between *the State* of Louisiana and *the State* of Texas, and *not a controversy in vindication of the grievances of particular individuals.*"

After explaining as the reason for the constitutional grant of the original jurisdiction, that the States by their grants in the Constitution, gave to the nation all their sovereign powers to negotiate, and make treaties, and to make war with other States, the opinion refers to the Debs case (158 U. S. 564), in which the Court held that it was proper for the Government, concerned as it was with the preservation of the rights of all its citizens, to appeal to the Courts for relief even though it might not suffer any particular or special injury, and then says (176 U. S. at p. 19; italics ours):

> "but the State of Louisiana presents herself in the attitude of *parens patriae,* trustee, guardian, or representative of all her citizens.
>
> She does this from the point of view that the State of Texas is intentionally absolutely interdicting interstate commerce as respects the State of Louisiana by means of unnecessary and unreasonable quarantine regulations. *Inasmuch as the vindication of the freedom of interstate commerce* is *not committed to the State of Louisiana,* and that State is not engaged in such commerce, *the cause of action must be regarded not as involving any infringement of the powers of the State* of Louisiana, or *any special injury to her property,* but as asserting that the State is entitled to seek relief in this way, *because* the matters complained of *affect her citizens at large.* Nevertheless, if the case stated *is not one presenting a controversy between these States,* the exercise of original

jurisdiction by this Court as against the State of Texas, *cannot be maintained.*"

The opinion concluded that a "direct" controversy was not involved. In the concurring opinion of Mr. Justice Harlan he stated more completely the point on which we rely in the case at bar, thus (176 U. S. at pp. 24-25; italics ours):

> "But I am of opinion that the State of Louisiana, in its sovereign or corporate capacity, cannot bring any action in this Court on account of the matters set forth in its bill. The case involves no property interest of that State, nor is Louisiana charged with any duty, *nor has it any power, to regulate interstate commerce. Congress alone has authority in that respect.* When the Constitution gave this Court jurisdiction of controversies between States, it did not thereby authorize a State to bring another State to the bar of this Court for the purpose of testing the constitutionality of local statutes or regulations *that do not affect the property or the powers of the complaining state in its sovereign or corporate capacity,* but which at most affect *only the rights of individual citizens or corporations engaged in interstate commerce.* The word 'controversies' in the clauses extending the judicial powers of the United States to controversies 'between two or more states', and to controversies 'between a State and citizens of another State', and the word 'party' in the clause declaring that this Court shall have original jurisdiction of all cases 'of which the State shall be a party', refer to controversies or cases that are justiciable as between the parties thereto, and *not to controversies or cases*

> *that do not involve either the property or powers of the State* which complains in its sovereign or corporate capacity that its people are injuriously affected in their rights by the legislation of another State."

* * * * * * * * *

> "I concur in the judgment dismissing the suit, solely upon the ground that the State of Louisiana in its sovereign or corporate capacity, cannot sue on account of matters set out in the bill."

A similar conclusion was reached in *Oklahoma vs. A. T. & S. F. Ry Co.,* 220 *U. S.* 277 *at* 286, in which the complainant filed its original bill for the purpose of enforcing a provision in its organic act, requiring the railroads in Oklahoma to charge rates not in excess of similar rates charged by them in the State of Kansas. The injury was to the citizens of the State of Oklahoma, no claim of proprietary interest being made. The bill was demurred to on the ground that it failed to set forth any controversy between the complainant State and the defendant, within the original jurisdiction of the Court. Upon this question the Court said (220 U. S. 227 at p. 286):

> "But, plainly, the *state,* in its corporate capacity, would have no such interest in a controversy of that kind as would entitle it to vindicate or enforce the rights of a particular shipper or shippers, and, incidentally, of all shippers, by an original suit brought in its own name, in this court, to restrain the company from applying the Kansas rates, as such, to shippers generally in the local business of Oklahoma. The opposite view must necessarily rest upon the ground that the Constitution, when conferring *original* jurisdiction on this Court 'in all cases affecting am-

> bassadors, other public ministers and consuls, and *those in which a State is a party'* (Art. III, Sec. 1) intended to include any and every judicial proceeding of whatever nature which the state may choose to institute in this court, for the purpose of enforcing its laws, although the state may have no direct interest in the particular property or rights immediately affected, or to be affected, by the alleged violation of such laws."

The opinion then discussed and quoted from the opinion in *Louisiana vs. Texas, supra,* and said (220 U. S. 227, at page 289):

> "These doctrines, we think, control this case and require its dismissal as not being within the original jurisdiction of this Court as defined by the Constitution. * * *
>
> "We are of the opinion that the words in the Constitution, conferring original jurisdiction on this Court, in a suit 'in which a State shall be a party', are not to be interpreted as conferring such jurisdiction in every cause in which the State elects to make itself a party plaintiff of record and seeks not to protect its own property, but only to vindicate the wrongs done to some of its people or to enforce its own laws or public policy against wrong-doers generally."

At the same term, the Court decided the case of *Oklahoma vs. G. C. & S. F. Ry. Co.,* 220 *U. S.* 290, in which a bill was filed to enjoin defendant railroads from transporting liquor into the State of Oklahoma in violation of its laws. The main ground of the decision was an application of the principle decided in *Wisconsin vs. Pelican Insurance Company,* 127 *U. S.* 265, in which it was held that the original jurisdiction of this Court did not include suits filed by a state to enforce penalties or judgments for violation of the penal laws of the complainant state. The Court said (220 U. S. 290, at 300-301):

> "But there is another ground which is equally fatal to the claim that this Court may give the relief asked by an original suit brought by the State. * * * In Oklahoma vs. Atchison, T. & S. F. R. Co. No. 13, Original, ante p. 277, it was held that a *State* could not invoke the original jurisdiction of the Court, by suit on its behalf, where the primary purpose of the suit was to protect its citizens *generally,* against the violation of its laws by the corporations or persons sued; that the above words, 'those in which a State shall be a party', were not to be so interpreted as to embrace suits of that kind."

We respectfully submit that the conclusion to be deduced from the cases above cited, is that (aside from the cases in which a complainant State has a proprietary interest in the subject matter), the right of a State to invoke this original jurisdiction exists only as to matters over which the State has actual sovereign or quasi-sovereign powers.

Without this element, a State cannot have such power or responsibility in respect of the subject matter as to give *a "direct" interest* or to render the controversy a "direct" controversy with another State over such subject matter.

If the States still possessed all their original sovereign powers, every legal right of their citizens would come properly within the protection of the State when interfered with by another State. But by the Constitution many sovereign powers were surrendered to the Nation. As a result, many of the rights of citizens, now exist, not because of citizenship in their particular States, but because of citizenship in the United States. This was definitely decided in the "*Slaughter House Cases,*" 16 *Wall.* 36, where the precise point was involved in construing the Fourteenth Amendment to the Constitution. In instancing some of the rights derived from citizenship in the United States, the Court said (16 Wall. 36 at 79; Italics ours):

> "*The right to use the navigable waters of the United States, however they may penetrate the territory of the several States,* * * * *are dependent upon citizenship of the United States, and not citizenship of a State.*"

So in the case at bar, the right of the citizens of the complainant States to the unobstructed navigation of the waters of the Great Lakes and of the Lakes-to-the-Gulf Waterway, are derived from their citizenship in the United States and not at all from the sovereignty or authority of the complainant States. Over the exercise of this right to navigate these waters the complainant States have neither authority nor control. Their sovereignty does not cover the subject matter of this amended bill, and as a result they have no power or responsibility to redress alleged injuries suffered by citizens of the United States, who happen also to be citizens of the complainant States, in regard to alleged obstructions to these waterways. The complainant States, therefore, have no such interest in the subject matter of the amended bill as to render this controversy a "direct" controversy between States, and no such relation to the subject matter as would justify this Court in taking jurisdiction. On this ground alone, the amended bill should be dismissed.

II.

THE CONSTITUTIONAL POWER OF THE CONGRESS TO REGULATE COMMERCE, WHETHER EXERCISED OR NOT, AS TO ALL MATTERS OF NATIONAL SCOPE AND IMPORTANCE, IS EXCLUSIVE OF ALL STATE ACTION, AND WHEN, AS IN THE INSTANT CASE, THE CONGRESS HAS ONCE ASSUMED CONTROL OF ANY PARTICULAR INSTRUMENTALITY OF INTERSTATE COMMERCE, NO STATE CAN ACT UPON THE SAME SUBJECT MATTER.

(A) It has been decided that the navigability of the Great Lakes is a matter of such national importance as to be within the exclusive power of Congress to regulate.

Since the above proposition was squarely presented and decided in *Sanitary District of Chicago vs. United States*, 266 *U. S.* 405, *at* 426, we deem it unnecessary to cite any other authority in its support. In the Sanitary District case, the Court said, concerning the lack of power in Illinois to authorize this diversion (p. 426; italics ours):

> "The main ground is the authority of the United States to remove obstructions to interstate and foreign commerce. *There is no question that this power is superior to that of the States to provide for the welfare or necessities of their inhabitants."* Monongahela Bridge Co. vs. U. S., 216 U. S. 177; Second Employers Liability Cases, 223 U. S. 1, 53. But *in matters where the national importance is imminent and direct, even*

where Congress has been silent, the States may not act at all. Kansas City Southern Ry Co. v. Kaw Valley Drainage District, 233 U. S. 75, 79. Evidence is sufficient, if evidence is necessary, to show that a withdrawal of water on the scale directed by the statute of Illinois threatens and will affect the level of the Lakes, and that is a matter which could not be done without the consent of the United States, even were there no international covenant in the case."

Since it was settled by the above decision that the regulation of the navigability of the waters of the Great Lakes in respect of this diversion of water at Chicago, is a matter of national importance over which the States could not exercise authority even in the absence of congressional action, we respectfully submit that,

(B) **The effect of a decree in the instant case, as sought by the complainant States, would be a regulation by these States of interstate commerce over the Great Lakes, a subject matter that this Court has held to be not within their constitutional powers or authority.**

The prayer for relief in the amended bill, is three-fold: first, for a general injunction restraining defendants from permanently diverting any water whatever from Lake Michigan; second, in the event that the canal be used subject to Federal control as a navigable waterway, for an injunction against the permanent diversion from Lake Michigan of any water in excess of *the amount this Court may determine* to be *reasonably required for navigation* through the "Lakes-to-the-Gulf" waterway; and, third, for an injunction restraining the pollution of the Sanitary and Ship Canal of the defendant District, and of the Chicago, DesPlaines and Illinois Rivers, in such a way as to affect the health of the people of the complainant States navigating said rivers, or to injure property of the complainant States, while so engaged. The amended bill also shows that the Congress has assumed control over this very subject matter, and that the Secretary of War has permitted this diversion at Chicago under a permit that leaves the diversion subject to his supervision. So it is clear, that complainant States are seeking by this suit to take part in the regulation of this waterway as an instrumentality of interstate commerce, and that the granting of such relief would be inconsistent with the maintenance of the paramount power of Congress over interstate commerce.

We respectfully submit that the amended bill should be dismissed for this reason also.

III.

IT APPEARS UPON THE FACE OF THE AMENDED BILL, THAT THE DIVERSION COMPLAINED OF IS BEING MADE PURSUANT TO A WRITTEN PERMIT THEREFOR DULY ISSUED AND "AUTHORIZED BY THE SECRETARY OF WAR" AND "RECOMMENDED BY THE CHIEF OF ENGINEERS" OF THE UNITED STATES, ACTING PURSUANT TO THE AUTHORITY AND PROVISIONS OF THE "RIVERS AND HARBORS ACT" OF 1899, BY WHICH ACT THE CONGRESS OF THE UNITED STATES, AS THIS COURT HAS HELD IN RESPECT OF THIS SAME DIVERSION IN THE CASE OF SANITARY DISTRICT VS. UNITED STATES, 266 U. S. 405, HAS VALIDLY CONFERRED UPON SAID OFFICIALS THE POWER EXCLUSIVE OF ANY ACTION BY ANY STATE, TO PERMIT, REGULATE AND CONTROL THE AMOUNT AND CONDITIONS OF SUCH DIVERSION; AND SAID PERMIT CONSTITUTES A VALID AND LEGAL AUTHORIZATION BY THE UNITED STATES OF SUCH DIVERSION.

In *Sanitary District vs. U. S.*, 266 *U. S.* 405, the Court said (p. 428; italics ours):

> "In an appropriation Act of March 3, 1899, Chapter 425, Section 10, 30 Stat. at L. 1121, 1151, * * * Congress provided 'That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States, is hereby prohibited; * * * and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or enclosure within the limits of any break-water, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same'. By Sec. 12, violation of the law is made a misdemeanor and punished, and the removal of prohibited structures may be enforced by injunction of the proper Court of the United States in a suit under the direction of the Attorney General. This statute repeatedly has been held to be constitutional in respect of the power given to the Secretary of War. Louisville Bridge Co. vs. U. S., 242 U. S. 409, 424. It is a broad expression of policy in unmistakable terms, advancing upon an earlier act of September 19, 1890, Chapter 907, Section 10, 26 Stat. at L. 426, 454, which forbade obstruction to navigable capacity 'not authorized by law,' and which had been held satisfied with regard to a boom across a river by authority from a state. United States vs. Bellingham Bay Boom Co., 176 U. S. 211. There is neither reason nor opportunity for a construction that would not cover the present case. As

> now applied, it concerns a change in the condition of the lakes and the Chicago River admitted to be navigable, and, if that be necessary, an obstruction to their navigable capacity (United States vs. Rio Grande Dam & Irrigation Co., 174 U. S. 690), without regard to remote questions of policy. *It is applied prospectively to the water henceforth to be withdrawn This withdrawal is prohibited by Congress, except so far as it may be authorized by the Secretary of War."*

The diversion from Lake Michigan of which the amended bill complains, was the subject matter before the Court in the Sanitary District Case. The issues were practically the same as in the instant case except that in the Sanitary District case, the United States, through the Attorney General, had filed its bill to enjoin diversion *in excess* of the amount specified in a permit theretofore issued by the Secretary of War under the authority of the Rivers and Harbors Act of 1899. The decision of the Court necessarily involved first, a decision as to the validity of the statute as a proper exercise by Congress of its power under the commerce clause; second, the applicability of the statute to the matter of this diversion; and third, the approval by this Court of the authority conferred by the statute upon the Secretary of War to issue permits authorizing diversion. These very complainants appeared before the Court in the Sanitary District case as friends of the Court, and argued in favor of an affirmance by the Court of the decree entered in the District Court at Chicago, enjoining the defendants from taking more than the amount authorized by the permit referred to.

This Court affirmed the decree below, and directed that it go into effect in sixty days. But the Court recognized that the Act of Congress in question was prospective, that the authority of the Secretary of War to regulate this subject matter, was equally prospective and might well be exercised in different ways at different times, depending upon changed circumstances, and so the decree was affirmed "*without prejudice to any permit that may be issued by the Secretary of War according to law.*"

The amended bill in this case, sets out (printed bill, page 30, paragraph 28), that on March 3, 1925, within sixty days from January 5, 1925, the date when this Court rendered its decision, the Secretary of War issued a new permit under the statute in question. The amended bill itself, therefore, sets forth the complete lawful authority for the acts of these defendants from which relief is sought. And the amended bill should be dismissed for this reason also.

IV.

THE GRANT OF POWER TO THE SECRETARY OF WAR MADE BY THE RIVERS AND HARBORS ACT OF MARCH 3, 1899, "REPEATEDLY HAS BEEN HELD TO BE CONSTITUTIONAL."

Sanitary District vs. U. S., 266 *U. S.* 405, 428.

This proposition seems so firmly established by this Court, as not to be open to debate.

V.

THERE IS NO "COMMON LAW RIGHT" IN RESPECT OF THE WATERS OF THE GREAT LAKES AS CLAIMED IN THE AMENDED BILL, WHICH CAN SUPERSEDE OR HAVE THE EFFECT OF LIMITING THE EXCLUSIVE POWER OF CONGRESS TO REGULATE THE NAVIGABILITY OF THESE WATERS, OR TO PERMIT THE DIVERSION FROM LAKE MICHIGAN OF WHICH THE AMENDED BILL COMPLAINS. THE WISDOM OR EXPEDIENCY OF A PERMIT ISSUED BY THE SECRETARY OF WAR, PURSUANT TO THE POWER GRANTED HIM BY THE RIVERS AND HARBORS ACT OF MARCH 3, 1899, IS NOT SUBJECT TO REVIEW BY THE COURTS.

In the Sanitary District case, supra, this Court decided as we understand: first, that the power of Congress to regulate the navigability of the Great Lakes is paramount, and not subject to interference by the States; and, second, that the method adopted by Congress, in which authority was given to the Secretary of War to maintain proper navigable conditions through the issuance of permits under the Act of March 3, 1899, was constitutional and adequate in the premises.

This decision would seem sufficient in itself to sustain the first proposition above stated. It may be well, however, to also call attention to the decision in *U. S. v. Rio Grande Dam & Irrigation Co.*, 174 *U. S.* 690 *at* 702, where this point was dealt with in the following language (italics ours):

> "The unquestioned rule of the common law was that every riparian owner was entitled to the continued natural flow of the stream. * * *

> "While this is undoubted, and the rule obtains in those states in the Union which have simply adopted the common law, it is also true that as to every stream within its dominion, a state may change this common law rule and permit the appropriation of the flowing waters for such purposes as it deems wise. * * *
>
> "Although this power of changing the common law rule as to streams within its dominion undoubtedly belongs in each state, yet two limitations must be recognized: First, that in the absence of specific authority from Congress, a state cannot by its legislation, destroy the right of the United States, as the owner of lands bordering on a stream, to the continued flow of its waters; so far at least as may be necessary for the beneficial uses of the government property. Second, that *it is limited by the superior power of the general government to secure the uninterrupted navigability of all navigable streams within the limits of the United States.* In other words, *the jurisdiction of the general government over interstate commerce, and its natural highways, vests in that government the right to take all needed measures to preserve the navigability of the navigable water-courses of the country, even against any state action.*"

And the second proposition, that the Courts will not review the wisdom or expediency of the permit, is also well established.

The Rivers & Harbors Act of 1899, has been held to be a valid exercise by Congress of its constitutional power to regulate commerce. When the Secretary of War issues a permit under the Act, his status is merely that of an agent of Congress, acting within the authority prescribed by Congress. We understand that the Court has also decided (in the Sanitary District case, supra) that it is within this authority of the Secretary of War to grant a permit authorizing the diversion of water from Lake Michigan, as complained of in the amended bill. In its essence, therefore, the exercise of this power by the Secretary of War is *an administrative function* in aid of an exercise of the legislative power of Congress; *U. S. v. Chandler-Dunbar Water Power Co.*, 229 *U. S.* 53, *at* 64. It is similar in essence to the power exercised by the Interstate Commerce Commission in prescribing rates. The extent to which this Court will pass upon the legal sufficiency of such an administrative order, has been carefully defined and stated thus in the opinion in *Interstate Commerce Commission v. Illinois Central Railroad Company*, 215 *U. S.* 452, *at* 470 (italics ours):

> "Beyond controversy, in determining whether an order of the Commission shall be suspended or set aside, we must consider (a) the relevant question of constitutional power or right; (b) all pertinent questions as to whether the administrative order is within the scope of the delegated authority under which it purports to have been made; and (c) the proposition which we state independently although in its essence, it may be contained in the previous one, viz., whether, even although the order be in form within the delegated power, nevertheless it must be treated as not embraced therein, because the exertion of authority which is questioned, has been manifested in such an unreasonable manner as to cause it, in truth, to be within the elementary rule

that the substance, and not the shadow, determines the validity of the exercise of the power. Postal Telegraph Cable Co. v. Adams, 155 U. S. 688, 698. Plain as it is that the powers just stated are of the essence of judicial authority, and which, therefore, may not be curtailed, and those discharged may not be by us in a proper case avoided, *it is equally plain that such perennial powers lend no support* whatever *to the proposition that we may, under the guise of exerting judicial power, usurp merely administrative functions by setting aside a lawful administrative order upon our conception as to whether the administrative power has been wisely exercised.*"

And in *Southern Pacific Co. v. Olympian Dredging Co.*, 260 U. S. 205, at 210, the Court said (italics ours):

> "It is for Congress, under the Constitution, to regulate the right of navigation, by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction and to prescribe the way in which the question of obstruction shall be determined. *Its action* in the premises *cannot be revised or ignored by courts* or by juries, except that *when it provides for an investigation of the facts* * * * the courts can see to it *that executive officers conform their action to the mode prescribed by Congress.*"

VI.

THE NATURE OF THE ALLEGED CAUSE OF ACTION, AS SHOWN BY THE AMENDED BILL AND REFLECTED IN ITS PRAYER FOR RELIEF, IS NOT SUCH AS TO ENTITLE COMPLAINANTS TO ANY OF THE EQUITABLE RELIEF SOUGHT, BECAUSE:

(A) Insofar as said amended bill seeks an injunction to restrain the permanent diversion from Lake Michigan of any water whatever, it relates to a subject-matter over which the Congress has exclusive jurisdiction, which jurisdiction has been assumed, and is being exercised.

The contention stated in this sub-head has been fully discussed heretofore.

(B) In seeking to have this Court determine the amount of diversion "reasonably required" for navigation purposes, the amended bill attempts to impose upon this Court the exercise of a power not judicial in its nature, but essentially legislative and heretofore constitutionally delegated by Congress to the Secretary of War upon recommendation of the Chief of Engineers in the Rivers and Harbors Act of March 3, 1899.

The legal nature of the power exercised by the Secretary of War, under the Act of March 3, 1899, in granting the permit of 1925, has already been discussed.

The amended bill asks the Court to determine the amount of water "reasonably required" for purposes of navigation on the "Lakes-to-the-Gulf" waterway. Such a determination would involve the decision of many complicated and important questions of fact relating to engineering and navigation, as for instance: what depth should be maintained in this waterway to meet the needs of its effective navigability, especially in those parts of the Mississippi River where the low-water channel depth is difficult to maintain; what engineering methods of channel control and of flow control should be assumed by the Court in determining the quantity of diversion; what current speed could be expected in various parts of the channel as the result of given quantities of diversion and under the engineering methods and practices of controlling current speed. The mere statement of such questions is sufficient to demonstrate that they are essentially legislative in nature and to be decided solely by the Secretary of War under his delegated authority from the Congress.

We respectfully submit, that this prayer of the amended bill, in view of the existing permit issued by the Secretary of War under which diversion now takes place as appears on the face of the pleading, asks this Court, in the language of Mr. Justice White in the Illinois Central case, *supra,* to "usurp merely administrative functions by setting aside a lawful administrative order upon" the Court's conception "as to whether the administrative power has been wisely exercised."

(C) In seeking an injunction against alleged damage to navigation on the Great Lakes claimed to result from alleged lowering of the levels thereof, and alleged damage to navigation on the "Lakes-to-the-Gulf" waterway, claimed to result from the alleged pollution thereof, it appears from the amended bill that the complainant States sue as mere private litigants who seek to restrain an alleged public nuisance, and it further appears that none of the complainant States, nor any of their respective citizens, suffer or can suffer any direct, peculiar or special injury different in kind or degree from the alleged injury

to the general public. The exclusive power to prevent this character of public nuisance, except only in the case of a complainant suffering special, peculiar and irreparable damage different in kind from that suffered by the general public, is vested in the United States. Such power is being exercised by the United States in respect of this waterway, and the relief sought would conflict therewith.

The extent to which the National Government is exercising jurisdiction over the subject-matter of this controversy is fully set out in the amended bill, and in the decision of this Court in the Sanitary District case, *supra*. Our point here is, that the prayer for relief is an attempt by the complainant States to enjoin what is claimed to be a public nuisance, although their relation to the subject-matter is such that they neither can nor do suffer any special or peculiar injury different in kind, nature or degree, from the injury resulting to each member of the general public, from the alleged nuisance.

The rule requiring the showing of such special injury was established in this Court as early as the decision in *The Mayor, etc., of Georgetown v. Alexandria Canal Company*, 12 *Peters* 91. The City of Georgetown sought to enjoin the further construction of a canal because it was alleged that this resulted in making shallow and therefore unnavigable, parts of the harbor of Georgetown in the Potomac River. The bill showed no special damage to the city different in kind or in degree from that suffered by any member of the general public seeking to use this facility of navigation. The Court pointed out that the bill was, in substance, a bill to enjoin a public nuisance, and laid down the rule applicable, we submit, to the case at bar, in the following (p. 99; italics ours):

"The principle then is, that *in case of public*

> *nuisance* where a bill is filed *by a private person asking for relief by way of prevention*, the plaintiff *cannot maintain a stand in a court of equity, unless he avers and proves some special injury.* . . . The complainants then must, *as in the case of private persons,* to maintain their position in the court of equity for relief against a public nuisance, have averred and proved that they were the owners of property liable to be affected by the nuisance, and that, in point of fact, they were so affected so that *they thereby had suffered a special damage.* Now, there is no such averment in this bill.''

And applying the rule, the bill was dismissed.

The rule thus announced has been followed in later cases: *Pennsylvania v. Wheeling Bridge Company,* 13 *How.* 518, 566; and *Arizona Copper Company v. Gillespie,* 230 *U. S.* 46, 57.

The amended bill seeks to prevent interferences with navigation on the Great Lakes resulting from alleged lowering of the levels thereof due to diversion of water from Lake Michigan, and interference resulting from pollution of the ''Lakes-to-the-Gulf'' waterway, claimed to result from its use in disposing of Chicago sewage. There is no claim whatever that the damage to the complainant States is different in any way from the damage suffered by the public at large, nor is there even a claim that the citizens of the complainant States suffer peculiar or special damage. This point applies with equal force to both of the alleged nuisances set up in the bill, i. e. the lowering of the levels of the Great Lakes, and the pollution of the waterway.

(D) In seeking relief from alleged pollution of the

"Lakes-to-the-Gulf" waterway, it appears on the face of the amended bill, that the waterway alleged to be polluted lies wholly below all of the complainant States, and that none of said States have any direct or proprietary interest in the navigable condition thereof, the exclusive power to protect such navigable condition being vested in the United States, which is now exercising the same.

As to this waterway, complainants are upper riparian owners, and can only be affected by the alleged pollution and by the injury claimed to result therefrom, when, if ever, citizens of the complainant States desire to use this waterway in interstate commerce. The protection of this waterway from such pollution as would injure its navigability, is within the control being exercised by the Secretary of War, and is not subject to control in this suit.

VII.

The United States alone can complain of any alleged failure of the Sanitary District to comply with the conditions of the permit issued to said District by the Secretary of War, March 3, 1925. Other adequate remedies are provided to protect against breaches of such conditions, thus making relief in equity unnecessary and inappropriate.

(A) The Permit is expressly made revocable by the Secretary of War at any time; and by other expressions of the permit, the diversion complained of is being made under the supervision, and at times under the control, of the United States Engineer at Chicago. So this complete remedy to prevent or protect breaches of the permit is always available.

(B) The Rivers and Harbors Act of March 3, 1899 (Sections 12 and 17), provides special and adequate reme-

dies for violations of the act, including failures to comply with the conditions of permits issued thereunder. These are designed to enforce compliance with the broad system of regulating navigation embodied in the act. These special remedies to be exercised by federal authority are exclusive of all other remedies and preclude complainants from any relief in equity in this particular.

The provisions of the Act of March 3, 1899, and this Court's construction of it, show that Congress intended by it to establish a comprehensive and complete system of regulation covering the entire subject matter of the control of the navigability of the navigable waters of the United States, including the creation of complete and adequate remedies to make it effective and to remedy violations of the Act and of permits issued under it. The Act created new statutory liabilities and provided special remedies for them.

We respectfully submit, that this system provided by Congress, and the special statutory remedies created as a part of it, are exclusive; that the granting of the remedy sought by the complainants in the case at bar, would be inconsistent therewith and in fact destructive of the very purpose of the statute; and that, by necessary implication from the statute itself, it was the intent of Congress by its enactment to deny the further use of remedies such as are sought in the amended bill, to prevent obstructions to navigation.

Analysis of Sections Seven to Twenty of the Rivers and Harbors Act of March 3, 1899.

Section 7. The Secretary of War shall submit in his annual report, a statement of the then condition of works of River and Harbor improvement with estimates of cost of repair and recommendations.

Section 8. The Secretary of War is directed to report to Congress a list of all Government harbor works occupied by private persons, the terms of such occupancy, date of same together with recommendations.

Section 9. Forbids construction of any dams, dikes or bridges or causeway over or in any navigable water until the consent of Congress and the approval of plans by the Chief of Engineers and the Secretary of War provided when such waters are within the limits of a single State, State consent and approval by the Chief of Engineers and Secretary of War are sufficient, but when such plans have been approved strict compliance therewith is required.

Section 10. The creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of waters of the United States is prohibited; and it shall not be lawful to build any wharf or pier in any port or river, or any other water outside established harbor lines, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; nor to excavate or fill or in any manner alter the navigable capacity of any navigable water unless similarly recommended and authorized.

Section 11. Power is given the Secretary of War when deemed essential, to designate harbor lines beyond which no piers, etc., may be extended except under his regulations.

Section 12. Violations of Sections 9, 10 and 11 is made a misdemeanor punishable by fine or imprisonment, or both, and further, the removal of structures erected in violation thereof "may be enforced by the injunction of any circuit court exercising jurisdiction in any district in which such structures may exist, and proper proceedings to this end may be instituted under the direction of the Attorney General of the United States.

Section 13. It is made unlawful to dump refuse, etc., into navigable waters or to deposit same on banks thereof, but the Secretary of War upon approval of the Chief of Engineers may permit such deposits in designated areas.

Section 14. It is made unlawful to injure or destroy, or obstruct by fastening vessels thereto, or otherwise, any wharf, pier, etc., under control of the United States, in whole or in part for the prevention of floods, etc., provided the Secretary of War and Chief of Engineers may grant temporary permission therefor when deemed not injurious.

Section 15. Anchoring in navigable channels so as to prevent passage is forbidden or to voluntarily sink vessels therein or to float rafts so as to impede such channels, duty to buoy sunken vessels, etc.

Section 16. Penalty imposed for misdemeanor, fine and imprisonment, for violation of Sections 13, 14 and 15. Vessels responsible for such damage subject to libel by the United States.

Section 17. The Department of Justice shall conduct the legal proceedings necessary to enforce Sections 9 to 16. It is the duty of United States district attorneys to vigorously prosecute offenders when requested by the Secretary of War or his subordinates, reports to be made to the Attorney General and copies to the Secretary of War by such District attorneys; and in aid of enforcement of said laws, United States collectors of customs and other revenue officers are given power to swear out process and arrest, with or without process, persons committing any of the offenses prohibited.

Section 18. When the Secretary of War has good reason to believe any railroad or bridge is an obstruction to navigation he shall give notice to interested persons, conduct a hearing and recommend desirable changes, if any. If alterations are not made in time specified, criminal proceedings are required by the local United States District Attorney. Penalty of $5,000.00 a month fine is imposed.

Section 19. Power of the Secretary of War to break up and dispose of abandoned crafts in navigable waters. Publication of notice, etc.

Section 20. In the event of grounding of any craft in any navigable waters or canal lock in a way dangerous to navigation, the Secretary of War or his agents may take immediate possession of such craft so as to remove or destroy it and clear the channel, using judgment to prevent unnecessary injury. Expense of removal to fall upon the owners.

The Act of 1899, above briefly summarized, was a revision of a prior Act of similar purport contained in the Rivers and Harbors Act of September 19, 1890.

In *Southern Pacific Company vs. Olympian Dredging Company,* 260 *U. S.* 205, 208, 210, suit was brought against the railroad for damages resulting from the sinking of a barge which ran against certain piles in the Sacramento River, which were left by the railroad upon the removal of one of its bridges. The removal and the manner of leaving the piles was in strict compliance with a permit of the Secretary of War issued under the provision of Section 7, of the Act of 1890, and the question presented for decision was whether the courts would inquire into reasonableness or propriety, of an obstruction that the Secretary of War had thus permitted. On this point the Court said, pages 208-210:

> "By this legislation Congress assumed jurisdiction of the subject of obstructions to navigation, and committed to the Secretary of War administrative power insofar as administration was necessary. * * * That the Secretary of War was authorized to impose the condition heretofore quoted does not admit of doubt. The power to approve implies the power to disapprove, and the power to disapprove necessarily includes the lesser power to condition an approval. In the light of this declared assumption by Congress of control over the subject and of the large powers delegated to the Secretary, the condition imposed by that officer cannot be considered otherwise than as an authorative determination of what was reasonably necessary to be done to insure free and safe navigation so far as the obstruction in question was concerned. * * * It was not for the petitioners, however, to question either his reasons or his conclusions. They were justified in proceeding upon the assumption that what the Secretary, in the exercise of his lawful powers, declared to be no obstruction to navigation, was in fact no obstruction."

The opinion then quoted from the opinion in *Mononga-*

hela Bridge Company vs. United States, 216 *U. S.* 177, 195; as follows:

> "Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. It is for Congress, under the Constitution, to regulate the right of navigation by all purported means, to declare what is necessary to be done in order to free navigation from obstruction and to prescribe a way in which the question of obstruction shall be determined. Its action in the premises cannot be revised or ignored by the Courts or by the jury * * * ." (This case construed the Act of 1899).

It is clear from the foregoing, that by this statute Congress set up a system of regulation which covered the entire subject of navigable waters. It gave complete authority to the Secretary of War to carry out this system of regulation and to impose specified penalties for failure to comply with his requirements. It also placed in the Department of Justice, acting in strict co-operation with the Secretary of War, such judicial supervision over the subject matter as the policy of the regulation would require. If, at the suit of a private individual, injunctions should be granted inconsistent with the provisions of any permit issued by the Secretary of War, and power to issue such injunction were assumed by the Courts, the carrying out of this Congressional scheme would be impossible.

An analogous situation in support of this contention is shown in the opinion in *Texas and Pacific Railway Com-*

pany v. Abilene Cotton Oil Company, 204 *U. S.* 426, 437. In that case a shipper sued in the State Court to collect damages resulting from the collection from the shipper by the defendant railroad, of claimed excessive freight rates. At the common law this action would lie, the damages being the amount by which the rate in question exceeded what the Court and jury would find to be reasonable. The sole question before this Court was whether the necessary effect of the Interstate Commerce Act was to deprive a shipper of this common law remedy for overcharge. In the Interstate Commerce Act there is an express reservation of common law remedies theretofore existing.

In considering this question, the Court concluded that the common law remedy would not be construed to have been taken away unless imperatively demanded by the construction of the statute. The Court then summarized the Commerce Act, holding that it was intended as an effective means of redressing wrongs resulting from unjust discrimination and undue preference, that the principal means be employed to this end, was the requirement of uniformity of charges obtained by compelling freight rates to be filed with the Interstate Commerce Commission, and when filed to be collected from all shippers. The Court pointed out that if the common law remedy were allowed the uniformity required by the Act would be destroyed and said:

> "Indeed the recognition of such a right is wholly inconsistent with the administrative power conferred upon the Commission and with the duty, which the statute casts upon that body, of seeing to it that the statutory requirements as to uniformity and equality of rates is observed. * * * This must be, because,

> if the power existed in both Courts and the Commission to originally hear complaints on this subject, there might be a divergence between the action of the Commission and the position of the Court."

The Court therefore held that the common law right no longer existed having by necessary implication been repealed by the statute, which required primary recourse to the Interstate Commerce Commission in any matter involving an alleged excessive rate.

In the case at bar the Secretary of War has approved by the issuance of his permit, the obstruction to navigation of which complainants complain. Assuming that a Court might differ with the Secretary of War as to the wisdom or propriety of permitting this diversion, it is clear that if by granting injunctive relief, a Court should require a departure from the terms of the permit issued by the Secretary of War, the entire sytem of regulating of navigable waters established by the Act, would be interferred with and its effectiveness destroyed.

Moreover, it seems to be established doctrine that where a statute creates a right or *liability,* and *prescribes a remedy, the remedy prescribed is exclusive;* Pollard v. Bailey, 20 Wall. 520, 526, Fourth National Bank v. Francklyn, 120 U. S. 747, 756.

We therefore respectfully submit, that the necessary intent of the Act of March 3, 1899, is to make exclusive of all other remedies, the special statutory remedies that the Act itself provides as available through the Secretary of War and the Department of Justice.

And the fact that these remedies were not made directly available to private litigants, is in harmony with the decisions of this Court that neither individuals, nor States, have any justiceable interest in the control of the navigability of the navigable waters of the United States.

(C) It must be presumed that in issuing and recommending said permit of March 3, 1925, the Secretary of War and the Chief of Engineers took full cognizance of the extent to which Lake levels would be lowered, and navigability obstructed, if at all, by the diversion authorized in said permit. The Secretary of War, being the agent of Congress in determining these matters, his conclusions are not subject to review by the Courts.

We have already discussed the extent to which a court may review the discretion of the Secretary of War acting under the authority conferred upon him by Sec. 10, of the Act of March 3, 1899, under which the permit in question was issued.

Both from the averments in the amended bill and from the record in the Sanitary District case to which this Court may refer under its rule of judicial notice, this Court knows that for many years the subject-matter of this litigation—the diversion at Chicago, of water from Lake Michigan—has been under the supervision and inspection of the Secretary of War and his assistants. The record in this Court in the Sanitary District case contained testimony of many Government officers as to the character, extent and effects upon Lake levels, of this diversion. The Court must presume, therefore, that the Chief of Engineers, in recommending the permit of March 3, 1925, and the Secretary of War, in issuing the same, took full cognizance of any effect upon Lake levels which might result therefrom.

We submit that so far as concerns the effect upon Lake levels, of the diversion authorized by this permit, the legal situation is closely analogous to that before this Court on the original bill of the *State of Pennsylvania* concerning the *Wheeling and Belmont Bridge Company*, 59 *U. S.* 421.

The original bill was filed by Pennsylvania to redress special damage resulting to it in its proprietary capacity due to the fact that the bridge was alleged to interfere with navigation on the Ohio River. The Court, in the original case, took jurisdiction of the bill, and granted an injunction which required an abatement of the public nuisance Thereafter the Congress in the excerise of its authority to regulate commerce, passed a statute declaring that the bridge was a *lawful* structure. After this statute, contempt proceedings were begun before the Court to compel the bridge to abide by the original decree, but it was held that since the bridge had been declared a lawful structure, it should not be abated as being any longer a public nuisance.

It is respectfully submitted, that in so far as concerns the diversion of water from Lake Michigan within the amount permitted by the permit of March 3, 1925, all questions of legality have been removed by the issuance of said permit. The power of the Secretary of War to issue the permit has been confirmed by this Court in the Sanitary District case. A structure of any kind in the navigable waters of the United States is, to the extent that vessels might use in those waters, the same space occupied by such structure, an obstruction to navigation. It cannot be claimed that there is any inconsistency between permitting the Secretary of War to authorize obstructions to navigation, and the general prohibition contained in Section 10, of the Act of March 3, 1899. The entire Statute must be read together. It clearly involves a complete and comprehensive scheme of regulation, and particularly a scheme designed, through the creation of works of man, in and adjoining to the navigable waters of the country, to render feasible such use of those waters as may best conserve the general public interest. No such scheme could possibly be carried out, unless it involved the creation of power to determine to what extent and in what particulars actual obstructions to navigation might be required, always, of course, conditioned upon the duty to make such permitted obstructions harmonize with the remedial purpose of the statute —to further and develop the navigable waters of the country.

VIII.

THE RIGHTS ASSERTED AND THE RELIEF SOUGHT IN AND BY THE AMENDED BILL ARE CONTRARY TO, AND INCONSISTENT WITH, THE RIGHTS ASSERTED AND THE RELIEF SOUGHT IN AND BY THE ORIGINAL BILL HEREIN, IN THE RESPECT THAT THE ORIGINAL BILL CONCEDED AND ADMITTED THE RIGHT OF THE DEFENDANTS TO A DIVERSION NOT IN EXCESS OF FOUR THOUSAND, ONE HUNDRED AND SIXTY-SEVEN (4,167) CUBIC FEET PER SECOND, AND ALSO TO A DIVERSION IN EXCESS OF SAID AMOUNT, IF AND WHEN THE CONGRESS OF THE UNITED STATES OR THE SECRETARY OF WAR ACTING UPON THE RECOMMENDATION OF THE CHIEF OF ENGINEERS, SHOULD SO PERMIT, WHEREAS, THE AMENDED BILL DENIES SUCH RIGHTS OF THE DEFENDANTS; THEREFORE, THE COMPLAINANTS ARE NOW ESTOPPED FROM DENYING THE SAID RIGHT OF THE DEFENDANTS, AND FROM SEEKING THE RELIEF PRAYED FOR IN THE AMENDED BILL.

The original bill herein was filed June 5, 1922, to the October Term, 1921, by the State of Wisconsin as sole complainant. The prayer of this bill was for a general injunction against any diversion until such time as the Congress should give its valid consent, and in the alternative, in the event the canal of the defendant District be used as a navigable waterway, for an injunction against any diversion in excess of the amount which the Court should determine to be reasonably required for purposes of navigation through said canal, until such time as Congress should give its valid consent; and in the event that the Court should hold it within the power of the Secretary of War to permit diversions, then for an injunction against any diversion in excess of 4,167 cubic feet per second until such time as Congress or the Secretary of War acting upon the recommendation of the Chief of Engineers should permit a larger amount.

Thereafter, the complainant, Wisconsin, together with the additional complainants named in the amended bill, and also the Lake States of Indiana and Michigan, appeared with leave, as friends of the Court, in the Sanitary District case, and there argued in favor of the affirmance of the decree that had been entered in the District Court, enjoining the defendant Sanitary District from diverting water in excess of 4,167 cubic feet per second, the amount allowed by the then outstanding permit from the Secretary of War.

The question in that case, as well as the question presented by the original bill here, necessarily involved a determination by this Court of the legality of the authority exercised by the Secretary of War in issuing permits for this diversion.

But when the amended bill in the instant case is considered, which in effect denies the authority of the Secretary of War to issue such permit, it is clear that the complainants have materially changed their position. This, under well-established rules, they may not do.

In their original bill, it was the duty of the complainants to state their entire case, to set forth every ground upon which they could obtain relief. They could not thereafter enlarge the scope of the action. If a decree had been entered, for instance, in the original bill, it would be *res adjudicata* so far as the complainants are concerned of the matter presented in this bill, not because the issues of the two are identical, but because the complainants had the opportunity to present those issues on the original bill. As was said by this Court in *Northern Pacific Railway Company v. Slaght,* 205 *U. S.* 122, 130-131, the question as to such judgment when pleaded in bar of another action will be necessarily its legal identity with such action. The general rule of the extent of the bar is not only what was pleaded or litigated, but what *could* have been pleaded or litigated.

After the original bill herein was filed, in 1922, the Sanitary District and the State of Illinois filed a joint and several answer. No further steps were taken until October, 1925, except, as stated, that Wisconsin, together with other Lake States, voluntarily appeared in the Sanitary District case.

The relief prayed in the original bill herein, was identical with the relief sought by the Government in the Sanitary District case. The appearance of Wisconsin in that case to urge affirmance of the decree awarding the relief sought, gave to the Sanitary District and the State of Illinois the right to assume that Wisconsin would be satisfied with the decision of this Court in that matter. The permit granted by the Secretary of War, March 3, 1925, imposed many and substantial burdens upon the Sanitary District as conditions with which it must comply in order to continue to divert water from Lake Michigan.

In seeking this permit—and of course, this Court may assume the permit would not have been issued except on application of the Sanitary District—the District had a right to assume that it could proceed with the program of construction imposed upon it by the conditions of the permit without fear of any further threat of litigation from the State of Wisconsin. The mere pendency at that time of the original bill contained no such threat because,. as above pointed out, the relief sought in that bill was identical with the relief sought in the Sanitary District suit.

Under these circumstances, therefore, we submit that complainants are estopped to set up a new theory denying the authority of the Secretary of War, afer the Sanitary District had obtained the permit in March, 1925, subject to the heavy burdens therein imposed.

For this reason also, the amended bill should be dismissed.

CONCLUSION.

Having endeavored above to show the various reasons why the amended bill should be dismissed as wholly insufficient to invoke the original jurisdiction of this Court, and as wholly lacking in equity, we shall close with a short explanation of the interests that the Mississippi Valley States have in the subject matter in controversy.

It is two-fold. The vast domain that comprises the Mississippi Valley and the freight territory tributary to the Mississippi, is deeply concerned in the carrying out by the Government of its plans for the development of these inland waterways.

The diversion at Chicago of an adequate and reasonable quantity of lake water, is essential to the development and operation of this very important "Lakes-to-the-Gulf" waterway.

This interest of the Valley States rests not only upon the direct benefit to be obtained by all their peoples through the very great tonnage of freight that moves and will move over these waterways, but also upon the indirect benefit to be obtained through the lowering and leveling effect that the existence of these all-water or part-water routes and their low freight rates have and will have upon competing rail rates.

If it be suggested that the Mississippi Valley States have no justiciable interest in these subjects of navigability and transportation, we respectfully answer that they have at least as much justiciable interest in them as the complaining Lake States.

But there is another interest, that was held in *Missouri v. Illinois, supra,* to be justiciable, and that is of direct and urgent importance to Missouri, perhaps also to Kentucky and Tennessee, viz.: the protection of the Illinois and Mississippi Rivers against dangerous pollution.

The great and urgent importance to the Valley States, of this water pollution feature of the present situation, does not seem to have been understood by the Court in the Sanitary District case, probably because the Court then had in mind the facts and situations disclosed by the record in *Missouri v. Illinois.* We therefore venture to stress the fact that the physical situation has changed in important respects.

If the prayer of the amended bill should be granted, and an adequate diversion of water from Lake Michigan should be enjoined, a much more serious and dangerous pollution of the Illinois and Mississippi Rivers would occur than was found to be the fact in *Missouri v. Illinois.*

This is so because: at the time the evidence was taken in *Missouri v. Illinois, only a part* of the sewage of Chicago passed into or through the Sanitary District's canal, and the City of Chicago was then much smaller in population than now. Since then the situation has changed, and the menace to the water supply of St. Louis and other River cities has greatly increased. Now *almost all of the sewage and waste, domestic and industrial, of the vastly greater* City of Chicago passes into the canal, and would seriously menace the water supply of the River cities, certainly in Illinois and Missouri, if an adequate diversion should be discontinued.

We respectfully submit that this interest is direct and substantial, and should entitle the Valley States to participate in the defense of this case.

Respectfully submitted,

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Frank M. Thompson,
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Frank E. Daugherty,
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Cornelius Lynde,
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Solicitors.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

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In The Supreme Court of the United States

ORIGINAL JURISDICTION

OCTOBER TERM, 1925.

THE STATE OF WISCONSIN, THE STATE OF OHIO, THE STATE OF PENNSYLVANIA AND THE STATE OF MINNESOTA,
Complainants.
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF TENNESSEE, AND STATE OF LOUISIANA,
STATE OF KENTUCKY
Intervening Defendants.

Bill in Equity
Original
Jurisdiction
No. [redacted] 7

NOTICE AND MOTION, BRIEF AND ARGUMENT FOR THE STATES OF INDIANA AND MICHIGAN AS *AMICI CURIAE*.

ANDREW B. DOUGHERTY,
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ARTHUR L. GILLIOM,
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In The Supreme Court of the United States

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

THE STATE OF WISCONSIN, THE STATE OF OHIO, THE STATE OF PENNSYLVANIA AND THE STATE OF MINNESOTA, Complainants. vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, Defendants. STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA, Intervening Defendants.	Bill in Equity Original Jurisdiction No. 16.

NOTICE OF MOTION

Please take notice that at the opening of the session of the Supreme Court of the United States on Monday, the 1st day of March, 1926, or as soon thereafter as counsel can be heard, the undersigned will submit the annexed motion for leave to file a brief on behalf of the State of Michigan and the State of Indiana as amici curiae.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan,
ARTHUR L. GILLIOM,
Attorney General of the State of Indiana,
FRED C. GAUSE,
Of Counsel for the State of Indiana,
Solicitors for Petitioners.

Dated this 18th day of February, 1926.

To OSCAR E. CARLSTROM,
Attorney General of Illinois,
HECTOR A. BROUILLET,
Attorney, the Sanitary District of Chicago,
Solicitors for Defendants,
and
NORTH T. GENTRY,
Attorney General of Missouri,
FRANK M. THOMPSON,
Attorney General of Tennessee,
FRANK E. DAUGHERTY,
Attorney General of Kentucky,
PERCY SAINT,
Attorney General of Louisiana,
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Solicitors for Intervening Defendants.

IN THE
SUPREME COURT OF THE UNITED STATES
ORIGINAL JURISDICTION

OCTOBER TERM, 1925

THE STATE OF WISCONSIN, THE STATE OF OHIO, THE STATE OF PENNSYLVANIA AND THE STATE OF MINNESOTA, Complainants. vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, Defendants. STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA, Intervening Defendants.	Bill in Equity Original Jurisdiction No. 16.

MOTION FOR LEAVE TO FILE BRIEF ON BEHALF OF THE STATE OF MICHIGAN AND THE STATE OF INDIANA, AS AMICI CURIAE

Now comes Andrew B. Dougherty, Attorney General of the State of Michigan, and Arthur L. Gilliom, Attorney General of the State of Indiana, and states, there is involved in this suit, the question of the authority or right of defendants to abstract water from the Great Lakes and their watershed and divert the same into a different watershed, which abstraction reduces the navigable capacity of said Great Lakes, in which petitioners have a direct proprietary interest for purposes of highways and other uses which are of great interest and value to the people and the prosperity of said states. That by reason of the interests of the People of the State of Michigan and of the People of the State of Indiana in this matter, the undersigned desire to submit a brief in their behalf on the questions involved in this case.

Therefore, leave is prayed to file the brief attached hereto on behalf of the People of the State of Michigan and the People of the State of Indiana as amici curiae.

Respectfully submitted,

ANDREW B. DOUGHERTY,
Attorney General of Michigan,

ARTHUR L. GILLIOM,
Attorney General of Indiana,

FRED C. GAUSE,
Of Counsel for the State of Indiana,
Solicitors for Petitioners.

Dated this 18th day of February, 1926.

IN THE
SUPREME COURT OF THE UNITED STATES

ORIGINAL JURISDICTION

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STATE OF TENNESSEE,
STATE OF KENTUCKY
AND STATE OF LOUISIANA,
Intervening Defendants.

Bill in Equity
Original
Jurisdiction
No. 16.

BRIEF AND ARGUMENT FOR THE STATE OF MICHIGAN AND INDIANA AS AMICI CURIAE

May It Please the Court:

The States of Michigan and Indiana, joining in this brief, have, together with all other States in the Great

Lakes basin, large and important interests in the commerce and use of the Great Lakes, the waters of which are being abstracted by the Defendants State of Illinois and the Sanitary District of Chicago. The State of Michigan alone has 1,624 miles of shore line on the Great Lakes and the connecting waters.

The State of Indiana in the interest of brevity adopts the statement of facts contained in the brief filed by complainants.

The State of Michigan also in the same interest does likewise for the purpose of this suit and this brief. But that the Court may be fully informed as to the position of the State of Michigan with respect to the full rights of that State in and to the use of the waters of the Great Lakes basin, that State asserts that although she submits that complainants are fully entitled to the relief asked, she urges such relief on the ground that neither defendants nor any agency, international, national or State, may abstract and permanently divert from the Great Lakes and their natural watershed any water whatever and to secure such determination she is submitting to this Honorable Court her bill of complaint, praying for full and complete relief from the acts of defendants, State of Illinois and Sanitary District of Chicago in abstracting waters from the Great Lakes and diverting from the Great Lakes watershed the waters of the Chicago River.

The position of the State of Michigan in respect to the matters stated is expressed in the concurrent resolution of her legislature adopted on February 19th, 1925, a copy of which is hereto attached as appendix I.

ARGUMENT.

I.

THE GREAT LAKES AND CONNECTING WATERWAYS CONSTITUTE A GREAT NATURAL HIGHWAY WHICH NEITHER DEFENDANTS NOR ANY OTHER AGENCY HAS POWER TO IMPAIR BY APPROPRIATING OR ABSTRACTING WATER FROM THE GREAT LAKES WATERSHED AND DIVERTING IT INTO ANOTHER WATERSHED.

Citation of authorities in support of the above statement is unnecessary. Under the commerce clause of the Constitution, Congress has the power to regulate navigation over the Great Lakes as they constitute a highway used in interstate commerce.

The defendants assume that since Congress has the authority to regulate navigation over this marine highway that it must also have full and exclusive proprietary right therein any may, if it chooses, remove that highway or any portion thereof to some other locality. That Congress does not have that power seems to be clearly settled in Kansas vs. Colorado, 206 U. S., 46.

The Constitution of the United States does not in terms give to the Congress any authority over navigable highways other than the power to regulate navigation as found in the commerce clause and it cannot be presumed, against the interests of the States which granted the limited and enumerated powers of the Federal Government, that they surrender their own rights to the United States. This Honorable Court said in Kansas v. Colorado, supra,

> "It still is true that no independent and unmentioned power passes to the national government or can rightfully be exercised by the Congress."

This honorable Court held in Port of Seattle vs. Oregon and Washington Railroad Company, 255 U. S., 56, that the right of the United States in the navigable waters within the several states is limited to the control thereof for purposes of navigation; and subject to that right each state became, upon its organization as a state, the owner of the navigable waters within its boundary and of the land under the same.

II.

EVEN IF THE CONGRESS HAD THE POWER, WHICH WE DENY, TO AUTHORIZE THE ABSTRACTION OF ANY WATER FROM ONE NATURAL WATERSHED AND DIVERT IT TO ANOTHER, IT HAS NOT EXERCISED SUCH POWER.

The Rivers and Harbors Act which authorized the Secretary of War to pass upon obstructions to the navigable capacity of navigable waters did not by express terms or implication authorize the Secretary of War to abstract the waters from the Great Lakes watershed either for the purpose of building a new navigable highway in another part of the country or for the purpose of furnishing cheap sewage disposal facilities for a local interest or the development of hydro-electric power for a similar local interest. Had the Congress undertaken to exercise such power or to delegate the exercise of such power to an administrative officer, the act would have been unconstitutional.

We submit that the Congress in legislating as to obstructions to the navigable capacity of existing waterways under the powers granted to it by the commerce clause could hardly have intended to divest the various states bordering on the Great Lakes and the Dominion of Canada of their sovereign rights in such waters and to appropriate them to the national government and then transfer all of that vested power over navigable waterways, carrying over one-quarter of the waterborne commerce of the United States, to the administrative discretion of an administrative officer.

That the Secretary of War's authorization to construct any work in or about a navigable waterway is merely a *license* to do the work and not a grant of *power* to do it has been held in

Hubbard vs. Fort, 188 Fed. 987 (993)
Cobb vs. Lincoln Park Comrs., 202 Ill. 437, 67 M. E. 5, 63 L. R. A. 264.
Wilson vs. Hudson County Water Co., 76 N. J. Eq. 543, 76 Atl. 560.

This construction of the nature of the right conferred by the permit of the Secretary of War is supported by the note at the heading of the permit of March 3rd, 1925, which head-note is as follows:

> "Secretary of War Order
> Secretary of War's Decision on the Chicago Drainage Case.
>
> NOTE:—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining state assent to the work authorized. IT MERELY EXPRESSES THE ASSENT OF

THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See Cummings vs. Chicago, 188 U. S. 410)."

We submit that the requirement of the Secretary of War that State assent to the work be obtained has never been met by the defendant Sanitary District. So far as either the bill of complaint or the motion or brief of the defendants disclose the facts, no State has assented to the abstractions of water from the Great Lakes basin except the State of Illinois. The other Great Lakes States having proprietary interests in the water of the Great Lakes and the Dominion of Canada have not consented. The State of Illinois only contributes about 3% of the water flowing into the Great Lakes basin or about one thousand cubic second feet. While the defendant Sanitary District, with the assent of that one State, is taking and proposes to take at least ten times that amount of water without the consent of the other States and the foreign power interested.

Section 10 of the Rivers and Harbors Act of March 3, 1899, prohibits any obstruction to the navigable capacity of navigable waters of the United States unless *affirmatively* authorized by Congress. This Honorable Court in Sanitary District vs. United States, 266 U. S. 405, said: "As now applied it concerns a change in the condition of the lakes and the Chicago River, admitted to be navigable, and if that be necessary *an obstruction to their navigable capacity.*" (Italics added.) It consequently follows that the Secretary of War was without authority even under the terms of the statute to express the assent of the Federal Government in the permit issued. The permit was neither asked for nor issued until after the work had been commenced.

We submit that there is no permit in substance authorizing the defendant Sanitary District to abstract water from the Great Lakes. The permit in substance authorizes the abstraction of water only if it does not unreasonably interfere with navigation. If the abstraction does unreasonably interfere with navigation then the District has no permit. If the rule that the demurrer or motion to dismiss admits the facts in the bill is applied then interference with navigation being established by the pleadings, the permit of the Secretary of War becomes, by express limitation, a nullity. Since the brief of defendant State of Illinois admits the lowering of Lake levels by its appropriation of water from the Great Lakes, the permit appears to fail even without reference to the rule above referred to.

All of which is respectfully submitted.

ANDREW B. DOUGHERTY,
Attorney General of Michigan,
ARTHUR L. GILLIOM,
Attorney General of Indiana,
FRED C. GAUSE,
Of Counsel for the State of Indiana ,
Solicitors for Petitioners.

Appendix I.

House Concurrent Resolution No. 5.

A concurrent resolution protesting against the unlawful abstraction of the waters of Lake Michigan by the Sanitary District of Chicago, or any other person or agency.

Whereas, The State of Michigan has a full proprietary ownership in all the waters in the Great Lakes within the boundary lines of the State, and as such owner the State is entitled at all times to have an uninterrupted flow of all the waters coming naturally into the Great Lakes Basin, and is duty bound to protect and preserve the right of the State to these waters; and

Whereas, The Sanitary District of Chicago has been for a long time unlawfully abstracting large quantities of the waters of Lake Michigan and diverting these waters from the Great Lakes Basin into the Mississippi River Basin; and

Whereas, There are now pending in the Congress of the United States bills purporting to be measures for the improvement of commerce and navigation which would authorize on the part of the Federal Government a diversion of ten thousand cubic feet per second of water from Lake Michigan for the alleged improvement of the navigation of waters lying outside the Great Lakes Basin, but which said bills are in fact for the purpose of an attempted legalization of the abstraction of these waters by the Sanitary District of Chicago for its own use and benefit; and

Whereas, An abstraction and diversion of the waters of Lake Michigan does and will so injure the navigability of the Great Lakes and the connecting waters that it makes navigation of the many harbors in Michigan difficult and dangerous and the maintenance of these harbors more costly; seriously affects the immense fruit interests in the State and jeopardizes their development through chemical changes due to the diversion of the natural flow of these waters, retards the building up the Great Lakes navigation, both as to gross volume and the size and draft of the vessels employed; seriously affects privately owned docks, elevators, warehouses, railroad lines and many other constructions built to take and ship lake tonnage; and

Whereas, The Sanitary District of Chicago has petitioned the Secretary of War of the United States for a permit to authorize the said District to abstract ten thousand cubic feet per second of the waters of Lake Michigan, and the Secretary of War has set the date of February 20, 1925, as the time when he will, at his office at Washington, D. C., hear the said petition and the objections to be made to the granting of any such permit; therefore, be it

Resolved, By the House of Representatives of the State of Michigan, (The Senate concurring) That for and in behalf of the people of the State, we vigorously protest against and object to the continued unlawful diversion and abstraction of the waters of Lake Michigan by the Sanitary District of Chicago, and be it further

Resolved, That we oppose and object to any scheme or plan of improvement of the navigable waters of the United States at the expense of and to the detriment of the continued improvement and natural navigability of the Great Lakes; and be it further

Resolved, That we commend the Attorney General of this State for the very active and able service rendered the people in leading the opposition of the Lake Border States to any unlawful abstractions and diversions of these waters, and urge him to continue all necessary activities in protection of the States' rights in and to these waters; and be it further

Resolved, That a committee consisting of three State Representatives to be appointed by the Speaker of the

House of Representatives, and two State Senators to be appointed by the President of the Senate, be appointed and authorized and directed to proceed to Washington, D. C., together with the Attorney General of this State, and at the appointed time and place present, as such committee, to the Secretary of War, the protest and objection of the State of Michigan to the granting of any permit authorizing the abstraction or diversion of any of the waters of the Great Lakes, and especially as petitioned for by the Sanitary District of Chicago. The actual and necessary expenses of such committee shall be allowed and paid when accounts therefor have been certified to as correct by the Speaker of the House and the President of the Senate, and be it further

Resolved, That a copy of these resolutions, duly prepared by the Secretary of the Senate and certified to by the said Secretary and the Clerk of the House of Representatives be transmitted by the said Secretary of the Senate to the Honorable, The Secretary of War of the United States; to each of the Michigan members in Congress; to the Secretary of the Senate and the Secretary of the House of Representatives of Congress; and to the Attorney General of this State.

O.T. 1930 ORIGINAL NOS.6,10 & 11,

IN THE

SUPREME COURT OF THE UNITED STATES

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

Office Supreme Court, U. S.
FILED
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STATE OF WISCONSIN, STATE OF OHIO, STATE OF PENNSYLVANIA AND STATE OF MINNESOTA,

Complainants,

v.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,

Defendants.

STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,

Intervening Defendants.

Bill in Equity.
Original Jurisdiction.
N[illegible]
7

BRIEF ON BEHALF OF COMPLAINANTS IN OPPOSITION TO MOTION TO DISMISS

1

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Mayer Printing Company,
Madison, Wis.

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IN THE

SUPREME COURT OF THE UNITED STATES

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

STATE OF WISCONSIN, STATE OF OHIO, STATE OF PENNSYLVANIA AND STATE OF MINNESOTA,
Complainants,
v.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,
Intervening Defendants.

Bill in Equity.
Original Jurisdiction.
No. 16.

BRIEF IN OPPOSITION TO MOTION TO DISMISS THE AMENDED BILL OF COMPLAINT

STATEMENT OF FACTS

This case comes on for hearing on a motion by defendants to dismiss. This action was originally brought by the State of Wisconsin in 1922 against the State of Illinois and the Sanitary District of Chicago. In October, 1925, leave was granted by this court to file an amended complaint joining the states of Minnesota, Ohio and Pennsylvania as complainants. On January 4, 1926, the defendant State of Illinois filed its motion to dismiss and the defendant Sanitary District of Chicago filed its answer and motion to dismiss. On January 25, 1926, the States of Missouri, Tennessee, Kentucky and

Louisiana filed a motion to be admitted as intervening defendants and to dismiss.

The salient facts set up in the amended complaint and for present purposes admitted by the demurrer and motions to dismiss may be briefly summarized.

The complainants allege injuries to them in their proprietary capacities as *quasi*-sovereigns, and in their capacities as *parens patriae* of their people, resulting from unlawful acts of the defendant State of Illinois and defendant Sanitary District of Chicago.

These injuries consist of a long continued and permanent lowering of the levels of the Great Lakes and their connecting waters through the abstraction of the waters of Lake Michigan from the Great Lakes watershed and their permanent diversion through the Chicago, Des Plaines and Illinois rivers and the Sanitary Canal into the Mississippi watershed. This has obstructed the navigable capacity of the Great Lakes and connecting waters and caused large losses to these states and their people in reducing the carrying capacity of the large numbers of vessels navigating these waters and in damages done to their harbors, and in damages to the property rights of thousands of citizens of the complainant states and to the proprietary rights of the complainant states in the waters within their borders.

These injuries also consist of the excessive pollution of the navigable waters of the Chicago, Des Plaines and Illinois rivers and the Sanitary Canal, making navigation thereon dangerous to the health and lives of the people of the complainant states having the right to navigate said waters in carrying on a large commerce which is or could be served by such navigation.

The complainant states assert that neither the State of Illinois nor the United States could legally authorize any abstraction of the waters of the Great Lakes to be diverted into another watershed for any purpose, but bring this suit only to enjoin the defendants from so taking any water in excess of the amount needed for navigation without injury to the navigable capacity of the Great Lakes. The amount so needed is alleged not to exceed 500 cubic feet per second for the present navigation and not to exceed 1,000 cubic feet per second for any possible future navigation over the Sanitary Canal, the Chicago, Des Plaines and Illinois rivers.

I.

THE PRINCIPAL ALLEGATIONS OF THE AMENDED BILL OF COMPLAINT MAY BE SUMMARIZED AS FOLLOWS:

That the complainants are states of the United States of America. The various acts of Congress define their boundaries as extending to the center of the lakes, between such states.

That the complainant states have extensive shore lines along said lakes with numerous harbors and a large commerce amounting to many millions of tons annually for each of said states.

That the Sanitary District Canal through which the waters of Lake Michigan are abstracted was constructed solely for sewage disposal purposes, pursuant to the legislative acts of the State of Illinois, beginning with the year 1889, which acts have been so construed by the highest court of the State of Illinois.

That in 1903, the Illinois Legislature authorized the construction and operation by the Sanitary District of an electric power plant which has been operating since 1907, producing more than 20,000 H. P., and many million dollars of profits to the Sanitary District.

That an underestimate by engineers of the Sanitary District shows an abstraction of water from Lake Michigan increasing from 2,900 cubic feet per second in 1900 to 7,786 cubic feet per second in 1917, and that in fact in 1917, and since, more than 8,800 cubic feet per second have been so abstracted.

That the Great Lakes, excepting Lake Superior and connecting waters and the St. Lawrence River have been lowered not less than six inches by such abstraction of water by defendants, and that such lowering has reduced the possible loading of vessels thereon by at least six inches, and has reduced their cargo carrying capacity by many tons, with a resultant increase of freight costs to the people of complainant states and to the State of Wisconsin in its proprietary capacity. That the carriage of coal by such vessels constitutes the principal source of supply of coal for the State of Wisconsin and its people, that such lowering has lessened the utility of all of the ports of said lakes and connecting waters of said lakes, and that the total annual loss due to the lowered carrying capacity of lake vessels chargeable to the abstraction of such water amounts to many millions of dollars.

That navigation in the Chicago River has been made so difficult and dangerous by the swift current created by the abstraction of this water as to reduce the commerce handled in the Chicago harbor from between six and eight millions of tons of freight each year to less than one-third that amount, a large part of which commerce was between citizens of Wisconsin and citizens of Illinois.

That the State of Illinois asserts and seeks to bar the United States from control over said canal and to subordinate its use to sewage disposal and power purposes.

That for the purpose of present navigation over said canal and the Chicago, Des Plaines and Illinois Rivers, the diversion necessary does not exceed 500 cubic feet per second, and that the maximum amount of water so needed to be diverted for the greatest possible navigation upon said canal and river will never exceed 1,000 cubic feet per second.

That none of the permits issued by the various Secretaries of War are or ever have been of any force or effect to authorize a withdrawal of water from Lake Michigan in such quantities as to obstruct its navigability, and that the defendants have never been authorized by Congress to divert any water from Lake Michigan.

That the acts of the defendants have caused large pecuniary losses to the peoples of the complainant states and have violated the legal rights of the states themselves.

The situation out of which this controversy arises has been in the courts so long and has been so recently before this court that the facts are already quite familiar to the court. We do not agree with the defendants as to the statements of facts in their briefs nor that matters set out therein are matters of which this court will take judicial notice or which are material at this time. Without conceding anything on these points or considering any statement of facts necessary for this present purpose other than as set out in the amended complaint, we add for such use as the court may find convenient the following supplementary matters which are based upon governmental reports, official documents and other public records.

II.

THE HISTORY OF THE SANITARY CANAL CONCLUSIVELY ESTABLISHES THAT THE CANAL IS NOT NOW AND NEVER HAS BEEN A NAVIGATION PROJECT, BUT THAT IT IS NOW AND ALWAYS HAS BEEN SIMPLY A SANITATION AND POWER PROJECT FOR THE BENEFIT OF THE SANITARY DISTRICT OF CHICAGO.

Prior to the decision of this court in the *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 45 Sup. Ct. 176, 69 L. Ed. 352, there had never been any serious claim on the part of the defendants Sanitary District and State of Illinois that the Sanitary Canal was anything other than a sanitation and power project. When this court in the foregoing case decided that the defendant had no right to appropriate and abstract the waters of the Great Lakes-St. Lawrence System for local sanitation and power purposes, the defendant, the Sanitary District of Chicago and the State of Illinois, took the position in the instant case, that such canal was not a sanitation and power project but was a navigation enterprise. This changed position upon facts which were well known to such defendants at and prior to decision of the *Sanitary District* case has an important bearing upon the weight to be given the claims of the defendants in urging that proposition in a court of equity at this time.

The Sanitary Canal was opened in January of 1900. Separate Section 3, Constitution of Illinois 1870 and Starr and Curtis Statutes 1896, page 206, forbade the State of Illinois to loan its credit or make appropriations in aid of canals. The necessary effect of this constitutional provision was applied in *Burke* v. *Snively,* 208 Ill. 328, 348, 70 N. E. 327.

The defendant Sanitary District of Chicago was created by an Act of Illinois of May 29, 1889, entitled "An act to create sanitary districts, etc." In *Chicago* v. *Green,* 238 Ill. 258, 87 N. E. 417, the highest court of the State of Illinois in speaking of this act said:

> "The purpose of the act of 1889 was to furnish a common outlet for the sewage of the incorporated municipalities within the limits of the district."

In *People* v. *Nelson,* 133 Ill. 565, 27 N. E. 217, it was said:

> "A sanitary district is a municipal corporation organized to secure, preserve and promote the public health."

From these various acts, decisions and constitutional provisions it is apparent that the State of Illinois could act only through the medium of the defendant Sanitary District and that such district could build and operate a sanitary canal solely as a sanitation project and not as a canal for the purposes of navigation.

The true purposes of the Sanitary Canal are also shown in an official memorandum or report issued by the Trustees of the Sanitary District in December, 1923, which contains the following statement on page four:

> "The Sanitary Project was developed by the City of Chicago with the cooperation of the State Board of Health of Illinois and

> a joint committee of the Illinois General Assembly in the years 1885-1889. To study and report upon the problem Chicago created the Drainage and Water Supply Commission consisting of eminent Civil Engineers. Three methods of the solution of the problem of disposal of the sewage of the Chicago District were considered by the Commission: First, the discharge of sewage into Lake Michigan at one end of the City and the taking of water supply from the Lake at the other extreme end of the city; Second, the disposal of sewage on land by intermittent filtration over a vast sewage farm (as large as 15,000 acres); Third, the discharge of sewage into the Des Plaines River by means of a ship canal, and the resultant disposal by dilution. The third method, recommended by the Commission, was chosen as the basis of the Sanitary District Act.
>
> "Thereupon the Sanitary District of Chicago was created by act of the Illinois State Legislature May 29, 1889, and the validity of the act was affirmed by the State Supreme Court on June 12, 1890. Its purpose was to provide a Main Channel or outlet and necessary adjuncts to divert the sewage of Chicago and adjacent towns from Lake Michigan, thus protecting the municipal water supply from contamination by sewage. To dispose of sewage by dilution and provide an outlet into the Illinois River the act required that such channel should be made of such size and capacity as to provide a minimum dilution of 3.33 cubic feet per second for every 1,000 people."

While defendant Sanitary District and State of Illinois now attempt to argue that the principal object of the Act of Illinois of 1889 was to provide for the construction of a ship canal, the reason given by the Sanitary District in their requests to the War Department for permission to divert water from the Chicago River into the Des Plaines River were merely to aid in the disposition of the sewage of Chicago, and to prevent that sewage from entering Lake Michigan and polluting the water supply of Chicago. In 1911 the defendant Sanitary District applied to Secretary of War Stimson for permission to increase the withdrawal of water to ten thousand cubic second feet. In the opinion of Secretary Stimson containing his decision upon that application, he said:

> "The demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. There is involved in this case no issue of conflicting claims of navigation."

And again in that opinion Secretary Stimson says,

> "Having reached the conclusion that the proposed diversion of the waters of Lake Michigan would substantially injure the interests of navigation on the Great Lakes, which it is my legal duty to protect, it would clearly follow that the present application should be denied."

In 1907 the trustees of the defendant Sanitary District, after their application for a permit to reverse the current of the Calumet River had been denied, passed a resolution which reads in part as follows:

> "Whereas, heretofore, to-wit: on November 28, 1906, this board instructed its president to transmit to the Secretary of War an application for a permit to reverse the flow of said Calumet River and thereafter, to-wit: On March 14, 1907, the Secretary of War communicated to the board his refusal to issue such permit;
>
> "Whereas, this board is advised that it has the right and that is the duty under the laws of the State of Illinois to construct said channel, notwithstanding the refusal of the Secretary of War to issue a permit therefor, for the purpose of furnishing the proper sanitary method of disposing of the sewage of the territory and inhabitants contiguous to the said proposed channel and within the corporate limits of the Sanitary District of Chicago, and unless restrained by a court having jurisdiction of the subject matter at the instance of the United States Government."

The testimony of the engineering expert for the proponents of the Sanitary District before the Illinois Legislative Committee on April 7, 1887, shows that the main reason for adopting the dilution method instead of the purification method for the disposal of the sewage of Chicago was to save some expense. See pp. 1800-1820, Part 2, Rivers and Harbors Committee Hearing of April and May, 1924.

The foregoing documentary evidence conclusively establishes that the Sanitary Canal was not constructed for navigation purposes, but solely for the purpose of disposing of the sewage of the Sanitary District by dilution methods.

III.

A COMPARISON OF THE COMMERCE OF THE DES PLAINES AND ILLINOIS RIVERS WITH THE COMMERCE OF THE GREAT LAKES SYSTEM.

The commerce upon the Sanitary Canal, the Des Plaines River and the Illinois River is shown by the official publication of the U. S. Department of Commerce, 1923, Miscellaneous Series No. 119, entitled "Inland Water Transportation in the United States." From that report it appears that the total volume of freight on the Illinois River in 1921 was 157,536 tons. The volume of commerce on the Des Plaines River was much smaller. The volume of commerce on the Sanitary Canal was approximately 400,000 tons, consisting chiefly of the removal of rock and debris from along its banks by barges.

From page 67 of the same report it appears that in 1920 the total volume of freight carried on the Great Lakes was over one hundred and eleven million tons. The Statistical Report of the War Department for the year 1923 shows that of all the waterborne commerce into and out of and through the United States, approximately twenty-seven per cent was carried on the Great Lakes. From the government reports it appears that the freightage through the Soo Canal alone has reached a peak of ninety-two million tons and is nearly double that of the combined freightage of the Panama and Suez Canals in their twelve months' year against the lakes' eight months season. The Great Lakes perform a ton mile service equivalent to about twenty-five per cent of the tonnage of all the railroads of the United States, and carry bulky raw materials such as iron ore, stone, coal, and grain at a cost not exceeding one-fifth and sometimes as low as one-tenth of the cost of railway transportation.

The present small commerce upon the Des Plaines and upper Illinois Rivers cannot be substantially increased until the completion of the locks and improvements on these rivers, which, according to present plans, will not be for two or three years. The engineering reports hereinafter cited show that an abstraction of less than one thousand cubic second feet will suffice for the commerce of one hundred million tons per year, which is immensely greater than any probable commerce upon the Des Plaines and Illinois Rivers.

IV.

ONE THOUSAND CUBIC SECOND FEET IS THE GREATEST AMOUNT OF WATER WHICH WILL EVER BE REQUIRED FOR THE NEEDS OF NAVIGATION UPON THE SANITARY CANAL, DES PLAINES AND ILLINOIS RIVERS.

Defendants assert that the allegation in the bill of complaint that the present needs of navigation upon the Des Plaines and Illinois Rivers do not exceed five hundred cubic second feet of abstraction and will not with any development of which those waters are capable exceed one thousand cubic second feet, should not be accepted by this court as a fact, although admitted by their motion to dismiss. The only argument advanced in support of this contention is that the complaint does not disclose whether such quantity of water is needed for slack water navigation or free water navigation. For the purpose of this motion it must be considered as a verity that such an amount is sufficient for any type of navigation of which these waters are capable. However, as bearing upon the truth and the good faith of the contention, we will state the facts.

With respect to the Des Plaines and upper Illinois Rivers no contention for free water navigation can be made in good faith. From the end of the drainage canal at Lockport to the surface of the water at Utica there is a drop of about one hundred and thirty feet in a distance of sixty-six miles. As a physical fact, this drop demonstrates that no open river navigation is practical over this distance or even possible with any degree of safety. (In fact, the defendant State of Illinois is now constructing five locks averaging about twenty-six feet lift each to cover this section of the river.) At Lockport there is a fall of thirty-four feet. Obviously no possible quantity of water would render free navigation over such a drop possible. With reference to the lower Illinois from La Salle to its mouth at Grafton, there is a fall of only about thirty feet in two hundred and twenty-four miles. Upon that portion of the Illinois River open navigation is possible with very small water flow, as any desirable draft can be obtained in the boat channel by dredging without the addition of any water to the natural flow of the stream, and once secured will be practically permanent. Annual Report of the Chief of Engineers, 1868, House Executive Document No. 1, part 2, 40th Congress, 3d Session, p. 438. A further report August 30, 1878, provided for no diversion of waters, but specifically stated that "the slack-water system * * * has the advantage in every important feature." Annual Report, Chief of Engineers, 1879, House Executive Document, No. 81, 45th Congress, 3d Session, p. 8.

Since physical obstruction to the upper Illinois and Des Plaines Rivers demand locks under any system of improvement for navigation purposes, the only water needed from the Great Lakes System is a sufficient addition to the natural flow in the Des Plaines and Illinois Rivers to provide for efficient and proper operation of necessary locks. It is entirely feasible to provide any necessary capacity in the lower river by dredging. The expense of such dredging is nominal and when once incurred does not have to be incurred again. On the other hand, the *annual* damage to navigation on the Great Lakes by an excessive abstraction of waters probably equals or exceeds the total added cost to be incurred but once in the improvement of the Des Plaines and Illinois Rivers without abstraction in excess of 1,000 cubic second feet.

The five hundred to one thousand cubic second feet stated to be the maximum required for navigation, approximates that required for the Soo and Welland Canals, where the traffic is greatly in excess of what could reasonably be expected for the Des Plaines-Illinois waterway. On the other hand, a diversion of ten thousand cubic second feet creates a current of such an excessive velocity as to make navigation difficult and even dangerous. The attempt now being made by Chicago to establish permanent bridges over the Chicago River indicates that the people of the Sanitary District are not chiefly interested in providing for navigation either on the Sanitary Canal or along the Illinois and Des Plaines Rivers. The alternative Calumet-Sag Channel is at present of shallow depth and the only existing proposal to deepen this channel does not contemplate the deepening of this channel for a number of years. The Chicago Sanitary District can, by installing sewage disposal works, as has been done elsewhere, dispose of all danger of pollution of the lake by returning only a safe effluent from such disposal works.

The amount of water necessary for navigation purposes upon the Des Plaines-Illinois waterway was passed upon by the Special Board on the Waterway from Lockport, Illinois, to the mouth of the Illinois River. This board was made up of government engineers under the chairmanship of General W. H. Bixby, Chief of Engineers. The report, dated January 23, 1911, was published in the House of Representatives Document 762, 63d Congress Second Session, pages 101 to 107. We quote from pages 105, 106, 107 as follows:

> "The Board considers a bottom width of 160 feet in canal and 200 feet in the open river above the mouth of the Illinois River sufficient for a channel of eight or nine feet available depth. For safety and ease of navigation the channel should be extended to 11 feet in rock cuts and canals, and the locks should be given 11 feet depth, 80 feet width and 600 feet useful length. With these lock dimensions three barges carrying about 9,000 tons of freight may be locked through with their tow-boat. A waterway of these

> dimensions would have a capacity exceeding 100,000,000 tons per annum and would accommodate barge tows carrying about nine times the ordinary train-load of this vicinity. In addition the vessels using it would be capable of navigating the Ohio and Lower Mississippi Rivers. Such waterway will not require a diversion of more than 1,000 second feet from Lake Michigan, this amount would not injuriously lower lake levels nor cause excessive flooding of land in the Illinois Valley." (Page 105.)
>
> (Page 106.) "For purposes of navigation a diversion from Lake Michigan of less than 1,000 second feet of water is all that will be necessary." (Page 107.) "* * * The claim that more than 1,000 cubic feet per second is required for purposes of navigation cannot be maintained."

The statement that 1,000 cubic second feet is all that could ever be needed for navigation purposes in this waterway has often been reinterated. Thus Secretary Stimson in his decision of January 8, 1913, denying permission to abstract 10,000 cubic second feet said:

> "The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a *deep* waterway from the Great Lakes to the Mississippi over the route of the sanitary canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over ,000 feet per second, or less than a quarter of the amount already being used for sanitary purposes in the canal. This estimate is confirmed by the report of the special board of engineers on the deep waterway from Lockport, Ill., to the mouth of the Illinois River, dated January 23, 1911. It is also confirmed by the practical experience of the great Manchester Ship Canal in England. From the standpoint of navigation alone in such a waterway too great a diversion of water would be a distinct injury rather than a benefit. It would increase the velocity of the current and increase the danger of overflow and damage to adjacent lands."

Again, in the final report of the special board on the waterway from Lockport to the mouth of the Illinois River (House Document 762, 63d Congress, 2d Session, p. 14) dated December 16, 1913, it is said:

"But the Board reiterates that a diversion exceeding 1,000 second feet is not necessary for navigation purposes alone in the Illinois River, and that an added discharge will produce a slight and inadequate effect on the Mississippi River."

The report just quoted is the last official report of the War Department to Congress upon this subject, but General Taylor, the present Chief of Engineers, when called before a senate committee on January 20, 1925, and questioned as to the amount of diversion necessary for the navigation of a nine-foot channel down the Illinois River, referred to the various reports that we have quoted above, and said with reference to the original Bixby report:

> "It has been investigated a number of times, and I think the conclusions reached by that board have always been concurred in." (Vol. 2, p. 741, Hearings on the Nine-Foot Channel from the Great Lakes to the Gulf, Pursuant to Senate Resolution 411, 67th Congress, 4th Session.)

The abstractions of the defendant Sanitary District in excess of 1,000 cubic second feet have introduced a current into the Chicago River which has made it practically impossible for large boats to navigate that river, and has virtually driven all commerce from the river. This is clearly brought out by the defendants' own engineer, Isham Randolph, in testimony given before the House Rivers and Harbors Committee. (See last paragraph of Document No. 6 of that Committee, 59th Congress, 1st Session.) Thus it is apparent that not only is 1,000 cubic second feet all that will ever be needed for navigation purposes, but that the excessive amount now being diverted is an actual injury to navigation.

The recently completed locks and dams, and the locks and dams under construction and those contemplated for the Des Plaines and Illinois Rivers, answer conclusively any argument that there can be any free water navigation with the abstraction of any possible amount of water from Lake Michigan.

V.

THAT THE ABSTRACTION OF THE WATERS OF THE LAKES IN THE QUANTITY CLAIMED BY THE DEFENDANTS CONSTITUTES A SUBSTANTIAL AND UNREASONABLE OBSTRUCTION TO THE NAVIGABLE CAPACITY OF THE GREAT LAKES IS AN ESTABLISHED FACT.

The levels of the lakes have been lowered approximately six inches by the Chicago abstraction. *Chicago Sanitary District* v. *United States,* 266 U. S. 405, 45 Sup. Ct. 176, 69 L. Ed. 352. This has resulted in a reduction of the carrying capacity of the Great Lake freighters and in a loss in that connection amounting to at least three million dollars per year. House Committee Hearings of 1924, page 105; Hearings Rivers and Harbors Committee, House of Representatives, 69th Congress, First Session Jan. 30, 1926, page 11. It has resulted in damages to docks, piers, and other property, and has required additional expense in dredging. Both the federal government and the Canadian government have expended large sums to improve the navigation of the Great Lakes. The loss in load for big lake freight carriers has been from eighty to eighty-eight short tons per inch of draft, Record Volume 3, 1245, *Sanitary District of Chicago* v. *United States.* These losses have increased as the commerce has grown. The increased extent of the damage appears from the testimony in the River and Harbors Committee hearings, 68th Congress, first Session, on Illinois and Mississippi Rivers and diversion of water from Lake Michigan, Part 2, pp. 348, 376 and 392-431. See also Senate Special Committee in 1925 Report on Hearings on Nine Foot Channel from Great Lakes to the Gulf, 68th Congress, Second Session, pursuant to Senate Resolution 411, 67th Congress, Fourth Session, in volume 2, pages 134, 230.

Assuming that there is a lowering of the levels of the Great Lakes from natural causes or any causes in addition to the lowering caused by the abstraction of the defendant Sanitary District, that is no justification for its unlawful abstractions. If nature has caused a lowering of the levels of the lakes, then the abstraction of the defendant Sanitary District causing an additional lowering is so much the more serious.

The contribution to the lowering of the lakes by the deepening of the St. Clair River is practically nothing, as shown by the annual report of the Chief of Engineers for 1900. A contrary allegation appearing on page 92 of Answer of Sanitary District can only be based upon the Wisner Report of Oct. 12, 1911 to Board of Trustees of Sanitary District. Mr. Wisner in his report on the Deep Waterway on pages 280 and 297 stated that he had learned that the deepening of the St. Clair Channel had lowered Lake Huron about one foot, the basis of that report being the probability of such a lowering as stated in the report of the Chief of Engineers for 1899. However, Colonel Leydecker, in charge of the United States Lake Survey, stated in the annual report of the Chief of Engineers for 1900 that he much regretted that this incorrect statement had appeared in his previous year's report, and that a long and thorough investigation during the intervening year, of which the results were published on pages 5320 to 5401 of the Annual Report of the Chief of Engineers for 1900, showed conclusively that the lowering of Lake Huron could not have been produced by any changes in the St. Clair and Detroit Rivers.

However, it needs no argument to show that a lowering of the lake level by six inches constitutes an unreasonable and substantial obstruction to navigation.

VI.

THERE IS A WELL DEFINED DIVIDE BETWEEN THE GREAT LAKES AND MISSISSIPPI WATERSHEDS.

Some attempt has been made by the defendants to imply that there is not and never has been any well defined divide between the

Mississippi and Great Lakes watersheds and that the waters of the Great Lakes System at times run into and mingled with the waters of the Mississippi system. There is a well defined divide of at least eight feet in height between the two watersheds. For legal purposes, it can make no difference whether the divide is eight feet or eight thousand feet in height. General Wilson, in the Annual Report of Chief of Engineers of 1868, at page 440, says:

> "About thirteen miles southwest of the mouth of the Chicago River is a depression of a mile or more in width * * * through which a part of the waters of the Des Plaines River in times of flood flow into the lake."

General Wilson goes on to state that the surface of Lake Michigan is between eight and fourteen feet below the summit of this depression. Lake Michigan has never been known to rise to such a height. Consequently it is clear that in a state of nature all of the waters of the Chicago and Calumet Rivers always flowed into Lake Michigan, that the waters flowing into this depression in times of flood were a part of the Upper Des Plaines River waters flowing out of the Illinois or Mississippi basin into the Great Lakes basin, and that none of the waters of the Chicago River ever flowed into the Mississippi basin.

VII.

THE COMPLAINT AND FACTS PRESENT NOT ONLY THE ABSTRACTION BY AN UPPER RIPARIAN STATE OF ALL OF THE WATERS OF AN INTERSTATE WATERCOURSE ORIGINATING WITHIN ITS OWN BORDERS BUT THE CASE OF A STATE, BY REVERSING THE FLOW OF THAT PART OF THE WATERCOURSE WITHIN ITS BORDERS, THROUGH THE AGENCY OF NATURAL LAWS, ABSTRACTING WATERS OF SUCH WATERCOURSE WHICH ORIGINATED IN LOWER RIPARIAN STATES AND PERMANENTLY DIVERTING THEM FROM THE WATERSHED.

The defendant is claiming the right to abstract and appropriate the waters of the Chicago and Calumet plus eighty-five hundred cubic second feet from Lake Michigan, plus the domestic pumpage from Lake Michigan, which amounts to an additional 1,200 cubic second feet and which, instead of being returned to the lake, is diverted into the Sanitary Canal. (See Report of Major Putnam, Appendix I, to this brief.) Illinois has less than seven per cent of the total area of the lake, and it contributes hardly three per cent of the total rainfall in the Lake Michigan basin or of the outflow of water from Lake Michigan and Lake Huron. Report of Major Putnam, November 1, 1923, page 66, as distributed by the Secretary of War. Prior reports have estimated the low water flow of the Chicago River at from six hundred to eight hundred cubic second feet. The flow of the Des Plaines is little larger. There are no other streams of appreciable size flowing into the lake in Illinois.

It is obvious that the State of Illinois and the Chicago Sanitary District are asserting the right not only to appropriate all of the waters of an interstate watercourse originating within the borders of the State of Illinois, but through the agency of natural laws to appropriate and abstract the waters of that watercourse originating in the lower riparian states.

VIII.

THE IMMINENT NATIONAL CONCERN WHICH ATTACHED AND ATTACHES TO THE CHICAGO ABSTRACTION ARISES FROM THE LOWERING OF THE LEVELS OF THE GREAT LAKES AND NOT FROM THE INTERESTS OF CHICAGO AND ILLINOIS IN OBTAINING THESE WATERS FOR SANITATION OR POWER PURPOSES.

It is obvious that the matter of national concern in connection with this abstraction is the interference by a state with the natural levels of the Great Lakes-St. Lawrence Waterways. *Sanitary District of Chicago* v. *United States*, 266 U. S. 405, 46 Sup. Ct. 176, 69 L. Ed. 352. The United States generally has no interest in the sanitation needs, real or imaginary, or the power desires of Chicago or Illinois, so long as they do not interfere with the rights of others. The defendants attempt to give their acts the status of an imminent national concern because their acts through the operation of natural laws affect a wholly different matter which was and is an object of such national concern.

IX.

THE VARIOUS PERMITS GRANTED BY DIFFERENT SECRETARIES OF WAR WERE NOT IN AID OF NAVIGATION.

A casual reading of the applications for various permits requested by the Sanitary District of Chicago, the decisions of the various secretaries of war, and the various permits actually issued discloses conclusively that such permits were not only not granted in aid of navigation but were reluctantly given in any degree because of the fact that they were injurious to navigation. In the letter of Secretary of War Weeks to the President of the Board of Trustees of the Sanitary District of Chicago accompanying the permit under which the defendants now claim, and bearing date March 3, 1925, it is said:

> "This department has always held and continues to hold that the taking of an excess amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost dispatch." See Appendix I to this brief.

In the recommendation of General Taylor, Chief of Engineers, upon which the permit of March 3, 1925 is based, he states in commenting upon one of the conditions attached to that permit as follows:

> "And the proposed construction is the first stage in a programme which will permit the ultimate reduction of the water diverted to 4,167 cubic feet per second or lower if treatment plants are installed."

Again, General Taylor states in his recommendation as follows:

> "It is, of course, highly desirable that the excessive diversion of water from Lake Michigan be reduced to reasonable limits with the utmost dispatch. *For humanitarian reasons,* it is impractical to make the desired reductions instantaneously * * *."

In the Warren report of August 30, 1919 as concurred in November 9, 1920 by the Chief of Engineers in the Annual Report of the Chief of Engineers for 1920, at page 95, it is said:

> "If conditions could be restored to those existing in 1890, and the city of Chicago should ask permission to divert water for use in such a sewage disposal system as they now have, the request would and should be refused. It would undoubtedly appear that the benefits to be obtained would not be commensurate with the damage which would be caused. If the question were to be de-

cided solely on the basis of the most economical use of the waters of the Great Lakes the solution would involve restriction of the division to the amount required for purposes of navigation, and adoption of other methods of sewage disposal."

From all the documents relating to the various permits issued by the Secretary of War for different diversions by the defendants and particularly the present permit of March 3, 1925, it is obvious that such permits were not in aid of navigation but were given merely as a *modus vivendi* of handling a situation in which the defendant Sanitary District had wilfully placed the people of Chicago.

X.

THE EARLY ACTS OF CONGRESS WERE FOR A SUMMIT LEVEL CANAL.

The acts of Congress of 1822 and 1827 provided merely for a summit level canal, which of course did not contemplate or authorize any abstractions from Lake Michigan. Moreover, these acts had no relation to the present canal. The Boundary Waters Treaty of 1909 had and has no connection with the Sanitary Canal.

Claim is made that the Boundary Waters Treaty authorizes the Sanitary Canal abstraction. At the time this treaty was made the federal government was maintaining suit to enjoin the illegal acts of the defendant Sanitary District. *Chicago Sanitary District* v. *United States,* 266 U. S. 405, 46 Sup. Ct. 176, 69 L. Ed. 352. Defendants refer to preliminary reports which were not embodied in the treaty. The only diversions which were considered as the treaty was actually made were with reference to power developments already in existence or under completion around Niagra Falls. The figures show that the computations were based upon the capacities of these plants without reference to the Chicago abstraction. International Waterway Commission Public Reports 1905, 1906, 1907. Moreover only legal diversions could be recognized.

Under a construction of the facts most favorable to the defendant's contention no diversion in excess of 4,167 cubic second feet could have been authorized. The federal government has given a practical construction to the treaty to the effect that it did not authorize the claimed right of abstraction of these waters by the defendant Sanitary District. This is conclusively shown by the fact that the federal government successfully maintained a suit to prevent such abstraction as is now claimed as a matter of right under the treaty. *Sanitary District of Chicago* v. *United States*, 266 U. S. 405, 46 Sup. Ct. 176, 69 L. Ed. 352.

XI.

NATIONAL ECONOMIC LOSS IN POWER DEVELOPMENT.

It appears from the testimony in *Sanitary District Chicago* v. *United States*, 266 U. S. 405, 46 Sup. Ct. 176, 69 L. Ed. 352, that the diversion of ten thousand cubic second feet of water at Chicago is capable of producing about thirty thousand horsepower of electric energy at Lockport, although the average production has been about twenty thousand horse-power. The greatest possible development of power from this source, from Lake Michigan to the Mississippi River, will not exceed eighty thousand horsepower. As against this, engineers have computed that this ten thousand cubic second feet of water, if permitted to flow through its natural channels down the Niagara River and into the St. Lawrence would produce not less than five hundred thousand horsepower of electric energy. The mere statement of these facts is sufficient to disclose the immense economic loss caused by the Chicago abstraction to the people of the United States and Canada, in the way of development of electric power.

POINTS AND AUTHORITIES.

I.

THE COMPLAINT PRESENTS A JUSTICIABLE CONTROVERSY WITHIN THE ORIGINAL JURISTION OF THIS COURT.

Constitution of the United States, Article III, Section 2.

Missouri v. *Illinois,* 180 U. S. 208, 241, 21 Sup. Ct. 331, 45 L. Ed. 497.

Georgia v. *Tennessee Copper Co.,* 206 U. S. 230, 237, 27 Sup. Ct. 618, 51 L. Ed. 1038.

North Dakota v. *Minnesota,* 263 U. S. 365, 373, 44 Sup. Ct. 138, 68 L. Ed. 342.

Kansas v. *Colorado,* 206 U. S. 46, 97-98, 27 Sup. Ct. 655, 51 L. Ed. 956.

Kansas v. *Colorado,* 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838.

Pennsylvania v. *Wheeling Bridge Co.,* 13 How. 518, 14 L. Ed. 249.

Wyoming v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 999.

Missouri v. *Illinois,* 200 U. S. 496, 26 Sup. Ct. 268, 50 L. Ed. 572.

So. Carolinia v. *Georgia,* 93 U. S., 4, 23 L. Ed. 782.

New York v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937.

Pennsylvania v. *West Virginia,* 262 U. S. 553, 591, 43 Sup. Ct. 658, 67 L. Ed. 1117.

Wisconsin v. *Duluth,* 96 U. S. 379, 24 L. Ed. 668.

Wisconsin v. *Pelican Insurance Co.,* 127 U. S. 265, 8 Sup. Ct. 1370, 32 L. Ed. 239.

Oklahoma v. *A. T. & S. F. Co.,* 220 U. S. 277, 31 Sup. Ct. 434, 55 L. Ed. 465.

New Hampshire v. *Lousiana,* 108 U. S. 76, 2 Sup. Ct. 176, 27 L. Ed. 656.

Hans v. *Louisiana,* 134 U. S. 1, 10 Sup. Ct. 504, 33 L. Ed. 842.

Louisiana v. *Texas,* 176 U. S. 1, 20 Sup. Ct. 251, 44 L. Ed. 347.

II.

THE COMPLAINING STATES HAVE SUBSTANTIAL LEGAL INTERESTS WITH CORRESPONDING INJURIES INVOLVED IN THIS CONTROVERSY WHICH ENTITLE THEM TO MAINTAIN THIS SUIT.

1. The complaining states have a proprietary interest in the waters of the Great Lakes and connecting waters within their respective borders, which they have the right and duty to protect.

Martin v. *Waddell,* 16 Peters 367, 410, 10 L. Ed. 997.

Port of Seattle v. *Oregon & Washington Rwy. Co.,* 255 U. S. 56, 41 Sup. Ct. 237, 65 L. Ed. 500.

Barney v. *Keokuk,* 94 U. S. 324, 338, 24 L. Ed. 224.

Kansas v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956.

McCready v. *Virginia,* 94 U. S. 391, 394, 24 L. Ed. 248.

Shively v. *Bowlby,* 152 U. S. 1, 14 Sup. Ct. 548, 38 L. Ed. 331.

Pollard v. *Hagan,* 3 How. 212, 11 L. Ed. 565.

Manchester v. *Mass.,* 139 U. S. 240, 11 Sup. Ct. 559, 35 L. Ed. 159.

Ill. Cent. Rwy. Co. v. *Illinois,* 146 U. S. 387, 13 Sup. Ct. 110, 36 L. Ed. 1018.

Hudson County Water Co. v. *McCarter,* 209 U. S. 349, 28 Sup. Ct. 529, 52 L. Ed. 828.

Hoge v. *Eaton,* 135 Fed. 411, 414.

Farnham on Waters, (1904) Vol. 1, pp. 29, 602.

Holyoke Water Power Co. v. *Conn. River Co.,* 20 Fed. 71.

Pine v. *New York,* 112 Fed. 98.

U. S. v. *Rio Grande Dam & Irrig. Co.,* 174 U. S. 690, 19 Sup. Ct. 770, 43 L. Ed. 1136.

Moore, History of The Foreshore (3d ed.) (1888), 370-413.

Hargrave's Law Tracts (1787) pp. 11-12, 25-36.

Hall, The Seashore, (2d ed.) (1875) pp. 1-9.

Hale, De Partibus Maris, 84-89.

Hardin v. *Jordan,* 140 U. S. 371, 11 Sup. Ct. 808, 35 L. Ed. 159.

Mumford v. *Wardwell,* 6 Wall. 423, 18 L. Ed. 756.

St. Anthony Falls Water Power Co. v. *Commissioners,* 168 U. S. 349, 18 Sup. Ct. 157, 42 L. Ed. 497.

Mobile Transp. Co. v. *Mobile,* 187 U. S. 479, 23 Sup. Ct. 179, 47 L. Ed. 266.

Gibson v. *U. S.,* 166 U. S. 269, 17 Sup. Ct. 578, 41 L. Ed. 996.

Georgia v. *Tennessee Copper Company,* 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038.

Kansas v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 342.

Wyoming v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 999.

New York v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937.

Missouri v. *Illinois,* 180 U. S. 208, 21 Sup. Ct. 331, 45 L. Ed. 497.

Pennsylvania v. *West Virginia,* note in 43 Sup. Ct. 658, 669.

2. The actions of the State of Illinois and its agents, of which the bill complains, constitute an injury to the complaining states in their quasi-sovereign capacity, wholly distinct from the injuries to their citizens; and they are entitled to maintain this suit in this court to vindicate quasi-sovereign rights.

Georgia v. *Tennessee Copper Company,* 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038.

Hudson Water Company v. *McCarter,* 209 U. S. 349, 355, 357, 28 Sup. Ct. 529, 52 L. Ed. 828.

North Dakota v. *Minnesota,* 263 U. S. 365, 44 Sup. Ct. 138, 139, 68 L. Ed. 342.

Pennsylvania v. *West Virginia,* 262 U. S. 553, 592, 43 Sup. Ct. 658, 67 L. Ed. 1117.

New York v. *New Jersey,* 256 U. S. 296, 494, 41 Sup. Ct. 492, 65 L. Ed. 937.

North Dakota v. *Minnesota,* 263 U. S. 365, 374, 44 Sup. Ct. 138, 68 L. Ed. 342.

Missouri v. *Illinois,* 180 U. S. 208, 21 Sup. Ct. 331, 45 L. Ed. 497.

Kansas v. *Colorado,* 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838.

Wyoming v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 999.

Pennsylvania v. *Wheeling & B. Bridge Co.,* 9 How. 647, 13 L. Ed. 294, 11 How. 528, 13 L. Ed. 799, 13 How. 518, 14 L. Ed. 249, 18 How. 421, 15 L. Ed. 435.

South Carolina v. *Georgia,* 93 U. S. 4, 23 L. Ed. 782.

3. The complaining states have a right to maintain this suit in their private capacities as owners of public works and public property.

Pennsylvania v. *Wheeling Bridge Co.,* 13 How. 518, 14 L. Ed. 249.

Pennsylvania v. *West Virginia,* 262 U. S. 553, 43 Sup. Ct. 658, 67 L. Ed. 1117.

Kansas v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956.

Georgia v. *Tennessee Copper Co.,* 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038.

4. The complaining states have a standing to maintain this suit as parens patriae to protect their people.

Missouri v. *Illinois,* 180 U. S. 208, 21 Sup. Ct. 331, 45 L. Ed. 497.

North Dakota v. *Minnesota,* 263 U. S. 365, 375-376, 44 Sup. Ct. 138, 68 L. Ed. 342.

New York v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937.

Pennsylvania v. *West Virginia,* 262 U. S. 553, 43 Sup. Ct. 658, 67 L. Ed. 1117.

Kansas v. *Colorado,* 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838.

5. While a state may not maintain an action solely to vindicate the freedom of commerce in the role of a mere volunteer, where the action of another state violating the freedom of commerce inflicts special injury on the state in its proprietary or quasi-sovereign capacity, or as parens patriae of its people, it can maintain an action to enjoin such act, not as an academic vindication of the freedom of commerce but as a redress of it injuries in the capacities stated.

Louisiana v. *Texas,* 176 U. S. 1, 20 Sup. Ct. 251, 44 L. Ed. 347.

Western Union Telegraph Company v. *Attorney General of Massachusetts,* 125 U. S. 530, 8 Sup. Ct. 961, 31 L. Ed. 790.

Williams v. *Talladega,* 226 U. S. 404, 415, 416, 33 Sup. Ct. 116, 57 L. Ed. 275.

Pennsylvania v. *West Virginia,* 262 U. S. 553, 591, 43 Sup. Ct. 658, 67 L. Ed. 1117.

Pennsylvania v. *Wheeling Bridge Company,* 13 How. 518, 578, 14 L. Ed. 249.

Missouri v. *Illinois,* 200 U. S 496, 26 Sup. Ct. 268, 50 L. Ed. 572.

6. The bill does not ask the court to regulate navigation or to supervise long continuing acts.

United States v. *Rio Grande Dam & Irrigation Company,* 174 U. S. 706, 19 Sup. Ct. 770, 43 L. Ed. 1136.

III.

THE UNITED STATES AND SISTER STATES ARE NOT INDISPENSABLE PARTIES.

State of California v. *Southern Pacific Company,* 157 U. S. 229, 249, 15 Sup. Ct. 591, 39 L. Ed. 683.

Shields v. *Barrow,* 17 How. 130, 139, 15 L. Ed. 158.

Kansas v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956.

New York v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937.

Wyoming v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 999.

Kawananakoa v. *Poly Blank,* 205 U. S. 349, 27 Sup. Ct. 526, 51 L. Ed. 834.

Kansas v. *United States,* 204 U. S. 331, 341, 27 Sup. Ct. 388, 57 L. Ed. 510.

Mechanics Bank v. *Seton,* 1 Pet. 229, 306, 7 L. Ed. 152.

Osborn v. *United States Bank,* 9 Wheat. 738, 6 L. Ed. 204.

Sanitary District of Chicago v. *United States,* 266 U. S. 405, 431, 45 Sup. Ct. 176, 69 L. Ed. 352.

IV.

THE BILL OF COMPLAINT IS NOT MULTIFARIOUS

Heckman et al. v. *United States,* 224 U. S. 413, 448, 32 Sup. Ct. 424, 56 L. Ed. 820.

Risley v. *Utica,* 173 Federal 502.

Virginia-Carclina Chemical Co. v. *Home Insurance Co.,* 113 Fed. 1.

V.

THE STATE OF ILLINOIS WAS AND IS WITHOUT POWER TO APPROPRIATE AND ABSTRACT THE WATERS OF THE GREAT LAKES AND CONNECTING WATERS IN DEFIANCE OF RIGHTS OF THE COMPLAINING STATES.

1. The common law of waters has been generally adopted in the United States and obtains in the defendant and complaining states.

United States v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690, 702, 19 Sup. Ct. 770, 774, 43 L. Ed. 1136.

Kimberly & Clark Co. v. *Hewitt,* 79 Wis. 334, 337, 44 N. W. 303.

Priewe v. *Wisconsin State Land and Improvement Co.,* 93 Wis. 534, 67 N. W. 918.

Cedar Lake Hotel Co. v. *Cedar Lake Hydraulic Co.,* 79 Wis. 297, 48 N. W. 371.

Williams v. *Bass,* 179 Wis. 364, 191 N. W. 499.

Evans v. *Merriweather,* 4 Ill. (3 Scam.) 492, 38 Am. Decisions 106.

Barrett v. *Mt. Greenwood Cemetery Association,* 159 Ill. 385, 42 N. E. 891.

Village of Dwight v. *Hayes,* 150 Ill. 237, 37 N. E. 218.

Plumleigh v. *Dawson,* 6 Ill. (1 Gilman) 544.

Dayton v. *Commissioners,* 128 Ill. 271, 21 N. E. 198.

Bliss v. *Kennedy,* 43 Ill. 67.

Minnesota Loan & Trust Co. v. *St. Anthony Falls Water Power Co.,* 82 Minn. 505, 85 N. W. 520, 523.

Miller v. *Miller,* 9 Pa. 74, 49 American Decisions 545.

Clark v. *Pennsylvania R. R. Co.,* 145 Pa. St. 438, 77 Atl. 989.

Columbus and H. Coal & Iron Co. v. *Tucker,* 48 Ohio St. 41, 57, 26 N. E. 630.

Mansfield v. *Balliett,* 65 Ohio St. 451, 63 N. E. 86, 58 L. R. A. 628, 633.

Canton v. *Schock,* 66 Ohio St. 19, 63 N. E. 600.

Burke v. *Simonson,* 104 Ind. 173, 2 N. E. 309.

Stock v. *Jefferson,* 114 Mich. 357, 72 N. W. 132.

Amsterdam Knitting Co. v. *Dean,* 43 N. Y. St. 21, affirmed 56 N. E. 757, 162 N. Y. 278.

Strobel v. *Kerr Salt Co.,* 164 N. Y. 303, 58 N. E. 142.

Rossmiller v. *State,* 114 Wis. 169, 186, 89 N. W. 839.

Illinois Steel Co. v. *Bilot,* 109 Wis. 418, 425, 426, 84 N. W. 855.

Pewaukee v. *Savoy,* 103 Wis. 271, 274, 79 N. W. 436.

2. As proprietors of the waters of the Great Lakes within their borders, the complaining states have a right to the natural flow of

the waters in such watershed and to all the waters coming naturally to them, to the end that the waters of the Great Lakes shall be preserved in their navigable capacity and at their natural level and condition for all uses and purposes.

Hudson County Water Co. v. *McCarter,* 209 U. S. 349, 356, 28 Sup. Ct. 529, 52 L. Ed. 828.

McCarter v. *The Hudson Water Co.,* 70 N. J. Equity 695, 718-719.

Farnham on Waters (1904) Vol. 1, p. 29.

Hoge v. *Eaton,* 135 Fed. 411, 414.

Holyoke Water Power Co. v. *Connecticut River Co.,* 52 Conn. 570, 22 Blatchf. 131, 20 Fed. 71.

Pine v. *New York,* 50 C. C. A. 145, 112 Fed. 98.

Kansas v. *Colo.,* 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838.

U. S. v. *Rio Grande,* 174 U. S. 690, 19 Sup. Ct. 770, 43 L. Ed. 1136.

3. An upper state through which flows or on which borders an interstate stream or watercourse, cannot appropriate the waters thereof in defiance of the rights of a lower state; such appropriation will be enjoined by the court; and in determining the fair use of such interstate waters, the upper state cannot complain if its rights are measured by its own law of waters. Applying that rule, as the most favorable to Illinois which she could possibly demand, her asserted right to abstract the waters of the Great Lakes fails.

Kansas v. *Colo.,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956.

Wyoming v. *Colorado,* 259 U. S. 419, 466, 42 Sup. Ct. 552, 66 L. Ed. 660.

Hudson County Water Company v. *McCarter,* 209 U. S. 349, 356, 28 Sup. Ct. 529, 52 L. Ed. 828.

Pine v. *New York,* 185 U. S. 93, 22 Sup. Ct. 592, 46 L. Ed. 820.

Economy Light and Pr. Co. v. *U. S.,* 256 U. S. 113, 41 Sup. Ct. 409, 65 L. Ed. 847.

Farnham on Waters, Vol. 1, page 59.

Hyde on International Law (1922) Vol. 1, pp. 315-316.

Holyoke Water Power Co. v. *Conn. River Co.,* 20 Fed. 71.

4. Since a state has no power to abstract all of the waters of an interstate watercourse in defiance of lower riparian states, clearly Illinois has no right to not only abstract all of the waters of such a watercourse within its own boundaries, but by reversing the flow of that part of the watercourse within its borders, to abstract waters of such watercourse which originate in lower riparian states and permanently divert them from the watershed.

Kansas v. *Colorado,* 206 U. S. 117, 27 Sup. Ct. 655, 46 L. Ed. 838.

Wyoming v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 660.

Pine v. *New York,* 185 U. S. 93, 22 Sup. Ct. 519, 46 L. Ed. 820.

Hudson County Water Co. v. *McCarter,* 209 U. S. 349, 28 Sup. Ct. 529, 52 L. Ed. 828.

Holyoke Water Power Co. v. *Connecticut River Co.,* 20 Fed. 71.

5. The various acts of the Illinois Legislature purporting to authorize the Sanitary District of Chicago to abstract waters from Lake Michigan were unconstitutional and void.

These acts assumed to control and appropriate the waters of a national and international waterway.

Moore v. *American Transportation Co.,* 24 Howard 1, 16 L. Ed. 674.

The Propeller Genesee Chief, 12 Howard 443, 13 L. Ed. 1058.

U. S. v. *Chandler-Dunbar Water Power Co.,* 229 U. S. 53, 33 Sup. Ct. 667, 57 L. Ed. 1063.

Sanitary District of Chicago v. *United States,* 266 U. S. 405, 426, 45 Sup. Ct. 176, 69 L. Ed. 352.

Burke v. *Snively,* 208 Ill. 328, 70 N. E. 327.

Separate Section 3, Constitution of Illinois, 1870.

Ordinance of 1787.

Economy L. & Power Co. v. *U. S.,* 256 U. S. 113, 41 Sup. Ct. 409, 65 L. Ed. 847.

VI.

IT IS NOT CONSIDERED THAT CONGRESS HAS POWER TO AUTHORIZE THE ABSTRACTION OF THE WATERS OF THE GREAT LAKES FROM THAT WATERSHED AS A FEDERAL ACT, FOR ANY PURPOSE. COMPLAINANTS, HOWEVER, IN THIS ACTION, DO NOT NOW ASK AN INJUNCTION AGAINST ANY ABSTRACTION REASONABLY NECESSARY FOR NAVIGATION PURPOSES WHICH WILL NOT BE IN EXCESS OF 500 CUBIC SECOND FEET AT PRESENT, OR EVER IN EXCESS OF 1,000 CUBIC SECOND FEET—THE ATTITUDE OF THE COMPLAINING STATES BEING EXPLAINED BY LEGISLATIVE RESOLUTIONS APPEARING AS APPENDICES TO THIS BRIEF.

1. The constitutional power over navigable waters construed in the light of history and the common law, does not extend to the abstraction of the waters of one watershed for the benefit of another.

Kansas v. *Colorado,* 206 U. S. 46, 94-95, 27 Sup. Ct. 655, 51 L. Ed. 956.

Odgers, Common Law of England, Vol. I, pp. 590-594.

2. In any event, the acts of Congress for improvement of navigation must be reasonably appropriate to that end. The acts of Congress in control and improvement of navigation under the commerce clause of the federal constitution must be reasonably appropriate to the ends of navigation and not arbitrary or capricious or for any other purpose, such as the sanitation needs, real or imaginary, or the power desires of another state or city. It cannot, under the guise of the power to regulate interstate Commerce, arbitrarily destroy the rights of riparian owners or the proprietary rights of littoral states without any object not really related to navigation.

Woodruff v. *North Bloomfield Gravel Mining Co.,* 18 Fed. 753, 778, 779.

Barney v. *Keokuk,* 94 U. S. 324, 342, 24 L. Ed. 224.

Burlington Gas Light Co. v. *Burlington, etc. Rwy. Co.,* 165 U. S. 370, 17 Sup. Ct. 359, 41 L. Ed. 749.

Muhlker v. *N. Y. & Harlem R. R. Co.,* 197 U. S. 544, 25 Sup. Ct. 522, 49 L. Ed. 872.

Sauer v. *City of New York,* 206 U. S. 536, 27 Sup. Ct. 686, 51 L. Ed. 1176.

3. If Congress can appropriate these waters in any amount, it can do so only for the promotion of navigation, and then only to the extent reasonably necessary therefor; and the court will enjoin abstractions admittedly in excess thereof.

Kansas v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956.

New York v. *New Jersey,* 265 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937.

U. S. v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690, 19 Sup. Ct. 770, 43 L. Ed. 1136.

4. If such an appropriation of the waters of one or more of the states, to their injury, were otherwise valid, the act would still violate Article I, Section 9, Clause 6 of the federal constitution.

Art. I, Sec. 9, Clause 6, U. S. Constitution.

Pennsylvania v. *Wheeling Bridge Co.,* 18 How. 421, 15 L. Ed. 435.

So. Carolina v. *Georgia,* 93 U. S. 4, 13, 23 L. Ed. 782.

VII.

ASSUMING THAT CONGRESS COULD AUTHORIZE SUCH AN ABSTRACTION OF THE WATERS OF THE GREAT LAKES AS TO IMPAIR THEIR NAVIGABLE CAPACITY, IT HAS NEVER DONE SO.

1. The Act of Congress of March 2, 1827, does not authorize the abstraction of the waters of the lakes.

4 U. S. Stats. at L. 234.

The Sanitary District of Chicago v. *U. S.*, 266 U. S. 405, 45 Sup. Ct. 176, 69 L. Ed. 352.

2. The permit of the Secretary of War issued March 3, 1925, does not purport to authorize any abstraction of the waters of the Great Lakes which would injure their navigable capacity.

Louisville Bridge Co. v. *U. S.*, 242 U. S. 409, 37 Sup. Ct. 158, 61 L. Ed. 395.

U. S. v. *Chandler-Dunbar Water Power Co.*, 229 U. S. 53, 33 Sup. Ct. 667, 57 L. Ed. 1063.

3. The Rivers and Harbors Act does not empower the Secretary of War to authorize any obstruction of the navigable waters of the United States; and to the extent that the permit of the Secretary of War is claimed to authorize obstruction of the waters of the Great Lakes in excess of the amount needed for navigation, it would be clearly unauthorized by said act.

Section 10 of the Rivers and Harbors Act of March 3, 1899 (30 Stats. at L. 1151).

Hubbard v. *Fort*, 188 Fed. 987, 992, 993, 996-997, 998-999.

Sanitary District of Chicago v. *United States*, 266 U. S. 405, 431, 69 L. Ed. 352.

VIII.

IF THE RIVERS AND HARBORS ACT ATTEMPTS TO AUTHORIZE ABSTRACTION OF WATERS OF THE GREAT LAKES WITHOUT REGARD TO THE INJURY TO THEIR NAVIGABLE CAPACITY AND NOT TO PROMOTE NAVIGATION, BUT FOR THE SANITATION AND POWER DESIRES OF ILLINOIS, IT IS UNCONSTITUTIONAL AND VOID.

Kansas v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956.

Woodruff v. *North Bloomfield Gravel Mining Co.,* 18 Fed. 753, 778.

Sanitary District of Chicago v. *United States,* 226 U. S. 405, 431, 45 Sup. Ct. 176, 69 L. Ed. 352.

United States v. *River Rouge Improvement Co.,* 46 Sup. Ct. 144, 70 L. Ed. 148.

Illinois Central Rwy. Co. v. *Illinois,* 146 U. S. 387, 13 Sup. Ct. 110, 36 L. Ed. 1018.

Port of Seattle v. *Oregon Rwy. Co.,* 255 U. S. 56, 41 Sup Ct. 237, 65 L. Ed. 500.

Alabama v. *Gulf Power Co.,* 283 Fed. 606.

New Jersey v. *Sargent,* 46 Sup. Ct. 122, 70 L. Ed. 177 (Advance Sheets).

Art. I. Sec. 9, Clause 6, U. S. Constitution.

IX.

ASSUMING THE PERMITS OF THE SECRETARIES OF WAR TO BE VALID PURSUANT TO CONGRESSIONAL AUTHORITY FOR THE ABSTRACTION OF THESE WATERS SO FAR AS RELATES TO THE OBSTRUCTION OF NAVIGABLE CAPACITY (WHICH WE DO NOT CONCEDE), THESE PERMITS ARE NO DEFENSE TO THIS BILL.

30 U. S. Stats. at L. 1121.

United States v. *Chandler-Dunbar Water Power Co.,* 229 U. S. 53, 33 Sup. Ct. 667, 57 L. Ed. 1063.

Hubbard v. *Fort*, 188 Fed. 987, 999.

Cobb v. *Commissioners of Lincoln Park*, 202 Ill. 427, 439-440, 67 N.E. 5.

Wilson v. *Hudson County Water Co.*, 76 N. J. Eq. 543, 558, 76 Atl. 560.

Attorney General ex rel. Becker v. *Bay Boom W. R. & F. Co.*, 172 Wis. 363, 376, 178 N.W. 569.

Thlinket Packing Co. v. *Harrison Co.*, 5 Alaska 471.

Columbia Salmon Co. v. *Berg*, 5 Alaska 538.

New York v. *New Jersey*, 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937.

International Bridge Co. v. *New York*, 254 U. S. 126, 132, 41 Sup. Ct. 56, 65 L. Ed. 176.

X.

THE DOCTRINE, THAT IN MATTERS WHERE THE NATIONAL CONCERN IS IMMINENT AND DIRECT, THE STATES MAY NOT ACT AT ALL, EVEN WHEN CONGRESS HAS BEEN SILENT, IS NO DEFENSE TO THIS BILL.

Sanitary District of Chicago v. *United States*, 266 U. S. 405, 426, 45 Sup. Ct. 176, 69 L. Ed. 352.

Kansas City So. R. R. Co. v. *Kaw Valley Drainage District Co.*, 233 U. S. 75, 79, 34 Sup. Ct. 564, 58 L. Ed. 857.

XI.

THE BOUNDARY WATERS TREATY OF 1909 IS NO AUTHORITY FOR THE ACT OF THE DEFENDANTS: ON THE CONTRARY, IT FORBIDS THE ACT

Sanitary District of Chicago v. *United States*, 266 U. S. 405, 45 Sup. Ct. 176, 69 L. Ed. 352.

XII.

THE COMPLAINANTS ARE NOT ESTOPPED BY THE FORMER PLEADING

N. Pacific R. R. Co. v. *Slaght,* 205 U. S. 122, 27 Sup. Ct. 442, 51 L. Ed. 738.

Strathleven Steamship Co. v. *Baulch,* 244 Fed. 412.
21 C. J. 1234.

XIII.

OTHER TECHNICAL OBJECTIONS TO THIS BILL ARE WITHOUT MERIT

Supreme Sitting O. of I. H. v. *Baker,* 134 Ind. 293, 33 N.E. 1128, 20 L. R. A. 210.

Norfold, etc. R. Co. v. *Sutherland,* 105 Va. 545, 55 S. E. 456.
31 Cyc. 463.

Turner v. *Roundtree,* 30 Ala. 706.

Briscoe v. *Bank of Kentucky,* 11 Peters, 257, 9 L. Ed. 709.

Kansas v. *Colorado,* 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838.

Virginia v. *West Virginia,* 220 U. S. 1, 31 Sup. Ct. 330, 55 L. Ed. 353, 357.

ARGUMENT

I.

THE COMPLAINT PRESENTS A JUSTICIABLE CONTROVERSY WITHIN THE ORIGINAL JURISDICTION OF THIS COURT.

The pertinent provision of the constitution is Section 2 of Article III of the Constitution of the United States, which, so far as being material, reads as follows:

> "The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, * * * to Controversies between two or more states;—between a State and Citizens of another State; * * *.
>
> "In all Cases * * * in which a State shall be Party, the supreme Court shall have original Jurisdiction. In all the other Cases before mentioned, the supreme Court shall have appellate Jurisdiction, both as to Law and Fact, with such Exceptions, and under such Regulations as the Congress shall make."

This court has laid down the rule generally with respect to original jurisdiction of actions between states of the Union that wherever a controversy between states is of such a nature that, if the states were independent, the controversy would become the subject of diplomatic representations with the right to resort to force in the event of a failure of diplomatic representations, the case is one which is justicable in this court in its original jurisdiction. The original jurisdiction of this court in such matters was intended to take the place of the right of one state of the Union to vindicate its wrongs at the hands of another state by negotiation and force, which rights were surrendered by the states upon the adoption of the federal constitution.

In *Missouri* v. *Illinois,* 180 U. S. 208, 241, 21 Sup. Ct. 331, 45 L. Ed. 497, this court said:

> "An inspection of the bill discloses that the nature of the injury complained of is such that an adequate remedy can only be found

in this court at the suit of the state of Missouri. It is true that no question of boundary is involved, nor of direct property rights belonging to the complainant state. But it must surely be conceded that, if the health and comfort of the inhabitants of a state are threatened, the state is the proper party to represent and defend them. If Missouri were an independent and sovereign state, all must admit that she could seek a remedy by negotiation, and, that failing, by force. Diplomatic powers and the right to make war having been surrendered to the general government, it was to be expected that upon the latter would be devolved the duty of providing a remedy and that remedy, we think, is found in the constitutional provisions we are considering.

"The allegations of the bill plainly present such a case. The health and comfort of the large communities inhabiting those parts of the state situated on the Mississippi River are not alone concerned, but contagious and typhoidal diseases introduced in the river communities may spread themselves throughout the territory of the state. Moreover, substantial impairment of the health and prosperity of the towns and cities of the state situated on the Mississippi River, including its commercial metropolis, would injuriously affect the entire state.

"That suits brought by individuals, each for personal injuries, threatened or received, would be wholly inadequate and disproportionate remedies, requires no argument."

In *Georgia* v. *Tennessee Copper Co.*, 206 U. S. 230, 237, 27 Sup. Ct. 618, 51 L. Ed. 1038, this court said:

"When the states by their union made the forcible abatement of outside nuisances impossible to each, they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the ground of their still remaining quasi-sovereign interests; and the alternative to force is a suit in this court."

In *North Dakota* v. *Minnesota*, 263 U. S. 365, 373, 44 Sup. Ct. 138, 68 L. Ed. 342, this court in discussing its orginal jurisdiction in controversies between states of the Union, said:

"The jurisdiction is therefore limited generally to disputes which, between states entirely independent, might be properly the subject of diplomatic adjustment. They must be suits 'by a state for an injury to it in its capacity of quasi-sovereign. In that capacity the state has an interest independent of and behind the titles of its citizens, in all the earth and air of its domain.' "

In *Kansas* v. *Colorado,* 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838, this court passed upon a demurrer to the complainant charging the state of Colorado with appropriation of waters of an interstate river in violation of the rights of the state of Kansas and its citizens and praying for injunctive relief against such appropriation of waters of the interstate water course. In discussing the justicable character of that suit at page 140, the court said:

> "Undoubtedly as remarked by Mr. Justice Bradley in *Hans* v. *Louisiana,* 134 U. S. 1, 15, the Constitution made some things justicable, 'which were not known as such at the common law; such, for example, as controversies between states as to boundary lines, and other questions admitting of judicial solution.' And as the remedies resorted to by independent states for the determination of controversies raised by collision between them were withdrawn from the states by the Constitution, a wide range of matters, susceptible of adjustment, and not purely political in their nature, was made justicable by that instrument."

Again at page 145 it was said:

> "Without subjecting the bill to minute criticism, we think its averments sufficient to present the question as to the power of one state of the Union to wholly deprive another of the benefit of water from a river rising in the former and, by nature, flowing into and through the latter, and that, therefore, this court, speaking broadly, has jurisdiction.
>
> "We do not pause to consider the scope of the relief which it might be possible to accord on such a bill. Doubtless the specific prayers of this bill are in many respects open to objection, but there is a prayer for general relief, and under that, such appropriate decree as the facts might be found to justify, could be entered, if consistent with the case made by the bill, and not inconsistent with the specific prayers in whole or in part, if that

were also essential. *Tayloe* v. *Merchants' Insurance Company*, 9 How. 390, 406; Daniell, Ch. Pr. (4th Am. ed.) 380."

The court then took the broad ground that the technicalities of the pleading which obtained in ordinary suits between private parties had no relation to controversies, practically international in character, stripped the controversy of all technicalities, brushed aside all defects in the bill and found that since there was a robust controversy between two states, the court would sit as an international tribunal and hear the controversy without even attempting a close analysis of the bill to discover whether or not it contained imperfections or inadequacies of statement.

At page 146, it was said:

> "Sitting, as it were, as an international, as well as a domestic tribunal, we apply Federal law, state law, and international law, as the exigencies of the particular case may demand, and we are unwilling, in this case, to proceed on the mere technical admissions made by the demurrer. *Nor do we regard it as necessary, whatever imperfections a close analysis of the pending bill may disclose, to compel its amendment at this stage of the litigation.* We think proof should be made as to the * * * circumstances, a variation in which might induce the court to either grant, modify, or deny the relief sought or any part thereof."

The complaint relates to the equitable use of interstate waters lying partly in the complaining states and partly in the defendant State of Illinois. It relates to the alleged right of the State of Illinois to appropriate and abstract the waters of an interstate stream or watercourse to the injury of the complaining states, which are lower riparian states upon such interstate stream or watercourse. It requires no argument to demonstrate that such a claim of right upon the part of the State of Illinois and action on the part of that state in pursuance of such an asserted right to the injury of the various interests of the complaining states in the waters of the interstate stream or watercourse constituting the Great Lakes-St. Lawrence System creates a controversy between the complaining states and the

State of Illinois, which, if such states were independent, would give rise to diplomatic negotiation between such states with the right to resort to force in the event of the failure of amicable adjustment.

In *Kansas* v. *Colorado,* 206 U. S. 46, 97-98, 27 Sup. Ct. 655, 51 L. Ed. 956, this court said:

> "One cardinal rule, underlying all the relations of the states to each other, is that of equality of right. Each state stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none. Yet, whenever, as in the case of Missouri v. Illinois, supra, the action of one state reaches, through the agency of natural laws, into the territory of another state, the question of the extent and the limitations of the rights of the two states becomes a matter of justiciable dispute between them, and this court is called upon to settle that dispute in such a way as will recognize the equal rights of both and at the same time establish justice between them."

In this connection we also invite the attention of the court to the following cases:

> *Pennsylvania* v. *Wheeling Bridge Co.,* 13 How. 518, 14 L. Ed. 249;
> *Wyoming* v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 999;
> *Missouri* v. *Illinois,* 200 U. S. 496, 26 Sup. Ct. 268, 50 L. Ed. 572;
> *So. Carolina* v. *Georgia,* 93 U. S. 4, 23 L. Ed. 782;
> *New York* v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937;
> *Pennsylvania* v. *West Virginia,* 262 U. S. 553, 591, 43 Sup. Ct. 658, 67 L. Ed. 1117.

In all of these cases the right of a state to maintain an original suit in this court upon the grounds like or similar to those asserted by the complainants in this case was sustained by this court. With this statement of the general principles upon which this court has assumed jurisdiction of controversies between states, we proceed to the question whether there are rights asserted by the complaining states with corresponding injuries which entitle them to maintain this suit as real parties in interest, rather than in the role of volunteers.

However, before passing from this general question of the scope of the jurisdiction of this court in original suits to which states are parties, we wish to notice briefly the cases relied upon by the defendants as establishing that the court is without jurisdiction of this controversy. The cases which are relied upon by the defendants in this connection are as follows:

Wisconsin v. *Duluth,* 96 U. S. 379, 24 L. Ed. 668;
Wisconsin v. *Pelican Insurance Co.,* 127 U. S. 265, 8 Sup. Ct. 1370, 32 L. Ed. 239;
Oklahoma v. *A. T. & S. F. Co.,* 220 U. S. 277, 31 Sup. Ct. 434, 55 L. Ed. 465;
New Hampshire v. *Louisiana,* 108 U. S. 76, 2 Sup. Ct. 176, 27 L. Ed. 656;
Hans v. *Louisiana,* 134 U. S. 1, 10 Sup. Ct. 504, 33 L. Ed. 842;
Lousiana v. *Texas,* 176 U. S. 1, 20 Sup. Ct. 251, 44 L. Ed. 347.

The claim that these cases are authority for the denial of jurisdiction in this suit or even that they have any pertinent relation to the maintenance of the suit is perhaps best answered in the language of this court. In *Pennsylvania* v. *West Virginia,* 262 U. S. 553, 592, 43 Sup. Ct. 658, 67 L. Ed. 1117, this court in respect to a similar subject, said:

> "The defendant State relies on such cases as *New Hampshire* v. *Louisiana,* 108 U. S. 76; *Louisiana* v. *Texas,* 176 U. S. 1; *Kansas* v. *United States,* 204 U. S. 331; *Oklahoma* v. *Atchison, Topeka & Santa Fe Rwy. Co.,* 220 U. S. 277, and *Texas* v. *Interstate Commerce Commission,* 258 U. S. 158, 162, but the facts on which they turned, as the opinions show, were so widely different from those here that they are not in point."

Nevertheless, we will briefly comment on the cases as follows:

In *Wisconsin* v. *Duluth,* 96 U. S. 379, 24 L. Ed. 668, this court assumed jurisdiction, but denied relief because the bill was without equity.

In *Wisconsin* v. *Pelican Insurance Co.,* 127 U. S. 265, 8 Sup. Ct. 1370, 32 L. Ed. 239, this court assumed jurisdiction but denied relief upon the merits because it was an attempt to enforce extraterritorially the penal laws of the plaintiff state. The same situation exists in *Oklahoma* v. *A. T. & S. F. Co.,* 220 U. S. 277, 31 Sup. Ct. 434, 55 L. Ed. 465. That such was the effect of the decisions in those cases has been heretofore stated by this court. *Kansas* v. *Colorado,* 206 U. S. 46, 83, 27 Sup. Ct. 655, 51 L. Ed. 956. The cases of *New Hampshire* v. *Lousiana, supra,* and *Hans* v. *Lousiana, supra,* were cases which on the facts amounted to suits by private individuals against one of the states of the Union in contravention of the 11th Amendment to the Constitution of the United States, forbidding the institution of a suit by any private person against another state of the Union. The decision in *Louisiana* v. *Texas,* 176 U. S. 1, 20 Sup. Ct. 251, 44 L. Ed. 347, was clearly explained and its lack of application to a suit such a this definitely stated in the opinion of the court in *Kansas* v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956. However, it is a sufficient commentary upon the alleged application of the decision of that case to the instant suit, to state that under the construction of the pleadings and facts adopted by this court, Lousiana was attempting to maintain a suit merely as a volunteer for the vindication of the freedom of interstate commerce. It requires no argument to demonstrate that upon such a state of facts the complaining state would present no interest in the suit which would entitle it to maintain the same without any regard to the nature of the controversy, since this court will not sit for the purpose of determining a question which, as to the complainant, is merely academic, involving no right of such complainant.

II.

THE COMPLAINING STATES HAVE SUBSTANTIAL LEGAL INTERESTS WITH CORRESPONDING INJURIES INVOLVED IN THIS CONTROVERSY WHICH ENTITLE THEM TO MAINTAIN THIS SUIT.

1. *The complaining states have a proprietary interest in the waters of the Great Lakes and connecting waters within their respective borders, which they have the right and duty to protect.*

It is a well established principle of law that the states in their quasi-sovereign capacities are the owners of all the public waters and the submerged lands within their respective borders. The original states possessed these proprietary rights at the time of the adoption of the federal constitution and their rights were not surrendered to the federal government but were retained in full vigor and effect, subject only to the paramount right of congress to regulate the navigable waters for the promotion of navigation and interstate commerce. All subsequent states of the Union upon admission to statehood acquired the same rights in the waters and submerged lands within their domains as existed, and still exist in the original states of the Union.

In touching upon this right in the case of *Martin* v. *Waddell,* 16 Peters 367, 410, 10 L. Ed. 997, the court said:

> "* * *When the Revolution took place, the people of each state became themselves sovereign; and in that character held the absolute right to all their navigable waters, and the soils under them for their own common use, subject only to the rights since surrendered by the Constitution to the general government."

In the case of *Port of Seattle* v. *Oregon & Washington Rwy. Co.,* 255 U. S. 56, 41 Sup. Ct. 237, 65 L. Ed. 500, this court in discussing the proprietary rights of a state in the waters and submerged lands within its borders, said:

> "The right of the United States in the navigable waters within the several states is limited to the control thereof for purposes of navigation. Subject to that right, Washington became, upon its organization as a state, the owner of the navigable waters within its boundaries and of the land under the same. (*Weber* v. *Board of Harbor Com.*, 18 Wall. 57, 21 L. Ed. 798.) By section one of article 17 of its Constitution, the state asserted its ownership in the bed and shore 'up to and including the line of ordinary high tide in waters where the tide ebbs and flows.' The extent of the state's ownership of the land is more accurately defined by the decision of the highest court, as being the land below high-water mark, or the meander line, whichever of these lines is the lower. The character of the state's ownership in the land and in the waters is the full proprietary right. The state, being the absolute owner of the tide lands and of the waters over them, is free in conveying tide lands either to grant with them rights in the adjoining water area or to completely withhold all such rights."

Again, in *Barney* v. *Keokuk*, 94 U. S. 324, 338, 24 L. Ed. 224, this court said:

> "And since this court, in the case of *The Genesee Chief* v. *Fitzhugh* [12 How. 443, 13 L. Ed. 1058], has declared that the Great Lakes and other navigable waters of the country, above as well as below the flow of the tide are, in the strictest sense, entitled to the denomination of navigable waters, and amenable to the admiralty jurisdiction, there seems to be no sound reason for adhering to the old rule as to the proprietorship of the beds and shores of such waters. It properly belongs to the states by their inherent sovereignity, and the United States has wisely abstained from extending (if it could extend) its survey and grants beyond the limits of high water."

This citation was quoted with approval by this court in *Kansas* v. *Colorado*, 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956.

Again, in *McCready* v. *Virginia*, 94 U. S. 391, 394, 24 L. Ed. 248, this court said:

"The principle has long been settled in this court, that each

State owns the beds of all tide-waters within its jurisdiction, unless they have been granted away. *Pollard's Lessee* v. *Hagan,* 3 How. 212; *Smith* v. *Maryland,* 18 How. 74; *Mumford* v. *Wardwell,* 6 Wall. 436; *Weber* v. *Harbor Commissioners,* 18 Wall. 66. In like manner, the States own the tide-waters themselves, and the fish in them, so far as they are capable of ownership while running. For this purpose the State represents its people, and the ownership is that of the people in their united sovereignty. *Martin* v. *Waddell,* 16 Pet. 410. The title thus held is subject to the paramount right of navigation, the regulation of which, in respect to foreign and inter-state commerce, has been granted to the United States."

In that case it was further stated that any states upon admission to the Union acquired the same rights in the navigable waters and submerged lands as were and are held by the original states.

In *Snively* v. *Bowlby,* 152 U. S. 1, 14 Sup. Ct. 548, 38 L. Ed. 331, the court quoted *Martin* v. *Waddell, supra,* with approval to the effect that when the revolution took place, the people of each state became themselves sovereign, and in that connection held their absolute right to all navigable waters and the soils under them for their common use, subject only to the rights subsequently surrendered by the Constitution to the general government. The court further pointed out that by common law both the title and the dominion of the sea and of the rivers and arms thereof, where the tides ebbed and flowed, and all lands below the high water mark within the jurisdiction of the Crown of England, were in the King; that upon the American Revolution, all the rights of the Crown and Parliament in such waters and submerged lands vested in the several states. That such rights in the waters and submerged lands are not limited to tidal waters, but extend to all navigable waters of the United States, is pointed out in the opinion of this court in *Barney* v. *Keokuk, supra.*

Other cases and texts which establish and define the proprietary rights of the states of the Union in their quasi-sovereign capacities in the public waters thereof, and the submerged lands within their domains, are as follows:

Pollard v. *Hagan,* 3 How. 212, 11 L. Ed. 565;
Manchester v. *Mass.,* 139 U. S. 240, 11 Sup. Ct. 559, 35 L. Ed. 159;
Ill. Cent. Rwy. Co. v. *Illinois,* 146 U. S. 387, 13 Sup. Ct. 110, 36 L. Ed. 1018;
Hudson County Water Co. v. McCarter, 209 U. S. 349, 28 Sup. Ct. 529, 52 L. Ed. 828;
Hoge v. *Eaton,* 135 Fed. 411, 414;
Farnham on Waters, (1904) Vol. 1, pp. 29, 602;
Holyoke Water Power Co. v. *Conn. River Co.,* 20 Fed. 71;
Pine v. *New York,* 112 Fed. 98;
U. S. v. *Rio Grande Dam & Irrig. Co.,* 174 U. S. 690, 19 Sup. Ct. 770, 43 L. Ed. 1136;
Moore, History of the Foreshore (3d ed.) (1888), 370-413;
Hargrave's Law Tracts, (1787), pp. 11-12, 25-36;
Hall, The Seashore, (2d ed.) (1875) pp. 1-9;
Hale, De Partibus Maris, 84-89;
Hardin v. *Jordan,* 140 U. S. 371, 11 Sup. Ct. 808, 35 L. Ed. 159;
Mumford v. *Wardwell,* 6 Wall. 423, 18 L. Ed. 756;
St. Anthony Falls Water Power Co. v. *Commissioners,* 168 U. S. 349, 18 Sup. Ct. 157, 42 L. Ed. 497;
Mobile Transp. Co. v. *Mobile,* 187 U. S. 479, 23 Sup. Ct. 179, 47 L. Ed. 266;
Gibson v. *U. S.,* 166 U. S. 269, 17 Sup. Ct. 578, 41 L. Ed. 996.

Since these complaining states under the authorities hereinbefore cited have the full proprietary right in the navigable waters within their boundaries and the lands under the same, it would seem to require no citation of authority to demonstrate that they have a standing in this court to protect those right as against any other state which may attempt to appropriate such waters, in which they have the full proprietary interest, to their injury and in violation of their proprietary rights. However, there is abundant authority to sustain that right. That right stands upon an equal plane with the right to protect the forests of a state or any other great gift of nature within its borders. It stands on a parity with the right to protect air over its domains. In fact, it would seem to rise to a dignity higher than that of the right to protect its forests, since the title to the forests is in private citizens, whereas the title to the waters is in the states themselves. In *Georgia* v. *Tennessee Copper Company,* 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038, the court held that the state of Georgia had a right to maintain an original suit in this court to protect its forests from destruction without regard to their economic value, and without regard to the fact that such forests were held in private ownership. In *Kansas* v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956, Kansas asserted its right to protect an interstate river because of its ownership of the bed of the same. The right to maintain the suit was sustained, as we understand it, on this as well as additional grounds. That a state may vindicate its rights in interstate waters as against the appropriation thereof, or pollution thereof by another state or agency thereof, has also been recognized by this court in *Wyoming* v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 999, *New York* v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937, *Missouri* v. *Illinois,* 180 U. S. 208, 21 Sup. Ct. 331, 45 L. Ed. 497.

The allegations of the bill disclose that a large part of this interstate stream or watercourse, together with connecting waters thereof, which is generally known and described as the Great Lakes-St. Lawrence Waterway, lies within the borders of the complaining states. If such allegations did not appear from the face of the bill, this court would take judicial notice thereof, since the court will necessarily take judicial notice of the extent of the boundaries of a state of the Union. From such judicial notice this court would know that the borders of the complaining states extend to the center of such of the Great Lakes as border upon the respective complaining states and include within their boundaries many of the connecting waters thereof. The bill further discloses not only that the action of the State of Illinois, of which complaint is made, is interference with the natural flow of the waters of an interstate watercourse within the borders of the offending state, but also that the act of which complaint is made, by reversing the natural flow of a portion of that course, attempts to reach into the borders of the complaining states through the operation of natural laws and abstract from those states waters of an interstate stream or watercourse, which originated in such complaining states or some of them, and which were never within the boundaries of Illinois, except through the agency of the act of which complaint is made. That the abstraction and taking of waters of the complaining states in which they hold the full proprietary right constitutes an injury to those states, would follow without any express allegation to that effect.

Thus, in *Georgia* v. *Tennessee Copper Co.*, 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038, the court said:

> "The state has a property interest in water naturally flowing into it and in the public waters and air within its boundaries."

And in a note to *Pennsylvania* v. *West Virginia*, 43 Sup. Ct. 658, 669:

> "If running water is withheld, its property is taken. If the public water or air is polluted, its territorial integrity is invaded."

However, the bill aptly states injury to the states and to large numbers of their citizens.

2. *The actions of the State of Illinois and its agents, of which the bill complains, constitute an injury to the complaining states in their quasi-sovereign capacity, wholly distinct from the injuries to their citizens; and they are entitled to maintain this suit in this court to vindicate quasi-sovereign rights.*

While the states of the Union have surrendered some of their sovereign rights to the federal government they still retain in their capacities of quasi-sovereign, many rights which they are entitled to maintain and vindicate. In *Georgia* v. *Tennessee Copper Company,* 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038, where the State of Georgia instituted an original suit in this court to enjoin the discharge of noxious fumes over the territory of that state, this court disregarded any proprietary interest which Georgia might have in minute tracts of forest lands within its borders, but laid down the principle that in its capacity of quasi-sovereign it had a right to protect its forests from destruction, and the air over its domain from pollution. In this connection the court said:

> "This is a suit by a state for an injury to it in its capacity of quasi-sovereign. In that capacity the state has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air. It might have to pay individuals before it could utter that word, but with it remains the final power. The alleged damage to the state as a private owner is merely a makeweight, and we may lay on one side the dispute as to whether the destruction of forests has led to the gullying of its roads."

In that case the court further pointed out that no proof of special damage was requisite to the successful maintenance of the suit; that the injury to a state by the invasion of its quasi-sovereign rights was not susceptible of being compensated in money, and that the right to balance equities as against an invasion of such sovereign right does not exist. In this case the court said:

"Some peculiarities necessarily mark a suit of this kind. If the

> state has a case at all, it is somewhat more certainly entitled to specific relief than a private party may be. It is not lightly to be required to give up quasi-sovereign rights for pay; and, apart from the difficulty of valuing such rights in money, if that be its choice it may insist that an infraction of them shall be stopped. The states, by entering the Union, did not sink to the position of private owners, subject to one system of private law. This court has not quite the same freedom to balance the harm that will be done by an injunction against that of which the plaintiff complains, that it would have in deciding between two subjects of a single political power."

The court further pointed out that it was immaterial whether the action of Georgia would do more harm than good to her citizens, as that was a matter for a state alone to determine.

In *Hudson Water Company* v. *McCarter*, 209 U. S. 349, 355, 28 Sup. Ct. 529, 52 L. Ed. 828, this court said:

> "It sometimes is difficult to fix boundary lines between the private right of property and the police power when, as in the case at bar, we know of few decisions that are very much in point. But it is recognized that the State as quasi-sovereign and representative of the interests of the public has a standing in court to protect the atmosphere, the water and the forests within its territory, irrespective of the assent or dissent of the private owners of the land most immediately concerned. *Kansas* v. *Colorado*, 185 U. S. 125, 141; s.c., 206 U. S. 46, 99; *Georgia* v. *Tennessee Copper Co.*, 206 U. S. 230, 238."

In *North Dakota* v. *Minnesota*, 263 U. S. 365, 373, 44 Sup. Ct. 138, 68 L. Ed. 342, this right was reaffirmed by this court.

The foregoing cases proceed upon the principle that a state in its quasi-sovereign capacity has the right to protect the forests, the air over its domain, and the public waters. An injury to any of these great gifts of nature constitutes an injury to the state in its quasi-sovereign capacity, which is not susceptible of being compensated in money, and as to which its decision with respect to the maintenance of its natural resources unimpaired by outside interference is conclusive, and which quasi-sovereign rights it may vindicate without assigning any reason therefor. As stated in *Hudson Water Company* v. *McCarter,* 209 U. S. 349, 357, 28 Sup. Ct. 529, 52 L. Ed. 828:

> "It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one a reason for its will."

The complaint, however, discloses another injury to the complaining states in their quasi-sovereign capacities which entitles them to maintain this suit. It appears affirmatively from the bill of complaint that the alleged wrongful act of the State of Illinois and its agents has lowered the waters of the Great Lakes to the extent of at least six inches. From this fact it necessarily follows that there has been great damage to the rights of riparian owners of these lands who are citizens of the complaining states. It further appears from the allegations of the bill that this lowering of the levels of the Great Lakes within the borders of these states and also connecting waters within the borders of these states has caused great damage to thousands of the citizens of the complaining states in their attempts to navigate these waters. It has been often held by this court that injury to the welfare, prosperity, and property of a large number of the citizens of a state constitutes an injury to such state in its quasi-sovereign capacity wholly distinct from injuries to its citizens and entitles the state to maintain an original action in this court against an offending state.

In *Pennsylvania* v. *West Virginia,* 262 U. S. 553, 592, 43 Sup. Ct. 658, 67 L. Ed. 1117, in considering the right of a state to maintain an action where a substantial portion of its population has been affected, the court said:

> "Their health, comfort and welfare are seriously jeopardized by the threatened withdrawal of the gas from the interstate stream. This is a matter of grave public concern in which the State, as the representative of the public, has an interest affected. It is not merely a remote or ethical interest apart from that of the individuals but one which is immediate and recognized by law."

Again, in *New York* v. *New Jersey*, 256 U. S. 296, 494, 41 Sup. Ct. 492, 65 L. Ed. 937, the court said:

> "The health, comfort and prosperity of the people of the state and the value of their property being gravely menaced, as it is averred that they are by the proposed action of the defendants, the state is the proper party to represent and defend such rights by resort to the remedy of an original suit in this court under the provisions of the Constitution of the United States. *Missouri* v. *Illinois*, 180 U. S. 208, 241, 243, 21 Sup. Ct. 331, 45 L. Ed. 497; *Georgia* v. *Tennessee Copper Co.*, 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038, 11 Ann. Cas. 488."

Again, in *North Dakota* v. *Minnesota*, 263 U. S. 365, 374, 44 Sup. Ct. 138, 68 L. Ed. 342, this court said:

> "It needs no argument, in the light of these authorities to reach the conclusion that, where one state by a change in its method of draining water from lands within its border increases the flow into an interstate stream, so that its natural capacity is greatly exceeded and the water is thrown upon the farms of another state, the latter state has such an interest as quasi sovereign in the comfort, health, and prosperity of her farm owners that resort may be had to this court for relief."

The converse of the foregoing proposition is obviously of equal truth; and therefore a change in the method of drainage which diminishes the flow of a stream or watercourse in another state with damage to that state and its citizens, must be equally actionable.

In this case we also invite the court's attention to the following cases:

Missouri v. *Illinois*, 180 U. S. 208, 21 Sup. Ct. 331, 45 L. Ed. 497;

Kansas v. *Colorado*, 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838;

Wyoming v. *Colorado*, 259 U. S. 419, 42 Sup. Ct. 522, 66 L. Ed. 999;

Pennsylvania v. *Wheeling & B. Bridge Co.*, 9 How. 647, 13 L. Ed. 294;

11 How. 528, 13 L. Ed. 799; 13 How. 518, 14 L. Ed. 249; 18 How. 429, 15 L. Ed. 435;

South Carolina v. *Georgia*, 93 U. S. 4, 23 L. Ed. 782.

3. *The complaining states have a right to maintain this suit in their private capacities as owners of public works and public property.*

The right of a state to maintain an original action in this court to protect its rights where the unlawful act of another state, person, or corporation has caused injury to such state in its capacity of owner of public works and public property has always been recognized. *Pennsylvania* v. *Wheeling Bridge Co.*, 13 How. 518, 14 L. Ed. 249; *Pennsylvania* v. *West Virginia*, 262 U. S. 553, 43 Sup. Ct. 658, 67 L. Ed. 1117; *Kansas* v. *Colorado*, 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956; *Georgia* v. *Tennessee Copper Company*, 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038.

The bill avers in considerable detail special damage to the State of Wisconsin in its ownership of public works and public property by reason of the alleged wrongful acts of the State of Illinois and its agents. Some contention is made in the various briefs filed by and on behalf of the defendants that such injury is not real or substantial. For the purposes of a motion to dismiss or of demurrer, this allegation of fact in the complaint is admitted and stands as a verity in the case. The defendants can not both admit the fact and ask the court to disregard it. If they had seen fit to deny that fact and put the complainant to its proof, it would have been their right, but they cannot admit it and then ask the court to disregard it for the purpose of avoiding the force of their admission. The same situation applies to many other arguments of fact attempted to be made by or on behalf of the defendants.

4. *The complaining states have a standing to maintain this suit as parens patriae to protect their people.*

It has been recognized in this court by a large number of decisions that a state has a standing as parens patriae of its people where the illegal act of another state, person, or corporation has caused injury and damage to a large number of the citizens of that state. As has been pointed out by this court, obviously separate and independent actions by such injured citizens do not constitute an adequate remedy. In *Missouri* v. *Illinois,* 180 U. S. 208, 21 Sup. Ct. 331, 45 L. Ed. 497, this court said:

> "That suits brought by individuals, each for personal injuries threatened or received, would be wholly inadequate and disproportionate remedies, requires no argument."

This right must be distinguished from an attempt to collect individual claims of the citizens of the state as their trustee against a sister state. In *North Dakota* v. *Minnesota,* 263 U. S. 365, 375-376, 44 Sup. Ct. 138, 68 L. Ed. 342, this court said:

> "The right of a state as parens patriae to bring suit to protect the general comfort, health, or property rights of its inhabitants threatened by the proposed or continued action of another state by prayer for injunction is to be differentiated from its lost power as a sovereign to present and enforce individual claims of its citizens as their trustee against a sister state."

The right of a state to proceed as parens patriae is sustained in the following cases:

> *New York* v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937;
>
> *Pennsylvania* v. *West Virginia,* 262 U. S. 553, 43 Sup. Ct. 658, 67 L. Ed. 1117.

The fact that the state has no pecuniary interest is immaterial. In *Kansas* v. *Colorado,* 185 U. S. 125, 142, 22 Sup. Ct. 552, 46 L. Ed. 838, the court said:*

> "As will be perceived, the court there ruled that the mere fact

that a state had no *pecuniary* interest in the controversy would not defeat the original jurisdiction of this court, which might be invoked by the states as *parens patriae,* trustee, guardian, or representative of all or a considerable portion of its citizens; and that the threatened pollution of the waters of a river flowing between states, under the authority of one of them, thereby putting the health and comfort of the citizens of the other in jeopardy, presented a cause of action justicable under the Constitution.

"In the case before us the state of Kansas files her bill as representing and on behalf of her citizens, as well as in vindication of her alleged rights as an individual owner, and seeks relief in respect of being deprived of the waters of the river accustomed to flow through and across the state, and the consequent destruction of the property of herself and of her citizens and injury to their health and comfort. The action complained of is a state action, and not the action of state officers in abuse or in excess of their powers."

5. *While a state may not maintain an action solely to vindicate the freedom of commerce in the role of a mere volunteer, where the action of another state violating the freedom of commerce inflicts special injury on the state in its proprietary or quasi-sovereign capacity or as parens patriae of its people, it can maintain an action to enjoin such act, not as an academic vindication of the freedom of commerce but as a redress of its injuries in the capacities stated.*

Much is attempted to be made in the various briefs filed by and on behalf of the defendants of a statement in one of the opinions in *Louisiana* v. *Texas,* 176 U. S. 1, 20 Sup. Ct. 251, 44 L. Ed. 347, to the effect that the vindication of interstate commerce has not been entrusted to the State of Louisiana. From this statement it is argued that the complaining states have no right as propritors quasi-sovereign or *parens patriae* to assert any claim in this suit based upon an alleged unlawful interference by the State of Illinois with the freedom of commerce which causes special damage to the complaining states and their citizens. In view of the many discussions of the decision in *Louisiana* v. *Texas, supra,* by this court in subsequent opinions, and the obvious difference between the facts in that case and those set forth in the instant bill of complaint it is difficult to believe that this contention is seriously made. Obviously no state may maintain an action to vindicate the freedom of commerce as an academic proposition. However, a claim that a state may not maintain an action to redress wrongs arising from an unlawful interference with the freedom of interstate commerce on the part of another state is a very different matter. It is a matter that has no relation to the fact that the regulation of interstate commerce is entrusted to the federal government. A state may not lawfully interfere with the freedom of interstate commerce, either by direct and positive regulations or by an act which, although in itself not purporting to have any connection with interstate commerce, yet by its inevitable effect interferes with the freedom of that commerce. When a state has interfered with interstate commerce either directly or through an act which inevitably has that result, it is liable to suit by an injured party. The restriction on the state extends not only to a simple prohibition of laws impairing freedom of interstate commerce, but extends to interference by any ultimate organ. *Western Union Telegraph Company* v. *Attorney General of Massachusetts,* 125 U. S. 530, 8 Sup. Ct. 961, 31 L. Ed. 790; *Williams* v. *Talladega,* 226 U. S. 404, 415, 416, 33 Sup. Ct. 116, 57 L. Ed. 275. Accordingly when a state has, by an unlawful act, interfered with the freedom of interstate commerce to the damage of another state or a private individual, it is no answer to a suit on behalf of those injured that the regulation of interstate commerce is entrusted to the federal government. It is not a suit to regulate interstate commerce but to redress wrongs growing out of an unlawful interference with interstate commerce. In *Pennsylvania* v. *West Virginia,* 262 U. S. 553, 43 Sup. Ct. 658, 67 L. Ed. 1117, the state of Pennsylvania maintained a suit on the basis that West Virginia, by an act of its legislature had attempted to interfere unlawfully with the freedom of interstate commerce to the damage of Pennsylvania in its proprietary capacity and to the damage of the state in its quasi-sovereign capacity through injury to a large number of its citizens. The right to maintain that suit was fully sustained by this court. At page 591 the contention of the defendants is discussed and fully disposed of. There this court said:

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*Italics, except in cited cases and Latin expressions, are ours.

> "Each suit presents a direct issue between two States as to whether one may withdraw a natural product, a common subject of commercial dealings, from an established current of commerce moving into the territory of the other. The complainant State asserts and the defendant State denies that such a withdrawal is an interference with interstate commerce forbidden by the Constitution. This is essentially a judicial question. *It concededly is so in suits between private parties, and of course its character is not different in a suit between States.*
>
> "What it sought is not an abstract ruling on that question, but an injunction against such a withdrawal presently threatened and likely to be productive of great injury. The purpose to withdraw is shown in the enactment of the defendant State before set forth and is about to be carried into effect by her officers acting in her name and at her command. The State is the principal and the action of her officers rightly may be imputed to her, even thought a suit for an injunction might lie against them.
>
> "The attitude of the complainant States is not that of mere volunteers attempting to vindicate the freedom of interstate commerce or to redress purely private grievances. Each sues to protect a two-fold interest—one as the proprietor of various public institutions and schools whose supply of gas will be largely curtailed or cut off by the threatened interference with the interstate current, and the other as the representative of the consuming public whose supply will be similarly affected. Both interests are substantial and both are threatened with serious injury."

The same question was involved in *Pennsylvania* v. *Wheeling Bridge Company,* 13 How. 518, 14 L. Ed. 249. In that case the right to maintain action because of damage to the complaining state was also sustained.

In *Pennsylvania* v. *Wheeling Bridge Company, supra,* 578, the court said:

> "For the reason and facts stated, we think that the bridge obstructs the navigation of the Ohio, and that the state of Pennsylvania has been, and will be, injured in her public works in such manner as not only to authorize the bringing of this suit, but to entitle her to relief prayed."

Any number of cases might be cited of suits between private individuals involving the constitutionality of state regulations on the ground of interference with the freedom of interstate commerce. If the theory of the defendants were correct every such suit would have to be dismissed upon the ground that the regulation of interstate commerce was entrusted solely to the federal government.

Defendants advance the novel theory that complaining states suffering special damage in their proprietary capacities, as quasi-sovereign, and as *parens patriae* of their people, from an illegal obstruction to navigation upon the Des Plaines and Illinois Rivers by virtue of their pollution, have no right to complain thereof for the reason that such states are not lower riparian owners upon said river. Obviously the right of navigation free from unlawful obstructions is not dependent upon a location either above or below or at the point of unlawful obstruction of a navigable water of the United States. If the complaining states in any of their capacities sustained special injury from such unlawful obstruction their right to proceed against the same cannot be questioned, and it is, of course, ridiculous to talk of upper and lower riparian rights in connection therewith. The same situation was presented with respect to the location of the obstruction in *Pennsylvania* v. *Wheeling Bridge Company,* 13 How. 518, 14 L. Ed. 249. See also *Pennsylvania* v. *West Virginia,* 262 U. S. 553, 43 Sup. Ct. 658, 67 L. Ed. 1117.

The point is attempted to be made that it has been finally determined by this court in *Missouri* v. *Illinois,* 200 U. S. 496, 26 Sup.

Ct. 268, 50 L. Ed. 582, that the pollution does not constitute an obstruction. As the point is relatively unimportant, it is only necessary to say that the controversy in that case related only to the condition of the waters in the Mississippi River at St. Louis, which is several hundred miles below the Des Plaines. The court did not decide that the Des Plaines River and upper Illinois were not polluted. In the second place this decision was rendered somewhat over twenty years ago, and the quantity of sewage polluting these waters has immensely increased since that time.

In the brief of the intervening defendant states it is asserted that the right to use the navigable waters of the United States is an incident of citizenship of the United States and not of citizenship of the state. The materiality of that question is not apparent. The right exists regardless of whether it is derived from the state or from the United States. Rights derived from the United States are certainly no less sacred than those derived from a state and no less capable of judicial vindication at the suit of a person suffering special injury from a deprivation of such right. The right to engage in interstate commerce is a natural right subjected by the constitution to federal regulation free from obstruction. Yet the state of Pennsylvania vindicated its right in its proprietary capacity and the rights of its citizens in a quasi-sovereign capacity to this freedom of interstate commerce in *Pennsylvania* v. *West Virginia*, 262 U. S. 553, 43 Sup. Ct. 658, 67 L. Ed. 1117. Cases without number could be cited where private individuals or corporations have vindicated federal rights of this character before this court. Certainly it will not be contended that only the federal government could vindicate an injury to one of its citizens by reason of the denial or infringement of a right either natural or arising by virtue of federal citizenship. Many times such infringements give rise to a claim for damages, and obviously the United States could not sue to collect the damages for one of its citizens.

6. *The bill does not ask the court to regulate navigation or to supervise long continuing acts.*

A prayer for enjoining an abstraction of all waters beyond that needed for navigation does not involve an administration of the regulation of commerce. It involves only a finding of fact. This court has made such a determination at the instance of a private citizen and certainly the rights of these states are of a higher dignity than those of a private citizen. Moreover, the prayer for enjoining the abstraction of any water does not involve a regulation of navigation. In *United States* v. *Rio Grande Dam & Irrigation Company*, 174 U. S. 690, 19 Sup. Ct. 770, 43 L. Ed. 1136, this court required the lower court to make a determination of the amount of water which might be appropriated by the irrigation company without substantial damage to the navigable portions of the Rio Grande River and, upon such determination, to enjoin that company from abstracting a larger quantity of such waters. This, of course, was the determination of a question of fact. Such is the most that could be presented to the court in this case under any view of the relief demanded.

Moreover, it stands admitted by the demurrer or motion to dismiss in this case that abstraction of waters beyond one thousand cubic second feet is in excess of either the present or prospective needs of navigation. The attempt is made to admit this fact and then ask the court to disregard the same. For the purposes of this motion it must stand as a verity in the case, and there is no question that it could be successfully controverted. The consistent effort of the defendants to avoid the effect of their demurrer to the bill by asking this court to disregard allegations of fact contained therein is a substantial admission that the demurrer should be overruled. We will not further discuss the facts in connection with this allegation at this point since they are covered fully in the statement of facts in the beginning of this brief.

Under the state of the pleadings it stands admitted that any diversion in excess of one thousand cubic second feet would not be for purposes of navigation, but would necessarily be solely for the real or imaginary sanitary needs of the defendant Sanitary District or to produce the power desired by that district or by the State of Illinois. The only interest, under any conceivable view of the controversy here presented, which the federal government could have would relate only to navigation. Since the bill does not seek to control waters so far as they are needed for navigation purposes the relief obviously would not constitute any regulation of navigation.

III

THE UNITED STATES AND SISTER STATES ARE NOT INDISPENSABLE PARTIES.

In the State of *California* v. *Southern Pacific Company,* 157 U. S. 229, 249, 15 Sup. Ct. D. 591, 39 L. Ed. 683, this court defined a necessary party as follows, quoting from *Shields* v. *Barrow,* 17 How. 130, 139, 15 L. Ed. 158:

> " 'Persons who not only have an interest in the controversy, but an interest of such a nature that a final decree cannot be made without either affecting that interest, or leaving the controversy in such a condition that its final determination may be wholly inconsistent with equity and good conscience.' "

Obviously neither the United States nor the sister states has or have any interest in the relief sought here. They could not be affected by the decree prayed for.

The fact that the controversy may involve the extent of the power of congress to regulate navigation under the interstate commerce clause does not make the United States an indispensable party. If such were not the case the United States would be an indispensable party in every suit involving a constitutional question under the federal constitution. It needs no argument or citation of authority to demonstrate that such is not the fact. The same reasoning applies to any constitutional question which may arise under the Rivers and Harbors Act.

The bill seeks to enjoin the abstraction of waters, in which the complaining states have a legal interest, to their damage to the extent which is admittedly in excess of the needs of navigation. The interest of the United States in any private controversy affecting navigable waters thereof is limited solely to navigation questions. Thus in *Kansas* v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956, the United States filed a petition for leave to intervene on the ground that it was interested in the disposition of the waters of the Arkansas River for reclaiming large areas of arid lands in the west. This court denied the petition of the United States for intervention in that case on the ground that under the constitution the United States had no interest in any of the waters of the United States except so far as that interest could relate to the navigation thereof, and that it had no standing upon any other grounds. No federal property was involved.

In *New York* v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937, the United States intervened to protect its rights with reference to government property and with reference to the control of navigation in upper New York Bay. Subsequently by an agreement which was held to be lawful and within the authority of the federal officers making the same, the United States compromised with the State of New Jersey its claims with reference to injury to its own property and with reference to injury to the navigation of upper New York Bay. Notwithstanding such settlement on the part of the United States the suit between New York and New Jersey proceeded in this court for a period of approximately six years. Obviously, the federal government could not have been considered an indispensable party to that suit.

We also invite the attention of the court to *Wyoming* v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 999.

Moreover, the United States cannot be sued without its consent. It has not given its consent to be sued in this behalf. The exemption of the United States from suit cannot be held to be a ground for denying relief to the complainant states. If the United States feels that it has any substantial interest in the controversy, it can intervene if it sees fit. However, the court will not permit itself to be prevented from granting relief among the parties before it by the fact (which does not exist in this case) that another party which might be otherwise important, if not indispensable, cannot be sued because of sovereign exemption or for any other reason. The defendants cannot avoid responsibility for their own acts even though it was assumed that the United States would be an indispensable party but for the fact that it is exempt from suit.

In *Kawananakoa* v. *Polyblank*, 205 U. S. 349, 27 Sup. Ct. 526, 51 L. Ed. 834, the territory of Hawaii was an indispensable party but could not be sued because of its exemption as a sovereign. The court, however, granted relief against the defendants, and on page 354 said:

> "However it might be in a different case, when the inability to join all parties ~~had~~ and to sell all the land is due to a conveyance by the mortgagor directly or indirectly to the Territory the court is not thereby deprived of ability to proceed."

We also invite attention of the court to the following cases:

> *Kansas* v. *United States*, 204 U. S. 331, 341, 27 Sup. Ct. 388, 51 L. Ed. 510;
> *Mechanics Bank* v. *Setoon*, 1 Pet. 299, 306, 7 L. Ed. 152;
> *Osborn* v. *United States Bank*, 9 Wheat. 738, 6 L. Ed. 204.

Cases such as *California* v. *Southern Pacific Co.*, 157 U. S. 229, 15 Sup. Ct. 591, 39 L. Ed. 683, have no application here. In that case the complaining state had a remedy by suit in its own courts against all of the parties concern~~ing~~ed and could, if it saw fit, take the case to this court by writ of error. The existence of such a remedy was pointed out in that case. However, if this court were to hold that the United States is a indispensable party it would amount to a denial of ~~that~~ any remedy to the complaining states, since the United States has not consented to be sued. This would violate the fundamental principle of equity that there is no wrong without a remedy.

This suit seeks to protect the proprietary and quasi-sovereign rights of the complaining states in the waters of the Great Lakes-St. Lawrence System. As a phase thereof the complaining states seek to protect the navigation of the Great Lakes System and to permit all needed abstraction from those waters for the needs of navigation upon the Des Plaines and Illinois Rivers. Clearly the sister states of the Union are not indispensable parties. The sister states which do not border upon the Great Lakes-St. Lawrence waterway can have no possible rights other than in navigation. The bill does not seek to affect navigation other than that it will incidentally protect and promote the navigation of the Great Lakes-St. Lawrence waterway without injury to the navigation of the Illinois and Des Plaines Rivers. In *Sanitary District of Chicago* v. *United States*, 266 U. S. 405, 431, 45 Sup. Ct. 176, 69 L. Ed. 352, this court in discussing the alleged interest in the Mississippi River states said:

> "The interest that the river states have in increasing the artificial flow from Lake Michigan is not a right, but merely a consideration that they may address to Congress if they see fit * * *. But we repeat that the Secretary, by his action, took no rights of any kind. He simply refused an application of the Sanitary Board to remove a prohibition that Congress imposed. It is doubtful, at least, whether the Secretary was authorized to consider the remote interests of the Mississippi states or the sanitary needs of Chicago."

Obviously, sister states cannot, at best, be more than proper parties to this bill. Indiana, Michigan, and New York, being the other littoral states of the Great Lakes-St. Lawrence waterway, have filed briefs in support of the complainants' bill as *amici curiae*.

IV

THE BILL OF COMPLAINT IS NOT MULTIFARIOUS.

In direct opposition to the preceding point the defendants assert that the bill of complaint is multifarious in that the complaining states have no right to join in bringing and maintaining this suit. This assertion is obviously without merit. All of the complaining states have a common interest; all are seeking a common relief; and the rights of all of the complaining states depend upon the same transactions or state of facts.

In *Heckman et al.* v. *United States,* 224 U. S. 413, 448, 32 Sup. Ct. 424, 56 L. Ed. 820, in commenting upon a claim that the bill was multifarious, this court said:

> "A further objection is that the bill is multifarious. But in view of the numerous transfers which the Government attacks, it was manifestly in the interests of the convenient administration of justice that unnecessary suits should be avoided, and that transactions presenting the same questions for determination should be grouped in a single proceeding. The objection to the misjoinder of causes of action is likewise without merit."

It is sufficient if complainants are all interested, although distinctly, in the subject matter, and in the object to be obtained. In any event, an objection to multifariousness always rests largely in the discretion of the court. Since one of the grounds of equity jurisdiction is the prevention of a multiplicity of suits the court of equity looks with favor upon the joining of complainants in a suit; and the avoidance of a multiplicity of suits is a good ground for joinder of complainants.

We also invite the attention of the court to *Risley* v. *Utica,* 173 Fed. 502; *Virginia-Carolina Chemical Co.* v. *Home Insurance Co. of New York,* 113 Fed. 1.

V

THE STATE OF ILLINOIS WAS AND IS WITHOUT POWER TO APPROPRIATE AND ABSTRACT THE WATERS OF THE GREAT LAKES AND CONNECTING WATERS IN DEFIANCE OF RIGHTS OF THE COMPLAINING STATES.

1. *The common law of waters has been generally adopted in the United States and obtains in the defendant and complaining states.*

It was the unquestioned rule of the common law that a riparian proprietor was entitled to the continued natural flow of a living stream by or through his land without appreciable diminution in quantity or impairment in quality. This rule was generally adopted in the United States and it is our purpose at this point to demonstrate that such rule obtains in the defendant State of Illinois and in all of the complaining states.

In *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 702, 19 Sup. Ct. 770, 43 L. Ed. 1136, this court said:

> "The unquestioned rule of the common law was that every riparian owner was entitled to the continued natural flow of the stream. It is enough, without other citations or quotations, to quote the language of Chancellor Kent, 3 Kent, Comm. sec. 439;
>
> " 'Every proprietor of lands on the banks of a river has naturally an equal right to the use of the water which flows in the stream adjacent to his lands, as it was wont to run (*currere solebat*) without diminution or alteration. No proprietor has a right to use the water, to the prejudice of other proprietors, above or below him, unless he has a prior right to divert it, or a title to some exclusive enjoyment. He has no property in the water itself, but a simple usufruct while it passes along. *Aqua currit et debet currere solebat*, is the language of the law. Though he may use the water while it runs over his land as an incident to the land, he cannot unreasonably detain it, or give it another direction, and he must return it to its ordinary channel when it leaves his estate.' "

This court then stated that the rule as laid down by Chancellor Kent is undoubted and obtains in those states of the Union which have simply adopted the common law.

That rule obtains in full vigor in the complaining State of Wisconsin. In *Kimberly & Clark Co.* v. *Hewitt*, 79 Wis. 334, 44 N. W. 303, the Supreme Court of Wisconsin held that a riparian owner upon a river had no right to divert the water thereof or a material part of it through his own land and return it to the river below the land of a lower proprietor and thus deprive him of the use thereof. At page 337 the court said:

> "The rule is elementary that, unless affected by license, grant, prescription, or public right, or the like, every proprietor of land on the bank of a stream of water, whether navigable or not, has the right to the use of the water as it is wont to run, without material alteration or diminution; and no riparian owner has the right to use the water of the stream to the prejudice of other riparian owners above or below him, by throwing it back on the former or subtracting it from the latter. *Lawson* v. *Mowry*, 52 Wis. 219, and cases cited in the opinion by Mr. Justice Cassoday; Ang. Water-courses (7th ed.), ch. 4, p. 98, note 2; Burrill, Law Dict. tit. *'Ut Currere Solebat.'*"

Not even the state can take away or destroy the rights of a riparian owner on a navigable lake without compensation or for a private purpose. *Priewe* v. *Wisconsin State Land and Improvement* Co., 93 Wis. 534, 67 N. W. 918. We also invite the attention of the court to *Cedar Lake Hotel Co.* v. *Cedar Lake Hydraulic Co.*, 79 Wis. 297, 48 N. W. 371; *Williams* v. *Bass*, 179 Wis. 364, 191 N. W. 499.

The common law rule of waters obtains in the State of Illinois. *Evans* v. *Merriweather*, 4 Ill. (3 Scam) 492, 38 Am. Decisions 106; *Barrett* v. *Mt. Greenwood Cemetery Association*, 159 Ill. 385, 42 N. E. 891; *Village of Dwight* v. *Hayes*, 150 Ill. 237, 37 N. E. 218; *Plumleigh* v. *Dawson*, 6 Ill. (1 Gilman) 544; *Bliss* v. *Kennedy*, 43 Ill. 67; *Dayton* v. *Commissioners*, 128 Ill. 271, 21 N. E. 198.

To avoid burdening this brief unnecessarily we will simply cite the decisions to show that a common law rule that a lower riparian owner is entitled to the natural flow of a stream through or by his property without material diminution of quantity or quality obtains in the other complaining states and in the other states littoral to the Great Lakes-St. Lawrence System. *Minnesota Loan & Trust Co.* v. *St. Anthony Falls Water Power Co.*, 82 Minn. 505, 85 N. W. 520, 523; *Miller* v. *Miller*, 9 Pa. 74, 49 American Decisions 545; *Clark* v. *Pennsylvania R. R. Co.*, 145 Pa. St. 438, 77 Atl. 989; *Columbus and H. Coal & Iron Co.* v. *Tucker*, 48 Ohio St. 41, 57, 26 N. E. 630; *Mansfield* v. *Balliett*, 65 Ohio St. 451, 63 N. E. 86, 58 L. R. A. 628, 633; *Canton* v. *Shock*, 66 Ohio St. 19, 63 N. E. 600; *Burke* v. *Simonson*, 104 Ind. 173, 2 N. E. 309; *Stock* v. *Jefferson*, 114 Mich. 357, 72 N. W. 132; *Amsterdam Knitting Co.* v. *Dean*, 43 N. Y. St. 21, affirmed 56 N. E. 757, 162 N. Y. 278; *Strobel* v. *Kerr Salt Co.*, 164 N. Y. 303, 58 N. E. 142.

As was pointed out in *Mansfield* v. *Balliett*, 65 Ohio St. 451, the right of every proprietor over or past whose land a stream of water flows that it shall continue to flow to and from his premises in the quantity, quality, and manner in which it was accustomed to flow by nature, subject only to the reasonable uses of upper riparian proprietors, is a property right which cannot be taken except for public purposes and then only for compensation. It needs no argument to show that the state of Illinois could not take the property rights of the citizens of the complaining states, even for compensation, because such an act would be an invasion of and an injury to the quasi-sovereign rights of the complaining states.

The state holds the title to the waters in trust for its people, so that it not only has a right but it also has a duty to protect them. In *Rossmiller* v. *State*, 114 Wis. 169, 186, 80 N. W. 839, the Supreme Court of Wisconsin stated that it "has repeatedly said that the navigable waters of the state have substantially the incidents of tidal waters at common law; that the title to the beds of such waters was reserved for the State by the Ordinance of 1787 and vested in it at the instant it was admitted into the Union to preserve the public character of such waters with all such incidents; and that the state never has and never can constitutionally impair the trust." To the same effect see *Illinois Steel Co.* v. *Bilot*, 109 Wis. 418, 425, 426, 84 N. W. 855; *Pewaukee* v. *Savoy*, 103 Wis. 271, 274, 79 N. W. 436.

2. *As proprietors of the waters of the Great Lakes within their borders, the complaining states have a right to the natural flow of the waters in such water-shed and to all the waters coming naturally to them, to the end that the waters of the Great Lakes shall be preserved in their navigable capacity and at their natural level and condition for all uses and purposes.*

The waters of the Great Lakes are owned by the respective states in a proprietary capacity. However, this title of the states is in trust for all of their citizens for the use of navigation, fishing and every other proper and legitimate use to which the waters can be put. The waters also have a beneficial effect upon the lands through which they flow or along which they border. Such waters benefit and render more easily accessible the water supply beneath the ground bordering upon them and contribute directly to the waters in and under the adjoining land which are necessary to the successful cultivation of that land. For all of these purposes it is not only the right but the duty of the state, as the guardian and trustee of its citizens, to protect those waters in their natural state from any injury not authorized by law. Since the lower riparian owner on a stream may claim as against the upper riparian owner, the right to a continued, uninterrupted and unpolluted flow of the stream passing his lands, why cannot the lower state claim the same right as against the upper state? The right of the state is superior in extent and in dignity to the right and property of the riparian owner, since the state has the full proprietary interest which the riparian owner has not, and since the state has the additional right and duty in its quasi-sovereign capacity as guardian of the right and property of its citizens.

In *Hudson County Water Company* v. *McCarter*, 209 U. S. 349, 356, 28 Sup. Ct. 529, 52 L. Ed. 828, this court, in speaking of the right of a state to protect and conserve its natural resources for the benefit of the people, and speaking with particular regard to the right of a state in its quasi-sovereign capacity to protect its waters, said:

> "We are of the opinion further that the constitutional power of the state to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use or speculation as to future needs. * * * It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one a reason for its will."

In discussing this case in the lower court, 70 New Jersey Equity 695, 718-719, Justice Pitney said:

> "It will, of course, be observed that the case before us is not at all parallel to the case that would be presented were the state of New Jersey or citizens thereof setting up a right to interfere with the flow of water that otherwise would, in its natural course, reach the territory of a neighboring state. Such a case was presented in *New York City* v. *Pine,* 185 U. S. 93. There the city of New York constructed a dam on the west branch of Byram River, within the State of New York, this being a non-navigable stream of fresh water arising in New York, flowing thence through the State of Connecticut, and emptying into Long Island sound. The plaintiffs were riparian owners of land in the State of Connecticut, and brought action in federal circuit court for an injunction to restrain the city from diverting the waters of the west branch from their natural flow through the plaintiffs' lands. *The supreme court assumed, without deciding, that although the west branch above the dam and all the sources of the supply of water to that branch are within the limits of the State of New York, that state has no power to appropriate such water or prevent its natural flow through its customary channel into the State of Connecticut.* The injunction was denied, however, and the right of the plaintiffs to pecuniary compensation established in its stead, on the ground of their acquiescence in the construction of the works by means of which the diversion was to be effected. In the great case of

Kansas v. *Colorado*, 185 U. S. 125 (decided on demurrer, but not yet determined on final hearing), the State of Kansas, party on the basis of its ownership of riparian land upon the Arkansas river and partly in the right of its citizens who are riparian owners thereon, is seeking to enjoin the State of Colorado from withdrawing from the river for irrigation of the arid lands of Colorado so much of the waters of the river as to materially injure the riparian lands in Kansas. A demurrer to the bill was overruled on the ground that in a case of so great importance a determination of the questions involved ought to be left until the facts were established by proofs. *Impliedly the right to prevent an undue interference with the natural flow of the river was recognized.*"

This question is discussed in Farnham on Waters (1904) Vol. 1, p. 29, as follows:

"A river which flows through the territory of several states or nations is their common property. Each is entitled to its navigation throughout its whole extent, so far as it can be exercised without injury to the rights of others. It is a great natural highway conferring, besides the facilities of navigation certain incidental advantages, such as, fishery and the right to use the water for power. Neither nation can do any act which will deprive the other of the benefits of those rights and advantages. The inherent right of a nation to protect itself and its territory would justify the one lower down the stream in preventing by force the one further up from turning the river out of its course or in consuming so much of the water for purposes of its own as to deprive the former of its benefit. * * * Courts, having a supervisory jurisdiction over the acts of the political department of government, will prevent acts by that department which will injure the rights of the neighboring states. The gifts of nature are for the benefit of mankind, and no aggregation of men can assert and exercise such rights and ownership of them as will deprive others having equal rights, and means of enjoying them, of such enjoyment. The acts of nations must be governed by principles of right and justice. The days of force and self-aggrandizement at the expense of neighboring nations are passed, and the common right to enjoy the bountiful provisions of Providence must be preserved."

In *Hoge* v. *Eaton*, 135 Fed. 411, in a suit by settlers in Wyoming on a stream which arises in Colorado to restrain the diversion of water from such stream in Colorado, the court, p. 414, stated the following to be a general principle:

> *"The idea of an exclusive right in the people of a state to divert its running waters to the injury of riparian owners in another state must be equally unattainable. Indeed, the doctrine of riparian ownership and use of running water is not subject to political boundaries. Between hostile states the doctrine must be recognized, but any such repudiation would be simply vis major. Between states dwelling in peace and concord, as are the states of our Union, the equal rights of the inhabitants of each state to the waters of intersecting streams must always be recognized."*

In this connection we invite the attention of the court to the following cases:

> *Holyoke Waterpower Co.* v. *Connecticut River Co.*, 52 Conn. 570, 22 Blatchf. 131, 20 Fed. 71;
>
> *Pine* v. *New York*, 50 C. C. A. 145, 112 Fed. 98;
>
> *Kansas* v. *Colo.*, 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838;
>
> *U. S.* v. *Rio Grande*, 174 U. S. 690, 19 Sup. Ct. 770, 43 L. Ed. 1136.

3. *An upper state through which flows or on which borders an interstate stream or watercourse cannot appropriate the waters thereof in defiance of the rights of a lower state; such appropriation will be enjoined by the court; and in determining the fair use of such interstate waters, the upper state cannot complain if its rights are measured by its own law of waters. Applying that rule, as the most favorable to Illinois which she could possibly demand, her asserted right to abstract the waters of the Great Lakes fails.*

The proposition that an upper riparian state upon an interstate stream or watercourse may not divert, appropriate or use the waters of that stream within its borders to the injury of a lower riparian state and without regard to any prejudice which may be worked to the rights of the lower state and its citizens, has been definitely and finally settled. Such a right was asserted on behalf of the State of Colorado in the case of *Kansas* v. *Colo.*, 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956, and was resolved adversely to Colorado. In the case of *Wyoming* v. *Colorado,* 259 U. S. 419, 466, 42 Sup. Ct. 552, 558, 66 L. Ed. 999, In reply to that contention, this court said:

> "The contention of Colorado that she as a state rightfully may divert and use, as she may choose, the waters flowing within her boundaries in this interstate stream, regardless of any prejudice that this may work to others having rights in the stream below her boundary, cannot be maintained. The river throughout its course in both states is but a single stream, wherein each state has an interest which should be respected by the other. A like contention was set up by Colorado in her answer in *Kansas* v. *Colorado* and was adjudged untenable. Further consideration satisfies us that the ruling was right. It has support in other cases, of which *Rickey Land & Cattle Co.* v. *Miller & Lux,* 218 U. S. 258, 31 Sup. Ct. 11, 54 L. Ed. 1032; *Bean* v. *Morris,* 221 U. S. 485, 31 Sup. Ct. 703, 55 L. Ed. 821; *Missouri* v. *Illinois,* 180 U. S. 208, 21 Sup. Ct. 331, 45 L. Ed. 497, and 200 U. S. 496, 26 Sup. Ct. 268, 50 L. Ed. 572, and *Georgia* v. *Tennessee Copper Co.,* 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038, 11 Ann. Cas. 488 are examples."

The law is thus clearly established that an upper riparian state may not appropriate the waters of an interstate watercourse to the detriment of the lower riparian state and its citizens. The question is then presented: What rule shall be applied in determining the uses which may be made of such interstate watercourse by the respective states in conformity to and in recognition of their respective rights? In the case of *Kansas* v. *Colorado, supra,* and *Wyoming* v. *Colorado, supra,* this court laid down the rule that in determining the fair apportionment of the beneficial uses of an interstate stream by the upper and lower riparian states, it would take into consideration the law of waters of the respective states, and that the lower riparian state could not complain if the upper riparian state were permitted to make such uses of the interstate waters as were permitted by the law of waters of the complaining state. Thus in *Kansas* v. *Colorado, supra,* this court found that the state of Colorado had adopted the appropriation doctrine of waters common in arid regions of the west, that the state of Kansas by its law of waters recognized the right of riparian owners to a reasonable appropriation of the waters of a stream for irrigation purposes within the basin of the stream, and that Kansas could not justly complain of a reasonable appropriation of waters of the Arkansas River by the state or citizens of Colorado for irrigation purposes within the basin of that river. This court, in deciding the facts in that case, held under the evidence that there was no appropriation of the waters of the Arkansas River by Colorado outside of its basin, and no unreasonable appropriation within the basin in relation to the rights of lower riparian owners as recognized by the laws of Kansas. It was therefore held that Kansas had no present ground for enjoining the use of the waters of the Arkansas River by the state of Colorado, and the case was dismissed, but without prejudice to another action in the event that the state of Colorado should later assume to use an unreasonable portion of the waters of the Arkansas River for irrigation purposes.

In *Wyoming* v. *Colorado, supra,* this court found that both of the states, being in the arid section of the west, had adopted the appropriation theory of the law of waters. It was accordingly held that the respective rights of the two states in the interstate stream in controversy should be determined by the application of the law of waters common to the two states just as though the property rights involved were embraced within a single state having such a law of waters. Applying this doctrine Colorado, as an upper riparian state, was compelled to recognize the prior appropriations in the state of Wyoming and was enjoined from appropriating any quantity of the waters of the interstate stream except that part which was in excess of the reasonable requirements of the prior appropriation in the state of Wyoming. It should be noted that this case laid down the doctrine that the most favorable consideration which a state may ask in relation to its rights in an interstate stream or watercourse is the determination of its rights on the basis of its own law of waters. It does not follow, however, that where two states have an entirely different law of waters, either of them can prejudice the rights of the other by virtue of adopting a law of waters which is not recognized by the other state, and which would seriously injure such other state. Up to this time the decisions have gone merely to the extent of saying that the lower riparian state cannot complain if its rights are determined in accordance with its own law of waters.

As has been demonstrated in the preceding sections of this brief, the common law of waters obtains in all of the complaining states, and in the defendant state of Illinois. By that law of waters, every riparian owner is entitled to the natural flow of the stream or watercourse without substantial diminution in either quantity or quality. Under that law of waters, any right to divert water from a watercourse without returning it before it leaves the land of the one making the diversion is denied, and much less can any riparian owner abstract the waters of such watercourse and transport them away from the watershed so as to be wholly lost to the lower riparian owners. As was said by this court, in *Hudson County Water Company* v. *McCarter,* 209 U. S. 349, 356; 28 Sup. Ct. 529, 531, 52 L. Ed. 828:

> "*The problems of irrigation have no place here.* Leaving them on one side, it appears to us that few public interests are more obvious, indisputable, and independent of particular theory than the interest of the public of a state to maintain the rivers that are wholly within it substantially undiminished, except by such drafts upon them as the guardian of the public welfare may permit for the purpose of turning them to a more perfect use."

It is thus apparent that under the recognized rules of law, the right of the state of Illinois to appropriate and abstract this water wholly fails.

We also invite the attention of the court to

Pine v. *New York,* 185 U. S. 93, 22 Sup. Ct. 592, 46 L. Ed. 820;

Economy Light & Pr. Co. v. *U. S.,* 256 U. S. 113, 41 Sup. Ct. 409, 65 L. Ed. 847;

Farnham on Waters, Vol. 1, p. 59;

Hyde on International Law, (1922) Vol. 1, pp. 315-316;

Holyoke Water Power Co. v. *Conn. River Co.,* 20 Fed. 71.

4. *Since a state has no power to abstract all of the waters of an interstate water course in defiance of lower riparian states, clearly Illinois has no right to not only abstract all of the waters of such a water course within its own boundaries, but by reversing the flow of that part of the water course within its borders, to abstract waters of such water course which originates in lower riparian states and permanently divert them from the watershed.*

By the decisions in the cases cited and discussed in the preceding section, it is apparent that an upper riparian state has no right to appropriate all of the waters of an interstate watercourse originating within its bounds without regard to the rights of lower riparian states. However, the defendant state is asserting a right which goes much farther. It is not only appropriating all of the waters of the Chicago and Calumet Rivers, which originate and lie within the bounds of the state of Illinois but the waters of which in the course of nature naturally flow into and belong to the lower riparian complaining states, but it is also asserting the right to appropriate 8,500 cubic second feet additional out of the waters of Lake Michigan, plus 1,200 cubic second feet from the waters of the same lake by way of pumpage, which is not returned to the lake as is required in the ordinary and legal use of such waters for domestic purposes, but is likewise permanently diverted from the watershed. The mean low water flow of the Chicago River is approximately 600 to 800 cubic second feet and that of the Calumet River is less than 1,000 cubic second feet. However, under the precedure adopted by Illinois, none of the waters of either of these rivers flow into the lake. There are no other streams of appreciable size flowing into the lake from Illinois. In addition to appropriating the waters of the Chicago and Calumet Rivers, the defendant state of Illinois is taking about 9,700 cubic second feet of water from the lake. It needs no argument to demonstrate that this 9,700 cubic second feet of water taken from Lake Michigan does not originate within the bounds of Illinois. This therefore must necessarily originate within the bounds of some of the lower riparian states. Accordingly it constitutes the taking of the waters of an interstate stream, by Illinois, which originate lower down upon such watercourse, and a direct appropriation of the waters of such lower riparian states. It would not be seriously contended that the state of Illinois could, by means of a pipe line or other mechanism, take the waters of Wisconsin inland lakes for its own purposes; yet there is no distinction between such an act and the one of which complaint is made.

Since the act of Illinois constitutes a much more flagrant violation of the law of waters than that complained of in the case of *Kansas* v. *Colorado, supra,* and *Wyoming* v. *Colorado, supra,* the illegality of the act and the right of the complaining states to enjoin the same, cannot be questioned.

Kansas v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956;

Wyoming v. *Colorado,* 259 U. S. 419, 42 Sup. Ct. 552, 66 L. Ed. 999;

Pine v. *New York,* 185 U. S. 93, 22 Sup. Ct. 592, 46 L. Ed. 820;

Hudson County Water Co. v. *McCarter,* 209 U. S. 349, 28 Sup. Ct. 529, 52 L. Ed. 828;

Holyoke Water Power Co. v. *Connecticut River Co.,* 20 Fed. 71.

5. *The various acts of the Illinois legislature purporting to authorize the Sanitary District of Chicago to abstract waters from Lake Michigan were unconstitutional and void.*

These acts assumed to control and appropriate the waters of a national and international waterway.

The national and international character of the Great Lakes-St. Lawrence system has been recognized by this court.

Moore v. *American Transportation Co.,* 24 How. 1, 16 L. Ed. 674;

The Propeller Genesee Chief, 12 How. 443, 13 L. Ed. 1058;

U. S. v. *Chandler-Dunbar Water Power Co.,* 229 U. S. 53, 33 Sup. Ct. 667, 57 L. Ed. 1063.

The necessary consequences of carrying out the provisions of the acts of the Illinois Legislature was to lower the level of the Great Lakes and to interfere with interstate commerce upon the greatest inland waterway in the world. This was a matter upon which no state might lawfully act, even though Congress was silent. In *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 426, 45 Sup. Ct. 176, 69 L. Ed. 352, this court has said:

> "But in matters where the national importance is imminent and direct even where Congress has been silent the States may not act at all. *Kansas City Southern Ry. Co.* v. *Kaw Valley Drainage District,* 233 U. S. 75, 79. Evidence is sufficient, if evidence is necessary, to show that a withdrawal of water on the scale directed by the statute of Illinois threatens and *will affect the level of the Lakes, and that is a matter which cannot be done without the consent of the United States, even were there no international covenant in the case.*"

Moreover, the natural consequences of this act were to destroy property rights of citizens of lower riparian states without compensation, in violation of the federal Constitution. It assumed through the agency of natural laws, to legislate *extra* territorially. The Illinois acts also violated act of Congress, the Constitution of Illinois, and the Ordinance of 1787.

We also invite the attention of the court to the following:

> *Burke* v. *Snively*, 208 Ill. 328, 70 N. E. 327;
> Separate Section 3, Constitution of Illinois, 1870;
> Ordinance of 1787;.
> *Economy L. & Power Co.* v. *U. S.*, 256 U. S. 113, 41 Sup. Ct. 409, 65 L. Ed. 847.

VI

IT IS NOT CONSIDERED THAT CONGRESS HAS POWER TO AUTHORIZE THE ABSTRACTION OF THE WATERS OF THE GREAT LAKES FROM THAT WATERSHED AS A FEDERAL ACT, FOR ANY PURPOSE. COMPLAINANTS, HOWEVER, IN THIS ACTION, DO NOT NOW ASK AN INJUNCTION AGAINST ANY ABSTRACTION REASONABLY NECESSARY FOR NAVIGATION PURPOSES WHICH WILL NOT BE IN EXCESS OF 500 CUBIC SECOND FEET AT PRESENT, OR EVER IN EXCESS OF 1,000 CUBIC SECOND FEET—THE ATTITUDE OF THE COMPLAINING STATES BEING EXPLAINED BY LEGISLATIVE RESOLUTIONS APPEARING AS APPENDICES TO THIS BRIEF.

1. *The constitutional power over navigable waters construed in the light of history and the common law, does not extend to the abstraction of the waters of one watershed for the benefit of another.*

The waters of the Great Lakes and their connecting waters, together with the submerged lands thereunder, are the property of the littoral states, and their title thereto, regardless of whether it be the full legal title, or in trust for their people, is subject only to the paramount right of Congress to regulate navigation as a power implied from the express power to regulate commerce. Since the rights of these states in such waters and submerged lands are proprietary rights, the control of these states thereover must be final and conclusive except in so far as that title is qualified by the legitimate scope of the federal power to regulate navigation.

When the United States was settled, the colonists brought to this country the common law of England. That common law prevailed in full force and effect at the time of the adoption of the constitution. The existence of that common law was taken for granted by the framers of the constitution, and the constitution was adopted and must be construed in relation to the rights, privileges and limitations which existed by virtue of the common law, and upon which common law rights the constitution, upon its adoption, was superimposed. This has many times been recognized by this court. In *Kansas* v. *Colorado,* 206 U. S. 46, 94-95, 27 Sup. Ct. 655, 51 L. Ed. 956, this court said:

> "It is undoubtedly true that the early settlers brought to this country the common law of England, and that that common law throws light on the meaning and *scope* of the Constitution of the United States and is also in many States expressly recognized as of controlling force in the absence of express statute. As said by Mr. Justice Gray in *United States* v. *Wong Kim Ark.,* 169 U. S. 649, 654:
>
> " 'In this, as in other respects, it must be interpreted in the light of the common law, the principles and history of which were familiarly known to the framers of the Constitution. *Minor* v. *Happersett,* 21 Wall. 162; *Ex parte Wilson,* 114 U. S. 417, 422; *Boyd* v. *United States,* 116 U. S. 616, 624, 625; *Smith* v. *Alabama,* 124 U. S. 465. The language of the Constitution, as has been well said, could not be understood without reference to the common law, 1 Kent. Com., 336; Bradley, J., in *Moore* v. *United States,* 91 U. S. 270, 274.' "

When the constitution was adopted, and the express power given to Congress to regulate commerce, the right to abstract the waters of a watershed had never been claimed, and much less recognized. This fact is readily determined by any study of the common law in England as it existed at the time when the constitution was adopted, or since that time. Odgers, Common Law of England, Vol. 1, pp. 590-594. The paramount rights of congressional control to which the title of a state to the waters within its boundaries and the riparian titles of its citizens were subject was only the appropriation of all the waters of a navigable waterway for an avenue of commerce along such natural highway, including the natural extensions thereof together with the right to improve that natural highway in its natural basin without regard to any incidental injury therefrom; but it never included within the grant of power, the right to take or seriously injure one of the great gifts of nature belonging to one or more states and hand it over to another state or states, even as an incident of interstate commerce. These complaining states were settled because of the existence of these resources, and the states themselves then enlarged and enhanced the gifts of nature within their boundaries. Citizens of these states settled and established themselves within their borders because the natural resources contained therein appealed to them. Was it ever contemplated by the framers of the constitution that such natural resources might at any time be taken away from those who had settled in proximity to them and developed and made use of them, for the benefit of people who had chosen to settle and locate in another watershed? This is a very different question from the right of the federal government to do incidental damage by improving a natural waterway substantially in its natural location. It is unthinkable that a power given to Congress only by implication was ever intended to permit a temporary majority of a political body to take or injure the gifts of nature in one state, for another. It is our contention that Congress has no more power to take the water which is the property of the complaining states to their injury, either to give it to Illinois for any purpose or to create an artificial waterway in another watershed, than it would have to authorize the state of Illinois to appropriate the forests of Wisconsin to construct canals or locks on the Illinois River for the improvement of navigation. For the purpose of making the principle involved very clear, let us assume an extreme case. Assuming it were economically and mechanically possible to transport the waters of the Great Lakes system by syphon, pipe line or other mechanism, to the Sacramento River, would it be contended that Congress had the power of appropriating the waters of the Great Lakes-St. Lawrence system for the improvement of navigation on the Sacramento River? Yet there is no distinction in principle between such a case and the appropriation of the waters of the Great Lakes for the Illinois and Des Plaines Rivers.

In asserting this lack of constitutional power on the part of Congress, complainants do not consider that they are challenging any of the great decisions of this court with reference to the improvement of navigable waters by Congress. The facts present a novel question which, in the opinion of the complainants, has never been passed upon by this court.

2. *In any event, the acts of Congress for improvement of navigation must be reasonably appropriate to that end. The acts of Congress in control and improvement of navigation under the commerce clause of the federal constitution must be reasonably appropriate to the ends of navigation and not arbitrary or capricious or for any other purpose, such as the sanitation needs, real or imaginary, or the power's desires of another state or city. It cannot, under the guise of the power to regulate interstate commerce, arbitrarily destroy the rights of riparian owners or the proprietary rights of littoral states without any object ~~not~~ really related to navigation.*

The power of Congress to regulate a navigable waterway even in ~~when~~ its natural channel and natural basin extends only to an improvement of navigation upon such waterway. That right does not include the abstraction or destruction of the waters of such waterway.

In *Woodruff* v. *North Bloomfield Gravel Mining Co.,* 18 Fed. 753, the defendant mining company sought to justify the obstruction of a river with debris from its mining operations upon the ground of federal authority. On pp. 778, 779 the court, Sawyer, J. said:

> "Congress is authorized to *'regulate,'* but not to *destroy* 'commerce among the states.' It may, undoubtedly, in its wisdom, obstruct, or, perhaps, destroy navigation, to a limited extent, at particular points, for the purpose of its general advantage and improvement on a larger general scale, such, for example, as by authorizing the building of a railroad or post-road bridge across a navigable stream; but it cannot destroy, or authorize the destruction, entire or partial, of the whole system of navigable waters of a state for purposes wholly foreign to commerce or post-roads, or to their regulation. If congress could so authorize, or, as it is claimed, has so authorized, the acts complained of as to make them lawful, then it can authorize, and it has authorized, the filling up and utter destruction of all the navigable rivers, streams, and bays of the state, for there is no limit fixed to the amount of *débris* that may be sent down; and upon the hypothesis claimed, if such waters are not filled up and destroyed, it is for want of physical capacity to do it, and not because it is unlawful.
>
> "But the injury to navigation is not the only element of a public nuisance in the case. The injuries already accomplished, and those still accruing, as well as those threatened to the cities and riparian proprietors of a large extent of country, if unlawful, constitute a public nuisance of themselves, irrespective of the injuries to navigation; and there can be no possible ground for maintaining that congress has authority to legalize such injuries, and take away their character of a public nuisance. There is, then, no plausible ground for holding that congress has ever attempted to make the acts complained of unlawful, or, if it had, that there is any power vested in congress to effect that purpose. These acts, therefore, have not been legalized by reason of any congressional action."

While the power of Congress in the control of navigation under the interstate commerce clause is plenary within its field, it has always been recognized that its acts under that power could not exceed what was reasonably necessary for the improvement of navigation.

Could it be reasonably claimed that Congress has the power to drain the Great Lakes? If Congress has that power, it may reduce the Great Lakes, and particularly Lake Michigan, to nothing more than a small river or canal following the lowest part of the bed of the lake, and leave the property and the great cities of the complainant states in effect stranded upon the edges of this dried up basin. It seems to us unthinkable that Congress could have that power. Certainly Congress could not exercise that power for the sanitation needs or power desires of the state of Illinois. It seems equally clear that they could not exercise that power without any reasonable relation to the ends of navigation. If these conclusions are correct, then there is a limit to the extent to which Congress can abstract the waters of the Great Lakes and lower their water levels and impair their navigable capacity. If there is a limit, the question is then present as to what is the proper definition of that limit. It seems clear that it could not in any event exceed the amount of abstraction which would be reasonably necessary for navigation upon the Des Plaines and Illinois Rivers.

The decisions of this court with respect to the use and obstruction of highways offer an instructive analogy. In *Barney* v. *Keokuk,* 94 U. S. 324, 342, 24 L. Ed. 224, it was held that the public authorities could not authorize permanent obstructions like a depot building, on the streets of a town. In this case the public authorities had attempted to authorize a railroad company to occupy a public street with a depot building. The owner of the adjoining lots brought ejectment. This court said:

> "The Circuit Court is clearly correct, however, in holding that the construction of a permanent freight depot in Water Street was an unauthorized and improper occupation of that street. It was a total obstruction of the passage; and this, as we have said, cannot be created or allowed. It is subversive of, and totally repugnant to, the dedication of the street, as well as to the rights of the public."

The court stated that it made no difference in its opinion whether the public owned the fee of the street or merely an easement for highway purposes. The rule was laid down that the public authorities could not authorize any obstruction in a public highway, and that the public authorities could not authorize any use of a public highway for any purpose other than that of a public avenue of communication. This doctrine is recognized in the following cases:

> *Burlington Gas Light Co.* v. *Burlington, etc. Rwy. Co.,* 165 U. S. 370, 17 Sup. Ct. 359, 41 L. Ed. 749;
>
> *Muhlker* v. *N. Y. & Harlem R. Co.,* 197 U. S. 544, 25 Sup. Ct. 522, 49 L. Ed. 872;
>
> *Sauer* v. *City of New York,* 206 U. S. 536, 27 Sup. Ct. 686, 51 L. Ed. 1176.

Is not the trust of the federal government in the navigable waters of the United States just as sacred and of as high a degree as that of a state in a public highway. If such is the fact, these cases sustain the proposition that the federal government has no authority to authorize any use of, or the creation of any obstruction in, any of the navigable waters of the United States, except for the promotion of navigation thereon as a public avenue of commerce.

3. *If Congress can appropriate these waters in any amount, it can do so only for the promotion of navigation, and then only to the extent reasonably necessary therefor; and the court will enjoin abstractions admittedly in excess thereof.*

In *Kansas* v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956, the federal government sought to intervene for the purpose of controlling the waters of the Arkansas River for the use in the irrigation of arid lands. This court in denying the petition of the federal government pointed out that the federal government was one of delegated and enumerated powers; that its sole concern with the waters of the United States under the constitution was for purposes of navigation, and that it had no interest in such waters which it could assert for any other purpose. While the federal government did not seek to interfere, the same conclusion would be reached from *New York* v. *New Jersey*, 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937.

In *U. S.* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 19 Sup. Ct. 770, 43 L. Ed. 1136, the federal government sought to enjoin the defendant corporation from impounding the waters of the Rio Grande at a point in the territory of New Mexico where such river was not navigable, as an interference with the navigable capacity of said river on its lower reaches where it had navigable capacity.

This court refused to enjoin all impounding of the waters of the Rio Grande River by the defendant company, but merely enjoined the impounding of any quantity which it should be determined would substantially interfere with the navigable capacity of the lower reaches of the Rio Grande River. It thereby impliedly denied the authority of the federal government to interfere with the exercise and control of the waters of the Rio Grande River beyond the point where navigation was affected. The court also undertook to determine the amount of waters which might so be impounded without substantial injury to navigation. This determination was made at the instance of a private corporation which was a defendant in that case. Surely the rights of these great states in their quasi-sovereign capacity and in their proprietary capacity as owners of these waters, rise to a higher dignity than the right of a private individual. Certainly the court, at their request, will determine what, if any, amount of water may be abstracted by Congress from the Great Lakes-St. Lawrence System for the improvement of navigation in another watershed. But here no determination is necessary, as it is admitted on the pleadings, and is conclusively established by the government reports that any abstraction in excess of 1,000 cubic second feet is not necessary for navigation in the Illinois and Des Plaines Rivers, and would in fact be detrimental to navigation in those rivers.

4. *If such an appropriation of the waters of one or more of the states, to their injury, were otherwise valid, the act would still violate Article I, Section 9, Clause 6 of the federal constitution.*

Article I, Section 9, Clause 6 of the Constitution of the United States reads as follows:

> "No preference shall be given by any Regulation of Commerce or Revenue, to the Ports of one State over those of another; nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another."

The effect of this provision of the constitution was raised in *Pennsylvania* v. *Wheeling Bridge Co.,* 18 How. 421, 15 L. Ed. 435. The effect of this provision was again raised in *South Carolina* v. *Georgia,* 93 U. S. 4, 23 L. Ed. 782. This court in commenting upon the construction placed upon this provision in the *Wheeling Bridge Company* case, *supra,* said, p. 13:

> "It was there said that the prohibition of such a preference does not extend to acts which may directly benefit the ports of one State, and only incidentally injuriously effect those of another, such as the improvement of rivers and harbors, the erection of lighthouses, and other facilities of commerce."

In the *Wheeling Bridge* case it was held that the fact that Congress had authorized the construction of a bridge over the Ohio River at Wheeling which incidentally might to some extent hurt navigation to the ports of Pittsburg in Pennsylvania did not violate this provision. In *South Carolina* v. *Georgia, supra,* it was held that the act of the federal government, in closing one of two channels in the Savannah River where that river was divided by an island, did not come within this prohibition. The reason for such a holding was that where Congress, in the exercise of a lawful power, made an improvement at a port in one state which might incidentally affect the ports of another state, such incidental effect could not be construed to invalidate the exercise of a valid power. That is, Congress may, for instance, improve the harbors of the ports of one state. Such improvement may incidentally tend to give such harbors a preference over those of another state by reason of the fact that such improvements will make such harbors more attractive to commerce. However, such an incidental result cannot interfere with such a valid congressional act. It is analogous to the rule that although Congress cannot arbitrarily injure riparian rights, under the guise of improving navigation, any injury which is done to riparian rights in the lawful improvement of the navigation along the watercourse is *damnum absque injuria*. In short, the acts which do not come within this prohibition are those which are performed at the particular port or ports of a state, without any direct relation to the ports of other states, and where the results to the ports of other states can only be consequential and indirect. However, where the act of Congress directly gives a preference to the ports of one state over those of another, it is within the constitutional prohibition. In the instant case, were Congress to attempt to authorize the taking or attempt directly to take the waters of the Great Lakes away from the ports of the complaining states and give such waters to the ports of Illinois, it would be an act directly and positively giving a preference to the ports of Illinois over the ports of the complaining states. Certainly it can not be contended that if Congress attempted to take all of the water of the Great Lakes by draining them, and give such waters to the ports of the state of Illinois for navigation purposes in either natural or artificial channels, such act would not constitute a direct and positive preference of the ports of that state over the ports of the complaining states. If a lesser amount of water is taken away from the lakes, and consequently from the ports of the complaining states, to give to the ports of Illinois for an artificial waterway, the preference can be none the less a preference though less in degree. The constitutional provision recognizes no degrees, perhaps for the well-known reason that a very small commercial advantage is sufficient to enable one port to ruin another. It does not say that Congress can give the ports of one state a little preference, or a medium preference, but that it can give them no preference. We submit that this constitutional prohibition would be an absolute bar to any attempt of Congress to take the waters of the Great Lakes away from the ports of the complaining states and give those waters to the ports of Illinois. We are not dealing with the extent of a constitutional power delegated to Congress which should be liberally construed to effectuate the purposes of the delegation, but we are dealing with the lack of such a power under the terms of the constitution, and that instrument should be construed just as liberally to prevent Congress from asserting a power which was denied to them under its terms.

VII

ASSUMING THAT CONGRESS COULD AUTHORIZE SUCH AN ABSTRACTION OF THE WATERS OF THE GREAT LAKES AS TO IMPAIR THEIR NAVIGABLE CAPACITY, IT HAS NEVER DONE SO.

1. *The Act of Congress of March* 2, 1827, *does not authorize the abstraction of the waters of the lakes.*

It can hardly be believed that the defendant seriously contends that the Act of Congress of March 2, 1827, 4 Stats. at Large 234, constitutes or constituted any authority for the abstraction of the waters of the lakes. Prior to the argument of the case of *The Sanitary District of Chicago* v. *U. S.*, 266 U. S. 405, 45 Sup. Ct. 176, 69 L. Ed. 352, the defendant state of Illinois and the Sanitary District of Chicago had never pretended that this act of Congress constituted any such authority. The idea that any such authority existed under any such act was clearly an after-thought. The canal authorized by that act had and has no relation to or connection with the Sanitary Canal. That act contemplated a summit level canal with locks to be operated by the natural flow of the waters. It was a canal the location of which was fixed by law, and which location is not the location of the Sanitary Canal. It was a canal for navigation and not for sewage and power as is the Sanitary Canal. It would, furthermore, have been rendered inoperative by the subsequent Rivers and Harbors Act enacted prior to any abstraction of the waters of the lake by the defendant Sanitary District. Any contention, however, that such act constitutes congressional authority for the present abstraction was decided against the defendant in *Sanitary District of Chicago* v. *U. S.*, 266 U. S. 405, 45 Sup. Ct. 176, 69 L. Ed. 352.

2. *The permit of the Secretary of War issued March* 3, 1925, *does not purport to authorize any abstraction of the waters of the Great Lakes which would injure their navigable capacity.*

Such a grant would be in derogation of the public rights and should therefore be strictly construed against the grantee or permittee. *Louisville Bridge Co.* v. *U. S.*, 242 U. S. 409, 37 Sup. Ct. 158, 61 L. Ed. 395.

The permit is set forth in the Bill of Complaint, pp. 30-31-32. However, the preliminary recital to the permit is not set forth in the bill, and we quote it herewith:

> "It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings* v. *Chicago*, 188 U. S., 410.)"

The first condition of the permit provides "that there shall be no unreasonable interference with navigation by the work herein authorized." Construing the permit of the Secretary of War in the light of the recognized rules of construction, it only purports to authorize the Sanitary District of Chicago to abstract so much of the waters of the Great Lakes as will not injure their navigable capacity, but not exceeding 8,500 cubic second feet in any event. Clearly the permit does not purport to authorize the Sanitary District of Chicago to abstract a quantity of water from the lakes which will injure their navigable capacity, and that district is limited to such quantity as will not injure the navigable capacity of the lakes no matter how small that quantity may be. Under the state of the pleadings in this case and facts which cannot be successfully controverted, that amount will not exceed 1,000 cubic second feet. For the purposes of the present motion to dismiss, however, it is only material that the present admitted abstraction does [redacted] injure the navigable capacity of the lakes.

It should be noted that this permit does not constitute any appropriation of the waters being abstracted by the defendant Sanitary District for the purposes of navigation, such as was the case in the congressional act under consideration in *U. S.* v. *Chandler-Dunbar Water Power Co.,* 229 U. S. 53, 33 Sup. Ct. 667, 57 L. Ed. 1063. The permit at most could constitute a mere permissive and revokable consent to the abstraction of navigable waters, creating no property rights in the permittee.

3. *The Rivers and Harbors Act does not empower the Secretary of War to authorize any obstruction of the navigable waters of the United States; and to the extent that the permit of the Secretary of War is claimed to authorize obstruction of the waters of the Great Lakes in excess of the amount needed for navigation, it would be clearly unauthorized by said act.*

Section 10 of the Rivers and Harbors Act of March 3, 1899, (30 Stats. at Large 1151) reads as follows:

> "Sec. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier,

dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

It is obvious that this section of the Rivers and Harbors Act prohibits any obstruction or injury to the navigable capacity of any of the waters of the United States which has not been *affirmatively* authorized by Congress. The Secretary of War, on recommendation of the Chief of Engineers, is then authorized to give a revocable consent or license for the construction of certain enumerated structures which may not constitute an obstruction to navigable capacity, if properly constructed and providently located. The act then proceeds to authorize the Secretary of War on recommendation of the Chief of Engineers to give a revocable license or consent for certain other works within the navigable waters of the United States, which may not constitute any obstruction to navigable capacity or constitute such an unappreciable obstruction as to be unimportant. However, the abstraction of the waters of a navigable watercourse of the United States, or the construction of an entirely new, artificial waterway, is not among the possible obstructions to navigation for which the Secretary of War is authorized to give even a revocable permit or consent. Obviously the building of a wall, pier or dolphin is not a question of national policy. Just as obviously, the project of turning the waters of the Great Lakes, constituting the greatest and most important inland waterway and avenue of commerce in the world, even if within the power of Congress, would be a momentous question of national policy which Congress would be neither willing nor able to delegate to one man. The determination of whether a dolphin may be constructed without injury to the navigable capacity of waters is a question of fact which may readily be determined by the Secretary of War as a fact upon which the legislative will, as declared by statute, may be brought into operation.

In short, Section 10 of the Rivers and Harbors Act clearly means the following:

(1) The creation of any obstruction to the navigable capacity of a navigable water must be affirmatively authorized by Congress, e. g., there must be an act of Congress, general or special, authorizing the obstruction.

(2) A modification of the course, location, condition, or capacity of any navigable water of the United States when *not* amounting to an obstruction, must, to be lawful, be recommended by the Chief of Engineers, and authorized by the Secretary of War.

Under sec. 10 of the Rivers and Harbors Act of 1899, the secretary of war has delegated power only. The only power which is delegated to the secretary of war and the only power which constitutionally could be delegated to him under that act is to determine a question of fact as to whether a given construction or act will materially affect navigation.

By that act congress thus intended to delegate to the chief of engineers and the secretary of war administrative authority to determine the facts. If they were of the opinion that a contemplated use of navigable waters in a certain case, was not such an impairment of their navigable capacity as to require the prohibition of congress, then the construction, use or act was "affirmatively authorized by congress" because the administrative agent to which congress had delegated the ascertainment of the facts had found the facts to be that such use was not for the time being an impairment of navigable capacity such as congress intended to prohibit.

The function of the war department under the acts of congress is to determine these facts and not questions of policy. The intention of congress that navigable waters of the United States shall not be diverted for local purposes so as to injure the just rights of the whole people in the navigability of such waters, is very clear. The decision to divert the waters of the Great Lakes to the Mississippi watershed, even if within the power of congress, would be clearly a question of policy and not the determination of a fact.

The present permit of March 3, 1925, under which abstractions are now being made, expressly negatives any implications that the secretary of war decided that the diversion of 8,500 cubic second feet does not obstruct navigation or impair the navigable capacity of the Great Lakes. This is made clear by the first condition in that permit. It is further shown by the reports of the engineers and the letter of the Secretary of War to the Sanitary District, which appear in Appendix I of this brief. Since this permit does not have, and does not profess to have, any relation to navigation or questions of navigation, but obviously assumes to deal with questions of sanitation, it is a nullity.

This act has not been construed by this court, but it has been construed by the circuit court in *Hubbard* v. *Fort,* 188 Fed. 987. On pages 992-993 the court said:

> "So far as applicable to the present question, such section may be summarized thus: First, the creation of any obstruction to the navigable capacity of any waters of the United States is prohibited unless affirmatively authorized by Congress; second, it shall not be lawful to build any structure in a navigable river or water of the United States, except on plans recommended by the chief of engineers and authorized by the Secretary of War; and, third, it shall not be lawful to excavate or fill the channel of any navigable water of the United States unless such work is recommended by said Secretary of War prior to beginning the same."

It is interesting to note that by Section 9 of Chapter 429 of the Act of March 3, 1899, 30 Stats. at Large 1151, it was made unlawful to construct or commence to construct any bridge over any navigable water of the United States without the consent of Congress, or with such consent until the plans shall have been submitted to and approved by the Chief of Engineers and the Secretary of War. Accordingly, before a bridge can be built over the navigable waters of the United States, the consent of Congress must be obtained by statute. Can it be reasonably contended that Congress, by the Rivers and Harbors Act of 1899, 30 Stats. at Large 1121, reserved to itself the exclusive right of determining whether a bridge should be built over any of the navigable waters of the United States, but delegated to the Secretary of War the right to determine whether the Great Lakes should be drained into the Mississippi Valley?

We quote further from the discussion of this act in *Hubbard* v. *Fort, supra,* pp. 996-997:

> "And how can it be said that the structures or the works subsequently referred to in this section may not amount to an obstruction to such navigable capacity? It is to be noted that 'excavate or fill' is associated with 'alter or modify the course, location, condition, or capacity of any' navigable water, all of which may be so performeed as to become serious obstructions to navigation. That such obstructions may be but slight, and that some will be of only temporary duration, would not make them any less obstructions, and within the prohibition. Any less comprehensive interpretation of the first part of section 10 would do violence to its language, and, as already said, be meaningless. If Congress intended that as to all other obstructions not prohibited by section 9, no affirmative action by Congress should be necessary, but that they might be constructed upon obtaining the permission of the Secretary of War it used singularly inapt and ambiguous language in expressing such intention.
>
> "The use of the word 'authorize' instead of 'approve' does not change the Secretary of War's act from permissory to plenary. Two of the definitions of the word 'authorize' are to aprove of; to formally sanction. Cent. Dict. & Cyc. What does the Secretary of War authorize? Not the building of the structures mentioned in the second part of this section, but the plans to which such construction is to conform. And what does he authorize as to excavating, filling, altering, etc., of the channel of navigable waters, but the commencement, the character, and the manner of doing

such work? While the language here employed is not as felicitous and clear as it might be, yet, when it is considered that Congress here revising and amending, any other interpretation than that such official action by the designated executive officer was to be had only after the initial power to do such works shall have been procured from Congress would be to unnecessarily limit the plain and unambiguous language used in the first part of this section by which full control over all the works in interstate waters was kept in Congress itself.

At pages 998-999, Id., is the following:

> "Among the changes effected by the act of 1899 was to require the affirmative authorization by Congress to create any obstruction to the navigable waters of the United States, except that bridges, dams, dikes, and causeways in or across waters the navigable portions of which lie wholly within the limits of a single state was permitted if authorized by state legislation and the locations and plans of such structure were approved by the chief of engineers and by the Secretary of War. Perhaps without the change from 'authorized by law' to 'authorized by Congress' no obstruction to the navigable capacity of interstate waters without affirmative congressional enactment would have been lawful, but a present reading of the law in the light of the history of its enactment clearly evinces to my mind a legislative purpose to require affirmative action on the part of Congress before such a crossing of interstate streams as contemplated by complainants in this suit shall be permitted, and that only when such congressional action shall have been taken can the powers delegated to the Secretary of War be put into operation."

That the acts of the defendant Sanitary District constitute obstructions of navigable capacity of the Great Lakes was decided in *Sanitary District* v. *U. S.*, 266 U. S. 405, 429, 45 Sup. Ct. 176, 69 L. Ed. 352, where this court said:

> "As now applied, it concerns a change in the condition of the Lakes and the Chicago River, admitted to be navigable and, if that be necessary, *an obstruction to their navigable capacity.*"

Moreover, the Secretary of War in any case has no power to grant a permit except before the work is begun. He is not authorized to validate a work unlawfully begun or constructed. When a state illegally creates an obstruction, the act gives the Secretary no power to sanction it or authorize its continuance.

VIII.

IF THE RIVERS AND HARBORS ACT ATTEMPTS TO AUTHORIZE ABSTRACTION OF WATERS OF THE GREAT LAKES WITHOUT REGARD TO THE INJURY TO THEIR NAVIGABLE CAPACITY AND NOT TO PROMOTE NAVIGATION, BUT FOR THE SANITATION AND POWER DESIRES OF ILLINOIS, IT IS UNCONSTITUTIONAL AND VOID.

The scope of the power of Congress over navigable waters under the interstate commerce clause is limited solely to regulation of their use and their improvement for navigation purposes. It is not a case of the extension of a valid power; it is the case of an absence of power. Thus, the United States has no jurisdiction over the waters of the United States for the purpose of reclaiming arid lands. *Kansas* v. *Colorado,* 206 U. S. 46, 27 Sup. Ct. 655, 51 L. Ed. 956. The United States Congress has no power to authorize the filling in of a stream with the debris of mining operations. *Woodruff* v. *North Bloomfield Gravel Mining Co.,* 18 Fed. 753, 778. In *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 431, 45 Sup. Ct. 172, 69 L. Ed. 352, this court said:

> "It is doubtful at least whether the Secretary was authorized to consider the remote interests of the Mississippi States or the sanitary needs of Chicago."

While the federal government may lawfully dispose of surplus power which is incident to a valid improvement in navigation, it has no control over the power developments or navigable waters except in so far as regulations of navigation incidentally affect such power development.

Valid regulatory acts must be appropriate to the ends of navigation. Otherwise they are beyond the power of Congress. *United States* v. *River Rouge Improvement Co.*, 46 Sup. Ct. 144, 70 L. Ed. 148 (advance sheets); *Illinois Central Rwy. Co.* v. *Illinois*, 146 U. S. 387, 13 Sup. Ct. 110, 36 L. Ed. 1018; *Port of Seattle* v. *Oregon Rwy. Co.*, 255 U. S. 56, 41 Sup. Ct. 237, 65 L. Ed. 500; *Alabama* v. *Gulf Power Co.*, 283 Fed. 606; *New Jersey* v. *Sargent*, 46 Sup. Ct. 122, 124, 70 L. Ed. 177, 181 (Advance Sheets).

To the extent that the Rivers and Harbors Act attempted to authorize such abstraction for such purposes it would violate Article I, Section 9, Clause 6 of the federal Constitution. The argument upon the effect of that provision is set out in a prior section of this brief.

IX.

ASSUMING THE PERMITS OF THE SECRETARIES OF WAR TO BE VALID PURSUANT TO CONGRESSIONAL AUTHORITY FOR THE ABSTRACTION OF THESE WATERS SO FAR AS RELATES TO OBSTRUCTION OF NAVIGABLE CAPACITY (WHICH WE DO NOT CONCEDE), THESE PERMITS ARE NO DEFENSE TO THIS BILL

The various permits of the Secretaries of War do not in any sense constitute an appropriation of the waters abstracted to the uses of navigation, but on their face, purport to be mere temporary consents to what would otherwise be an illegal and criminal obstruction in navigable waters under the Rivers and Harbors Act. The distinction between such a permit and a valid act of Congress appropriating all of the waters of a navigable stream for the use of navigation in that stream is obvious. It was an act of the latter character which was under consideration of this court in *United States* v. *Chandler-Dunbar Water Power So.,* 229 U. S. 53, 33 Sup. Ct. 667, 57 L. Ed. 1063. In fact, such permits do not constitute affirmative authorization of any character. They at most constitute a defense for the sanitary district on a charge of violation of the criminal provisions of the Rivers and Harbors Act. They constitute no authority to do the work or act in question. They do not authorize any invasion or injury to the rights of others and the secretary would be without power to give such authority if he desired. This is made clear by the heading of the permit which we quote as follows:

> "NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings* v. *Chicago,* 188 U. S., 410)"

The permits are at best mere permissive, revocable consents creating no property right in the permittee. While that question has not been presented to this court it has been passed upon by a number of other courts. In *Hubbard* v. *Fort,* 188 *Fed.* 987, the receivers of the Hudson County Water Company sought to maintain a right to lay two water mains across the Kill von Kull by virtue of a permit issued by the Secretary of War and against the protest of the State of New Jersey. A bill was brought to enjoin the officials of New Jersey from enforcing the provisions of a New Jersey statute. The complainant claimed such statute was an illegal interference with interstate commerce, and that the permit of the Secretary of War was complete authority. The court held that the permit of the Secretary of War consituted no authority to lay the water mains.

and dismissed the bill for want of equity. The distinction between an act of Congress in the furtherance of navigation and interstate commerce and a permit to an individual to engage in a private work was well pointed out by the court, which said, p. 999:

> "This is not a case of the United States government seeking to make a crossing of this interstate stream in the exercise of its governmental powers, but an attempt to override a sovereign state's opposition to the use of its submerged land by a corporation of its own creation, under the claim of being engaged in interstate commerce."

A labored attempt is made in the brief of the Sanitary District to show that the permit is an affirmative act of the government in furtherance of a scheme for the improvement of navigation. This is based first on the condition that it shall not unreasonably interfere with navigation. Instead of showing that the act licensed under the permit is in furtherance of navigation, it conclusively establishes that it is probably detrimental to navigation, and unreasonable interference therewith. The making of inspections by the United States is not in the interests of furthering navigation by virtue of the act of the defendants, but in the interests of safeguarding navigation from serious injury by the acts of the defendant. The same situation applies with reference to the prohibition of interference with the full, free use by the public of the navigable waters of the United States. The provision with reference to sewage treatment by artificial processes is not to the end that navigation shall be promoted by virtue of the abstraction of the defendants, but to the end that such abstraction may be reduced as speedily as possible in order to terminate the admitted injury to navigation from the defendants' act. It is indeed a bold position to assert that under the guise of improvement of navigation the defendants may claim the right to abstract waters to the injury of navigation for the purpose of counteracting their illegal pollution of navigable waters. The construction of controlling works, the question of compensating works, the execution of the sewage treatment program and the metering of the water supply are all to the end that the injury to navigation from the defendants' unlawful abstraction shall be terminated as speedily as possible and establish that such abstraction is not in promotion of navigation, but detrimental to it.

In *Cobb* v. *Commissioner of Lincoln Park*, 202 Ill. 427, the highest court of Illinois passed upon the effect of a permit issued by the Secretary of War and that court held that it was no defense to an action by private individuals who would be injured by the performance of the act specified in the consent. At pp. 439-440 the court said:

> "But such permission is not given to override the rights of the owners of the submerged lands. It is, as said above, a declaration by the guardian of the interests of the public at large that the proposed structure will not interfere with navigation. It is strictly permissive, and not an authorization by paramount authority to build the structure."

Such must necessarily be the effect of such a permissive consent by the Secretary of War. Otherwise, although Congress itself is without power to control the navigable waters for any purpose other than the promotion of navigation and without power to arbitrarily injure and destroy the riparian rights of private individuals for any purpose other than to promote navigation, the Secretary of War might, under the guise of such permissive consent, destroy any or all riparian rights without promoting the ends of navigation.

In *Wilson* v. *Hudson County Water Co.*, 76 N. J. Eq. 543, 76 Atl. 560, the court in discussing this statute and the facts presented in *Hubbard* v. *Fort*, said, p. 558:

> "The doctrine of *Cobb* v. *Lincoln Park*, as applicable to the case under consideration may be paraphrased as follows: The provisions of section 10 of the River and Harbor Act of March 3d, 1899, were designed to protect the navigable waters of the United States (including the Kill von Kull) from encroachment and from obstruction to navigation, and to commit the duty of their protection to an officer of the general government without whose per-

mission no such obstruction can be made; that the act is a mere regulation for the benefit of commerce and navigation and that the license or permission of the secretary of war is only a finding and declaration that a proposed structure or excavation would not interfere with or be detrimental to navigation, and is not equivalent to a positive declaration by the authority of congress that the licensee may make such obstruction or excavation without first obtaining the consent of the owner of the submerged land; that the Water Company, not having by the law of this state the right to excavate on the submerged lands without the state's consent, could not acquire that right by obtaining a license from the secretary of war; that the act is not a declaration touching the rights of the owner of the submerged lands in question, and, assuming that the permission of the general government to the excavation and laying of the proposed pipe line is necessary, such permission is not given to override the rights of the owner of the submerged lands, namely, the State of New Jersey, and it is, as said, the declaration by the guardian of the interests of the public at large that the proposed work will not interfere with navigation, and is strictly permissive, and not an authorization by paramount authority to do the work proposed."

In *Attorney General ex rel. Becker* v. *Bay Boom W. R. & F. Co.*, 172 Wis. 363, 376 178 N. W. 569, the effect of a permit of the secretary of war under the Rivers and Harbors Act was considered and discussed. That was an action brought by a citizen of Wisconsin on the relation of the Attorney General to prevent the construction of a dike within the waters of Lake Poygan, a meandered bod of water in Wisconsin. The court is commenting upon the claim of paramount authority under a federal permit said:

> "The federal permit expressly declares that it grants no property rights or exclusive privileges and that the free use by the public of the area inclosed is not to be prevented. The application for the permit and the grant of it presupposes that there was a body of navigable waters; otherwise it was an idle ceremony. It is considered that the facts show that the construction of the dike was not sought by defendant for the improvement of navigation and that its location and construction is in fact an injury to the public

easement and that the federal permit, in the light of the conditions upon which it was granted, does not vest defendant with the right to continue the dike, since it is an encroachment and injury to the enjoyment of the public easements of navigation and the rights of fishing and hunting."

See also *Thlinket Packing Co.* v. *Harrison Co.*, 5 Alaska 471; *Columbia Salmon Co.* v. *Berg*, 5 Alaska 538.

In this conection it should be observed that, as we have shown above, the complaining states are appearing in this suit to enforce various rights different from and in addition to the right to be free from an unlawful interference with interstate commerce. They appear in the capacity of proprietors of the waters and submerged lands of the Great Lakes and connecting waters within their borders. They appear in their capacities of quasi-sovereign to protect from injury the property rights of thousands of their citizens from damage to piers, docks, buildings, wharves, and riparian lands from the illegal abstraction and the consequent lowering of the levels of the Great Lakes and connecting waters within their borders. They appear in the capacity of *parens patriae* to protect the rights of their people. Even if it were assumed that such permit would be a defense to an action for obstructing the navigable capacity of the waters (which complainants do not concede) the permit would be no defense to the injury to the proprietary rights of the states in these waters and submerged lands or to the injury to the states in their quasi-sovereign capacity. Clearly the permit does not purport to authorize the defendants to appropriate the property of the citizens of the complaining states or to injure the property of such citizens. Under the law of the complaining states the riparian rights are property which cannot be taken even for public use without compensation by the complaining states themselves. When riparian rights are destroyed or substantially impaired, property is taken within the law of these complaining states. For another state to take the property of their citizens is an invasion of their quasi-sovereign rights wholly independent of rights to be free from unlawful obstructions to the freedom of navigation. The permit in any view wholly fails as a defense to the assertion of such rights. The permit itself recites that it shall not be construed as creating any property right or exclusive privilege or authorizing the injury or destruction of the property of others. This point is further illustrated by *New York* v. *New Jersey,* 256 U. S. 296, 41 Sup. Ct. 492, 65 L. Ed. 937. In that case, after the federal government had made a valid settlement of all its rights pertaining to navigation and government property, this court entertained a suit over a period of five or six years, involving the rights of the State of New York in the waters in controversy. In *International Bridge Co.* v. *New York,* 254 U. S. 126, 132, 41 Sup. Ct. 56, 65 L. Ed. 176, where it was asserted that a congressional act constituted paramount authority for the maintenance of the bridge as against the state of New York this court said:

> "There was no exercise of the power of iminent domain by the United States. The State was the source of every title to that land and, apart from the special purposes to which it might be destined, of every right to use it. Any structure upon it considered merely as a structure is erected by the authority of New York."

The court further said that the Rivers and Harbors Act did not make Congress the source of right to build a bridge, but subjected the right to be obtained from the state to the condition of getting congressional consent to act upon the state permit.

Thus, cases relating to the sections of the Rivers and Harbors Act authorizing the Secretary of War to abate a bridge found to be an obstruction to navigation have no application.

X.

THE DOCTRINE THAT IN MATTERS WHERE THE NATIONAL CONCERN IS IMMINENT AND DIRECT THE STATES MAY NOT ACT AT ALL, EVEN WHEN CONGRESS HAS BEEN SILENT, IS NO DEFENSE TO THIS BILL.

By a specious process of reasoning, the defendants attempt to show that the complainants are prevented from maintaining this suit on the ground that it involves a matter of imminent and direct national importance upon which a state may not act even in the absence of congressional action. The first fallacy in the defendants' proposition arises from the assumption that the abstraction of waters by the defendant Sanitary District for sanitation and power purposes is a matter in which the national interest is imminent, direct, and important. The abstraction of waters by that district for sanitation and power is strictly a local proposition in which the nation, as a whole, has no direct or imminent interest, considering only the nature of such act and purposes of such act without regard to the effects which flow therefrom through the necessary operation of natural laws. The national interest is no more imminent and direct in the matter of the local sanitation and power problems of Chicago than in the sanitation problems of every other city in the United States. Such problems have always been considered distinctly local in character. Defendants try to bottom this contention upon *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 426, 45 Sup. Ct. 176, 69 L. Ed. 352. In that case this court said:

> "Evidence is sufficient, if evidence is necessary, to show that a withdrawal of water on the scale directed by the statute of Illinois threatens *and will affect the level of the lakes, and that is a matter* which cannot be done without the consent of the United States, even were there no international covenant in the case."

It is obvious that the matter which this court held to be of direct and imminent national concern was not the use of the waters by Chicago for sanitary and power purposes, but the effect of such use upon the level of the lakes through the operation of natural laws.

The second fallacy in the defendants' contention is the effort to twist this principle from its proper application of preventing any state action in a matter of direct and imminent national importance, even where Congress has been silent, to prevent anyone from challenging an unlawful and illegal state action in defiance of this principle. In short, the defendant State of Illinois violates this principle of limitation upon state action, and then seeks to use the principle to prevent anyone from questioning its violation thereof. This certainly is a bold and unique position. Among cases which have laid down this principle and which is cited in *Sanitary District of Chicago* v. *United States, supra,* as authority for it, is the case of *Kansas City So. R. R. Co.* v. *Kaw Valley Drainage District Co.,* 233 U. S. 75, 79, 34 Sup. Ct. 564, 58 L. Ed. 857. In that case the drainage district secured a decree from the supreme court of Kansas requiring the railroad company, which was an important artery of interstate commerce, to remove certain bridges as obstructions to a river tending to cause the flooding of lands, of the drainage district, in times of high water. As against this decree the railroad company appealed to this court on the ground that such a destruction of their bridges would involve a serious injury to a great artery of interstate commerce. The court held that the state was without authority to order the destruction of such bridges even in the absence of congressional action, since it would amount to an interference with a matter of such imminent and direct national concern that the silence of Congress amounted to a prohibition that there should be any interference therewith. It is to be noted that the matter of imminent national concern was not the flooding of the lands of the drainage district, but the destruction of an important artery of interstate commerce. If the principle urged by the defendants were correct then this court should have dismissed the suit of the railroad company on the theory that it could not question the action, in effect of the State of Kansas, ordering the destruction of its bridges and the consequent injury to the nation in a matter of direct and imminent national concern, because it was such matter of imminent and direct national concern and could not be questioned by anyone except the federal government. In short, the situation would have been that, although the State of Kansas had unlawfully acted in a field forbidden to it because of its direct and imminent national concern, the person or corporation injured by such unlawful act on the part of the state could not question the act in this court, because of the very principle which made the act illegal and unlawful. The fallacy of this position is self-evident.

XI.

THE BOUNDARY WATERS TREATY OF 1909 IS NO AUTHORITY FOR THE ACT OF THE DEFENDANTS: ON THE CONTRARY, IT FORBIDS THE ACT.

At the outset it may properly be observed that under the treaty power the federal government cannot extend its constitutional authority. Therefore if, as contended by the complaining states, Congress is without power under the constitution to authorize the acts of the defendants, then obviously Congress or the federal government could not authorize and sanction such acts by an exercise of the treaty power.

Some reference is made in the briefs of the defendants to hearings and reports of the International Waterways Commission in which reference was made to the Chicago abstraction and in which was contained a recommendation that the Chicago abstraction should never be permitted to exceed ten thousand cubic second feet. This discussion did not purport to recognize any right of Chicago to divert or abstract ten thousand cubic second feet of the waters of the lakes or any other amount. Moreover, many things were discussed in the reports of the International Waterways Commission which were never covered and many suggestions were made which were never adopted in the treaty as finally drawn. One of the things which was not included in the treaty was any authorization for Chicago to abstract any water whatsoever.

Clearly, under the most favorable view which could be taken on behalf of the defendants there could have been no recognition of a right to abstract in excess of four thousand one hundred sixty-seven cubic second feet. At the time when the treaty was ratified the federal government was proceeding with a suit to restrain the illegal acts of the defendants. No illegal abstraction could have been referred to. All subsequent acts of the federal government in any way relating to matters touching the Boundary Waters Treaty must be assumed to have been in furtherance of that treaty in the absence of a direct declaration to the contrary. It must be assumed that Congress would either legislate in furtherance of the treaty or abrogate it. One of the interests of the federal government in *Sanitary District of Chicago* v. *United States*, 266 U. S. 405, 45 Sup. Ct. 176, 69 L. Ed. 352, was the enforcement of international covenant known as the Boundary Waters Treaty of 1909 with Great Britian. It was there recognized that that treaty at least prohibited any abstraction by Chicago in excess of four thousand one hundred sixty-seven cubic second feet. Can it be contended that Congress delegated to the Secretary of War, by means of the power to grant a permissive and revocable permit for certain purposes, the power to abrogate a treaty with a foreign nation?

It is a bold position for the defendants to attempt to assert that a restriction of the abstraction of the waters of the lakes might affect the levels thereof contrary to the provisions of the Boundary Waters Treaty, and one which smacks of bad faith when it is a matter of common knowledge that the archives of the State Department and the records of hearings before the various Secretaries of War upon the defendants' applications for permits are replete with the protests of Canadian authorities and Canadian interests against this abstraction of waters by Chicago as causing serious and substantial damage to Canada and Canadian interests in violation of the covenants of the Boundary Waters Treaty of 1909.

These states have an interest under the Boundary Waters Treaty. Bordering as they do upon the great nation of Canada and having as a result of geographical position a larger volume of trade and a greater amount of intercourse with that nation than other portions of the United States, they are peculiarly interested in the maintenance of friendly relations with t great and friendly nation.

XII.

THE COMPLAINANTS ARE NOT ESTOPPED BY THE FORMER PLEADING.

It is asserted in a brief on behalf of the intervening states that complaining states are estopped by their former pleading. The States of Minnesota, Ohio, and Pennsylvania were not parties to the former pleading. In support of this proposition, reliance is placed upon *N. Pacific R. R. Co.* v. *Slaght*, 205 U. S. 122, 27 Sup. Ct. 442, 51 L. Ed. 738. That was a case involving the title to land, and it was properly held that a final adjudication of the title was *res adjudicata*, although the plaintiff had not asserted all of the legal grounds of title which might have been asserted in the original suit. Surely no argument is needed to demonstrate the utter lack of application of that decision to the facts of this case. In the instant case there has never been any trial on the merits. There has never been any adjudication of rights of any kind. There can be no estoppel because a pleader mistakes a legal right, if such be the fact. It is an elementary principle that there is no estoppel from asserting a prior inconsistant legal position unless it has been sustained by final judgment. Much less can there be any estoppel from asserting a legal position in the pleading which has never been the subject of judicial determination on the merits.

> *Strathleven Steamship Co.* v. *Baulch*, 244 Fed. 412; 21 C. J. 1234.

XIII.

OTHER TECHNICAL OBJECTIONS TO THE BILL ARE WITHOUT MERIT.

The amended bill is within the scope of the original bill. It relates to the same transaction and merely corrects the prayer for relief.

Some of the objections of the defendants go to the prayer for relief. The prayer for relief is not part of the pleading and is not reached by demurrer.

Supreme Sitting O. of I. H. v. *Baker*, 134 Ind. 293, 33 N. E. 1128, 20 L. R. A. 210.

Where an amended bill is complete in itself without reference to the original bill, a demurrer raises the question only of the sufficiency of the amended bill. It does not challenge the right to file it.

Norfold, etc. R. Co. v. *Sutherland*, 105 Va. 545, 55 S. E. 465;

31 Cyc. 463;

Turner v. *Roundtree*, 30 Ala. 706.

The allegations of a plea to which a demurrer has been filed stand admitted.

Briscoe v. *Bank of Kentucky*, 11 Peters 257, 9 L. Ed. 709.

On a demurrer or motion to dismiss a plea its allegations will be liberally construed in favor of the pleader.

Kansas v. *Colorado*, 185 U. S. 125, 22 Sup. Ct. 552, 46 L. Ed. 838.

The rule that the allegations of a plea will be liberally construed on motion to dismiss is peculiarly applicable to a controversy between states which has been said to be of a quasi-international character. In such cases this court has laid down the rule that it will disregard all technicalities and consider the case solely upon its merits. In *Virginia* v. *West Virginia*, 220 U. S. 1, 31 Sup. Ct. 330, 55 L. Ed. 353, 357, 358, this court said:

> "The case is to be considered in the untechnical spirit proper for dealing with a quasi international controversy, remembering that there is no municipal code governing the matter, and that this court may becalled on to adjust differences that cannot be dealt with by Congress or disposed of by the legislature of either

state alone. *Missouri* v. *Illinois,* 200 U. S. 496, 519, 520, 50 L. Ed. 572, 578, 579, 26 Sup. Ct. Rep. 268; *Kansas* v. *Colorado,* 206 U. S. 46, 82-84, 51 L. Ed. 956, 968, 969, 27 Sup. Ct. Rep. 655. Therefore we shall spend no time on objections as to multifariousness, laches, and the like, except so far as they affect the merits, with which we proceed to deal. See *Rhode Island* v. *Massachusetts,* 14 Pet. 210, 257, 10 L. Ed. 423, 445; *United States* v. *Beebe,* 127 U. S. 338, 32 L. Ed. 121, 8 Sup. Ct. Rep. 1033."

See also Equity Rule 19.

CONCLUSION.

In the foregoing brief the complainants have endeavored to demonstrate first, that in the absence of any federal question the right of the complaining states to relief against the defendant State of Illinois and the defendant Sanitary District cannot be questioned, and, second, that there is no federal question which is a bar to the maintenance of this suit.

This suit is simply a controversy between the complaining states and the defendant State of Illinois. All of the argument with reference to the so-called "lakes to the gulf" waterway and with reference to sanitation needs of Chicago, is, in the mind of these complainants, merely for the purpose of attempting to becloud the issues presented by this bill. Properly construed, the bill has no relation to that proposed waterway.

The statement is made in the brief of the intervening defendant that some of the harbors of the complaining states which are specified in the bill of complaint, are mere landings. The government reports of the Department of Commerce will disclose that nearly all of these harbors compare very favorably with the Port of Chicago in the amount of commerce. The issue presented is one of vital importance to the future welfare and prosperity of the citizens of the complaining states. That welfare is sought to be sacrificed merely to save the city of Chicago from expenditures for the sanitary disposal of its sewage which all cities in the United States have to make, and to permit the city of Chicago to continue draining its sewage through a wide area of the United States in defiance of the present state of the art of sewage disposal.

Respectfully submitted,

HERMAN L. EKERN,
Attorney General of Wisconsin,

RAYMOND T. JACKSON,
Special Assistant Attorney General of Wisconsin,

RALPH M. HOYT,
Special Assistant Attorney General of Wisconsin,

CIFFORD L. HILTON,
Attorney General of Minnesota,

C. C. CRABBE,
Attorney General of Ohio,

NEWTON D. BAKER,
Special Assistant Attorney General of Ohio,

GEORGE W. WOODRUFF,
Attorney General of Pennsylvania,

PHILLIP WELLS,
Deputy Attorney General of Pennsylvania.

APPENDIX I.

This appendix contains the report of Major Putnam to the Chief of Engineers on application of Sanitary District of Chicago for permit of March 3, 1925; the recommendation of General H. Taylor, Chief of Engineers, on said application; the letter of the Secretary of War Weeks to the Board of Trustees of the Sanitary District; and, the permit of March 3, 1925.

1.

REPORT OF MAJOR PUTMAN TO CHIEF OF ENGINEERS.

U. S. Engineer's Office, Chicago, Ill., March 2, 1925. To the Chief of Engineers, Washington, D. C.

1. This is an application from the Sanitary District of Chicago, a municipality created under the laws of the state of Illinois, to divert 10,000 cubic feet per second of water from Lake Michigan, for the purpose of keeping the sewage of that locality from contaminating its water supply and for reducing the sewage by dilution.

2. This question of the diversion of water from Lake Michigan has been so thoroughly investigated by the Department and discussed at such great length in various reports that it is not believed advisable to enter into any descriptive or historical review before presenting the recommendations which are to follow. Detailed information of this character may be found in the report entitled "Diversion of Water from Lake Michigan," which was submitted by this office on November 1, 1923.

3. This application is prompted by the action of the United States Supreme Court on January 5, 1915, by which it sustained the position taken by the local United States Court, requiring adherence to the limitations placed by the Secretary of War on the amount of the diversion. The local authorities are faced with the alternative

of a reduction in the amount of diversion to 4,167 cubic feet per second by March 5, 1925, or relief from Congress or the War Department.

4. In the issuance of a permit, the exact meaning of the word "diversion" should be understood. In the recommendations which follow, by diversion is meant the amount of water which is actually withdrawn from Lake Michigan by the Sanitary District of Chicago through its main drainage canal and auxiliary channels, and is not inclusive of the amount flowing in the channels which come from the sewers of the locality. In other words, "diversion" is taken to be the gross flow at Lockport, less the amount of water used by the city of Chicago for domestic purposes.

5. It is recommended that a permit be issued to the Sanitary District of Chicago, covering a period of five years, to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second; the instantaneous maximum not to exceed 11,000 cubic feet per second. This permit should be made conditional upon the following:

(1) The Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

(2) The Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

(3) The Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

(4) The execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the United States District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

(5) If, within six months after the issuance of this permit, the city of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum, thereafter this permit may be revoked without notice.

6. The average diversion from Lake Michigan during 1924 by the Sanitary District has been approximately 8,500 cubic feet per second. This diversion, combined with the discharge from the sewers of the locality, produce a total flow at Lockport of about 9,700 cubic feet per second. This so closely approximates the *flow* necessary to safeguard against reversals of the river into the lake in times of storm (10,000 cubic feet per second) that a permit for *diversion* of 8,500 cubic feet per second will suffice in this regard. No obligation appears to rest with the Department to prevent any increase in pollution of the Illinois and Des Plaines Rivers; the maintenance of *status quo* as regards amount of diversion will place the burden of relieving the lower river situation upon the Sanitary District. Until the controlling works (condition 3) are completed, ample protection against the dangers of a reversal of the river is provided by the authority to divert an instantaneous maximum of 11,000 cubic feet per second.

7. Condition (1), as proposed, provides for the execution of a sewage treatment program which will relieve the load on the Drainage Canal by the equivalent of a population of 1,200,000. Compliance with this condition will make possible a reduction in amount of diversion to 7,250 cubic feet per second or lower by the end of 1929. This condition looks to a reduction to 4,167 cubic feet per second by 1935.

8. It might be considered preferable to substitute the following

condition for the one proposed so that definite yearly performance might be prescribed as closely as possible:

I. That the Sanitary District of Chicago carry out the following program of artificial sewage treatment of a degree sufficient to produce aggregate results equivalent to the complete (100%) treatment of the sewage of a human population of at least 1,200,000.

Before December 31, 1925

(1) Completion of 95th Street Pumping Station.

(2) Completion of Calumet Intercepting Sewer serving area south of 87th Street, east of South Chicago Avenue and north of Calumet River.

(3) Removal of levee at entrance of Calumet-Sag Channel.

(4) Completion of miscellaneous sewer connections to Calumet System (S. D. Budget item 65-56-A-1).

(5) Completion of Elmwood Park Interceptor to Des Plaines River.

(6) Placing of contracts for extension to Des Plaines Plant.

Before December 31, 1926

(1) Purchase of sewer easements for Des Plaines project as follows:

  a. River Grove to Elmwood Park.
  b. Bellwood-Broadview.
  c. North Riverside.

(2) Purchase of easements for sewer extension to Calumet project:

  a. West Blue Island.
  b. Blue Island Branch.
  c. Hegewisch.
  d. Riverdale and Dolton.

(3) Dredging Little Calumet River.

(4) Purchase of site for West Side Plant, including land necessary for trickling filter addition.

(5) Purchase of site for Southwest Side Plant, including land necessary for trickling filter addition.

(6) Completion of following auxiliaries to North Side project:

- a. Interceptors from treatment plant south to Fullerton Avenue.
- b. Necessary syphons and controls.

(7) Placing of contracts for completion of North Side Plant.

(8) Purchase of sewer easements necessary for West Side project.

Before December 31, 1927

(1) Completion of following sewers of Des Plaines project.

- a. River Grove to Elmwood Park.
- b. Bellwood-Broadview.
- c. North Riverside.

(2) Completion of extension to Des Plaines Plant—activated sludge—to give 1945 capacity for connected area.

(3) Placing of contracts for interceptors for West Side project.

(4) Completion of new pumping station to replace existing Lawrence Avenue Station.

(5) Placing of contracts for extension of Calumet Plant.

(6) Placing of contract for West Side Plant—Imhoff.

Before December 31, 1928

(1) Completion of sewer extensions to Calumet project as follows:

a. West Blue Island.

b. Blue Island Branch.

c. Hegewisch.

d. Riverdale and Dolton.

(2) Completion of extension to Calumet Plant—Imhoff—to give 1945 capacity for connected area.

(3) Completion of North Side Plant—activated sludge— to give 1930 capacity for connected area.

(4) Purchase of sewer easements necessary for Southwest Side project.

Before December 31, 1929

(1) Completion of Interceptors—West Side Plant.

(2) Completion of West Side Plant—Imhoff—to give 1945 capacity for connected area.

9. This condition is not recommended, however. It would be quite impractical to enforce; for there would be many changes to be made in the program during the course of its execution, and each change would require the approval of the Secretary of War and the Chief of Engineers, and perhaps, the rewriting of the permit. If condition (1) is couched in the more general terms recommended, it is proposed to inform the Sanitary District that the performance expected of them will be as outlined in detail in paragraph 8, and this would permit minor departures to be authorized promptly as they were necessary.

10. The estimated cost of the proposed program is approximately $54,192,000. The present bonding power of the Sanitary District (3% of the assessed valuation) is insufficient to finance this program; however, legislative authority may be obtained to increase this rate to 5%—the constitutional limitation. The estimated revenue from bonds on this basis (including reissues) to December 31, 1929, is $66,240,000.

11. Condition (2) merely obligates the Sanitary District to pay

its proper share of works to restore the level; or compensate for the lowering of the Great Lakes system should such works be constructed. It does not commit the Department to any particular plan nor to the general proposition of restoration of lake levels. The posting of the guarantee will not embarrass the Sanitary District financially nor interfere with the execution of the sewage treatment program.

12. Condition (3) is considered necessary to permit an ultimate reduction of the diversion to 4,167 cubic feet per second. Controlling works of some sort will be required to keep the Chicago River from discharging into Lake Michigan in times of flood, and at least two types have been suggested which are believed to be practical.

13. The provision with reference to metering of the water service of the city of Chicago is included for three reasons:

(a) There will be a substantial saving in the cost of construction and operation of sewage treatment plans due to the decreased amount of sewage to be treated.

(b) There will be substantial reduction in the amount of lake water used for domestic purposes.

(c) It will be possible for the city of Chicago to finance a filtration system for its water supply when its water consumption is reduced to a reasonable amount. When the water supply is filtered, the dangers incident to an occasional reversal of the Chicago River will be entirely eliminated.

14. A shorter time limit for the permit is not recommended, as results produced by the end of 1927, for instance, will not permit a reduction in the amount of the diversion, which it is believed should be required in any renewal, no matter when it is made. Furthermore, sufficient performance can not be prescribed for a shorter period to insure completion of a larger program looking to a reduction in diversion to 4,167 cubic feet per second by 1935.

(Signed) RUFUS W. PUTNAM,
Major, Corps of Engineers,
District Engineer.

2.

RECOMMENDATION OF CHIEF ENGINEERS.

March 3, 1925.

To the Secretary of War:

1. The Sanitary District of Chicago has made application for a permit to divert an annual average of 10,000 cubic feet per second from Lake Michigan through the channels of the Sanitary District.

2. The District Engineer recommends the issuance of a permit, covering a period of five years, to divert through the main drainage canal and auxiliary canals of the Sanitary District, an amount of water not to exceed an annual average of 8,500 cubic feet per second; the instantaneous maximum not to exceed 11,000 cubic feet per second, such permit to be subject to certain conditions set forth in the first indorsement hereon.

3. The first condition recommended by the District Engineer provides for the adoption and execution of a program of construction of modern sewage disposal plants at such a rate as to provide before the end of five years for treatment of the sewage of a human population of 1,200,000. This figure is believed to be the maximum practicable under existing conditions, and the proposed construction is the first step in a program which will permit the ultimate reduction of the amount of water diverted to 4,167 cubic feet per second, or lower, as treatment plants are installed.

4. The program of construction recommended is limited to five years, as it is not possible to predict what advances may be made in the science of sewage disposal during the next five years. It is entirely within the realms of possibility that during that period such advances may be made as to warrant the Department's insisting on an even more rapid rate of progress thereafter, should a renewal of this permit be sought. A shorter period for the permit is not believed advisable, as it would be difficult to prescribe sufficient progress in the way of construction of sewage treatment plants and require a

substantial reduction in the diversion upon the renewal of the permit.

5. It is estimated that the construction of sewage treatment plants for a population of 1,200,000 will permit a reduction in the necessary diversion from Lake Michigan of about 1,250 cubic feet per second. In other words, such construction would permit a reduction in the authorized diversion, by December 31, 1929, to about 7,250 cubic feet per second. As stated above (paragraph 4), it is probable that a still more rapid rate of reduction of diversion may be practicable thereafter.

6. It is, of course, highly desirable that the excessive diversion of water from Lake Michigan be reduced to reasonable limits with the utmost dispatch. For humanitarian reasons, it is impracticable to make the desired reduction instantaneously, and it is believed that the procedure proposed by the District Engineer is the most reasonable and just to all concerned that can be adopted.

7. As further means of relieving the present undesirable situation with respect to lake levels, the District Engineer recommends as conditions of the permit the prompt adoption and execution of a program for metering Chicago's water supply, the construction of controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms, and also that the Sanitary District be required to pay a share of the cost of such regulating or compensating works for restoring lake levels as may be constructed, posting a bond of $1,000,000 as a guarantee of their good faith in the matter.

8. I concur in the views of the District Engineer, and recommend the issuance of a permit in accordance with the draft herewith.

H. TAYLOR,

Major General,
Chief of Engineers.

3.

LETTER OF SECRETARY OF WAR WEEKS TO SANITARY DISTRICT.

Mr. Lawrence F. King,
President, Board of Trustees,
Sanitary District of Chicago,
910 South Michigan Avenue,
Chicago, Illinois.

March 3, 1925.

Dear Sir:

With reference to your application of January 31, 1925, for permission to divert an annual average of ten thousand cubic feet of water per second from Lake Michigan through the channels of the Sanitary District of Chicago, it is my pleasure to inform you that after careful consideration by the Chief of Engineers and myself, and acting upon his recommendation, I have issued a permit, effective this date, authorizing the temporary withdrawal of 8,500 cubic feet of water per second until December 31, 1929. One copy of this permit is transmitted herewith.

Your attention is invited to the conditions to which this authorization is subject, particularly those prescribing certain definite accomplishments on the part of your locality. This department has always held and continues to hold that the taking of an excessive amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost dispatch. I appreciate that the desired reduction can not be made instantaneously, but with the view of making a substantial reduction by the time this permit expires, the conditions require, among other things, the artificial treatment of the sewage of a large population, the construction of controlling works to prevent the discharge of the Chicago River into the lake, and the metering of the water service of the city of Chicago.

I can not emphasize too strongly the importance of diligent and prompt execution of the conditions imposed. If it is necessary to increase the bonding power of the Sanitary District from three to five per cent of the assessed valuation of the taxable property, or if increased taxing power is imperative, the requisite legislative permission should be obtained promptly. While it is not in my province to dictate, I sincerely urge the reduction of your expenses to the lowest possible requirements, and, further, that arrangements be made with the packers and corn products interests to treat their waste before discharging it into the sewers.

I believe that steps should be taken which will enable Chicago to complete the entire work within ten years.

Sincerely yours,

JOHN W. WEEKS,
Secretary of War.

4.

PERMIT OF MARCH 3, 1925.

ORDER BY SECRETARY OF WAR

NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining *state assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF FEDERAL GOVERNMENT SO FAR AS CONCERNS PUBLIC RIGHTS OF NAVIGATION. (See *Cummings* v. *Chicago,* 188 U. S., 410.)

THE PERMIT

WHEREAS, By Section 10 of an Act of Congress, approved March 3, 1899, entitled "An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," it is provided that it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any part, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, barbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same;

AND WHEREAS, Application has been made to the Secretary of War by *The Sanitary District of Chicago, Illinois,* for authority to divert an annual average of 10,000 cubic feet of water per second from Lake Michigan through the channels of said Sanitary District;

AND WHEREAS, In the judgment of the Secretary of War, an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

NOW THEREFORE, This is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provisions of the aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

1. That there shall be no unreasonable interference with navigation by the work herein authorized.

2. That if inspections or any other operations by the United

States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.

3. That no attempt shall be made by the permittee, or the owner, to forbid the full and free use by the public of any navigable waters of the United States.

4. That the Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

5. That the Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the United States District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

8. That if, within six months after the issuance of this permit, the city of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum, thereafter this permit may be revoked without notice.

9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed

herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice.

10. That this permit is revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress.

11. That this permit, if not previously revoked or specifically extended, shall cease and be null and void on December 31, 1929.

WITNESS my hand this 3rd day of March, 1925.

(Signed) H. TAYLOR,
Major General, Chief of Engineers.

WITNESS my hand this 3rd day of March, 1925.
JOHN W. WEEKS, Secretary of War.

APPENDIX II

This appendix contains the resolutions of protest of the lake states against the diversion of the waters of the Great Lakes by the Sanitary District of Chicago.

WISCONSIN RESOLUTION

[Jt. Res. No. 9, A.]

No. 1, 1925

JOINT RESOLUTION

Protesting to the congress and to the secretary of war of the United States against the continuation of the illegal taking of water from the Great Lakes through the Chicago Drainage Canal.

WHEREAS, Actions were instituted by the United States in 1908 and 1913 against the Sanitary District of Chicago praying an injunction to restrain the diversion of water from the Great Lakes through the Chicago Drainage Canal in excess of four thousand one hundred sixty-seven cubic feet per second, and over the protest of the government a decision was delayed until, after the resignation of Judge Landis, on June 18, 1923, Judge Carpenter decided the case in favor of the government and ordered that the injunction be granted;

WHEREAS, The states of Wisconsin, Minnesota, Michigan, Indiana, Ohio, Pennsylvania and New York joined in appearing as amici curiae with the United States against the Sanitary District of Chicago in said action on appeal before the supreme court of the United States;

WHEREAS, The United States supreme court on January 5, 1925, affirmed the decision of Judge Carpenter, holding that the Sanitary District of Chicago has violated the laws of the United States, that its action is in violation of our treaty with Great Britain and enjoining any abstraction of water in excess of four thousand one hundred sixty-seven cubic feet per second;

WHEREAS, The legislature of Wisconsin in 1921 ordered and directed the beginning of a suit in the supreme court of the United States by the state of Wisconsin against the state of Illinois and the Sanitary District of Chicago to restrain the taking of water from the Great Lakes by the Sanitary District of Chicago and such action has begun and is still pending, no proceedings therein having been had awaiting the final decision in the case just decided;

WHEREAS, The present illegal abstraction of water from the Great Lakes now, and for many years past, has reached the enormous amount of upwards of ten thousand cubic feet per second and has seriously lowered the levels of the Great Lakes and the St. Clair, Detroit, Niagara and St. Lawrence rivers, and has greatly restricted and interfered with navigation thereon;

WHEREAS, The Great Lakes constitutes the greatest waterway in the world, carrying at the present time a tonnage equal to one-fourth of all the railroad tonnage of the United States at a cost of less than one-fifth that of railroad freight rates, and the diversion by the Sanitary District of Chicago has already increased lake freight rates by not less than three million dollars annually and has damaged lake harbors and other works fully twelve million dollars;

The enormous diversion has created currents in the Chicago harbor which have destroyed Chicago as a lake port to its own great loss and to the great loss of all other ports thereby deprived of economical lake transportation to and from this great center of the middle west;

Incalculable damage has been done to farm and other property along the Illinois river and its fishing and pearl industry has been destroyed by the dumping of Chicago sewage into the stream;

The action of the Sanitary District in abstracting nearly ten thousand cubic second feet where less than one thousand cubic second feet is necessary or desirable for navigation has rendered futile all projects for a lake to the gulf waterway by way of the drainage canal and the Desplaines, Illinois and Mississippi rivers, and if continued will forever prevent the development of such waterway;

The Chicago Sanitary District is deriving a revenue of more than one million dollars annually from electric power produced by the waters so taken, and by this diversion is preventing the United States from obtaining its fair share of water for power purposes at Niagara Falls and along the St. Lawrence river, where the same quantity of water will produce at least ten times the amount of power produced by the Sanitary District;

The controversy over the diversion by the Sanitary District stands in the way of the immediate undertaking of the St. Lawrence waterway to give to ocean going vessels access to the Great Lakes and to give to the middle and the northwestern part of the United States the advantages of ocean going ports and the enormous development of power possible through such improvement of the St. Lawrence river; and

WHEREAS, The Sanitary District of Chicago has repeatedly asked Congress to enact legislation permitting such diversion and Congress has refused to enact such legislation, and bills are now pending in Congress for such permission, and the Sanitary District has repeatedly petitioned Secretaries of War for permits authorizing such diversion, and Secretary of War Stimson, in 1913, refused any permission in excess of four thousand one hundred sixty-seven cubic feet per second, and the Sanitary District now gives out that it will make application for a permit to increase said amount and is carrying on a propaganda and gives out that it must continue to take not less than ten thousand cubic feet per second until the year 1945, with the implication that it intends to continue to abstract this amount of water or more during this period and all time thereafter and will not erect sewage disposal plants other than to take care of sewage from the growth of population and industries during this time, and the Sanitary District is not now making provisions for the immediate practical disposal of sewage by modern methods as is being done in other large lake cities; and, WHEREAS, The states appearing with the government in the recent case take the position that the waters and the right to have these waters flow down the natural watershed of the Great Lakes is a property right of these states within their respective boundaries, and that there has been delegated to the government of the United States no power to divert these waters for any purpose except possibly so far as needed for the protection and improvement of navigation for which purpose there will at no time be needed more than one thousand cubic feet per second along the Chicago, Desplaines and Illinois rivers,

Resolved, by the Assembly, the Senate concurring, That the state of Wisconsin hereby respectfully protests to the Congress of the United States and to the Secretary of War against any action by either recognizing or continuing any permit to the Sanitary District of Chicago to divert water from the Great Lakes through the Chicago Drainage Canal for any purpose other than the protection and improvement of navigation;

Resolved, That a copy of this resolution, properly attested by the presiding officers and chief clerks of both houses, be sent to the President of the United States, the Secretary of War, the presiding officers of the senate and the house of representatives, and to each United States senator and member of Congress from Wisconsin;

Resolved, That a copy of this resolution so attested be sent to the governor and the presiding officers of both houses of the legislature in each of the states of the union, inviting the cooperation of the states in like protest to the Congress and to the Secretary of War.

HENRY A. HUBER,
President of the Senate.
H. W. SACHTJEN,
Speaker of the Assembly.
F. W. SCHOENFELD,
Chief Clerk of the Senate.
C. G. SHAFFER,
Chief Clerk of the Assembly.

MINNESOTA RESOLUTION

A CONCURRENT RESOLUTION PROTESTING TO THE CONGRESS AND SECRETARY OF WAR OF THE UNITED STATES AGAINST THE CONTINUATION OF THE ILLEGAL TAKING OF WATER FROM THE GREAT LAKES THROUGH THE CHICAGO DRAINAGE CANAL.

Whereas actions were instituted by the United States in 1908 and 1913 against the Sanitary District of Chicago, praying an injunction to restrain the diversion of water from the Great Lakes through the Chicago Drainage Canal in excess of four thousand one hundred sixty-seven cubic feet per second, and over the protest of the government a decision was delayed until, after the resignation of Judge Landis, on June 18, 1923 Judge Carpenter decided the case in favor of the government and ordered that the injunction be granted;

Whereas the states of Wisconsin, Minnesota, Michigan, Indiana, Ohio, Pennsylvania and New York joined in appearing as amici curiae with the United States against the Sanitary District of Chicago in said action on appeal before the supreme court of the United States;

Whereas the United States supreme court on January 5, 1925, affirmed the decision of Judge Carpenter, holding that the Sanitary District of Chicago has violated the laws of the United States, that its action is in violation of our treaty with Great Britain and enjoining any abstraction of water in excess of four thousand one hundred sixty-seven cubic feet per second;

Whereas the legislature of Wisconsin in 1921 ordered and directed the beginning of a suit in the supreme court of the United States by the State of Wisconsin against the state of Illinois and the Sanitary District of Chicago to restrain the taking of water from the Great Lakes by the Sanitary District of Chicago and such action has been begun and is still pending, no proceeding therein having been had awaiting the final decision in the case just decided;

Whereas the present illegal abstraction of water from the Great Lakes now, and for many years past, has reached the enormous amount of upwards of ten thousand cubic feet per second and has seriously lowered the levels of the Great Lakes and the St. Clair, Detroit, Niagara and St. Lawrence rivers, and has greatly restricted and interfered with navigation thereon;

Whereas the Great Lakes constitute the greatest waterway in the world, carrying at the present time a tonnage equal to one-fourth of all the railroad tonnage of the United States at a cost of less than one-fifth that of railroad freight rates, and the diversion by the Sanitary District of Chicago has already increased lake freight rates by not less than three million dollars annually and has damaged lake harbors and other works fully twelve million dollars;

Therefore, be it resolved by the Senate of the state of Minnesota, the House of Representatives concurring, that the state of Minnesota hereby respectfully protests to the Congress of the United States and to the Secretary of War, against any action by either, recognizing or countinuing any permit to the Sanitary District of Chicago, to divert water from the Great Lakes through the Chicago Drainage Canal for any purpose other than the protection and improvement of navigation.

Resolved, that a copy of this resolution, properly attested, by the proper officers of both houses, he sent to the President of the United States, the Secretary of War, the presiding officers of the Senate and the House of Representatives, and to each United States Senator and member of Congress from the state of Minnesota.

W. I. NOLAN,
President of the Senate.

JOHN A. JOHNSON,
Speaker of the House of Representatives.

Passed the Senate the Fourth day of February, nineteen hundred and twenty-five.

GEO. W. PEACHEY,
Secretary of the Senate.

Passed the House of Representatives the Fourth day of February, Nineteen Hundred and Twenty-five.

OSCAR ARNESON,
Chief Clerk of the House of Representatives.

Approved February 4th, 1925.

THEODORE CHRISTIANSON,
Governor of the State of Minnesota.

Filed February 5th, 1925.

MIKE HOLM,
Secretary of State.

OHIO RESOLUTION

86th General Assembly,
Regular Session, 1925. } H. J. R. No. 5

MR. HUNT, of Lucas.

JOINT RESOLUTION

Protesting against the taking of water from the great lakes for use of the Chicago drainage canal or for any other purpose.

WHEREAS, The city of Chicago has for many years taken from Lake Michigan many thousands of cubic feet of water per second for the use and purposes of the Chicago drainage canal; and

WHEREAS, The diversion of said water has resulted in the lowering of the water level in the great lakes, and is a serious menace to navigation upon said great lakes; and

Whereas, A member of the Illinois delegation to the congress of the United States has introduced a bill and the same is now pending in congress to legalize the further diversion of a greater quantity of water into the Chicago drainage canal and thence into the Mississippi river and that said diverted water would be lost to the great lakes forever; and

Whereas, The water of the great lakes is an international possession and the taking of the same is likely to result in complications and difficulties with a friendly foreign neighbor; and

Whereas, The canalization of the great lakes and the St. Lawrence river will in all probability be begun and completed within the next ten years, thus making ocean ports of all of our great lake cities and bringing undreamed of benefit to a great proportion of the population of the United States; therefore

Be it resolved by the General Assembly of the State of Ohio, That we do hereby emphatically protest against the diversion of any water whatsoever by the city of Chicago or elsewhere from its normal flow through the chain of the great lakes and the St. Lawrence river to the sea or any other act which will in any way tend to interfere with or impair the normal flow of the usual level water in the said great lakes.

That we do hereby respectfully request our representatives in both houses of congress to use their vote and influence to prevent the taking of any further quantity of water from the great lakes and to compel the city of Chicago to discontinue its present diversion of said water.

That a copy of this resolution be sent to the president of the United States, to the secretary of war, to the Honorable Frank B. Willis and Honorable Simeon D. Fess, United States senators from Ohio, and to each and every member of the Ohio delegation to the House of Representatives of the congress of the United States.

PENNSYLVANIA RESOLUTION

COMMONWEALTH OF PENNSYLVANIA
RESOLUTION NO. 4.

In the House of Representatives,
January 26, 1925.

WHEREAS, The city of Chicago is now diverting colossal quantities of water out of Lake Michigan into the Chicago Drainage Canal for sanitation and power purposes, which diversion has already caused great injury to commerce on the Great Lakes, and

WHEREAS, The said city of Chicago is now seeking permission through the provisions of a bill now pending in the Congress of the United States, to increase the diversion of water from said lake to ten thousand cubic feet per second for the alleged purpose of protecting its water supply and disposing of its sewage, and

WHEREAS, The diversion of water in the quantities intended would result in a considerable additional lowering of the mean levels of the Great Lakes to the great damage of the inner harbors and connecting channels and by reducing the carrying capacity of the lake fleet would make certain an enormous yearly loss to owners thereof, and

WHEREAS, The lowering of the levels of the Great Lakes and the changing conditions resulting therefrom would very seriously affect the fishing industries of the Commonwealth, and

WHEREAS, This excessive drainage would be of water to and in which the Dominion of Canada has rights equal to those of the United States, and any attempt to increase the same is in violation of the Treaty Relations with the Dominion of Canada, therefore

BE IT RESOLVED (if the Senate concur), That it is the opinion of the General Assembly of the Commonwealth of Pennsylvania that any increase in the amount of water permitted to be drained from the Great Lakes would be against the interests of the people of the United States, would seriously affect the fishing industries of this

Commonwealth, would be unnecessary, and might have an unwanted effect upon our friendly relations with the people of the Dominion of Canada, and be it further

Resolved, That a copy of these resolutions be transmitted by the Secretary of the Commonwealth to each Member of the Senate and each Member of the House of Representatives in the Congress of the United States, and that they be urged to use their vote and influence against the passage of any legislation intended to permit such further damage.

The foregoing resolution was adopted by the House of Representatives and concurred in by the Senate, January 26th, 1925.

THOMAS H. GARVIN,
Chief Clerk of the House of Representatives.

W. P. GALLAGHER,
Chief Clerk of the Senate.

Approved—The 3d day of February, A. D. 1925.

GIFFORD PINCHOT.

The foregoing is a true and correct copy of Resolution of the General Assembly No. 4.

CLYDE L. KING,
Secretary of the Commonwealth.

NEW YORK RESOLUTION

STATE OF NEW YORK
IN SENATE

Albany, February 2, 1925.

By Mr. Gibbs:

Whereas, There is pending before Congress a bill known as Senate Bill No. 4428 (McCormick bill) which among other things authorized the withdrawal of 10,000 cubic feet per second of water from Lake Michigan by the Sanitary District of Chicago; and there is also pending in the Senate an amendment proposed by Mr. McKeller to H. R. Bill No. 3933, which bill provides for the purchase of the Cape Cod canal property, and which amendment authorizes among other things for some years the withdrawal of 10,000 cubic feet per second of water from Lake Michigan by the Sanitary District of Chicago and thereafter a withdrawal of 7,500 cubic feet per second;

Whereas, the withdrawal of 1,000 cubic feet per second of water from Lake Michigan is adequate for the needs of navigation in constructing a waterway from Lake Michigan to ultimately connect with the Mississippi River; and the withdrawal of 10,000 cubic feet per second of water from Lake Michigan at Chicago is damaging navigation interests on the Great Lakes to the extent of approximately $3,000,000 annually in addition to the damage done to other interests;

Resolved, (If the Assembly concurs), That the Legislature of the State of New York respectfully memorialize the Congress of the United States not to advance to passage the aforesaid bills nor any other measure which would authorize the withdrawal of any quantity of water from Lake Michigan through the Chicago sanitary canal in excess of 1,000 cubic feet per second.

Be it Further Resolved, That a copy of these resolutions be transmitted to the Secretary of War, the Clerk of the Senate and to the Clerk of the House of Representatives and to each Senator and Representative in Congress representing the State of New York, and that the latter be urged to do all in their power by voice and vote to prevent the passage of this proposed legislation, which by this memorial is brought to the attention of Congress.

By Order of The Senate

ERNEST A. FAY, Clerk.

IN ASSEMBLY
February 3, 1925
Concurred in without amendment,
By order of the Assembly,
Fred W. Hammond, Clerk.

House Concurrent Resolution No. 5.

MICHIGAN RESOLUTION

A CONCURRENT RESOLUTION PROTESTING AGAINST THE UNLAWFUL ABSTRACTION OF THE WATERS OF LAKE MICHIGAN BY THE SANITARY DISTRICT OF CHICAGO, OR ANY OTHER PERSON OR AGENCY.

Whereas, The State of Michigan has a full proprietary ownership in all the waters in the Great Lakes within the boundary lines of the State, and as such owner the State is entitled at all times to have an uninterrupted flow of all the waters coming naturally into the Great Lakes Basin, and is in duty bound to protect and preserve the right of the State to these waters; and

Whereas, The Sanitary District of Chicago has been for a long time unlawfully abstracting large quantities of the waters of Lake Michigan and diverting these waters from the Great Lakes Basin into the Mississippi River Basin; and

Whereas, There are now pending in the Congress of the United States bills purporting to be measures for the improvement of commerce and navigation which would authorize on the part of the Federal Government a diversion of ten thousand cubic feet per second of water from Lake Michigan for the alleged improvement of the navigation of waters lying outside the Great Lakes Basin, but which said bills are in fact for the purpose of an attempted legalization of the abstraction of these waters by the Sanitary District of Chicago for its own use and benefit; and

Whereas, An abstraction and diversion of the waters of Lake Michigan does and will so injure the navigability of the Great Lakes and the connecting waters that it makes navigation of the many harbors in Michigan difficult and dangerous and the maintenance of these harbors more costly; seriously affects the immense fruit interests in the State and jeoparizes their development through chemical changes due to the diversion of the natural flow of these waters; retards the building up of the Great Lakes navigation, both as to gross volume and the size and draft of the vessels employed; seriously affects privately owned docks, elevators, warehouses, railroad lines and many other constructions built to take and ship lake tonnage; therefore, be it

Resolved, By the House of Representatives of the State of Michigan, (the Senate concurring), That for and in behalf of the people of the State, we vigorously protest against and object to the continued unlawful diversion and abstraction of the waters of Lake Michigan by the Sanitary District of Chicago; and be it further

Resolved, That we oppose and object to any scheme or plan of improvement of the navigable waters of the United States at the expense of and to the detriment of the continued improvement and natural navigability of the Great Lakes; and be it further

Resolved, That we commend the Attorney General of this State for the very active and able service rendered the people in leading the opposition of the Lake Border States to any unlawful abstractions and diversions of these waters, and urge him to continue all necessary activities in protection of the States' rights in and to these waters; and be it further

Resolved, That a copy of these resolutions, duly prepared by the Secretary of the Senate and certified to by the said Secretary and the Clerk of the House of Representatives be transmitted by the said Secretary of the Senate to the Honorable, the Secretary of War of the United States; to each of the Michigan members of Congress; to the Secretary of the Senate and the Secretary of the

House of Representatives of Congress; and to the Attorney General of this State.

ONTARIO RESOLUTION

CANADA

To All to Whom These Presents May Come or Concern.

I, Charles Frederick Bulmer, Assistant Clerk of the Legislative Assembly of the Province of Ontario, do hereby certify that the typewritten paper hereto annexed is a true copy of a Resolution made upon the fourth day of April, A. D. 1924, by the Legislative Assembly of the Province of Ontario.

(Signed) C. H. BULMER
Assistant Clerk of the Legislative Assembly,
ONTARIO

ON MOTION OF MR. KEEFER,
SECONDED BY MR. McCREA,

That whereas there is and has been for some time past, but without any legal authority for so doing, a diversion and abstraction at Chicago of 10,000 cubic feet per second flow of waters out of the boundary waters between Canada and the United States, commonly known as the Great Lakes System, and into another watershed into which said waters do not belong;

And whereas such diversion and abstraction is contrary to the international treaty respecting boundary waters entered into between Canada and the United States, and the Canadian Government has been protesting and is protesting against such diversion for some time past to the Government of the United States;

And whereas the Province of Ontario, which is bounded on the south by the Great Lakes System, is vitally affected by any diversion from the said Lakes of any body of water, both because of its effect on navigation in the Great Lakes and the St. Lawrence River, and also because of the Hydro-electric energy that could be developed from such water viz., 500,000 horsepower, in the Niagara and the St. Lawrence Rivers; therefore,

Be it resolved, That the Legislature of the Province of Ontario in Session assembled respectfully urge upon the Government of the Dominion of Canada to use every means within its power with the United States of America to restrain the City of Chicago from such illegal and improper diversion of water from the international waters in which Canada and particularly the Province of Ontario are so vitally interested.

And this Legislature also recommends that the Government of Canada should request the Government of the United States to take and exercise control of the works which permit of any diversion at Chicago instead of allowing same to be under the jurisdiction of one interested party only.

O.T. 1930 ORIGINAL NOS.6,10 & 11,

Office Supreme Court, U. S.
FILED
MAR 8 1926
WM. R. STANSBURY
CLERK

In The Supreme Court of the United States

October Term, 1925

No. [redacted] Original [redacted] 8

In Equity.

State of Michigan,
Complainant,
vs.
State of Illinois and Sanitary District of Chicago,
Defendants.

BILL OF COMPLAINT.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan,
Solicitor for Complainant.

ROBERT SMITH COMPANY, LANSING, MICH.

In The Supreme Court of the United States

October Term, 1925

No. —— Original

In Equity.

State of Michigan,
Complainant,
vs.
State of Illinois and Sanitary District of Chicago,
Defendants.

MOTION FOR LEAVE TO FILE BILL OF COMPLAINT.

Now comes the complainant by Andrew B. Dougherty, Attorney General of said State, and moves the court for leave to file the accompanying bill of complaint.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan.

IN THE SUPREME COURT

# of the

UNITED STATES.

State of Michigan,
Complainant,
vs.
State of Illinois and Sanitary District of Chicago,
Defendants.

BILL OF COMPLAINT.

To the Honorable, the Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of Michigan, one of the United States, by its solicitor, Andrew B. Dougherty, Attorney General of said State, brings this bill of complaint against the State of Illinois and the Sanitary District of Chicago and your orator complains and alleges:

I.

The State of Michigan is one of the States of the United States of America and this action is brought on its behalf, as such State, in the Supreme Court of the United States in the exercise of the original jurisdiction of said court on the ground that it is an action in equity relating to a controversy between two or more states of the United States and also between a state of the United States and a citizen of another State.

II.

The defendant, State of Illinois, is also one of the States of the United States of America and the defendant, Sanitary District of Chicago is a public corporation organized and existing under and by virtue of the laws of said State of Illinois and is a citizen of said last named State.

III.

The State of Michigan has approximately one thousand six hundred and twenty-four miles of shore line along Lakes Superior, Michigan, Huron, St. Clair and Erie and their connecting waterways which lakes, together with Ontario, and their connecting waterways constitute a group of interrelated and interdependent inland seas or oceans, commonly known as the Great Lakes, and provide a natural water highway from the head or westernmost point of Lake Superior to the Atlantic Ocean by way of the river St. Lawrence.

IV.

The Great Lakes waterway lies partly within the United States of America and partly within the Dominion of Canada, one of the states or dominions of the colonial empire of Great Britain and the continuation of that highway connecting the Great Lakes with the Atlantic Ocean through and by the St. Lawrence River, passes for a great distance wholly through Canadian territory; that all of said waterway lying within international waters has been opened by treaties between the United States of America and Great Britain and the Dominion of Canada, as free water so that American vessels including the ships of citizens of complainant and the trade and commerce of its people are secured equal rights of navigation with Canadian vessels in the many harbors, approximately fifty in number, which the Canadian government has improved for shipping on the Great Lakes, their connecting waters and the St. Lawrence River, all of which rights and benefits of navigation are of great and continuing benefit to complainant, its people, its trade and commerce and the prosperity of its shipping interests.

V.

That the Great Lakes waterway lies within a single water shed and constitutes a natural highway which may be improved but may not be destroyed or impaired by either federal or State authority.

VI.

That the State of Michigan was admitted to the union of States comprising the United States of America in 1837, being created from a portion of the territory known as the North West Territory established by an ordinance of the Congress of the United States on July 13th, 1787, from territory previously ceded to the United States by the State of Virginia upon the condition, among other things that from said ceded territory there should in time be created not less than three nor more than five states; said ordinance by article four thereof expressly provided:

> "The navigable waters leading into the Mississippi and St. Lawrence and the carrying places between the same shall become highways and forever free as well to the inhabitants of the said territory as to the citizens of the United States and those of any other states that may be admitted into the confederacy without any taxes, imposts or duty therefor."

Which provision of said ordinance was a recognition that the people of said territory should have the same rights of free ingress and egress as were secured to the citizens by the fourth article of the confederation between the states.

VII.

That the State of Michigan on its admission to the union of the states took and had the title to all of the submerged or subaqueous lands within its borders which included the lakes, bottoms of that portion of the Great Lakes, Superior, Michigan, Huron, St. Clair and Erie, within its borders.

VIII.

That the State of Michigan in *its proprietary capacity* and *in trust for its people*, its *shippers*, its shipping and its *commerce*, *had* and continues to have a *vested right* in said Great Lakes *waterway* as a *public highway* and a *perpetual paramount easement for highway purposes*, which right was, prior to the admission of said State into the Union, vested in and held in trust for the public, first by the British Crown, second by the State of Virginia, third by the United States and the organized territorial division thereof known as the North West Territory.

IX.

That the State of *Michigan's vested right* in and to the Great Lakes waterway as a *highway of commerce* is *concurrent with the rights of all other states of the United States bordering* upon said waterway and of the Dominion of Canada also bordering thereon and that said natural waterway is lawfully entitled to receive all of the water from rivers and streams in the same water shed provided by nature for the purpose of keeping up and maintaining the waters in said water shed as such natural highway.

X.

In the year 1889 the legislature of the State of Illinois enacted a statute entitled "An act to create sanitary districts and remove obstructions in the Des Plaines and Illinois Rivers," approved May 29th, 1889, and published in the laws of Illinois for the year 1889 commencing at page 186; which act authorized the organization of public corporations to be known as sanitary districts, with power, among other things, to construct, maintain and operate drainage canals or channels for the disposal of drainage and sewage. By sections 23 and 24 of the said act, it was further provided as follows, to-wit:

"Sec. 23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers, such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute and to be of a depth of not less than fourteen feet and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom, capable of producing a depth of not less than eighteen feet of water. If the population of the district drained into such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel. * * *

"Sec. 24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the Des Plaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes."

XI.

In November and December of the year 1889, defendant, the Sanitary District of Chicago, was organized as a sanitary district under the act of 1889 hereinbefore referred to, and has since continuously existed as such sanitary district under the said act of 1889 and the acts amendatory thereof and supplementary thereto. At the time of its organization said defendant district consisted of a territory about 185 square miles in area. By successive acts of the legislature of Illinois the area of said defendant district has been increased from time to time, and as your orators are informed and verily believe and therefore aver, its area is now approximately 395 square miles, extending from the Illinois-Indiana State line on the south and east to the northerly boundary of Cook county on the north, with about 33 miles of frontage on Lake Michigan and comprises the entire city of Chicago together with large areas of land to the south, west and north of said city.

XII.

On or about the 3rd day of September, 1892, defendant Sanitary District of Chicago, acting as a subordinate agency of the defendant, State of Illinois, pursuant to the act of 1889 hereinbefore referred to, commenced the construction of a canal or channel commencing at a point in the west fork of the south branch of the Chicago river about 6 miles above the mouth of said river, which river was a navigable stream tributary to and a part of the Great Lakes watershed, and extending in a general westerly direction for a distance of about 32 miles to a point near the city of Joliet, Illinois. At its westerly terminus said canal was made to connect with the Des Plaines river, a stream flowing in a westerly and southwesterly direction and forming a tributary of the Illinois river, which latter river in turn flows in a westerly and southwesterly direction and forms a tributary of the Mississippi river.

XIII.

In the construction of said canal it was at all times the plan of the defendant, State of Illinois, and the defendant, Sanitary District of Chicago, that the said canal should be used as a passage-way for the sewage of the territory comprising the Sanitary District of Chicago, to the end that such sewage might be carried down the said canal into the Des Plaines and Illinois rivers; and in order to accomplish the said purpose it was the intention of said defendants at and prior to the commencement of the construction of said canal to divert from Lake Michigan, and pass through the said canal, such amounts of water as might be deemed by said defendants to be necessary for the proper dilution of the said sewage and its propulsion through the canal and the Des Plaines and Illinois rivers. In pursuance of such intention, and prior to the completion of said canal, the legislature of the defendant State of Illinois enacted in the year 1895 an amendment to section 20 of the act of 1889 hereinbefore referred to, which amendment is published in the Laws of Illinois for the year 1895 commencing at page 168 thereof, and provides that any sanitary district organized under the provisions of the act of 1889 and maintaining a channel which causes the discharge of sewage into or through any river beyond the limits of such district, "shall, at the time any sewage is turned into or through any such channel or channels, turn into such channel or channels not less than 20,000 cubic feet of water per minute for every 100,000 inhabitants of said district, and shall thereafter maintain the flow of such quantity of water."

XIV

Upon the completion of the said canal, the defendant, Sanitary District of Chicago, in compliance with section 27 of the said act of 1889, applied to the Governor of the State of Illinois for authority to commence the use of said canal, and such authority was granted by the said governor on behalf of the defendant State of Illinois, and thereupon, on or about the second day of January, 1900, said defendant District commenced the abstraction of water from Lake Michigan and its diversion into the Chicago river and thence into and through the said canal, in such amounts and at such velocity as to reverse the flow of the Chicago river and create a steady and uninterrupted flow of water, from said day down to the present time, from Lake Michigan through the Chicago river to the said canal thence through the said canal to the Des Plaines river near Joliet, and thence down the Des Plaines and Illinois rivers to the Mississippi river.

XV.

The primary object and purpose of the act of 1889 hereinbefore referred to, as said act was construed by the highest court of the State of Illinois in the case of *People v. Nelson, 133 Ill. 565,* 27 N. E. 217, and *Beidler v. Sanitary District of Chicago,* 211 Ill. 628, 71 N. E. 1118, was to provide a method of disposing of the sewage of the city of Chicago and contiguous territory, and the canal constructed by the defendant district as hereinbefore described has been continuously used for such purpose since the month of January, 1900. By the terms of the act of 1895 referred to in paragraph 12 hereof, defendant State of Illinois has undertaken to make it the legal duty of the defendant, Sanitary District of Chicago, to pass water through the said canal at the rate of 20,000 cubic feet per minute or 333 1-3 cubic feet per second, for every 100,000 inhabitants of the territory composing the Sanitary District of Chicago. At the time of the passage of said act of 1895, and at all times since, it was well known to the legislature of the State of Illinois and to the officers of the defendant Sanitary District of Chicago, that the only source from which water in such quantities as required by said act could be obtained was by the abstraction of water from Lake Michigan, and it was at all of said times the intention of said legislature that the duty which it sought to impose upon the defendant District by the said act of 1895 should be performed by means of such abstraction, according to the census of 1920, the population of the Chicago Sanitary District was 2,963,090 in that year, and as your orators are informed and verily believe and therefore aver, the population of said district is now in excess of said number, and therefore the effect of the said act of 1895 is to direct the defendant, Sanitary District of Chicago, to abstract water from Lake Michigan at the present time at the rate of not less than 9,876 cubic feet per second.

XVI.

Subsequent to the opening of the said canal, and in the year 1903, the defendant, State of Illinois, by an act of its legislature approved May 14th, 1903, and published in the Laws of Illinois for the year 1903 commencing on page 113, undertook to authorize the defendant, Sanitary District of Chicago, to construct and operate a plant for the generation of electrical energy by hydraulic power derived from the water passing from Lake Michigan through the said canal. The provisions of said act with reference to said subject are as follows:

> "Sec. 5. That the said sanitary district of Chicago is hereby authorized to construct all such dams, waterwheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now, or hereafter, constructed by said district.
>
> "Sec. 6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy, and shall be transmitted to the various cities, villages and town within said sanitary district, or adjacent to the main channel of said sanitary district and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said sanitary district: Provided, however, that it shall be the duty of said sanitary district to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said sanitary district."

XVII.

Under and by virtue of the authority attempted to be conferred on the defendant District by the defendant State of Illinois in said act of 1903, said District constructed and placed in operation a hydro-electric power plant at Lockport, near the western terminus of the said canal, and has continuously operated the same since its completion in the month of November, 1907. The said power plant is capable of developing in excess of 36,000 horsepower of electrical energy and does in fact develop and generate, as your orator is informed and verily believes and therefore avers, in excess of 20,000 horsepower continuously throughout the year. The electrical energy thus generated is mainly transmitted to the city of Chicago and there sold for municipal and commercial purposes; and, as your orator is informed and verily believes and therefore avers, the operations of said plant since the year 1907 have produced many millions of dollars of gross revenue to the defendant Sanitary District of Chicago and have earned for the said District many millions of dollars of profits over and above the cost of operating the said plant, including proper allowances for depreciation and a reasonable return upon investment therein.

XVIII.

Since the completion of said hydro-electric development near the western terminus of said canal, the object and purpose of the defandants in the operation of the said canal and in the abstraction of water from Lake Michigan through the same has been and is now two-fold, to-wit: the disposition of the sewage of the defendant Sanitary District of Chicago, and the generation and sale of electrical energy.

XIX.

According to the reports of the engineers of the defendant, Sanitary District of Chicago, the yearly mean amount of water passing through the said canal at its westerly terminus, practically all of which is water abstracted from Lake Michigan, is as follows for the years 1900 to 1917, inclusive:

Year	Cubic Feet per Second	Year	Cubic Feet per Second
1900	2,900	1909	2,766
1901	4,046	1910	3,458
1902	4,302	1911	6,445
1903	4,971	1912	6,424
1904	4,793	1913	7,191
1905	4,480	1914	7,105
1906	4,473	1915	6,971
1907	5,116	1916	7,325
1908	4,421	1917	7,786

—which [redacted] your orator is informed and believes and therefore avers, are based on methods of calculation which result in very considerably underestimating the actual amounts of flow through the canal. Your orator is informed and verily believes and therefore avers that the actual mean abstraction of water from Lake Michigan through said canal for the year 1917 was about 8,800 cubic feet per second, and that such abstraction beginning with the year 1918 and taken down to the present time has been in excess of 8,800 cubic feet per second; which abstraction is on the basis of average amount of water taken and which is greatly increased at certain periods in the exercise of the judgment and appropriating desires of the defendant, Sanitary District, and which increases have no relation to the needs of navigation on the Great Lakes and which at times of low water or barometric pressure are still further adversely affected by the further lowering of lake levels and the consequent decrease in the navigable capacity of said Great Lakes, their rivers and harbors.

XX.

Complainant is informed and believes and therefore avers it to be true that the rivers and streams of the State of Illinois contribute naturally to the Great Lakes watershed less than an average of one thousand cubic feet per second of water; that the defandants are now withdrawing permanently from said Great Lakes watershed an average of eleven thousand seven hundred cubic feet per second, including the natural flow of the Chicago River wholly reversed and appropriated by the defendant Sanitary District and diverted into another watershed, and the pumpage of said defendant Sanitary District from the Great Lakes which is not returned in its natural course to said Great Lakes but is diverted into another watershed by means of said defendant Sanitary District's canal; and complainant is informed and believes and therefore avers it to be true that the said defendant Sanitary District from time to time increases its abstraction, appropriation and diversion of water from the Great Lakes to a total of fourteen thousand two hundred cubic feet per second with resultant and resulting increased impairment of the levels of the Great Lakes, particularly during periods of low water or barometric pressure thereon, thereby increasing the hazards of navigation and causing an increased reduction in the navigable capacity of said Great Lakes, their connecting waterways and ports and harbors.

XXI.

That the Chicago River is a navigable stream within the Great Lakes watershed which contributes in its natural state, your orator is informed and believes and therefore avers as true, approximately one thousand cubic feet per second to the waters of the Great Lakes, in the use of which complainant and its people, its trade and commerce, ships and shipping, have a vested right for purposes of navigation and a paramount easement for highway purposes; that complainant both in its proprietary capacity and quasi-sovereign capacity as a lower riparian proprietor has riparian rights in said natural flow of said Chicago River, but notwithstanding the rights and interests of complainant and of its people and the rights of navigation and of all people adjacent and having a right of highway in the great Lakes waterway, including the Dominion of Canada, the defendant, Sanitary District, has wholly diverted the flow of said river from said watershed and appropriated it to its own use in the operation of a sewage disposal canal and the production of hydro-electric power to the entire destruction of all riparian rights of said complainant and of its people and the navigation rights of all interests navigating the Great Lakes.

XXII.

All of the water abstracted from Lake Michigan by the defendants in the manner hereinbefore set forth is carried into the Mississippi valley and hence is permanently abstracted from the Great Lakes system and its own natural watershed. As the result of such abstraction, the mean level of the water in Lakes Michigan, Huron, Erie and Ontario and in the various waterways connecting said lakes, and in the St. Lawrence River above tide-water, has been lowered not less than six inches below the level that would exist in said lakes and waterways in the absence of such abstraction; and as the amount of abstraction in cubic feet per second becomes greater, the amount of lowering of the level of said lakes and waterways increases in proportion.

XXIII.

That because of unexplained conditions resulting possibly in part from deforestation of the great timbered areas formerly adjacent to the Great Lakes basin, there is an unexplained reduction in the amount of water in the Great Lakes basin with a resultant decrease in the levels of the Great Lakes amounting as your orator is informed and believes and therefore avers to be true, to the extent of approximately three feet less than the levels existing ten years ago and consequent corresponding decrease in the navigable capacity of said Great Lakes, their connecting waters, ports and harbors; that the Great Lakes and their connecting waters and harbors and also in large areas of the lake bottom are so shallow that their levels are already dangerously lowered to the impairment of their navigation under the conditions and development of modern commerce; that although connecting waterways and channels are susceptible of deepening by dredging, it is a practical impossibility to change large shoal areas of the ocean bottom of these inland oceans constituting the Great Lakes water system, so that in times of violent storm, the shoal places may be a sufficient distance from the normal surface of the lake ,to permit of navigation in safety and if lake levels are permitted to be impaired by the abstraction of large volumes of water, whether under pretended authority of the legislature of a State or of the Congress of the United States, to the point where the large ships of modern commerce, because of the increasing hazards of open water navigation in time of storm, may only navigate under fair weather and placid water conditions, it will necessarily result in a destruction and retirement of the present commercial carriers of the said Great Lakes with incidentally great loss of property, great increase in freight costs due to the necessity of carriage of smaller cargoes in a new type of cargo carrier, with a consequent impairment of the prosperity of the states, people, cities and industries adjacent to the Great Lakes waterway and the states to the west thereof now dependent thereon and to the prosperity of the State of Michigan and of its people and industries in which complainant is particularly interested and with respect whereof it particularly complains.

XXIV.

Neither the Congress of the United States nor any federal agency or authority nor the legislature of the State of Illinois or any agency of that or any other State has the authority to abstract from the Great Lakes basin any water to be diverted into any other natural or artificial watershed, whether for the purpose of operating, maintaining and flushing an open sewer maintained in violation of modern standards of sanitation, or even for the purpose of navigation; the power of the Congress of the United States is expressly restricted to the control of the waters of the Great Lakes as a navigable waterway under the powers vested in it by the commerce clause of the Constitution of the United States which power is that of regulation, not of destruction.

XXV.

There is no authority in the government of the United States or of any of the states or of any of their agencies authorizing the changing of the natural course of the Chicago River and its unlawful alteration, reversal and change by the defendants is against the rights of this complainant as well as against the rights of all parties and interests in the Great Lakes water system.

XXVI.

The lowering of the levels of the Great Lakes which are interrelated and interdependent, particularly lakes Michigan and Huron which are in fact but one lake, the body of water connecting them being approximately four miles in width, has seriously diminished the navigability and navigable capacity of said Great Lakes, their ports and harbors, with resultant impairment and partial destruction of the great natural highway in which the State of Michigan and its people have an interest as hereinbefore enumerated. On said lakes there is a great commerce, domestic and foreign, and many freight and passenger ships operate on all of said lakes and waterway between the state of Michigan and the other states adjacent thereto and to and with other states and countries and in addition thereto, great ships particularly of a type peculiar to the Great

Lakes and known as bulk freighters and having an enormous carrying capacity and capable of operation at very low freight rates when loaded to maximum capacity, carry from the great wheat producing areas of the American Northwest, the grain there produced to lower lake ports and to the ocean and also carry from the large mineral territories of northern Michigan and Minnesota and Canada, large mineral deposits particularly of iron and copper ore to the industrial districts of the United States and particularly of Illinois, Ohio, Indiana, Pennsylvania and New York and the industrial districts of the Province of Ontario in the Dominion of Canada and to the industrial districts of the State of Michigan in which complainant is particularly and peculiarly interested—while upbound these ships carry in addition to the vast variety of manufactured commodities known to commerce, the coal produced in the coal regions of the eastern part of the United States and necessary to the manufacturing, industrial. domestic and governmental uses of millions of the people of the United States on and adjacent to the borders of the upper lakes of said Great Lakes region, including not only the states of the northwest and of Canada but also Minnesota, Wisconsin, Illinois, Ohio, Indiana and particularly the State of Michigan, in which state and the needs of its people, its industries, including its commerce and its own governmental institutions, your orator is peculiarly interested. That for every inch of the normal draft of said vessels which they are unable to use because of the reduction in the navigable capacity of the Great Lakes waterway, their cargo carrying capacity is reduced by many tons with the resulting increase in freight costs per ton which becomes a burden upon the State of Michigan in its proprietary capacity and upon the many thousands of people of the State, a burden upon intra and interstate commerce and an impairment of the use and the usefulness of the great natural highway created by nature for the use of the people adjacent thereto and expressly dedicated to said people by the Congress of the United States prior to the organization of the republic.

XXVII.

That the State of Michigan in its proprietary capacity and also in its quasi-sovereign capacity is injured by the impairment of its riparian rights in that portion of lakes Superior, Michigan, Huron, St Clair and Erie and their connecting waters lying within its boundaries resulting from the impairment and lowering of the levels of the Great Lakes consequent upon the unlawful and unnatural diversion and abstraction of water from the Great Lakes and their water shed by the defendants.

XXVIII.

That the State of Michigan in its quasi-sovereign capacity has constantly sustained great and irreparable injury through the loss to its people, its trade, commerce and shipping and to owners of riparian rights in the Great Lakes and their connecting waterways, due to the lowering of the levels of the Great Lakes consequent upon the unlawful and unnatural diversion and abstraction of water from the Great Lakes water shed by the defendants; and complainant avers that a great number of its citizens own within its borders, riparian rights in the Great Lakes and their connecting waterways, of a value of many millions of dollars which rights are largely dependent for their usefulness and value upon the maintenance of the levels of the Great Lakes; that the impairment and lowering of the lake levels of said Great Lakes is destructive of such valuable riparian rights of citizens of Michigan located within its borders, with incidental destruction of the usefulness and value of docks, wharves, ship yards, boat houses, warehouses and landing places; and complainant avers that all of such rights existing and exercised under the law, may not be destroyed in the interests of the sewage disposal or hydro-electric power needs or desires or pretended economies of the defendant, Sanitary District, or of any other person.

XXIX.

That large numbers of the citizens of the State of Michigan own interests in ships and ship yards within its borders which together with the privately dredged and maintained channels leading to ship yards and landing places have a value in the aggregate of many millions of dollars and which are dependent upon the continued and successful operation of commerce, intrastate and interstate upon the Great Lakes and their connecting waters; all of which great and extensive interests, essential both to the prosperity of great numbers of its people and of great importance to complainant itself in the proprietary sense in the payment of taxes and other revenues, are being injured by the unlawful and unnatural diversion and abstraction from the Great Lakes and their watershed by the defendants with the resultant lowering of the levels of the

Great Lakes and consequent decrease in their navigable capacity and the navigable capacity of the ports and harbors thereof improved at great expense by the government of the United States and also of the ports and harbors thereof improved at great expense by the Dominion of Canada, and causing great and irreparable loss to complainant and its people and its trade and commerce having equal rights of use with the people of the Dominion of Canada under international treaty.

XXX

That the State of Michigan in its proprietary capacity has the title to vast quantities of fish found in the Great Lakes and within its borders; that said fish are taken from the waters of the Great Lakes to the extent of millions of pounds annually and constitute a substantial part of the food supply of the people of the United States, particularly of the States adjacent to said Great Lakes, including the people of the State of Michigan; that said fishing, including the marketing thereof has for many years constituted an industry in the State of Michigan in which many of its people are employed and in which many others of its people own valuable property rights; that great numbers of complainant's people adjacent to the Great Lakes derive much pleasure and recreation from fly, rod and still fishing which said fishing is one of the attractions which draws annually to the State of Michigan many thousands of people who contribute greatly to the prosperity and wealth of many sections of the State of Michigan bordering upon the Great Lakes and engaged in the operation of summer hotels and summer resorts with a resultant increase in property values and consequent increasing tax revenues to complainant; that the continued lowering of the levels of the Great Lakes with resultant exposure of shallow and inshore areas of lake bottom used for feeding and spawning grounds by the fish of the Great Lakes, including the ports of said lakes and their connecting waters within the borders of the State of Michigan, is destructive of fish life and continued fish propagation with consequent decrease in the fish life of said lakes and reduction in the scope and extent and prosperity of the fishing industry in said State and reduction in the food supply of its people by reason of which its people sustain great and irreparable injury.

XXXI.

The acts of the defendants hereinbefore set forth and described, in abstracting water from the Great Lakes Basin, and the rivers, streams and waters naturally contributary thereto and diverting them into the canal of the defendant District and into an entirely different watershed are in violation of the legal rights of complainant and of the people of the State of Michigan in the following respects, to-wit:

a) In that the defendants by said acts are interfering with the common law and vested right and paramount easement of highway of the State of Michigan and of its people and of the public generally, to have the free and unobstructed use of the Great Lakes waterway and the various ports and harbors thereof both within and without the borders of the State of Michigan for purposes of navigation, trade and commerce, free from any and all interferences with the present and prospective natural navigable capacity of said waterway and its usefulness as a public highway.

(b) That the acts of said defendants constitute an interference with the right of the people of the State of Michigan as well as of the people generally, to the free and unobstructed navigation of Lakes Superior, Michigan, Huron, St. Clair, Erie and Ontario and the navigable waters between the said lakes and from said lakes into the Atlantic Ocean, which rights belong to the said people of the State of Michigan both by common law and by the express guaranty contained in the ordinance for the government of the territory of the United States northwest of the river Ohio, enacted by Congress on June 13th, 1787, and constituting a contract between the government of the United States and the several States bordering on the Great Lakes and among said States bordering on the Great Lakes, which neither the government of the United States nor any of said States has the right to impair.

(c) That the acts of the defendants hereinbefore complained of constitute a present and constantly increasing burden upon intra-state and interstate commerce in that they are impairing and destroying a natural highway used and useful in interstate commerce.

(d) That the acts of the defendants hereinbefore complained of in abstracting water from the Great Lakes and Great Lakes watershed and thereby impairing their capacity, are destructive of the fisheries thereon and the riparian rights and shipping and commercial rights of complainant's citizens on and in said Great Lakes and their connecting waters; that complainant owns the fish in the Great Lakes adjacent to and within its borders which are available for and used by its people in connection with the fishing industry which is of very large and extensive scope within complainant's borders and also as a portion of the food supply of the people of the State of Michigan and that complainant and its people as well as the people generally, adjacent to and having an interest in said Great Lakes waterway, have a right to have such natural waters in the Great Lakes watershed maintained therein for the use and maintenance of the pleasure and convenience of the people of said State and for the purposes hereinbefore recited.

XXXII.

The said violations of the legal rights of the State of Michigan and of its people have caused and now cause and will continue to cause, so long as they are permitted to continue, serious interference with the trade and commerce of the people of the State of Michigan in their commerce within and among themselves, with neighboring States and with the world, and in its proprietary capacity, resulting in large and constantly increasing pecuniary losses to the said people and the said State which cannot be actually estimated and for the recovery of which no adequate remedy exists at law. The State of Michigan therefore brings this action on behalf of itself and in its proprietary capacity and on behalf of the people of said State for the purpose of establishing and protecting the legal rights of said State and its people against the encroachment of the defendants and of terminating a condition which is destructive to the welfare and prosperity of said State and of its people.

Wherefore, your orator prays that the defendants may be required to answer the allegations hereinbefore set forth in this bill of complaint and that upon final hearing of this cause an injunction be issued under the Seal of this court, restraining the defendants and each of them and each of their officers, agents or servants from taking or causing to be taken, any water whatever from Lake Michigan and its natural tributaries in such manner as to permanently divert the same from the said lake and said watershed.

Your orator prays that upon the final hearing of this cause, an injunction be issued under the Seal of this court restraining the defendants and each of them and each of their officers, agents and servants from reversing the flow of the Chicago river or in any manner obstructing its natural flow so as to prevent it from flowing in the course of nature into the Great Lakes, or to take or cause to be taken any water whatever from said Chicago river in such manner as to permanently divert the same from the Great Lakes watershed.

And your orator also prays for such other and further relief as to this Honorable Court may seem meet and consistent with equity and good conscience.

May it please your Honors to grant unto your orator a writ of subpoena under the Seal of this court directed to the Governor and Attorney General of the defendant, the State of Illinois, and to the Sanitary District of Chicago, commanding them and each of them on a day certain to be therein named and under a certain penalty, to be and appear in this honorable Court then and there to answer, but not under oath (answer under oath being expressly waived) all and singular the matters and things hereinbefore set forth and to abide such further order and decree of the court as may be made against the said defendants or either of them.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan.
Solicitor for the Complainant,
The State of Michigan.

UNITED STATES OF AMERICA
STATE OF MICHIGAN } ss.
COUNTY OF INGHAM

ANDREW B. DOUGHERTY, being first duly sworn, on oath says that he is the duly elected, qualified and acting Attorney General of the State of Michigan; that he has read the foregoing bill of complaint and knows the contents thereof; and that the same is true to his own knowledge except as to the matters therein stated on information and belief, and as to such matters he believes it to be true; and that as such Attorney General he is duly authorized to pray leave to file the said bill of complaint.

ANDREW B. DOUGHERTY,

Subscribed and sworn to before me this 16th day of February, 1926.

ANN M. HETTMAN,
Notary Public, Ingham County, Mich.
My Commission expires April 29, 1929.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

Office Supreme Court, U. S.
FILED
MAR 8 1926
WM. R. STANSBURY
CLERK

Supreme Court of the United States

OCTOBER TERM, 1925

No. [redacted] 7

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,
against
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

Brief and Argument Filed by the State of New York by Permission of this Court as *Amicus Curiae.*

ALBERT OTTINGER,
Attorney-General of New York.

C. S. FERRIS,
Deputy Attorney-General.

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Supreme Court Of The United States

OCTOBER TERM, 1925.

No. 16.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

BRIEF AND ARGUMENT FILED BY THE STATE OF NEW YORK BY PERMISSION OF THIS COURT AS *AMICUS CURIAE.*

Statement of the Case.

The Sanitary District of Chicago was organized under the provisions of a statute of the State of Illinois, approved May 29, 1889; in force July 1, 1889. The title of this statute reads as follows: "An Act to Create Sanitary Districts and to Remove Obstructions in the Desplaines and Illinois Rivers."

The reason for this statute appears on page 6 of the brief of the Attorney General of Illinois in this case in his statement: "By 1884, the rapid growth of the city had created, in the lake, the canal (the old Illinois and Michigan canal) and the two rivers (Illinois and Desplaines rivers) just mentioned, a dangerous condition, resulting from sewage disposal;" and further appears on page 11 of the brief of the Sanitary District in this case in the statement: "The primary purpose of the Act of 1889 as construed by the highest courts of Illinois is to provide a method of disposing of the sewage of the City of Chicago and contiguous territory." It is obvious that this statute was enacted for the purpose of enabling the City of Chicago and certain adjacent municipalities to organize themselves into a body corporate with the power to construct and build up a sewage disposal system by which the sewage of the City of Chicago and adjacent territory should be run off through an enlarged canal into the Desplaines River.

The purpose of the organization of the Sanitary District of Chicago has been effectuated by the construction of the present sewage disposal system. The Sanitary Canal was opened in 1900. Prior to the opening of the canal and on the 8th day of May, 1899, the Secretary of War issued a temporary and conditional permit for the diversion of water from the Chicago River through the Sanitary Canal. The permitting paragraph and conditions in said permit read as follows:

> "Now, therefore, the Chief of Engineers, having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said sanitary district of Chicago to open the channel constructed and cause the waters of Chicago River to flow into the same, subject to the following conditions:

> "1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the sanitary district of Chicago to Congress for the consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.
>
> "2. That if at any time it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such an extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.
>
> "3. That the sanitary district of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago River."

This permit was modified by the Secretary of War from time to time and on the 17th day of January, 1903, he further modified the permit by limiting the amount of water to be diverted to 250,000 cubic feet per minute or 4,167 cubic feet per second. (Amended Bill of Complaint, pp. 19–25.)

In 1912 the Sanitary District applied to Secretary of War Stimson for permission to withdraw from Lake Michigan 10,000 cubic feet of water per second. Exhaustive hearings were held on this application and on the 8th day of January, 1913, Secretary Stimson denied the application and wrote an opinion of some length setting forth the reasons for his denial of the application and also pointing out minutely the great damage which would be inflicted upon navigation and other interests on the Great Lakes and St. Lawrence River and connecting waterways if such increased diversion were permitted.

Subsequent to the decision of this court in January, 1925, affirming the injunction decree of the District Court, which restrains the Sanitary District from withdrawing from Lake Michigan water in excess of 4,167 cubic feet per second (*Sanitary District* v. *U. S.*, 266 U. S. 405), the Sanitary District again applied to the Secretary of War for permission to withdraw 10,000 cubic feet per second of water from Lake Michigan, and on the 3rd day of March, 1925, a permit was issued to the Sanitary District, signed by Major General Taylor, Chief of Engineers, and Hon. John W. Weeks, Secretary of War, a copy of which permit appears in the amended bill of complaint at pages 30-32.

It should be noted at this point that in each and every one of the permits issued to the Sanitary District, prior to the permit of March 3, 1925, it was expressly stated by the Secretary of War that the diversion of water by the Sanitary District was a question to be dealt with by Congress, and it will be further noted that, after the oral decision of Judge Landis in 1920, upholding the contention of the Government, several bills were presented in Congress, some of which would, if enacted into law, undertake to authorize the diversion of 10,000 cubic feet per second of water from Lake Michigan, while others are drafted as measures to improve navigation on the Illinois River and for other purposes, such other purposes being the withdrawal of an increased amount of water from Lake Michigan by the Sanitary District. Extensive hearings were held in March and April, 1924, on these bills before the Committee on Rivers and Harbors in the House of Representatives, and other hearings were held in January, 1925, before a special committee of the Senate known as the McCormick Committee. In all of these hearings it was disclosed that the Chief of Engineers had reported time and again that the amount of water necessary to be diverted from Lake Michigan for navigation purposes to afford a nine-foot waterway between Chicago and the Mississippi River would not exceed 1000 cubic feet per second; and on the 20th day of January, 1925, Major General Taylor, Chief of Engineers, testified before the McCormick Committee that 1000 cubic feet per second would be adequate for such nine-foot waterway. (Vol. 2, p. 141, McCormick Committee Report.)

There has been pending in Congress at all times during the last five years one or more of these bills intended to authorize the Sanitary District to withdraw not less than 10,000 cubic feet per second of water from Lake Michigan. While hearings have been held on these bills as above stated Congress has shown no disposition to approve them. It cannot be fairly stated that Congress by any affirmative act or by acquiescence has assented to the withdrawal of water from Lake Michigan by the Sanitary District.

The claimed right of the Sanitary District to withdraw water from Lake Michigan for sewage purposes and not return the same to the lake, a most extraordinary and unreasonable use thereof, presents a question concerning which there has been serious controversy for a quarter of a century. This controversy has been carried on before the Secretary of War, committees of both branches of Congress, and in the federal courts. All of the Great Lakes States, the Canadian Government and a large number of commercial bodies, municipalities and individuals have taken part therein. It has also been the subject of diplomatic correspondence between this Government and Great Britain.

The great damage to navigation interests on the Great Lakes and the St. Lawrence River, and to adjoining states, their citizens and the municipalities therein, due to the Chicago diversion has been established and is well understood. The damage already caused is small in comparison with the damage which will be caused in the future if this diversion is continued. The freight tonnage on the Great Lakes above the Niagara River in 1923 amounted to more than one hundred million tons; it was more than double the combined tonnage passing through the Suez and Panama Canals; and it exceeded the foreign commerce of all the Atlantic, Gulf and Pacific coast harbors in 1920. (Marine Review, January, 1925.)

The effect of this diversion on the levels of the Great Lakes was fully set forth in the memorandum of Secretary of War Stimson in 1913. He stated that from the evidence before him it appeared that the water surface of the Great Lakes would be reduced about 6 inches and the permissible load of one of the large modern vessels would be reduced by from 300 to 550 tons with a consequent loss of from $5,600 to $7,500 in freight for such vessel per season; that the loss to navigation interests resulting from a reduction of 6 inches in the depth of water would amount to $1,500,000 per annum, or a sum which, capitalized at 4 per cent would amount to a loss of $37,500,000; and that the lowest careful estimate of injury to American vessels alone is reported by the Chief of Engineers at $1,000,000 per year. Since 1913 shipping on the Great Lakes has increased so rapidly that now the annual loss to navigation interests alone amounts to more than $3,500,000. These facts, and others showing further damage and loss to the downstream states, are also established in the case (*Sanitary District* v. *U. S.*, 266 U. S. 405).

The defendants refer to the act of Congress of March 2, 1827 (4 U. S. Stat. at L. 234), by which Congress granted to the State of Illinois certain lands in that state for the purpose of "aiding said state in opening a canal to unite the waters of the Illinois River with those of Lake Michigan." This Court considered the statute of 1827 (*Sanitary District* v. *U. S.*, 266 U. S. 405), and disposed of the contention that the act of 1827 is any basis of authority whatever for the withdrawal of water from Lake Michigan by the Sanitary District.

There are other facts in the case which might be stated and undoubtedly will be stated by the parties to the suit, but the foregoing statement of facts is deemed sufficient for the following argument by the State of New York.

ARGUMENT.

THE SANITARY DISTRICT OF CHICAGO HAS NO RIGHT TO WITHDRAW WATER FROM LAKE MICHIGAN, UNLESS THE AMOUNT WITHDRAWN IS RETURNED TO THE LAKE, UNDER ANY EXISTING STATE OR FEDERAL LAW, NOTWITHSTANDING THE PERMIT OF THE SECRETARY OF WAR, DATED MARCH 3, 1925.

I.

Natural Rights of the State of Illinois, the City of Chicago, and the Sanitary District in Lake Michigan and Its Waters.

It is unnecessary for the purpose of this argument to discuss the question of the rights of the defendant State of Illinois in Lake Michigan and its waters. That right has been defined by this Court. (*Illinois Cent. R. R. Co.* v. *Illinois,* 146 U. S. 387.) The important question here is to what extent may the Sanitary District lawfully go in making use of the waters of this lake for domestic and sanitary purposes—in short may the Sanitary District in disposing of its sewage and trade wastes lawfully withdraw from Lake Michigan this large volume of water and discharge the same through the Sanitary Canal into the Desplaines River which lies in another watershed? It is not contended here that the Sanitary District or the City of Chicago may not use the waters of Lake Michigan for domestic and sanitary purposes in any ordinary and reasonable way; but it is contended that the withdrawal of water from Lake Michigan and the discharge of the same into the Mississippi watershed, as is now being done by the Sanitary District, a most unusual and extraordinary use of said waters, is unlawful, notwithstanding the permit issued by the Chief of Engineers and the Secretary of War in March, 1925.

The Great Lakes and St. Lawrence River and connecting waterways constitute a national as well as an international waterway and the rules of international law apply to this waterway in the relations of the United States with the several states and with a friendly foreign nation and also apply in the relations of the State of Illinois with all of the other Great Lakes states. Prior to the adoption of the federal constitution each state possessed all of the attributes of sovereignty. Touching upon this question in the case of *Martin* v. *Wadell,* 16 Pet. 367, this Court held (page 410) as follows:

> "For when the revolution took place, the people of each state became themselves sovereign; and in that character hold the absolute right to all their navigable waters, and the soils under them, for their own common use, subject only to the rights since surrendered by the constitution to the general government."

The several states are the original reservoirs of power and retain all of the rights and powers of sovereignty except such as were surrendered to the General Government by the commerce clause of the constitution. (Art. 1, Sec. 8, Clause 3.) In considering the rights of the State of Illinois and the Sanitary District in the Great Lakes and St. Lawrence waterway and the limitations under which such rights may be exercised the complainant states and other states adjoining this waterway are not fettered by the provisions of the commerce clause of the constitution but may consider each state sovereign in itself and subject to the rules of international law. The question is then what rights do the State of Illinois and the Sanitary District possess and within what limits must they act in exercising such rights having in mind the rights of the other states adjoining this waterway. We quote from Oppenheim on International Law (3rd Ed. Vol. 1, p. 211):

> "Just like independence, territorial supremacy does not give a boundless liberty of action. * * * Thus, to give another and fifth example, a state is, in spite of its territorial supremacy, not allowed to alter the natural conditions of its own territory to the disadvantage of the natural conditions of the territory of a neighboring state—for instance, to stop or to divert the flow of a river which runs from its own into neighboring territory."

And from Hyde on International Law (Vol. 1, Sec. 183) on the subject of "Diversion of Waters" as follows:

> "The diversion of the waters of an international stream for any purposes, such as those of sanitation, navigation, power or irrigation, tends to interfere with the fullest use of the river by all riparian proprietors. There may be said to be an essential conflict between the interest of the stream as a whole, and that of the particular State diverting its

> waters. Where a river traverses or serves as the boundary of the territories of several States, the existence of the river interest, as such, becomes the more apparent, because of the common concern of all in its welfare."
>
> * * *
>
> "In the case of a navigable river a special element projects itself which at once opposes any unrestricted taking of water serving to diminish the depth of channels of navigation and thus to impair their value. Any duty imposed upon a riparian State, either by international law or by contract, to maintain the navigability of an international river, implies an obligation also to check within places subject to the control of such State the commission of any acts which, unless restricted, would prove injurious to navigation generally."

Illinois like New York is a common-law state. She has not legislated in derogation of the common law. There are no conditions in Illinois which compels or justifies her departure from the common-law rule. There are no lands to be irrigated or arid lands to be reclaimed within her borders as there are in many of the states west of the Mississippi river. Therefore the common law is applicable to questions relating to the interior streams of the state and is applicable in determining the question of what use may be made of the waters of Lake Michigan. This lake is not an interior body of water. It is one of the bodies of water constituting the Great Lakes and St. Lawrence Waterway. It is a boundary water of the

State of Illinois and other states. A great volume of commerce has been built up on this waterway. The cities of Milwaukee, Detroit, Cleveland, Buffalo and many smaller cities lie along its shores, all of which are seriously menaced by the Chicago diversion. The Sanitary District (virtually the City of Chicago) to the great damage of commerce on the Great Lakes and to the great damage of all the downstream states and their citizens demands the right to continue the withdrawal of this large volume of water from this waterway for what—not for navigation purposes,—not for any purpose for which there are no other adequate means—but for a system of sewage disposal by means of dilution, a great open sewer, unscientific to the extreme, offensive, and destructive of fish life in the Desplaines and Illinois Rivers, and inflicting great property damage along the same. There are other and better ways of disposing of Chicago's sewage. This has been demonstrated beyond any question. Chicago started wrong in this matter, and has continued wrong for twenty-five years and in open defiance of the rights of the other states and a friendly foreign nation and also in open defiance of the duly constituted authority of the General Government. The basis of her claim is a wrongful and unlawful appropriation of the waters of this great waterway and her unwillingness to spend the necessary money to correct this wrong to say nothing of her unwillingness to compensate for the great damages which she has inflicted upon navigation interests and upon the downstream states and their citizens. Consequently there is a dispute between Illinois and the Sanitary District on the one hand and the other Great Lakes States on the other and this Court is called upon to settle this dispute.

In the settlement of this dispute the Court will apply the rules of law which have been adopted by the State of Illinois. Since Illinois is a common-law State the rules of the common law should be applied. Each state is free to determine whether it will apply the rules of the common law or some other law, but when it has made its decision it is bound by the rules of the law which it has adopted. As said by Mr. Justice Brewer in the case of *Kansas* v. *Colorado* (206 U. S. 46) at page 94: "It may determine for itself whether the common-law rule in respect to riparian rights or that doctrine which obtains in the arid regions of the West of the appropriation of waters for the purposes of irrigation shall control," and again at pages 97 and 98:

> "One cardinal rule, underlying all the relations of the States to each other, is that of equality of right. Each State stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none. Yet, whenever, as in the case of *Missouri* v. *Illinois,* 180 U. S. 208, the action of one State reaches through the agency of natural laws into the territory of another State, the question of the extent and the limitations of the rights of the two States becomes a matter of justiciable dispute between them, and this court is called upon to settle that dispute in such a way as will recognize the equal rights of both and at the same time establish justice between them. In other words, through these successive disputes and decisions this court is practically building up what may not improperly be called interstate common law."

What then is to be the rule of interstate law to be applied in this case. There is no question here of conflict of authority between the State of Illinois and the General Government nor conflict of authority between the other Great Lakes States and the General Government. The question presented is clearly a question of interstate rights. The complainant states and the other Great Lakes States have no controversy with the General Government; their controversy is with the State of Illinois and the Sanitary District of Chicago. While Illinois and the Sanitary District have repeatedly challenged the right of the General Government to prohibit the diversion of water through the Sanitary Canal, the other Great Lakes States have taken the position that the General Government has the power to prohibit this diversion and further that it is its duty to prohibit it. It is our position that the rule of interstate law to be applied in this case should conform to the rules of the common law and those general rules of international law which have been in effect in Illinois since her organization as a state and are generally in effect in the other Great Lakes States.

There can be no absolute property in flowing water, nor is it the subject of absolute dominion or control. Like air, light, or the heat of the sun, it has none of the attributes commonly ascribed to property. It was observed by Blackstone (2 Bl. Com. 18): "Water is a movable, wandering thing and must of necessity continue common by the law of nature; so that I can have only a temporary, transient, usufructuary property therein." The right to its use as it flows along is a property right, but the use must be an ordinary and reasonable use and one that will not deprive downstream proprietors of an equal use and one that will not seriously diminish the flow of the stream. (3 Kent's Com., 439, 440.) The maxim, *aqua currit et debet currere ut currere solebat,* expresses the general rule of law which governs the rights of owners of property on water courses. Bearing on this princip~~al~~le of law we quote from the opinion of Mr. Justice Brewer (page 100) in the case of *Kansas* v. *Colorado, supra:*

> "Suppose the controversy was between two individuals, upper and lower riparian owners on a little stream with rocky bank and rocky bottom. The question properly might be limited to the single one of the diminution of the flow by the upper riparian proprietor. The lower riparian proprietor might insist that he was entitled to the full, undiminished and unpolluted flow of the water of the stream as it had been wont to run. It would not be a defense on the part of the upper riparian proprietor that by the use to which he had appropriated the water he had benefited the lower proprietor, or that the latter has received in any other respects an equivalent. The question would be one of legal right, narrowed to place, amount of flow and freedom from pollution.
>
> "We do not intimate that entirely different considerations obtain in a controversy between two States. Colorado could not be upheld in appropriating the entire flow of the Arkansas River, on the ground that it is will-

> ing to give, and does give, to Kansas something else which may be considered of equal value. That would be equivalent to this court's making a contract between the two States, and that it is not authorized to do.''

The State of New York, injured by the Chicago diversion, to protect its rights as a state, which are directly affected, and in its capacity as *parens patriae,* trustee, guardian, and representative of its citizens, asks this Court to stop this diversion—this unlawful appropriation of the waters of Lake Michigan—which seriously diminishes the flow of this great waterway with its consequent damage; and to consider the greater interest of the stream as a whole which outweighs the local interest or benefits derived by Chicago, and to prevent this great and continuing wrong.

II.

The Commerce Clause of the Constitution.

Article 1, Clause 8, Section 3, of the Constitution confers upon Congress the power to ''regulate commerce with foreign nations, and among the several states, and with the Indian tribes.'' It is not our purpose to question the power of Congress to regulate and control navigable waters under this section of the Constitution. This power of Congress has been clearly defined in the case of *Gibbons* v. *Ogden* (9 Wheaton 1) and later cases; but we do contend that Congress in exercising this power must act within certain limitations; that whatever Congress does must be in aid of navigation and not destructive of navigation; that Congress must act within certain prescribed rules of law. The existence of this great waterway is a permanent provision of nature. The right to regulate commerce presupposes that commerce exists and it goes without saying that whatever Congress may do it must be something in aid of commerce and not something that will seriously impair commerce or destroy it. We quote from the opinion of Mr. Justice McKenna (page 259) in the case of *Greenleaf Lumber Co.* v. *Garrison* (237 U. S. 251): "All navigable waters are under the control of the United States for the purpose of regulating and improving navigation." And also from the opinion of Mr. Justice Van Devanter (page 47) in Second Employers' Liability Cases (223 U. S. 1): "To regulate," in the sense intended, is to foster, protect, control and restrain, with appropriate regard for the welfare of those who are immediately concerned and of the public at large."

The Act of Congress of March 5, 1899, provided "that the creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of any of the waters of the United States is hereby prohibited; * * * and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the chief of engineers and authorized by the Secretary of War prior to beginning the same." The diversion of water from Lake Michigan by the Sanitary District affects the navigability of the Great Lakes and is an obstruction to navigation and comes within the prohibition of the Act of 1899. The Secretary of War is the agency of the government whose duty it is to protect the navigable capacity of the navigable waters of the United States and we submit that he has no power to give any valid permit to do any act which will seriously impair or destroy the navigable capacity of such waters.

III.

The Permit of the Secretary of War Issued March 3, 1925.

At the outset we desire to call the attention of the Court to that part of the Act of March 5, 1899, quoted under Point II of this brief, under which the Secretary of War, upon the recommendation of the Chief of Engineers, is authorized to permit certain work prior to the beginning of the same. When the application was made by the Sanitary District to the Secretary of War in February, 1925, for permission to maintain the work which it had constructed, to wit, the diversion of water from Lake Michigan through the Sanitary Canal, the Secretary of War had before him the findings made by himself (treating the office of Secretary of War as a continuing office without regard to the changes in its incumbency) dating from the year 1913, that the diversion, for which permission was asked by the Sanitary District, had seriously affected the levels of the Great Lakes and constituted an unlawful obstruction to navigation. He had before him also various uniform reports of the Chief of Engineers to the same effect, and he had before him the testimony of the then and present Chief of Engineers Major General Taylor, given before the McCormick Committee on the 20th day of January, 1925, that 1000 cubic feet per second of water was all that was necessary for a nine-foot channel between Chicago and the Mississippi River. He had before him his own letter of January 26, 1922, addressed to the Chairman of the Committee on Rivers and Harbors of the House of Representatives, in which he referred to H. R. Bill 9046, introduced in the 67th Congress, 2nd Session and intended to authorize the Sanitary District to withdraw from Lake Michigan 10,000 cubic feet per second of water, in which letter he had advised the Chairman of the Committee on Rivers and Harbors in these words: "I am, therefore, unable to recommend the favorable consideration of the bill." There had been no reversal or modification of any of these findings. Every finding of fact was adverse to the Chicago Sanitary District. Congress had not and has not authorized a nine-foot channel from Chicago to the Mississippi River. Nothing was presented to the Secretary of War from which he or the Chief of Engineers could modify the findings of fact already made or the opinions already expressed. There was no change in conditions, unless it may be said that the wrong perpetrated by Chicago had continued for a greater duration of time. With this situation confronting him the Chief of Engineers and the Secretary of War issued the permit of March 3, 1925, authorizing the diversion of 8,500 cubic feet per second with an instantaneous diversion of 11,000 cubic feet per second. This permit we say was and is an unlawful permit and was beyond the power of the Secretary of War to grant. He attached certain conditions to the permit, which, if complied with, will reduce the diversion to 4,167 cubic feet per second by 1935. Another condition which he attached to the permit requires that the Sanitary District shall post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith that it will pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed. The term "compensating works" is a misnomer. There can be no such thing as compensating works. It has been agreed by engineers for a long time that regulating or control works at different points in this waterway are desirable and such regulating and control works are necessary regardless of the Chicago diversion. Such was the report of the Engineering Board of Review employed by the Sanitary District in 1924. (See paragraph 5 on page 2 of the Recommendations of this Engineering Board of Review.) Compensation might very properly be made to the states and citizens of the states which have been damaged by this diversion. Navigation interests alone have been subjected to and are now being subjected to great loss. These interests might properly be compensated. At any rate the condition is practically meaningless. The proposal for regulating or control works has been widely discussed but has never reached any further stage. Furthermore such works cannot be constructed without the consent of the Canadian government. This government has strenuously opposed the Chicago diversion and has shown no disposition to unite with our government on any plan for constructing such works. The imposing of this condition by the Secretary of War is equivalent to his making a contract between the State of Illinois or the Sanitary District and the other

Great Lakes States and we submit that he was not authorized to make any such contract. If there are to be any regulating or control works they should be constructed and paid for by the two governments as a navigation requirement and without reference to the Chicago diversion.

The Secretary of War has resorted to the Act of Congress of March 5, 1899, for his authority to issue the permit under consideration. We submit that there is nothing in that act which authorizes him in any case to give permission to construct works in any of the navigable waters of the United States or to do any other act which will constitute an obstruction to navigation. He is authorized in certain cases to give permission where the work has been recommended by the Chief of Engineers prior to the beginning of the work. In this case the work had been completed before the permit was issued, March 3, 1925. The Chief of Engineers prior to that time had repeatedly recommended that the work should not be permitted for the reason that it constituted a serious obstruction to navigation and the Secretary of War had repeatedly refused to permit such work. A fair interpretation of this statute means that whenever an applicant for a permit desires to erect any structure in navigable waters or perform any other act affecting navigable waters, before the Secretary of War may grant the permit to the applicant, there must be an investigation by the Chief of Engineers and a determination by him that such work or act will not be an obstruction to the navigable capacity of the waters affected. The Secretary of War is the guardian of the rights of all the people in navigable waters and is the protector of such rights.

IV.

The Mississippi Valley States.

The position of the several Mississippi Valley States intervening and seeking to secure the continuance of the diversion of water from Lake Michigan is to say the least anomalous. They are intervening in a suit in equity and asking for a continuance of the enjoyment of property rights which they are now receiving at the hands of one who has wrongfully appropriated the same. They are the receivers and beneficiaries of property rights wrongfully appropriated and now come into a court of equity asking a judgment of the court that they may continue to enjoy the benefit of these property rights which have been wrongfully appropriated. The position of these several states was discussed by Mr. Justice Holmes in the case of *Sanitary District of Chicago* v. *United States* (266 U. S. 405), and it is sufficient to quote from the opinion in that case as follows:

> "States bordering on the Mississippi, allowed to file briefs as amici curiae, suggest that they were not heard and that rights have not been represented before the Secretary of War. The City of Chicago makes a similar complaint and argues that it is threatened with a loss of a hundred million dollars.
>
> "The interest that the river states have in increasing the artificial flow from Lake Michigan is not a right, but merely a consideration that they may address to congress if they see fit, to induce a modification of the law that now forbids that increase unless approved as prescribed. * * * It is doubtful at least

whether the secretary was authorized to consider the remote interests of the Mississippi states or the sanitary needs of Chicago.''

V.

The Position of New York State as One of the Great Lakes States.

The State of New York has equal navigation rights with the other Great Lakes States on the Great Lakes, the St. Lawrence River and connecting waterways and it has another right appurtenant to the Niagara and St. Lawrence Rivers which the other Great Lakes States do not possess. It has the right to use the available waters of these two rivers for the purpose of developing power. The order of precedence in the use of the waters of this waterway is (1) domestic and sanitary purposes; (2) navigation; (3) development of power. The use of water for domestic and sanitary purposes must be the ordinary, reasonable and generally approved use. The use of the waters of this waterway for navigation purposes is general, each State possessing equal rights. The residue of the water available for power belongs to the State adjoining that particular part of the waterway where power may be developed. New York is the only one of these states adjoining that part of the waterway where power may be developed and is entitled to this residue of the water for that purpose. A flow of 10,000 cubic feet per second of water through the Niagara River and the international section of the St. Lawrence River is capable of developing about 400,000 horsepower. This is a property right of the State of New York which it is obligated to protect.

In Conclusion.

We believe that the complainant states in their amended bill of complaint present a case justiciable in this Court. They submit a dispute between the complainant states and the State of Illinois and the Sanitary District of Chicago which would seem to be a justiciable case under the authority of *Kansas* v. *Colorado, supra.*

If as defendants contend the United States or the Secretary of War is a necessary party defendant a dismissal of the amended bill of complaint is unnecessary. The Attorney-General may intervene, or the Secretary of War may be made a party defendant by amendment.

It is the position of the State of New York that an injunction should issue against the defendants restraining them from taking any water whatever from Lake Michigan in such manner as to permanently divert the same from the said lake agreeably to the provisions of the first paragraph of the prayer for relief on page 36 of the amended bill of complaint; but the State of New York does not agree to the alternative relief suggested in the subsequent paragraphs of the prayer for relief.

It is respectfully submitted that the motion to dismiss the amended bill of complaint should be denied.

February , 1926.)

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Supreme Court, U. S.
FILED
MAR 8 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

Original Jurisdiction

OCTOBER TERM, ~~1925~~ 1926

THE STATES OF WISCONSIN, OHIO, PENNSYLVANIA AND MINNESOTA, *Complainants*,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, *Defendants*,
STATES OF MISSOURI, TENNESSEE, KENTUCKY AND LOUISIANA, *Intervening Defendants*.

Bill in Equity
Original Jurisdiction
No. 1~~6~~ 7

REPLY BRIEF ON THE QUESTION OF JURISDICTION IN SUPPORT OF MOTION TO DISMISS FILED ON BEHALF OF THE STATES OF MISSOURI, KENTUCKY, TENNESSEE, AND LOUISIANA, INTERVENING DEFENDANTS.

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IN THE

Supreme Court of the United States

Original Jurisdiction

October Term, 1925

The State of Wisconsin, the State of Ohio, the State of Pennsylvania and the State of Minnesota,
Complainants
vs.
State of Illinois and Sanitary District of Chicago,
Defendants
State of Missouri, State of Tennessee, State of Kentucky and State of Louisiana,
Intervening Defendants

Bill in Equity
Original Jurisdiction
No. 16

SUPPLEMENTARY STATEMENT

We find certain features of complainant's "Statement of Facts," that call for correction, and therefore we submit this supplemental statement:

(1) In their caption to subdivision II (complain-

ant's brief, page 5), and elsewhere, they say that "The history of the sanitary canal conclusively establishes that the canal is not now and never has been a navigation project, but that it is now and always has been simply a sanitation and power project for the benefit of the sanitary district of Chicago."

This statement ignores substantial provisions of the Illinois Statutes and is incorrect in fact.

We assume there can be no impropriety in referring to the express provision of the Sanitary District Act of Illinois, of 1889, which is referred to, and partly quoted in paragraph 9, page 6, of complainant's amended bill. This statute created the Sanitary District, and, as amended, defined its powers. This statute shows conclusively and contrary to the above statement of complainants that the Canal is now and always has been a navigation as well as a sanitation project.

By Section 7, *inter alia*, the trustees are given power to "make and establish docks adjacent to *any navigable channel made under the provisions hereof* for drainage purposes, and *to lease, manage and control such docks.*" By Section 17, the trustees are empowered to enter upon, use, widen, deepen and improve any navigable or other waters, waterways, canal or lake. Section 23, which is in part quoted on pages 6 and 7 of the amended bill, specifically authorizes the use of the waters of Lake Michigan in the canal. Section 24 provides that the canal shall be *a navigable water of the United States, under the control of the Federal Government, for navigation purposes* but not for sanitary or drainage purposes.

Two years after the canal was opened, and, of course, long before the filing of this suit, an act of the Illinois

General Assembly, in force July 1, 1901, gave additional powers to the Sanitary District, among others the power to utilize the original Illinois and Michigan Canal theretofore built by the State of Illinois pursuant to the authority of the Act of Congress of March 2, 1827, subject, however, to the obligation to supply the facilities afforded by that canal. By Section 3, it was provided that the District "shall permit all water craft navigating or proposing to navigate said Illinois and Michigan Canal to navigate all of said channels of said sanitary district promptly, without delay, and without payment of any tolls or lockage charges for so navigating in said channels." And Section 8, specifically required the district to comply with all of the provisions of the Act of Congress of March 2, 1827, which provided for the uniting of the waters of Lake Michigan and the Illinois River.

These statutes of Illinois, which, as we shall hereafter show, have been held to be valid under the Constitution of Illinois, clearly empowered the defendant Sanitary District to construct, maintain and operate navigable channels, and this was an essential part of the purpose of the Legislature in the enactment of these statutes.

In addition to this conclusion, necessary to be drawn from the above provisions, the same purpose is also clearly shown by the requirements of Section 23, that the channel, when created, shall be of the depth of not less than fourteen feet, and, if cut through rock, of not less than eighteen feet deep, and "a current not exceeding three miles per hour." If the sole purpose of its construction had been to dispose of sewage, it would have been in the interest of the proper carrying out of such a purpose to require a rapid current rather than to put in a prohibition of any such speedy flow. The only possible purpose in mind in this latter requirement was to demand at all times the maintenance in the canal of a current which would not be inconsistent with ordinary navigation requirements.

There is also a complete lack of harmony between the statement of the complainant's brief above referred to, as to the purpose of the Sanitary District's canal, and their statement (page 9), of the actual volume of commerce transported on the canal.

Moreover, for the purpose of this case, the purpose and usefulness of this canal for navigation, must also be regarded as conclusively established by the fact that the Secretary of War has, from the beginning, and in the interests of navigation, assumed jurisdiction over its construction and uses, and the amount of diversion through it.

(2) On page 10 of their brief, under division IV of their "Statement of Facts," complainants make the following statements: "One thousand cubic second feet is the greatest amount of water which will ever be required for the needs of navigation upon the Sanitary Canal, DesPlaines and Illinois Rivers." And complainants support this statement by quotations from a number of engineering reports, none of which were referred to in the bill of complaint.

This statement, we presume, is based upon Paragraph 25 of the bill of complaint (pages 18 and 19), which alleges, "that the amount of water necessary to permit *the said canal* to be operated for navigation purposes only," as orators are informed and believe, does not at the present time exceed 500 cubic feet per second, and that the amount to be needed for future requirements for navigation only, will not, on information and belief, exceed 1,000 cubic feet per second, even "if the said canal should come to be utilized to the fullest extent to which it is physically capable of being used for the purposes of navigation."

This is the sole averment in the bill specifying the quantity of diversion claimed by the complainants to be necessary on any portion of the Lakes-to-the Gulf Waterway for navigation purposes.

It should be noted that the statement just quoted from the brief, states the amount of water alleged to be needed *not only* upon *the canal,* but also in *the DesPlaines and Illinois Rivers,* whereas these two rivers were not included in the above averment in the bill.

This averment in the bill, limited as it is to *the canal only,* being technically admitted by the pending motions and demurrer, is sought to be used again and again throughout the complainant's brief as a binding admission as to the needs of navigation *throughout the entire Lakes-to-the Gulf Waterway.*

We call attention here to the fact that the admission as made by the demurrer and motions to dismiss, is much narrower than it is stated in complainant's brief, i. e., the admission is only that the *utmost amount of diversion needed for navigation purposes on the Canal,* is 1,000 cubic feet per second.

The contentions that complainants predicate on this admission of fact we shall reply to later in this brief, where we shall also endeavor to show that other portions of the bill more than overcome the effect of this omission, and permit the Court in its consideration of the pending motions and demurrer to take into account the much greater quantity of water that is in fact needed for navigation on the extensive system of navigable waters of which the canal is only a very small part.

I. THE QUESTION OF JURISDICTION.

The Brief for the complainant states is predicated, as to this question, upon assumptions and contentions that are not pleaded in the bill, nor supported by the authorities cited.

The grounds upon which rest the contentions of the complainant states appear in points I and II of "Points and Authorities," pages 23 to 27, and in subdivisions I & II, pages 38 to 63, of the "Argument," complainants' brief.

Summarized they are:

(A) That the bill presents a case involving the *proprietary interests* of complainant states, as *absolute owners* of parts of the waters of the Great Lakes within their borders.

(B) That as quasi-sovereigns, they have the right wholly distinct from the injuries to their citizens, to protect their own quasi-sovereign rights.

(C) That they have a right to maintain this suit in their representative capacities to protect their citizens.

(D) That they have a right to maintain this suit in their private capacities as owners of public works and property.

(E) That they can maintain this suit not as "an academic vindication of the freedom of commerce, but as a redress" of special injuries to the complainants in the capacities above stated; and

(F) That the bill does not ask the Court to "regulate navigation or to supervise long continuing acts."

The weakness of complainants' case appears first from the fact that a comparison of the scope of the above contentions with the scope of the bill and its expressed legal theory shows that a substantial part of their present contentions is an after-thought not at all within the contemplation of the bill.

We assume that the Court will decide this question of jurisdiction within the limits of the averments of the bill, although we shall endeavor in this brief to meet all of the contentions of complainants on this question.

The sole subject matter of the bill is navigability in interstate commerce; its main theory is that the complainant states are lower riparian owners along a waterway of which Lake Michigan is the upper stretch, and they, as lower riparian owners, claim injury solely from interference by upper riparian owners, with the navigability of waterways for use in interstate commerce. The bill itself expressly states the nature of the legal rights sought to be protected, and the legal theories upon which relief is asked; see paragraph 29, pages 33-34.

The sole subject matter of each of these rights and wrongs, is the alleged interference with the navigability in interstate commerce, of the waters of the Great Lakes and of the "Lakes-To-The-Gulf" waterway. This case has to do only with the protection and control of the navigability of certain navigable waters of the United States, over which, as the bill itself shows, the Congress has assumed and is exercising, its exclusive jurisdiction.

This controlling fact—perhaps the most important fact in this case—*that Congress has taken and is exercising,* through its Agent the Secretary of War, *com-*

plete jurisdiction over the entire subject matter—even to the extent of *expressly authorizing the very diversion complained of—is ignored by complainants' brief on this question of jurisdiction.*

We refer to this fact as important and vital, because none of the cases cited by complainant disclose any instance in which this Court has taken jurisdiction and granted relief at the instance of a State, to protect any feature of interstate commerce over which the Congress had theretofore taken and was then exercising its paramount jurisdiction and control.

Proceeding now to a discussion of complainants' grounds of jurisdiction in the order above summarized, we respectfully contend:

(A) *That the complainant States have no such proprietary interest in or ownership of the waters of the Great Lakes within their borders, as to supersede or limit the paramount power of Congress to protect and control the navigability of these waters, and for such purposes to permit the diversion from Lake Michigan of which the amended bill complains.*

The Nature of Complainants' Proprietary Interest.

If, as seems to be the case, complainants claim absolute ownership, as individual proprietors of a part of the water of the Great Lakes, we need only quote from the opinion in *U. S. vs. Chandler-Dunbar W. P. Co.*, 229 U. S. 53, at 69:

> "Ownership of a private stream wholly upon the lands of an individual is conceivable; but that the running water in a great navigable stream is capable of private ownership is inconceivable."

The extent to which the States have a proprietary interest *in the lands under* these waters, is not involved in this case. Although it is suggested in complainants' brief (page 53), that damage has resulted to riparian owners—to this extent seeking to involve the title of complainant States to the lands under the waters—no such claim is made in the bill.

The sole question presented by the bill, is the control of the navigability of these waters.

While it is true that the complainant States have some proprietary interest in, or title to, these waters while within their respective boundaries, the very authorities cited by them show that they are merely trustees of this title to protect this public right of navigation, *but subject always to the paramount power of Congress.*

This title is an incident of sovereignty, and is similar to the title held by the Crown to the navigable waters of Great Britain. The title thus derived is necessarily held subject to the provisions of the Constitution, and to the paramount power of Congress to control interstate commerce. The so-called "trust," insofar as interstate commerce is concerned, is therefore, merely a naked trust.

The fact that the complainant States have such a limited or qualified title to these waters, cannot of itself justify the claimed jurisdiction. The bill avers no attack on this title, and the interference with the rights claimed to be incident to such title, is shown by the bill to be authorized by Congress pursuant to its paramount power, subject to which the title is held.

In *Illinois Central R. Co. vs. Illinois,* 146 U. S. 387, at 452 (36 L. Ed. 1018-1042), the Court said (italics ours):

> "That the State holds the title to the lands under the navigable waters of Lake Michigan, within its limits, in the same manner that the State holds title to soils under tide water, by the common law, we have already shown, * * *. *It is a title held in trust* for the people of the State *that they may enjoy the navigation of the waters, carry on commerce over them,* and have liberty of fishing therein, free from the obstruction or interference *of private parties.* * * *
>
> (p. 453) General language sometimes found in opinions of the courts, expressive of absolute ownership and control of lands *by the state* under navigable waters, irrespective of any trust as to their use and disposition, must be read and construed with reference to the special facts of the particular cases."

In *United States vs. Rio Grande Dam & I. Co.* 174 U. S. 690, 43 L. Ed. 1136, the Court held that the common law authority of the states to regulate, permit or deny diversions from streams flowing within their boundaries, is always subject to the paramount power of Congress to regulate interstate commerce.

So it is clear that the proprietary interest asserted by the complainant States, cannot constitute a ground for jurisdiction in the instant case, because the bill shows that jurisdiction is sought to be invoked notwithstanding the fact that Congress has taken and is exercising its paramount and exclusive jurisdiction over the subject matter of this suit.

The Claimed Common Law Right to An Undisputed Flow.

The bill (page 35) claims a "common law right" of the complainant States and their peoples, to have an unobstructed use of Lake Michigan for purposes of navigation "free from any and all interference with the *natural* navigable capacity of said Lake." Upon this averment is based that substantial part of complainants' brief in which they claim that jurisdiction should be taken and relief granted in this case, because of the diversion of water from Lake Michigan, and because such diversion carries the water into a different water shed.

It is a complete answer to these contentions, that the bill shows: that the diversion of water from Lake Michigan,—the alleged wrongful act on which the entire bill rests,—has been authorized by Congress through its agent, the Secretary of War; that the diversion thus authorized, was for the expressed purpose of aiding navigation; and that, therefore, the argument of complainants is that their right to have the waters of Lake Michigan flow to them without interruption or diminution of their natural capacity, is superior to the power of Congress under the Constitution to permit a diversion of such waters for the benefit of navigability.

Moreover, this Court has firmly established the doctrine that the common law rules affecting the rights of riparian owners to appropriate the waters of flowing streams may be changed by the States through legislation, or by established custom, for purposes having no relation to navigation, such as the reclamation and irrigation of arid lands, and the conduct of mining opertions; and that such appropriations may be made even to the extent of permanently diverting waters used for such purposes from their natural water shed.

In *U. S. v. Rio Grande Dam Co.*, 174 U. S. 690, at 702-703, there was a diversion of water from the Rio

Grande River (flowing between the United States and Mexico), and a claim by the United States that such diversion of water from the Rio Grande River should be abated as a substantial obstruction to the navigability of interstate and international waters.

Concerning the power of a state to change the common law rule against the appropriation of the waters of a river, this Court said, at page 702-3 (italics ours):

> "* * * it is also true that as to every stream within its dominion *a state may change this common law rule* and *permit the appropriation of the flowing waters for such purposes as it deems wise.* * * *
>
> Although this power of changing the common law rule as to streams within its dominion undoubtedly belongs in each state, yet two limitations must be recognized. * * * that *it* (*the state*) *is lmitied* by *the superior power of* the general government *to secure the uninterrupted navigability* of all navigable streams within the limits of the United States. In other words, *the jurisdiction of the general government over interstate commerce and its natural highways vests in that government* the right *to take all needed measures to preserve the navigability* of the navigable-water courses of the country even against any state action."

In *Kansas vs. Colorado,* 206 U. S. 46, at p. 86, this Court again recognizes the above doctrine, and also says concerning the powers of a State (p. 94):

> "It may determine for itself whether the common-law rule in respect to riparian rights or that doctrine which obtains in the arid regions of the West of the appropriation of waters for the purposes of irrigation shall control. Congress cannot enforce either rule upon any State."

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And at page 95:

> "Neither State can legislate for, or impose its own policy upon the other."

It follows from the above decisions that there is no fixed or rigid rule of the common-law that Illinois could not change by legislation. And there can be no question that Illinois did legislate to authorize this diversion of water from Lake Michigan into the Mississippi Valley watershed, and that the constitutionality of this legislation has been sustained by the Supreme Court of Illinois: *Wilson vs. Board of Trustees*, 133 Ill. 443, *People vs. Nelson,* 133 Ill. 565 at 594.

Nor does the fact, so much stressed by complainants, that this diversion is *into a different watershed,* prove that such a diversion is unlawful.

In *Wyoming vs. Colorado,* 259 U. S. 419, there were diversions from a flowing stream into a different watershed, and upon this point this Court said (p. 466, italics ours):

> "The objection of Wyoming to the proposed diversion on the ground that it is *to another watershed,* from which she can receive no benefit, *is also untenable.* The fact that the diversion is to such a watershed has a bearing in another connection, but *does not in itself constitute a ground for condemning it.*"

Applying these rules to the instant case, it follows that there is no such common-law rule as the complainants claim to render unlawful this appropriation and diversion of water from Lake Michigan.

But even if there were such a rule applicable in a controversy, as between the States, in which the appropriations and diversions complained of had not been expressly permitted under the authority of Congress—it could have no application here because the Secretary of War, as the agent of Congress, has expressly permitted this diversion.

So the complainants are invoking the original jurisdiction of this Court not in a controversy between States to apportion between them the use of the waters in question, but in a suit by certain States to prevent another State from doing in respect of navigable waters of the United States, what the Secretary of War has expressly permitted in the interests of navigability.

Consequently, the claimed "common-law right to an uninterrupted flow," cannot constitute adequate ground for the exercise of jurisdiction in this case.

(B) *The quasi-sovereignty of complainant States, apart from alleged injuries to their citizens, does not justify jurisdiction.*

The complainants' brief (pages 51 to 55), attempts to justify jurisdiction of this case through an alleged invasion of quasi-sovereign rights: first, the general right to protect forests, air and public waters within their respective domains; second, a right to prevent damage to the rights of riparian owners, citizens of the respective States; and, third, the right to prevent damage to citizens of the complaining States in their attempts to navigate these waters in interstate commerce.

In support of the first of these contentions, complainants cite the decisions of this Court in *Georgia vs. Tennessee Copper Company*, 206 U. S. 230, 51 L. Ed. 1038; *Hudson Water Company vs. McCarter*, 209 U. S.

349, 52 L. Ed. 828, and *North Dakota vs. Minnesota,* 263 U. S. 365, 68 L. Ed. 342.

None of these cases is applicable here, because no question was presented involving an effort by States to control any feature of interstate commerce over which Congress had taken jurisdiction and was exercising control.

In *Georgia vs. Tennessee Copper Co., supra,* the suit was to enjoin the defendant copper companies from discharging noxious gas from their works in Tennessee, into the State of Georgia. Damage to Georgia as a private owner was alleged, but was treated by the Court as a mere "make-weight." Jurisdiction was taken and relief granted, on the ground that it was a reasonable demand of Georgia in its capacity of quasi-sovereign (p. 238):

> "that the air over its territory should not be polluted on a great scale by sulphurous acid gas, that the forests on its mountains * * * should not be further destroyed, * * * that the crops and orchards on its hills should not be endangered from the same source."

No question involving the control of any feature of interstate commerce was involved.

In the case at bar, this question constitutes the gist of the action.

In *Hudson Water Co. vs. McCarter, supra,* the State of New Jersey had passed a statute designed to forbid riparian owners in New Jersey from diverting outside the State, waters of a stream within the State. The Court held that this was a valid exercise of the police power of the State over waters within the State. The waters in question did not appear from the opinion to be navigable, but without regard to this, it is clear that no question of the control of public waters for use in interstate commerce was presented.

In *North Dakota vs. Minnesota, supra*, suit was brought to prevent the further overflowing and injury to farm lands in North Dakota, produced by ditches constructed by Minnesota for drainage and sanitation. Apparently, these ditches were not navigable, nor is there any indication that the Secretary of War had authorized any of the acts complained of. The overflow of North Dakota farm lands,—the claimed injury,—clearly involved a subject-matter within the scope of State sovereignty, and the Court based its jurisdiction on this ground.

In each of these cases, the suits involved matters over which the respective States had a reserved quasi-sovereignty which they sought to protect, and which constituted the basis of jurisdiction. As shown in our original brief (pages 24-36), the existence of such sovereignty carries with it as a necessary incident. power to protect, by suit in this Court, its citizens who are damaged in respect of the subject matter of such sovereignty, by wrongful acts of other States or of citizens of other States.

In the case at bar, the complainant States possess no sovereignty whatsoever over the subject matter of this cause,—the control of the navigability of navigable waters of the United States for use in interstate commerce. Sovereignty over this subject is possessed exclusively by the Nation. Since the complainant States do not possess this sovereignty, they, therefore, have no incidental right to maintain this suit.

As to the second claim of quasi-sovereignty,—a right to prevent damage to riparian owners,—it is a complete answer that there is no averment in the bill making any claim of damage to riparian owners, citizens of the complaining States, caused by the diversion.

But even assuming that such damage did in fact result, there is a further complete answer in that the bill itself shows that the diversion is authorized by the permit of the Secretary of War, in exercise of the paramount power of Congress over the navigable waters of the United States.

In *United States vs. Chandler-Dunbar W. P. Co.*, 229 U. S. 53, 57 L. Ed. 1063, this Court held that the United States in the exercise of this paramount power, may interfere with, limit, or even destroy riparian rights. On this subject the Court said (page 61, italics ours):

> "This title of the owner of fast land upon the shore of a navigable river to the bed of the river is, at best, a qualified one. It is a title which inheres in the ownership of the shore; and, unless reserved or excluded by implication, passed with it as a shadow follows a substance, although capable of distinct ownership. *It is subordinate to the public right of navigation, and however helpful in protecting the owner against the acts of third parties, is of no avail against the exercise of the great and absolute power of Congress over the improvement of navigable rivers.* That power of use and control comes from the power to regulate commerce between the states and with foreign nations. It includes navigation and subjects every navigable river to the control of Congress. *All means having some positive relation to the end in view which are not forbidden by some other provision of the Constitution are admissible.* If, in the judgment of Congress, the use of the bottom of the river is proper for the purpose of placing therein structures in aid of navigation, *it is not*

> *thereby taking private property for public use, for the owners' title was in its very nature subject to that use in the interest of public navigation.* If its judgment be that structures placed in the river and upon such submerged land are an obstruction or hindrance to the proper use of the river for purposes of navigation, *it may require their removal and forbid the use of the bed of the river by the owner in any way which, in its judgment, is injurious to the dominant right of navigation.* * * *"

And at page 64:

> "*So unfettered is this control of Congress over navigable streams of the country that its judgment as to whether a construction in or over such a river is or is not an obstacle and a hindrance to navigation is conclusive.* Such judgment and determination *is the exercise of legislative power* in respect of a subject *wholly within its control.*"

This case involved the condemnation by the United States of property adjoining the St. Mary's River, and it was claimed by the riparian owners that they should receive compensation for the taking of their riparian rights *in the stream* (including the impairment of water power), as distinguished from the land adjoining the stream. Concerning this claim, the Court said (page 66, italics ours):

> "So much of the zone covered by this declaration as consisted of fast land upon the banks of the river, or in islands which were private property, is, of course, to be paid for. *But the flow of the stream was in no sense private property,* and *there is no room for a judicial review of the judgment of Congress that the flow of the river is not*

> *in excess of any possible need of navigation, or for a determination that, if in excess, the riparian owners had any private property right in such excess which must be paid for if they have been excluded from the use of the same."*

This case well illustrates the paramount nature of the authority of Congress over the subject matter of the case at bar.

And as to the rights of riparian owners, for the protection of which against this diversion authorized by the Secretary of War as the agent of Congress, the complainant States invoke the original jurisdiction of this Court,—the case is conclusive that the complainants have no such rights. Therefore, this claimed ground of jurisdiction also falls.

As to the third claim of quasi-sovereignty,—the claimed right to prevent damage to citizens of the complainant States in their attempts to navigate these waters in interstate commerce, none of the authorities cited by complainants sustain their contention; on the contrary pertinent decisions of this Court are against it.

We respectfully submit that all the cases point to this conclusion: that the cases in which this Court has allowed its original jurisdiction at the suit of a State to redress injuries to its citizens have fallen into one or the other of two classes: first, cases in which the complainant States possessed quasi-sovereign authority over the subject-matter of the alleged injury; and second, cases in which the injury resulted in property damage to the State itself in its proprietary capacity, for the relief of which jurisdiction was taken, but as the result of such relief its citizens were also protected.

The case at bar is not among either of the two above

indicated classes of cases in which the Court has allowed jurisdiction, but is within the kind of cases in which it has been denied.

The complainant States have no quasi-sovereign power to vindicate the freedom of navigation, nor as we shall show, have they any proprietary interest requiring protection in this suit.

(C) *The claimed right of complainant states to maintain this suit in their representative capacity as parens patriae to protect their peoples.*

The complainant States contend (their brief, page 56), that they "have a standing to maintain this suit as *parens patriae* to protect their people where the illegal act of another state, person, or corporation has caused injury and damage to a large number of the citizens of that state." At the same time they recognize that this claimed right must be distinguished from an attempt by a state to "collect" *individual* claims of its citizens against another state. In the latter connection, they quote from *North Dakota* vs. *Minnesota,* 263 U. S. 365, 375-376, the following:

> "The right of a State as *parens patriae* to bring suit to protect the general comfort, health, or property rights of its inhabitants, threatened by the proposed or continued action of another state, by prayer for injunction, is to be differentiated from its lost power as a sovereign to present and enforce individual claims of its citizens as their trustee against a sister state."

Since the complainant States thus concede that jurisdiction will not be granted to a State for the purpose of protecting the *individual* claims of its citizens, no matter how great in number, it necessarily follows

that no ground of jurisdiction is left to a complaining state to protect the rights of its people, except where the exercise of the rights involved is *under the protection of the quasi-sovereign powers of the State.* In no other way can full effect be given to the Eleventh Amendment, which removed from the judicial power of the United States, suits against one of the States *by citizens* of another State.

The extent to which this Court has applied the rule of the Eleventh Amendment is well illustrated by the decision in *New Hampshire and New York* vs. *Louisiana,* 108 U. S. 76-91, in which it was held that the Court would look through the formal transfer to a State of the legal title of claims held by certain of its citizens against another tSate, and when it was apparent that such transfer was only for the purpose of using the name of the State to enforce the individual claims of its citizens, the Court refused its original jurisdiction. Any other device by which a State permits itself to be merely an instrument to enforce or protect property rights, essentially those of its citizens, would be equally ineffective.

It must follow, therefore, that the rights of citizens as distinguished from those of the State, may be protected by original suit by the State in its representative capacity, only when the State is entitled to a remedy in vindication of its own rights, which remedy may also operate incidentally for the protection of the individual rights of its citizens. The fundamental fact, therefore, without which jurisdiction seems always to have been denied, and, within the doctrine of the Eleventh Amendment, must be denied, is the actual presence in the case of an interest of *the State* as distinguished from the individual interests of its citizens.

The cases cited by complainants (brief, page 56) in support of their above contention, are consistent with this view of the limits of jurisdiction.

The case of *New York* vs. *New Jersey,* 256 U. S. 296, 65 L. Ed. 937, involved threatened injury to New York, by pollution—through a proposed scheme of sewage disposal—of the waters of upper New York Bay. As to its jurisdiction, to entertain this proceeding the Court said (p. 301, italics ours):

> "But we need not inquire curiously as to the rights of the state of New York, derived from this compact, for, wholly aside from it, and regardless of the precise location of the boundary line, the right of the state to maintain such a suit as is stated in the bill is very clear. *The health, comfort, and prosperity of the people* of the state and the value of their property *being gravely menaced,* as it is averred that they are by the proposed action of the defendants, the state is the proper party to represent and defend such rights by the resort to the remedy of an original suit in this Court, under the provisions of the Constitution of the United States." Citing Missouri vs. Illinois, 180 U. S. 208, and Georgia vs. Tennessee Copper Co., 206 U. S. 230.

In this case, as in the two cases cited, the subject matter of the litigation was clearly within the scope of the police power of the complainant State. Its rights as quasi-sovereign were directly involved and threatened by the acts of the defendants. To the extent, therefore, that its quasi-sovereignty was thus threatened, the State had a direct interest in the controversy, and could with propriety bring suit to protect its sovereignty and thereby to prevent injuries to its citizens.

In *Pennsylvania* vs. *West Virginia,* 262 U. S. 553, two bills substantially alike, one by Pennsylvania, and the other by Ohio, were considered. Both were brought to prevent the enforcement of a West Virginia statute restricting the piping of natural gas from West Virginia into the complainant and other states into which for a number of years gas had been thus transported in large and continuous volume. With the long acquiescence and encouragement of West Virginia, Pennsylvania and Ohio had come to be largely dependent on the continued flow of such gas as a fuel for their state institutions, and otherwise, and for the use of their citizens. The challenged statute of West Virginia imposed on the pipe line carriers, a mandatory duty which, if obeyed, would largely prevent this supply of gas from moving into Pennsylvania and Ohio.

In describing the effect of the cutting off of this supply of gas, the Court said (page 592):

> "Each state uses large amounts of the gas in her several institutions and schools—the greater part in the discharge of duties which are relatively imperative. A break or cessation in the supply will embarrass her greatly in the discharge of those duties and expose thousands of dependents and school children to serious discomfort, if not more. To substitute another form of fuel will involve very large public expenditures.
>
> The private consumers in each State not only include most of the inhabitants of many urban communities, but constitute a substantial portion of the state's population. Their health, comfort, and welfare are seriously jeopardized by the threatened withdrawal of the gas from the interstate stream. This is a matter of grave public concern in which the state, as the representative of the public, has an interest apart from the indi-

viduals affected. It is not merely a remote or ethical interest, but one which is immediate and recognized by law."

The Court took jurisdiction and granted relief (to the extent only of declaring the statute of West Virginia invalid and enjoining its enforcement), primarily on the ground that the suit was to protect proprietary interests of the complainant States, (see the Court's reference to the case in *New Jersey* vs. *Sargent, Attorney General*, No. 20 Original, October Term, 1925, decided January 4, 1926).

The bills did not seek to obtain "decretal regulations," nor did the Court attempt to "regulate the interstate commerce involved."

To the extent that the decision gave recognition to the right of the complainant States in their representative capacity, to protect their peoples, the subject matters of such protection were expressed to be "their *health*, *comfort*, and *welfare*," (page 592), which are recognized subjects for the exercise of the quasi-sovereign powers of the States.

Consequently, the decision is not to be regarded as enlarging the scope of this previously recognized right of a State to sue in its representative capacity to protect those quasi-sovereign powers for the benefit of its citizens.

Moreover, the decision in the Pennsylvania case is to be distinguished from the case at bar on several grounds:

First. In the Pennsylvania case, there was a clear and indisputable ground of jurisdiction,—threatened injury to the property and proprietary interests of Pennsylvania.

No such ground of jurisdiction exists in the case at bar.

Second. The bill in the Pennsylvania case was filed, in so far as representative capacity was concerned, to protect the *health, comfort,* and *welfare* of its citizens, —a purpose clearly within the valid exercise of the State's reserved sovereign police power.

In the case at bar, the bill seeks only to vindicate the freedom of interstate commerce,—a *subject expressly removed from the operation of the State's police power.*

Third. In the Pennsylvania case, the interstate commerce in question,—interstate pipe-line transportation of gas,—had by the express action of Congress (see Section 1, Act to Regulate Commerce, as amended, 34 Stat. at L. 544; Transportation Act, 41 St. at L. 474),—been left free from congressional regulation. Consequently, since Congress had not assumed control over it, the subject matter remained within the scope of the States' police power, when exercised within constitutional limits, for the protection of the "health, comfort and welfare" of their peoples, and not as a direct regulation of interstate commerce, and the complainant States were, therefore, free to sue to protect themselves and their peoples from inequitable treatment by West Virginia.

In the case at bar, however, *Congress has assumed and is exercising its constitutional power to regulate the entire subject matter of the bill.* Moreover, the Court has held (*Sanitary District case*) that even if Congress had not assumed such jurisdiction, the subject matter is of such "imminent and direct national importance," that the States could not act at all even if Congress had been silent.

Each of these reasons necessarily precludes the possibility of power in complainant States to maintain this suit as representatives of their peoples.

Fourth. The concluding paragraph of the opinion of the Court in the Pennsylvania case (262 U. S. at 600), shows clearly that the Court did not intend by its decree to grant to complainants any relief that would constitute a *regulation of interstate commerce.* Thus the Court said, page 600, (italics ours):

> "The *object of the suits* is not *to obtain decretal regulations,* * * *."

And,

> "If there be need for *regulating the interstate commerce involved, the regulation should be sought from the body in whom the power resides.*"

These quotations support and strengthen our above contention that the Court did not regard or treat the regulation of interstate commerce, as within the subjects open to protection by a state suing as the representative of its people.

The Pennsylvania case, therefore, is an authority against the contention of complainants here under discussion.

In the case at bar, the sole purpose of the suit is to regulate the navigable capacity of these navigable waters, in interstate commerce. To allow the original jurisdiction for such a suit by a State against another State, would be contrary to all of the pertinent decisions of this Court, including that in the Pennsylvania case.

(D) ***The claimed right of complainant States to*** *maintain this suit in their private capacities as owners of public works and public property.*

It should be noted first, that Wisconsin alone, claims any special injury to itself in its private proprietary capacity, as distinguished from its representative capacity.

The sole averments of this nature in the bill, are found in paragraph 21, pages 14 and 15. Insufficient as these are to show any actual damage suffered by Wisconsin as the result of the diversion of waters from Lake Michigan, the decision of this Court in the *Chandler-Dunbar Water Power Company case, supra,* as to the paramount nature of the power of Congress in its regulation of navigable waters, is a complete answer. The only way in which the acts of defendants are claimed to injure Wisconsin, is in the imposition of a burden upon interstate commerce, resulting from the diversion as a claimed obstruction to the navigable capacity of the Lakes. This diversion has been authorized by the Secretary of War with the approval of the Chief of Engineers exercising the delegated authority of Congress, and for the benefit of navigation. If there be an injury to the complainant, Wisconsin, in the particular alleged, it is not a legal injury for which legal redress may be allowed.

This conclusion is unavoidable upon the authority of *Southern Pacific Co. vs. Olympian Dredging Co.,* 260 U. S. 205, 67 L. Ed. 213.

In that case, the defendant railroad company had obtained a permit from the Secretary of War, to build a new bridge in place of an old one, across a navigable stream. One of the conditions of the permit required the railroad company to cut down the piles which had supported the old bridge to a certain number of feet below the then low water level, but leaving, the stumps of the piles when so cut down, in the stream. The railroad company complied with this condition. Thereafter the plaintiff in the case claimed to have been damaged by the defendant as the result of a collision of its barge with these piles so remaining in the bed of the stream. The Court held: that compliance with the conditions of the permit of the Secretary of War, entirely relieved the railroad company of any liability.

In discussing the power of the Secretary of War under the Act, the Court said (page 208, italics ours):

> "That the Secretary of War was authorized to impose the condition heretofore quoted does not admit of doubt. The power to approve implies the power to disapprove, and the power to disapprove necessarily includes the lesser power to condition an approval. *In the light of this general assumption by Congress of control over the subject*, and *of the large powers delegated to the Secretary, the condition imposed by that officer* cannot be considered otherwise than as *authoritaative determination of what was reasonably necessary to be done to insure free and safe navigation* so far as the obstruction in question was concerned. * * *

Page 209:

> "The Secretary of War evidently concluded that the situation was such as to require the removal of the old bridge and piles, but not such as to require the removal of the latter beyond the depth fixed by his order. Whether the limitation in this respect was grounded alone upon what the Secretary considered would be sufficient to secure the safety of navigation, or upon the fact that to leave the stumps in

> the bed of the river would be of some positive service in stabilizing the shifting bed of the stream, or useful in some other way, does not appear. *It was not for the petitioners, however, to question either his reasons or his conclusions.* They *were justified in proceeding upon the assumption that what the Secretary, in the exercise of his lawful powers, declared to be no obstruction to navigation, was in fact no obstruction.* The language which this Court employed in Monongahela Bridge Co. vs. United States, 216 U. S. 177, 195, 56 L. Ed. 435, 442, is pertinent: * * * 'Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. *It is for Congress,* under the Constitution, *to regulate the right of navigation by all appropriate means,* to declare *what is necessary to be done* in order to free navigation from obstruction, and *to prescribe the way* in which the question of obstruction shall be determined. *Its action in the premises cannot be revised or ignored by the Courts or by juries, except that when it provides for an investigation of the facts, upon notice and after hearing, before final action is taken, the Courts can see to it that executive officers conform their action to the mode prescribed by Congress.'* See also Union Bridge Co. vs. United States, 204 U. S. 364, 385, 51 L. Ed. 523, 533; The Douglas (1182) L. R. 7, Prob. Div., 157, 47 L. T. N. S. 15; Frost vs. Washington County R. Co., 96 Me. 76, 59 L. R. A. 68; Maine Water Co. vs. Knickerbocker Steam Towage Co., 99 Me. 473; The Plymouth, 140 C. C. A. 1, 225 Fed. 483."

This case is on all fours with the case at bar, so far as concerns the existence of any claim for legal redress from special injuries alleged to result from this diversion of water from Lake Michigan. The defendants are acting in accordance with the permit of the Secretary of War, issued in aid of navigation.

The Court may not revise or set aside the Secretary's order, even though the Court might differ with his conclusion as to the value of this diversion in aid of navigation. As shown in the above quotation, his order is to be treated as if it were an act of Congress itself.

In connection with this contention of complainants, it should be noted that the bill contains certain averments to the effect that the defendants have not complied with the conditions of the permit of the Secretary of War, issued March 3, 1925. But none of these averments include any claim that such non-compliance has resulted in a greater lowering of Lake levels than would result if all of the conditions of the permit were strictly complied with. So far as concerns the point here under discussion, even if these averments be taken as true, they can have no effect to justify a right of action by the complainants since they do not cause them the special damage relied on in the bill.

(E) *The claim that a state may enjoin a violation of the freedom of interstate commerce, not as an academic volunteer, but in redress of special injuries.*

Complainants attempt (brief, pp. 57-61), to distinguish *Louisiana vs. Texas,* 176 U. S. 1, 44 L. Ed. 347,—by suggesting a lack of interest in Louisiana; they admit that the states may not regulate interstate commerce,—contend that actions to enjoin violations of the freedom of interstate commerce are not in conflict with the power of Congress to regulate it,—and cite *Pennsylvania vs. West Virginia, supra,* in support of this contention. They also, somewhat surprisingly, cite on this point, *Pennsylvania vs. Wheeling Bridge Co.,* 13 How. 518, 14 L. Ed. 249.

In reply, we respectfully submit, that in *Louisiana vs. Texas, supra,* the quasi-sovereignty of Louisiana was as much involved in the wrongs suffered by some of its citizens in the interruption of their interstate commerce with Texas, as is that of the complainants, in the alleged obstruction to the interstate navigation of the complainants' citizens. If the number of citizens affected be greater in the present case, the damage to each individual was infinitely greater in the Louisiana case. The decree sought in the instant case would prevent compliance with a regulation of commerce lawfully issued under congressional authority, and, therefore, would be itself a regulation of that commerce. And the final result of the Wheeling Bridge litigation demonstrates, that neither complainants nor their citizens have suffered legal damage in the case at bar.

In that case, this Court granted an injunction to redress actual property damage to Pennsylvania. Thereafter, Congress declared the bridge, which was causing the damage by obstructing navigation, to be lawful, and Congress thereby issued its permit. Thereupon this Court held, *Pennsylvania vs. Wheeling Bridge Co.,* 18 How. 459, 15 L. Ed. 435, that these acts theretofore held to be actionable had *become lawful,* and that the actual resulting damage *could not be redressed.* The case holds in effect, that freedom of interstate commerce in law, means freedom within such limitations or restrictions as Congress may impose, and the permit of the Secretary of War in this case is such a limitation.

Although not on this point, complainants then contend, that if they suffer special damage from pollution of the Illinois waterways, they may sue to redress it, but they fail to point to any such special damage.

Complainants conclude their argument under this head, by contending that rights derived from citizenship in the Nation as distinguished from the States, may be protected at the suit of individuals. Our contention on this point is merely that the States, as *parens patriae,* possess no quasi-sovereignty to be exercised to protect navigable waters that are under the care of the national Government. And this contention, complainants do not answer.

(F) *The claim that the bill does not ask the Court "to regulate navigation or to supervise long continuing acts."*

Complainants contend (brief, p. 62), that the granting of a prayer for an injunction against a diversion exceeding the needs of navigation, does not involve "an administration of the regulation of commerce," nor ask the Court to "supervise long continuing acts," And this, notwithstanding the fact that the part of the bill here referred to (bill, p. 36), assumes that the Sanitary District's canal is a part of the navigable waters of the United States, and "subject to the same control on the part of the United States as the other navigable waterways thereof" and notwithstanding such assumption, seeks to enjoin the permanent diversion of any water from Lake Michigan "for any purpose, *in excess* of *the amount* which *the Court shall determine* to be *reasonably required for the purpose of navigation* in and through said canal and the connecting waters to the Illinois and Mississippi Rivers, without injury to the navigable capacity of the Great Lakes and the connecting waters thereof."

Complainants say (brief, p. 62), that such a prayer "involves only a finding of fact," and that "this Court has made such a determination at the instance of *a* *private citizen,"* but they cite no case in support of this latter contention, unless it be ***United States vs. Rio Grande Dam & I. Co.,*** 174 U. S. 690, 43 L. Ed. 1136. This case, however, is not in point, because it was a suit brought by the United States, not by a private citizen, to prevent acts of a state which would interfere with navigability. The purpose of the suit was to protect the navigable waters in question, for the benefit of interstate commerce. A state claimed the right to divert and appropriate a part of these flowing waters for other purposes, so the Court was compelled to find the essential fact, namely, the quantity of water that could be thus diverted without injuring navigability,—as the point of demarcation between state and national authority.

In the case at bar Congress has acted in exercise of its power to regulate navigability, and the prayer of the bill is a clear attempt to ask this Court to substitute in place of the regulatory supervision already being exercised by the Secretary of War, a different and a court-made regulation. In the case at bar, the diversion is being made pursuant to a permit of the Secretary of War, and, therefore, pursuant to the consent of Congress, and no occasion exists for the Court to apportion these waters between state and national authority, the entire appropriation being made pursuant to national authority.

The additional above contention of complainants, that by granting the relief prayed in the bill, this Court would not "supervise long continuing acts" is obviously without merit, because such a determination by the Court would involve the constant supervision of this diversion, and frequent re-considerations of a constantly changing state of facts due to the progressive development by the Sanitary District of its other methods of sewage treatment, and due to other changes which from time to time will vary, because of changes in the quantity of lake water needed in aid of navigation, not only in the Illinois rivers, but also in the Mississippi River where a much greater quantity is needed at critical points than in the Illinois rivers.

Moreover, it is obvious that a determination by this Court of the quantity of water to be needed in aid of navigation, at various times in the future, would involve complicated and important questions of fact relating to engineering and navigation problems, as for instance: the depths to be maintained at various points in this long waterway to meet the needs of its effective navigability and its constantly increasing commerce, especially in those parts of the Mississippi River where the low water channel depth is difficult to maintain; the engineering methods of channel control, and of flow control that should be assumed by the Court in its determination of the quantity of diversion; the speed of current to be expected in various parts of the channel as the result of given quantities of diversion under the varying engineering practices that obtain in different portions of the watery way for controlling the current speed.

The mere statement of these problems indicates that the relief prayed would necessarily require the Court to "supervise long continuing acts," and it is not to be conceived that the Court will oust the supervising control over these very matters that the Secretary of War and the Chief of Engineers already have in hand, nor substitute its own supervision for the regulation and continuing of navigation.

We come now to a contention of the complainants, made not only under this point, but frequently elsewhere in their brief, that this Court and the defendants, on the consideration of these motions to dismiss and demurrers are conclusively bound to admit what are claimed to be averments in the bill to the effect that not more than 1,000 cubic feet per second need be diverted from Lake Michigan for navigation purposes.

While the pending motions and demurrers do admit facts well pleaded, it may be said in passing that such technicalities have not received much consideration by the Court when it has exercised its original jurisdiction; but when all of the averments of the bill are taken into consideration, we respectfully submit that not only from a technical viewpoint, but as a matter of substance, there is no merit in this contention.

Reliance is placed by complainants upon the effect of the averments found in paragraph 25 (page 18) of the bill, which reads as follows:

> "The amount of water necessary to permit the said canal to be operated for navigation purposes only, as your orators are informed and verily believe and therefore aver, does not at the present time exceed 500 cubic feet per second, and the amount of water which may in the future be required for the operation of said canal for navigation purposes only, if permitted to be operated for such purposes, will not exceed one thousand cubic feet per second, as your orators are informed and verily believe and therefore aver, even if the said canal should come to be utilized to the fullest extent to which it is physically capable of being used for the purposes in navigation."

As already noted, the prayer of the bill asks the Court to determine the amount "reasonably required for the purposes of navigation in and through said Canal and *the connecting waters of the Illinois and Mississippi Rivers* * * *." Even without such averment, the Court knows that the navigability question is not limited to the twenty-six mile stretch of the Sanitary District Canal, but also involves the rest of the Lakes-to-the-Gulf waterway, in the preservation, utilization and improvement of which, the intervening defendant states that we represent, are so much concerned.

It is apparent, therefore, that the sole allegation in the bill—made, it will be observed, only on information and belief—is confined to the needs of this twenty-six miles of canal. There is no averment whatsoever, upon which the motions and demurrer can operate as an admission, concerning the navigation needs of the great remaining stretch of the waterway which includes the DesPlaines, Illinois and Mississippi Rivers.

Moreover (and this rests upon merit not technicality), the bill also shows—by alleging the permit of 1925, as the successor of many earlier permits also pleaded in the bill—that Congress, through its agent, the Secretary of War, with the recommendation of the Chief of Engineers, having exclusive authority and jurisdiction to determine such fact, has *officially determined* that the needs of navigation for all purposes, require a diversion of "not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second;" and this official conclusion of fact by Congress is not subject to collateral attack in the Courts.

Therefore, we respectfully submit, that the legal dignity, ~~right~~ weight and effect of this admission in the bill of an official determination by Congress that a greater quantity than 1,000 cubic feet per second is needed, far outweights complainant's technical contention that these motions and demurrers conclusively admit that only 1,000 cubic feet is needed for a small part only of the waterway in question.

This Court has held (Sanitary District case) that the granting of this power to the Secretary of War is constitutional, and it has approved an exercise of such power in respect of this very diversion.

That this Court will not review such administrative determinations of fact, see *Interstate Commerce Commission vs. Illinois Central Railway Co.*, 215 U. S. 452, at 470.

In this connection, the decision in *Wisconsin vs. Duluth*, 96 U. S. 379, is in point. Wisconsin sued on the ground that the channel of the St. Louis River as it flowed in a state of nature, was a common boundary between Wisconsin and Minnesota, in continuation of an interstate waterway in which Wisconsin had an interest. A canal cut by Duluth across Minnesota Point, deeper than the natural outlet of the St. Louis River at its mouth, had diverted the current of the River from its natural course to a new course through the canal and Superior Bay, and Wisconsin averred that this diversion from the natural outlet would cause the latter to fill up, and would thus destroy the usefulness of the river and bay for navigation. Wisconsin in its original bill, challenged the authority of Minnesota thus to divert the waters, to the prejudice of Wisconsin and its citizens.

One of the affirmative defenses pleaded was that the United States by its legislative and executive departments, had approved the construction of the canal, and *had taken control of the work,* for the benefit of navigability.

Concerning this defense, the Court said (page 388, italics ours):

> "If, then, Congress, in the exercise of a lawful authority, has adopted and is carrying out a system of harbor improvements at Duluth, this court can have no lawful authority to forbid the work. If that body sees fit to provide a way by which the great commerce of the Lakes and the countries west of them, even to Asia, shall be securely accommodated at the harbor of Duluth by this short canal of three or four hundred feet, can this Court decree that it must forever pursue the old channel, by the natural outlet, over water too shallow for large vessels, unsafe for small ones, and by a longer and much more tedious route?
>
> "* * * *While the engineering officers of the Government are, under the authority of Congress, doing all they can to make this canal useful to commerce, and to keep it in good condition, this court can owe no duty to a state which requires it to order the City of Duluth to destroy it.*"

Having endeavored to show, subdivisions (A) to (F) above,—that each of the grounds upon which complainants' brief relies in support of their claim that the Court should take jurisdiction of the case at bar, is without merit, we shall proceed next to reply to the rest of complainants' contentions, which,—aside from certain technical questions which we shall not discuss in this reply,—may be considered together as involving the same general subject, and as governed in the main by the decision in the Sanitary District case.

II. THE NATURE AND EXTENT OF THE ALLEGED COMMON LAW RIGHTS OF THE COMPLAINANT STATES IN THE WATERS OF THE GREAT LAKES AND CONNECTING WATERS.

Complainants contend (brief, pages 68-81): That "the common law of waters has been generally adopted in the United States, and obtains in both the complainant and defendant states"; that *as owners* of the waters of the Great Lakes within their borders, the complainant States "have a right to the natural flow of the waters in such watershed, and to all the waters coming naturally to them, to the end that the waters of the Great Lakes shall be preserved in their navigable capacity, and at the natural level and condition for all other purposes"; that an upper state bordering on a navigable water course, cannot appropriate the waters thereof to the prejudice of a lower state; that the Courts will enjoin such appropriation, and in apportioning the respective quantities of such waters that may fairly be appropriated by various interested states, will take into account such common law or statutory rules or customs concerning such appropriations of waters, as may obtain between the states, or in the defendant state; that a state cannot divert interstate waters within its boundary from their natural watershed; and that various Illinois Statutes purporting to authorize the Sanitary District to divert water from Lake Michigan, were unconstitutional.

To a large extent, the above contentions have already been replied to, in that part of this reply brief which deals with the subject of jurisdiction. We there quoted the authorities, showing that the claimed rights of the complainants States in respect of the waters of the Great Lakes, both as to title and maintenance of flow and appropriation or diversion, are subject in all respects to the paramount power of Congress to control and regulate such waters in the interests of navigability. We shall not repeat at this point the citations or discussion thus already made.

We shall, however, reply to those of the above contentions not already dealt with in this brief.

(A) As to the state of the common-law rule in Illinois concerning the appropriation of water from flowing streams, it is a sufficient reply, to say: that the cases already quoted from and discussed, establish the rule that a state may change its common-law rule; that Wisconsin may not impose on Illinois a rule of Wisconsin's making; that Illinois by its Sanitary District acts has changed her common law to expressly permit and legalize this diversion so far as State authority is required; and that the case at bar is not one in which the controversy is between States that seek under State authority only, to appropriate navigable waters, but is an effort by complainant States to prevent defendants from making a diversion of water that has been expressly authorized by the Secretary of War and that is being made under his supervision and control,—for the benefit of navigation.

(B) In reply to complainants' contention (brief, pp. 80, 81), that the various Illinois Statutes authorizing the Sanitary District to divert water from Lake Michigan, *were unconstitutional,* we respectfully submit:

(1) That viewing these Illinois Statutes as an expression by an owning or riparian state, of its change in the common-law rule affecting the appropriation of flowing waters, and as its express consent to such appropriation,—their constitutionality has been conclusively decided by the Supreme Court of Illinois, in

Wilson vs. Board of Trustees, 123 Ill. 443; *People vs. Nelson,* 133 Ill. 565, and *Pittsburg F. W. & C. Ry. Co. vs. Sanitary District,* 218 Ill. 286. And a citation of authorities should be unnecessary upon the proposition that within this view, the decision of the highest court in the state upon the constitutionality of its own statutes, will be followed by this Court.

(2) That these Illinois decisions are equally conclusive to establish the validity of these statutes as proper exercise of the police power of Illinois.

(3) That viewing the Illinois Statutes in relation to the paramount control of Congress over interstate commerce, there can be no doubt of, and we have not contended against, the existence or full scope of such paramount power. On the contrary, we contend that the Illinois Statutes, supplemented by the permit of the Secretary of War issued pursuant to the authority of Congress, constitutes complete lawful authority, both state and Federal, for the making of the diversion sought to be enjoined by the bill. And even though the alleged interference with interstate commerce, affects national or international waterways of such importance that a state may not act at all to authorize such interference, nevertheless, in such a case the permit of the Secretary of War alone constitutes complete lawful authority for the diversion in the case at bar.

III. THE DECISION IN THE SANITARY DISTRICT CASE CONCLUSIVELY ESTABLISHES THE LACK OF EQUITY IN COMPLAINANTS' BILL.

Since the decision in the Sanitary District case, as we understand it, answers all of the contentions of the complainants and conclusively shows lack of equity in the bill, we shall attempt to state the scope and effect of this decision.

(1) *The power of Congress to authorize this diversion.*

In the Sanitary District case, the Court affirmed the decree below which enjoined the Sanitary District from diverting more than 4187 cubic feet per second, the amount authorized at that time by permit of the Secretary of War. This decree was affirmed, to go into effect within sixty days, *without prejudice to any permit lawfully to be issued by the Secretary of War.*

The effect of the affirmance thus qualified, necessarily involved the conclusion by the Court, that the Secretary of War could lawfully exercise the power under Section 10, of the Rivers and Harbors Act of March 3, 1899, *to authorize* this diversion. The opinion comments on the fact that the diversion is from the Great Lakes watershed into the Mississippi watershed, so the above mentioned conclusion of the Court was reached notwithstanding this fact.

As to the Rivers and Harbors Act of 1899, the opinion states that it "repeatedly has been held to be constitutional in respect of the power given to the Secretary of War."

The conclusion is unavoidable, that the decision of the Court in this case squarely sustained the power of Congress through its agent the Secretary of War, to authorize this diversion.

(2) *The legal effect of the permits.*

As stated in the opinion in the Sanitary District case, the prayer of the bill was for an injunction to prevent diversions in excess of the permit of the Secretary of War. This prayer was allowed with the qualification above set forth. The several permits theretofore issued by the Secretary of War were discussed by the Court in the opinion, and in concluding such discussion, the Court says (italics ours):

> "This withdrawal is prohibited by Congress, *except so far as it may be authorized by the Secretary of War.*"

The prohibition thus referred to, was that expressed in Section 10, of the Rivers and Harbors Act of 1899; and the "authorization" referred to, was a permit of the Secretary of War, under the same act.

(3) *The constitutionality of the Rivers and Harbors Act of March 3, 1899.*

The permits before the Court in the Sanitary District case were issued under the grant of power defined in Section 10 of this Act. The Act was necessarily before the Court for consideration, and as stated above, its constitutionality was squarely affirmed in the opinion.

The essence of the decision in the Sanitary District case was, that the power of Congress was paramount over the subject matter of this suit,—the diversion of water from Lake Michigan into a different watershed.

The defendant, Illinois, sought to justify its departures from the restrictions imposed upon it by the then permits of the Secretary of War, by reliance upon its police power, and upon these same alleged riparian rights which the complainants emphasize so much in the case at bar. All of these contentions were held unavailing, solely by reason of the paramount effect that the Court held must be given to the exclusive power of Congress to regulate commerce. There is no legal contention available to the complainants in the instant case, which could not have been urged by Illinois, in opposition to the relief sought by the Government in the Sanitary District case.

CONCLUSION

Since the decision in the Sanitary District case constitutes a complete reply to all of the substantial legal contentions made by complainants in their brief, except on the question of jurisdiction, we have endeavored to limit this reply brief to that question. What we have said in our original brief and in this reply also answers the contentions made in the briefs filed by other Lake States as *amici curiae*.

Having thus endeavored to show that this case is not one properly cognizable by the Court under its original jurisdiction, and that complainants' case is without equity and does not entitle them to the relief sought, we respectfully submit that the motion to dismiss filed by the intervening defendants should be sustained.

Respectfully submitted,

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IN THE

Supreme Court of the United States

OCTOBER TERM, A.D. 1925.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, *Complainants*,

vs.

THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *Defendants*.

STATES OF MISSOURI, TENNESSEE, KENTUCKY AND LOUISIANA, *Intervening Defendants.*

REPLY BRIEF OF DEFENDANT, THE SANITARY DISTRICT OF CHICAGO, UPON THE MOTION TO DISMISS THE AMENDED BILL OF COMPLAINT.

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IN THE

Supreme Court of the United States

OCTOBER TERM, A.D. 1925.

Number 16 Original in Equity.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, *Complainants,*

vs.

THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *Defendants.*

STATES OF MISSOURI, TENNESSEE, KENTUCKY AND LOUISIANA, *Intervening Defendants.*

REPLY BRIEF OF DEFENDANT, THE SANITARY DISTRICT OF CHICAGO, UPON THE MOTION TO DISMISS THE AMENDED BILL OF COMPLAINT.

We have anticipated, and, we believe, fully answered in our main brief the points and authorities in complainants' brief. In any event further discussion seems unnecessary in view of the very recent and conclusive decision of the Court (rendered last Monday, March 1, 1926) in

> **Oregon, Washington Railroad & Navigation Company v. State of Washington,**

in which this Court again ruled that, where Congress has occupied a field of governmental activity under the Constitution, the states are powerless to interfere with the Federal Government. In that case it appeared that the State of Washington had provided for inspections and investigations to be made by certain of its officers for the purpose of fixing a quarantine to prevent the spread of dangerous plant disease or insect infestation. These officers in the performance of their duty under the state act had issued an order that alfalfa raised in certain territory outside the State of Washington should not be shipped into or through the state. Congress had passed an act providing for action by the Secretary of Agriculture for the purpose of preventing the spread of disease to plant life. The question arose as to whether the act of Washington was in conflict with that of Congress. The court after holding that the act of the Legislature of Washington was a real quarantine regulation, and valid as such in the absence of federal regulation, held it, however, to be invalid, in view of the Congressional regulation, and this notwithstanding that in that case the Secretary of Agriculture had not acted. The Court said:

> "In the relation of the states to the regulation of interstate commerce by Congress there are two fields. There is one in which the state can not interfere at all, even in the silence of Congress. In the other, and this is the one in which the legitimate exercise of the state's police power brings it into contact with interstate commerce so as to affect that commerce, the state may exercise its police power until Congress has by affirmative legislation occupied the field by regulating inter-

> state commerce and so necessarily has excluded state action.
>
> * * * * * * *
>
> It follows that pending the existing legislation of Congress as to quarantine of diseased trees and plants in interstate commerce, the statute of Washington on the subject can not be given application. It is suggested that the states may act in the absence of any action by the Secretary of Agriculture; that it is left to him to allow the states to quarantine, and that if he does not act there is no invalidity in the state action. Such construction as that can not be given to the federal statute. *The obligation to act without respect to the states is put directly upon the Secretary of Agriculture whenever quarantine, in his judgment, is necessary. When he does not act, it must be presumed that it is not necessary. With the federal law in force, state action is illegal and unwarranted.*"

That case was obviously much stronger for state power than the present. It dealt with a question of quarantine which is within state power in the absence of federal regulation and the federal administrative officer *had not acted.* In the instant case we are dealing with interstate navigation, as to which federal power is plenary, and the federal administrative officer *has acted.*

At no place in their brief do the complainants attempt to meet the proposition presented by us, that this whole controversy was settled by the decision and decree of this court in

> *Sanitary District v. United States*, 266 U. S. 405,

nor have they even mentioned the opinion of the acting Attorney General of February 13, 1925, to the Secretary of War, holding that he was authorized to issue the very permit (March 3, 1925) here claimed to be invalid. (Appendix, our brief p. 59.)

All the states and parties here in this suit were before the court, either as parties or as *amici curiae* in the Sanitary District case. There the complainant states and *amici curiae* supporting them here, contended, as the United States contended, that the whole matter was within the power of the Secretary of War to regulate under Section 10 of the 1899 Act. Furthermore, in that case it was recognized by the United States that a serious condition affecting the health of the people of Chicago and its environs—upwards of three million people, half the population of the State of Illinois,—had to be considered; that if the diversion were immediately or within any short time decreased to 4,167 cubic seconds feet (not 500 or 1,000 as contended for here), serious results would follow to the health and lives of the people; that such curtailment of withdrawal would not only affect immediately the people of Chicago obtaining their drinking water supply from Lake Michigan, but also would extend along the Drainage Canal, Des Plaines and Illinois Rivers, impairing the health of people living along the waterway, and of those navigating same.

Consequently, the United States in its brief in the Sanitary District case, and the Solicitor General in his oral argument called attention to this condition and suggested and indeed requested that this Court, if it affirmed the decree should recognize the power of the Secretary of War, acting on the recommendations of the Chief of Engineers, to grant a permit even for a greater diversion than the 4,167 cubic seconds feet, if the equities of the case so required.

The Solicitor General said:

> "Throughout this litigation the Government of the United States and its legal representatives have not been unmindful of the welfare of the people of Chicago. Within the scope of its delegated power, the Federal Government (and not the Sanitary District) represents the people of Chicago; and, so representing them—whose truest welfare must be that of the whole people of the United States—the Federal Government has endeavored to act in this matter for the common welfare. Certainly it has not been lacking either in consideration or patience in this litigation. But in its deep concern for the welfare of Chicago, the Government must also have regard for the rights and interests of the great States and populous cities which have equal rights in the waters of Lake Michigan.
>
> It is a condition and not a legal theory that confronts the Government. The question is not judicial, and this Court will presume that theLegislative and Executive branches of the Government will not be unmindful of all the equities of the situation.
>
> As this serious problem will require time for its careful consideration, the Government can not object, if the Secretary of War, acting on the recommendation of the Chief of Engineers, sees fit, pending the action of Congress, and as a modus vivendi to modify the existing permit and temporarily permit a greater diversion of waters.
>
> If there be any doubt as to his power under the authority already delegated to him, the Government has no objection to a proviso in any decree that this Court may enter which will provide that the decree and the injunction, while immediately

> effective, shall be without prejudice to any temporary permit that the Secretary of War, acting upon the recommendation of the Chief of Engineers, may see fit to grant in the nature of a modus vivendi, pending the action of Congress in the premises.
>
> This would set at rest the authority to make some temporary arrangement in the event the present Congress could not dispose of the question before it adjourns sine die on March 4, and especially in the event that Congress might not be again in session until the first Monday of December next."

Presumably pursuant to this suggestion and request, this Court provided:

> "Decree for an injunction as prayed is affirmed to go into effect in sixty days—without prejudice to any permit that may be issued by the Secretary of War according to law."

In so doing this Court recognized that the United States in asking equity, should do equity, and the Secretary of War within the sixty days issued his permit to this great end. The effect of the order of affirmance, therefore, was that the decree of the lower court should become effective to limit the diversion only to the extent that the Secretary of War acting on the recommendations of the Chief of Engineers might fix within the period of sixty days. This court there recognized the validity of the regulations theretofore made by the Secretary of War, extending over a period of twenty-six years; and Congress has at all times had notice by the various annual reports of the Chief of Engineers to it of the regulation of the withdrawal made and by its silence has therefore indicated its approval of the action of the administrative officers to whom it had delegated the power to find a practical solution of a very difficult problem.

In view of the specific provisions of the Sanitary District Act providing for the construction and maintenance of the channels to be built so that they would be navigable and could be used for navigation between the Great Lakes and the Mississippi River, the complainants' proposition, that the sole purpose of the construction of these works was sewage disposal, is very surprising. The various provisions of the Sanitary District Act in this respect were specifically mentioned in our brief. (pp. 8-9.)

The case of

Chicago v. Green, 238 Ill. 258,

is cited (Complainants' Brief, p. 6) and part of the opinion is quoted as supporting that proposition. Counsel, however, fail to quote the other language of the opinion specifically holding that one of the purposes of these works was to provide for navigation (p. 270):

> " * * * It is also manifest, not only from the Sanitary District Act but from the surrounding facts and circumstances, that as a part of the work of disposing of the sewage of the municipalities in the Sanitary District by an outlet through the Des Plaines and Illinois rivers, it was *intended at the same time to assist in building a great waterway from Lake Michigan to the Mississippi River* with the incidents of dockage and water power which would necessarily follow from

> *a navigable channel of the proposed size and location.*"

Counsel quote from the opinion in

People v. Nelson, 133 Ill. 565,

but fail to take cognizance of the following language in that opinion (p. 594):

> "Sec. 24, however, recognizes the obvious fact that the contemplated channel, when completed in such way as to accomplish in a satisfactory manner the purpose for which it is designed, will constitute a waterway capable of being utilized for purposes of navigation and therefore declares what in the absence of such declaration would be the fact, viz., that when so completed it shall be a navigable stream."

In the same manner, in endeavoring to lay a basis for the claim that 500 to 1,000 cubic seconds feet is all the water that possibly could be required to be diverted from Lake Michigan for navigation purposes, counsel fail to observe the report and language of General William V. Judson, U. S. Engineer at Chicago (report dated March 23, 1921) concerning a 9 foot waterway from Chicago to the mouth of the Illinois River, as to the volume of water required for a waterway (H. R. Doc. No. 2, 67th Congress, 1st Session):

> "For a 9-foot channel with an increment of 4167 second feet, the cost, either with dams retained or removed, apears almost prohibitive, and the probability that Congress will limit the increment to 4167 second feet is, in my opinion, so remote that this hypothesis may be left out of

> consideration. * * * In my opinion, to most reasonably conform to the probable conditions of the future, an 8-foot project should now be adopted, based on a 7500 second feet withdrawal for purposes of estimate, and with all dams removed. Then should Congress place the limit of the amount of water to be withdrawn from Lake Michigan at 10,000 second feet, which I deem probable, and under proper conditions advisable that increment would of itself increase the depth to 9 feet."

Counsel also cite the report of Gen. Wilson of 1868. This report also contained a discussion of the improvement of navigation on the Illinois River by withdrawal of a large quantity of water from Lake Michigan. (Chief of Engineers Reports, 3rd Session, 438, 449):

> " * * * Those which have been most generally advocated are:
>
> 1. By dredging and wing-dams.
>
> 2. By drawing a sufficient supply of water from Lake Michigan to give the requisite depth in the Illinois River.
>
> The navigation of the river may doubtless be much improved by the first method, but it is doubtful whether any amount of expenditure upon this plan would give an available depth for navigation of more than four feet at extreme low water in a channel of 160 feet wide.
>
> * * * * * *
>
> The plan of supplying sufficient water from Lake Michigan to make navigation of the Illinois River suitable for the largest class of steamboats,

> without the intervention of dams and locks, has received considerable attention, but this plan is, for reasons which will be hereafter stated, impracticable at any reasonable cost."

The excessive cost referred to by Major Wilson was the building of a canal from the Chicago River across the Continental Divide to Lockport, such as the Sanitary and Ship Canal now operated by the Sanitary District. The construction of the Sanitary and Ship Canal later made possible and feasible the improvement and maintenance of navigation upon the Illinois River with the use of a large amount of water from Lake Michigan.

In quoting from the testimony of the Chief of Engineers, Major General Harry Taylor, before the Select Committee on 9 Foot Channel from the Great Lakes to the Gulf (U. S. Sen. 68th Con., 2nd Session, pursuant to Senate Resolution 411, 67th Congress, 4th Session, Vol. 2, p. 141), counsel failed to include the very pertinent testimony following their quotation:

> "Of course the amount of water depends entirely upon how the improvements shall be made. We could get 8 or 9 feet in the Illinois River with 1,000 second feet or with 10,000 second feet diversion, but by different methods of improvement and at different cost. * * * With 1,000 second feet you would have to have locks and with 10,000 second feet no locks would be required; that is, below Utica."

Major Putnam, in his report to the Chief of Engineers of November 1, 1923, referred to in complainants' brief and mentioned in Major Putnam's letter to the Chief of Engineers dated March 2, 1925, recommending the issuance of the permit of March 3, 1925 (Appellant's Brief, Appendix 115) (the report recites the facts upon which his recommendation was made), discusses the value of the diversion for navigation purposes as follows:

> (P. 43): "There is no doubt but what navigation conditions have been improved by the diversion of water from Lake Michigan. Originally the low-water discharge at La Salle was in the neighborhood of 500 cubic feet per second, while at Grafton it was near 1,000 second-feet. The addition of over 8,000 cubic feet per second, while increasing the slope and the velocity slightly, produced a discharge of about 8,500 cubic feet per second at La Salle and about 9,000 at Grafton. Depths throughout the entire stream were increased substantially as may be seen from the following table and as indicated by comparing the profiles in Plate VII:

Miles above Grafton	Name of Place	Increased depth with 8,000 cubic feet per second diversion
223.2	LaSalle	5.0
88.6	Beardstown	2.2
0.0	Grafton	1.2"

The diversion of water from Lake Michigan has gone on for upwards of twenty-six years and consequently the United States in maintaining its project depth for navigation in the Illinois River below Utica or the southern end of the Illinois and Michigan Canal, has relied upon this diversion of water to produce the required depths, particularly at low water times when navigation requires it. Consequently the river has not been dredged by the United States continuously in order to remove earth and other substances settling in the bottom of the navigation channel, which dredging would have been required had the diversion not existed or had it been materially less. To reduce the flow from Lake Michigan would therefore deprive the river in the stretches mentioned of the required project depths. Even the project that is being carried out by the Government at the present time would not permit the reduction to 4,167 seconds feet prior to 1928, and Major Putnam in his said report states the problem thus (p. 60):

> "On the improved portions of the Illinois River depths have been materially benefited by the introduction of Lake Michigan water. The present project contemplates the completion of a 200-foot channel 7 feet deep based on a diversion of 4,167 cubic feet per second. If the project were completed the flow could be reduced to 4,167 cubic feet per second and cause no injury to navigation. It is estimated that about 1,700,000 cubic yards of material would have to be dredged to complete the project. This would require from three to four years' time with a 15-inch suction dredge such as is contemplated for the river. With the expenditure of about $973,000, inclusive of funds available, the project will be completed by 1928. *A reduction in diversion to 4,167 cubic feet per second could not be made without detriment to navigation before that time.*"

The value of this water for navigation upon the Mississippi River below the mouth of the Illinois is further stated by Major Putnam (p. 47):

> "The diversion of 8,000 second feet from the lake constitutes slightly over one-fourth of the low water flow in the Mississippi River. An inspection of the discharge curve of the river at St. Louis indicates that an increment of 8,000 cubic feet per second produces an increased depth of 1.4 feet."

The value of the water in the Illinois River to avoid conditions offensive to people living along or navigating it, is stated in this report (p. 48):

> "While conditions along the upper river are not always pleasant, they are neither so bad as to endanger the health of any community or of individuals who travel on vessels navigating the stream nor so offensive as to depreciate seriously values of adjoining property. Further contamination by increase of sewage or reduction of fresh water probably would produce the latter difficulty."

Counsel for complainants cite at numerous places in their brief the cases of

Pennsylvania v. West Virginia, 262 U. S. 553, 67 L. ed. 1117.

Pennsylvania v. Wheeling Bridge Co. (1st case), 13 Howard 518, 14 L. ed. 249,

New York v. New Jersey, 256 U. S. 296, 65 L. ed. 937,

in support of the jurisdiction of the court over the matter in controversy. These cases have no application, for in the first *Wheeling Bridge* case and in *Penn-*

sylvania v. West Virginia there had been no regulation or attempt at regulation or control of the subject of interstate commerce before the court in those cases. The effect of regulation by Congress of the subject (in that case restraint or impairment of the freedom of commerce) was clearly shown in the second Wheeling Bridge case (18 Howard 421, 15 L. ed. 435) where the court upheld an act of Congress declaring lawful the bridge which was found to be in the first Wheeling Bridge case actually obstructive to navigation. If there had been regulation or control exercised by Congress of the subject of transportation of natural gas in interstate commerce, sanctioning such restraint as West Virginia attempted by the act of its legislature before the court in *Pennsylvania v. West Virginia, supra,* the decision would have been different, as is indicated by the very last sentence of the court's opinion, as follows:

> "If there be need for regulating the interstate commerce involved, the regulation should be sought from the body in whom the power resides."

Prior to the passage of the Wilson and Webb-Kenyon Act, the court held the laws of the states prohibiting the transportation of intoxicating liquors into the state under certain conditions of shipment, to be invalid, as an impairment or regulation of interstate commerce.

Bowman v. Chicago, Northwestern Railway Co., 125 U. S. 465, 31 L. ed. 700.

Similar laws, however, thus restraining and impairing the freedom of interstate commerce were held valid and enforceable under certain conditions provided for by the Webb-Kenyon Act.

> *James Clark Distilling Co. v. Western Maryland Railway Company* and State of West Virginia, 242 U. S. 311, 61 L. ed. 326.

Chief Justice White, in discussing the practicability of the regulation of commerce provided for under the Webb-Kenyon Act, used language which applies forcefully to the very regulation of the Chicago diversion by the Secretary of War acting on the recommendation of the Chief of Engineers under the March 3, 1925, permit, as follows (p. 340):

> "* * * Or, in other words, stating the necessary result of the argument from a concrete consideration of the particular subject here involved, that because Congress, in adopting a regulation, had considered the nature and character of our dual system of government, state and nation, and instead of absolutely prohibiting, had so conformed its regulation as to produce co-operation between the local and national forces of government to the end of preserving the rights of all, it had thereby transcended the complete and perfect power of regulation conferred by the Constitution."

In

> *New York v. New Jersey, supra,*

New York based its right to proceed upon the injury to the health and comfort of its citizens, due to the discharge of the sewage of the Passaic Valley into New York Bay. There was no right claimed due to impairment of navigation, a subject for the exclusive control of Congress. It is true that the United States intervened and the State of New Jersey acquiesced in its demands by stipulation and the United States then withdrew as an intervenor long before this Court decided the case.

The only use to which the bed and waters of the Great Lakes within the confines of the different complainant states can be put, or it is claimed may be put, is for navigation. No other use is claimed for them by the amended bill of complaint, and none is suggested even in complainants' brief. Full, complete and exclusive control of this use is in the Federal Government and has been and is being exercised by Congress and by the officer or officers to whom has been delegated the authority. What vestige of dominion or control of the waters and bed of the lakes remains or is in the state, is unable to be observed, because whatever right they have is subject to the paramount power of Congress in control of navigation (and counsel so admit in their brief). Thus, the paramount power of Congress to control (a power exercised) envelopes and supersedes any right, authority or dominion of the states in such waters. So, what the states complainant complain about in the assumed capacity of lower riparian proprietors is nothing. In speaking of the right of a riparian proprietor in the waters and submerged land of navigable waters, this court said, in

Scranton v. Wheeling, 179 U. S. 141, 45 L. ed. 126 at page 137:

"It is a qualified title, a bare technical title, not at his absolute disposal, as is his upland, but to be

> held at all times subordinate to such use of the submerged lands and of the waters flowing over them as may be consistent with or demanded by the public right of navigation."

Some argument is attempted, to the effect that the power of Congress to regulate interstate commerce, including within such power the control of navigable waters, is limited to such extent that Congress in exercising control cannot divert or cause to be diverted or permit the diversion of waters from one watershed into another. We submit that the power of Congress in the regulation of interstate commerce is plenary, and such has been the holding of this court from *Gibbons v. Ogden*, down. Because of its peculiar pertinence here, we call attention to the so often quoted language of the opinion of the Chief Justice in that case, as follows (9 Wheaton 1, 6 L. ed. 23, at page 70):

> "It is the power to regulate; that is, to prescribe the rule by which commerce is to be governed. This power, like all others vested in Congress is complete in itself, may be exercised to its utmost extent, and acknowledges no limitations, other than are prescribed in the constitution. These are expressed in plain terms, and do not affect the questions which arise in this case, or which have been discussed at the bar. If, as has always been understood, the sovereignty of Congress, though limited to specified objects, is plenary as to those objects, the power over commerce with foreign nations, and among the several States, is vested in Congress as absolutely as it would be in a single government, having in its constitution the same restrictions on the exercise of the power as are found in the constitution of the

United States. The wisdom and the discretion of Congress, their identity with the people, and the influence which their constituents possess at elections, are, in this, as in many other instances, as that, for example, of declaring war, the sole restraints on which they have relied, to secure them from its abuse."

In

> *Chicago, Rock Island & Pacific Railway Company v. Hardwick Farmers Elevator Company,* 226 U. S. 426, 57 L. ed. 284, 287,

it is said:

> "As legislation concerning the delivery of cars for the carriage of interstate traffic was clearly a matter of interstate commerce regulation, even if such subject was embraced within that class of powers concerning which the state had a right to exert its authority in the absence of legislation by Congress, it must follow, in consequence of the action of Congress to which we have referred, that the power of the state over the subject-matter ceased to exist from the moment that Congress exerted its paramount and all-embracing authority over the subject. We say this because the elementary and long-settled doctrine is that there can be no divided authority over interstate commerce, and that the regulations of Congress on that subject are supreme."

That Congress has lawfully committed to the Secretary of War, acting on the recommendation of the Chief of Engineers, full and complete power to control navigable waters, which includes fostering, improving or restraining facilities of navigation, cannot now be questioned. In referring to the former act of Congress of September 19, 1890, the court in

> *United States v. Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 43 L. ed. 1136, 1143,

said:

> "* * * Evidently Congress, perceiving that the time had come when the growing interests of commerce required that the navigable waters of the United States should be subjected to the direct control of the national government, and that nothing should be done by any state tending to destroy that navigability without the explicit assent of the national government, enacted the statute in question."

In

> *Sanitary District of Chicago v. United States*, 266 U. S. 405, 69 L. ed. 352, 364,

the court said:

> "* * * This statute repeatedly has been held to be constitutional in respect of the power given to the Secretary of War. Louisville Bridge Co. v. U. S., 242 U. S. 409, 424, 61 L. ed. 395, 403, 37 Sup. Ct. Rep. 158. It is a broad expression of policy in unmistakable terms, advancing upon an earlier Act of September 19, 1890, chap. 907, sec. 10, 26 Stat. at L. 426, 454, Comp. Stat. Sec. 9910a, which forbade obstruction to navigable capacity 'not affirmatively authorized by law,' and which had been held satisfied with regard to a boom across a river by authority from a state. United States v. Bellingham Bay Boom Co., 176 U. S. 211, 44 L. ed. 437, 20 Sup. Ct. Rep. 343. There is neither reason nor opportunity for a construction that would not cover the present case. As now applied it concerns a change in the condition of the lakes

and the Chicago river, admitted to be navigable, and, if that be necessary, an obstruction to their navigable capacity (United States v. Rio Grande Dam and Irrig. Co., 174 U. S. 690, 43 L. ed. 1136, 19 Sup. Ct. Rep. 770), without regard to remote questions of policy. It is applied prospectively to the water henceforth to be withdrawn. This withdrawal is prohibited by Congress, except so far as it may be authorized by the Secretary of War."

That Article 1, Section 9, Clause 6, of the Constitution of the United States does not apply and can have no bearing upon the controversy here, is shown by counsels' own argument, (their brief 89, 90) and by the citation of

> *South Carolina v. Georgia,* 93 U. S. 4, 23 L. ed. 782.

The subject of the control is navigable waters. Under the commerce clause of the constitution the power thus given can not be limited by Article 1, Section 9, Clause 6, of the Constitution. Otherwise, the intention of the Constitution to give to Congress complete and full power to regulate interstate commerce without any limitations whatever would be frustrated. Every facility for navigation to meet present demands of interstate commerce upon the Great Lakes has been provided by the United States in the improvement of the connecting channels of the Great Lakes, including all the harbors mentioned in the amended bill of complaint. So Congress by the 1899 Act has not only generally exercised control of and delegated to the Secretary of War the power to regulate all navigable waters, but has actually and physically assumed and exercised control of the particular waters here involved by providing for deepening harbors and connecting channels and by otherwise improving them.

COMPLAINANTS' PRAYER FOR RELIEF.

We submit that the court can measure the futility of this litigation by the character of the relief prayed. These prayers in themselves demonstrate, without reference to the averments of the bill, that this suit should not be entertained but should be dismissed.

The first prayer asks, in substance, for a permanent injunction restraining the State of Illinois and the Sanitary District "from taking or causing to be taken any water whatever from Lake Michigan in such manner as to permanently divert the same from the said lake."

It is not clear what the pleader means by the word "permanently," but the most reasonable construction would apply it to a use of the waters which are not returned to the Lake. If by the word "permanently," the pleader means the duration of time, then the bill is both premature and futile, for the permit of the Secretary of War, which is the basis of this action, is limited in duration and is, in any event, revocable at any time in the discretion of the political department of the government.

We assume, however, as is reasonable, that "permanently" simply means that the complainants do not object to a temporary use of water which would be subsequently returned to Lake Michigan. If so, it is obvious that the prayer, if granted, would prevent the city of Chicago from making any use whatever of the waters of Lake Michigan, even for drinking purposes, and, as Chicago has no other available water supply for its three millions of inhabitants than the waters of Lake Michigan, it is quite obvious that to grant such an injunction would be calculated to cause an immediate depopulation of the second city of the country. We cannot believe that this prayer is meant seriously and it can well be dismissed by this court as a mere futility, quite independent of the fact that it seeks to obstruct a use of the waters which the political department of the United States has expressly sanctioned.

The second prayer asks a permanent injunction to restrain defendants "from taking or causing to be taken any water from Lake Michigan in such manner as to permanently divert the same from said Lake for any purposes in excess of the amount *which the court shall determine* to be reasonably required for the purposes of navigation in and through said Canal and the connecting waters to the Illinois and Mississippi Rivers, without injury to the navigable capacity of the Great Lakes and the connecting waters thereof."

This prayer cannot be characterized as a futility, but it can be justly characterized as a direct and necessary obstruction of the operations of the political department of the government in whose discretion the Constitution has vested the determination of the matter. It invites this court to usurp the functions both of the Secretary of War and his Chief of Engineers, and also of the Congress of the United States, and to determine for itself, without the adequate means of information which so complicated a problem of engineering would require, the question as to the respective navigable capacities of two great waterways, one to the Atlantic Ocean and the other to the Gulf of

Mexico. Possibly the court might be willing to assume such a responsibility if Congress had not acted, but the political department of the government has passed upon this question, not only with its affirmative prohibition of any state action, but by its very wise provision that this difficult question of engineering shall be determined, subject always to the final action of Congress, by the Secretary of War and the Chief of Engineers. By a long series of permits, they have determined this question. For over twenty-five years they have assumed the responsibility of determining to what extent the waters of Lake Michigan could be diverted into the Drainage Canal without undue prejudice either to the interests of the Great Lakes or to the interests of the Mississippi Valley. To grant this prayer for relief would mean that the Secretary of War would at once be *functus officio*, and even the Congress of the United States would thereafter be impotent to determine a great question of national policy, for if the court were itself to determine how these waters could be most wisely used for purposes of navigation in the common interests of the whole nation, it would, in effect, be discharging a function that is purely political in character and, in no respects, judicial.

All this was passed upon in the Sanitary District case, which this court has already decided, for it was the contention of the government in that case that while the unlawful diversion of the waters against the paramount authority of the government was a judicial question, that the method of apportioning the waters between respective national highways was not a judicial question, but was one that was peculiarly a question of political discretion and, as such, could only be solved by the Congress of the United States or by such administrative officers as Congress, by reason of the inherent difficulty of the problem, might delegate the task.

This prayer for the relief becomes more significant when the interpretive contention in complainants' brief is read, for the main contention in that brief is Point VI, which is as follows:

> "It is not considered that Congress has power to authorize the abstraction of the waters of the Great Lakes from that water-shed as a federal act, for any purpose. Complainants, however, in this action, do not now ask an injunction against any abstraction reasonably necessary for navigation purposes *which will not be in excess of 500 cubic second feet at present, or ever in excess of 1000 cubic second feet.*"

In other words, the complainants ask this court to definitely determine, under this prayer for relief, that at the present time Chicago may not divert more than 500 cubic feet per second, or at any time, no matter what the growth of that great city may be, more than 1,000 cubic feet a second, as the measure of apportionment between the respective waterways. For this court to sustain this contention would be to nullify not only the present permit of the Secretary of War, which was given with the sanction of this court in the Sanitary District case, but it would nullify every permit that has ever been granted by the United States government in the twenty-six years that the Sanitary District has operated, and it would largely impair, if not destroy, vast works which have been constructed on the faith of these permits, the cost of which is in excess of $100,000,000.

This would be a judicial usurpation of the functions of the political branch of the government beyond any precedent, and it is a responsibility that this court would not willingly assume, even if it had the power under the Constitution, and yet it is the real prayer for relief in this bill. As such, its impropriety would seem to be too clear for argument.

This court said, in

> *Newport and Cincinnati Bridge Company vs. U. S.* 105 U. S. 470, 26 L. ed. 1143, 1147,

> "* * * It is to be observed that the question now under consideration is not whether the Bridge Company has failed to comply with the requirements of the Joint Resolution, but whether those requirements are all that the due protection of free navigation demands. The first is, undoubtedly, a proper subject for judicial inquiry, but the last, as we think, belongs to the Legislature.
>
> * * * * * * * *
>
> No provision is made for instituting proceedings to have the question determined judicially; and even if the courts should determine that the bridge did substantially and materially obstruct navigation, Congress could not be compelled to withdraw its assent to the further continuance of the structure.
>
> * * * * * * * *
>
> * * * It would be an abuse of judicial power for the courts to attempt to interfere with the constitutional discretion of the Legislature."

The attempt to claim the right in any state of the Union to come into this court to compel Illinois to maintain its waterways in a certain manner because some citizen of the complaining state in his foreign travels might not like the odors arising therefrom is "too futile to need reply."

CONCLUSION.

We desire to submit very earnestly one final suggestion to the court. These bills should be dismissed because even the pendency of this litigation in the judicial branch of the government tends to embarrass the Secretary of War in the full exercise of his discretion in the matter and also the Congress in its determination of the policy of the nation. It is well known that the final solution of this great problem has been under consideration by Congress for many years. The problem is a difficult one and the political department of the government should be left free to determine it without a cloud upon its powers to do so, to which the pendency of even a frivolous suit gives rise. *As this court, in the Sanitary District case, clearly decided that the solution of the problem rested with the political department of the government, this bill should be dismissed.*

Respectfully submitted,

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No. 16, Original Jurisdiction.

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1925

Bill in Equity Original Jurisdiction. No. 16.

STATES OF WISCONSIN, MINNESOTA,
OHIO AND PENNSYLVANIA,
Complainants,

VS.

STATE OF ILLINOIS AND THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

REPLY BRIEF OF ILLINOIS

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REPLY BRIEF OF ILLINOIS *

A multitude of new issues have been injected into this case by the various briefs filed in opposition to the motion of Illinois to dismiss the amended bill. It would unduly dissolve the logical consideration of what we believe to be the only legal issues in the case to follow these several synopses of argument. Therefore Illinois will adhere, in this brief, to the synopsis of argument found on the first page of the index in her former brief and in this reply, to which index is attached an annotated synopsis of complainants' arguments, showing the location herein of our answers thereto. Complainants' very divergent views as to the facts asserted in our former "Statement" require us to precede our legal re-argument with an "Argument on facts."

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* NOTE.—Italics appearing in quotations are ours.

ARGUMENT ON THE FACTS

I.

The national interest is and always has been imminent. It is military as well as commercial. Over a century ago Congress helped to build, and affirmatively authorized, a water level canal and diversion of waters from Lake Michigan into the Mississippi, without limitation as to location or size of canal or quantity of water to be diverted, and with an implied authority for expansion as commerce should require.

The site of the canal is an ancient portage, recognized and used from the time of the earliest discoveries in America, as the connecting link in the single continuous central waterway of continental intercourse and navigation from the mouth of the St. Lawrence and the North Atlantic to the Gulf of Mexico. It was used by the Indians from time immemorial for the light craft of huntsmen in peace and as a strategic route for the war-canoes of tribal conflict. In a state of nature, it was amply sufficient for the rude traffic of that earlier day, and, with the arrival of the Europeans, became the one great pathway from the North for the discovery, colonization and conquest of our inland empire. It is so significantly linked with political, economic and racial development on this continent that no just appraisal of the immediate moving forces and the pregnant future bearings of this controversy can omit a reference to the record and the romance of that history.

Here, in the vanguard of the first fierce impulse of France came Pere Marquette, piloted by Indian navigators and seeking to extend the spiritual, if not the temporal, empire of Rome. Here, eight years later, in 1681, in its military advance to the valley of the Mississippi, marched the intrepid expedition of LaSalle under command of the devoted Tonti. Twice the great LaSalle himself took the same path and, upon his untimely death, followed Pere Memore, Abbe Cavalier, St. Cosme and Gravier.

As trade trod on the heels of discovery and conquest, the slight craft of *coureurs de bois*, bearded traders and gaunt frontiersmen, began to take their place with those of the red navigators of this beaten way. To the precise extent that either these military expeditions or this primitive barter in gewgaws and peltries required an avenue of commerce and conquest from the French Canadian settlements to the interior, this was their natural and principal highway. The domination of controlling natural barriers and defiles over the destiny of areas and peoples do not change with the advance of science and civilization, and whether it be considered in its commercial or its military and strategic aspect, this route and this defile have profoundly influenced the destiny of peoples on this continent and will continue so to do.

In its work of previsioning and organizing empire in the Northwest Territory, Congress was not obtuse to the fundamental fact that the bearing of trade-routes, natural barriers and productive areas, are quite as essential in the erection of states and their amalgamation into a powerful and harmonious federation as is political map-making and the allocation of rights rising from any system of municipal law. In the preamble of the report on the division of that territory Congress expressly recognized this principle (Journals of Congress, Volume IV, p. 663) and, in amending the act creating the boundaries of Illinois to include a strip of land littoral of Lake Michigan and thence westward to the Mississippi, it was said (p. 1677, 32 Annuals 15th Congress) that the amendment was intended to "afford additional security to the perpetuity of the Union, inasmuch as the state would thereby be connected with (the older states complainant here) * * through the lakes. The *facility of opening a canal between Lake Michigan and the Illinois river* * * *, is acknowledged by every one who has visited the place. Giving the proposed state the port of Chicago * * *will draw* *its attention to the opening of communication between the Illinois river and that place * *.*"

In 1795 a treaty with the Northwest Indians had secured free passage by this route for the United States and, by a treaty of 1816 with the Ottawas, the lands occupied by the site had been ceded to the United States. At this time, the site of the canal consisted of two short sluggish streams, one flowing into Lake Michigan, the other into the Mississippi watershed. Between them was a marshy lake. In time of high water it sometimes discharged its overflow both ways and in high east winds the water from the lake itself sometimes backed up and flooded into the Mississippi valley. In high water the voyageurs escaped any portage at all. In low water they carried their freight for short distances. As late as 1819 an official report described a gutter between the heads of the two streams which was "at first a path worn out by the feet of those who carried things across the portage." (Report of the Secretary of War to Congress 1819).

Such was the history of the *site* of the canal in question here before any construction, and such was the early development of the considerations which have ever controlled the views and shaped the conduct of all those whose duty or fate it has been to think or act in the development of the interest, security and harmony of this nation as one political entity of continental extent, as distinguished from those whose circumstance or zeal of local loyalty may unconsciously impel them unduly to minimize the importance of these considerations and to take a different view, focused in intensity but restricted in breadth, by the lens of particular or immediate or localized concern. We pass to the history of the construction of the canal itself.

As shown in our first brief, Congress very early acted upon the purpose (as above related) of the Act of 1818. It proceeded upon a report of the Secretary of War (1819) containing a survey, the only discussion in which *was of a water level canal* which it was thought could be excavated by finishing a "canal begun by nature" and developing that gutter which, "judging from the appearance of those (gutters) now forming *was at first worn out by the feet of those who carried things across the portage.* By an act of 1822 (3 U. S. Stat. at L. p. 659) Congress authorized the State to survey and mark a canal "connecting the Illinois river with the Southern bend of Lake Michigan" and reserved from public sale a pathway 180 feet wide for its construction. It was stated by appellant in the case of *U. S. v. Sanitary District* (which statement was therefore adopted and adverted to by this court) that the effect of this act lapsed because its conditions were not complied with by Illinois. This statement was an error, as is shown by the first brief of Illinois. (p. 59.)

The conditions were complied with, and in 1826 Illinois, through her legislature, memorialized Congress for an act authorizing the construction of a canal "uniting the waters of Lake Michigan with the Illinois river."

In 1827 Congress, in response to the Illinois Memorial of 1826, passed an act (4 U. S. Stat. at L p. 234), authorizing Illinois to build a canal "*uniting the waters of the Illinois river with those of Lake Michigan,*" and therein donated a substantial grant of land to aid in building it.

Complainants' brief contends that only a "summit-level" and not a "water-level" canal was authorized, that no authority was given by this Act of Congress to divert water from Lake Michigan, and that such Act constitutes no authorization whatever for the present canal. Since only a water level canal (to be constructed by excavating an existing "gutter") had ever been discussed and reported upon to

Congress, since the authority was to unite the two waters, and since the Illinois river is lower in altitude than Lake Michigan, complainants' principal contention must fail. Under the words and physical facts involved no other form of canalization is conceivable.

The Act specified neither size nor description of the canal authorized, but since the preceding Act of 1822 had provided that 90 feet should be reserved on either side of the canal and *that it should be and forever remain a public highway*, it can scarcely be contended (if it could under any circumstances be contended) that the Act did not prevision and provide for expansion in proportion to the growing necessities of navigation.

The Illinois memorial requesting the Federal act of 1827 represented the proposed canal as "an important addition to the *great connecting links in the chain of internal navigation which will effectually secure the indissoluble union of this great and powerful Republic.*"

It is not irrelevant to note that statesmen in that day were closer to, and therefore perhaps more concerned with. the disrupting national effect of unbalancing differences in the economic circumstance of the several theatres of human development which they were trying to amalgamate into a nation. Even then was threatening the inevitable result of growing disproportion in such differences, of unwillingness to accommodate them. and of arbitrary insistence on so-called "*absolute*" rights of states and sovereignties and short-sighted or introspective oratory about the dignity thereof—the War Between the States.

It is equally significant to note, in recounting this early history that, by acts of Parliament in 1822 and 1824, the government of Great Britain had inhibited the right of navigation in the St. Lawrence river to citizens of the United States. Recent diplomatic correspondence of Canada with our State Department was reported in the public prints of February 25, 1926, as threatening now to block the Great Lakes-St. Lawrence seaway project, unless certain concessions demanded by Canada are allowed.

The economic area littoral of the Lakes is not the only, or even the principal commercial, industrial and agricultural theatre whose prosperity depends on water outlets to the sea. The Mississippi basin equally requires such an outlet, and it should be remarked with emphasis that dependence on an outlet, the mouth and approach of which is *entirely within the sovereignty and control of another government,* is not sufficient for the security of this as a nation, either for the commerce of peace or the strategy of war. There have been naval engagements in the Great Lakes. *Congress has hitherto seen fit, by statutes, to require surveys of a water route from the Mississippi to the lakes capable of floating war craft and has consistently emphasized the importance of the canal to national defense* (See pages 12 and 15 *infra*).

Peace with Canada and Great Britain must be regarded as partaking of all the certainty of which international relations are capable, but the present peace displays no unbroken record and we *have seen*, on this continent, a terrific collision between economic and political areas bound by much closer ties than are we, as a nation, to Canada.

The Lakes-to-the-Gulf Waterway and the canal in its present size are matters of national concern quite as much under the defense clauses of the Constitution as under the commerce clause.

The striving of inland peoples for free highways of navigation to open water has been, by all odds, the most pregnant cause of political disharmony, hatred and disastrous conflict of any of which the page of human history bears record. Now, to minimize, as a matter of primary national concern, the organic importance of the Lakes-to-the-Gulf waterway or of that critical link therein which has become the subject of this suit, ill comports with the foresight, statecraft and breadth of vision which so early and so continuously have otherwise regarded it. Now to seek to strike down all that has been done to secure and safeguard it, by means of an equity suit, rested by the complainants on such principles of municipal law and procedure, as are appropriate to a boundary controversy between small private proprietors, seems singularly incongruous with the gravity of the principles and problems which here face the nation.

II.

Congress continuously encouraged and invited Illinois to enlarge the early canal and co-operated with the State in constructing the waterway to the Mississippi, of which it was a part.

In pursuance of the Act of Congress of 1827, Illinois in 1836 enacted a statute providing for a canal "45 feet wide at the surface, 30 feet at the base and of a sufficient depth to secure a navigation of at least four feet * * *to be supplied with water from Lake Michigan* and such other sources as the canal commissioners may think proper, and to be constructed in the manner *best calculated to promote the permanent interest of the country, reserving 90 feet on each side of the canal to enlarge its capacity, whenever, in the opinion of the board of canal commissioners, the public good* shall require it * * *."

There is no contention by the defendant that the present canal *is* the canal originally constructed under the three statutes just cited. But we do contend, and shall demonstrate in this brief the following propositions. The status of the federal law, at the time construction of the present canal was authorized by Illinois, *did not require specific Congressional authority* before a state could proceed with such work. The intent of Congress, consistently expressed by its statutes before and at that time, was to construct a waterway from the Lakes to the Mississippi, such as would require the canal projected by Illinois, and would be vastly benefited by it. The work by Illinois was carried out under the encouragement, if not the invitation, of the Federal Government, and in very close co-operation with the War Department. That department consistently planned and executed works ancillary to and extending the waterway of the canal in precisely the same fashion as led this court to say in the case of *Wis. vs. Duluth* (96 U. S. 379), that, as against the attack of another state, the Federal Government had adopted the work. All that was done by Illinois during the entire period of the construction and diversion was officially in the cognizance of Congress. Every act by Illinois of a kind for which Congress had required Federal permission was so permitted.

In this recital, a fact must be constantly borne in mind which seems to have been overlooked by the complainant. The foregoing recitation is not (as in the Federal case recently decided) advanced as an estoppel against regulation of this diversion by the Federal government. No such question is here involved. We are relating the official history of the canal *to demonstrate the Federal interest which complainants' bill and brief say does not exist and to refute the contention that the canal is not and never was a navigation project.* The only opinion on this subject in the Federal case was that an *imminent and direct Federal interest does exist, and that the canal is a navigation project.*

We shall not here detail all the intermediate public history contained in our first brief relating to the period between the authorization of the original canal and construction of the present canal. The funds jointly provided by Congress and Illinois proved insufficient for a water-level canal. The wealth and commerce of the state increased. In 1861 Illinois passed a statute requiring another survey of the canal and of the Illinois and Desplaines rivers "to *secure from Lake Michigan a free, flowing, ample and never failing supply of water sufficient for the navigation of the Illinois river at all times.*" Under authority of a state statute, the canal was deepened and improved until 1871, when the original purpose of Congress was consummated by the statute, and water flowed by gravity from Lake Michigan into a water-level canal on the original plan.

In 1862, while the nation was concerned with the grave alarms of civil war, the ominous motive note of warning sounds again through this narrative, in President Lincoln's message, calling the attention of Congress to the *military and commercial* importance of enlargement. In 1866, Congress began to concern itself with the project of an international watercourse via the Mississippi, Desplaines and Illinois rivers, utilizing the canal as the last link to Lake Michigan, and diverting water from the same into the Illinois. Congress appropriated money not only for surveys (which were made in elaborate detail) for such a "*system of navigation for military, naval and commercial purposes,*" (Act of March 2, 1867; River and Harbor Act of 1888, and see pages 12 and 15 *infra*), but also (and this is most important to this case) actually *began the active physical construction and improvement of that waterway from the westward terminus of the state's work to the mouth of the Illinois river.*

The nature of these reports, acts, and constructions, between 1866 and 1889, is indicated by the following quotations from a few of such reports.

The report of a survey of the Illinois river made pursuant to to an Act of Congress June 23, 1866, contained the following:

> "The Illinois river seems to have been specially designed by nature as the line by which the waters of Lake Michigan are to be connected with those of the Mississippi. Its two tributaries, the Des Plaines and the Kankakee, * * * are separated from the lake basin by a ridge of insignificant height and width. * * * *At no remote period the waters of the lake must have been carried off by these streams.* * * * the data herein contained, together with the * * canal * * *already in operation, *demonstrate beyond a doubt that the waters of the lake may be carried into the Illinois river through a navigable channel of any required dimensions*, and at a cost which cannot be regarded as excessive when the objects to be obtained are duly considered."

A report made pursuant to the River and Harbor Act of 1875, transmitted to Congress, contained the following:

> "The improvement of the eastern portion of the Illinois and Michigan canal involves the further cutting down of the summit-level and enlarging the waterway *so as to afford an unfailing supply of water from Lake Michigan for the improved Illinois river.* * * *
>
> "Sometime during the year 1866, the Board of Public Works of the City of Chicago entered into a contract with the State to cut down and reduce the summit-level of the canal to the elevation of the lake. * * * This contract satisfied, the work completed, and navigation on the canal resumed July 18, 1872. * * *
>
> *"One of the important duties of this survey was to determine accurately the volume of water to be drawn from the lake to maintain a depth of water in the river after it should be improved."*

The Chief of Engineers report of 1880 to Congress pursuant to the River and Harbor Act of 1879 contained the following:

> "The question of a through line of water communication from the Mississippi to Lake Michigan, via the Illinois river, has been before Congress since an early date. *In 1822, the State of Illinois was authorized to make through the public lands of the United States a route for a navigable canal connecting the Illinois river with Lake Michigan,* and between that date and 1854 Congress had granted to the State 321,760 acres of land to assist in its construction. The canal was first opened to navigation in 1848, its cost up to that time being $6,409,509.95; since then the state has spent a great deal towards its enlargement and maintenance. In the meantime several surveys, having in view the improvement of the Illinois river, have been made, the first in 1838 * * * the next in 1866, the object of which was 'to obtain such specific and accurate information in regard to obstructions to navigation in that river as will enable you to submit estimates for its improvement, so that the largest boats navigating the Illinois and Michigan canal, and steamboats drawing four feet of water, will be enabled to pass through the river to St. Louis, during the season of extreme low water without breaking cargo."

"*His report on this survey led Congress to direct a more complete survey in 1867 (act approved March 2), the object of which was to prepare plans and estimates 'for a system of navigation' by way of the Illinois river, between the Mississippi and Lake Michigan, adapted to military, naval and commercial purposes.'* * * * It recommended that the Illinois river be improved by the construction of five locks and dams, creating thereby a slack water system with a navigable depth of 7 feet at the lowest stage. * * * The *State of Illinois, in substantial conformity with that plan, has constructed two of the proposed locks and dams* * * * at a cost of $747,747, while the annual appropriations by Congress for improving the Illinois river (aggregating to date $589,-

> 150) have been applied mainly to ameliorating its navigable condition * * * it was decided to apply the $5,000 allotted for our survey to the remainder of the river * * * *the improvement of the Illinois river, supplemented by the enlargement of the Illinois and Michigan canal as heretofore proposed, will furnish a reliable and commodious channel of water communication from the Mississippi river to the Northwestern lakes;* by this time the vast Mississippi valley, and all the country tributary thereto, is brought into direct water communication with Lake Michigan, at the great City of Chicago, with its flood of commerce eastward and westward; the route exists as a practicable one of considerable importance today, and the question is simply one of enhancing its value by increasing its capacity to a degree commensurate with the important interests involved.
>
> "Other routes have been examined and studied with care, but neither of them occupies so central a position, can be built so soon, and with such certain results, maintained so economically, nor utilized through so great a part of the year."

A report pursuant to the River and Harbor Act of 1882, by the Chief of Engineers to Congress contains the following:

> "* * * In regard to the proposed survey of the Illinois and Des Plaines rivers. * * * The necessity of the improvement derives its importance from several considerations. *The State has improved the river for ship navigation from La Salle to Copperas Creek, and the government is now engaged in continuing the improvement thence to the mouth.* I am directed to report upon the cost of enlarging the Illinois and Michigan canal * * * This work, * * * will give through navigation for large vessels from the lake to the Mississippi. * * * with the improvement of the river * * * carried on, navigation will be brought to within thirty-three miles of the lake, and this stretch can be opened by improving the Des Plaines higher up and *by enlarging the present Illinois and Michigan canal.*"

A report of Engineers of 1887, pursuant to the River and Harbor Act of 1886, contains the following:

> "The project now in the course of execution for the reach of the Illinois river * * * a distance of 135 miles, contemplates the construction * * * so as to insure a continuous depth throughout of not less than 7 feet at low water. * * * *The ultimate object * * * is to provide a channelway from the lower end of Lake Michigan to the Mississippi river of sufficient capacity to accommodate large sized Mississippi river-boats, so that the products of the country may be carried from the lake to the gulf without breaking bulk; also to enable vessels of war of considerable capacity to pass freely from the Gulf of Mexico into the defenseless waters of our northern lakes, should the exigencies of our foreign relations ever require this to be done.*
>
> "* * * It will then be practicable for the large steamers belonging to the Upper and Lower Mississippi, the Ohio, and Missouri rivers to come with their unbroken cargoes to within 100 miles of Lake Michigan. * * * by an expenditure * * * of less than $600,000.
>
> "The Illinois river * * * has been improved by the State of Illinois *by means of two locks and dams similar to those in process of construction by the United States on the river below.* * * * Congress has now before it the engineering data showing the feasibility and cost of a water communication between the Mississippi river * * * leading into Lake Michigan sufficiently commodious for the commercial and military exigencies of the country; * * * perfectly practical routes over which the line can be constructed are known to exist. * * * *The United States and the State of Illinois have long been committed to the project of opening a water communication between the Mississippi river and the northern lakes of capacity sufficient for the wants of commerce and for the exigencies of our national defense, should these ever arise.* * * The connecting link will be formed

> which will join the northern lakes with the vast network of navigable rivers whose waters flow into the Gulf of Mexico on a scale to a certain degree commensurate with the importance of the commerce. * * * Such a route * * * will serve as a wholesome regulator to the rates that would be exacted by other methods of transportation. * * * *Besides the immense commercial advantages * * * there are military and naval exigencies that might easily arise where it would figure as a prominent factor in the problem of our national defenses. From whatever point we look at the subject there is nothing local or sectional in it.* It is true that all the work to be done happens to be in the State of Illinois. The benefits to be derived belong to the nation at large. It is fortunate, too, that at this time the subject is unencumbered by any phase of a political character. *The problem of connecting Lake Michigan with the Mississippi river by a commodious waterway that could be used for commercial, military and naval purposes, has received attention from our most thoughtful statesmen from the day of Albert Gallatin to the present."*

The River and Harbor Act of 1888 (*the year preceding the Illinois Act*) contained the following provision:

> "Improving Illinois river, Illinois: Continuing improvement Two Hundred Thousand Dollars. And for the purpose of securing a continuous navigable waterway between Lake Michigan and the Mississippi river, having capacity and facilities adequate for the passage of the largest Mississippi river steamboats, and of naval vessels suitable *for defense in time of war*, the Secretary of War is authorized and directed to cause to be made the proper surveys, plans and estimates for a channel improvement and locks and dams in the beds of the Illinois and Des Plaines rivers from La Salle to Lockport, so as to provide a navigable waterway *not less than one hundred and sixty feet wide, and not less than fourteen feet deep*, and to have surveyed and located a channel from Lockport to Lake Michigan, at or near the City of Chicago, such channel to be suitable

> **for the purposes aforesaid; the necessary expense of such surveys, estimates, plans and location to be paid for out of the sum herein appropriated for the improvement of the Illinois river'."**

The survey made and reported to Congress in 1890, pursuant to this act contained the following:

> "* * * The conclusion has been arrived *at that it is necessary, for sanitary reasons, to construct a channel or channels from the lake to the Des Plaines valley, beyond the Chicago Divide, capable of carrying to the Illinois river from* 300,00 *to* 600,000 *cubic feet of water per minute,* to carry off and dilute to inoffensiveness the sewage of this great city, to prevent contamination of its water-supply *necessarily taken from Lake Michigan;* and that the necessary legislation to enable the city to undertake the work has been obtained from the State Legislature.
>
> COMMERCIAL ADVANTAGES
>
> "This route has invited attention as a practicable locus for a waterway between the Great Lakes and Mississippi river for many years, and its advantages have been so often reported to Congress that anything herein said would be mere repetition. It is sufficient to say that the minimum channel herein estimated upon will open a *channel of commerce with a maximum annual capacity of* 30,000,000 *tons between the Great Lakes, with its terminus at their greatest port, and a system of navigable rivers penetrating one-half of the states and territories of the Union, with a total navigable length equal to more than half the circumference of the globe.*"

III.

When the present canal was authorized by Illinois, the status of Federal law and administration were such that affirmative approval of Congress was neither required by Federal law nor indicated as necessary or advisable.

The recitation to this point will give some ideas of the cooperation and attitude of Federal administration at the time the present canal was undertaken by Illinois and of the attitude of Congress toward a waterway for very large ships and warcraft utilizing the canal, but, for a just appraisal of the circumstances of the critical year of 1889, it is necessary also to note the status of Federal law when Illinois passed her statute authorizing the canal.

Congress had not yet passed either of the River and Harbor Acts of 1890 or of 1899, the former of which was later described by this court as inaugurating "a new policy of direct control over the navigable waters of the United States" (*Southern Pacific Co. v. Olympian Dredging Co.* 260 U. S. 262), and the latter as an advance thereon (*Sanitary District vs. U. S.*, 266 U. S. 405). The law as then expounded by this court was that until Congress should see fit to assert general control, the power of a state to authorize obstruction in navigable capacity of waters within its borders was plenary (*Willamette Iron Bridge Co. vs. Hatch*, 125 U. S. 1 (1887), and even *after* the statute of 1890 and until the statute of 1899, it was held that a state *statute* fulfilled the requirements of the statute of 1890 and that an obstruction of a navigable stream within a state authorized by a state statute was no offense against the laws of the United States (*Lake Shore & Michigan Southern Railway Co. vs. Ohio*, 165 U. S. 365 (1897); *U. S. vs. Bellingham Bay Boom Co.*, 176 U. S. 211 (1899) Some idea of the then status of Federal law and administration on this subject may be gathered from an excerpt from a report to Congress by the Chief of Engineers (1895), written six years *after* the canal was authorized and begun:

> "The United States has always been slow to move; with its many sleeping rights, it has for many years been loath to exercise them. *Not till 1888 did it begin*

to exercise positive legislation over its navigable waters in order to preserve them for all its citizens. Each River and Harbor bill since then is found to have sections strengthening the hands of those who wish to keep the waterways open, and in good order for all classes of navigators. Not till 1890 had any prohibitive clauses been enacted into laws forbidding, for example, the destruction of channels by improper dumpings. *Saw mills went their own unchecked way every year, clogging up the streams. Railroads bridged all smaller streams in the states, without interference from the United States.* Many other features can be quoted. *But it is sufficient to say that all that is now changed. The adopted policy is to defend, as well as improve, all water courses,* now navigable or probably navigable, in the reasonably close future. Waterways are under the charge of the United States, and there is no likelihood of their being abandoned for some time to come."

"*With this an established fact it is impossible to think that U. S. supervision shall not be extended to the Chicago Drainage Canal in due time. Under whatever law built, and for whatever purpose constructed, just so soon as it is shown that that canal affects, or becomes a part of the system of navigable waterways* of the United States some supervision or control of it *must follow.* When boats use it for harbor purposes; when its waters add to the Illinois river, or take from the lakes, they alter natural conditions, *and the matter rises for consideration under national authority.*"

The same report also discloses the fact that not before November, 1891, had any one suggested that diversion of water would affect the lakes, and that the suggestion then came from the American Society of Civil Engineers. The report continues:

"What Is the Outflow of the Lower Lakes?

"*In November, 1891, the Chief of Engineers U. S.*

A., at the request of the Secretary of the American Society of Civil Engineers (who had been asked by the Chief Engineer of the Montreal Harbor Commission of Canada to suggest the subject), ordered a set of observations made to *determine the amount of water flowing down the Niagara river.* The time was especially propitious, as the water was then very low.

"*The results of these measurements were somewhat unexpected, and they were repeated in May, 1892.* The second set corroborated the first, and the whole formed the *subject of a report to the Chief of Engineers,* which appeared in his annual report of 1893, page 4364, and following. But, as the subject was important, the 'Engineering News' anticipated the appearance of the official report by publishing in its issue of March 8, 1893, this report, with the permission of the Chief of Engineers. *This publication was the first ever made in which as a result of careful measurements a relation between the level of the lakes and their outflow, or discharge, had been established and given to the public.* Prior determination of this discharge had not attempted to detect this relation, and nothing more than a general determination of a season's work had been published.

"*In all plans for the Chicago Drainage Canal the early measurements* had been taken, and those studying the subject chose such isolated figures as suited them best.

"*The report of 1892, being so late in appearance, long after the Drainage Canal was put under construction, escaped the notice* of many who are interin navigation, for two reasons. Some were too busy to see anything, unless specially brought to their notice. *Others thought the whole matter already fully canvassed, and settled.*"

In the light of the foregoing history of the events leading up to the enactment of the Illinois statute creating the canal

and of the then status of Federal policy and project, it can hardly be gainsaid that the State of Illinois was then justified in her conclusions that she had full legal authority to do all she was about to do; that a waterway, joining the Mississippi and Lake Michigan capacious enough to float the largest lake vessels and even ships of war was the fixed military and commercial policy of the United States, and was in actual process of consummation; that the construction of a canal along the general route of the old canal and capable of navigation by any facilities then exicting on the lakes, or likely there to exist, would be a tremendous stride toward the consummation of that national waterway, and was not only permitted, but, considering all the enthusiasm theretofore displayed by Congress and the Federal department in charge of such works, would be gratefully welcomed by the United States.

On May 28th, 1889, the legislature of Illinois passed a joint resolution addressed to Congress. *It declared the policy of Illinois to be* "to procure the construction of a waterway *of the greatest practicable depth and usefulness from Lake Michigan via the Des Plaines and Illinois rivers to the Mississippi river.*" (Compare River and Harbor Act of the preceding year (1888) page 15 *supra*) "* * * A continuous navigable waterway between Lake Michigan and the Mississippi river * * * adequate for the passage of the largest Mississippi river steamboats and of naval vessels suitable for defense * * * 160 feet wide and not less than 14 feet deep." (Note that the Illinois statute provided for a canal 160 feet wide and not less than 14 feet deep.) The legislature memorialized the government with a formal request to stop work on the projects it was then executing in connection with the old canal, and to concentrate all funds on the extension of the new and proposed canal from its projected western terminal to the Mississippi, contemplating a channel 14 feet deep and "*designed in such manner as to permit future development to a greater capacity.*"

Such were the enthusiasm, the motives and the attitude of the state and the nation on the next day, May 29, 1889, when the Illinois legislature passed the act under which was created the Sanitary and Ship canal, the abatement of which has now become the object of this suit. The engineering work authorized has involved an expenditure of over $100,000,000, and the increasing demands of the city now project a further expenditure on sewage disposal works of at least $125,000,000—a burden, using the basis of a computation once made by a War Department Engineer, which on the same *per capita* basis applied to the United States would build twenty or more Panama Canals.

IV.

The canal was conceived as and is a navigation project, both in its auxiliary and direct capacity for the flotation of commerce, and also in its sanitary capacity.

To all of the foregoing history, complainants listen impatiently and reply shortly:

"The canal was never a navigation project. Its only purpose was and is, *cheap sewage.*"

In order to meet this issue squarely, we have disassociated from the foregoing history the development of the sewage disposal problem at Chicago, and its bearing on the case, believing that the record of the development of the navigation project as related above is, of itself, an overwhelming refutation of the charge.

Considering the developed cost of the sewage project to completion, the total expenditure will be in the neighborhood of a *quarter of a billion dollars.* If any large city has a more expensive system, we are not aware of it. The sewage is not "cheap."

The history of the navigation project, as recited, would undoubtedly leave, in the mind of any careful observer, the question of why Illinois was willing to proceed at such staggering expense so far ahead of the actual completion of the large federal projects upon which she relied.

The answer is simply that she had no alternative. Her physical surroundings and the unparalleled rapidity of development of the inland empire of which she is necessarily the metropolis, confronted her as early as 1856 with a problem of sewage disposal, with which, after continuously expending her utmost energy, and treasure, without stint, she has to this day been no more than barely able to cope.

The city lies on a low, almost level, stretch of lake shore. The lake is without current, due to grade. The surrounding soil is ill-adapted to sand filtration or other methods of sewage disposal not requiring large quantities of water for dilution. Indeed, it is fair to say that no such method is even now reasonably practicable at Chicago. In a state of nature, the Chicago river, a short, slow, sluggish stream, flowed into the lake. About ten miles back of the lake, and parallel with it, the Des Plaines river flows southerly into the Mississippi watershed. The land between these streams was so low and marshy that, as before explained, water from an intermediate lake flowed, at high water, into both streams. Flood water from the Des Plaines, discharging across the gap, early became a menace to the city.

In 1856, with a population of 80,000, the first sewage system was constructed, discharging into the Chicago river. The city's only practicable water supply was the lake. The sewage deposited in the sluggish river began to fill it up. In times of heavy flood this filth was washed out into the lake and contaminated the water supply.

Chicago began to pump water out of the river into the canal. The expedient was not sufficient. The city grew with phenomenal rapidity. The Chicago river became a reeking and pestilential offense in the heart of this great nerve center of the commerce and industry of the middle west. Its discharges into the lake threatened to deprive the city of any potable water and created an alarming situation in public sanitation. Lake currents were insufficient to transport and dilute the filthy sediment that was rapidly filling up the lake front, as well as the river, and *imminently threatening to render the harbor of Chicago , the lake itself, the enormous commercial and transportation facilities of the city, and the highway of navigation to the gulf, all unavailable for interstate commerce and navigation.*

Such was the situation addressed by the Illinois legislature in the year 1889, when it authorized the present Sanitary and Ship canal.

The only practicable solution of the sanitary situation at Chicago, presented to the legislature by the best expert advice available in the world, was the one adopted. At that time no great city had evolved any successful system of sewage disposal except the dilution system. Disposal on land was reported as impracticable. Disposal in the lake promised no alleviation. The legislature did what it had to do. It authorized the canal.

The new canal was commenced in 1893 and was completed in 1900, closely paralleling and, for a considerable distance, on the identical route of the earlier canal. Annually Congress was informed of every step of its development in reports of the Chief of Engineers, of which the following are characteristic excerpts.

The Chief of Engineers report to Congress of 1892 contained the following:

> "* * * A large discharge into the Illinois river * * * which * * * would make an open river improvement practicable * * *.
>
> "* * * The extension of the navigation existing on the western rivers to the Great Lakes * * * the advisability and conditions of joint use by the United States for navigation and the City of Chicago for drainage of the channel that must be cut for both purposes * * * can be now examined."

A report transmitted by the Chief of Engineers to Congress in 1893 contained the following:

> "* * * The navigable channel of Chicago river is now maintained by the City of Chicago. * * * Chicago river is the most important navigable stream of its length on the globe. In the number of arrivals and departures of vessels annually it leads all harbors of the United States, in tonnage it is second only to New York. In these elements it is the head of the great commerce of the lakes, but in capacity, depth and width of navigation it is but a third-class port. Improvements are in progress along the chain of Great Lakes contemplating 20 to 21 feet depth of water at low water. Several harbors have 18 feet or more depth of channel. Chicago harbor has 16 feet at entrance to the river * * *.
>
> *"It will soon be necessary for Congress to provide for the extension to Lake Michigan of the navigation established on the Illinois river * * * and to determine to what extent * * * it will utilize for navigation the great channel now being cut by local authorities in the rock divide separating Lake Michigan from the Mississippi valley."*

In 1895 the special report of the Board of Engineers on the effect of the opening of the Sanitary District channel, parts of which have been excerpted above, also contains the following:

> "* * * It is true that the law as it stands, and the intention of the Trustees, contemplates the abstraction of only 300,000 cubic feet under present conditions, but after the canal is opened measurements would not be so instructive, and we *must assume that ultimately the entire* 600,000 *cubic feet per minute will be drawn from Lake Michigan, as required by the State law.*
>
> "The abstraction of 10,000 cubic feet of water per second from Lake Michigan will lower the levels of all the lakes of the system, except Lake Superior, and reduce the navigable capacities of all harbors and shallows throughout the system *to an extent that may be determined, if at all, by actual measurements only.* Under the laws of the United States these changes in capacity cannot be made without Federal authority, and to enable the executive officers of the Unted States to act advisedly in the matter it is necessary, in the opinion of the Board, not only that these measurements be taken, *but that the money cost of restoring the navigable depths in channels and harbors be carefully estimated.*"

The Rivers and Harbor Act of 1910 provided for this survey of compensating works. A special Board of Engineers reported to Congress pursuant thereto in 1913: "To restore the diminished levels of the lakes by constructing contractive works in their outlets does not, however, present any serious difficulties."

In 1899, in connection with the application of Illinois to open the drainage canal, the local army engineers reported to the Chief of Engineers in part as follows:

> "All the changes made by the Sanitary District of Chicago, taken by themselves, have been such as to increase the navigable capacity of Chicago river. * * * I *believe their channel will be entirely under control, and that if the discharge be injurious it can be at once and at any time shut off, and it is evident that the War*

> *Department should preserve the right to control the current and discharge through the controlling works of this channel."*

In 1900 the local engineers reported to the Chief of Engineers on the effect of the reversal of the Chicago river in part as follows:

> "* * * I recommend that no restrictions be placed upon the legal requirements of flow into the Sanitary canal, unless it should be found absolutely necessary to do so.
>
> *"The Engineer Department, the City of Chicago, and the Sanitary District are of one mind as to the need of improving Chicago river, and are co-operating heartily to that end, and large sums are appropriated and expended judiciously by each for the objects in view. The interests of navigation are not only being protected, but are being advanced practically sooner than could be hoped for in the usual course."*

A report on the extension of navigation from the Illinois river to Lake Michigan was made to Congress in compliance with the requirement of the River and Harbor Act of 1896, which was, in part, as follows:

> "* * * *Any navigable channel, therefore, constructed in continuation of the drainage canal must connect with this canal at Lockport* and terminate at or above LaSalle, about 66 miles distant, but the lockage, after the opening of the drainage canal, will be reduced by at least the amount that the increased discharge will raise the water surface of the Illinois river at LaSalle. * * *
>
> "The Trustees of the Chicago Sanitary District are constructing their canal with fixed bridges with 22 feet clear headroom over the canal. This is ample headroom for a commercial barge canal of the largest capacity, and the difference in cost between fixed and

draw-bridges crossing the canal between Chicago and Lake Joliet, with a reasonable allowance for difference in cost of operation, is probably sufficient to construct the canal from the present terminus of the drainage canal to Lake Joliet of from 8 to 10 feet depth, with locks suitable for the passage of the largest Mississippi river barges. * * *

"That prior to embarking in any such improvement it is advisable to secure from the State of Illinois the State works along the Illinois river and such parts of the Illinois and Michigan canal as may be utilized; also to thoroughly complete the lower Illinois river improvement, which has slowly progressed for thirty years, resulting in diversion of water traffic to rail. * * *

"The locality embraces an important commercial route between the Great Lakes and the Mississippi river system, and its utility and worthiness has long been recognized by Congress."

The River and Harbor Act of 1899 required reports from ie War Department on a project to extend navigation rom the Illinois river to Lake Michigan by a channel seven eet deep and also a channel eight feet deep. The report as made by a special board convened pursuant to the atute. Referring to the canal, the report said, in part:

"* * * * This channel opens a waterway over this part of the route which more than meets the requirements of the one called for, or of any other likely to be called for, by those interested in navigation.

"*If the route by the Chicago river and drainage canal be adopted, there remains but little more than half of the work involved in the 8-foot project of* 1890 *for the Government* now to take in hand in order to complete the improvement, since the estimated cost of this portion of the channel (about 28 miles) was nearly $14,000,000."

On November 17, 1900, the Board further reported in part as follows:

> "The Board finds the most economic route for waterways of 7 feet and 8 feet depth to be from Utica to Marseilles in the bed of the river, 11.4 miles; thence around the Marseilles rapids by canal, 7.4 miles; thence in the bed of the river to near the mouth of Kankakee river, 21.2 miles; thence by enlarging the Illinois and Michigan canal to the Joliet basin, 18.3 miles; thence by canal through Joliet basin and along the east bank of the Desplaines river, 4.5 miles, connecting with the Sanitary canal at Lockport, *and thence through the Sanitary canal and the Chicago river to Lake Michigan, thus complying with the terms of the Act of March 3rd,* 1899. * * *
>
> "* * * Estimates are based upon the assumption that the State of Illinois and the sanitary trustees of the City of Chicago will cede the necessary parts of their respective franchises free of cost to the United States, both for construction and use.
>
> "*Since the Board's report of March* 17, 1900, *the Trustees of the Sanitary District have undertaken to co-operate with the United States in deepening the south branch of Chicago river to* 21 *feet and widening it to at least* 200 *feet.* * * * *The fears entertained with respect to the dangers of navigating the south branch of the river under the new conditions of reversed flow have been allayed* to a great degree by the practical experience of the past season."

A report made in 1900, pursuant to the River and Harbor Act of that year, which Act called for estimates of cost for a 14-foot channel *"including proper connection at Lockport with the Sanitary and Ship canal."*

"The project for the lower Illinois river provides for locks 75 feet wide and 350 feet between miter sills, with 7 feet on the miter sills at low water. The discharge of the Chicago drainage canal should increase the navigable depth to over 8 feet, and if the project be extended to Lake Michigan by the 8-foot project on which estimates have been submitted by the Board, there will be afforded a connecting link between the Great Lakes and the rivers of the Mississippi valley, not only ample for river navigation as it now exists, but also for any improvement therein that has been authorized by Congress.

"*But it is held by not a few that the United States should take the initiative and construct a great waterway of which the Illinois valley line should be a link extending lake navigation to the interior of the country,* and that a commerce which does not now exist will then develop to such a magnitude as will more than justify the expenditures. *For such a project a depth of 14 feet or greater will be required,* and further surveys and estimates for a waterway of less depth than 14 feet cannot be considered by the terms of Section 22, under which the Board is instructed to act.

"The engineering questions presented in a project for a deep waterway to connect Lake Michigan with the Illinois river, although attended with considerable difficulty, are by no means insuperable. The proposed line would embrace, first, the Chicago river, consisting of the main river and a portion of the south branch for a distance of about 5 miles. This section is now under improvement by the United States in co-operation with the Trustees of the Sanitary District of Chicago, and will, when the many changes in bridges and tunnels have been made, and the widening and deepening of the channel completed, afford a *navigable depth of 21 feet and an available width of 200 feet.*

"Connecting with this section the sanitary canal affords a magnificent waterway, 28 miles in length, of

sufficient depth and width for any possible requirement of navigation.

"From the west end of this canal the waters of Lake Michigan, in a steady flow amounting to from 5,000 to 10,000 cubic feet per second, are discharged into the bed of the Des Plaines river, and are carried thence down through the Illinois to the Mississippi.

"*The velocity of current along the Des Plaines river,* which would have resulted from confining this discharge to a channel of 8 feet depth for barge navigation *will be sufficiently reduced in a ship canal of* 14 *feet depth or over, to make up-stream navigation feasible.* On the lower Illinois river the prevailing slope of less than 0.15 foot per mile will insure so gentle a current that the depth required can be secured simply by enlarging the existing waterway by dredging in an alluvial deposit, at a cost which will be small when compared with the work which has been done by the City of Chicago in cutting through the divide between the Lake basin and the Illinois valley water-shed * * *.

"But such a channel, to be of commercial value, should either form a through line of communication between the lakes and the Gulf of Mexico or extend to some large center of population, as St. Louis."

The River and Harbor Act of 1902 *appropriated* $200,000 *for the survey of a 14-foot waterway* from the terminus of the Sanitary District canal to St. Louis. The report of the War Department transmitted to Congress by the Chief of Engineers contains the following:

"*The plan proposed is based upon the assumption that the abstraction of* 10,000 *cubic feet of water per second from Lake Michigan, a quantity contemplated in the State legislation affecting the drainage canal, will eventually be permitted by competent Federal authority.*

"In this connection *the Board states that it does not*

> *condemn the present plan of taking* 10,000 *cubic feet per second*, believing, as it does, that some such amount will be needed to protect the lives and health of the people of a great city and of a populous valley; but it invites attention to the fact that *if a much larger amount be taken it will be necessary to construct remedial works elsewhere, and that these are, or should be, of an international character.* It is led to make this remark by the attitude of the Illinois legislature and of the other principal advocates of this enterprise, which is that the 14-foot waterway is only a beginning. and that a much deeper channel ultimately should be constructed, which means that a much larger volume of water must be taken from Lake Michigan. It is the opinion of the Board that the sanitary reasons for the abstraction of water so far exceed and over-shadow the commercial reasons that the amount should be strictly limited by the sanitary necessities of the case. It is impossible to fix a limit to the future growth of Chicago. In a future not remote larger amounts of water may be needed for sanitary purposes, and channels deeper than 14 feet will then become practicable in the open alluvial portion of the Illinois river."

In the report of the International Waterways Commission,, on which the Boundary Waters Treaty was based. is the following. referring to the canal:

> "It constitutes a navigable channel able to accommodate the largest vessels now navigating the Great Lakes. It extends from the Chicago river to Lockport, where it discharges into the Des Plaines river and is now being extended two miles farther to a new power house. With the six miles of the Chicago river and the two miles extension just mentioned. it provides a wide and deep channel for a distance of 36 miles from Lake Michigan. At present it has no navigable connection with the streams below, but under State legislation a connection is to be made. It creates an important water power.

> "Although the primary object of the Chicago Drainage canal was the discharge of Chicago sewage, its function as a channel for navigation was kept in view from the beginning.
>
> "The Board does not condemn the present plan of taking 10,000 cubic feet per second, believing, as it does, that some such amount will be needed to protect the lives and health of the people of a great city and of a populous valley; but it invites attention to the fact that if a much larger amount be taken it will be necessary to construct remedial works elsewhere, and that these are, or should be, of an international character. It is led to make this remark by the attitude of the Illinois legislature and of the other principal advocates of this enterprise, which is that the 14-foot waterway is only a beginning, and that a much deeper channel ultimately should be constructed, which means that a much larger volume of water must be taken from Lake Michigan. It is the opinion of the Board that the sanitary reasons for the abstraction of water so far exceed and overshadow the commercial reasons that the amount should be strictly limited by the sanitary necessities of the case. * * *"

The report to Congress of the Chief of Engineers for 1906, referring to lake levels and currents in the Chicago river, contains the following:

> "Furthermore, by reason of winds and barometric effects, oscillations of six inches several times in a single day are frequent, and two to four feet within an hour are occasionally experienced. Consequently, individual exceptional levels are misleading, and the general effects of water diversions must be measured by annual average rather than by monthly or daily.
>
> "These currents, although much complained of at the time, are not greater than are constantly encountered in many tidal rivers on the Atlantic coast, where no

complaints are made, because all boat captains and pilots are accustomed to such currents and make their arrangements accordingly.

> "*Summing up the above, it may be briefly stated, therefore, that* 10,000 *cubic feet per second diversion of water from Lake Michigan into the drainage canal will be, probably, not unreasonably obstructive to navigation or injurious to property.*"

It is clear that before, at and after the canal was authorized, it was treated by the Federal Government as an integral link in the national waterways, necessary to interstate navigation, both in its sanitary and flotation aspects.

As the work progressed, some misgivings arose as to the effect of new currents in the Chicago river. Also, when the possibility of an unforeseen effect on lake levels began to appear, the Federal Government was immediately apprehensive.

From the inception of the canal, however, the Federal reports emphasize the necessity to navigation of proper sanitation at Chicago. As experience accumulated, the Government found that most of its early misgivings were unsubstantial. In any event, it relied on its complete legal control of the situation and proceeded to handle the whole matter in the best interests of navigation and of the commerce of the nation as a whole, with due regard to the existing and future necessities of the Lakes-to-the-Gulf waterway. Consistently throughout the various reports appears the importance of the canal-cut to that waterway.

It also appears from these reports that the Federal Government has conducted its improvements in the waterway below the canal and in the Chicago river above the canal in co-operation with the State of Illinois, with due regard for the value of the canal as a part of the waterway, and in such manner as to connect up the work of the Federal Government at both ends of the canal, with *the channel of the canal itself as a continuous highway of interstate commerce.*

So much for what the Federal Government and the State of Illinois have done with reference to the present canal and diversion.

V.

Sewage disposal, standing alone, is, in this case, a matter of imminent national concern in the fields of both interstate commerce and of national defense. The problem here is a condition and not a theory. The permits of the Secretary are not only appropriate, but necessary. The canal and diversion are integral and necessary parts of a national system of navigation and can no more be decreed away than can the Straits of Mackinac.

Complainants say that nothing that has been done by either sovereignty bears any relation to navigation. We think the history of the development of the motive to secure flotation of commerce alone sufficiently disposes of that contention, but if not, there is another consideration which annihilates it. *Sewage disposal in this manner, in this case, was itself, and still remains, a compelling requirement of interstate and international navigation.*

The City of Chicago, the lake in front of it, the canals and rivers behind it, are all among the most important of the national facilities for interstate commerce. The port of Chicago did not locate itself. As we have shown, the city and the great defile back of it making possible the potential waterway between the lakes and the gulf, were all previsioned by Congress *as facilities of interstate commerce,* and were, by Congress, tacked on to the northern end of Illinois and brought within the domain of that state for the very purpose of bringing about precisely the result that has ensued.

The projected port stood at the southern extremity of lake navigation. It was the open maw of the furthermost reach of deep water from the Atlantic Coast into the interior. It was the southernmost extremity of an impassable natural barrier (Lake Michigan) to land highways from west to east, which barrier lay directly athwart the natural trans-continental course of lowest gradients and easiest and most direct routes for railways. It was the northeast extremity of the waterway to the Gulf. It lay on the only link between the two great continental systems of waterways. To the north and east was a great and insatiable demand for raw products; to the south and west an equally insistent necessity for the products of manufacture, and, at almost equal distances in different directions, and of easy access, lay inexhaustible resources of the constituents of steel—by-product coal, iron ore, and limestone. The natural routes for their transport converged here. West to the mountains and south to the Gulf lay an area of potential productivity unequalled on the earth's surface in extent, variety and fertility. Every human activity was beckoned and impelled to this vast theater, and the bulk of every product of export, every necessity for import, had to strain through this one opening.

There is no parallel in cartography or history of a natural defile controlling to such an extent the fundamental forces of human destiny and development. Mesopotamia, Khyber Pass, the Bosphoros, Aden, the English Channel, the mouths of the Nile, the Pillars of Hercules, the Route of Conquest at Verdun—all have dominated the great mass movements of mankind, and each has controlled a pathway on sea or land, but the mere mention of them and of their image in their present state, after the continuous development of centuries, discloses the inadequacy of comparison.

No human foresight could possibly have pictured the effect of these forces on the development of Chicago as a control center of the national system of interstate commerce. With dazzling rapidity the steel ribbons of the great transcontinental land routes came and looped themselves about the southern arc of the lake. Water craft on both great international systems (north and south) began disgorging their cargoes on the flimsy wooden wharves of the sluggish Chicago river. Industries of a magnitude never encountered or imagined, inevitably converged at this great bulk-breaking portage to serve the flood of national traffic. The growth of the community created as the resultant of these forces is unparalleled in either rapidity or magnitude. The fundamental necessities to the existence and efficiency of that port require and have heretofore received full flexibility of *administrative* control of two sovereignties. Today they are placed before this Court, which is asked to deal with them within the cast-iron restrictions of private municipal law, and to treat with the economic solar plexus of the commercial, industrial and agricultural nerve-system of the nation, as though this were a controversy between two stubborn and litigous British free-holders over a mill-right in a affluent of the Humber.

Chicago exists by virtue of no euphony in the name of Illinois. It is a phenomenon resulting solely from the forces of national economics and topography, converging with unprecedented momentum on the southern extremity of Lake Michigan. Congress, to the extent described, was conscious of those forces and located the port and the canal in anticipation of them. **That port and canal are problems for national consideration; and such national consideration involves the waterway of commerce south quite as much as the water-**

way of commerce north. In the present relation, it involves the question of protecting the lake, the harbor, the canal and the rivers from pollution and disease. That question, in these circumstances, is before the nation as a vital and overwhelming consideration of interstate commerce and in no other aspect.

It happens to be a question of tremendous gravity at this moment, because of the size and circumstances of the community, and because of the instant situation as it now exists. The condition that confronts us is as follows.

We have here an industrial and commercial community, created by national economic forces seated athwart the controlling inland link of international *interstate commerce.* Due to the addition of the peculiar effluvia of the kinds of industry, which national necessity has located here, the community is daily creating sewage equivalent to that of an ordinary population of nearly 5,000,000 persons. It has absolutely no other method of sewage disposal than one which involves the diversion of water from an inland sea, and there is grave doubt whether any other method is possible at any cost.

Complainants contend that, under our system of government, no Congress, no Secretary of War, no Federal Court of Justice, confronted with such a situation can consider its effect on interstate commerce, or, after weighing all the circumstances, can determine that the present canal and diversion could be and ought to be continued in the interest of national defense and interstate and international commerce and navigation. The reason advanced for this remarkable view is that sewage disposal has not, in other circumstances and under other conditions, been determined to fall within the realm of such consideration. Also because, if one treats the law as a set of artificial restrictions, like the arbitrary and dead rules of chess, which were conceived for the purposes of dexterity and amusement ten centuries ago, and not as a vital and necessary hand-maiden of human progress, one flushed with advocacy may deduce a rule that a queen may not move directly to the heart of an *impasse* but must remain useless because the geometrical delineation of her restricted paths places all of them outside of her ordered trajectory. Such a contention is unworthy of consideration.

We believe that, without looking further than the foregoing recitation of facts at public cognizance, it is clear that:

(1) The whole subject matter is disclosed as one of such imminent national interest in the fields of interstate commerce and national defense as to abate the suggestion of such an interest of state quasi-sovereignty therein as would maintain the suit of any of the states complainant.

(2) That a water-level canal and diversion of water from Lake Michigan through it were originally affirmatively authorized by Congress without other limitation on expansion other than the progressive necessities of commerce; that the present situation is an inevitable development thereof, and was created with full legal authority and under such cognizance of Congress and such supervision, permission and co-operation of the proper departments of the national government as has been prescribed by Congress; and that the canal and diversion have been effectually adopted by the United States by such supervision and co-operation in its construction and administration, at least as against the claim and right of any state in this Court.

(3) The canal and diversion have utility in interstate commerce and navigation; for flotation of commerce in the canal; for creation by the canal of practicable navigation in the entire riverway from Lockport, Illinois, to Memphis, Tennessee; for connection, by the canal-cut, between the

Lakes-to-the-Gulf Waterway and the St. Lawrence Seaway, and finally, for sanitation, by the canal, of interstate and international navigation and commerce. In any one or all of these four aspects, the acts of Congress, of the State of Illinois and of the Secretary of War must be regarded as proper, appropriate, and necessary to the security of national defense and in the interest of interstate and international commerce.

Some of the permits of the Secretary of War are set forth in the bill of complaint. The chronology of the rest is contained in our first brief. An examination of them discloses how carefully every step of construction was followed by the War Department, how every effect upon navigation was observed, and how promptly and effectively control was exercised.

Beginning in 1913, a controversy arose as to the effect of earlier permits. This controversy culminated, a little over a year ago in a vindication by this court (*Sanitary District v. the United States,* 266 U. S. 405) of the validity and effectiveness of the Secretary's control. A decree issued here restricting diversion to such amount as the Secretary should determine was necessary. All operations since that time have been in strict conformity with that decree.

The complainants contend that the diversions authorized by these permits bear no reasonable relation to navigation and set up a diversion of 1000 c. s. f. as all that, *in their opinion,* is necessary to navigation. By "navigation" they mean *present flotation* of commerce in the canal and in the Illinois and Des Plaines rivers, by a system of dams and locks. To support the conclusion that only 1000 c. s. f. is necessary, they refer to certain Engineers' reports of *one particular method* of flotation favored by that *one particular group of engineers.*

The public documents cited herein disclose the *variety of opinion* that has at various times existed in the War Department, and been under consideration by Congress, concerning the *best method* of utilizing the canal. *Three* separate *depths* and *two separate kinds of Lakes-to-the-Gulf* Waterways have been considered by the War Department, and are still under consideration by Congress. The requirements of this waterway are shown in these reports to have been variously estimated at from 10,000 to 1,000 c. s. f.

Of even more importance is the difference between "navigation in the Illinois and Des Plaines rivers" and "navigation in the *Illinois, Des Plaines and Mississippi rivers.*" The latter is the Lakes-to-the Gulf Waterway. The former is complainants' waterway postulated for the purpose of their bill. The latter requires far more water than the former. Of all the plans being considered by Congress, the complainants would force upon Congress and the country, by decree of this court, a 7-foot slack-waterway—a contrivance of dams, locks and barges, useful only in the Illinois and Des Plaines rivers.

The government has several alternatives in creating the various waterways. Decision involves weighing many expedients—less diversion into the canal and more dredging and dams in the southern rivers, or more diversion from the lakes with less construction in the southern rivers and more dredging in the lakes or construction of compensating works at their outlets. Complainants want to take all these engineering decisions to themselves. In order to provide a basis for their bill, they have selected the *one* among many plans that best suits their local needs **and are seeking to control the discretion of Congress and the executive departments of government by using the equity powers of this court to force its adoption.**

Much has been said about the assertion, technically admitted by the demurrer, that the diversion complained of lowers the levels of the lakes *six inches.* The states seek to have the *natural* levels restored to their harbors, and base their claim on the quasi-sovereign right of a state to the "natural gift" of waters within their dominion. This right they assert even as against Congress and the United States. The briefs indulge in much wild speculation about the threat of complete appropriation against them, and indulge fanciful parallels to syphoning out *all* the waters in the lakes. As pointed out in our first brief, they do not allege any actual loss or injury at all. They specify no single case of any reduced loading of any vessel at any port. In a lake-level that may fluctuate, at a particular port, *two feet* in the course of *an hour*, how could they? In one of the briefs they speak of injury already suffered by "thousands of their citizens," but in view of the facts related in the bill, it must be supposed that this assertion was developed in the heat of advocacy.

As a matter of fact, the whole assertion of lowered lake levels from this cause germinated from a technical calculation of engineers that only one versed in abstruse mathematics could follow. One could not go out with a measuring rod and determine any such result. As was said by Judge Carpenter in emitting the decree confirmed by this court in the federal case: (Unpublished report.)

> "From the standpoint of the practical mariner the testimony may not be satisfactory, * * * in fact *no lake captain testified that by reason of the lowering of Lake Michigan was navigation interfered with. I have grave doubt whether any boat has been stranded or delayed by reason of the action of the Sanitary District.*"

We must concede, for these purposes, that the lakes are lowered six inches. But if the whole system of Lake navigation is an artificial creation of the War Department, the Secretary of War could regulate it with more freedom than if it were a natural system. In our first brief we demonstrated by public records that the *natural* levels of the lakes provided, at the ports and critical points averred as *locii* of injury, only insignificant depths of from two or three feet upward, but rarely more than ten feet. We showed that Congress under the same general scheme of harbor and lake improvement as was described in *Wisconsin vs. Duluth*, 96 U. S. 379, had entered every one of these ports and, by dredging to an approximate depth of 19 to 20 feet, had made them practicable for navigation. **On the face of the bill it appears that it is this artificial depth, created by the Federal government, which alone has rendered it possible for these ports to receive the freighters of "enormous carrying capacity," in respect of whose "reduced loading" the injury is claimed.**

What "great gift of nature" have we here? What *quasi sovereign* right have these states complainant in this navigable capacity of interstate navigable waters, which was created by, and (under the established doctrines of this court) belongs to, the sovereignty of the United States? What injury can there be if under color of authority of the United States 1/36th or 1/40th of the gift of *navigable capacity* received from that hand be retaken by the same hand? How, in such a state of affairs, can complainants apprehend any real obstruction by the Federal government of that which it has been at so much pains to provide? The apprehension is not real. *There are many ways of solving the problem and it is for Congress and not these complainants to select the method.*

Complainants say the permits of the Secretary of War and all that has been done under them were invalid because they were inappropriate to the needs of navigation. How can the complainants judge the problems, the intention and the policy of the Federal government? We have shown abundantly that what has been done was done *in the interests of commerce*, both on the lakes and elsewhere. Here the Secretary of War is balancing the requirements of two of the great demands that the regulation of commerce places upon him. The Federal government has more ways than one of solving its problems. In official reports to Congress the War Department has already suggested the complete restoration of all lake levels from the effects of this and all other diversion by the construction of compensating works in several of the lake outlets. The proposed plan which would cost only a fraction of the staggering loss that would be imposed by the relief prayed for here and with a far more beneficial effect upon navigation. Restoration of lake levels would abolish the whole ground of complaint stated in the bill. But complainants will not hear to it. Why?

The only conceivable objection that these complainants could possibly have to this solution would be inadvisable for them to insert in the bill—less hydro-electric energy than could be secured by abating the diversion.

The State Department is even now negotiating with Canada for a solution of the whole problem. Congress has several cognate measures under consideration, and Illinois is working earnestly to provide, at tremendous cost, auxiliary works to reduce the amount of water required. The President's last message earnestly recommended the immediate improvement of the Lakes-to-the Gulf Waterway. This court has considered all the facts alleged here, and the canal is being administered under its decrees. Every department of the government, every agency concerned (except complainants) is working with knit brows toward a constructive solution. Can it be that there is any theory of law that will permit the sudden and annihilating crash of a bludgeon of destruction into such a status of co-operation and efforts? We think not.

But all of the foregoing assumes that the only consideration the Secretary of War can entertain is the consideration of the flotation of ships. We have abundantly shown the fallacy of this. The plan which the complainants are attempting to force upon the government is wholly impracticable, since it cannot be consummated without the creation of a pestilential obstruction to interstate commerce and navigation at one of its most critical points.

In such circumstance, to attack the act of the Secretary of War on the sole basis of an assertion that it is capricious, arbitrary and inappropriate to the needs of commerce is sufficient of itself to warrant dismissal of the bill.

VI.

The Great Lakes are inland seas, and not a "watercourse." They partake of none of the characteristics of a river. Appropriation of an insignificant affluent of one of them, lying wholly within a littoral state does not constitute "abstraction of all the waters of an interstate watercourse," nor do nor can complainants show that any of the water diverted by Chicago originated in their boundaries.

In an attempt to supply many fatal deficiencies in the bill, complainants have tried in their brief to shift the theory of the bill to make it rest on the *common law* doctrine of *riparian rights.* To do so they treat the whole *cluster* of *lakes* as a *river.* The court will find the lakes described in *The Propeller Genessee Chief,* 12 How. 443. They are inland seas, filling a great mid-continental basin into which water flows from many surface and subterranean sources. Exposed in this basin and practically without current, this water is subject to many forces of abstraction—evaporation and other diversions, and a constant and growing consumption by the populations rapidly increasing along its shores. The levels of the different lakes vary unaccountably integrally and as between each other, levels at particular points sometimes fluctuating two feet in an hour. No satisfactory result has ever been experienced in gauging these levels other than by measuring their outflow. There is no perceptible general current in Lake Michigan. The hydraulic principles involved have to do with the circumstance of a basin or sea and *not with those of a pipe or a river.* As we have seen, the Chicago river in a state of nature sometimes served as an outlet. It is true that, generally speaking, the excess over inflow from Lake Michigan proceeds at Mackinac into Lake Huron—but what may have been the influences creating the hydraulic equilibrium, called "levels," along the shores of Wisconsin, for example, is beyond the power of human ingenuity to determine. It is very unlikely (and it is entirely impossible to prove) that any water originating in Wisconsin ever flowed through the Sanitary and Ship canal. *If it did, it is difficult to follow Wisconsin's theory that she is* **a lower** *riparian owner.*

All of the analogies to the law of riparian ownership are here awry. Michigan and Wisconsin, which front on both lakes—Superior and Michigan—would have to appear as both upper and lower riparian owners. No water at all is or can be diverted from Lake Superior (and hence not from Minnesota). Minnesota and Indiana are necessarily *upper* proprietors, although, if their rights rest on the curious theory advanced by Wisconsin, they must assert themselves to be lower proprietors.

VII.

The boundary waters treaty of 1909 was intended and construed by our State Department as conserving to the United

States a diversion of 10,000 c. s. f. at Chicago, procured by concession of a very much larger diversion of 36,000 c. s. f. to Canada for her hydro-electric power producers. The State Department is now in negotiation with Canada on the subject of diversion, of restoring lake levels, and of the St. Lawrence seaway. The effect of this suit is obviously to embarrass these negotiations in the interest of Canada and against the interest of the United States.

The International Waterways Commission report, on the basis of which the Boundary Waters Treaty was negotiated, contained the following:

> "It can hardly be doubted that the canal will eventually form a part of an improved waterway between the Great Lakes and the Mississippi river, though its full depth will probably not be required for that purpose. Congress has not adopted any scheme for this improvement, but by its direction a survey was made, and plans with estimates for a waterway 14 feet deep were submitted by a board of engineers in a report dated August 26, 1905. * * * The board assumed that the Chicago drainage canal would eventually be permitted to take 10,000 cubic feet per second from Lake Michigan, and it expressed the opinion that with the volume added to the natural low-water discharge of the Illinois river a depth of 14 feet in the open channel could be maintained; also that if a much greater depth was to be secured a much larger volume of water must be taken from Lake Michigan. * * *
>
> "In the expenditure of $40,000,000 for the drainage canal the people of Chicago, with its population of 2,000,000, incurred a burden equivalent to that due to an expenditure of $1,600,000,000 by the United States, with its population of 80,000,000—that is enough to build eight or more Panama canals. It was a very serious effort and has commanded the admiration and sympathy of all observers. * * * The plans calling for that amount have been under public discussion for some

years. *Although withholding formal approval, the Federal authorities have taken no steps to prevent their execution. Congress has called for a plan and estimates for an improvement of the waterways connecting with it, the scope of which is fixed by that amount. There appears to be a tacit general agreement that Chicago needs, or will need, about* 10,000 *cubic feet of water per second for sanitary purposes, and that the city should have it without further question.* * * *

"One of the reasons given in 1889 for adopting this method of disposing of Chicago sewage was that it offered the advantage of furnishing a navigable waterway from Chicago to the Mississippi river. The navigable depth or capacity of such a waterway has never been authoritatively fixed. Congress has considered a depth of 14 feet, to the extent of ordering a survey and estimates of cost for that depth, but the Illinois legislature has declared its policy to be to secure the construction of a deeper channel, not limiting its proposed capacity in terms, but defining it to be 'of the greatest practicable depth and usefulness for navigation.' * * * A fair interpretation of this language gives a proposed depth of 20 feet, that being the depth required to accommodate the most important vessels now navigating the Great Lakes. It will require a volume of water greater than 10,000 cubic feet per second originally contemplated. * * *

"Nor does it (the Commission) wish to reopen the case of the Chicago Drainage Canal as designed and built. It accepts that as a fixed fact, with its attendant diversion of 10,000 cubic feet per second through the Chicago river. * * *

"The diversion of 10,000 cubic feet of water per second at Chicago will render practicable a waterway to the Mississippi river 14 feet deep. Any greater depth must be obtained by the abstraction of more water from Lake Michigan and at the expense of the navigation interests of the Great Lakes and of the St. Lawrence valley.

> "The effect upon Niagara Falls of diverting water at Chicago is of secondary importance, when considering the health of a great city and the navigation interests of the Great Lakes and of the St. Lawrence valley. * * *
>
> "The preservation of the levels of the Great Lakes is imperative. The *interest of navigation in these waters is paramount, subject only to the right of use for domestic purposes, in which term is included necessary sanitary purposes.* * * * We recommended, among other things, 'that any treaty which may be entered into should define the uses to which international waters may be put by either country without the necessity of adjustment in each instance, and would respectfully suggest that such uses should be declared to be (a) *uses for necessary domestic and sanitary purposes;* (b) service of locks for navigation purposes; (c) the right to navigate.' * * * **(This order of preference was included in the treaty.)**
>
> "* * *The diversion of 10,000 cubic feet per second through the Chicago river will *provide for the largest navigable waterway from Lake Michigan to the Mississippi river which has been considered by Congress.*"

The State Department's expert explained the treaty to the Senate Committee of Foreign Relations (Proceedings Foreign Relations Committee. 57-62. Congress) in part as follows:

> "*The waters of Lake Michigan do not come within the definition of boundary waters*, as defined in the preliminary article of the treaty, and it will be noted that in Article I of the treaty the waters of this lake are not included among the boundary waters of the Great Lakes system, *but are covered by special provision in the second paragraph of that article.*
>
> "The question has arisen as to the effect upon Lake Michigan of the provisions of Article II, which deals

with tributary waters, or rather with all waters which in their natural channels flow across the boundary or into boundary waters, and the objection is made that if the provisions of this article apply to Lake Michigan, the right to recover damages for injuries resulting on the other side of the line on account of the diversion of tributary waters might interfere with the diversion of the waters of Lake Michigan for the purposes of the Chicago canal.

"In response to this objection, ***attention is called to the express provision in this Article that it shall not apply to cases already existing, which would seem to cover, and was certainly intended to cover, the canal system at Chicago.***

* * * * * * * * *

"The treaty, therefore, recognizes that the settlement of the question of the use of waters of Lake Michigan is purely a domestic question, and leaves undisputed the governmental rights of the United States with respect to it."

There is doubtless a reason why Congress does not desire to enact a statute on this subject at this time. It is well known that the State Department is in negotiation with Canada at this moment and that the very subject of discussion is the regulation of the waters of the Great Lakes and compensation of the effects on lake levels of diversion by both governments; that (as shown elsewhere herein) our government believed that the present diversion at Chicago was secured by the Boundary Waters Treaty in return for a concession of a much larger diversion **for the benefit of Canadian water-power interests**; that there is involved in this negotiation the subject of the St. Lawrence Seaway, which is a corollary project with the Lakes-to-the-Gulf Waterway; that our nation is primarily interested in the latter and correlatively interested in the former, and that just the reverse is true of Canada; **that such an injunction**

as is here contended for would cut the ground from under the feet of our State Department in their negotiation and vastly increase the advantage of Canada therein; while legislation at this time would constitute an undignified, not to say fatuous, proceeding. It certainly cannot be seriously urged that a jurisdiction necessarily so sounding in the political aspect of the power to regulate commerce can be deduced in this court.

The Secretary of State, in his explanation (Proceedings Foreign Relations Committee, 57-62, Congress, pp. 271-2) of this same point, said:

> "The great bulk of the water goes on the Canadian side, and the Waterways Commission that was appointed some time ago to deal with the question of the lake levels reports, I think, that 36,000 feet can be taken out on the Canadian side and 18,500 feet on the American side without injury to the Falls. I thought it wise to follow the report of the Commission, and put in 1,500 feet in addition, to get round numbers, **so our limit is higher than we want, but their limit would not be cut down below, that is because there are three companies on the Canadian side who have works there.** Then there is this further fact why we could not object to this 36,000 cubic feet on the Canadian side: *We are now taking 10,000 cubic feet per second out of Lake Michigan at Chicago, and I refused to permit them to say anything in the treaty about it. I would not permit them to say anything about Lake Michigan. I would not have anything in the treaty about it, and under the circumstances, I thought it better not to kick about this 36,000. They consented to leave out of this treaty any reference to the Drainage canal,* **and we are now taking 10,000 cubic feet per second for the Drainage canal, which really comes out of this lake system."**

Upon such a record and on the clear intendment of the treaty itself as explained in our first brief, complainant takes up the cudgels for Canada, and even accuses Illinois of bad faith in asserting our conclusion as to the true meaning and effect of the treaty. We did not assert that a restriction of diversion would affect the levels of the lakes *contrary to the treaty.* We said (p. 35) that the existence of such a treaty was inconsistent with the theory of a residual right of a state to maintain the bill, and inconsistent with the relief sought thereby. *In view of the character of the negotiations now going on and the claims asserted by Canada, our comment seems singularly justified, because the effect of the bill and relief sought could not be otherwise than to embarrass our government and advantage our neighbor.*

VIII.

The conclusion that Canadian and other power interests can generate more hydro-electric energy if the diversion is thrown to her than can Illinois if the diversion is continued, is based on an error in computing the diversion, is irrelevant, and serves no other purpose in this suit than to disclose its probable motive and the real gravamen of the bill.

According to complainants computation (p. 79 of their brief), we are now taking 9,700 c. s. f. from the lake (8,500 feet by our permit and 1,200 feet by pumps) plus 1,800 feet from the two rivers formerly flowing into the lake, or a total of 11,500 c. s. f. This computation proceeds from ignorance of the facts. The diversion is *measured at Lockport, Illinois* the point of outflow from the canal, and not at the mouth of the Chicago river and the various other intakes. The permit is being strictly compiled with.

To the extent that she has authority to divert, the fact that Illinois may mitigate waste by using the water diverted for the generation of hydro-electric power, has no bearing on this controversy. The history recited shows that the generation of power was an after-thought, and had and has no effect to motivate the diversion. The "power-desires" erroneously deduced by complainants in Illinois may have been suggested by some motive which the human inhibitions, usual in such cases, have eliminated from the averments of the bill.

On page 22, and especially at the bottom of page 110, of complainants' brief appear assertions that contain the shocking implication that the states complainant are more interested in the adverse claims of Canada in these waters than they are in the rights of their sister states. The suit is in no just sense a controversy between states at all. Some organizing and provocative influence is apparent in the brief (pp. 129-142) by its reference to the procurement from five state legislatures within the space of two weeks in January and February, 1925, of resolutions protesting "Chicago's diversion." The growing insistence in the briefs on the greater quantity of hydro-electric energy that *could be created in Canada* if Chicago were denied any diversion and the water were allowed to flow into the St. Lawrence, indicates the motivating incentive and also the degree of substance of the assertions of right in navigable capacity of these waters.

ARGUMENT ON THE LAW

The bill makes no case justiciable here because the relief prayed for is not within the jurisdiction of the court, because all indispensable parties are not before the court, and because the bill well avers neither juridical right nor any injury.

I.

The bill makes no case justiciable here.

Complainants think a controversy between states is justiciable here if, as between independent sovereigns, it would be settled by diplomacy and, that failing, by force. This pronouncement is an inclusive description and not a law of jurisdiction. The latter is defined by the Constitution. The judicial power extends to "cases in Law and Equity" and to "controversies between two or more states." (Article III, Section 2, Constitution). It is by no means unlimited, and this court has repeatedly found bars to its extension. Among them are the following:

To have a standing here a case must be presented in form and substance appropriate to judicial cognizance and "subject to judicial solution" (*Kansas vs. Colo.*, 206 U. S. 46, 117; *Louisiana vs. Texas*, 176 U. S. 1; *Massachusetts vs. Mellon*, 262 U. S. 447).

> "Jurisdiction to grant an injunction to restrain a party from a wrong or injury to the rights of another, where the danger, actual or threatened, is irreparable or the remedy at law inadequate * * * comes under a familiar head of equity jurisdiction * * *. But according to the course of proceeding under the head of equity * * * a case must be presented appropriate for the exercise of judicial power; the rights in danger must be rights of persons or property * * *" (*Stanton v. Georgia*, 6 Wallace, 50, 76).

> "The question (of jurisdiction) is therefore not finally settled by the fact that the state * * * is a party * * *. It must also appear that the case is one to which * * * the judicial power of the United States extends * * * to all cases in *law and equity* * *" (*Minnesota vs. Hitchcock*, 185 U. S. 373, 383).

> "The grant * * * was not intended to confer upon the courts of the United States jurisdiction of a suit or prosecution by the one state, of such a nature that it could not, on the *settled principles of public and international law be entertained by the judiciary of the other state at all.* * * The position that the jurisdiction conferred by the Constitution upon this court in cases where a state is a party is limited to controversies of a civil nature does not depend upon mere inference

> * * * but has express legislative and judicial sanction * * * (citing Judiciary Act of 1789; *Chrisholm vs. Georgia*, 2 Dall. 419; *Ames vs. Kansas*, 111 U. S. 449) * * *" (*Wisconsin vs. Pelican Insurance Co.*, 127 U. S., 265, 289, 297).

Where the case appears to be one in which a court of equity will refuse its aid, the defendants should be permitted to resist it by demurrer (*Maxwell v. Kennedy*, 8 How. 210, 222).

While a state undoubtedly has rights, arising from her character as a sovereign, which are *different* from the rights of an individual, and, while this difference brings cases here of a nature "unknown to the common law," these rights can create a justiciable controversy only when they appear in the familiar and traditional setting of an equity suit. There must always appear the following familiar essentials: (1) jurisdiction in [redacted] to hear the suit and grant the relief; (2) a juridical right of the complainant; (3) a wrongful act of the defendant, threatening or invading that right. (*Georgia v. Stanton*, 6 Wallace 50, 75; *Mass. v. Mellon*, 262 U. S. 447). The mere fact that a state describes itself as a party and asserts a right does not enlarge the judicial power. (*Minn. vs. Hitchcock*, 185 U. S. 373, 383; *Oklahoma v. A. T. & S. F. Ry.* 220 U. S. 277; *Wisconsin v. Pelican Ins. Co.* 127 U. S. 265). The right asserted by a state must be a right of persons or property, or a right of dominion over physical domain, or quasi-sovereign rights actually invaded or threatened. (*Mass. v. Mellon*, 262 U. S. 447). The right must be the right of the state suing and not that of some other juridical party. Thus, where a suit is brought to protect a right under the Commerce Clause, the complainant must show that the act complained of injures him (and not another) *in some right guaranteed to him by that clause*.

(*M. K. & T. R. R. v. Cade,* 233 U. S. 642, 648 and all seven of the cases there cited).

For a far stronger reason, a state of this Union can not derive its right to sue another state from the right of its citizens to sue in general, for the Constitutional reason that such a suit against another state by its citizens is explicitly forbidden by the Eleventh Amendment. (*New Hampshire and N. Y. v. Louisiana,* 108 U. S. 76; *Wisconsin v. Pelican Insurance Co.,* 127 U. S. 265, 286; *Louisiana v. Texas,* 176 U. S. 1, 16).

The words "*parens patriae*" can no more magic away this Constitutional inhibition than can the word "*abracadabra.*" The principle neither is, nor constitionally can be, impaired by the very usual and self-serving averment that such rights of "very many" of such citizens are involved, because the constitutional inhibition would still forbid the suit. In the cases where this circumstance has been alluded to, the court *found its jurisdiction* in a right of the state to dominion over domain, and not in the rights of citizens. It referred to the number of citizens involved as establishing the substance and clearness of the injury and not as supplying, by multiplicity of citizens, a vacuum in sovereign right of the state (*Missouri v. Illinois,* 180 U. S. 208, 241; *Kansas vs. Colorado,* 185 U. S. 125, 144, 146).

For another Constitutional reason, the suit of a state cannot import into the judicial power matters allocated by the Constiution to either of the other two great branches of the Federal government. (*Georgia v. Stanton,* 6 Wall 50, 75; *New Orleans v. Payne,* 147 U. S. 261, on 266; *So. Pac. Co. v. Olympian Dredging Co.,* 260 U. S. 205; *Monongahela Bridge Co. v. U. S.* 216 U. S. 177; *U. S. v. California Land Co.,* 148 U. S. 31, 43, and cases there cited; *Passaic*

Bridge Cases, 3 Wall., Appendix 782; *Cherokee Nation v. Georgia,* 5 Pet. 1, 29-30; *Mass. vs. Mellon,* 262 U. S. 447).

Nor will the court attempt to exercise an authority inappropriate to the judicial function. (*Texas Ry. Co. v. Marshall,* 136 U. S. 393, 406; *Marble Co. v. Ripley,* 10 Wall. 339, 358; *Giles v. Harris,* 189 U. S. 475).

Nor will the court proceed in the absence of necessary parties (*California v. Southern Pacific Co.,* 157 U. S. 229; *Minnesota v. Northern Securities Co.,* 184 U. S. 199).

This is a motion to dismiss analogous to a demurrer. This defendant contends, and in this brief will attempt to show, that the bill has all of the infirmities just discussed, and should be dismissed *as presenting a case not justiciable in the original jurisdiction of this court.*

II.

The bill asks the court to regulate navigation, a constitutional function of Congress and not of this court.

The ordinary diversion or obstruction controversy involves the simple set of circumstances that something is being done which is unlawful and the effect of which is to obstruct navigation and not to improve and secure it. A court of justice, in acting upon it, is required to *vindicate* a regulation of commerce, not to *make* one. It is required to say that an existing rule or regulation is unlawful, not to make a new rule or regulation. The former is a *judicial,* the latter is a *legislative,* function.

> **"This power of regulation (fixing rates of speed on a railroad) * * * is a power legislative in character * * * the legislature may delegate to an administrative body the execution in detail of the legislative power of regulation * * *. The courts have no right to intrude upon this function * * *. In our opinion the injunction which**

was issued in this case constituted, in substance, the operation of a railway * * * was, in the first place, not within the limits of judicial power, and in the second place totally inconsistent with the power of regulation vested unmistakably by the legislature in the executive authorities." (*Honolulu Co. v. Hawaii*, 211 U. S. 282, 291-293; see also *Plymouth Coal Co. v. Pa.*, 232 U. S. 531, on 543.)

"It is one thing to inquire whether rates which have been charged and collected are reasonable—that is a judicial act; but an entirely different thing to prescribe rates which shall be charged in the future—that is a legislative act." (*I. C. C. v. Cincinnati, etc. Ry.*, 167 U. S. 479, 499; *C. M. etc. Ry. v. Minnesota*, 134 U. S. 418, 458; *Reagan v. Farmers Loan and Trust Co.*, 154 U. S. 362, 397).

The case before us is of tremendous gravity and, as the facts and number and character of the parties demonstrate, is of *imminent national concern*. The problem can be completely solved in a number of ways—controlling works at lake outlets—compositions with Canada—decreased diversion and increased dredging in the southern rivers—continued diversion and increased dredging in the harbors—combinations of all methods. Any of these solutions would be infinitely more beneficial to commerce than the arbitrary relief sought here. None of them is within the power of the court. The problem requires positive and constructive measures. The power invoked must of necessity be wholly negative and, in these circumstances, tremendously destructive. Complainants seek to invoke that power to coerce the legislative and executive departments to a particular plan of their own choosing.

If it be said that the power of the Secretary is not sufficient to regulate this diversion, the case and decree of *Sanitary District vs. U. S.* is our answer. *Regulation by* this court—not *power in* this court—is invoked by this bill.

We are here considering permits of the Secretary of War —not obstructing commerce—but balancing convenience among many plans to secure and advance commerce. Commerce stands on all sides of this controversy. In the name, but not in the interest, of the common right of the whole nation, complainants demand an absolute and localized benefit to a state.

Even if the Federal government decided to abate this diversion completely, and should determine that it was humanly possible to do so, as the Federal court below in the government suit remarked, it would require many years and a complex course of administration to accomplish it.

The whole system of lake navigation as it now exists—rivers, canals, harbors, and communicating straits—is an artificial creation by Congress, that never existed in any practical sense until Congress constructed it. The complaint made here is that the Federal government is not turning sufficient water into some of the harbors thus artificially created, and is not operating its artificial system to the satisfaction of some states. What is sought is regulation of this system by the court and, as an initial step, the creation of a great plague spot at a principal rail and navigation center of our national commercial system and an instantaneous blotting out of a highway of commerce which Congress and the nation have been developing for over a century and which now seems on the verge of final consummation.

The only case cited to entice the court into this field is *U. S. vs. Rio Grande Dam and Irrigation Company,* 174 U. S. 690. There, in arid lands, a development company sought to take *all the water* on the upper reaches of a single stream. The lower court had determined that the Federal government had no interest, because it took judicial notice that the stream was not navigable in the state. It was navigable below. This court remanded the case with instruction to determine what amount of diversion, for *purposes wholly unrelated to navigation,* would not interfere with navigation.

The case is very different here. Here the real question is: *How may the levels of the Great Lakes be regulated to preserve navigation in two separate highways with the greatest benefit to each and the least injury to either?* As we have shown, *the only practical solution is outside judicial power.*

Another controlling distinction is that, in the cited case, the court was vindicating a federal regulation of commerce. In the instant case it is asked to abate such a federal regulation and to supplant it with the court's decree. This the court has consistently declined to do, because it has found itself unable to inject the judicial power into the legislative authority, not only on the principle that it will not interfere with the administrative determination of questions allocated to the legislative branch and by them delegated to their instrumentalities, but also for the reason that such determination and administration is not consonant with the judicial function (p. 57 *Supra*). Some of the expressions of the court on these principles are excerpted below.

> "The proposed bridges will, in some measure, cause an obstruction of navigation. * * * Bridges are highways as necessary to the commerce and intercourse of the public as rivers. If every bridge over a navigable river be not necessarily a nuisance * * * *who is to judge of this necessity?* Who shall say what shall be the height of a pier, the width of a draw and how it shall be directed, managed and controlled? Is this a matter of judicial discretion or of legislative enactment? Can

there be a nuisance which is authorized by law? In the course of seventy years of practical construction of the Constitution no act of Congress is to be found regulating such erections. * * * Where do we find any authority in the Constitution or acts of Congress for assuming it ourselves? These are questions which must be solved before this court can constitute *arbiter pontium* and assume the power of deciding where and when the public necessity demands a bridge, what is sufficient draw or how much inconvenience to navigation will constitute a nuisance. The United States has no common law offenses and has passed no statute declaring such an erection be a nuisance. If so, *a court cannot interfere by arbitrary decree either to restrain the erection of a bridge or to define its form and proportions. It is plain that these are subjects of legislative, not judicial, discretion.* (*Passaic Bridge Cases,* 3 Wall. 782.) (Bridge case.)

"It cannot be necessary to say that where a public work of this character has been inaugurated or adopted by Congress and its management placed under control of its officers (referring to the whole system of lake harbors), *there exists no right in any other branch of the government to forbid the work or to prescribe the manner in which it shall be executed* * * * While the Engineering officers of the government are, under the authority of Congress, doing all they can to make the canal useful to commerce and keep it in good condition, this court can owe no duty to a state which requires it to order the City of Duluth to destroy it." (*Wisconsin vs. Duluth,* 96 U. S. 379.) (Canal case.)

"* * * It does not appear that the Secretary disregarded the fact or that he acted in any arbitrary manner or that he pursued any method not contemplated by Congress. It was not for the jury to weigh the evidence and determine, according to their judgment, as to what the necessities of navigation required, or whether the bridge was an unreasonable obstruction. The jury might have differed from the Secretary. That

was immaterial, for Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. *It is for Congress, under the Constitution, to regulate the rights of navigation by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction and to prescribe the way in which the question of obstruction shall be determined.* Its action in the premises cannot be revised or ignored by courts or *by juries.*" (*Monongahela Bridge Co. vs. U. S.,* 216 U. S. 177) (Bridge case.)

"So unfettered is this control of Congress over navigable streams of the country that its judgment as to whether construction in or over such a river is or is not an obstacle and a hindrance to navigation, is conclusive. *Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control.* * * * The conclusion to be drawn is that the question of whether the proper regulation and legislation of this river at the place in question required that no construction of any kind should be placed or continued in the river by riparian owners and whether the whole flow of the stream should be conceded for the use and safety of navigation, *are questions legislative in character,* and when Congress determined, as it did by the Act of March 3, 1909, that the whole river * * * was necessary for the purposes of navigation of said waters * * * that determination was conclusive. (*U. S. vs. Chandler-Dunbar Co.,* 229 U. S. 53.) (Hydro-electric power case.)

"There is little doubt that Congress, if it saw fit, in case of prevailing abuses in the management of wharf property * * might interpose and make regulations to prevent such abuses. When it shall have done so, it will be time enough for the courts to carry its regulations into effect by judicial proceedings. *But until Congress has acted, the courts of the United States can-*

> *not assume control over the subject as a matter of Federal cognizance. It is Congress and not the judicial department, to which the Constitution has given the power to regulate commerce with foreign nations and among the several states."* (*Transportation Co. vs. Parkersburg*, 107 U. S. 691.) (Wharf-toll case.)

We contend that Congress has acted within the intendment of its own rule in this case, and therefore that, for an even stronger reason than that just quoted, the court ought not to interfere. But if, as contended by complainants, Congress has *not* acted validly, then the case is placed squarely within the language quoted.

It is to be further observed that this is a case where no final stability of determination has yet been reached. It is perfecly apparent on the face of the permits recited in the bill that the federal government has the canal, the present diversion and the problems presented thereby, the Gulfs--to-the-Lake waterway and the whole subject of lake levels still under observation, experiment, and control. When we use the words "federal government" we mean its entire machinery. Congress, constantly and intimately cognizant of all that has happened and is likely to happen, has passed statutes requiring surveys and work on this project, and has now under consideration ~~bills governing~~ the diversion. The War Department has been constantly in observation and supervision, is now in much more direct control, and is concerning itself actively with all possible expedients to administer the situation. The State Department is actively negotiating with Canada on the very subject matter—lake levels—to which this complaint is addressed. It has consistently been the doctrine of this court that it should not intervene, under any such circumstances, at any suit. The principle was first expressed in one of the early classics of the court, in the following language:

> "It is scarcely necessary for the court to disclaim all pretensions to such a jurisdiction (Mandamus to the President) * * the province of the court is solely to decide on the rights of individuals, not to inquire how the executive, or executive officers perform their duties in which they have a discretion * *" (*Marbury vs. Madison,* 1 Cranch 137, on 170.)

The effect, if not the intention (see legislative resolutions in back of complainants' brief and pages 129, 133, 137, 138, 140 and 142), of the present suit is to restrict, influence, control, and coerce the action and final determination of each and every of these Federal instrumentalities in dealing with this problem. We have shown that the effect on the international negotiations must necessarily be stultifying (page 46, *supra*). The effect on other departments is equally obvious. A decree by this court would produce the result desired by the complainants, but such a result would be contrary to every legal principle which should govern this case.

Said Mr. Justice Miller in *Gaines v. Thompson,* 7 Wall. 347, 352, amplifying the principle deduced in *Marbury vs. Madison* above:

> "* * An officer to whom public duties are confided by law is not subject to the control of the Courts in the exercise of the judgment and discretion which the law reposes in him as a part of his official functions. Certain powers and duties are confided to those officers and to them alone, and however the Courts may, in ascertaining the rights of parties in suits properly before them, pass upon the legality of their acts after the matter has once passed beyond their control *there exists no power in the courts, by any of its processes, to act upon the officer so as to interfere with the exercise of that judgment while the matter is properly before him for action.*"

The doctrine of the only admissible basis of such a suit is defined in *U. S. vs. Calif. Land Co.*, 148 U. S. 31, 43, where it is said:

> "The only questions which can arise between an individual claiming a right under the acts done and the public, or any person denying its validity, are *power in the officer or fraud in the party*. All other questions are settled by the decision made or the acts done by the tribunal or officer, whether Executive (1 Cranch, 170), Legislative (4 Wheat, 423); 2 Pet. 412; 4 Pet. 563) Judicial (11 Mass. 227; 11 S. and R. 429; adopted in 2 Pet. 167, 168), or Special (20 Johns. 739, 740; 2 Dow P. C. 521 etc.) * * *".
>
> "* * * Until the legal title passes from the government, enquiry as to equitable rights comes within the cognizance of the Land Department. *Courts may not anticipate its action or take upon themselves the administration of the Land Grants of the United States.*" (*Oregon v. Hitchcock*, 202 U. S. 60, 70.)

In *Southern Pacific Co. v. Olympian Dredging Co.*, 260 U. S. 205, an act of the Secretary of War, under authority of the same section of the same statute pursuant to which he is acting here, was attacked as authorizing an obstruction which it was claimed could have no conceivably reasonable relation to the improvement of commerce, and this court said:

> "By the Act of September, 1890, Congress inaugurated a new policy of general, direct control over the navigable waters of the United States. * * By this legislation Congress assumed jurisdiction of the subject of obstructions to navigation and committed to the Secretary of War administrative power; * * that the Secretary of War was authorized to impose the condition heretofore quoted does not admit of doubt. *In the light of this general assumption by Congress of control over the subject, and of the large powers dele-*

> *gated to the Secretary, the condition imposed by that officer cannot be considered otherwise than as an authoritative determination of what was reasonably necessary to be done to insure free and safe navigation.* * * The order of the Secretary directing the removal of the old piles from the bed of the river to the depth there specified was a valid order * *. *It was not for the petitioner, however, to question either his reasons or his conclusions.* They were justified in proceeding upon the assumption that the Secretary, in the exercise of his lawful powers, declared to be no obstruction to navigation what was, in fact, an obstruction (quoting from the Monongahela Bridge Co. case) *Congress intended by its legislation to give the same force and effect to the decision of the Secretary that would have been accorded to direct action by it on the subject. It is for Congress, under the Constitution, to regulate the right of navigation by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined. Its action in the premises cannot be revised or ignored by the courts or by juries.*"

Another reason why the only relief possible is entirely inappropriate to the jurisdiction of this court has already been considered, namely, that what *must be done requires a continuous course of administration.* Complainants say that the only decree necessary is one to abate the diversion or to reduce it to 500 c. s. f. No such decree is possible. Unless the Chicago river be reversed enormous quantities of sewage would flow into the lake. It requires every foot of the present diversion to handle the present situation. The only decree conceivable is one whereby the court would undertake to proportion diversion to necessity daily and hourly; to supervise the construction of works to diminish it over a course of years. There is inevitably involved a course of complicated continuing administration which this court will not undertake. (See cases cited, first paragraph, p. 56 *supra.*)

But there remains a still further reason why the court should not assume this problem. It was adverted to in the case of ***Missouri v. Illinois***, where this same public work was involved, and in the same absence of so-called "affirmative authorization" by Congress. Said Mr. Justice Holmes:

> "In the case at bar, whether Congress could act or not, *there is no suggestion that it has forbidden the action of Illinois.* * * *. If we suppose a case which would not fall within the powers of Congress to regulate, the *pursuit of a declaration of rights by this court would be the establishment of a rule which would be irrevocable by any power except of this court to reverse its own decision, an amendment of the Constitution, or possibly an agreement between the states sanctioned by the Legislature of the United States.*"

Whither would the action sought by complainants lead? If this court declares that the provision by Congress of waterways for this nation is limited by the common law doctrin of riparian rights, and therefore to a rule that Congress can take no water from one channel to improve another, and that this great rock-cut must be rendered useless, down goes many a favored dream.

The proposition has been advanced by respectable authority that an inland economic area paralleled on both sides by two maritime economic areas cannot long exist in a single state, and that there are, for this reason, inherent vertical lines of cleavage in both the United States and Canada.

The principal problem now before Congress is the economic assertion that the combined effect of the tariff and the agricultural surplus is to impose on the entire agricultural product a price in domestic markets determined by the world price at Liverpool *less the cost of transportation thither,* so that every cent saved on the transportation of each pound of such product to Liverpool *would be* **added** *to the domestic price of every pound of the whole crop,* and that, unless some means can be devised to accommodate the disproportion between the world price for agriculture and the protected domestic price for everything *purchased by agriculture,* we are faced with a rapidly approaching debacle in our whole economic structure. It is to be remarked further that precisely this disproportion between the prices received by the agricultural south (whose product was all of the character of "export surplus" which cannot be protected by a tariff) and the "protected" prices required from the south for the industrial products of the north, was the effective economic cause of the Civil War.

This is a consideration involved in this case and running into the hundreds of millions of dollars annually, not to mention its bearing upon the harmony and solidarity of the Union. Among the means suggested to alleviate this situation are the St. Lawrence Seaway and the Lakes-to-the-Gulf Waterway, with their promised substantial reductions in over-seas transportation costs for the agricultural regions of the interior.

The whole subject of internal waterways has, after long neglect, suddenly become extremely articulate under the pressure of fundamental economic forces. It is an inappropriate hour to urge the destruction of this canal by a fiat from this court. It seems inconceivable that a suit can be maintained on a basis which seeks the irrevocable decree of this court to establish such rights in States as would restrict the power of Congress to address these fundamental problems of national security and harmony on the only grounds offering practicable solution.

There is another consideration which we do not advance on technical grounds, but solely for the sake of the light it may throw on the political nature of this controversy.

Is this a controversy between *states* in any sense of the word? We have already here *twelve* political sovereigns, grouped seven on one side and five on the other, and a foreign sovereignty whose interests are stressed in complainants brief. The considerations which brought here Missouri, Tennessee, Louisiana and Kentucky, are equally potent to bring at least Arkansas and Mississippi, and, as we believe, Oklahoma, Kansas, Nebraska, Iowa and South Dakota. We understand that the southern and western four-fifths of Minnesota is ranged against the rest of that state as to which side her representation here should take.

Is this not rather a contest between economic areas than a contest between states? And if such be the case, is this court the tribunal to *compose* their differences? *And if it is, have any such arbitrary and absolute rights as are advanced as the basis of this suit any place in the consideration of it?*

We think the questions answer themselves. We cannot conceive that the controversy of 1861 could ever have been here composed. We think that the Congress was devised and intended by the Constitution for such purposes as this. One state is not the nation—but 48 states are. When a controversy assumes such proportions and takes such directions as this one has assumed and taken, we believe the question *ipso facto* becomes political, and whether it does or not, the principles which should govern it were well laid down by Mr. Justice Clark, in *New York v. New Jersey* 256 U. S. 296, where he said:

> “* * We cannot withhold the suggestion inspired by a consideration of this case that the grave problems of sewage disposal presented by the large and growing

> populations living on the shores of New York Bay is one more likely to be wisely solved by co-operative study and by conference and mutual concession on the part of representatives of the states so vitally interested in it than by proceedings in any court, however constituted."

We think this bill should be dismissed because it asks the court to invade the constitutional functions of the legislative and executive departments.

III.

The United States and other states are indispensable parties.

We have developed the legal basis for this point sufficiently in our first brief. Complainants' replication is the rather astonishing dictum that neither the United States nor sister States have any interest in the relief sought here. This admits the principle, but denies the conclusion of interest. We think the interest of all absent parties is sufficiently developed in our two briefs.

As to the interest of the United States, it should be sufficient to say that the ink was hardly dry on the decree governing this matter at her suit in this Court when the amended bill was filed. It is her duty to regulate this matter. She sought here the kind of a decree her interest required. Her interest to preserve the diversion in such amount as she found necessary was vindicated and established by this court. In principle, at least, *the existence of her interest has been determined and adjudged here and this is a suit to upset that adjudication.*

The United States had an interest to prevent what she believed to be a diversion in excess of the requirements of navigation, but she has an equal interest to preserve what she believes to be a diversion appropriate to navigation.

Regulation of navigation is her duty, proper navigation is her right, and the determination of what is proper navigation is her function. The decree sought would impair her interest, and she is a necessary party.

We must next consider the reasons asserted against the interest of sister states. Complainants say: "The sister states which do not border upon the Great Lakes—St. Lawrence waterway—**can have no possible rights other than in navigation."** (Complainants' Brief, page 66.)

We cannot forbear to inquire: *On what rights, other than rights in navigation, are the complainant states themselves here?* Certainly their bill is based on their rights in the navigable capacity of interstate waterways, and on those rights alone. The injury they assert is an injury to navigation, and it is that alone. The only possible construction that could be put on this contention is that the states complainant have some *monopoly* on the navigation of the Great Lakes. This is too slight to consider.

The inevitable conclusion on the face of the pleadings is that, if a right in navigation will not qualify absent sister states as parties, then certainly it could not qualify the states complainant as parties. This is precisely our contention, and *we find here a concession by the states complainant that this bill ought to be dismissed on the very grounds we urge.*

Here, as consistently elsewhere throughout the bill, the complainants fail to apprehend the distinction between their suit and the suit of the United States in *Sanitary District vs. United States,* 266 U. S. 405. In that suit the Court was asked to vindicate a regulation of commerce by the federal government and to require the Sanitary District to comply with the regulations of the Secretary of War under the authority of Congress. Some of the river states intervened, seeking to justify what the Court found to be the then illegal diversion on the ground of their interest in having the illegal excess come to them. The Court found that they had no such interest. The question here is entirely different. What these complainants are seeking to do is to restrain a legal diversion authorized and continued by the United States in the proper regulation of commerce, as well for the benefit of the sanitary situation on a highway of commerce as for the increased navigability of the waters flowing along the borders of the absent river states. Certainly these sister states have a right in the increased navigable capacity of their waters thus legally vouchsafed to them.

If it be said, in *this* case, that they have no right because the increased navigability is artificial, then precisely the same consideration would, as we believe it does, exclude the suit of these complainants, because the injury they claim is to the navigable capacity of certain named harbors and, as we have shown, *such navigable capacity, in respect to every one of them, was artificially created by the United States.*

Surely an urging by the complainants against the juridical interest of absent sister states in the navigable capacity of interstate waters is a two-edged sword. They cannot minimize that interest without minimizing their own. They cannot abate it without stating their own case out of court.

Another error that complainants make throughout their brief is that under the circumstances of this case, diversion for sanitation has no relation to interstate commerce. We have demonstrated the error (p. 34). It is this error, among others, which leads them to cite the case of *Kansas vs. Colorado* in support of their contention that the United States is not an essential party. It is true that, in that case, the court held that the claim of the United States to regulate diversions along the Arkansas river (which was rested on a claimed Constitutional function to regulate arid lands), was without foundation, because the Constitution granted it no such power. But the court was alert to determine, before it denied the petition of the United States to intervene and before it proceeded to any consideration of the bill of Kansas, whether the waters in question were navigable. The court strongly intimated that if it had so found it would have allowed the petition and would also have dismissed the bill. The case of *Kansas v. Colorado*, therefore, is directly contrary to the contention for which it is cited—namely, that in a bill, the object of which is to abate a federal administrative regulation of commerce, brought by a state in circumstances where the relief prayed for would violently disorganize an entire system of navigation created and administered by the Federal Government, the United States is not a necessary party.

Similarly inapposite is the case of *New York vs. New Jersey*, 256 U. S. 296, a suit by New York to resist invasion of physical domain by great discharges of sewage. The court permitted intervention by the United States and postponed entirely consideration of the case until her interests had been composed by stipulation. From the circumstance that the suit then proceeded, complainants contend that the case determines that the United States had no necessary interest. The case compels a contrary conclusion. The United States was a party until its interest was satisfied. That the case went on resulted from the fact that the State of New York had a good bill in the first instance. The case is otherwise here.

Kawananako vs. Polybank, 205 U. S. 349, which is the only case quoted in support of complainants' contention, directly and explicitly refutes it.

IV.

The bill well avers no injury.

In our first brief we showed, by an analysis of the averments of the bill, that it asserted no actual or special injury to the states complainant, but rested on the assertion that, if the lakes be lowered six inches, six inches will be reduced from the depths of their harbors and, consequently, from the drafts of the largest ships that could enter them, and thus from the carrying capacity of such ships, and that this would increase lake rates. We showed that the bill had been drawn with care in order to avoid asserting that such an injury had happened or was actually threatened in practice. We showed the extreme improbability of any such injury ever occurring and concluded that the bill well averred no injury whatever.

All this was not intended as a *tour de force* of technicality. It was intended to call the attention of the court to the true nature of this controversy. The lower court in the federal suit reached practically the same conclusion, that there has been no real injury in navigation of the Great Lakes (p. 41 *supra*).

Complainants now restate and paraphrase the averments of their bill, but they add nothing to this deficiency. The restatement of the bill on this point is:

> "That the Great Lakes, *excepting Lake Superior*" (this averment should oust Minnesota) "*and connecting waters, and St. Lawrence river* have been lowered not less than six inches by such abstraction of water by defendants, and that such lowering has reduced the *possible* loading of vessels thereon by at least six inches and has reduced their cargo-carrying capacity by many tons, with a resultant increase of freight costs" (this is a conclusion of the pleader) "to the people of complaint states and to the State of Wisconsin in its proprietary capacity. That the carriage of coal by such vessels constitutes the principal source of supply of coal for the State of Wisconsin and its people; that such lowering has lessened the utility of all

> of the ports of said Lakes and connecting waters of said Lakes, and that the total annual loss due to the lower carrying capacity of lake vessels, chargeable to the abstraction of such water, amounts to many millions of dollars.'

This still amounts merely to an assertion that if lake vessels were constructed to utilize the entire capacity of these harbors and were loaded to their maximum capacity lake rates would be reduced, and that the fact that this has not been done leaves lake rates where they are, rather than as low as they might be.

We have shown that all these harbors differ in depth, and that their depth fluctuates widely and constantly, and that, in their natural state, they were, in nearly every instance, entirely incapable of receiving modern lake transportation. Their entire facility in this regard is created by the artificial works of the United States, just as is the diversion complained of.

Even had the complainant states shown an actual injury in this regard, the injury necessarily resides in a claimed reduction in the navigable capacity of the Great Lakes and the harbors thereof. Indeed that is the only substantial injury referred to or mentioned any place in the bill. As we showed in our first brief, that is an injury to the citizens of the complainant states and not to the states themselves, and not even to the citizens in their capacity as citizens of the complainant states. We shall expand this subject in the divisions of this brief which relate to the rights upon which such injuries are based. Suffice it here to say that a state cannot bring an action on the rights of her citizens, no matter how many they be, because such an action is inhibited by the eleventh amendment to the Constitution of the United States. The cases that have reference to the number of citizens injured, in discussing the jurisdictional questions involved, have rested the decision as to jurisdiction on the *quasi* sovereignty of the state, but, as we shall hereafter show, there is no *quasi* sovereignty of a state in the navigable capacity of interstate waters.

Complainants seek to make a distinction between their capacity as *quasi* sovereigns and their capacity as *parens patriae* of the rights of all their citizens. If this distinction means that a state may bring a suit which is properly based on the rights of its citizens it is a distinction inhibited by the Constitution. As we show herein (pages 54, 55, 89 *et seq*). No person can bring an action on the right of another person.

Apprehensive, apparently, of this weakness in their bill, complainants have attempted in their brief to shift the whole theory of their case and to import rights arising from the common law doctrine of riparian rights. We have addressed this contention in point V-a hereof, beginning at page 77.

V.

There was never a property right in the States complainant in the navigable capacity of these waters and the doctrine of riparian rights in no wise alters this rule.

Complainants insist that the right of a state in its littoral waters is the right of ownership and property therein. This contention is necessary to their suit if we are correct in contending that they have no sovereignty in the navigable capacity of interstate navigable waters. It is to be noted that we are speaking of only one aspect of the waters involved—that is, their navigable capacity.

Complainants say they are "*owners of all the public waters and the submerged lands within their respective borders.*" We insist that whatever may be their rights as to other aspects of such waters, they have no property in their ***navigable capacity***, and that otherwise their rights are quasi sovereign and not property rights in the sense in which the word "property" is used in the Constitution. We think that they have no such *property* in waters at all, but merely a *jus regium*, regardless of some of the language in the cases they cite. The language in every instance was used *arguendo*. Whenever the court has had to pass upon this question it has decided against any suggestion of such a "property" right.

In *Gilman vs. Philadelphia*, 3 Wall. 713, referring to the absolute power of Congress over the matter of navigable rivers, the court said:

> "For that purpose *they are the public property of the nation* and subject to all the requisite legislation of Congress. * * * *For these purposes Congress possesses all the powers which existed in the states before the adoption of the national Constitution.* * * * Although the *title* to the shores and submerged soil is in the various states and individual owners under them, *it is always subject to the servitude in respect of navigation created in favor of the Federal government by the Constitution.* * * * *The primary use of waters* * * * *is for the purpose of navigation.* * * *"

In *United States vs. Chandler-Dunbar Co.*, 229 U. S. 53, the court said:

> "Whether this private right for the *use of the flow of water* be based upon the qualified title which the company had (from the state) to the bed of the river over which it flows, or of the ownership of land bordering upon the river, is of no prime importance. *In neither event can there be said to arise any ownership of the river.* * * * That the running water in a great navigable stream is capable of private ownership is inconceivable. * * * That riparian owners upon public navigable rivers have, in addition to the rights common to the public, certain rights to the use and enjoyment of the stream must be conceded. * * *

> *These additional rights are not dependent upon the title to the soil over which the river flows, but are incident to the ownership upon the banks.* * * * It is for Congress to decide what is and is not an obstruction to navigation. * * * *Title is absolutely subordinate to the rights of navigation.* * * *"

To base a suit upon this kind of a property right is a doctrine which has been rejected by this court.

In *Hudson Co. vs. McCarter*, 209 U. S. 349, where the suit was brought by a state against a private trespasser. Mr. Justice Holmes said:

> "We prefer to put the authority which cannot be denied in the state upon a broader ground * * * since, in our opinion, *it is independent of the more or less attenuated residuum of title that the state may be said to possess.* * * *"

Indeed, it is a doctrine as old as the common law, that running water is not subject to ownership.

In Geer vs. Connecticut, 161 U. S. 519, referring to a similar doctrine in respect of wild animals, the court said:

> "We take it to be correct doctrine that ownership of wild animals, so far as they are capable of *ownership, is in the state, not as a proprietor, but in its sovereign capacity as the representative and for the benefit of all its people in common.*"

V-a.

Complainants add nothing to their claim of property rights by invoking the common law doctrine of riparian rights.

This is a controversy solely in respect of the *navigable capacity of interstate and international waters.* The doctrine of riparian rights has no place in it. No right or injury is averred in the bill, except with relation to navigable capacity. There is no showing, as indeed there could be none, that anybody's riparian rights of user have been impaired. The riparian doctrine is dragged in as an afterthought, in a desperate effort to remedy the total lack of the state's right of dominion or property in such navigable capacity, and thus to attempt to save their standing in this court.

As we have shown (p. 44 *supra*), the doctrine of riparian rights in a flowing stream have no application to the physical characteristics of the Great Lakes. This alone should conclude the contention.

That any application of such a doctrine should control a case like this was remarked upon by Mr. Justice Holmes in *Missouri vs. Illinois*, 200 U. S. 496, an equity suit aimed at this canal and one effect of this diversion;

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> "* * * It does not follow that every matter which would warrant a resort to equity by one citizen against another in the same jurisdiction equally would warrant an interference by this court with the action of a state. It hardly can be that we should be justified in declaring statutes or deeming such action void in every instance where the Circuit Court might interfere in a private suit upon *no other ground than an analogy to some selected system of municipal law and the fact that we have jurisdiction over controversies between states.*"

If the analogy *should* govern, however, it ought to govern completely, and, if so, the suit fails, because on the face of the bill it appears that user of Illinois has continued through twenty years of acquiescence and silence on the part of these complainants (See *Michigan vs. Wisconsin*, not reported, decided by this court on March 1, 1926). Therefore Illinois has a prescriptive right of over twenty years' user in the diversion, which, under the laws of all the states litigant here, is sufficient to conclude the controversy, and the coistence of which appears on the face of the averments of the bill, and in addition thereto, the rights asserted by complainants have long since been foreclosed by the Statutes of Limitation in those states. The facts supporting this contention are patent in the bill.

But regarding the character of the issues here presented, we believe that consideration will not proceed upon strict and technical analogies derived from a system of law appropriate to the vindication of the so-called absolute rights in private controversies.

The subject matter of this suit is *water*. In most aspects waters are in the exclusive dominion of the state. But that dominion *is not proprietary*. It is simply a *jus regium*—a right to regulate. From this *jus regium* flow riparian and all other water rights. They do not flow from *property* in the state. The subject was thoroughly expounded in *Illinois Central Ry. vs. Chicago*, 146 U. S. 387, holding that a state has no such "property" as can be conveyed:

> "The ownership and dominion over lands covered by tide waters belong to the respective states * * * *subject to the paramount right of Congress to control navigation* * * * *The same doctrine is held to be applicable to* * * * *the Great Lakes. These lakes possess all the general characteristics of open seas,* except in the freshness of their waters and in the absence of the ebb and flow of tide. In other respects they are inland seas. * * * * *The same doctrine as to the dominion and sovereignty* * * * *of lands under the navigable waters of the Great Lakes applies which obtains at common law* * * * of lands under tide waters * * *.
>
> "The state holds the title to the lands under the navigable waters of Lake Michigan * * * *but it is a title different in character from that which the state holds in lands intended for sale.* It is a title held in

trust * * * alienation is not consistent with the exercise of that trust * * *. The control of the state for the purpose of the trust can never be lost.' * * * General language sometimes found in opinions of the courts expressive of absolute ownership and control by the state of lands under navigable waters, irrespective of any trust as to their use and disposition, must be read and construed with reference to the special facts of the particular cases.

"* * * The power exercised by the state over the lands and waters is nothing more than what is called *jus regium*,' the right of regulating, improving and securing them for the benefit of every individual citizen. * * * (Referring with approval to the case of *Stockton vs. Railroad Co.*, 32 Fed. Rep. 9.) *The character of the title of ownership by which the state holds the state house is quite different from that by which it holds the land under the navigable waters in and around its territory.* * * * Prior to the Revolution the shore and lands under water of navigable streams and waters of the province of New Jersey belonged to the King. * * * *After the conquest the state lands were held by the state as they were by the King, in trust * * subject * * to the rights of navigation and commerce.* * * *"

(See the quotation from *Gillman vs. Philadelphia*, p. 76 *supra*, as to the devolution of this trusteeship from the state to the nation in respect of the navigable capacity of interstate waters.)

This doctrine is established law. The cases in complainants' brief, without exception, support it.

Riparian rights, therefore, derive *from the state and from a sovereignty* that has been excluded from the United States. Those rights are in the same subject matter (waters), in respect of which the right of navigation inheres. But that is the end of all [illegible] between them. Riparian rights inhere in ownership of the soil along the

banks (*U. S. vs. Chandler-Dunbar Co., supra*) and are not personal. They, and the right of state dominion from which they flow, are absolute, as this court in that case said also:

> "The private right to appropriate is subject * * * to the initial limitation that it may not substantially diminish one of the great foundations of public welfare and health. * * * It (the state) finds itself in possession of what all admit to be a great public good, and *what it has it may keep and give no one a reason for its will.*" (*Hudson Water Co. vs. McCarter*, 209 U. S. 349, at 356.)

Rights of navigation, on the other hand, constitute a *personal privilege.* They have been well described in *Frost vs. Washington Ry.*, 97 Me. 76, as follows:

> "This right of plaintiff was not his private property, nor even his private right. It could not be bought, sold, leased or inherited. He did not earn it, create it, or acquire it. He did not own it as against the sovereign. The right was the right of the public, the title and control being in the sovereign in trust for the public and for the benefit of the general public, and not for any particular individual. * * * Plaintiff * * * had no right against the public. The sovereign had the absolute control of it and could regulate, enlarge, limit, or even destroy it, as he might deem best for the whole public; *and this without making or providing any compensation.* * * * *The sovereign cannot take private property* * * * *without* * * * *compensation* * * * *but the constitutional provision does not limit the power of the sovereign over public rights* * * *"

Such cases as *Gibson vs. U. S.*, 166 U. S. 269, show that *riparian rights are not property in the sense of the fifth amendment.* Such cases as *Gilman vs. Philadelphia*, 3 Wall 713, show that rights of navigation are not property.

Both proceed from *sovereignty* of a State and not from *property* of a State. The difference is that riparian rights proceed from a sovereignty of the State in a matter in which the United States has no sovereignty, while rights to navigate interstate navigable waters proceed from the sovereignty of the United States in a matter in which the State has no sovereignty.

> "* * * A citizen of the United States has the right to come to the seat of government * * * to free access to its seaports * * * the right of the State to impede * * * the right which its citizens hold under it (the United States) has been universally denied. * * * If the right of passing through a State is one guaranteed to him by the Constitution * * * it must be sacred from State taxation * * *." (*Crandall vs. Nevada*, 6 Wall, at 46).

> "* * * The right to use the navigable waters of the United States * * * are dependent upon citizenship of the United States and not citizenship of a State * * *." (*Slaughter House Cases*, 16 Wall 36, 79.)

And, as has so often been decided here, when the two rights come into conflict, the sovereignty of the United States and the navigation right proceeding from it dissolve and completely deflect from consideration this aspect of sovereignty of a State and riparian rights proceeding from it.

This is strikingly demonstrated in the very case upon which complainants principally rely, *U. S. vs. Rio Grande Dam and Irrigation Co.*, 174 U. S. 690.

A dam company, proceeding under authority of a State to abstract waters from the Rio Grande, collided with the authority of the United States over navigation. This court, conceding this right in and from the State, nevertheless cut it off at the precise point where it, in any degree, affected the Federal sovereignty in navigation and the rights flowing therefrom.

A similar result has been reached here time and again: *U. S. vs. Chandler-Dunbar Co.*, 229 U. S. 53; *Economy Light & Power Co. vs. U. S.*, 256 U. S. 113 (power rights); *Gibson vs. U. S.*, 166 U. S., 269; *Scranton vs. Wheeler*, 179 U. S. 141 (right of access); *Philadelphia Co. vs. Stimson*, 223 U. S. 605 (property rights); *South Carolina vs. Georgia*, 93 U. S. 4 (contract rights).

Complainants contend, nevertheless, that the cases of *Kansas vs. Colorado*; *Colorado vs. Wyoming*; *Minnesota vs. South Dakota, and U. S. vs. Rio Grande Dam Co.* are authorities to the contrary.

We have just shown that the last case cited carries a reverse intendment. So also do the others.

The riparian doctrine is one of absolute right. Accordingly, Kansas in her bill so asserted it and demanded the water of the Arkansas without substantial diminution. There the court said:

> "Turning now to the controversy as here presented, it is *whether Kansas has a right to the continuous flow of the waters of the Arkansas river, as that flow existed before any human interference therewith*, or Colorado the right to appropriate the waters of that stream so as to prevent that continuous flow, *or that the amount of that flow is subject to the superior authority and supervisory control of the United States.* * * * If Colorado is diminishing that flow, has it an absolute right to determine for itself the extent to which it will diminish it, even to the entire appropriation of the water? And if it has not that absolute right, is the amount of appropriation that it is now

making such an infringement upon the rights of Kansas as to call for judicial interference?"

All of these questions were answered in that decision. Even though the evidence showed that Colorado was taking an enormous proportion of the stream, *the court declined to interfere.* The effect of that decision is absolutely fatal to complainants' contention here that riparian rights, *as between States*, carry any absolute right to *the flow without substantial* diminution. The court, in effect, did what Mr. Justice Holmes, in *Missouri vs. Illinois*, said it ought to do—declined to entertain the case on any "analogy to some selected system of municipal law." The case is an authority against the principal contention of complainants' brief—i. e., that complainants standing gains anything here by the invocation of the name of the common law doctrine of riparian rights.

But the reliance on that case carries a still greater peril to complainants' bill. Before considering the case at all, the court asked:

> *"Is the question one solely between the States, or is the matter subject to national legislative regulation, and if the latter, to what extent has that regulation been carried? * * *"*

There was a strong intimation that if the court had found the subject matter one of national regulation, the bill would have been dismissed. But the stream was found to be not navigable, and the Federal Government not to be properly in the case.

In the present case, the *only* subject matter is navigable capacity. The Federal Government has assumed complete control of it. The object of the suit is to coerce and dominate its discretion in the administration thereof. The case of *Kansas vs. Colorado* is directly against complainants' contention *at every point.*

Complainants reason thus: The United States was excluded from that suit because its claimed right was in arid lands—a subject not entrusted to it by the Constitution. Its right should be abated here (they say) because one use of the canal is sanitation—a subject not entrusted by the Constitution to the Federal Government. The answer to this is double.

(1) Sanitation, in this case, is necessary to navigation.

(2) The canal and diversion through it are themselves facilities of navigation and part of one integral system completely dominated by Congress.

But *Kansas vs. Colorado* strikes down, also, other contentions of complainants. They say, "because Illinois admits the common law doctrine of riparian rights, she must be governed by it. *Kansas vs. Colorado* says that the "* * * *power of changing the common law rule as to streams within its dominion undoubtedly belongs to each State.* * * *"

Wyoming vs. Colorado is to the same effect. Illinois has not changed the common law *in general,* but as to the Sanitary District she has changed it. If Illinois can do it *in general,* complainants should not be heard to say that she cannot do it *in particular.*

The decision in *Wyoming vs. Colorado* was the precise reverse of an admission of any principle that, as between States, either has an absolute right to the flow of a stream from one to the other, "substantially undiminished." The question was of the right *to take all the water* of such a stream. There is no such question here. Here the complainants say to Illinois, "You can take none." Such a dictum was definitely decided against in both *Kansas vs. Colorado* and *Wyoming vs. Colorado*. In both cases substantial impairment of rights of user and flow were demonstrated. Yet the bills were dismissed because the impairment was "reasonable." Here no impairment whatever is averred or involved. There is nothing to decide. There remains an abundance of water for every purpose considered in both of those cases. The cases are both contrary to complainants' contentions at every point.

Wyoming vs. Colorado strikes down the contention that there is any magic in watersheds. If the diversion is good, of what relevancy is its destination? This matter in this case was settled in *Missouri vs. Illinois.*

> "The natural features relied upon are of the smallest, and if under any circumstances they could affect the case it is enough to say that Illinois brought Chicago into the Mississippi watershed in pursuance not only of its own statutes, but also of the Acts of Congress of March, 1822, and March, 1827, the validity of which is not disputed."

The same principle abolishes the contention that lower States obtain any right because they can generate more power by use of the water diverted than can Illinois. If the diversion is lawful, of what relevancy is the use of the water? Such, in effect, was the conclusion of the court in *Wyoming vs. Colorado.* In *U. S. vs. Chandler-Dunbar Co.*, the court said: "If the primary purpose is legitimate, we can see no sound objection to leasing any excess of power over the needs of the Government." See *Kaukauna Water Power Company vs. Green Bay*, 142 U. S. 254.

There can be no doubt that the right of a State in the navigable capacity of interstate navigable waters is not a property right. It is an incident of sovereignty but not of any sovereignty of a state. (See p. 94 *infra* as to police power).

VI.

Sovereign rights of the States complainant in the navigable capacity of these waters have been completely appropriated by the United States to the exclusion of the States complainant.

1. By the Constitution

In addressing this branch of the consideration by itself it is necessary to assume; that Congress has passed no prohibitory legislation but that it has created the artificial system of lake navigation described at pages 24, 42, 58, 103; that Congress has had full knowledge of all Acts of Illinois and of the effect of them to improve the waterway to the south and incidentally to affect the waterway north. (Pages 21 to 34 *supra*).

We have already shown (p. 17 *supra*) that when the act alleged here to be wrongful was authorized and commenced by Illinois, there was no principle of law that required the state to obtain an act of Congress authorizing what she was about to do.

> "Calumet river, it must be remembered, is entirely within the limits of the State of Illinois, and the authority of the state over it is plenary, subject only to such action as Congress may take. * * * (*Cummings v. Chicago*, 188, U. S. 410).

> "The full power resides in the states as to the erection of bridges and other works on navigable streams wholly within their jurisdiction in the absence of the exercise by Congress of authority to the contrary. * * *" (*Lake Shore & Michigan Southern Ry. v. Ohio*, 165 U. S. 365).

> "* * * Congress must first legislate before the courts can proceed upon any such ground of paramount jurisdiction. * * * There is not at present any federal law on the subject by which relief can be obtained. In the various bridge cases * * * the refusal to interfere with their erection has always been based upon the absence of prohibitory legislation by Congress, and the power of the states over the subject in the absence of such legislation." (*Passaic Bridge Cases,* 3 Wall. 782).
>
> "At the time the boom was constructed, Congress had not, by any legislation, asserted its authority over nor taken into its own jurisdiction the subject of obstructions to the navigation of this river. * * * Congress, it must be assumed, was aware of the fact that until it acted upon the subject of navigable streams, which were entirely within the confines of a single state, *although connecting with waters beyond its boundaries*, that such state had plenary power over the subject. * * * When Congress in 1890 passed the River and Harbor Bill, we think the expression contained in Section 10 in regard to obstructions not affirmatively authorized by law, meant not only a law of Congress but a law of the state * * *. If the obstruction were affirmatively authorized by a law of the state, it did not come within the condemnation of the section, and its continuance was therefore valid. * * *" (*U. S. v. The Bellingham Bay Boom Co.,* 176 U. S. 211.)

Such citations could be multiplied. We think those quoted are sufficient to show that, omitting at all to consider the acts of 1890 and 1899, the construction and operation of the canal were of themselves no violation of any federal principle relating to interstate commerce and navigation. If this be so, *upon what right could another state base a suit in this court?* The case here emphatically answer that, *in such a case as this*, she has no such right. As we have shown, (p. 53 *supra*) she must come here either on her own direct property right, or on her rights as a quasi sovereign, and she cannot, in the absence of any sovereign right in herself, come in solely on the rights of her own citizens, because to do so would violate an express constitutional prohibition. We think the cases discussed above show conclusively that neither she nor her citizens have any *property* right in the navigable capacity of interstate waters. The same cases demonstrate that, in the same manner, both sovereignty and dominion in such navigable capacity are in the United States and not in any state. (*South Carolina v. Georgia*, 93 U. S. 4; *Gilman v. Philadelphia*, 3 Wall. 713; *Hardin v. Jordan*, 140 U. S. 371; *Scranton v. Wheeler*, 179 U. S. 141; *Louisville Bridge Co. v. U. S.*, 242 U. S. 409; *Shively v. Bowlby*, 152 U. S. 1; *Union Bridge Co. v. U. S.*, 204 U. S. 364; *Yates v. Milwaukee*, 10 Wall. 497; *U. S. v. Chandler-Dunbar Co.*, 229 U. S. 53; *Gibson v. U. S.* 166, U. S. 269; *Cooley v. Board of Wardens*, 12 How. 299; *U. S. v. Rio Grande Dam & Irrigation Co.*, 174 U. S. 690).

The right to navigate the navigable waters of the United States is enjoyed in one's capacity as a citizen of the United States and not as a citizen of a state (see discussion and cases, p. 45 *supra*).

The state having neither sovereignty nor property, has no ground upon which to rest her case in the absence of a prohibition by a constitution or law of the United States.

A suit cannot be maintained by one party on a right of another party. Nor can it aver a "right guaranteed by the constitution" unless the guarantee runs to the person suing. (See page 54 *supra* and cases there cited). The same principle applies to states, and so we see that a state cannot sue to vindicate the sovereignty of the United States. A state is not "*parens patriae*" of the rights of citizens of the United States. Mr. Justice Sutherland, in *Massachusetts v. Mellon*, 262 U. S. 447, said:

> "We come next to consider whether the suit may be maintained by the state as the representative of its citizens. * * But these citizens of Massachusetts are also citizens of the United States. *It cannot be conceded that a state, as parens patriae, may institute judicial proceedings to protect citizens of the United States from the operation of the statutes thereof.* While the state, under some circumstances, may sue in that capacity for the protection of its citizens (*Missouri v. Illinois*), it is no part of its duty or power to enforce their rights in respect of their relations with the Federal government. In that field it is the United States and not the states which represents them as *parens patriae* when such representation becomes appropriate. * * *"

To the same effect are *Louisiana v. Texas*, 176 U. S. 1; *Oklahoma v. Atchison Ry.*, 220 U. S. 277; *Oklahoma v. Gulf, etc. Ry.*, 220 U. S. 290.

All of these principles seem to us to be very clear. Complainants insist that cases decided here stand against our contention, and it becomes necessary to consider the cases advanced to support their insistence. The case they stress is *Pennsylvania v. The Wheeling, etc. Bridge Co.*, 13 Howard 518. We doubt if any case has been so frequently or so variously explained. If it be said that the right of Pennsylvania in that case proceeded on its sovereignty, the opinion of the court twice expressly refutes the view and rests the case on a very distinct and substantial property right. There the court said:

> "In this case '*the State of Pennsylvania is not a party in virtue of its sovereignty. It does not come here to protect the rights of its citizens.* * * * *Nor can the state prosecute this suit on the ground of any remote or contingent interest in itself* " (like a fraction of a cent a ton on the relatively small amount of coal for public buildings.)" It avers their claims in an abstract

right by a direct interest in the controversy. * * * In the present case *the rights asserted and relief prayed are considered as in no respect different from those of an individual. From the dignity of the state the Constitution gives to it the right to bring an original suit in this court, and this is the only privilege, if the right be established, which the State of Pennsylvania can claim in the present case.* * * * The State of Pennsylvania claims *nothing connected with the exercise of sovereignty.* It asks from the court a protection of its *property on the same ground and to the same extent as a corporation or individual may ask it.* * * *"

In *Missouri v. Illinois*, Mr. Justice Holmes speaks of that case in this way:

"The first question to be answered was put in the well-known case of the Wheeling Bridge. The question was put most explicitly by the assenting judges, but it was accepted by all as fundamental. The first justice observed that if the bridge was a nuisance it was an offense against the sovereignty whose laws had been violated, and he asked what sovereignty that was. * * * It could not have been Virginia because the state had purported to authorize it by statute. The first justice found no prohibition by the United States. No third source of law was suggested by anyone. The majority accepted the first justice's postulate and found an answer in what Congress had done." (Referring to a compact between Virginia and Kentucky which was held to have become a law of the Union by sanction of Congress regulating commerce and rendering unconstitutional a state law which violated it). "At a later stage of the case, after Congress had authorized the bridge, it was stated again in so many words that the ground of the former decision was that the act of the legislature of Virginia afforded no authority or justification. *It was in conflict with the acts of Congress.*"

In *Missouri v. Illinois*, Mr. Justice Holmes said of the canal and diversion here: "* * * *There is no suggestion that*

Congress had forbidden the action of the State of Illinois."

On this convergence of authority, in the last two sentences just quoted, how can Wisconsin sue here?

This view of the Wheeling Bridge case seems to us the one most consistent with the controlling principle. It absolutely abolishes the contention of complainant that *that* case justifies *this* suit.

In *Louisiana v. Texas*, 176 U. S. 1, this court said that the Wheeling Bridge case rested on the *property right* of Pennsylvania and in the *Passaic Bridge Cases*, 3 Wall. 782, Mr. Justice Grier said the Wheeling case rested on a monopoly threatened to be created in Virginia by the bridge. None of these interpretations of the case can bring any comfort to complainants.

But they say, "*We have a property right in the increased price we pay for coal for public buildings*" (the increase being due to increased lake freights as applied to coal—the increase in freight being due to six inches less depth in the artificial harbors in Wisconsin).

De minimus non curat lex. If this attempt did not flow from the dignity of a state, we might employ complainants' characterization of one of our contentions—"ridiculous." It is like the case in Mother Goose of the fire that burned the stick, that beat the dog, that worried the cat—and so on to the apple dumpling.

Said Mr. Justice Holmes in *Missouri v. Illinois*, "Before this court ought to intervene the case should be of serious magnitude, clearly and fully proved, and the principle to be applied should be one which the court is prepared deliberately to maintain against all considerations on the other side * * *" and in *Georgia v. Tennessee Copper Co.*, 206 U. S. 230, 237, "The alleged damage to the state as a private owner is merely a makeweight * * *" And, in the Wheeling Bridge case, the court said, "nor can the State prosecute this suit on the ground of any remote or contingent interest in itself."

The present case falls squarely within these principles and there is not an iota of right on which to base this suit.

There is no record in the annals of this court of a state maintaining a suit against another state on its "sovereign right" in the navigable capacity of interstate navigable waters. All the other cases relied upon by complainant stand on entirely different ground. The cases are *Kansas v. Colorado*, 206 U. S. 46; *Missouri v. Illinois*, 180 U. S. 208; *Georgia v. Tennessee Copper Co.*, 206 U. S. 230; *North Dakota v. Minnesota*, 263 U. S. 365; *New York v. New Jersey*, 256 U. S. 296; *Pennsylvania v. West Virginia*, 162 U. S. 553; *Wyoming v. Colorado*, 259 U. S. 419; *U. S. v. Rio Grande Dam & Irrigation Co.*, 174 U. S. 690; *Hudson Water Co. v. McCarter*, 209 U. S. 349.

They are easily disposed of. *Not one of them was based on an alleged sovereign right in the navigable capacity of interstate waters.* For convenience they may be grouped under three heads:

(1) Irrigation and riparian rights—*Kansas v. Colorado, Wyoming v. Colorado, U. S. v. Rio Grande Dam & Irrigation Co., Hudson Water Co. v. McCarter.*

(2) Invasion of physical domain by projection of objectionable matter across interstate borders. *Georgia v. Tennessee Copper Co., New York v. New Jersey, Missouri v. Illinois, North Dakota v. Minnesota.*

(3) Unconstitutional state law seeking to regulate and restrict purchase and sale of a commodity in interstate commerce and substantially affecting direct property rights of the state and health of inhabitants. *Pennsylvania v. West Virginia.*

The feature which distinguishes all these cases from the present case and controls consideration of them is that *they all rested on an unimpeachable right of quasi-sovereignty.* We have already disposed of *Kansas v. Colorado* (page) 71, 83), *Wyoming v. Colorado* (p. 84), and *U. S. v. Rio Grande Dam & Irrigation Co.* (p. 82). The first two rested on the sovereign right of a state to control the uses of water in all its streams for irrigation, *and the waters were not navigable. Kansas v. Colorado* expressly held that if the stream in question had been navigable, this quasi-sovereignty *would have vanished* in the presence of the paramount sovereignty of the United States at least in so far as the question of navigable capacity is concerned. In *U. S. v. Rio Grande Dam & Irrigation Co.* the quasi-sovereignty of the state *did vanish* in that presence. *Hudson Water Co. v. McCarter* was simply a case of trespass by an individual against the conceded dominion of the state over its waters. It *has* such dominion in respect of almost everything concerning waters, except in the *navigable capacity* of interstate navigable waters. As to intra-state navigable waters the state has the same dominion that she has over intra-state commerce. As to her purely permissive power to authorize obstructions in and, to a certain extent regulate, interstate waters within her borders, it does not flow from any sovereignty in their navigable capacity. It flows from the police powers and the implied authority of Congress to act in an ancillary capacity in respect thereof.

The second class of cases is equally simple. Surely a state has a *sovereign right* sufficient to come here and complain against something analogous to assault and battery—a gas or a sewage barrage across its borders. It is most instructive to note, however, that in *New York v. New Jersey* the United States intervened on its paramount sovereignty. When it did so everything else awaited its satisfaction. When that was accomplished the case proceeded upon the perfectly good basis on which it began—invasion of physical domain by projection of filth across the interstate borders, and with no question of navigable capacity involved.

North Dakota v. Minnesota involved no question of navigable capacity. The assault across the borders there was by a projection of flood waters destroying broad acres of tilth. There is nothing in the case to distinguish it from the other invasion cases, and nothing to bring it within the circumstances of this case.

Pennsylvania v. West Virginia is a border line case, but it has no application here. Pennsylvania's direct property right was a very large investment in heating appliances from which West Virginia threatened to cut off the only supply of fuel available, leaving such appliances useless. Her sovereign right was her duty to protect the health and comfort of her people in all parts of the state from having withdrawn the single source of the kind of fuel for which their facilities had been adapted. A State is *parens patriae* of the health and comfort of its people.

Furthermore, there was no question of navigable capacity involved. The case properly falls in that class of cases involving invalid state taxes and other burdens on *commodities* of interstate commerce, and not in the class of cases that have to do with the *facilities* of commerce.

The distinction is obvious. For example: It has been repeatedly held that the provision of organic acts, (such as the act admitting the State of Oregon into the Union, the Ordinance of the Northwest Territory and the Wisconsin State Constitution), providing that "all navigable waters shall be common highways and forever free," do not refer to *physical obstructions* but to *political regulations.*

Concerning these provisions this court said, in *Willamette Iron Bridge Co. v. Hatch*, 125 U. S. 1, on page 10:

> **"What regulation of commerce does it affect? Does it prohibit physical obstructions and impediments to the navigation of the streams? Or does it prohibit only the imposition of duties for the use of the navigation, and any discrimination denying to citizens of other states the equal right to such use? This question has been before this court, and has been decided in favor of the latter construction."**

It was also held in *Withers v. Buckley*, 20 Howard 84, that such a provision did not prevent the legislature of a state "from improving by a canal the navigation of one of" its "navigable rivers and thereby diverting without compensation the flow of water * * *."

The Withers case is cited with approval by this court in the later case of *Shively v. Bowlby*, 152 U. S. 1, on 33.

Moreover, the Supreme Court of Wisconsin, referring to this provision in the Wisconsin State Constitution, announced the same rule, and stated in the case of *In re Southern Wisconsin Power Co.*, 122 N. W. 801, 807:

> "The clause in the Constitution, providing that the navigable waters therein referred to 'shall be common highways and forever free' etc., does not refer to physical obstructions of these waters, but refers to political regulations which would hamper the freedom of commerce."

In the class of cases dealing with restrictions by attempted state political regulation of interstate commerce, the test of jurisdiction is: Did the plaintiff itself suffer from the burden imposed? Was the plaintiff one of the class guaranteed against such burden? (*M. K. & T. Ry. v. Cade*, 233 U. S. 642, 648 and seven cases there cited). The facts found by the court, in *Pennsylvania v. West Virginia*, seemed to bring Pennsylvania well within that rule, and that was sufficient to sustain the jurisdiction.

The West Virginia case, in another aspect, stands directly against the contention for which it is cited by complainants in this branch of the argument, viz.;

In ***Ohio Oil Co. v. Indiana*****, 177 U. S. 190, and** ***Walls v. Midland Carbon Co.*****, 254 U. S. 300, this court held that the legal right of a state respecting gas in the ground was like its right over wild animals, that is to say,** ***precisely like its rights in the corpus of waters within its boundaries, a quasi sovereign right in a substance not capable of ownership:*** **a right and a duty to protect it for the collective benefit of** its people. ***There was no question of interstate commerce*** *involved.*

But in ***Pennsylvania v. West Virginia***, where West Virginia was attempting to vindicate the identical *quasi sovereignty of the same subject matter* by a statute—the same natural gift within its borders—the asserted *quasi* sovereign right ***necessarily obtruded itself into a field occupied by the paramount sovereignty of the United States.*** **It vanished. It was non-existent.** Whatever may have been the *quasi* sovereignty of West Virginia in gas, she had no sovereignty in interstate commerce. The latter sovereignty belonged to the United States. Such precisely is out contention here. Whatever may be the sovereignty of complainants over waters within their borders, they have *no* sovereignty over *interstate commerce* and no sovereignty over the navigable capacity of these inland seas.

From the foregoing, it may be seen that the cases cited to support the suit of Wisconsin and sister states bring nothing to their comfort. The only cases on the subject are emphatically against her. The words "*parens patriae*" bring her no help. They mean no more than "sovereignty." Wisconsin cannot be "*parens patriae*" for Canada. She *is* not "*parens patriae*" for citizens of the United States. And, if she sues as "*parens patriae*" she must show dominion. She has no dominion in navigable capacity of interstate waters. **As was said in** ***Louisiana v. Texas*****, 176 U. S. 1:**

> **"Louisiana presents herself in the attitude of** ***parens patriae*****, trustee, guardian, or representative of all her**

> citizens * *. Inasmuch as the vindication of the freedom of interestate commerce is not committed to the state of Louisiana and that state is not engaged in such commerce, the cause of action must be regarded not as involving any infringement of the powers of the state of Louisiana, or any special injury to her property, but as asserting that the state is entitled to seek relief in this way, because the matters complained of affect her citizens at large. * *"

As we have shown, rights in interstate commerce flow from the sovereignty of the United States only.

> "It cannot be considered that a state as *parens patriae may institute judicial proceedings to protect citizens of the United States from the operations of the statutes thereof.*" (*Mass. v. Mellon*, 262 U. S. 447, 485).

> "We are of opinion that the words in the Constitution * * * are not to be interpreted as conferring * * jurisdiction in every cause in which the state elects to make itself a party plaintiff * * and seeks not to protect its own property, but only to vindicate the wrongs of some of its people * * *" (*Oklahoma v. Atchison Ry.*, 220 U. S. at 289). A state cannot invoke the original jurisdiction of the court by suit on its behalf where the primary purpose of the suit was to protect its citizens generally * *. (*Oklahoma v. Gulf etc. Ry.*, 220 U. S. 290 at 301.)

These cases should govern this bill. No property right is involved; the sole injury and right asserted are claimed as sovereign rights in navigable capacity of interstate navigable waters; there is no such state sovereignty; there is no wrongful act of the defendant. The bill should be dismissed.

Complainant contends that if this be true *only the United States* could sue for an alleged obstruction to the navigable capacity of an interstate navigable stream, whereas the books are full of suits sustained by individuals.

This is a *non sequitur.* Of course anybody who *has a right* and a *special injury therein threatened or created by a wrongful act* can sue. No individual could sue *in this case* because there has been no injury to any navigator (*U. S. v. Sanitary District of Chicago*, unpublished opinion of Judge Carpenter which appears at pp. 114 to 117 of Appellants Narrative, in *Sanitary District v. U. S.* 266 U. S. 405). But surely the fact that none of Wisconsin's citizens have a cause of action could supply no cause to her. *She* could not sue if they *had* a cause of action and a *fortiori*, she could not sue if they have *none.*

For reasons relating to the dignity of a sovereign, an individual cannot sue a state or the United States without consent. But if there were any injury, any individual could sue the Sanitary District here on the principle that suit against an officer or agency alleged to be acting under a void statute and thus infringing a right of an individual to the latter's injury, gives that individual a standing in court and his suit is not one against a sovereign. Hence the cases (whose name is legion) of such suits by individuals. *The very fact that there have been no such suits in this case is proof of the lack of merit and substance here.* And the usual argument that a state should sue to prevent injury to thousands is inappropriate here, for one injunction by one lone Sicilian fisherman in the lakes would accomplish all that could be done by seven states—or fifty power companies. But neither one nor fifty power companies could maintain a suit as against the interests of navigation. (*U. S. v. Chandler Dunbar Co.*, 229 U. S. 53), unless, perhaps, they could get some state to be their *parens patriae.*

Complainants say that the principle, that, in matters of commerce where the federal interest is imminent and direct, the states may not act at all, has no applicaion here. Our argument depends not on that principle. Nevertheless, we think it not only applies here, but applies with tremendous impact.

In respect of effective modern navigation, the lake harbors, the canal and the rivers to the gulf are all parts of one artificial system and facility of navigation. Congress has been experimenting with it all. The sanitary situation at Chicago can neither be decreed or legislated out of existence. It is a noisome fact.

By a combination of methods this problem will be solved —partly by a change in the present dilution of sewage, partly by dredging in the rivers below, partly by compensating works in the lakes above, partly by deepening the harbors in the lakes, in remote possibility by turning other waters into the lakes. This is a complex subject. Canada must be consulted and negotiated with. She is being negotiated with.

This is the problem of Congress. Can Congress be forced to solve it piecemeal and to adopt the single solution least beneficent to the general good. It may be inappropriate for Congress now to pass an act. Congress may not desire either to validate or deny the entire diversion until it has determined the Lakes-to-the-Gulf project—until it knows the attitude of Canada—until it has determined the real effect on lake-levels. Does this inaction of Congress give power to a state to coerce the legislative discretion and force action?

As we have shown, Congress *knew every detail of this history from the beginning*. It did not act. It preferred, for the time being, to leave regulation to the department it had created for that purpose rather than to enact an absolute rule of either inhibition or permission. Did the course pursued leave open a method by which the discretion of Congress, the State Department and the War Department can be coerced? We think the rule is as applicable to an artificial as to a natural waterway in such a case as this, that the non-action of Congress conclusively implies a prohibition of interference with the existing status and, if interference is outside the province of a state by reason of the Constitutional delegation of powers, we think it is equally outside the province of courts by reason of the Constitutional distribution of powers.

There is no theory on which the states complainant should be permitted to maintain this bill.

VI-2.

Sovereign rights of the States complainant in the navigable capacity of these waters have been completely appropriated by the United States to the exclusion of the States complainant, by general acts of Congress assuming exclusive control of navigable waters of the United States.

We have hereinbefore contended that, the Constitution, *ex proprio vigore*, and in the inaction of Congress, inhibits such a suit as this, but if it be held that in such inaction there is a sufficient residual right in the state to maintain this action, then we feel sure that Congress, by general acts, has absorbed that residual right.

Wisconsin v. Duluth, 176 U. S. 1 was concerned with what, for purposes of illustration, we may call a pear-shaped lake harbor, the base of the pear lay toward the lake. One side of the pear was Wisconsin, the other Minnesota, and the stem was a boundary stream between the states. The arc of the base was made by two narrow strips of land projecting from either state and almost meeting. The narrow strait between was near the Wisconsin shore. Current from the river, continuing across the harbor and through the channel, kept the strait scoured out and thus it became the only entrance to the harbor. On the Wisconsin shore near this entrance grew up the harbor of Superior City. On the opposite shore of the bay was Duluth, situated at the base of the Minnesota segment of the arc. Here came the Northern Pacific Railroad and established a terminus. Duluth needed a harbor. The Federal Government sought, without success, to provide one outside the arc. Duluth became impatient. With very little preliminary she went out one day and cut a channel across the arc close to the Minnesota shore. So expeditiously and effectively was this done that, within the year, the canal was complete. Minnesota had no acts of 1822 or 1827, nor any act of Congress, nor any permit from the Secretary of War, nor any statute from the state.

The channel of the boundary river promptly changed and began to run through the artificial canal. The natural entrance at Superior City began to fill up. Ships began to use the Duluth channel. The government began to dredge. Wisconsin began to sue. For seven years she sued and would not be comforted. Finally she came here.

In the meantime the Federal Government continued the even tenor of its accustomed way in maintaining the artificial system of lake navigation, precisely and with no more nor less definition than we have before us in the present case. It dredged the harbor. It dredged the Superior entrance. It dredged up to, but, at first, not through the Duluth entrance but it dredged at both ends thereof, just as it has dredged up to both ends of (and not through) the Sanitary and Ship canal. The Congressional appropriation of funds was general to the harbor. The engineer officer in charge expended them at his discretion, but he expended them with relation to both entrances. Finally he reported that he wanted to do $6,000 worth of urgent work on one of the piers of the canal and to have a fund of $10,000 available for other repairs. Congress cautiously authorized expenditure of the sum of $15,000 for "the *harbor* at Duluth" (not expressly for the canal) and in a refinement of caution prescribed "'that it shall be upon the express condition that it shall be without prejudice to either party in the suit now pending * * *" language curiously reminiscent of the cautious disclaimers of any responsibility in the present permits.

These facts are in precise parallel with the facts here, but our case is very much stronger. That case was decided in 1877. We have the statutes of 1822, 1827, 1890, 1899, the permits of the Secretary of War and the decree of this court in the federal case. Otherwise we have here the same kind of place in the same artificial system of lake navigation, the same federal co-operation and construction up to both ends of our canal, and, while we have never asked the Federal Government to make any repairs to our piers, we have worked side by side in the same rivers below our canal and in the Chicago river. Wisconsin contended there substantially what she says here: No state can obstruct an interstate stream. She is entitled to her natural gifts unimpaired and regardless of interstate commerce, etc., etc.

However, this court said:

> "We proceed to inquire what the general government has done. * * *The whole system of river and lake harbor improvements, whether on the sea coast or on the lakes or the great navigable rivers of the interior, has for years been mainly under the control of that government.* * * The operation of the government in this regard has been *conducted by the Bureau of Engineering* as part of the War Department, to which Congress has confided the execution of its wishes in all these matters. *That department has mapped out, in suitable geographical divisions, the work thus imposed upon it and placed these under the control of officers who are in charge of them.* These are again subdivided so that while the lake system or, at all events, the western lake system, is in the charge of one general superintendent, the separate works which at different places are con-

ducted under him have each another engineering officer who has special charge of these works. *For many years Congress has been in the habit of passing an appropriation bill called 'The River and Harbor Bill,' devoted to works of this class exclusively.* * * The money thus appropriated is expended, as we have said, under the direction of the War Department. *It cannot be necessary to say that when a public work of this character has been inaugurated or adopted by Congress and its management placed under control of its officers,* there exists *no right in any other branch of the government to forbid the work or to prescribe the manner in which it shall be executed.* * * (Note that this remark applies to the whole system of lake improvement as one unit). It had for several years been at work under appropriations by Congress prior to the construction of the canal at Duluth in the effort to deepen the channel at the mouth of the St. Louis river, but, we may infer, with little success beyond preventing it from filling up.

"The *rapid growth of the City of Duluth,* consequent upon its being made the terminus of a railroad, had attracted attention to the necessity of harbor improvement at that point and Congress had made appropriations for a breakwater which had been partially constructed outside of Minnesota point in the main water of the lake (that is far away from the Duluth harbor) but this had proved a failure, and it was seen that no safe harbor for the vast commerce which was expected to be created at that place by the Northern Pacific Railroad could be secured in that mode. The City of Duluth and the Railroad Company, impatient of relief from Congress, inaugurated, therefore, in 1871 the system of improving the inner harbor. * * The canal was completed sufficiently for use in that year and the dredging of the harbor commenced (by Duluth).

"The matter was in this condition when Congress, by the River and Harbor Bill approved March 3, 1873, appropriated, 'for the purpose of dredging out the Bay of Superior from the natural entrance to the docks of

Superior and Duluth and preserving both entrances from the lake thereto, $100,000' (this dredging and improvement was up to, but not including, the canal)." There was but one entrance into that bay from the lake until the canal was made. There were no docks at Duluth but those made by the Railroad Company and the City in the inner harbor and the upper end of that bay.

"We see, then, at once, that Congress, recognizing what had been done by private enterprise at Duluth, determined to place that harbor and that canal under the same protection and to provide for them in the same appropriation which covered the entrance and harbor at Superior City. Hence one hundred thousand dollars was appropriated as one item for both entrances and for both improvements to be administered by the same officers as their judgment might dictate." (This refers to money spent in the harbor not in the canals. The court continued speaking of the cautious way in which Congress had worded the statute).

"* * It was unnecessary * * *. The Congress of the United States had themselves before this adopted, recognized and taken charge of this work which had placed it on precisely the same ground and provided for in the same paragraph and out of the same aggregate sum of money that it did the work at the original entrance, as it is aptly called, at the mouth of the river. * * The War Department had accepted charge of the work, had expended appropriations made and had now for several years made the same regular estimates for this work that it did for all others under its control and management, * * and though the State of Wisconsin had brought her suit in this court to abate the work as a nuisance and Congress was made aware of the fact, it still, in 1876, made the usual appropriation and the War Department still had the work in charge, and *Congress cautiously said that this shall prejudice no one in the suit, but we shall go on, notwithstanding, and continue this system of improvement.*

"We do not feel called upon to make an argument to prove that these statutes of the Congress of the United States and these acts of the executive department in carrying those statutes into effect constitute an adoption of the canal and harbor improvement started by the City of Duluth and taking exclusive charge and control of it; that they amount to the declaration of the federal government that we were interposing and asserting our power.

"We take upon ourselves the burden of this improvement, which properly belongs to us, and that wherever this work for the public good is in our hands and subject to our control. If the merest recital of these acts of Congress and of the War Department under them do not establish that proposition, we can have little hope of making it plain by elaborate argument. * *

"While this court has maintained, in many cases, the right of the states to authorize structures in and over the navigable waters of the states which may either impede or improve their navigation in the absence of any action of the general government in the same matter, the doctrine has been laid down with unvarying uniformity *that when Congress has, by any expression of its will, occupied the field, that action was conclusive of any right to the contrary asserted under state authority.* * * "(that is, in this case, any right of a state to sue.)" If then Congress, in the exercise of a lawful authority, has adopted and is carrying out a *system of harbor improvements at Duluth*, this court can have no lawful authority to forbid the work. If that body sees fit to provide a way by which the great commerce of the lakes and the countries west of them, even to Asia, shall be securely accommodated in the harbor of Duluth by the short canal of three or four hundred feet, can this court decree that it must forever pursue the old channel by the natural outlet over water too shallow for large vessels, unsafe for small ones and by a longer and much more tedious route? *While the engineering officers of the government are, under au-*

> *thority of Congress, doing all they can to make this canal useful to commerce and to keep it in good condition, this court can* **owe no duty to a state** *which requires it to order the City of Duluth to destroy it.*"

The bill was dismissed. We believe the case controls the present case at every point and stands as a direct authority on the principles involved here. It decided, in effect, that the relief sought must invade the Constitutional function of another branch of the government and that a *state has no cause of action and a court no power* to interfere with the Federal artificial navigation system in the Great Lakes even where boundary streams are diverted, and littoral waters obstructed. This is the only suit we have found where what was sought was to coerce the War Department's discretion to balance convenience in regulating commerce—where commerce stands on both sides of the suit. It and *South Carolina v. Georgia*, 93 U. S. 4 are the only cases we could find where a state attempted to base a suit on its right in navigable capacity of interstate waters. Both failed.

Complainants urge that *Wisconsin v. Duluth* decided nothing as to jurisdiction. There is nothing in the report to indicate a demurrer. That is immaterial. If the relief sought is such as a court of equity ought not to grant, the bill is demurrable. The decision goes to jurisdiction. Dismissal on demurrer is within the discretion of the court, but in the instant case there seems to be *every* reason why the bill should be dismissed and *none* why it should be entertained.

We think that reference to the whole body of the River and Harbor Acts for the last sixty years is sufficient to demonstrate that this canal is but part of one navigation system which for all the purposes of this suit may be regarded *as wholly artificial and wholly created by the United States.* The entire argument about natural gifts, restoration of things to a state of nature, and absolute rights fails. There can be no more quasi sovereign rights in such a state of affairs than there can in a first class battleship. These states have no more right to enjoin this diversion permitted by the Secretary of War than they would have to enjoin his moving a regiment of regulars out of their domain. Even if such a right remains, where there is *non-action* by Congress, it certainly does not remain after such comprehensive *action* as we have here and this was held to be so in *Wisconsin v. Duluth*, even in the absence of the positive general enactments of 1890 and 1899.

But these latter statutes certainly conclude the argument. It would scarcely seem necessary to expand the showing and citation in pages 33 and 34 of our first brief that the System of Great Lakes and Lakes-to-Gulf navigation is one requiring unity of control, that by the acts of 1890 and 1899, Congress assumed that control.

Complainants' brief brings absolutely nothing in the way of authority against the pronouncements in the cited cases except to deny that the United States has any authority to *benefit* navigation anywhere if the same act would *impair* it anywhere. This is indeed a singular contention. Every bridge case presents a balance of convenience as was clearly shown in the *Passaic Bridge Cases*, 3 Wall. 782. In *South Carolina v. Georgia*, 93 U. S. 4, the act of the government complained of was throwing a navigable channel away from the Carolina side of an island to the Georgia side. This court dismissed the South Carolina bill. In *Wisconsin v. Duluth*, as we have just seen, the complaint was that an interstate boundary stream had been diverted and a natural channel obstructed.

While (because of the 5th Amendment) the power to regulate commerce is not the power to destroy *private property rights without compensation*, we have seen, in many of the cases cited and especially cases of the type of *Gibson v. the United States*, 166 U. S. 269, that the 5th Amendment is the *only* limit to its power to destroy. Also that even this limitation does not prevent destruction of riparian and other incorporeal rights—such as *rights in navigable capacity*

(*Union Bridge Co. v. U. S.*, 204 U. S. 364; *Northern Transportation Co. v. Chicago*, 99 U. S. 635; *Scranton v. Wheeler*, 179 U. S. 141; *U. S. v. Chandler-Dunbar Co.*, 229 U. S. 53). It is a power plenary—fully as wide as the situations with which it has to deal. While doubtless this court would strike down something done in the name of commerce that had no appropriate relation to commerce, the second *Wheeling Bridge Case*, 18 How. 421, demonstrates that it would never substitute for the determination of Congress as to what is or is not an obstruction to commerce, a contrary determination of its own. Talk of a fear of Congress "syphoning" away the Great Lakes may seriously begin when the depths of the harbors named in this suit is reduced from the 18 to 20 feet depth which Congress has provided in them to the 2 or 3 feet depth, with which Congress found them in their "*natural navigable capacity.*" The Great Lakes are still safe and in competent hands.

Complainants do not agree with our construction of the Boundary Waters Treaty. We think our view has been fully justified herein (pp. 45 to 51 *supra*). The effect of such a treaty to abate the quasi-sovereignty of a state wherever the two come into conflict is discussed in *Missouri vs. Holland*, 252 U. S. 416, where the question was the effect of the migratory bird treaty with Canada on the quasi-sovereign rights of a state in things *furae naturae.* There the court said:

> "We do not mean to imply that there are no qualifications to the treaty-making power but that must be ascertained in a different way. * * The treaty in question does not contravene any prohibitory words to be found in the constitution. * * The state, as we have intimated, founds its claim of exclusive authority upon an assertion of title to migratory birds * * but it does not follow that its authority is exclusive of paramount power. *To put the claim of the state upon title is to lean upon a slender reed.* Wild birds are not in pos-

> session of anyone. * * *But for the treaty the state would be free to regulate this subject itself.* * * No doubt the great body of private relations usually follow within the control of the state but a treaty may override its powers. * * This proposition * * was recognized as early as *Hopkirk v. Bell*, 3 Cranch 454 (citing many old cases). Here a national interest of very nearly the first magnitude is involved. It can be *protected* by national action in concert with that of *another power*. The subject matter is only transitorily within the state and has no permanent habitat therein. * * It is not sufficient to rely upon the states. The reliance is vain and were it otherwise the question is whether the United States is forbidden to act. We are of the opinion that the treaty and statute must be upheld."

Quasi sovereign rights in water are in precisely the same category as similar rights in animals *ferae naturae*.

We do not say (as complainants seem to think) that the United States restricted, by the treaty, its control over this diversion. Our contention is that a federal compact with a foreign power in respect of these waters is one more step in their recession from any *quasi* sovereignty of littoral states —one more evidence that states, either by suit or otherwise, have no right to interfere.

We believe that, quite apart from particular statutes and permits of the Federal government, assuming control of the navigable capacity of these waters, sovereignty over that capacity was lodged exclusively in the Federal government by the constitution alone, and if not, that it was completely absorbed by the general statutes and treaty mentioned to the complete exclusion of such state sovereignty as would support this suit.

VI-3.

The right of the states complainant to maintain this suit has been entirely obliterated by particular legislative, executive and judicial acts of the United States assuming complete

control of the very acts complained of and of every matter or thing affected by them.

Our contention may be epitomized thus: Congress authorized a canal and diversion of water from Lake Michigan by the acts of 1818, 1822 and 1827. The purpose of this authorization was to create a highway of commerce.

Neither the precise size nor location, nor amount of diversion were specified and hence the rule of reasonableness governed; nothing contrary to the foregoing conclusions was determined in Sanitary District v. U. S. That case merely held that such a history did not prevent control of the amount of diversion by the Secretary. The canal was expanded for navigation purposes until 1889. At that time no act of Congress was required to construct an obstruction in intra-state navigable waters. (See page 16 *supra*). No one had foreseen any effect on lake levels. (P. 18 *supra*).

The projects of Congress included a deep waterway along the canal route (p. 20 *supra*). Illinois hoped to hasten this consummation. Also the pollution of the lake, the Chicago river and the canal had themselves become a problem of navigation. Moved by both incentives, the canal was built. No authority was ever required *to build it* except as incidental construction in the Chicago river occupied water courses. Whatever authorization Congress required was secured in the form of permits from the Secretary of War.

By the time the earliest diversion through it was possible, the sanitary situation had become a compelling consideration of interstate commerce. Not until then had any army engineer ever suggested an effect on lake levels. (P. 18 *supra*).

The Illinois legislature memorialized Congress when it began construction, and every act done by Illinois was reported annually to Congress in meticulous detail (pages 16 to 34 *supra*). The attitude of the government was consistently one of encouragement, cooperation and invitation.

The canal was a combined project for flotation and sanitation. Both purposes bore a reasonable relation to navigation. The sanitary arrangements for a city of millions are not constructed in a year. When the first permit was presented to the Secretary of War, his action thereon was not merely an exercise of judgment on the *best* method of regulating navigation. From the sanitary aspect of navigation the method he accepted *the only method available*. From the flotation aspect it was a proper method. Both motives in good faith controlled the construction of the canal and the action of the Secretary. From the flotation aspect alone the Secretary would have been remiss in his trust if, then or at any time since, he had abated the canal. At least three special provisions of acts of Congress had called upon him for surveys of a riverway project which by necessary intendment contemplated the canal and diversion through it as within the immediate projects of Congress. (pp. 16 to 34, 120 *supra*).

The Lakes-to-the-Gulf Waterway is a fundamental and real requirement of navigation. The amount of water from Lake Michigan it will finally require when all is done that can be done has not yet been finally determined by Congress. The amount of water necessary to avoid paralysis of commerce by converting Lake Michigan into a cesspool is now passing through the canal. It is being diverted by a permit of the Secretary of War, acting under authority of the Act of 1899. The Secretary's authority to grant this permit has been confirmed by this court in the very circumstances here presented. Under the terms of that permit the federal government is now in direct regulatory control of all acts complained of here.

Assuming all federal acts as above recited to be valid, what remains as a basis for this suit? What right has a state? What is the wrongful act of defendants?

The suit reduces to a complaint that a regulation of commerce by the federal government is not a wise regulation and to a proceeding to coerce the discretion of the legislative and administrative branches of the government in acting on a matter wholly within their control. As we have shown (pp. 52 to 66 *supra*) *such a suit can have no standing here. No matter who the party and no matter what his injury or inherent right to sue.*

The Act of 1899, the Secretary's permit under it, and the decree of this court validating the Secretary's power are all patent on the face of the bill. Without any other argument or any other showing than this, this bill ought to be dismissed.

VII.

Every act complained of was done by or under valid and proper authority of the United States.

Complainant contends that Congress has no power to regulate navigation in such manner as will anywhere impair it, but only to regulate it in such manner as will everywhere benefit it. We think we have fully answered this novel contention elsewhere (p. 108).

But complainant says: "If the power is valid, Congress has never, by a statute, exercised it to authorize any abstraction of waters from the lakes; that Congress could not authorize water to be diverted beyond the lake watershed." We have answered the first suggestion at page 58 and the second at page 86. Complainants' next contention is that, if Congress or the Secretary authorized any diversion in excess of what is required for navigation, the authorization transcended the power. What was authorized was not excessive (pages 39-40; 112). Complainants' contention of excess proceeds on a norm of what is necessary for navigation which complainants construct for their own purposes.

It is for Congress and the Secretary to decide what is necessary and not for complainant or the court. When the federal government sues as in *Sanitary District v. U. S.*, it brings its own valid regulation and asks the court to vindicate that. When, thereafter a state sues, as here, it asks the court to upset the legislative regulation, substitute a judicial one and vindicate it by a decree.

But complainants say a former Secretary and some of his officers once said that a less amount than was permitted is really necessary. The final act of the Secretary—his permit—is the evidence of his determination of what is necessary. But complainant misconstrues the effect of the documents he quotes. He is speaking of that which, under *one* plan of Lakes-to-the-Gulf waterway, has been tentatively considered, in a few opinions and relating to one project, as necessary *for the flotation of ships.*

Sanitation of navigation is, in this case, necessary for navigation, and complainants' whole brief proceeds on the error of denying this obvious fact. A few of the many divergent opinions of experts on the kind of project and the amount of diversion necessary, are related in our argument on the facts. Let complainants ask themselves what would happen to navigation at Chicago, in the lake as well as in the canal, if the decree it seeks were to issue tomorrow. The present diversion is not only a benefit to navigation, it is a fundamental necessity thereto and it is justified as well on sanitation as on the flotation of commerce.

But complainant says the Act of 1899 never delegated power to the Secretary of War to authorize any obstruction to the navigable waters of the United States. To sustain this he cites a single case in the Federal Reporter, (*Hubbard v. Fort*, 188 Fed. 987) and incorrectly says that the statute has not been construed by this court.

In *Sanitary District v. U. S.* this court after quoting a portion of Section 10, (the section in question), said:

> *"This statute repeatedly has been held to be constitutional in respect of the power given to the Secretary*

of War. (*Louisville Bridge Co. v. United States*, 242 U. S. 409, 424, 37 S. Ct. 158, 61 L. Ed. 395.) It is a broad expression of policy in unmistakable terms, advancing upon an earlier Act of September 19, 1890, c. 907, § 10, 26 Stat. 426, 454 (Comp. St. § 9910a), which forbade obstruction to navigable capacity 'not authorized by law,' and which had been held satisfied with regard to a boom across a river by authority from a state. (*United States v. Bellingham Bay Boom Co.*, 176 U. S. 211, 20 S. Ct., 343, 44 L. Ed. 437). *There is neither reason nor opportunity for a construction that would not cover the present case.* As now applied it concerns a change in the condition of the Lakes and the Chicago river, admitted to be navigable, and, if that be necessary, an obstruction to their navigable capacity, (*United States v. Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 19 S. Ct. 770, 43 L. Ed. 1136), without regard to remote questions of policy. It is applied prospectively to the water henceforth to be withdrawn. This *withdrawal is prohibited by Congress*, except so far as it may be authorized by the Secretary of War."

Hubbard v. Fort, 188 Fed. 987, merely held what has also been held here in *Cummings v. Chicago*, 188 U. S. 410, that a permit to a private individual under the Act of 1899 did not obviate the necessity for *also* procuring state authority for an act performed *within the domain of the state and especially against state protest.* In that case the permitee was a trespasser seeking to lay water mains on state lands in the bed of the Kill von Kull in New Jersey. He sought to enjoin the state officers from interfering with him on the ground that the Secretary's permit constituted Federal authorization. The Federal district court went further than *Cummings v. Chicago* and said that the Act of 1899 required an act of Congress to authorize obstructions in navigable waters. The ground of the decision did not require such an interpretation of the statute. It is an interpretation contrary to a course of federal administration of 27 years standing, to the decision of this court in the Sanitary

District case and to the intendment of decisions in many other cases cited herein.

An interpretation consistent with the administrative course of conduct was enunciated in *Maine Water Co. v. Knickerbocker*, 99 Maine 473. This interpretation of the statute was cited with approval (if not, by necessary intendment adopted), by the court in *Southern Pacific Co. v. Olympian Dredging Co.*, 260 U. S. 205, 210. It is also consistent with the opinion of the Attorney General of the United States (Appendix III, Defendants' first brief) and also consistent with reason, since the interpretation contended for by complainants would paralyze the facilities of navigation. As was said in the case of *Maine Water Co. v. Knickerbocker, supra*:

> "We cannot help remarking, in passing, that if the defendant's interpretation of the Act of 1899 is the correct one, it leads to a rather surprising condition. It would seem that not a wharf or pier, outside established harbor lines, or where no harbor lines have been established, can now be built in the navigable waters of the United States, not a dolphin can be anchored for mooring vessels, not a boom can be stretched, nor a weir erected for any purpose, until hereafter authorized by Act of Congress. We think it cannot be assumed that Congress intended any such result unless the Act in question is so expressed as not to admit of any other reasonable interpretation."

The effect of the first sentence of Section 10 of the 1899 Act containing the prohibition against obstructions "not affirmatively authorized by Congress," was particularly important. The Court, with reference to this, further said:

> "The general prohibition in section 10 is brought with only one substantial change from section 10 of the Act of 1890. The Act of 1890 said 'not affirmatively authorized by law,' which was held in *U. S. v. Bellingham Bay Boom Co.*, 176 U. S. 211, to mean not only by a law of Congress, but even by a law of the state in which the river is situated. The Act of 1899 says 'not affirmatively authorized by Congress.' Following this

general prohibition, and immediately connected with it, is the remainder of section 7 of the Act of 1890, which relates to wharves and other structures, which would include this pipe line. The only important change is this. The Act of 1890 made unlawful the erection of such structures without the permission of the Secretary of War in the waters of the United States, outside established harbor lines, or where no harbor lines have been established, in such manner as shall obstruct or impair navigation. The Act of 1899 makes unlawful such erections, except they are built on plans recommended by the Chief of Engineers and authorized by the Secretary of War.

"Although in the arrangements of parts, the general prohibition now is found at the beginning of a section which also relates to the specific regulation of the building of wharves and so forth, instead of being in a section by itself, as before, we are not persuaded that Congress, by changing its position, intended to change its effect. It is still general as before. And though general in terms before, we think, as we have stated, that structures impliedly authorized by Congress in the preceding sections were not prohibited. And in its new position we think that the general prohibition is likewise qualified by the sentences which follow. It cannot make any substantial difference whether the general prohibition is at the beginning of a section or at the end, or in a section by itself, if it clearly appears from the language used and from the context, all taken together, that the legislative intention was that the general prohibition was to be regarded as subject to specified qualifications. * * *

"* * * The implication seems clear to us that such structures, if built according to plans recommended and authorized as provided in the section, are authorized by Congress — that they are affirmatively authorized, — though the affirmative authority arises by implication, —and that they are lawful without any further action by Congress."

But complainant contends that, even though the statute of 1899 intended that an obstruction could be authorized by the Secretary without an act of Congress, such act would not be so authorized as against complainants' protest.

To establish this, complainants point out that the printed form heading of the permit states that it grants no property rights or exclusive privileges, does not authorize any infringement of local laws, "nor does it obviate the necessity of *state assent to the work* authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION."

Of course the intendment of these limitations is perfectly obvious. The issuing of such permits is a routine departmental matter. When the federal government directly does work in a navigable stream (as we have seen in many cases of the type of *Gibson v U. S.*, 166 U. S. 269, and *U. S. v. Chandler-Dunbar Co.*, 229 U. S. 53) all private rights go down before it without compensation. Naturally the federal government does not release this great and possibly destructive power without some restrictions.

The four cases quoted to support the principal contention go no further than to vindicate this obvious principle. The first three, *Hubbard v. Fort*, 188 Federal 987; *Cobb v. Commissioners*, 202 Ill. 427; *Wilson v. Hudson Water Co.*, 76 N. J. Eq. 543, were cases of injury to property by the erection of structures thereon in defiance of the right of the owner, and the court held, in effect, that the permit did not authorize this without consent of the owner. The fourth case quoted from (*Attorney General v. Bay Boom, etc., Co.*, 172 Wis. 363), was an injunction by the state to prevent construction of a dyke *within a state without that state's assent*. The state court held that the permit on its face did not authorize this. It was exactly the case of *Cummins v. Chicago.*

These cases have no bearing on the present case. The permit says: "You must have state assent *for the work* authorized." We have such assent. The permit says: "This permit does not grant any property rights in other peoples property." No such property is involved here. "You must not invade *private rights* or federal or state laws, but, as to the *Public Right of Navigation*, your project is authorized by the federal government."

Only the *Public Right of Navigation* is involved in this complaint. It goes to an alleged impairment of the navigable capacity of the Great Lakes. As we have shown, that is a matter not within the dominion of any state and not subject to state laws. Complete control of it is in the federal government. Under that complete control, the act complained of has been authorized and the doctrine and the cases offered on this point are all quite outside of the issues involved.

There is another element here which is neither present in any of the cases cited by complainant, nor in the usual case where such permits are reviewed. In the usual case, the condition complained of is a crass and unrelieved obstruction to navigation—a barrier across or a butte within a highway of navigation—a physical structure, for some private gain, built on the property of others and opposed to the interest of navigation. On one side stands the public interest, on the other a private interest adversely affecting it.

The present *case is clear out of that category.* Commerce stands on *both sides* of this controversy. Only in a technical sense is there any obstruction at all. A relatively small amount of water from one stream amply navigable, even after the diversion, is turned into another stream to make the latter navigable at all, and to make navigation free of pestilence in both. Every substantial allegation of the bill is based on a claimed absolute right to say that not one drop of water may be so used, *no matter what the authority*. Most cases involve litigation of private rights, in matters of merely local and particular interest. This case goes to national fundamentals in every bearing and involves treasure beyond human comprehension.

The present case must be considered on its own facts and circumstances and be governed by a rule apposite to the great issues involved. It must not be considered on other and inapposite circumstances, nor governed by rules appropriate only to a different and opposing state of facts and principles.

West Chicago Railway v. Chicago, 201 U. S. 506, we believe concludes all questions involved in this branch of the case.

The River and Harbor Act of 1899 contained the following provision: "Improving Chicago river in Illinois: *Survey and estimate* of cost for a channel 21 feet deep * * exclusive of cost of removing or constructing bridges or piers or lowering channels* * ."

Without any authority whatever from the Secretary or Congress, the state of Illinois anticipated what Congress expressed as an intention by those words, and began dredging in the Chicago river, altering its capacity, and interfering with riparian and property rights therein generally. The Railway Company owned the bed of the stream, the bank on either side and a tunnel underneath it. The state ordered the Railway Company to lower the tunnel or remove it. The company resisted. A mandamus suit followed. Through varous vicissitudes the case came here.

The River and Harbor Act of 1888 (the year preceding the Illinois Canal Act) contained the following language: "Improving Illinois river, Illinois: Continuing improvement, $200,000.00. And for the purpose of securing a continuous navigable waterway between Lake Michigan and the Mississippi river, having capacity and facilities adequate for the passage of the largest Mississippi river steamboats, and of naval vessels suitable for defense in time of war, the Secretary of War is authorized and directed to cause to be made proper surveys, plans and estimates for a channel improvement * * * in the beds of the Illinois and Des Plaines rivers from LaSalle to Lockport, so as *to provide a navigable waterway not less than* 160 *feet wide and not less than* 14 *feet deep*, and to have surveyed and located a channel from Lockport to Lake Michigan, * * ." (Lockport is the southern terminus of the present canal).

Illinois anticipated what Congress expressed as an intention by those words and began constructing a canal from Lockport to Lake Michigan 160 feet wide and 14 feet deep.

Returning now to the West Chicago Railway case, the contention of the railway was that its property could not be taken without compensation, that the Act of 1899 forbade any obstructions or alterations in the navigable waters unless affirmatively authorized by Congress or permitted by the Secretary of War, and that the state had no such permit and no authority at all from Congress. The court held:

> "* * *For the purpose of obeying the act of Congress and in order to obtain a free and unobstructed navigation of the Chicago river* for the benefit of commerce, interstate and domestic, the City Council of Chicago * * passed the following ordinance: (Here follows the ordinance requiring the railroad to lower or remove its tunnel.) * * *Great stress is placed by the railroad on the fact that it is the owner in fee of the bed of the river* at the point where the tunnel was constructed * *. It is not vital to the present discussion; for it was ad-

judged by the state court *in harmony with the settled doctrines* * * that the 'title to land under a navigable river is not the same as the title to the shore lands * * the owner of the soil under the bed of such a stream can only use and enjoy it in as far as is consistent with the public right * *. In addition to these considerations, we may suggest the important one, that the rights of the company, as the owner of the fee of the land on either side of the river' (that is, *riparian rights*) * * 'were subject to the paramount right of navigation * *.' (Citing many of the cases cited herein.)

"The railroad company contends that the city had no power to require or authorize any changes in the bed of the river *without the approval of the Secretary of War.*" (Citing River and Harbor Act of 1899, Section 10). "* * The same act contains directions for improvement of the Chicago river. Concerning all the provisions together, we think it clear that when Congress declared in the River and Harbor Act of 1899 under the heading of *'Improving the Chicago River in Illinois,'* that all the work of removing and reconstructing the bridges and piers and lowering the tunnels * * * should be done by the city without expense to the United States, *it meant to give the assent of the United States to any work done by the city toward accomplishing the end which the government had in view.* The state court properly said that the city had power under its charter to deepen the channel and, as a preliminary to doing so, to require this tunnel to be lowered or removed, and the *act of Congress permits it to proceed so far as the lowering of the tunnel is concerned* * * *."

Besides the River and Harbor Act of 1888, quoted *supra*, the River and Harbor Acts of 1899, 1900 and 1902, contain practically the same kind of provisions with reference to the Illinois and Des Plaines waterway. It is to be noted that by the Act of 1899 in the Chicago Street Railway case, Congress merely called *for estimates* and *stated the depth* of the improvement project. It is also to be noted that it did the same thing in the act of 1888, and also that a 14 feet waterway project in the surveys cited *supra* called for a diversion of in the neighborhood of 10,000 c. s. f.

The West Chicago Railway case construed the words of the 1899 act as constituting *sufficient Congressional* authority (even in the absence of a permit under Section 10 and the express prohibition by Section 10 of action without a permit) to authorize the state to anticipate the intention of Congress and to confiscate riparian and public rights of owners along the shores of the waters being improved.

Complainants' contention is that even under a permit from the Secretary, such rights could not be interfered with, that they are property, etc. etc. This Street Railway case holds that, even in the face of the inhibition of the statute of 1899 against altering the capacity of a stream, and even in the absence of a Secretarial permit, such expressions of the intention of Congress are amply sufficient to establish the *Congressional authority* which complainants say is here lacking—at least as against such *incorporeal private rights* as are *riparian rights* or as against such *purely public rights* as are *rights of navigation*.

In other words, *this Court held that such expressions of the intent of Congress are a sufficiently affirmative authorization by Congress to satisfy the requirements of Section* 10 *of the Act of* 1899.

The delegation of power to the Secretary under the act of 1899 has repeatedly been held valid—even to the extent of effecting the repeal of an act of Congress. (*Louisville Bridge Co. v. U. S.*, 242 U. S. 409. See *Union Bridge Co. v. U. S.*, 204 U. S. 364, where the subject is exhaustively reviewed.)

Complainant contends that, even if Congress could stop up a stream it could not delegate that authority to the War

Department. It *has* delegated such power to an administrative Board—the California Debris Commission and the Courts have held the delegation valid in *U. S. v. North Bloomfield Co.*, 81 Fed. 343, where the constitutionality of the delegation was attacked, the court said:

> "The absolute power and control of Congress over the navigable waters of the United States in the interest of commerce with foreign nations and among the several states, and *its right to declare what may or may not constitute obstructions thereto, is thoroughly settled.* (*Miller v. Mayor, etc.* 109 U. S. 385, 3 Sup. Ct. 228; *Cardwell v. Bridge Co.*, 113 U. S. 205, 5 Sup. Ct. 423; *Escanaba & L. M. Transp. Co. v. City of Chicago*, 107 U. S. 678, 2 Sup. Ct. 185; *South Carolina v. Georgia*, 93 U. S. 4; *Gilman v. Philadelphia*, 3 Wall. 713.)"

The case of *United States v. North Bloomfield Gravel-Min. Co.* was decided subsequent to the case of *Woodruff v. North Bloomfield Gravel-Min. Co.*, 18 Fed. 753, relied upon by complainants at page 85 of their brief.

The California Débris Commission Act gave to the Commission power to grant permits for hydraulic mining and to determine the effect of such operations upon the navigability of the river systems involved.

In the latter case of *North Bloomfield Gravel-Min. Co. v. U. S.*, 88 Fed. 664, a suit was brought by the United States to restrain the defendant from mining, by hydraulic process, until it had complied with the provisions of said Act. In that case also it was held that the delegation of power to the Commission was valid and the court said on page 674:

> "The power of Congress to pass the act in question, mandatory in its requirements, as we construe it, notwithstanding the array of authorities cited by appellant, cannot, in our opinion, at this late day, be judicially questioned."

The navigable capacity of the Great Lakes, including their levels and the Sanitary and Ship Canal, is a subject over which Congress has taken such complete control as to abolish the right of any State to sue:

First: Because no state has any residual sovereignty in the subject matter and no sovereign right to vindicate Interstate Commerce.

Second: Because the complete absorbtion of the field by Congress by the whole series of River and Harbor Acts, expresses its will that there be no interference other than its own even by the Court. See Wisconsin vs. Duluth (brief, p. 104).

Third: Especially as to this canal and this diversion, Congress has expressed its wish for non interference by any agency in any way:

By the act of 1818, it attached the canal site to Illinois and invited Illinois to make it a waterway of commerce (page 3). By the act of 1822, it authorized a canal to connect the Lake with the Mississippi and by the act of 1827 it gave additional authority for the canal and diversion of water from Lake Michigan and aided the state in building the canal (page 5). By continuous construction in the Chicago and Illinois Rivers in connection with the canal and both before and after Illinois had deepened the cut to waterlevel, it adopted the cut and diversion as part of the national system of inland navigation (pages 13 and 20 to 33). By the Act of 1888, projecting and estimating a fourteen foot waterway and an artificial channel 160 feet wide by 14 feet deep, from Lockport to Lake Michigan, it assented to the work of Illinois in providing such waterway (pages 15, 20, 120 and West Chicago Ry. v. Chicago, 201 U. S. 506 at page 120, brief). By subsequent similar Acts it expressed a continuous purpose to utilize the reconstructed canal as a highway of commerce; for example:—Act of 1899 (page 27), Act of 1900 (page 28), Act of 1902 (page 30). By Act of 1904 (33 Stat. at L 589) Congress authorized Illinois to remove the crest from two federal dams in the Illinois river in order to permit commerce to avoid locks and float over the dams, thus utilizing for Interstate Commerce the increased diversion and indicating the intent of Congress to regard the waterway as a highway of such Commerce.

Whenever there has been any danger of interference with the canal or diversion by any power other than itself Congress has affirmatively expressed a "hands off" policy that is unmistakable. (Niagara Falls Act of 1906, 34 Stat. at L 626. Boundary Waters Treaty of 1909. See pages 48 to 56 of the brief).

In addition to all these special acts, the general acts of 1890 and 1899 and the permits of the Secretary of War thereunder, especially considering the manner of administration thereunder, constitutes a state of affairs in which it must be said that the Federal government is itself regulating and administering this subject (page 112). See Corrigan Transportation Co. v. Sanitary District 137 Federal 851 C C A. where the Court said "* * * The absolute sovereign * * * may alter the courses and currents of rivers or may dam them or fill them up and neither alien, nor subject traveler, nor navigator may complain. **No one can claim a vested right to have the United States interfere with Illinois nor can a cause of action arise from want of interference."**

By suit in this court the Federal government expressed its wish as to the regulation of this diversion and the Court there remarked that the United States does not wish to have the Canal interfered with as is demanded here. The Federal Government is the paramount and exclusive power, and, since such is its wish, then this bill should be dismissed on this motion both because these states have no right to interefere and because the court has no right to decree interference.

The power of Congress is plenary. The act of 1899 is Constitutional. And finally, everything that has been done by all authority is appropriate and necessary to the security and conservation of commerce and navigation.

CONCLUSION

This bill should be dismissed because:

(1) It is a suit in the name of states and navigation but in the interest of individuals and, as we believe, of hydro-electric power.

(2) It is in no just sense a suit between states. It is a controversy between economic areas, one of which crosses an international boundary. Its bearings are all political and its determination is peculiarly a function of Congress and not of this Court.

(3) It addresses a fundamental and intricate national problem, capable of many solutions which would be beneficial to the general good and seeks to restrict its determination to a single solution, inimical to the general good and beneficial to a single economic area and particular private interests.

(4) It is an attempt to coerce the discretion of the legislative and executive departments of government in a matter committed exclusively to their care, and to embarrass and control the negotiations of government with a foreign state.

(5) Solution of the problem presented involves continuous administrations and relations with a foreign nation. As between states, it requires co-operation, composition and adjustment. Such solution is impossible in the judicial field of absolute rights, instant determination and irrevocable decree—in a word, this is a problem which is political, legislative and administrative and not judicial in its nature.

(6) The bill fails in every juridical requirement. It shows no right, no wrongful act, no injury. It is brought by the wrong parties complainant. It fails to join indispensable

parties. The controversy is not presented in a manner appropriate to judicial cognizance. The complaint properly lies in the Constitutional field of other branches of the federal government. The relief prayed for is inappropriate to the functions and facilities of the court, outside its jurisdiction, and has incidental bearings repugnant to its purpose.

(7) The decree of the court in Sanitary District v. United States and the permit of the Secretary of War issued in compliance therewith (both patent on the face of the bill), are a complete and conclusive answer to the complaint.

The bill is inappropriate to the subject matter of the suit, to the jurisdiction of the court and to the nature of the questions involved, and should now be dismissed without further proceedings.

OSCAR E. CARLSTROM,
Attorney-General of Illinois.

JOHN T. KENWORTHY, Rock Island, Illinois,

CYRUS E. DIETZ, Moline, Illinois,
Solicitors for Illinois.

HUGH S. JOHNSON, Moline, Illinois
Of Counsel.

FILE COPY

IN THE

Supreme Court of the United States

October Term, 1927

No. 11 ORIGINAL

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.
No. 7, Original

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 11, Original

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 12, Original

MACLAY HOYNE,
JAMES M. BECK,
EDMUND D. ADCOCK,
GEORGE F. BARRETT,
Counsel for respondents.

Printed by National Publishing Co. [illegible] St. N. W., Washington, D. C.

IN THE

Supreme Court of the United States

October Term, 1927

No. 11 ORIGINAL

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, vs. State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7, Original
State of Michigan, Complainant, vs. State of Illinois and Sanitary District of Chicago, Defendants.	No. 11, Original
State of New York, Complainant, vs. State of Illinois and Sanitary District of Chicago, Defendants.	No. 12, Original

And now, to-wit, January 3, 1928, the Sanitary District, one of the above respondents, by its counsel, Maclay Hoyne, James M. Beck, Edmund D. Adcock and George F. Barrett, appears and respectfully represents to the Court that the time for filing exceptions to the Special Master's report has now expired and that exceptions have been filed in behalf of the complainants and that no exceptions have been filed by the respondents.

Counsel for the Sanitary District respectfully suggest that it is in the interests of both the complaining states and the responding states that as early a date should be fixed for the argument of this case as is consistent with the convenience of the Court and a reasonable opportunity to counsel for both litigants to prepare their briefs. It is of great importance to all of the states, who are parties to this litigation, that their rights should be finally established at the earliest practicable date. It is of especial importance to the Sanitary District, for, on the faith of the permit of the Secretary of War, the validity of which is challenged in these proceedings, the Sanitary District has made, and is still making, large expenditures of money to comply with the conditions of said permit, and it is, therefore, of great practical importance to the Sanitary District that the validity of this permit be established as soon as possible.

The Sanitary District therefore asks the Court at this time to enter an order as to the time for filing briefs and a date for the oral argument of such exceptions.

As the only exceptions filed are those of the complaining states, they are in the position of appellants, and the respondents, of appellees, and it is therefore submitted that this Court, in fixing the time for the filing of briefs, should first require the complaining states to file their briefs and that a reasonable opportunity should then be given to the respondents to file reply briefs.

Such an order will probably serve the convenience of the Court, for the reason that, if the respondents were obliged to file their briefs at the same time that the complaining states file their briefs, it would be necessary for the respondents in their brief to discuss all of the exceptions which are filed by the complaining states. The State of Michigan, alone, has filed thirty-nine exceptions and the exceptions of all the complainants will therefore, be great in number and varied in character. If counsel for the respondents can first examine the briefs of complainants before filing their answering briefs, they will know more clearly the exceptions upon which the complaining states chiefly rely and can then adapt their briefs to the nature of the objections and thus avoid an unduly extended brief in reply.

Counsel for respondents suggest for the consideration of the Court that thirty days be allowed, from January 3rd, to the complainants to file their briefs, and that an equal time be then allowed counsel for the respondents to file their answering briefs and that the date of the oral argument shall, therefore, be fixed, if convenient to the Court, as soon after the sixty-day period as practicable.

For the urgent public reasons above stated, it is earnestly hoped by the respondents that a date may be fixed for the oral argument that will permit of a final disposition of the case before the Court recesses for the summer, if the convenience of the Court makes this practicable.

All of which is respectfully submitted.

MACLAY HOYNE,
JAMES M. BECK,
EDMUND D. ADCOCK,
GEORGE F. BARRETT,
Counsel for respondents.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11.

IN THE

Supreme Court of the United States

October Term, 1927

No. 11 ORIGINAL

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.
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State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
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Maclay Hoyne,
James M. Beck,
Edmund D. Adcock,
George F. Barrett,
Counsel for respondents.

Printed by National Publishing Co. 1322 H St. N. W., Washington, D. C.

IN THE

Supreme Court of the United States

October Term, 1927

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State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, vs. State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7, Original
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For the urgent public reasons above stated, it is earnestly hoped by the respondents that a date may be fixed for the oral argument that will permit of a final disposition of the case before the Court recesses for the summer, if the convenience of the Court makes this practicable.

All of which is respectfully submitted.

MACLAY HOYNE,
JAMES M. BECK,
EDMUND D. ADCOCK,
GEORGE F. BARRETT,
Counsel for respondents.

FILED
MAY 22 1926
WM. R. STANSBURY
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

No [redacted] 7

STATE OF WISCONSIN, STATE OF OHIO, STATE OF PENNSYLVANIA AND STATE OF MINNESOTA,
Complainants,

v.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,
Intervening Defendants.

MOTION FOR APPOINTMENT OF COMMISSIONER, WITH NOTICE, AND PROPOSED ORDER

HERMAN L. EKERN,
Attorney General, State of Wisconsin,

C. C. CRABBE,
Attorney General, State of Ohio,

GEORGE W. WOODRUFF,
Attorney General, State of Pennsylvania,

CLIFFORD L. HILTON,
Attorney General, State of Minnesota.

NEWTON D. BAKER,
R. T. JACKSON,
Special Counsel.

IN THE

SUPREME COURT OF THE UNITED STATES

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

No. 16

STATE OF WISCONSIN, STATE OF OHIO, STATE OF PENNSYLVANIA AND STATE OF MINNESOTA,
Complainants,

v.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,
Intervening Defendants.

NOTICE

Sirs:

Please take notice that at the court room, in the Capitol, in the city of Washington, D. C., on the 24th day of May, 1926, at the opening of court on that day, or as soon thereafter as counsel can be heard, the motion, a copy of which is hereto annexed, will be presented to, and be brought on to be heard before said court.

You will further please take notice that hereto annexed is a copy of a proposed order to be entered herein pursuant to said motion.

HERMAN L. EKERN,
Attorney General, State of Wisconsin,

C. C. CRABBE,
Attorney General, State of Ohio,

GEORGE W. WOODRUFF,
Attorney General, State of Pennsylvania,

CLIFFORD L. HILTON,
Attorney General, State of Minnesota.

NEWTON D. BAKER,

R. T. JACKSON,
Special Counsel.

To:
Hector A. Brouillet,
Attorney, Sanitary District of Chicago,
George F. Barrett,
Edmond D. Adcock,
Louis J. Behan,
Morton S. Cressy,
Solicitors for Defendant, Sanitary District of Chicago,
James M. Beck,
Of Counsel,
Oscar E. Carlstrom,
Attorney General of Illinois,
John T. Kentworthy,
Cyrus E. Dietz,
Solicitors for Illinois,
Hugh S. Johnson,
Of Counsel,
North P. Gentry,
Attorney General of Missouri,
Frank M. Thompson,
Attorney General of Tennessee,
Frank E. Daugherty,
Attorney General of Kentucky,

Percy Saint,
Attorney General of Louisiana,
McKinney, Lynde and Grear,
Nagel and Kirby,
Solicitors,
Cornelius Lynde,
Daniel N. Kirby,
Of Counsel.

IN THE

Supreme Court of the United States

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

STATE OF WISCONSIN, STATE OF OHIO, STATE OF PENNSYLVANIA AND STATE OF MINNESOTA,
Complainants,

v.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,
Intervening Defendants.

Bill in Equity
Original Jurisdiction No. 16

MOTION

Come now the complainants, State of Wisconsin, by Herman L. Ekern, Attorney General, State of Minnesota by Clifford L. Hilton, Attorney General, State of Ohio by C. C. Crabbe, Attorney General, State of Pennsylvania by George W. Woodruff, Attorney General, and by Newton D. Baker and R. T. Jackson, Special Counsel for said states, and move the court for the appointment of some suitable person, qualified to take down in shorthand and transcribe testimony of witnesses or/and statements of others, to be designated by the court, as a special commissioner of this court, to take the proofs to be offered by the respective parties herein, within such time respectively, as may be prescribed by the court, and at such place or places as may be designated therefor, within these United States, on notice to be given by the respective parties thereto, as the court may prescribe, and with power, as such commissioner, to administer oaths to the witnesses so to be produced, to issue subpoenas for witnesses so to be produced and to compel witnesses so to be produced to testify by appropriate process, and that he report the proofs so by him taken under his oath, to this court, but without opinion thereon and without power to pass upon objections to evidence, with all convenient speed, and said commissioner shall have such powers as generally reside in a commissioner to take depositions.

Further, that the compensation of said commissioner shall be the usual compensation paid to court reporters in the city of Washington for the services that may be performed by the said commissioner in taking down in shorthand, transcribing testimony of witnesses or copying exhibits, and, in addition, the necessary traveling expenses of the commissioner.

The compensation of said commissioner shall be advanced to him from time to time by the parties on whose behalf evidence may be offered, including the taking down and transcribing of direct and cross-examination of witnesses offered. The amounts so advanced to the commissioner by the respective parties shall be treated as part of the costs in said cause, and may be taxed by the court against such of the parties as the court may determine.

There is pending before this court the case of *State of Michigan v. State of Illinois* and *Sanitary District,* Number 27, October Term, 1925, original in equity, which involves substantially similar subject matter and substantially similar questions, so that it is contemplated by counsel representing both the complainants and defendants here and the complainants and defendants in said Michigan case, that the two cases may be presented to the court upon one record, and may be heard by the court at the same time; that the testimony and evidence offered before the commissioner herein, so far as the same may be material and relevant to the issues in the said case of *State of Michigan v. Illinois and Sanitary District,* may be used and treated the same as if offered and presented before a commissioner duly appointed in said cause.

The defendant Sanitary District of Chicago has filed its answer in this cause. The defendants State of Illinois and States of Missouri, Tennessee, Kentucky and Louisiana, will file their respective answers on or before May 31, 1926 ,and the complainants will thereafter immediately file replications thereto.

This motion is pursuant to the agreement of counsel representing all parties.

This motion is further based upon all the records, files and proceedings had herein.

The reasons for this motion and for the appointment of a commissioner with the powers and duties prescribed are:

1. Because the issues involved herein embrace a wide range of facts covering a long period of time, proof of which will involve the introduction of a large amount of documentary evidence and the examination of a large number of witnesses.

2. Because the issues are of such a nature and the matters involved are of such great public importance that it is proper that the proofs be examined by this court without the intervention of a commissioner's opinion thereon.

The draft of order of court pursuant to this motion is herewith presented.

HERMAN L. EKERN,
Attorney General, State of Wisconsin,

C. C. CRABBE,
Attorney General, State of Ohio,

GEORGE W. WOODRUFF,
Attorney General, State of Pennsylvania,

CLIFFORD L. HILTON,
Attorney General, State of Minnesota.

NEWTON D. BAKER,

R. T. JACKSON,
Special Counsel.

IN THE

Supreme Court of the United States

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

STATE OF WISCONSIN, STATE OF OHIO, STATE OF PENNSYLVANIA AND STATE OF MINNESOTA,
Complainants,
v.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants,
STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,
Intervening Defendants.

Bill in Equity
Original Jurisdiction No. 16

ORDER

This cause coming on to be heard upon the motion of the complainants for the appointment of a special commissioner to take proofs in the said cause and the consent thereto by the defendants:

It Is Ordered:

(1) .... of ....,
be and he is hereby appointed special commissioner of this court, to take the proofs to be offered by the respective parties to this cause, and to report the same to this court with all convenient speed, without conclusions or power to pass upon objections to evidence, and the powers of said commissioner shall be generally those resting in a commissioner to take depositions.

(2) The said commissioner may take such proofs at such convenient places as may seem necessary and proper, and the said commissioner shall give ten days' notice by United States mail to solicitors representing all parties, of the place where such proofs shall be offered and of the time when the presentation of such proofs will begin, at such place as may be designated; and the said commissioner shall have power to administer oaths to the respective witnesses to be produced before him, to issue subpoenas for the appearance of witnesses before him at such times or places as may be fixed for the presentation of proofs, and to take such steps as may be necessary to compel the presence of witnesses subpoenaed, and the giving of testimony by such witnesses so produced.

(3) The compensation of said commissioner shall be the usual compensation paid to court reporters in the city of Washington for the services that may be performed by the said commissioner in taking down in shorthand, transcribing testimony of witnesses or copying exhibits, and, in addition, the necessary traveling expenses of the commissioner.

The compensation of said commissioner shall be advanced to him from time to time by the parties on whose behalf evidence may be offered, including the taking down and transcribing of direct and cross-examination of witnesses offered. The amounts so advanced to the commissioner by the respective parties shall be treated as part of the costs in said cause, and may be taxed by the court against such of the parties as the court may determine.

(4) Leave is hereby granted the defendants State of Illinois, States of Missouri, Tennessee, Kentucky and Louisiana, to file, and they are hereby ordered and directed to file their respective answers to said bill of complaint on or before May 31, 1926. And leave is hereby granted complainants to file thereafter their replications to all answers filed herein.

(5) The proofs offered and testimony and evidence presented by the respective parties in this cause, may be used so far as such evidence and proofs may be material and relevant, in the case of *State of Michigan v. State of Illinois* and *Sanitary District of Chicago,* Number 27, October Term, 1925, Original in Equity, the same as if such evidence and proofs were presented and offered before a commissioner appointed in such case to take proofs and

report same to the court; and for such purposes the complainants and/or defendants in said case of *Michigan v. Illinois* and *Sanitary District of Chicago,* may present proofs in support of the issues in said cause before the commissioner herein, and such proof, or parts thereof, may be used by the respective parties herein so far as the same may be material and relevant.

...., 1926.

....

Clerk of the Supreme Court of the United States.

Office Supreme Court, U. S.
FILED
MAY 22 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1925.

Original in Equity Numbe[redacted] [redacted] [redacted]

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

Order for Leave to Defendants to Answer and for Consolidation for the Purpose of Taking Proofs and Hearing with Original in Equity Number 16, October Term, 1925, Entitled "State of Wisconsin, et al., vs. State of Illinois, et al."

BARNARD & MILLER PRINT, CHICAGO

IN THE

Supreme Court of the United States.

OCTOBER TERM, A. D. 1925.

Original in Equity Number 27.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

ORDER.

This cause coming on to be heard upon the motion of the defendants for leave to file their answers herein and for consolidation of said cause with cause No. 16, original in equity, October term, 1925, entitled "*States of Wisconsin, Ohio, Pennsylvania and Minnesota, Complainants* v. *State of Illinois and The Sanitary District of Chicago, Defendants, States of Missouri, Tennessee, Kentucky and Louisiana, Intervening Defendants,*" for the purpose of taking proofs and hearing, IT IS ORDERED:

(1) The Defendants State of Illinois and The Sanitary District of Chicago are hereby given leave to file their respective answers, including therein motions to dismiss, on or before June 1, 1926. The complainant is hereby granted leave to file replications to such answers.

(2) This cause is hereby consolidated with cause No. 16, original in equity, October term, 1925, entitled

"States of Wisconsin, Ohio, Pennsylvania and Minnesota, Complainants, v. *State of Illinois and The Sanitary District of Chicago, Defendants, States of Missouri, Tennessee, Kentucky and Louisiana, Intervening Defendants,"* for the purpose of taking proofs and hearing.

(3) The proofs offered and testimony and evidence presented by the respective parties in cause No. 16, original in equity, October term, 1925, entitled *"States of Wisconsin, et al.* v. *State of Illinois, et al.,"* before the special commissioner therein appointed, may be used so far as such evidence and proofs may be material and relevant in this cause, the same as if such evidence and proofs were presented and offered before a special commissioner appointed in this cause to take proofs and report the same to the court, and for such purposes the complainants and/or defendants herein may present proofs in support of the issues in this cause before the special commissioner appointed in said cause No. 16, original in equity, October term, 1925, entitled *"States of Wisconsin, et al.* v. *State of Illinois, et al."*

Office Supreme Court, U. S.
FILED
MAY 22 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1925.

Original in Equity Number [redacted] [redacted] [redacted]

STATE OF MICHIGAN,
Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

Notice and Motion for Consolidation with No. 16 in Equity, Wisconsin, et al., vs. Illinois, et al., to Take Proofs and for Hearing.

OSCAR E. CARLSTROM,
Attorney General of Illinois,
CYRUS E. DIETZ,
HUGH S. JOHNSON,
Solicitors for Defendant, State of Illinois.
HECTOR A. BROUILLET, Attorney,
MORTON S. CRESSY,
Solicitors for Defendant, The Sanitary District of Chicago.

BARNARD & MILLER PRINT, CHICAGO

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1925.

Original in Equity Number 27.

STATE OF MICHIGAN,

Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,

Defendants.

NOTICE.

To Honorable

ANDREW B. DOUGHERTY,
Attorney General, State of Michigan, Complainant, Solicitor for Complainant;

To Honorable

HERMAN L. EKERN,
Attorney General of Wisconsin;

RAYMOND T. JACKSON,
Special Assistant Attorney General of Wisconsin;

RALPH M. HOYT,
Special Assistant Attorney General of Wisconsin;

CLIFFORD L. HILTON,
Attorney General of Minnesota;

C. C. Crabbe,
Attorney General of Ohio;

Newton D. Baker,
Special Assistant Attorney General of Ohio;

George W. Woodruff,
Attorney General of Pennsylvania;

Phillip Wells,
Deputy Attorney General of Pennsylvania;
Solicitors for Complainants in No 16, Original in Equity, October Term, 1925, entitled "*States of Wisconsin, et al.* v. *State of Illinois, et al.*"

To Honorable

North T. Gentry,
Attorney General of Missouri;

Frank M. Thompson,
Attorney General of Tennessee;

Frank E. Daugherty,
Attorney General of Kentucky;

Percy Saint,
Attorney General of Louisiana;

Daniel N. Kirby,

Cornelius Lynde,
Solicitors for Intervening Defendants in No. 16.
Original in Equity, October Term, 1925 entitled "*States of Wisconsin, et al.* v. *State of Illinois, et al.*"

Please take notice that on Monday, May 24, 1926, at the opening of court, we shall present the motion of the defendants in the above entitled cause for leave to file their respective answers and for consolidation of said cause for the purpose of taking proofs and hearing with cause No. 16, original in equity, October Term, 1925, entitled "*States of Wisconsin, et al.* v. *State of Illinois, et al.*" in accordance with copy of motion hereto attached; at which time and place you may be present, if you see fit.

State of Illinois,
By Oscar E. Carlstrom,
Attorney General of Illinois.

Cyrus E. Dietz,
Hugh S. Johnson,
Its Solicitors.

Sanitary District of Chicago,
By Hector A. Brouillet,
Morton S. Cressy,
Its Solicitors.
Defendants.

IN THE

Supreme Court of the United States,

OCTOBER TERM, A. D. 1925.

Original in Equity Number 27.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION.

The defendants, The State of Illinois, by Oscar E. Carlstrom, Attorney General of Illinois, Cyrus E. Dietz and Hugh S. Johnson, its solicitors, and The Sanitary District of Chicago, by Hector A. Brouillet, Attorney, and Morton S. Cressy, its solicitors, move the court for leave to file their answers herein on or before June 1, 1926, and the consolidation of this cause with cause No. 16, original in equity, October term, 1925, entitled "*States of Wisconsin, Ohio, Pennsylvania and Minnesota, Complainants* v. *State of Illinois and The Sanitary District of Chicago, Defendants, States of Missouri, Tennessee, Kentucky and Louisiana, Intervening Defendants,*" for the purpose of taking proofs and hearing.

In support of said motion defendants respectfully show that an inspection of the bill of complaint in this cause and the amended bill of complaint in No. 16, *Wisconsin, et al.* v. *Illinois et al.*, discloses that there are involved in the two cases substantially similar subject matter and substantially similar questions, so that the two cases may be properly presented to the court upon one record and may be heard by the court together; that counsel for all parties to the said cause No. 16, *Wisconsin, et al.* v. *State of Illinois, et al.*, have agreed to such consolidation for the purpose of taking proofs and hearing; that this motion is pursuant to the agreement of counsel representing all parties in said case of *Wisconsin, et al.* v. *Illinois, et al.*, and notice to all counsel has been given.

A draft of the order pursuant to this motion is herewith presented.

Respectfully submitted,
STATE OF ILLINOIS,
By OSCAR E. CARLSTROM,
Attorney General of Illinois.

CYRUS E. DIETZ,
HUGH S. JOHNSON,
Its Solicitors.

THE SANITARY DISTRICT OF CHICAGO,
By HECTOR A. BROUILLET,
MORTON S. CRESSY,
Its Solicitors,
Defendants.

Office Supreme Court,
FILED
MAY 24 1926
WM. R. STANSB

IN THE
Supreme Court of the United States.

October Term, A. D. 1925.

No. [redacted] Original, In Equity.
7

STATES OF WISCONSIN, OHIO, PENNSYLVANIA AND MINNESOTA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHCAGO,
Defendants,
AND
THE STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA,
Intervening Defendants.

ANSWER OF INTERVENING DEFENDANTS, THE STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA, TO THE AMENDED BILL OF COMPLAINT.

State of Missouri,
By North T. Gentry,
Attorney General.
State of Kentucky,
By Frank E. Daugherty,
Attorney General.
State of Tennessee,
By Frank M. Thompson,
Attorney General.
State of Louisiana,
By Percy Saint,
Attorney General.

Daniel N. Kirby,
Cornelius Lynde,
Solicitors.

GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

No. 16 Original, In Equity.

STATES OF WISCONSIN, OHIO, PENNSYLVANIA
AND MINNESOTA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY
DISTRICT OF CHICAGO,
Defendants,
AND
THE STATES OF MISSOURI, KENTUCKY,
TENNESSEE AND LOUISIANA,
Intervening Defendants.

ANSWER OF INTERVENING DEFENDANTS, THE STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA, TO THE AMENDED BILL OF COMPLAINT.

These defendants, the States of Missouri, Kentucky, Tennessee and Louisiana, by North T. Gentry, Attorney General of the State of Missouri, Frank M. Thompson, Attorney General of the State of Tennessee, Frank E. Daugherty, Attorney General of the State of Kentucky, and Percy Saint, Attorney General of the State of Louisiana, Daniel N. Kirby and Cornelius Lynde, their solicitors, reserving to themselves all right of exception to the amended bill of complaint, for answer thereunto aver and say as follows:

1. These defendants admit that the complainant States of Wisconsin, Ohio, Pennsylvania and Minnesota are all States of the United States of America, and that they bring this action in this Court as such states.

2. These defendants admit that the State of Illinois is one of the states of the United States of America, and the defendant, The Sanitary District of Chicago, is a public municipal corporation under and by virtue of the laws of the State of Illinois and a citizen of Illinois, and these defendants aver that each of the intervening defendants, the States of Missouri, Tennessee, Kentucky and Louisiana, is one of the States of the United States of America.

3. These defendants deny that a controversy exists between the said complainant states and the defendants cognizable in this Court, and over which this Court has jurisdiction. These defendants aver that the subject matter of the cause of action set forth in the amended bill of complaint, upon which the complainants therein seek relief, relates solely and exclusively to the conduct of interstate commerce over the waters of the Great Lakes and the channels and harbors connected therewith and located along the shores thereof; that all of these waters, and all of the commerce, referred to in the amended bill of complaint, are interstate or international waters and interstate or international commerce, over which the United States has and has assumed exclusive jurisdiction, and for the following reasons these defendants do now hereby move that the amended bill of complaint herein be dismissed for want of jurisdiction and want of equity:

First. That it appears on the face of the amended bill of complaint that this cause is not a cause justiciable in this Honorable Court in the exercise by it of its original jurisdiction under the Constitution of the United States.

Second. That the subject matter of the amended bill of complaint relates exclusively to the navigability of the navigable waters of the United States and their use in interstate commerce, over which waters the United States possesses, has assumed and is now exercising superior, supreme and exclusive jurisdiction.

Third. That it appears upon the face of the amended bill of complaint, and by the admission of counsel for the complainants made in open court on the argument of the demurrer and motions heretofore filed by the defendants and intervening defendants, that the diversion of water from Lake Michigan, complained of in said bill of complaint, is being made pursuant to a written permit therefor, with the conditions of which the defendant, The Sanitary District of Chicago and the State of Illinois are duly and lawfully complying, and these defendants aver that said permit was duly issued and authorized by the Secretary of War and recommended by the Chief of Engineers of the United States, pursuant to the authority and provisions of the Rivers and Harbors Act of March 3, 1899, by which Act the Congress of the United States validly conferred upon said officials the power and authority, without regard to any state action, to permit, regulate and control the amount and conditions of such diversion, and that all of the acts of said defendant, The Sanitary District of Chicago, have been validly and lawfully authorized by proper Acts of the Legislature of the State of Illinois, pursuant to the Constitution of said State.

Fourth. That the amended bill of complaint fails to state facts entitling complainants to relief in equity as therein prayed, because:

(a) In seeking an injunction to restrain the permanent diversion from Lake Michigan of any water whatsoever, it relates solely to subject matter over which the Congress of the United States has and has exercised exclusive jurisdiction.

(b) In seeking to have this Honorable Court determine the amount of diversion from Lake Michigan reasonably to be required for navigation, the amended bill of complaint seeks to impose upon this Court the exercise of powers and functions vested by the Constitution of the United States in the Congress and by the Congress lawfully delegated to the Secretary of War upon recommendation of the Chief of Engineers by whom such authority is and has been lawfully exercised.

(c) In that it appears upon the face of the amended bill of complaint that the alleged damage to navigation, due to the lowering of Lake levels and interfering with navigation on the Chicago River or on the Sanitary and Ship Canal of the defendant The Sanitary Dstrict of Chicago, or on the Desplaines, Illinois or Mississippi Rivers, by pollution thereof, in nowise whatsover constituted any direct or actual damage to the complainant states, but solely, as in the bill of complaint alleged, to their respective citizens, and that the exclusive power to redress injuries to the citizens of said states for interference with navigation conducted by said citizens in interstate commerce is vested solely in the United States.

Fifth. That it affirmatively appears on the face of the amended bill of complaint that the United States is a necessary and indispensable party to this suit, vested as it exclusively is, with the power to regulate and control navigation of interstate waters.

Sixth. Because the original bill admitted the right of the defendants to a diversion of water from Lake Michigan not in excess of 4167 c. f. s. under the then existing permit of the Secretary of War; and also to a diversion in excess of said amount if and when the Congress of the United States or the Secretary of War on the recommendation of the Chief of Engineers, should so permit, while the amended bill of complaint denies each of such rights, and complainants are therefore now estopped from any claim to the relief prayed for, based upon the denial of such rights.

Seventh. Because the joinder of the complainant states is improper and the amended bill of complaint is multifarious and in other respects uncertain, informal and insufficient, and does not state facts sufficient to entitle the said complainants or either of them to the equitable relief prayed in said bill.

These defendants admit that this action is brought in this Honorable Court as an attempt to invoke the exercise of its original jurisdiction on the claimed ground that it is an action in equity relating to an alleged controversy between two or more states of the United States, and also between states of the United States and citizens of another state.

4. These defendants admit the allegations in paragraph 4 of the amended bill of complaint, except as to the amount of freight received during the year 1923 at the several harbors of the State of Wisconsin including the Duluth-Superior harbor, as to which these defendants are not informed and call for strict proof.

5. These defendants admit the allegations of paragraph 5 of the amended bill of complaint, except as to the tonnage of the several harbors mentioned, which also include the harbor of Duluth-Superior and the tonnage thereof, as to which these defendants are not informed and call for strict proof.

6. These defendants admit the averments of paragraph 6 of the amended bill of complaint, except as to the tonnage alleged to be received or shipped as to the harbors mentioned, as to which these defendants are not informed and call for strict proof.

7. These defendants admit the averments of paragraph 7 of the amended bill of complaint, except as to the tonnage alleged to be received or shipped as to the harbors mentioned, as to which these defendants are not informed and call for strict proof.

8. These defendants admit the averments of paragraph 8 of the amended bill of complaint, and further show that, beginning with the year 1848, by reason of the construction of the Illinois and Michigan Canal and its enlargement thereafter, in early years during a large part of each year, and thereafter during the entire year, a large amount of water from the Chicago River and its several branches did not flow into Lake Michigan, but flowed through the Illinois and Michigan Canal to the Desplaines, Illinois and Missisippi Rivers.

9. These defendants admit the averments of paragraph 9 of the amended bill of complaint, but these defendants further aver on information and belief that by virtue of the provisions of said Act of 1899, in said paragraph 9 of the amended bill of complaint set forth, neither the defendant, The Sanitary District of Chicago, nor the State of Illinois now claim to possess authority to divert any water whatsoever from Lake Michigan in excess of the amount authorized from time to time by the Secretary of War, upon the recommendation of the Chief of Engineers, under the provisions of Section 10 of the Rivers and Harbors Act of March 3, 1899, or by the Congress of the United States.

10. These defendants admit all the averments of paragraph 10 of the amended bill of complaint.

11. These defendants admit the allegations of paragraph 11 of the amended bill of complaint, except that, on information and belief, the defendant The Sanitary District of Chicago, began the construction of its Sani-

tary and Ship Canal during the year 1890 and long prior to the 3rd day of September, 1892.

12. These defendants neither admit nor deny the averments of paragraph 12 of the amended bill of complaint, but call for strict proof.

13. These defendants admit all the averments of paragraph 13 of the amended bill of complaint, except that they are informed and believe that the main channel of the Sanitary and Ship Canal of the defendant The Sanitary District of Chicago, was opened on the 17th day of January, 1900.

14. These defendants neither admit nor deny the averments of paragraph 14 of said amended bill of complaint, but adopt as their answer the averments of the 14th paragraph of the answer of the defendant The Sanitary District of Chicago to the amended bill of complaint herein.

15. These defendants admit all the averments of paragraph 15 of the amended bill of complaint.

16. These defendants neither admit nor deny the allegations of paragraph 16 of the amended bill of complaint, but call for strict proof thereof.

17. These defendants deny the allegations of paragraph 17 of said amended bill of complaint, and aver, upon information and belief, that the primary purpose of the State of Illinois and The Sanitary District of Chicago in the construction of the Sanitary and Ship Canal of said Sanitary District was to create a deep waterway available for the navigation of the largest ships traversing the Great Lakes, which could also be utilized as a means of disposing of the sewage of the City of Chicago and contiguous territory; and further aver on information and belief that the legislation of Illinois and the acts of the defendant District, pursuant thereto, in

reference to the generation of electrical energy by utilization of the flow of water from Lake Michigan through the Canal of said defendant District, was merely an incident to the development of said primary purpose aforesaid, and a proper conservation of energy which would otherwise be wasted.

18. These defendants neither admit nor deny the averments of paragraph 18 of the amended bill of complaint, but call for strict proof thereof.

19. These defendants admit that all of the water diverted from Lake Michigan by the defendants State of Illinois and The Sanitary District of Chicago, as aforesaid, is carried into the Mississippi Valley and permanently abstracted from the Great Lakes system. These defendants are not informed as to the exact effect upon the mean levels of the water in Lakes Michigan, Huron, Erie and Ontario, and the various waterways connecting said lakes and the St. Lawrence River above tide water, resulting from such permanent diversion of water from Lake Michigan. These defendants are informed and believe that the determination of such effect comprehends the determination of the composite effect of a large number of indefinite factors and presents a problem of great difficulty, which these defendants are informed has never been definitely solved, and these defendants believe and aver that the lowering of said mean levels traceable exclusively to such diversion does not exceed 4¾ inches; and further aver that the full effect upon the levels of the Great Lakes from said diversion is fixed and has been fixed for a number of years past and will not increase in the future.

20. These defendants deny each and all of the averments of paragraph 20 of the amended bill of complaint, and further aver that they are informed and believe that

any method of treating sewage of a population as large as that of the City of Chicago and its contiguous territory, necessarily requires the use of large amounts of water in the treatment thereof, and consequently these defendants allege that even under the most modern processes of the art of sewage disposition, the use of a large and material amount of water from Lake Michigan would be required, as to the exact amount of which, however, these defendants are not informed.

21. These defendants deny that the alleged lowering of the level of Lake Michigan has seriously or substantially diminished the use of the ports of Wisconsin located on that Lake, as enumerated in paragraph 4 of the amended bill of complaint, by reducing at least six inces or any other amount in each of these ports in Wisconsin the draft of vessels which can be accommodated therein for loading and unloading. These defendants are not informed as to the percentage of the tonnage of freight received at said Wisconsin Lake Michigan ports, which consists of coal shipped from eastern states, but they are informed and believe that most of such coal so received at Wisconsin Lake Michigan ports is carried into said ports by car ferries which are relatively shallow draft vessels and capable of navigating all of said ports even though the navigable depths therein were considerable less than the lowest navigable depths obtainable in said ports at any time during the last twenty years.

These defendants deny that such eastern coal, shipped into Wisconsin by water through said Lake Michigan ports, constitutes the principal source of coal for the State of Wisconsin, in its proprietary capacity as owner of public buildings and institutions, and of many thousands of individuals and industrial plants located in said state, but these defendants admit that a considerable amount of said coal is so transported and is so used.

These defendants further aver on information and belief, that the principal source of the coal so used by the State of Wisconsin, as owner of public buildings and institutions, and by citizens thereof individually and in their commercial undertakings, is coal produced in the mines of Illinois, Indiana and Kentucky, and shipped by rail from such mines into the consuming points in the State of Wisconsin; that the distance required in the transportation of such coal is much less than the distance the eastern coal referred to in paragraph 21 of the amended bill of complaint must be carried, and although the movement of such coal is all rail, the transportation cost is much less than the combined rail and water rates applicable to the movement of eastern coal referred to in said paragraph 21 of said amended bill of complaint, and the freight differential in favor of Illinois, Indiana and Kentucky coal is so great that by no possibility whatever could any saving in the cost of transportation of eastern coal in bulk or other freighters on the Great Lakes inure to the benefit of the State of Wisconsin or consumers of coal in said state. These defendants deny that any burden is imposed upon the State of Wisconsin, in its proprietary capacity, or upon any of its people, by reason of the alleged increase in the cost of coal in said state, due to the increase in the cost of transporting said coal by water over the Great Lakes into said state.

These defendants further aver that the transportation of water borne coal aforesaid is interstate commerce, over which the United States has assumed exclusive jurisdiction; that all of the harbors and ports of the State of Wisconsin, referred to in the amended bill of complaint require for their maintenance constant dredging each year. Under normal conditions any dredging required by virtue of any effect of said diversion on said parts or harbors is negligible and of no consequence; and further aver that all of said harbors have been dredged and the harbors improved by the United States, at its expense, since the opening of the Sanitary and Ship Canal of the defendant District, and have been made and planned by the United States upon the basis of the withdrawal of 10,000 cubic feet per second of water at Chicago, and in full contemplation of the effect thereof upon lake levels and designed to equalize such effect.

22. These defendants admit that in addition to the Wisconsin ports enumerated, located along the shores of the Great Lakes there are a large number of ports located along the shores of Lake Michigan adjacent to the States of Illinois, Indiana and Michigan; on Lake Huron in the State of Michigan and the Dominion of Canada; on Lake Erie in the States of Michigan, Ohio, Pennsylvania and New York and the Dominion of Canada, and on Lake Ontario in the State of New York and Dominion of Canada. These defendants deny that the lowering of the level of all of said lakes by the acts of the defendants, State of Illinois, and The Sanitary District of Chicago, has lessened the utility of all of the ports on said lakes, or any of them, and of the waterways connecting said lakes or any of them, in the manner alleged in said amended bill of complaint. These defendants admit that in the conduct of transportation and interstate commerce between Wisconsin, Minnesota, Ohio and Pennsylvania ports, and the ports in other states, it would be possible by reason of decreased depths to so reduce the capacity of vessels carrying such commerce as to materially increase the cost of such transportation; but these defendants allege that the vessels engaged in such transportation are very largely bulk freighters,

carrying in the main, bulk commodities such as grain, ore and coal; that in the loading of such vessels with such bulk commodities it is impossible to so load them as to bring the draft of such vessels to within five or six inches of a given figure; that there is at no time any permanent water level of the Great Lakes or any of them, but barometric pressure, winds, and other natural phenomena constantly produce from moment to moment, variations in these levels; that the clearance over the bottom requires a margin of safety, and in the practical conduct of such transportation the slight lowering of the levels of the Great Lakes which may be traceable to the acts of the defendants, State of Illinois and The Sanitary District of Chicago, has no appreciable or substantial effect, either on the actual loading of such vessels, or still less upon the cost of such transportation.

These defendants deny that the total annual loss due to the lower carrying capacity of Lake vessels, chargeable directly to the diversion of water by the defendants, State of Illinois and The Sanitary District of Chicago, amounts to many millions of dollars or to any sum whatsoever, or to any sum which can be ascertained and considered by this Honorable Court, as actual legal damage; and further deny that a large part or any of said loss falls upon the people of the States of Wisconsin, Minnesota, Ohio and Pennsylvania, or any of them; and further deny that any of such loss or a material portion thereof is widely distributed through all parts of said states. These defendants aver that all of the commerce referred to in said paragraph 22 of said amended bill of complaint and throughout said bill is interstate commerce, carried on over and upon navigable waters of the United States, over which the Congress has, under the Constitution of the United States, exclusive jurisdiction, and has assumed and is exercising such jurisdiction; that the supposed injury and damage alleged in paragraph 22 of said amended bill of complaint, concerns and relates to alleged interference with interstate commerce, concerning which said complainants have no right or jurisdiction to complain.

23. These defendants deny that the diversion of water, as aforesaid, has seriously impaired or impairs in any appreciable or substantial degree the navigability of the Chicago River by introducing into said River a current so swift as to make navigation thereof difficult or dangerous, or by, in any other way, impeding navigation therein.

These defendants aver, on information and belief, that navigation in the Chicago River has been vastly improved by the acts of the defendants, State of Illinois and The Sanitary District of Chicago, through the expenditure by said State, District and City of many millions of dollars for the deepening, straightening and widening of said river.

These defendants aver, on information and belief, that the decrease in handling of commerce by vessels in and out of the Chicago River has resulted from the tendency to so greatly increase the size of such vessels as to make them very difficult to handle in the river; and further aver, on information and belief, that interstate commerce over the waters of the Great Lakes to and from the City of Chicago and the Chicago industrial district has not in fact decreased, but has greatly increased, the larger vessels being now docked, loaded and unloaded at points on the shores of Lake Michigan adjacent to or within the City of Chicago, more convenient for the handling of large vessels than the Chicago River.

These defendants further deny, on information and belief, that any portions of the Chicago River, usable or useful in navigation thereof, have become entirely closed up by reason of said diversion, and thus rendered unusable to the people of Wisconsin or any other person or persons.

24. These defendants admit that prior to the construction of the Sanitary and Ship Canal of The Sanitary District of Chicago, the Desplaines and Illinois Rivers constituted a navigable waterway, extending from Lake Michigan on the east to the Mississippi River on the west, and aver that said rivers are and always have been such navigable waterway; and these defendants further allege that said Sanitary and Ship Canal now constitutes a part of said waterway and is a vast and material improvement over the portion thereof for which it may be now substituted. These defendants deny that in the construction of said Sanitary and Ship Canal the defendant District, materially modified or altered said navigable waterway aforesaid, by diverting certain portions of the Desplaines River from its original bed. These defendants deny that said diversion aforesaid has had any injurious effect upon the navigable capacity of the West Fork of the South Branch of the Chicago River. These defendants admit that said Canal by reason of its greatly increased capacity and practicability has become in fact a substitute for said old navigable waterway, referred to in paragraph 24 of said amended bill of complaint, and they further admit that said Canal is now the only practicable means of navigation by water from Lake Michigan to the Mississippi River.

These defendants allege that about the year 1848, the Illinois and Michigan Canal was constructed by the State of Illinois, pursuant to Acts of Congress passed in the years 1822 and 1827, and extended from the West Fork of the South Branch of the Chicago River along the line of the waterway referred to in said amended bill of complaint to and through the City of Joliet and along the Desplaines and Illinois Rivers to the Illinois River at La Salle, Illinois; and that said Illinois and Michigan Canal took the place of the old natural waterway referred to in said amended bill of complaint, and was used and still is used solely for navigation and as a substitute for said old natural waterway.

These defendants aver that the Sanitary and Ship Canal of the defendant The Sanitary District of Chicago has become a substitute for the upper portion of said Illinois and Michigan Canal, from Chicago to Joliet, and is now the only practical means of navigation between the Chicago River and the Illinois and Michigan Canal at Joliet; that the portion of said old canal extending north from Joliet as originally constructed, is in its present state useless as a means of navigation, as a result of lack of water therein and various obstructions in said canal, but that the portion of said old Illinois and Michigan Canal extending from Joliet to the Illinois River at La Salle is now used and operated for navigation purposes.

These defendants aver that since the construction of the main channel of the defendant District's Sanitary and Ship Canal, commerce has used this completely modern and practical waterway from the Chicago River to Joliet; that said Sanitary and Ship Canal is six times as deep and four times as wide as the old Illinois and Michigan Canal as it existed and was operated prior to the completion of the main channel of said Sanitary and Ship Canal.

These defendants, on information and belief, deny that the said The Sanitary District of Chicago, or the State of Illinois, have always expressly, or in any manner whatsoever, refused to concede that said Sanitary and Ship Canal was substituted as aforesaid for the original Illinois and Michigan Canal is a navigable waterway of the United States, and further deny that under the provisions of said Act of 1899, and particularly Section 24 thereof, as quoted in paragraph 9 of said amended bill of complaint, or any other provisions or enactments of law, or official action of any kind, the said defendants State of Illinois and The Sanitary District of Chicago have undertaken to bar the Government of the United States from all or any control or authority over said Canal, as alleged in paragraph 24 of said amended bill of complaint; and further deny that said defendants last named have undertaken to make the control and authority of said Government of the United States subordinate to the use of said Canal for sanitation and drainage purposes or otherwise; and these defendants aver that the said Sanitary and Ship Canal has been used, and is now used, and has been continuously operated and maintained in such a manner as to provide for free, easy and convenient navigation thereon; and that said Sanitary and Ship Canal serves all the purposes of navigation, and that its use for sanitation and drainage purposes has not conflicted and does not conflict with its use for navigation, and such supplemental sanitation and drainage uses have not impaired and do not impair the navigation use thereof.

These defendants further aver, on information and belief, that under the Acts of the State of Illinois in reference thereto, navigation on said Sanitary and Ship Canal is required to be free, without payment of fees at locks, or other charges therefor; and further aver that the United States has already taken and assumed, and for many years last past has had exclusive jurisdiction over navigation upon said Sanitary and Ship Canal.

25. These defendants deny each and all of the averments of said amended bill of complaint in paragraph 25 thereof, as to the amount of water necessary to be diverted from Lake Michigan for navigation purposes on said waterway from Lake Michigan to the Gulf of Mexico. These defendants will hereinafter more specifically answer the averments of said amended bill of complaint in said paragraph 25 in this regard.

26. These defendants admit that paragraph 26 of said amended bill of complaint correctly sets forth true and correct copies of the various permits signed by the respective Secretaries of War, Assistant Secretaries of War and Acting Secretaries of War therein named, upon the dates therein set forth. These defendants further admit the allegations contained in said paragraph 26 as to the suit brought by the United States of America in the Northern District of Illinois, to enjoin the defendant, The Sanitary District of Chicago, from diverting a greater amount of water from Lake Michigan than the amount authorized by certain permits referred to in said amended bill of complaint, and further admit that the decree entered in said cause is correctly set forth in said paragraph 26.

These defendants further aver that the several permits referred to in said paragraph 26 lawfully authorized the said defendants The Sanitary District of Chicago and the state of Illinois, to divert and withdraw from Lake Michigan the quantities of water in said permits specified, and constituted complete and lawful authority therefor, and for all the results thereof.

28. These defendants admit that pursuant to the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled, "An Act making appropriations for the construction, repair and preservation of certain public works on Rivers and Harbors, and for other purposes," and under the full and lawful authority thereof, on March 3, 1925, Major General H. Taylor, Chief of Engineers, and the Honorable Joseph H. Weeks, Secretary of War, made and entered the order correctly set out in said paragraph 28 of said amended bill of complaint.

These defendants deny each and all of the other allegations contained in said paragraph 28, and these defendants further aver that heretofore, on the oral argument before this Court of the motion to dismiss heretofore made by these defendants, and the demurrer of defendant the State of Illinois, to the amended bill of complaint, counsel for the complainants herein specifically admitted in open court, in response to a question addressed to him by one of the Justices of this Honorable Court, that the defendant, The Sanitary District of Chicago, and the City of Chicago, had fully and completely, and in entire good faith, complied with each and all of the conditions of said order and permit, and these defendants aver that the complainants herein are bound by said admission, and for the purposes of this cause the averments contained in said paragraph 28 of said amended bill of complaint, alleging on information and belief that the defendants State of Illinois and The Sanitary District of Chicago have failed to comply with the conditions of said order and permit, must be taken as untrue and of no force and effect. And these defendants pray as to the extent to which the defendant The Sanitary District of Chicago has complied with the conditions of said order and permit, to refer to the allegations contained in relation thereto in paragraph 28 of the answer heretofore filed by The Sanitary District of Chicago to said amended bill of complaint, and pray leave to adopt the same.

29. These defendants deny that the acts of the defendants State of Illinois and The Sanitary District of Chicago, in diverting water from Lake Michigan into the canal of the defendant District, have never been authorized by Congress, but on the contrary allege that each and all of their acts have been duly authorized by the Congress; and these defendants further deny that said acts or any of them are in violation of the legal rights of the states of Minnesota, Michigan, Ohio and Pennsylvania, or either of them, or of the legal rights of the people of said states, or any of them, in any respect whatsoever; and these defendants further deny that by said acts the defendants State of Illinois and The Sanitary District of Chicago are interfering with the common law right of said states of Minnesota, Michigan, Ohio and Pennsylvania, or either or any of them, or of their people, to have the free and unobstructed use of Lake Michigan and the various ports and harbors thereof, within the borders of said states, for the purpose of navigation, trade and commerce, free from any and all interference with the natural navigable capacity of said Lake or said harbors by any agency other than the states of Minnesota, Wisconsin, Ohio and Pennsylvania, or the United States Government, or any one or more of them. These defendants are not advised as to the existence of any common law right pertaining to said complaining states, or either of them, and deny as a matter of law that there is any common law pertaining to the respective states of the United States of America in their relations to and with each other. These defendants further deny that by said

acts aforesaid of the defendants aforesaid, there has resulted any interference whatsoever with the right of the people of Wisconsin, Minnesota, Ohio and Pennsylvania, or any of them, to the free and unobstructed navigation of Lakes Michigan, Huron, Erie and Ontario, and the navigable waters between said lakes, and from said lakes into the Mississippi River and the Atlantic Ocean. And these defendants further deny the existence of any common law right in said people to said navigation aforesaid, but allege that all the rights of said people arise by reason of their citizenship in the United States of America, and these defendants specifically deny that any of said claimed rights of the people of said complaining states arise by reason of any express guaranty contained in the Ordinance for the Government of the Territory Northwest of the River Ohio, enacted by Congress on June 13, 1787; and these defendants further deny that by said acts aforesaid, the State of Illinois or The Sanitary District of Chicago, or either of them, are in any manner whatsoever violating the provisions of the Act of Congress of March 3, 1899, known as the Rivers and Harbors Act of 1899, or of the provisions of Section 10 thereof, or any other provisions thereof.

30. These defendants deny each and every one of the averments of paragraph 30 of the amended bill of complaint.

31. These defendants deny that the alleged violations of the legal rights of the complainants and of the respective peoples of the complaining states, have caused, now cause or will continue to cause in any way whatsoever serious interference with the interstate trade and commerce of the people of the complaining states, or any damage whatsoever to the respective complaining states in their proprietary capacity, resulting in any pecuniary

loss whatsoever to said respective peoples or respective states.

And these defendants further allege that the prayer of said amended bill of complaint is improper and not one to be considered by this Honorable Court, in that the same asks the Court to determine the amount of water reasonably required for the purpose of navigation to be diverted from Lake Michigan in and through said canal and connecting waters to the Illinois and Mississippi Rivers, since the determination of that question involves the exercise of legislative functions and presents a question not justiciable before this Honorable Court; and these defendants further allege that the Congress of the United States is authorized under the Constitution of the United States to delegate to the Secretary of War, power and authority to authorize the diversion of waters from Lake Michigan, through said Lakes to the Gulf Waterway, for purposes of navigation and purposes other than those of navigation, as will be hereinafter more fully set forth.

32. These defendants further allege that as appears by paragraph 28 of said amended bill of complaint the diversion of water from Lake Michigan is now taking place pursuant to the terms and permission of the permit issued by the Secretary of War on recommendation of the Chief of Engineers, March 3, 1925; that the Secretary of War and Chief of Engineers are specifically authorized by the provisions of Section 10 of an Act of Congress, approved March 3, 1899, entitled "An Act making appropriations for the construction, repair and preservation of certain public works on rivers and harbors, and for other purposes" to authorize alterations in the capacity and modifications in the course, location and condition of any of the navigable waters of the

United States and to thereby authorize diversion of water from the Great Lakes. That the Secretary of War and his subordinate officers in the War Department of the United States Government, are charged by the various Acts of the Congress of the United States, under the provisions of the Constitution of the United States, with numerous duties in connection with the preservation and creation of navigable waters and waterways of the United States, and in regulating and controlling the use of such waterways in carrying out certain policies of Congress enacted pursuant to its power to regulate interstate commerce. And these defendants allege that for the reasons hereinafter set forth, the Secretary of War and the Chief of Engineers in issuing the permit of March 3, 1925 performed said act in the exercise of the discretion imposed upon them by Congress under the power to foster, create and preserve the national defense, the power to regulate, construct and utilize the navigable waters of the United States, and through the utilization of such waterways the power to regulate interstate commerce.

33. That under the provisions of Section 8 of Article 1 of the Constitution of the United States, the Congress is given power to declare war; to raise and support armies; to provide and maintain a navy; to make rules for the government of the land and naval forces; to provide for calling forth the militia to execute the laws of the Nation, suppress insurrections and repel invasions. That under the provisions of Article 2 of the Constitution, the executive power is vested in the President of the United States, who is Commander in Chief of the Army and Navy of the United States. He may require the opinion in writing of the principal officer of each of the executive departments. Pursuant to these provisions of the Constitution, the Congress has created

the War Department and provided for the office of Secretary of War, the principal officer in this executive department of the Government, and has imposed upon him by various statutes from time to time, numerous duties and powers in reference to the national defense. Among the duties imposed upon the Secretary of War and the War Department are the control and regulation of the navigable waters of the United States, indicating conclusively thereby the conclusion of the Congress that in its wisdom the waterways of the United States are an essential element in the national defense. As the development of this country and the character of its civilization has become more complicated, transportation has become increasingly important to the national defense. Wars cannot be effectively conducted without available transportation. Reliance upon the railroads of the country as the exclusive means of transportation in time of war would be an unwise and unsafe policy, and from the beginning of the government it has been the policy of the Congress, through the Secretary of War, to control, regulate, foster and preserve in their utmost usefulness for purposes of transportation, and as an element of the national defense, the navigable waters of the United States.

As alleged in the amended bill of complaint much commerce between ports in different states is conducted over the navigable waters of the Great Lakes. Each of the Great Lakes, except Lake Michigan, borders upon a foreign country, and in the event of war with such country, this commerce, important as it is, would be subject to immediate interruption. Creation, fostering and preservation of waterways within the territorial limits of the United States and thus less subject to foreign agression, is important in the national defense; and in the exercise of the power and responsibility in him imposed by the Congress, pursuant to the constitutional provisions aforesaid, the Secretary of War is vested with discretion to create, regulate and improve the navigable waterway from the harbor of Chicago, through the Sanitary and Ship Canal of the defendant The Sanitary District of Chicago, the Illinois and Desplaines Rivers and the Mississippi River to the Gulf of Mexico, as this waterway in the event of disaster to the commerce conducted over the Great Lakes would be available for the movement of troops and munitions, and for the preservation of those fundamental industries, without which under modern conditions war cannot be successfully waged.

34. For many years inland navigation has been conducted on the waters of the Mississippi River, and in the original settlement of the Mississippi Valley this avenue of transportation was the most important element. In recognition of this the Congress has consistently appropriated from year to year sums for the regulation, preservation and maintenance of conditions in the Mississippi River and its tributaries helpful to navigation and the conduct of such commerce. The Mississippi River extends for purposes of navigation from the cities of Saint Paul and Minneapolis in the State of Minnesota to the Gulf of Mexico, and traverses or marks the borders of the states of Minnesota, Wisconsin, Iowa, Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana. It possesses two tributaries of almost equal importance and magnitude,—the Ohio and Missouri Rivers. The Ohio, for navigation purposes, extends a considerable distance into the State of Pennsylvania, and then through or bordering upon the states of West Virginia, Ohio, Kentucky, Indiana and Illinois. The Missouri River rises in the Rocky Mountains and then traverses or marks the boundaries of the states of Nebraska, North Dakota, South Dakota, Iowa, Kansas and Mis-

souri. The Illinois River, with its tributaries and The Sanitary and Ship Canal of the defendant The Sanitary District of Chicago, furnish an available water route connecting this long highway of navigation and commerce with the water transportation of the Great Lakes. At the present time navigation is conducted on the Mississippi River in large volume to the City of St. Louis, and during a considerable portion of the year a depth of 9 feet is maintained. The projected depth called for by the several appropriation Acts of Congress, pursuant to its policy of furnishing and maintaining adequate conditions for navigation on this waterway is for a projected depth of 9 feet on the Mississippi to the mouth of the Ohio; of 8 feet from the mouth of the Ohio to the City of St. Louis; of 7 feet from the City of St. Louis to Grafton, Illinois, the mouth of the Illinois River, and of 6 feet from Grafton to the head of navigation at the Twin Cities. During a considerable portion of the year these depths are not maintained, due to insufficient water in the River, and peculiar conditions obtaining therein, which result in a fluctuating channel and frequent formation of bars and other obstructions to navigation. In the original state before the works of man altered the conditions of nature, bordering upon the upper waters of the Mississippi were vast areas of swamp lands, which in the Spring, in time of freshets, were overflowed and filled with large quantities of water, which slowly thereafter drained off, thus serving as adequate reservoirs for the maintenance of an approximately uniform flow in the river. As civilization has proceeded throughout this territory many of these lands have been drained, and the available area of reservoir has been very greatly reduced. At the same time the works undertaken by the War Department in aid of the maintenance of adequate depths in the river, the deepening of channels, the restricting of the flow by wing dams and other construction have all tended to furnish a channel capable of more rapidly carrying off the water than the original condition of the river. These changes in the condition and regimen of the river have resulted in a lengthening of the periods of low water, during which navigation is interfered with, and at times prevented, due to lack of navigable depths at many places along the channel. The natural conditions of the Mississippi River and its peculiarities have always rendered navigation thereon uncertain and subject to interruptions. These same conditions to an even greater degree hamper and impede navigation on the Missouri River, and also to a greater extent upon the Ohio River and the other tributaries of this vast network of navigable systems affording when these difficulties are overcome the most available means of inland water transportation and serving the largest productive areas to be found in the world.

35. Settlement of the Mississippi Valley, originally dependent entirely upon water transportation, was greatly increased by the creation of a network of railroads connecting the important centers, practically all of which, however, had been originally located because they severally had available water transportation. The growth of railroad facilities resulted in the paralleling of all of the water routes by numerous railroad lines, and inevitably the railroads competed with the water carriers for the handling of transportation between all points in the Mississippi Valley and between such points and the seaboard. The difficulties of navigation and the lack of adequate organization among those conducting it, the more speedy handling of traffic by the railroads and the great increase of facility of transportation by the

railroads, all tended to make railroad transportation preferable when costs at all approximated the cost of water transportation. The railroads consistently followed the policy of driving the water carriers out of existence by publishing and maintaining rates which equaled and in many instances were lower than the available water rates. These competitive rates, made in every instance for the purpose of taking away from the water carrier the available commerce, were invariably much lower than the normal level of rates which the rail carriers had to maintain in order to earn an adequate return on their capital investment, or a profit on their operation, and invariably when water transportation had been eliminated the railroads, if they were not restrained from so doing by laws or regulations resulting therefrom, would increase their rates up to the normal level, thus frequently disrupting and impairing the commercial structure of the country which had grown up through the upbuilding of communities at points where the cheaper water transportation was available.

During the decades immediately following the Civil War the building of railroads proceeded with remarkable speed, and necessarily resulted in fierce and unrestricted competition, not only between the railroads and water carriers, but between the railroads themselves. This competition produced discrimination between places, commodities and individuals, and frequently resulted in such an impairment of revenues of the competing railroads as to seriously hamper their ability to adequately render transportation service to the public. As a result, in 1887, pursuant to its power to regulate commerce the Congress enacted the Act to Regulate Commerce which, with the amendments and supplemental acts added from time to time, imposed upon the railroads, common carriers engaged in interstate commerce, the duty of charging no more than reasonable rates, the duty of avoiding undue and unreasonable discrimination between persons, communities, commodities or different classes of traffic, and the duty of maintaining their published rates. This system of regulation was followed by similar systems of regulation by the several states over the commerce conducted by railroads between points within these states. The rates of the railroads were not and could not in the very nature of things, be uniform for all classes of traffic and between all points. Frequently rates were created for the purpose of stimulating the location and upbuilding of new industries at suitable locations, thus providing additional traffic to the railroads. All of the railroad rates throughout the Mississippi Valley were influenced and affected by the existence of the available means of transportation afforded by the Mississippi, Ohio and Missouri Rivers and their tributaries, and by the water commerce of the Great Lakes. The Congress in its wisdom did not require uniformity of rates between all points and for all classes of traffic, as any such requirement would have most seriously hampered if it had not destroyed the commercial welfare of the entire Mississippi Valley. The railroads were permitted, under the provisions of the Act to Regulate Commerce and acts amendatory thereof and supplemental thereto, to maintain rates for the purpose of meeting water competition and competition by longer and more circuitous rail routes which would be at a lower level than rates to intermediate points.

36. As a result of the greatly increased facilities of railroad transportation through the improvement in the mechanism used, the creation of many new and valuable services, also more particularly as a result of the com-

petition above described, and the failure of the inland water carriers to organize to meet rail competition, water transportation upon the inland waterways of the Mississippi Valley practically ceased to exist and only a very few unimportant and ineffectual remnants were left by the time the World War had begun. During the World War there was imposed upon the normal commerce of the country tremendous burdens in handling war munitions and troops, which strained to the utmost the transportation facilities of the country. Much commercial traffic had to be abandoned or decreased in amount by reason of this overwhelming and superior demand. Due to this burden of wartime commerce and the changed conditions resulting from the necessities of the War, Congress, in the exercise of its war powers, authorized the President to take over the railroad systems of the country; and further, as a measure of relief to the overburdened railroad systems, authorized and directed the Director General of Railroads to begin water transportation upon the Mississippi River between St. Louis and New Orleans, upon the Black Warrior River in Alabama, between Birmingham and Mobile, and upon the Erie Canal in New York, upon which rivers, as aforesaid, water transportation had theretofore practically ceased.

In the beginning of this water transportation on these Rivers it became necessary to construct an entirely new mechanism and to create new and improved units of transportation; and pursuant to the direction of Congress the Director General of Railroads brought into existence the Mississippi-Warrior Barge Line. At the termination of government possession and control of the railroads the Secretary of War was directed to continue the transportation conducted on the Barge Line in the waterways last mentioned, and the policy of Congress in connection with inland transportation was authorized and declared in Sections 201 and 500 of the Transportation Act of 1920 in the following language:

> "SEC. 201. (a) On the termination of Federal Control, as provided in Section 200, all boats, barges, tugs, and other transportation facilities, on the inland, canal, and coastwise waterways (hereinafter in this section called 'transportation facilities') acquired by the United States in pursuance of the fourth paragraph of section 6 of the Federal Control Act (except the transportation facilities constituting parts of railroads or transportation systems over which Federal control was assumed) are transferred to the Secretary of War, who shall operate or cause to be operated such transportation facilities so that the lines of inland water transportation established by or through the President during Federal control shall be continued, and assume and carry out all contracts and agreements in relation thereto entered into by or through the President in pursuance of such paragraph prior to the time above fixed for such transfer. All payments under the terms of such contracts, and for claims arising out of the operation of such transportation facilities by or through the President prior to the termination of Federal control, shall be made out of moneys available under the provisions of this Act for adjusting, settling, liquidating and winding up matters arising out of or incident to Federal control. Moneys required for such payments shall, from time to time, be transferred to the Secretary of War as required for payment under the terms of such contracts.
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> (b) All other payments after such transfer in connection with the construction, utilization and operation of any such transportation facilities, whether completed or under construction, shall be made by the Secretary of War out of funds now or hereafter made available for that purpose.
>
> (c) The Secretary of War is hereby authorized, out of any moneys hereafter made available therefor, to construct or contract for the construction of terminal facilities for the interchange of traffic be-

tween the transportation facilities operated by him under this section and other carriers whether by rail or water and to make loans for such purposes under such terms and conditions as he may determine to any State whose constitution prohibits the ownership of such terminal facilities by other than the State or a political subdivision thereof.

(d) Any transportation facilities owned by the United States and included within any contract made by the United States for operation on the Mississippi River above Saint Louis, the possession of which reverts to the United States at or before the expiration of such contract, shall be operated by the Secretary of War so as to provide facilities for water carriage on the Mississippi River above Saint Louis.

(e) The operation of the transportation facilities referred to in this section shall be subject to the provisions of the Interstate Commerce Act as amended by this Act or by subsequent legislation, and to the provisions of the 'Shipping Act 1916,' as now or hereafter amended, in the same manner and to the same extent as if such transportation facilities were privately owned and operated; and all such vessels ~~while~~ operated and employed solely as merchant vessels shall be subject to all other laws, regulations and liabilities governing merchant vessels, whether the United States is interested therein as owner, in whole or in part, or holds any mortgage, lien, or interest therein. For the performance of the duties imposed by this section the Secretary of War is authorized to appoint or employ such number of experts, clerks, and other employees as may be necessary for service in the District of Columbia or elsewhere, and as may be provided for by Congress. [41 Stat. L. 458.]"

"Sec. 500. It is hereby declared to be the policy of Congress to promote, encourage and develop water transportation, service and facilities in connection with the commerce of the United States, and to foster and preserve in full vigor both rail and water transportation.

It shall be the duty of the Secretary of War, with the object of promoting, encouraging, and develop-

> ing inland waterway transportation facilities in connection with the commerce of the United States, to investigate the appropriate types of boats suitable for different classes of such waterways; to investigate the subject of water terminals, both for inland waterway traffic and for through traffic by water and rail, including the necessary docks, warehouses, apparatus, equipment, and appliances in connection therewith, and also railroad spurs and switches connecting with such terminals, with a view to devising the types most appropriate for different locations, and for the more expeditious and economical transfer or interchange of passengers or property between carriers by water and carriers by rail; to advise with communities, cities and towns regarding the appropriate location of such terminals, and to co-operate with them in the preparation of plans for suitable terminal facilities; to investigate the existing status of water transportation upon the different inland waterways of the country, with a view to determining whether such waterways are being utilized to the extent of their capacity, and to what extent they are meeting the demands of traffic, and whether the water carriers utilizing such waterways are interchanging traffic with the railroads; and to investigate any other matters that may tend to promote and encourage inland water transportation. It shall also be the province and duty of the Secretary of War to compile, publish and distribute, from time to time, such useful statistics, data and information concerning transportation on inland waterways as he may deem to be of value to the commercial interests of the country.
>
> The words 'inland waterway' as used in this section shall be construed to include the Great Lakes. [41 Stat. L. 499.]"

Subsequently, by an Act entitled, "An Act to Create the Inland Waterways Corporation, for the purpose of carrying out the Mandate and Purpose of Congress, as appears in sections 201 and 500 of the Transportation Act, and for other purposes," approved June 7, 1924 (43

Stat. L. 360), Congress created the Inland Waterways Corporation, and provided that the Secretary of War shall be deemed to be the incorporator and shall govern and direct the corporation in the exercise of the functions vested in it by the Act.

The corporation was empowered and directed to continue the conduct of the transportation and terminal facilities provided for by the above quoted sections of the Transportation Act, and to initiate water carriage on the Mississippi River above Saint Louis. The operation of these facilities was declared to be subject to the provisions of the Interstate Commerce Act, as amended. The corporation was empowered to conduct the business of a common carrier by water.

In the fiscal year ending June 30, 1925, the Inland Waterways Corporation made a gross earning of $3,339,542, and carried on the Mississippi River alone approximately 100,000 tons of freight per month. Among other benefits to the Mississippi Valley and particularly the grain producers thereof, through the Barge Line rate of 2 mills per ton per mile available for the movement of the exportable surplus of grain and grain products, large quantities of grain have been transported to foreign markets at an average saving in transportation costs of 4 cents a bushel If water transportation could have been conducted by the Barge Line on the Missouri River and on the Mississippi as far north as the Twin Cities, this saving would have been very materially increased.

These defendants aver that in and by the provisions of these Acts of Congress there devolved upon the Secretary of War the duty of fostering inland water transportation in the Mississippi Valley, and of preserving the same, and of conducting such transportation in accordance with the provisions of the Interstate Commerce

Act in such a way as to regulate transportation on these waterways for the benefit of the nation at large.

37. In fostering and preserving both rail and inland water transportation in the United States since the World War, due to fundamental economic changes, there have arisen a number of new and perplexing problems. During the last ten years the main line mileage of the railroads of the United States has made little or no increase. The traffic handled by the railroads in this period has increased approximately 25 per cent. Handling this vast increase of traffic has been accomplished by the railroads by increased efficiency in operation, better organization, and, primarily by the building of transportation units of greatly increased capacity. It has been the history of the commerce growth of the United States that it doubles in volume every twenty years. During the last ten years there has been an entirely insufficient additional investment for the purpose of meeting future increases in traffic. The railroads at the same time have been confronted with rapidly rising costs, not only of railroad labor, but of all supplies, such as fuel, equipment, etc., used in transportation. At the same time, due to the effect of regulation and of the economic demands of certain sections of the country and of the population thereof, there has not been as great a proportionate increase in the rates which the railroads are entitled to collect for the service furnished by them as there has been in their operating costs. The result has been a material decline in the value of railroad securities, and the railroads to-day find it increasingly difficult to finance additional investment in transportation facilities.

The Mississippi Valley is the great food producing area of the United States. Much of this territory is virgin today, to the extent that crops may be raised thereon without replacing in the soil minerals extracted by the harvest. The land available for cultivation is practically all occupied and has been for several years last past. For many years the total farm production of the United States has exceeded the total consumption, and the exportable surplus has been sold abroad in competition with farm products of other countries throughout the world. The amount of the exportable surplus has been so great that it is an accepted axiom that the price of the exportable farm surplus of the United States determines to a large extent the price received by the producer for his entire product. Most of the exportable surplus of the United States has been in the past sold in Europe, whose buying power has been greatly depleted by the World War. In addition new farm areas have been developed in South America, new cotton producing territories in Egypt and India, and most of the food producing countries whose surplus competes with that of the United States in the world market produce their grain and other products at points very much nearer water transportation to the consuming market than is the situation of the farmer in the Mississippi Valley. Generally farm products in the Mississippi Valley have to be transported approximately 1000 miles to water transport to the world market. The increase in the cost of transportation, the increasing competition of foreign farm products and the increasing costs of farm operation in the United States have all served to materially decrease the rewards of the food producer of the Mississippi Valley. Water transportation is materially cheaper than rail transportation. Rail transportation costs approximately ten times as much as water transportation on the Great Lakes, and five to seven times as much as water transportation on the Mississippi waterway system. The only relief to the farmer in the Mississippi Valley is to render available water transportation wherever it is possible.

38. The Illinois River waterway to the Mississippi consists of the Chicago River connecting with the Sanitary and Ship Canal of the defendant, The Sanitary District of Chicago, the Illinois and Desplaines Rivers to the Mississippi. The Chicago River and the Sanitary and Ship Canal are readily navigable to vessels with a draft not exceeding 20 feet, as far as Lockport, the end of the Canal. The waterway from Lockport to Utica on the Illinois River is being developed by the defendant State of Illinois, and with reference to this waterway, these defendants refer to the answer of the defendant State of Illinois herein and pray leave to adopt the same, as their answer.

The United States, as a result of various appropriations in various Rivers and Harbors Acts, has undertaken and is undertaking the development of the waterway from Utica, Illinois, to Grafton, Illinois, at the junction of the Illinois and Mississippi Rivers. Generally speaking the portion of this waterway to be developed by the State of Illinois would create a canalized river with a series of locks and dams, required by the material drop in altitude at the beginning and end of this section of the river. The latest report of the Chief of Engineers submitted to the present Congress, and adopted in the pending Rivers and Harbors Bill therein, recommends the continuance in the Illinois River of two Federal dams with the appurtenant locks, and the elimination of two state dams previously constructed by the State of Illinois in aid of a scheme of development of this waterway. For the purposes of the canalized rived from Lockport to Utica, a flow of water not greatly in excess of 2,000 c.f.s. would be reasonably sufficient to furnish adequate navigation conditions in this section of the waterway, although if the flow be as great as that authorized by the permit of March 3, 1925, aforesaid, the depth in this section of the waterway would be 9 feet instead of 7 feet to 8 feet. In the balance of the Illinois River, due to the flat character of the country through which the river flows and the small drop in this long stretch of river, provided a constant and considerable amount of dredging be furnished, with not much in excess of 2,000 c.f.s. of flow from Lake Michigan, a 7-foot waterway may be maintained. But the two Federal dams would be required with this flow and possibly one or both of the state dams, and where dams are maintained, in order to hold up water to preserve channel depths, locks are required, which slows down and delays transportation, and greatly increases the cost thereof. With a flow from Lake Michigan of an amount as great as specified in the permit of March 3, 1925, aforesaid, a 9-foot depth may be maintained, at least two of the four existing dams may be eliminated, and during a considerable portion of the navigation season all of the dams are unnecessary. Thus transportation under this enhanced flow is greatly improved and the cost thereof materially decreased.

From Grafton to St. Louis on the Mississippi River, navigation is difficult, and during large portions of the year materially impeded by lack of sufficient water to ensure adequate channel depths. The water diverted from Lake Michigan under the present permit of March 3, 1925, constitutes more than 25 per cent of the volume of the water in the river at St. Louis at low water flow and throughout this stretch of river, and furnishes at critical points of navigation during low water periods from 2½ to 3 feet of depth over the bars, and for purposes of practical navigation under existing conditions, the maintenance of this flow to an amount not less than the amount specified in the permit aforesaid, is essential and cannot be avoided.

From the mouth of the Ohio River, as far south as Vicksburg, the channel of the Mississippi varies very little, presenting numerous difficulties for navigation, in places where channel depths rapidly become uncertain during low water, and where bars and other obstructions to navigation frequently and without notice are formed. During low water periods of navigation, as far south as Vicksburg, Mississippi, and in increasing amounts from there north, the water diverted from Lake Michigan in the amount specified in the permit aforesaid, furnishes at least one foot additional depth over what would otherwise be found at the critical points over the bars, and is essential under present conditions for the maintenance of the channel depth specified in the Federal project for the improvement of the Mississippi River navigation.

39. The demands for transportation vary in different parts of the Mississippi Valley at different times of the year. If water transportation be adequately furnished on the Mississippi as far north as the Twin Cities and from Pittsburgh down on the Ohio River and to upper Missouri River points on the Missouri River, and also on the essential connection between this system and the Great Lakes via the Illinois River waterway, the traffic offered will induce the furnishing of a much greater amount of equipment than if this system of inland waterway transportation remain as at present cut up into separately operated and disconnected fragments.

The volume of traffic would increase in inverse ratio to the extension of the system, and if the system were fully developed it would be possible to concentrate facilities from one part of the system upon another to meet changed conditions, which will occur from time to time, thus greatly facilitating not only the service to be rendered by the system, but also decreasing the cost of operation. At the present time, if the construction work on the Illinois Waterway were finished, only during a portion of the year, even with the benefit of the flow from Chicago, could a nine-foot channel depth be maintained from New Orleans to Chicago, as additional work to deepen the channel of the Mississippi from the mouth of the Ohio to Grafton, Illinois, must be completed in order to maintain therein a nine-foot channel depth, the Government project at present, from St. Louis north providing only for six feet therein. With a six-foot channel depth which must be crossed, adequate loading of barges destined from or to Chicago or New Orleans, could not be accomplished, and the cost of transportation would be very materially increased. If the water from Lake Michigan which materially serves to increase the present channel depths in the Mississippi were materially decreased in amount, it would be many years under present plans before adequate navigation conditions, either on the Mississippi or Illinois Waterway, could be achieved, and the development of this system of navigation, so essential to the continued prosperity and growth of the great Mississippi Valley would be rendered impossible of achievement.

40. The manufacturing and distributing centers of the Mississippi Valley have, during recent years, been subject to increasingly harmful competition from similar producing and distributing centers on the Atlantic

Seaboard. By the expenditure of public funds derived from taxation of the entire country, including the Mississippi Valley, the Congress has caused the completion of the Panama Canal, which furnishes cheap coast to coast water transportation. Producing and manufacturing centers of the Mississippi Valley desiring to sell their products on the Pacific Coast must transport them by rail, while their competitors on the Atlantic Seaboard have available the much cheaper coast to coast water transportation, through the Panama Canal. With the great and material increase in water transportation, resulting from the greatly increased number of vessels engaged in this coast to coast transportation, due to the upbuilding of the American Merchant Marine during the World War, the difference in transportation cost in favor of the Atlantic Seaboard has become so great as in many instances to render it impossible for producers, manufacturers and shippers in the Mississippi Valley to compete on the Pacific Coast with products originating on the Atlantic Seaboard. The inevitable tendency of this situation is to induce the relocating of industries and manufacturers on the Seaboard and away from the food producing Mississippi Valley. If this tendency be carried to its conclusion, the food producer in the Mississippi Valley will be compelled to pay a greatly increased cost for all manufactured articles, due to the fact that they must be transported from points of production on the seaboard, instead of from nearby points of production now located within the Valley. It is only by proper and adequate development of water transportation on the Mississippi Inland Waterway system, described above, that any relief is offered to the manufacturer and shipper located throughout the Mississippi valley. Manufacturers at St. Paul, Chicago, St. Louis and Memphis, and even as far east as Pittsburgh, may then avail themselves of the barge line transportation to New Orleans, and water transportation from there to the Pacific Coast, and thus may compete on equal or approximately equal terms with the producing centers of the Atlantic Seaboard.

41. It has been the history of transportation in the United States that the development of new transportation facilities creates traffic. It is the policy of Congress, announced in Section 500 of the Transportation Act aforesaid, to foster and preserve side by side both rail and water transportation. The development of the Mississippi Inland Waterway system above described will not serve to decrease the earnings of the railroads located in the Mississippi Valley, but on the contrary will relieve these railroads of the transportation of large quantities of heavy bulk freight which is carried at very low rates and will originate and create much additional traffic, and must eventually serve to greatly increase rather than decrease the revenues of these roads. The operations of the Mississippi-Warrior Barge Line on the Mississippi River have already served to demonstrate that the carriers whose lines parallel the transportation furnished by the Barge Line have actually received more freight from the Barge Line than they would have received had it not been originated by the Barge Line, than they have lost in competition with the Barge Line.

41. These defendants therefore show unto this Honorable Court that in and by the provisions of Section 10 of the Rivers and Harbors Act of March 3, 1899, the provisions of Sections 201 and 500 of the Transportation Act, and the provisions of the Inland Waterways Corporation Act aforesaid, and also by virtue of his numerous

responsibilities in connection with the National Defense, the Secretary of War is in the first place vested with authority within his discretion to authorize changes in the capacity of any of the navigable waters of the United States, even though such changes without his authorization should, as a matter of law, be deemed to be obstructions to navigation; and that the Secretary of War is charged with the duty of fostering, preserving and creating water transportation on the waterways of the Mississippi Valley, and of conducting transportation on the Mississippi Waterway System, through the instrumentality of the Inland Waterways Corporation, and in the conduct of such transportation so regulating the same by the fixing of rates to be charged therefor and the affording of facilities of transportation, as to best serve the interests of the People of the United States, and particularly the residents of the Mississippi Valley.

The defendants further aver that in the exercise of the discretion aforesaid, the Secretary of War is fully authorized to permit diversion of water from Lake Michigan into the Sanitary and Ship Canal of the defendant, The Sanitary District of Chicago, and thence into the Desplaines and Illinois Rivers to the Mississippi, even though such diversions do in a slight measure alter the capacity of any of the navigable waterways of the United States, and such exercise of discretion is fully justified by all the facts aforesaid, and the defendants further aver that the exercise of such discretion, justified as it is by the facts aforesaid, is a matter not within the power of this Honorable Court to review, but presents solely a question of legislative or administrative policy in due furtherance of the policy of the Congress announced in the Acts aforesaid, and patricularly in the first paragraph of Section 500 of the Transportation Act of 1920, each and all of which enactments are constitutional exercises of the power of the Congress to regulate interstate commerce.

All of which matters and things these defendants are ready to maintain and prove, as this Honorable Court shall direct, and humbly pray to be hence dismissed with their reasonable costs and charges in this behalf most wrongfully sustained.

STATE OF MISSOURI,
By NORTH T. GENTRY,
Attorney General.

STATE OF KENTUCKY,
By FRANK E. DAUGHERTY,
Attorney General.

STATE OF TENNESSEE,
By FRANK M. THOMPSON,
Attorney General.

STATE OF LOUISIANA,
By PERCY SAINT,
Attorney General.

DANIEL N. KIRBY,
CORNELIUS LYNDE,
Solicitors.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

In the Supreme Court of the United States

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

OFFICE OF THE CLERK
RECEIVED
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SUPREME COURT U. S.

STATE OF WISCONSIN, STATE OF OHIO, STATE OF PENNSYLVANIA AND STATE OF MINNESOTA,
Complainants,

v.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,
Intervening Defendants.

Bill in Equity
Original Jurisdiction
[redacted] **7**

OFFICIAL NEWSPAPER RELEASES

Covering Correspondence between
THE DEPARTMENT OF STATE AND
THE BRITISH EMBASSY
In Regard to the Subject Matter of the Within Suit

Printed by Complainants for the Use of
THE SUPREME COURT OF THE UNITED STATES
In the above entitled cause.

In the Supreme Court of the United States

ORIGINAL JURISDICTION

OCTOBER TERM, 1925

STATE OF WISCONSIN, STATE OF OHIO, STATE OF PENNSYLVANIA AND STATE OF MINNESOTA,
Complainants,

v.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF TENNESSEE, STATE OF KENTUCKY AND STATE OF LOUISIANA,
Intervening Defendants.

Bill in Equity
Original Jurisdiction
No. 16

OFFICIAL NEWSPAPER RELEASES
Covering Correspondence between
THE DEPARTMENT OF STATE AND THE BRITISH EMBASSY
In Regard to the Subject Matter of the Within Suit

Printed by Complainants for the Use of
THE SUPREME COURT OF THE UNITED STATES
In the above entitled cause.

DEPARTMENT OF STATE

FOR THE PRESS

Canada

February 24, 1926.

Confidential Release for Publication in Newspapers Appearing on the Streets After 3:00 O'Clock, Eastern Standard Time, Wednesday, February 24th, 1926, and Not to be Previously Quoted, Published, or Used in Any Way.

Through an arrangement between the Department of State and the British Embassy for simultaneous publication in the United States and Canada, the following correspondence in regard to the diversion of water from Lake Michigan by the Sanitary District of Chicago is made available to the press:

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"Department of State,
Washington,
April 2, 1924.

"His Excellency
The Right Honorable
Sir Esme Howard, G. C. M. G., K. C. B., C. V. O.,
Ambassador of Great Britain.

"Excellency:

"Further reference is made to the note from your Embassy No. 130 of February 9, 1924, in which it was stated that the Government of the Dominion of Canada desired to send Mr. W. J. Stewart, Chief Hydrographer of the Dominion Government to be present in its behalf at hearings of a special committee of the Senate appointed to investigate the problem of a nine foot channel in the proposed waterway from the Great Lakes to the Gulf of Mexico, and to the inquiry made in your note No. 256 of March 21, 1924, in regard to the date on which these hearings will be held, and whether Mr. Stewart will be at liberty to be present.

"The Committee of the Senate to which reference was made in the Embassy's note of February 9, 1924, has not held hearings during the present session of Congress or yet arranged to hold them.

"I am informed by the Chairman of the Committee on Rivers and Harbors of the House of Representatives that this Committee has arranged to resume hearings on April 15, on bills dealing with the diversion of waters from Lake Michigan, the most important one, I understand, being known as the Hull Bill (H. R. 5475). The Committee desires to obtain all the information it can which will be helpful towards a correct determination of the matters which it has under consideration. It will welcome the help of all who have information of value relating to these matters, and will be glad to have Mr. Stewart attend the hearings.

"Accept, Excellency, the renewed assurances of my highest consideration.

(Signed) CHARLES E. HUGHES."

"British Embassy,
Washington, D. C.,
June 13, 1924.

"The Honourable Charles E. Hughes,
Secretary of State of the United States,
Washington, D. C.

"Sir:

"I have the honour to refer to my note No. 256 of the 21st of March and to other correspondence on the subject of the diversion of water from the Great Lakes as a result of the Chicago drainage system, and at the request of His Excellency the Governor General of Canada to call your attention to the fact that this matter has come up for discussion in the Canadian Parliament on several different occasions during the current session.

"On each occasion, and with increasing emphasis amounting to unanimity, demands have been made upon the Dominion Government to renew the protests which have already been lodged against the action of the Sanitary District of Chicago, in continuing and seeking to extend their claim to diversion of water from the St. Lawrence Watershed into that of the Mississippi, with consequent adverse effect upon important interests in the navigation both of the Great Lakes and of the St. Lawrence River, and the development of power, actual and prospective, upon the River itself and upon the waters connecting the Lakes.

"The Dominion Government are constrained to believe that unless some reassuring message can be made to the people of Canada that favorable progress is being made in the matter, public opinion throughout the Dominion will become so aroused as to render exceedingly difficult the amicable consideration and discussion of the far less-reaching problem and issue incident to the Great Lakes and the International Waterway. The Government of Canada are fully aware that in many parts of the United States public opinion is similarly being aroused, and are not ignorant of the fact that the United States Government is not less anxious than they are to see a settlement speedily effected.

"It is for these reasons, therefore, while unwilling to prefer any request or take any steps which might add to the existing embarrassment, the Dominion Government feel that they must once again direct the attention of the United States Government to the serious situation, which has developed, and in doing so express the hope that it may be possible now to obtain an expression of the views of the United States Government on the points raised in my note of March 21st. The Government of Canada feel that it would be most advantageous for them to obtain a statement from the competent United States authorities which will definitely define the position as it now stands, and they trust that such a statement will be of a reassuring character as to probable future developments.

"In bringing these facts to your notice, I venture to hope that I may receive an expression of the views of the United States Government at your earliest convenience for communication to the Dominion Government.

"In this connection I would add that the Dominion Government propose to publish forthwith the note No. 256 which I addressed to you on March 21st.

"I have the honour to be
with the highest consideration,
Sir,
your most obedient,
humble servant,
(For the Ambassador)
(Signed) Herbert W. Brooks."

"Department of State,
Washington,
June 28, 1924.

"His Excellency
The Right Honorable
Sir Esme Howard, G. C. M. G., K. C. B., C. V. O.,
Ambassador of Great Britain.

"Excellency:

"I have the honor to acknowledge the receipt of your Note No. 533 of June 13, 1924, in further reference to the diversion of water from Lake Michigan at Chicago.

"In previous correspondence in regard to this matter reference was made to the suit brought by this Government to restrain the Sanitary District of Chicago from diverting a larger quantity of water from Lake Michigan than is authorized by the permit issued to the Sanitary District by the Secretary of War and to bills introduced in Congress during the past session with reference to the construction of the proposed waterway from Lake Michigan to the Mississippi River and the sewage disposal system of Chicago.

"The suit for an injunction, which is now pending on appeal in the Supreme Court of the United States, has been assigned for argument on November 10, 1924, early in the next term of the court. The position of the United States as plaintiff in this litigation is evidence of the interest which this Government has in the preservation of the navigability of the Great Lakes system of waterways. Until the Court has rendered an opinion in the case this Department will not be in a position to furnish the Canadian Government with further information in regard to the views of this Government concerning the question involved in the litigation.

"Hearings were held in March, April and May, 1924, by the Committee on Rivers and Harbors of the House of Representatives on the several bills introduced in Congress. In order that the Committee might be fully informed of the views of the Canadian Government in regard to the diversion of water from Lake Michigan I sent copies of your notes of February 13, 1924, and March 21, 1924, to the Chairman of the Committee. I have also sent him a copy of your note of June 13, 1924. In my note of April 2, 1924, I informed you that the Committee would be glad to have Mr. W. J. Stewart, Chief Hydrographer of the Canadian Government attend the hearings. The bills were still before the Committee on the adjournment of the session of Congress on June 7, 1924.

"I regret that the formulation of a comprehensive statement of the views of this Government concerning the diversion of water from Lake Michigan will have to be deferred for a time because certain of the questions involved are under consideration by Congress and the Supreme Court both of which are at the present time in recess. This Government is prepared, however, to include consideration of the diversions of water from Lake Michigan among the questions to be referred by the United States and Canada to the Joint Board of Engineers appointed for the further investigation of the proposed Saint Lawrence Waterway, as will be fully explained in my note in regard to the instructions to be given to the engineers. It would be understood, of course that the submission of this question to the Joint Board of Engineers would be without prejudice to the rights of this Government with reference to the diversion of water from Lake Michigan or the position which it may take concerning questions that may arise because of such diversions.

"In connection with the statement made in your note under acknowledgment that it is the purpose of the Canadian Government to publish forthwith your note No. 256 of March 21, 1924, I invite your attention to the release of my note of April 2, 1924, given in my note of April 9, 1924.

"Accept, Excellency, the renewed assurances of my highest consideration.

(Signed) Charles E. Hughes."

"Department of State,
Washington,
February 13, 1925.

"His Excellency
The Right Honorable
Sir Esme Howard, G. C. M. G., K. C. B., C. V. O.,
Ambassador of Great Britain.

"Excellency:

"I have the honor to transmit herewith for your information a copy of a notice of a hearing which will be held in the office of the Secretary of War on February 20, 1925, on an application made by the Sanitary District of Chicago for a permit to divert an annual average of ten thousand cubic feet of water per second from Lake Michigan.

"Accept, Excellency, the renewed assurances of my highest consideration.

(Signed) Joseph C. Grew
Acting Secretary of State."

"Enclosure:
Notice, February 10, 1925."

ENCLOSURE

"NOTICE

"February 10, 1925.

"The Secretary of War will hold a hearing in his office at eleven A. M., February 20, 1925, on an application made by the Sanitary District of Chicago on January 31, 1925, for a permit to divert an annual average of 10,000 cubic feet per second of water from Lake Michigan.

"He now has under consideration the question of issuing a permit, covering a period of five years, to the Sanitary District, to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, with an instantaneous maximum not to exceed 11,000 cubic feet per second—the permit to be made conditional upon the following:

> (1) The Sanitary District of Chicago shall submit for approval and carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of 1,200,000 before the expiration of the permit, proper credit to be given for all completed portions of projects which are a part of its sewage treatment program.
>
> (2) The Sanitary District shall pay its share of the cost of such regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.
>
> (3) The execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the U. S. District

Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

(4) If, within six months after the issuance of this permit, the City of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum thereafter, this permit may be revoked without notice.

The Secretary desires that the discussion at the hearing be limited strictly to the matter contained in the application for the permit, that is, the amount of water to be granted to Chicago and the conditions upon which the issuance of a permit should be contingent.

As the time which can be given each side for the hearings is limited, it is desired that the number of speakers be limited to as few as practicable, and it is hoped that the proponents and opponents of the application will select their speakers with this object in view."

On February 17, 1925, a member of the staff of the British Embassy had informal conversations with officials of the State Department and as a result arrangements were agreed upon for representatives of Canada to attend the hearings to be held by the Secretary of War beginning on February 20 and for the views of the Dominion Marine Association to be expressed thereat. On this occasion the State Department officials concerned drew special attention to the limitation upon discussion at the hearings as stated in the penultimate paragraph of the War Department's notice enclosed in the note of February 13 from the Secretary of State to the British Ambassador.

"British Embassy,
Washington,
February 24th, 1925.

"The Honourable
Charles E. Hughes,
Secretary of State of the United States,
Washington, D. C.

"Sir:

"I have the honour to refer to your note of the 13th instant, and to inform you that the Government of Canada have observed that public hearings have recently been held by the War Department in Washington on an application made by the Sanitary District of Chicago for permission to increase the quantity of water which that District is now permitted to divert from Lake Michigan under authority of the Secretary of War and that the question whether, in accordance with the recommendation of the Chief Engineer, the amount permitted to be diverted should, under certain conditions, be increased to 8,500 cubic feet per second instead of 4,167 cubic feet per second, to which the Sanitary District is limited under a recent judgment of the Supreme Court of the United States, was also considered.

"The Dominion Government now desire me to state that, while they would not wish to oppose any interim measure which may be necessary to protect the health of the inhabitants of the city of Chicago, they feel compelled to reiterate the protest they have already made against the abstraction of water from the St. Lawrence basin and, in order that there may be no misunderstanding, I desire to take this opportunity of making it clear that the Government of Canada do not surrender any claims that might be put forward for consequential losses already suffered or which may possibly be suffered in the future on this account. The Dominion Government are of opinion that it is impossible to lose sight of the fact that the effect of the present increase in permitted diversion of water will be to postpone the relief for which the navigation and other interests injuriously affected by the attitude of the Chicago Sanitary District have been waiting already too long, and which, subject only to the paramount necessity of safeguarding public health, these interests are now entitled to receive.

"I feel sure that you will readily appreciate that the injury to Canadian interests by any lowering of the natural level of the Great Lakes connecting waters and the St. Lawrence River by the diminution of their natural water supply is of constantly increasing importance not only on account of navigation on the Great Lakes and lower St. Lawrence River but also on account of power development. The Government of Canada have not failed to recognize that United States interests are likewise substantially affected by this question.

"The Government of Canada feel confident that the Government of the United States is fully alive to the advisability of restricting within the narrowest possible limit the amount of water to be diverted from Lake Michigan for use by the Sanitary District of Chicago, and in this connection, they feel certain that no permit will be granted for the diversion of any water not essential to safeguarding the health of the population of that city, and, further, that the period during which such diversion must on this account continue, will be made as short as circumstances permit.

"I should be most grateful if you would be so good as to communicate the contents of this note to the interested authorities of the United States Government.

"I have the honour to be,
with the highest consideration,
Sir,
Your most obedient,
humble servant,

(Signed) ESME HOWARD."

"Department of State,
Washington,
February 26, 1925.

"His Excellency
The Right Honorable
Sir Esme Howard, G. C. M. G., K. C. B., C. V. O.,
Ambassador of Great Britain.

"Excellency:

"I have the honor to acknowledge the receipt of your note No. 198 of February 24, 1925, in regard to the diversion of water from Lake Michigan by the Sanitary District of Chicago, and to inform you that I have transmitted a copy thereof to the Secretary of War for his consideration in connection with the application of the Sanitary District for a permit increasing the diversions now authorized.

"Accept, Excellency, the renewed assurances of my highest consideration.

(Signed) CHARLES E. HUGHES."

"Department of State,
Washington,
March 21, 1925.

"His Excellency
The Right Honorable
Sir Esme Howard, G. C. M. G., K. C. B., C. V. O.,
Ambassador of Great Britain.

"Excellency:

"Referring to my predecessor's note of February 26, 1925, informing you that he had transmitted a copy of your note No. 198 of February 24, 1925, to the Secretary of War, I have the honor to inform you that under date of March 3, 1925, a permit was issued by the Secretary of War to the Sanitary District of Chicago authorizing the temporary withdrawal from Lake Michigan of 8,500 cubic feet of water per second until December 31, 1929, subject to certain specific conditions which are set forth in the permit.

"The permit issued by the Secretary of War, a copy of which is enclosed, was made public on March 7, 1925.

"Accept, Excellency, the renewed assurance of my highest consideration.

"FRANK B. KELLOGG."

"Enclosure:
Permit."

ENCLOSURE

"PERMIT

"WHEREAS, By Section 10 of an Act of Congress, approved March 3, 1899, entitled 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same;

"AND WHEREAS, Application has been made to the Secretary of War by THE SANITARY DISTRICT OF CHICAGO, ILLINOIS, for authority to divert an annual average of 10,000 cubic feet of water per second from Lake Michigan through the channels of said Sanitary District;

"AND WHEREAS, In the judgment of the Secretary of War, an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

"NOW THEREFORE, this is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provisions of the aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

"1. That there shall be no unreasonable interference with navigation by the work herein authorized.

"2. That if inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.

"3. That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of any navigable waters of the United States.

"4. That the Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

"5. That the Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

"6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed, in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

"7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the U. S. District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

"8. That if, within six months after the issuance of this permit, the City of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum, thereafter, this permit may be revoked without notice.

"9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice.

"10. That this permit is revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress.

"11 That this permit, if not previously revoked or specifically extended, shall cease and be null and void on December 31, 1929.

"WITNESS my hand this 3rd day of March, 1925.

"(Signed) H. TAYLOR,
Major General,
Chief of Engineers.

"WITNESS my hand this 3rd day of March, 1925.

"JOHN W. WEEKS,
Secretary of War."

"British Embassy,
Washington, D. C.,
May 7, 1925.

"The Honourable
Frank B. Kellogg,
Secretary of State of the United States,
Washington, D. C.

"Sir:

"In your note of March 21st last you were so good as to inform me that a permit had been granted on the 3rd of that month by the Secretary of War to the Trustees of the Sanitary District of Chicago authorizing a diversion from Lake Michigan, through its main drainage canal and auxiliary channels, of an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second.

"I now have the honour to inform you that before considering further the situation resulting from the decision of the Secretary of War to allow an increase of the flow through the main drainage canal and auxiliaries beyond the limit of 4,167 cubic feet per second specified in the permit of 30th June, 1910, and the consequences to navigation, power and other interests on the Great Lakes and St. Lawrence waterway system resulting from this continued diversion, against which the Government of Canada have been compelled to protest repeatedly and against which they must still protest, the Dominion Government desire to ascertain precisely the extent to which the new permit will modify the actual conditions which obtained during the year immediately preceding the 3rd March, 1925.

"Inasmuch as previous permits on the part of the Secretary of War have authorized a certain total flow in the main canal and auxiliary channels, either by direct limitation of flow or by authorization of channel capacity, the Government of Canada interpret the permit of March 3rd last as having been issued on a similar basis, with the sole exception that modification has been made in the total amount of water specified. In other words, the flow permitted under previous permits included all waters from whatever source passing Lockport, and under the permit of 3rd March, 1925, this flow is not to exceed an annual average of 8,500 cubic feet per second.

"The Government of Canada would, therefore, appreciate being advised as follows:

"First,—What has been the actual average flow of the water passing Lockport during the year ending 3rd March, 1925;

"Second,—By what amount will this average flow of water passing Lockport be immediately reduced under the terms of the permit of 3rd of March;

"Third,—By what amount will this average flow be further reduced by 31st of December, 1929, the date upon which the new permit terminates.

"I have the honour to be
with the highest consideration,
Sir,
Your most obedient,
humble servant,
(For the Ambassador)
H. G. Chilton."

"British Embassy,
Washington, D. C.,
June 2nd, 1925.

"The Honourable,
Frank B. Kellogg,
Secretary of State of the United States,
Washington, D. C.

"Sir:

"With reference to my note No. 467 of the 7th ultimo respecting the diversion of water from Lake Michigan for use by the Sanitary District of Chicago, I have the honour to transmit to you herewith copy of a parliamentary question, together with a copy of the reply thereto, relating to this matter, which was asked in the House of Commons on May 19th.

"In view of the importance with which the Canadian Government and people regard the present situation, I have the honour to request the favour of an early reply to the enquiries contained in my note under reference.

"I have the honour to be,
with the highest consideration,
Sir,
Your most obedient,
humble servant,

Esme Howard."

Enclosure

"Chicago Drainage Canal.

"(From House of Commons Debates, Tuesday, May 19th, 1925)

"On the Orders of the Day:

"Right Hon. Arthur Meighen (Leader of the Opposition):

"Mr. Speaker, I have seen a report which has given me some concern; I do not know whether it has come to the Government's attention or not. It relates to the Chicago drainage canal diversion and to the interpretation given the recent judgment of the Supreme Court of the United States by the Chicago authorities and, so far as I know, by others generally. It is well known that a limitation was placed on the diversion by the Supreme Court judgment, which limitation was believed here to be a real limitation of the very serious diversion from our waters which had up to then taken place, and the still more serious diversion in immediate prospect, it being a limitation to 8,500 cubic second feet. The interpretation which I have seen as intended to be acted upon is this; that the 8,500 cubic second feet, disastrously serious in itself, is to be applied to the drainage exit alone, that is to say, it is not to include the waters diverted by the alteration of the course of the Chicago river, which course has been changed from a flow into the lake—the natural flow—to a flow at a nearer point into the Chicago canal. It also involves an exclusion of the water taken for purposes of water supply. That is to say, the interpretation is said to be 8,500 cubic second feet for drainage alone, exclusive of 1,300 cubic second feet represented by the turning of the course of the Chicago river, and 1,200 cubic second feet more taken for the purposes of water supply. This total would be 11,000 cubic second feet, or worse than we ever understood as having been the actual practice. I would like to ask the Government if they have had any information to this effect, and if so, what steps the Government have in mind to bring to a head, or at least, to some prospect of solution, this very dreaded and calamitous state of affairs.

"Right Hon. W. L. Mackenzie King (Prime Minister):

"The matter to which my right hon. friend has just referred came also to the attention of the government and we immediately communicated with the United States Government, placing before them the interpretation referred to and asking them whether that was the view they took of the decision and its effect. We also drew attention to other possible interpretations with a view to getting from the United States authorities an exact statement of what in their opinion was the authoritative interpretation. Up to the moment we have not received any final answer, but in view of my right hon. friend's question today I will have a further despatch sent."

"Department of State,
Washington,
June 15, 1925.

"Mr. Henry G. Chilton, C. M. G.,
Envoy Extraordinary and Minister Plenipotentiary,
Chargé d'Affaires ad interim of Great Britain.

"Sir:

"Referring further to your note No. 467 of May 7, 1925, concerning the diversion of water from Lake Michigan by the Sanitary District of Chicago, I have the honour to furnish you with the following information in reply to the inquiries made by the Canadian Government.

"First: The actual average flow of the water passing Lockport during the year ending March 3, 1925, has been 9,700 cubic feet per second.

"Second: This average flow of water passing Lockport will not be immediately reduced by any amount under the terms of the permit issued by the Secretary of War on March 3, 1925.

"Third: This average flow may be reduced by December 31, 1929, by an amount varying from 1,750 to 3,000 cubic feet per second.

"By way of explanation of the wide range over which the amount of reduction by December 31, 1929, varies, it should be stated that the amount of reduction depends upon the decrease in the sewage load on the water in the Drainage Canal. The permit prescribes that a minimum population of 1,200,000 be provided with the equivalent of 100% treatment. The program of sewage treatment plant construction contemplates the completion of plants which will give 100% treatment to a population of slightly over 1,400,000. If this program is carried to completion a larger reduction may be made in the flow than if only the requirements of the permit are carried out.

"Furthermore, when the controlling works which are required to be placed in the Chicago River or Drainage Canal to prevent reversals into Lake Michigan in times of flood are completed and in operation it may be found practicable to make a much larger reduction in the flow of water with safety to the water supply of the City of Chicago during winter season, a time when the oxygen content of the diluting water is much higher than it is during the summer season.

"It is also expected that there will be a substantial reduction in the amount of water consumed in the locality for domestic purposes as the result of a requirement of the permit of March 3, 1925, which makes it necessary for the City of Chicago to adopt and carry into execution a program of metering its water supply. By December 31, 1929, this reduction will vary between 400 and 600 cubic feet per second.

"The net result of all these varying influences will be to make it possible to reduce the average flow by a minimum amount of 1,750 cubic feet per second, and possibly by the maximum amount of 3,000 cubic feet per second.

"To explain the apparent inconsistency between the amount of water specified in the permit (8,500 cubic feet per second measured at the intakes) and the flow at Lockport (9,700 cubic feet per second) it might be stated that the difference represents the amount of domestic water consumption by the City of Chicago which could not be authorized or included properly in a permit issued to the Sanitary District of Chicago, a separate municipality, other than to make the permit non-operative in case of failure on the part of the former agency to adopt certain measures of conservation which were specified. Condition 8 of the permit of March 3, 1925, looks to a substantial reduction of this portion of the flow in the Chicago Drainage Canal, at the same time condition 4 makes possible a reduction in the amount of water used for dilution of sewage.

"Accept, Sir, the renewed assurances of my high consideration.

"For the Secretary of State:

"Joseph C. Grew."

"British Embassy,
Manchester, Mass.
September 15th, 1925.

"The Honourable
Frank B. Kellogg,
Secretary of State of the United States,
Washington, D. C.

"Sir,

"At the request of the Governor General of Canada, I have the honour to inform you that the Government of Canada has carefully considered your note of June the 15th last on the subject of the interpretation of the permit granted by the United States Secretary of War on the 3rd of March, 1925, for the diversion of water from Lake Michigan by the Sanitary District of Chicago.

"The Government of Canada is constrained to point out that despite repeated protests against the diversion of water from Lake Michigan, the above-mentioned permit of March 3rd, 1925, authorizes a diversion in amount over twice that stipulated in any previous permits.

"In this connection I have the honour to state that the Canadian Government also views with apprehension the interpretation which has been placed upon the permit in your note under reference. As set forth in the note which I had the honour to address to you on this subject on May the 7th last, the Government of Canada believed that the present permit, as in the case of previous permits, would limit the amount of the total diversion and be applicable to all waters passing Lockport. The interpretation of the permit of the 3rd March, 1925, as contained in your note under reference, would indicate, however, that the point of measurement is changed from Lockport to the intake works of the Sanitary District and through such change the permit recognizes an actual diversion much in excess of the stipulated amount of 8,500 second feet set forth in the permit. In other words, it is clearly stated that the permit does not embrace water diverted by the City of Chicago's pumping stations which at the present rate of pumping amounts to some 1,200 second feet thereby increasing the authorized diversion from 8,500 second feet to 9,700 second feet.

"In addition, it would appear that if measurement be made at the intake from Lake Michigan the result would be to exclude from the operations of the permit the intercepted flow of the Chicago and Little Calumet Rivers, which varies in amount but is equal, it is understood, to an annual average of about 1,300 second feet. In these circumstances it would appear that the effect of the permit of the 3rd March would not merely authorize an average annual diversion of 9,700 second feet as above noted, but would recognize and permit of a total diversion passing Lockport of 11,000 second feet.

"While it is understood from your note of June the 15th that the Government of the United States anticipates that at the expiry of a five year period the annual diversion may be reduced between 1,750 and 3,000 second feet, this is far from reassuring since even if the larger suggested reduction becomes effective, the diversion at the beginning of 1930 will still be almost double that authorized by the Secretary of War of the United States when action for an injunction against the Sanitary District of Chicago was commenced in 1908.

"Furthermore, the Government of Canada would point out that works dependent on the levels and flow of the Great Lakes System cannot be confidently projected or economically carried out if diversions from the watershed are permitted without mutual assent thereto. Moreover, in this connection the continued and increasing impairment of the natural levels and discharge of the Great Lakes System, due to the diversion from Lake Michigan, raises the question as to the extent to which the Canadian Government would be warranted in giving consideration to any further improvements therein until there is an assurance of definite curtailment of such diversion.

"In connection with this matter the attention of the Canadian Government has been called to a permit dated the 30th April, 1925, from the United States Acting Secretary of War, authorizing the Sanitary District of Chicago to carry out certain dredging work in the Calumet river system, which it is understood will involve an expenditure of $1,500,000 and enable the Calumet-Sag Channel to bypass 2000 second feet into the main drainage canal. If the report of this large expenditure is correct, it would appear to indicate that the Sanitary District is proceeding in expectation of continued diversion.

"The Canadian Government is therefore compelled to conclude that despite repeated protests no immediate or definite reduction has been provided and, furthermore, that if the above interpretation of the permit of 3rd March, 1925, is confirmed, the effect will actually be to authorize a greater diversion than is now being made.

"I accordingly have the honour to request that you will be so good as to communicate the above consideration to the competent authorities of the United States Government and to enquire whether it is not their intention to take measures to ensure immediate as well as more definite and more substantial future curtailment in the amount of water which is being diverted with such serious results from the Great Lakes and St. Lawrence System.

"I have the honour to be,
with the highest consideration,
Sir,
Your most obedient,
humble servant,
(Signed) H. G. Chilton."

"British Embassy,
Washington, D. C.
October 5th, 1925.

"The Honourable
Frank B. Kellogg,
Secretary of State of the United States,
Washington, D. C.

"Sir:

"With reference to my note No. 813 of September 15th last, I have the honour to inform you that the word 'reported' used in the second paragraph thereof should be amended to read 'repeated.' It is regretted that this error should have occurred.

"I have the honour to be,
with the highest consideration,
Sir,
Your most obedient,
humble servant,
(Signed) H. G. Chilton."

"British Embassy,
Washington, D. C.
November 5th, 1925.

"The Honourable
Frank B. Kellogg,
Secretary of State of the United States,
Washington, D. C.

"Sir:

"I have the honour to draw your attention to a clerical error in paragraph 7 of my note No. 813 of the 15th ultimo, on the subject of the diversion of water from Lake Michigan by the Sanitary District of Chicago. In that paragraph the sum of $1,500,00 quoted in the passage reading 'involve an expenditure of' is erroneous, and should read $1,500,000.

"I have the honour to request that you will be so good as to correct the error in the original note from this Embassy the occurrence of which is regretted.

"I have the honour to be,
with the highest consideration,
Sir,
Your most obedient,
humble servant,
(Signed) Esme Howard."

"November 24, 1925.

"His Excellency
The Right Honorable
Sir Esme Howard, G. C. M. G., K. C. B., C. V. O.,
Ambassador of Great Britain.

"Excellency:

"Referring further to your Embassy's note No. 813 of September 15, 1925, bringing to my attention certain remarks and inquiries of the Canadian Government in regard to the diversion of water from Lake Michigan by the Sanitary District of Chicago, I take pleasure in submitting the following statements:

"The Sanitary District of Chicago to which the permit of March 3, 1925, was issued by the Secretary of War, is a municipal corporation separate and distinct from the City of Chicago. The operations of the Sanitary District are conducted under direct authority of the legislature of the State of Illinois without reference to the operations of the municipal government of the City of Chicago. Diversion of water for domestic consumption in the City of Chicago being purely a function of the municipal government of the City, it is considered that the authority granted the Sanitary District could not be made to apply to or include this other diversion as well. The case before the Secretary of War for action involved the granting of a permit for diversion of water for sanitary purposes only, and the instrument of authority was worded accordingly.

"On the other hand, it seemed to the Secretary of War that the diversion of water for domestic consumption by the City of Chicago was larger than it should be, and that the amount wasted was not a negligible portion of the gross diversion. He also considered that this excessive diversion for domestic purposes made the cost of sewage treatment plant construction and operation unnecessarily high and consequently added to the length of the construction period and the difficulties of financing. For these reasons the Secretary of War took cognizance of the diversion for which the City of Chicago is responsible, in a restrictive way, rather than by permissive means, and included a condition in the permit making the instrument voidable in case of City of Chicago fails to take specified steps looking to a curtailment in the amount of water diverted for domestic purposes.

"In the judgment of the Secretary of War the average diversion which should be authorized for sanitary purposes under the conditions known to exist should be not less than 8,500 cubic feet per second. The safety of the lives and health of citizens of the locality cannot be disregarded, and until the conditions of the permit of March 3, 1925, have been complied with no substantial reduction in the amount of diversion could be made without endangering health if not life.

"The expression 'measured at the intakes,' used to designate the places where the total actual flow should not exceed that specified in the permit, is hypothetical as it is impracticable to measure the diversion at the numerous intakes with accuracy. For this reason, the practical enforcement of the limitation placed upon the diversion will be carried out at Lockport. Measurements taken there will determine the gross diversion, sanitary and domestic, and, as accurate information is available in regard to the amount of water pumped by the City of Chicago for domestic purposes, the sanitary diversion may be computed by subtracting the domestic diversion from the gross flow at Lockport.

"The term 'diversion' as used in the permit is construed to include the discharge of the Chicago and Calumet Rivers. In view of the methods employed in computing the amount of the diversion the discharge of these streams will be included within the 8,500 cubic feet per second authorized by the permit of March 3, 1925.

"With reference to the permit issued on April 29, 1925, by the Acting Secretary of War, authorizing the dredging of the Little Calumet River, attention is invited to the following special condition attached thereto: 'That this permit does not authorize and should not be construed as authorizing or allowing any increase whatever in the diversion of water from Lake Michigan authorized by permit issued to the Sanitary District of Chicago by the Secretary of War March 3, 1925, nor as modifying in any respect the conditions of that permit.'

"The deepening of the Little Calumet River will give the Sanitary District of Chicago better control over river reversals, for it will increase the discharge capacity of the system at intermediate stages and insure protection of the water supply during these critical periods. Since the total sanitary diversion is limited to an average of 8,500 cubic feet per second and an instantaneous maximum of 11,000 cubic feet per second, if the Sanitary District chooses to pass 2,000 cubic feet per second through the Calumet River and Sag Channel it will be required to reduce the amount diverted through its other intakes to keep within the limitations placed by the permit of March 3, 1925.

"The Canadian Government is correct in concluding that no immediate reduction in diversions has been provided, but its conclusion that no definite reduction is assured and that the effect of the permits will actually be to authorize a greater diversion than is now being made cannot be confirmed. The *gross flow* at Lockport will not exceed an average of 9,700 cubic feet per second, and by the time the permit of March 3, 1925, has expired the gross flow may be reduced to 8,000 cubic feet per second and probably to 6,700 cubic feet per second. The sewage treatment program of the Sanitary District has been arranged, so as to make it possible to effect a reduction to a gross flow of 4,167 cubic feet per second by the year 1935 or before.

"I shall be grateful if you will cause the foregoing statements to be brought to the attention of the Canadian Government.

"Accept, Excellency, the renewed assurances of my highest consideration.

(Signed) Frank B. Kellogg."

Office Supreme Court, U. S.
FILED
JUN 1 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1925.

Number 25 Original in Equity. [redacted] [redacted] 10

STATE OF MICHIGAN,
Complainant,
vs.
THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

JOINT AND SEVERAL ANSWER OF DEFENDANTS, THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, TO THE BILL OF COMPLAINT.

THE STATE OF ILLINOIS,
By OSCAR E. CARLSTROM,
Attorney General,
CYRUS E. DIETZ and
HUGH S. JOHNSON,
Solicitors for Defendant, State of Illinois.

THE SANITARY DISTRICT OF CHICAGO,
By HECTOR A. BROUILLET,
Attorney,
MORTON S. CRESSY,
Assistant Attorney,
Solicitors for Defendant,
The Sanitary District of Chicago.

BARNARD & MILLER PRINT, CHICAGO

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1925.

Number 27 Original in Equity.

STATE OF MICHIGAN,

Complainant,

vs.

THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,

Defendants.

JOINT AND SEVERAL ANSWER OF DEFENDANTS, THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, TO THE BILL OF COMPLAINT.

These defendants, State of Illinois, by Oscar E. Carlstrom, Attorney General, Cyrus E. Dietz and Hugh S. Johnson, its solicitors, and The Sanitary District of Chicago, by Hector A. Brouillet, Attorney, and Morton S. Cressy, Assistant Attorney, its solicitors, reserving to themselves all right of exception to said bill of complaint, for joint and several answer thereunto alleged, aver and say as follows:

1.

These defendants admit that the State of Michigan is one of the States of the United States of America, and that it brings this action in this court as such State of the United States of America, and they admit that the action is brought in the Supreme Court of the United States in the exercise of the original jurisdiction of said court, on the claimed ground that it is an action in equity relating to an alleged controversy between two states of the United States and also between a state of the United States and a citizen of another state. But these defendants deny that a controversy exists between the said complainant and the defendants, cognizable in this court, and over which this court has jurisdiction, but they aver that the matters and things in the said bill of complaint set forth and upon which the said complainant seeks relief, relate to the regulation of the Great Lakes System of Waterways and the channels and harbors connected therewith, including the channels and harbors located along the shores of the Great Lakes; that the said Great Lakes System of Waterways, channels and harbors connected with it, are interstate or national waters, over which the United States has and has assumed exclusive jurisdiction; that the said supposed interference with navigation in said bill of complaint alleged, upon said Great Lakes System of Waterways and harbors and channels connected with it due to the supposed acts and doings of the said defendants, or one of them, can be complained of, if at all, only by the United States, and that the United States is a necessary and indispensable party. For the reasons in this paragraph stated, these defendants do now hereby move that the said bill of complaint be dismissed.

2.

Defendants admit that the State of Illinois is one of the states of the United States of America, and the defendant The Sanitary District of Chicago, is a public municipal corporation organized and existing under and by virtue of the laws of the State of Illinois and is a citizen of Illinois.

3.

These defendants admit that the State of Michigan has approximately 1,624 miles of shore line along Lakes Superior, Michigan, Huron, St. Clair and Erie and their connecting waterways.

These defendants admit that Lakes Superior, Michigan, Huron, St. Clair, Erie and Ontario are known as the Great Lakes and are sometimes called inland seas or oceans; that each of said lakes is connected by outlet—inlet rivers through which water flows from the upper lakes to the lower lakes. These defendants deny that in a state of nature there was provided a natural water highway extending from the upper lake (Lake Superior) to the Atlantic Ocean by way of the St. Lawrence, but on the contrary aver that the said lakes and their connecting waterways in a state of nature afforded very meagre means for water communication for useful commerce, and that there was substantially no water highway connection between Lakes Superior and Michigan-Huron or between Lakes Huron and Erie, between Erie and Ontario, between Ontario and the Atlantic Ocean and the St. Lawrence River; that the rapids of the St. Lawrence and Niagara Falls and the rapids below and the rapids of the St. Marys River, constituted impassable barriers to navigation between said lakes, and that the shallowness of the waters of the St. Clair and Detroit Rivers made water connection for commerce between Lakes Erie and Huron in a state of nature almost impossible; that the outlet to the sea for water navigation in a state of nature was principally at the lower end of

Lake Michigan through the Chicago River, the South Branch and the West Fork thereof, Mud Lake, the Desplaines, Illinois and Mississippi Rivers; that the present facilities for navigation upon the Great Lakes and the connection between the different Great Lakes and between them and the Atlantic Ocean has been provided almost entirely through artificial means and by the United States of America within its domain and Great Britain or the Dominion of Canada within the territory of the Dominion of Canada; that in providing said facilities for waterway navigation upon the Great Lakes the United States has provided and is providing for proper waterway connection between such system of waterways and the system of waterways represented by the Mississippi River and its tributaries, and that such connection has been provided and is being maintained by way of the Chicago River, its South Branch and the West Fork of the South Branch of the Chicago River and by an artificial canal and waterway, (the Sanitary & Ship Canal of defendant District), to and through the Desplaines and Illinois Rivers; that said so-called Great Lakes system of waterways is only a part of, but an integral part of the great system of inland waterways improved, created, maintained, controlled and/or regulated by the United States of America.

4.

These defendants admit that the Great Lakes waterway lies partly within the United States of America, and partly within the Dominion of Canada, one of the states or dominions of the colonial empire of Great Britain and the continuation of that highway connecting the Great Lakes with the Atlantic Ocean through and by the St. Lawrence River, passes for a great distance wholly through the Canadian territory; that all of said waterway lying within international waters has been opened by treaties between the United States of America and Great Britain and the Dominion of Canada, as free water so that American vessels, including the ships of citizens of complainant and the trade and commerce of its people, are secured equal rights of navigation with Canadian vessels in the many harbors, approximately 50 in number, which the Canadian government has improved for shipping on the Great Lakes, their connecting waters and the St. Lawrence River.

These defendants aver that under the treaty between Great Britain and the United States concluded May 8, 1871, proclaimed July 4, 1871, known as the Treaty of Washington, the subjects of her Britannic Majesty were accorded reciprocal rights of navigation in the waters of the United States such as the St. Clair Flats Canal and in all canals connected with the navigation of the lakes or rivers traversed by or contiguous to the boundary line between the United States and Canada, including also the free and open use of the waters of Lake Michigan, wholly within the confines of the United States, for the purposes of commerce.

But these defendants deny that said rights and benefits of navigation are of great and continuous and/or peculiar benefit to the complainant State or the people of complainant State, or the property or the shipping interest of complainant State, as alleged in paragraph 4 of said bill of complaint. But these defendants respectfully show unto the court that said rights and benefits of navigation are under the exclusive control of the United States by reason of its exclusive control over interstate commerce, and that the citizens and people of the State of Michigan, if they receive any benefits by reason of such navigation, they receive it by virtue of the fact that they are citizens of the United States, and in common with all other citizens of the United States and not by reason of the fact that they are citizens of the State of Michigan, and that the United States of America has the exclusive right to represent the people of the State of Michigan in all matters pertaining to interstate or foreign commerce. For the reason in this paragraph stated, these defendants do hereby move that the said bill of complaint be dismissed.

5.

These defendants admit that the so-called Great Lakes as physical bodies of water lie within one watershed, but these defendants deny that the so-called Great Lakes system of waterways lies within one watershed. On the contrary, defendants aver that it is a part of the system of inland waterways of the United States extending into and connecting various and sundry so-called watersheds. These defendants admit that the said so-called Great Lakes waterway, as well as all other waterways, may be improved by the United States and by the States upon the approval of those officers of the United States authorized by Congress to grant such approval. These defendants deny the allegation in paragraph 5 of said bill of complaint that such waterways may not be destroyed or impaired by State or Federal authority. On the contrary these defendants aver that the Federal Government, acting through its constituted authority and the different States with the approval of properly constituted Federal officers, may impair or destroy parts of waterways in the exercise of the power of the United States to regulate interstate commerce and control and regulate navigable waters; that beginning with upwards of a century ago the United States entered upon projects for the improvement, control and regulation of the nav--gable waters of the Great Lakes and their connections with other navigable waters within the boundaries of the United States and has continuously since said time increased the extent of such control of navigation until on March 3, 1899, Congress passed an Act known as the Rivers and Harbors Appropriation Act of said date, by which Congress undertook complete control and regulation of and has ever since controlled and regulated the navigable waters of the United States, including the so-called Great Lakes waterway and the connection between said waterway and that waterway represented by the Mississippi River and its tributaries.

6.

These defendants admit that the State of Micihgan was admitted to the Union of the States comprising the United States of America, in 1837, being created from a portion of the territory known as the North West Territory established by an ordinance of the Congress of the United States on July 13, 1787, from territory previously ceded to the United States by the State of Virginia upon the condition, among other things, that from said ceded territory there should be created not less than three nor more than five states; said ordinance, by Article Four thereof expressly provided:

> "The navigable water leading into the Mississippi and St. Lawrence and the carrying places between the same shall become highways and forever free as well to the inhabitants of the said territory as to the citizens of the United States and those of any other states ~~and those of any other states~~ that may be admitted into the confederacy without any taxes, imposts or duty therefor."

Said provision of said ordinance was a recognition that the people of said territory should have the same rights of free ingress and egress as were secured to the citizens by the fourth article of the confederation between the States.

In this connection, however, these defendants aver that the said Article 4 of Ordinance of July 13, 1787, was and is subject to the power and authority granted to Congress by the Constitution of the United States to regulate commerce among the States, not only exercised at the time the said State of Michigan became a member of the Union, but also as to any regulation exercised thereafter; that prior to the said year 1837 when the said State of Michigan was admitted to the Union, the Congress of the United States had provided for and approved the construction of a canal to connect or unite the waters of Lake Michigan with those of the Illinois River, and in that connection had authorized the State of Illinois to abstract from Lake Michigan such amounts of water as should be reasonably necessary and required for the operation of said canal and the maintenance of navigation upon the Illinois River below the terminus of the proposed canal; that the United States itself had expressed through Congress the policy of so improving and maintaining the ancient waterway from Lake Michigan to and through the Illinois River; that the will of Congress was expressed by the Act of March 30, 1822, entitled "An Act to authorize the State of Illinois to open a canal through the public lands to connect the Illinois River with Lake Michigan," and also by the Act of March 2, 1827, entitled, "An Act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan;" that said Acts of Congress are still in full force and effect and are hereinafter more particularly set forth; that on January 9, 1836, prior to the admission of the said complainant to the Union as a State, the General Assembly of Illinois, acting under the authority and grant of said congressional acts of March 30, 1822, and March 2, 1827, passed an Act providing for the construction of and under which the Illinois and Michigan Canal, extending from the West Fork of the South Branch of the Chicago River southwesterly to Utica on the Illinois River, was constructed; that continuously since the passage of said Congressional Acts of March 30, 1822, March 2, 1827, and the construction of the Illinois and Michigan Canal, the State of Illinois, with the approval of the United States, has provided and maintained a waterway from the said Lake Michigan to and through the Illinois River, the operation of which waterway has depended at all times upon the abstraction of a large quantity of water from Lake Michigan, and does now depend upon the abstraction from Lake Michigan of approximately 8,500 cubic seconds feet of water, all of which is more particularly set forth hereinafter.

7.

These defendants admit that the State of Michigan on its admission to the Union of the States took and had the title to all of the submerged or subaqueous lands within its borders, which included the lakes, bottoms of that portion of the Great Lakes, Superior, Michigan, Huron, St. Clair and Erie, within its borders.

But these defendants aver that the said title to such submerged or subaqueous lands within the borders of said complainant State, is a bare, technical title and has no substance, and such title is subject to and is enveloped by the paramount power of Congress to control the said navigable waters in the regulation of interstate commerce; that said power of Congress is exclusive, has been and is being completely and fully exercised to the exclusion of any and all claimed rights of the States therein.

8.

These defendants deny that the State of Michigan in its proprietary capacity or in trust for its people, or its shippers, or its shipping, or its commerce, ever had, or continues now to have, a vested right in said Great Lakes waterway as a public highway or a perpetual paramount easement for highway purposes, and deny that said alleged right was, prior to the admission of said state into the Union, vested in, or held in trust for the public, by the British Crown or by the State of Virginia, or by the organized territorrial division thereof known as the North West Territory, but these defendants respectfully show unto the court that the regulation of navigation and of the so-called water highway, was, at the time of the filing of the bill of complaint herein, under the exclusive control of the Congress of the United States. For the reason stated in this paragraph defendants do hereby move that the said bill of complaint be dismissed.

9.

These defendants deny that complainant has any vested right in and to the so-called Great Lakes Waterway in any respect different from the rights afforded to the public generally through the exercise by Congress of its control over navigation; that complainant or States bordering upon said so-called Great Lakes Waterway, have any concurrent right or rights with each other in any respect different from the rights afforded to the public through the control by Congress of such waterways; that neither the complainant State nor any other State or States bordering upon the said so-called Great Lakes Waterway, is lawfully entitled to receive all the water from rivers and streams in said watershed for the purpose of keeping up and maintaining the waters in said watershed as such natural highway. These defendants aver that the water from rivers and streams in said watershed finding their way into navigable waters of the United States, are subject to the complete and exclusive control of the Congress of the United States in the regulation of interstate commerce in such manner as Congress in exercise of the political functions of Government, may consider reasonably necessary for the general public welfare.

10.

These defendants admit that in the year 1889, the Legislature of the State of Illinois, enacted a statute entitled:

> "An act to create sanitary districts and remove obstructions in the Des Plaines and Illinois Rivers", approved May 29th, 1889, and published in the laws of Illinois for the year 1889 commencing at page 186; which act authorized the orginization of public corporations to be known as sanitary districts, with power, among other things, to construct, maintain and operate drainage canals or channels for the disposal of drainage and sewage,

and that Sections 23 and 24 of said act, are set forth *in haec verba* in said paragraph 10 of said bill of complaint.

11.

These defendants admit that in November and December of the year 1889, the Sanitary District of Chicago was organized under the said Act of 1889, hereinbefore referred to, and that it has since continuously existed as said Santary District under said Act of 1889, and acts amendatory thereof and supplementary thereto. These defendants admit that at the time of its organization, said defendant District consisted of a territory of about 185 square miles in area. These defendants admit that by successive acts of the Legislature of Illinois, the area of said defendant District has been increased from time to time, and that the area of said Sanitary District now comprises approximately 438 square miles, extending from the Illinois state line on the south and east to the northern boundary of Cook County on the North, with about 34 miles of frontage on Lake Michigan and comprises the entire City of Chicago and approximately 49 other cities and villages located near said City of Chicago, together with large areas of land to the south, west and north of said city.

12.

These defendants admit the allegations of paragraph 12 of said bill of complaint with reference to the construction of the main channel of the Sanitary District, except as to the time when said construction was commenced. As to such allegations defendants aver that the construction of the main channel of said Sanitary District of Chicago was commenced during the year 1890 and long prior to said 3d day of September, 1892.

13.

These defendants deny that in the construction of said canal it was at all times, or that it is now, the plan of defendants that said canal should be used as a passageway for the sewage of the territory comprising The Sanitary District of Chicago, as, and in the manner, alleged in paragraph 13 of said bill; and aver that it never was, and is not now, the intention of defendants to use said canal in any manner, or to divert the water from Lake Michigan, except as authorized or permitted by the United States; and admits that Section 20 of the said Act of the General Assembly of 1889, by which the Sanitary District was organized, was amended in 1895 by the General Assembly of Illinois as is in said paragraph alleged, but defendants aver that without said amendment said section of said original act provided for the diversion and flow continuously through the main channel of "at least 200 cubic feet per minute for each 1,000 population of the district drained thereby," which is equivalent in amount to 20,000 cubic feet per minute for every 100,000 population, which is the specification contained in the 1895 amendment referred to in said paragraph 12.

14.

These defendants admit the allegations of paragraph 14 of said amended bill of complaint except as to the date when the main channel of the Sanitary District was opened, and avers that said main channel was opened on January 17, 1900.

15.

These defendants deny that the primary object and purpose of the Act of 1889, as alleged in said bill of complaint, was to provide a method of disposing of the sewage of the City of Chicago and contiguous territory, but admit that that was one of the objects and purposes of said act; and these defendants aver in this respect that the principal object or purpose of the said Act of 1889 was to provide for the construction of a ship canal to connect the Chicago River with the Desplaines and Illinois Rivers, and for the construction of other canals and waterways connected with it, and to provide for the quantity of water necessary for navigation upon the said ship canal and upon the Desplaines and Illinois Rivers, and to further carry out the plan and program of the State of Illinois for the construction of a deep waterway between the Great Lakes and the Mississippi River in accordance with various acts of Congress and acts of the State of Illinis, as hereinafter more specifically set forth.

These defendants admit that by the said Act of 1889 and acts amendatory and supplementary thereto, it is the legal duty of the defendant Sanitary District of Chicago, subject to the authority and permission of the United States, to pass through said canal water at the rate of 20,000 cubic feet per minute, or 33⅓ cubic feet per second, for every 100,000 inhabitants within the territory of the defendant Sanitary District of Chicago, and that the only source from which said quantities of water may be obtained was by the diversion of water from Lake Michigan.

These defendants aver that at the time of the passage of said Act of 1889, the Congress of the United States had not passed any act or acts by which it had assumed or had sought to assume general regulation of navigable waters of the United States; that the General Assembly of Illinois, in passing said Act of 1889 providing for said diversion in the amounts required according to population of the said Sanitary District, believed that it was acting not only in pursuance of the express power granted by Congress under the Acts of Congress of March 30, 1822, and March 2, 1827, relating to the construction of the Illinois and Michigan Canal hereinafter more particularly mentioned, but also in pursuance of the power then existing in the State of Illinois to regulate its navigable waters; that the said Act of 1895 above mentioned and as heretofore alleged, did not change in any respect the intent of the Legislature of Illinois as expressed by said Act of 1889 with reference to the quantity of water according to population of the Sanitary District of Chicago to be diverted from Lake Michigan; that upon the passage of the Rivers and Harbors Act of September 19, 1890, and The Rivers and Harbors Act of March 3, 1899, under which the Congress of the United States assumed jurisdiction to regulate generally navigable waters of the United States, the said defendant The Sanitary District of Chicago, in exercising the power and authority granted by the said Act of 1889 and acts amendatory thereof and supplementary thereto, sought to act and did act, at all times, in conjunction with and by the authority of the United States according to law.

These defendants admit that the population of the territory of the Sanitary District of Chicago according to the census of 1920, was 2,963,090, and admit that the said Act of 1889 of the General Assembly of Illinois and acts amendatory thereof and supplementary thereto, require the diversion or abstraction of water from Lake Michigan at the rate of approximately 9,876 cubic feet per second; but defendants aver that they cannot abstract or divert said quantity of water and does not intend to abstract or divert said quantity of water or any other quantity, except by and with the authority of the United States according to law.

16.

These defendants admit that subsequent to the opening of said canal, and in the year 1903, the defendant State of Illinois, by an act of its Legislature approved May 14, 1903, and published in the Laws of Illinois for the year 1903, commencing on page 113, undertook to authorize and did authorize the defendant, the Sanitary District of Chicago, to construct and operate a plant for the generation of electrical energy by hydraulic power derived from the water passing through the said canal.

The provisions of Sections 5 and 6 of said act are set forth *in haec verba* in said paragraph 16 of said bill of complaint.

17.

These defendants admit the allegations of paragraph 17 of said bill of complaint, with reference to the construction and operation of the hydroelectric power plant at Lockport, Illinois, and the capacity thereof; that the electrical energy thus generated is mainly transmitted to the City of Chicago and there sold for municipal and commercial purposes; but deny that the operations of said plant have earned for the Sanitary District of Chicago, many millions of dollars of profit over and above the cost of operating said plant, including proper allowance for depreciation and a reasonable return upon the investment therein.

18.

These defendants deny that since the completion of said hydro-electric development near the western terminus of said canal, the object and purpose of the defendant in the operation of the said canal and in the abstraction or diversion of water from Lake Michigan through the same has been and is now two-fold, to-wit: The disposition of the sewage of the defendant Sanitary District of Chicago, and the generation and sale of electrical energy as alleged in paragraph 18 of said amended Bill of Complaint. These defendants aver that the amount of water diverted from time to time has been and is reasonably necessary for the purposes of navigation and is as near as may be determined the amount provided to be diverted according to law; that at no time has the mean daily, or mean monthly, or mean yearly flow or diversion exceeded that amount; that prior to the construction of the said hydro-electric plant, the energy produced by said water as it passed from the southern terminus of the said main channel to the Desplaines river was entirely wasted and served no purpose; that the only purpose of constructing and operating said hydro-electric plant was to conserve this energy; that said energy so produced has been and is used for the purpose of lighting the streets of the City of Chicago and its suburbs, and also for lighting the boulevards and parks of the various park systems of Chicago according to law; and that the energy so used for such public purposes has been and is sold at approximately the cost of production.

19.

These defendants deny the allegations of said amended bill of complaint contained in paragraph 18 thereof in respect to the mean yearly amount of water passing through said Sanitary District Canal at its western terminus for the years 1900 to 1917, both inclusive, and deny that the statements of said bill of complaint with respect to said amounts are correct, but aver that the said mean yearly amounts of water (including drainage) passing through said Sanitary District Canal at its western terminus for said years, and in addition for the years from 1918 to 1924, both inclusive, are as follows:

Year	*Cubic Feet Per Second*
1900	2,990
1901	4,046
1902	4,302
1903	4,971
1904	4,793
1905	4,480
1906	4,473
1907	5,116
1908	6,443
1909	6,495
1910	6,833
1911	6,896
1912	6,938
1913	7,839
1914	7,815
1915	7,738
1916	8,200
1917	8,726
1918	8,826
1919	8,595
1920	8,346
1921	8,355
1922	8,858
1923	8,348
1924	9,465

that since March 3, 1925, the abstraction of water from Lake Michigan has not exceeded the amount fixed by the permit of the Secretary of War of said date, which said permit is set out in *haec verba* hereinafter.

20.

Defendants are not informed as to the amount of water naturally or in a state of nature contributed to the Great Lakes watershed through rivers and streams of the State of Illinois, and therefore ask strict proof as to the allegations as to such amount contained in paragraph 20 of said bill of complaint. These defendants deny that Defendant District is now withdrawing permanently from the Great Lakes Watershed an average of 11,700 cubic feet of water per second, including the natural flow of the Chicago River, but aver that the amount so withdrawn does not exceed the amount fixed by the permit of the Secretary of War dated March 3, 1925, hereinafter set out.

These defendants admit that the Chicago River is reversed at substantially all times by and through the diversion of water from Lake Michigan according to law; that the water so diverted from Lake Michigan by defendant, the Sanitary District, is not returned in its natural course to the Great Lakes. Defendants deny that from time to time or at any time the abstraction or diversion of water from the Great Lakes is increased to a total of 14,200 cubic feet per second, but aver that at no time is the abstraction or diversion increased beyond the amount allowed by said permit of March 3, 1925, hereinafter set out. Defendants deny any resultant and resulting increased impairment of the levels of the Great Lakes during periods of low water or barometric pressure, increasing the hazards of navigation and causing an increased reduction of the navigable capacity of the Great Lakes, their connecting waterways, ports and harbors.

These defendants aver that the commerce described in said paragraph 20 of said Bill of Complaint is commerce carried on, over and upon navigable waters of the United States, over which Congress has assumed and has exclusive jurisdiction; that the supposed injury and damage so alleged in said Bill of Complaint, concerns and relates to interference with navigable waters of which the said complainant has no right or jurisdiction to complain, and therefore this defendant moves that the said allegations in paragraph 20 of this Bill of Complaint be stricken, and that the said Bill of Complaint as to such allegations be dismissed.

21.

These defendants admit that the Chicago River is a navigable stream within the Great Lakes watershed; that the Chicago River contributed in its natural state, some water per second into the waters of the Great Lakes, but the exact amount of such contribution in its natural state defendants are not informed and ask strict proof thereof. These defendants show that subsequent to the opening of the Illinois and Michigan Canal, about the year 1848, until the year 1871, a certain quantity of water was diverted through said canal from the Chicago River and Lake Michigan to the Desplaines and Illinois River; that about the year 1871 the said Illinois and Michigan Canal was completed upon what is known as the Deep Cut Plan, whereby a greater quantity of water was diverted through said canal, whereby the Chicago River flow was reversed substantially at all times, except approximately thirty days during each year when at flood times the Chicago River flowed into Lake Michigan; that such condition existed until about the year 1884, when pumps were installed at Bridgeport, the northern terminus of the Illinois and Michigan Canal, whereby through the operations of said pumps a larger quantity of water was diverted from the Chicago River and Lake Michigan through said canal to the Desplaines and Illinois Rivers; that such condition existed until the opening of the Sanitary and Ship Canal on the 17th of January, 1900; that from that date the Chicago River has substantially at all times, including flood times, been reversed and has not flowed and does not flow into Lake Michigan. These defendants deny that the complainant State or its people or its trade and commerce, ships or shipping, had or have any vested right for the purposes of navigation or a paramount easement for highway purposes in the use of the Chicago River. These defendants aver that the said diversions of water from the Chicago River and Lake Michigan as above set forth, were made pursuant to the authority of the United States, and that all diversions now taking place are pursuant to such authority; and these defendants deny that the complainant State of Michigan either in its proprietary capacity or in its quasi-sovereign capacity, has had, or otherwise had or has, any riparian rights in the natural flow of the said Chicago River; these defendants admit that defendant District has wholly diverted the flow of said Chicago River from said Great Lakes watershed, but deny that it has appropriated said Chicago River to its own use in the operation of a sewage disposal canal, or the production of hydro electric power, and deny that the diversion of said Chicago River has been diverted to the entire destruction of all riparian rights of the complainant State of Michigan, or of its people, or the navigation rights of all interests navigating the Great Lakes, as alleged in paragraph 20 of said Bill of Complaint, but defendants respectfully show unto the Court that the diversion of water of the Chicago River, as well as the diversion of water of the Great Lakes, has not and will not injure, to any extent, the riparian rights, (if any such rights there be), or any other rights of complainant, of its people, or of interests navigating the Great Lakes, and said diversion has been, and is, by and with the authority of the Secretary of War, in accordance with the provisions of the Federal Act of Congress of March 3, 1899, and that as to all matters and things complained of in said paragraph 21, the said United States of America has the exclusive control, and that the supposed injury and damage so alleged in said Bill of Complaint, concerns and relates to interference with the navigable waters of which the said complainant either in its proprietary capacity, or quasi-sovereign capacity, or otherwise, has no right or jurisdiction to complain, and therefore defendants move that said allegations in paragraph 21 of said Bill of Complaint be stricken, and that the said Bill of Complaint as to such allegations be dismissed.

22.

These defendants admit that all the water diverted from Lake Michigan through and by means of the Sanitary District channel, is carried into the Mississippi Valley; that said water is permanently abstracted from the Great Lakes system, but deny that, as the result of such diversion, the mean level of the water in Lakes Michigan, Huron, Erie and Ontario, and in the various waterways connecting said lakes, and in the St. Lawrence River above tidewater, has been lowered six inches below the level that would exist in said lakes and waterways in the absence of such diversion. This defendant Sanitary District avers that the lowering of the surface elevation of the waters of said lakes and their connecting channels as a result of said abstraction or diversion or diversions as authorized by said permit of March 3, 1925, does not and will not exceed four and three-quarters inches on any of said lakes or waterways; and this defendant avers that it does not intend to divert any amount of water in excess of that authorized by the United States.

As to the allegations of said paragraph 22 of said bill of complaint concerning the alleged effect upon the surface elevations of the waters of the Great Lakes by the diversion of water through the defendant Sanitary District's channel, this defendant the State of Illinois separately and particularly denies that as a result of said diversion the mean level of the waters in Lakes Michigan-

Huron, Erie and Ontario and the various waterways connecting said lakes and in the St. Lawrence River above tidewater, has been lowered six inches or to any extent below the level that would exist in said lakes and waterways in the absence of such diversion.

23.

Defendants are not informed that there is a or any unexplained reduction in the amount of water in the Great Lakes Basin or in the Great Lakes, and are therefore not informed as to whether deforestation has any effect upon the amount of water finding its way into all or the different Great Lakes or into the Great Lakes Basin, and therefore asks strict proof thereof. These defendants aver that they are informed and believe and upon such information so state the fact to be, that there is a fixed relation between the amount of water in the Great Lakes or in the different Great Lakes and the amount of rainfall or precipitation upon the lake surfaces and the drainage areas of the different Great Lakes; that there are so-called periods of low supply and also so-called periods of abundant supply of water; that the supply of water to the Great Lakes Basin and to the Great Lakes depends upon the amount of such precipitation; that the surface elevations of the waters of the different Great Lakes vary from year to year and are observed to run in cycles; that there is a direct relation between the surface elevations of the waters of the Great Lakes and the amount of precipitation during each year or during a period of years; that during certain years or during certain periods of years, due to weather conditions a greater percentage of the rainfall or precipitation upon the drainage areas finds its way through the rivers and streams of such drainage areas to the Great Lakes than finds its way during other years or other periods of years; that at the present time, due to lack of rainfall upon the drainage areas and upon the surface elevations of the Great Lakes and also to conditions of run-off, and due solely to such conditions, the surface elevations of all the Great Lakes, including Lake Superior (not in any way affected by the Chicago diversion) are low, but not substantially, if any, lower than the surface elevations of the lakes were at other times prior to the construction and operation of the Sanitary and Ship Canal and prior to the time when any considerable amount of deforestation took place; that the hydrographs issued by the Lake Survey of the United States showing the elevations of the different Great Lakes for almost a century, show approximately ten year cycles for the rise and fall of the lake surfaces due to rainfall or precipitation supply; that the surface elevations of the waters of the different Great Lakes bear a certain relation to each other; that is, the surface elevations of Lakes Michigan-Huron are generally a certain number of feet higher than the surface elevation of the water of Erie, and the same applies to Superior in comparison with Lakes Michigan-Huron and the surface elevations of the waters of Lake St. Clair as compared with the surface elevations of the waters of the lakes above and below, and a similar relation exists between the surface elevation of Erie and Ontario.

These defendants deny that there has been created large shoal areas other than that it is natural for such shoal areas to be created, or that there has been or will be any increasing hazard of open water navigation, or any destruction and retirement of the present commercial carriers of the Great Lakes, as alleged in paragraph 23 of said Bill of Complaint; but these defendants show that the channels and shoal areas of the Great Lakes have been platted by the Engineer Corps of the War

Department of the United States, and that the connecting channels and harbors situated within the complainant State, as well as within other States bordering upon the Great Lakes, have been dredged by the United States Government, and that it is by reason of such improvement by the United States that the present carriers of modern commerce are able to navigate them. These defendants deny that the complainant State of Michigan, or its people, or its industries, have any right to complain for the reason that the improvement and regulation of navigation is within the exclusive power of the Congress of the United States, and over which Congress has assumed and has exclusive jurisdiction, and the supposed injury and damage so alleged in said Bill of Complaint, concerns and relates to the interference with navigable waters of which the said complainant has no right or jurisdiction to complain, and therefore defendants move that the said allegations in paragraph 23 of said Bill of Complaint be stricken, and that the said Bill of Complaint as to such allegations be dismissed.

24.

These defendants deny the allegation of said Bill of Complaint to the effect that neither the Congress of the United States or any other Federal Agency or authority, or the Legislature of the State of Illinois, or any agency of that or any other state, has the authority to abstract from the Great Lakes basin, any water into any other natural or artificial watershed, and defendants deny that the purpose of such abstraction or diversion of water was for the purpose of operating, maintaining and flushing an open sewer maintained in violation of modern standards of sanitation. These defendants deny that the power of the Congress of the United States is expressly restricted to the control of the waterways of the Great Lakes as a navigable waterway under the powers vested in it by the commerce clause of the Constitution of the United States. These defendants respectfully show unto the Court that the United States of America is not made a party to this Bill of Complaint, and therefore move that all allegations in paragraph 24 of the said Bill of Complaint be stricken and that the said Bill of Complaint as to such allegations be dismissed.

25.

These defendants deny the allegation of said bill to the effect that there is no authority in the Government of the United States or of any of the States, or of any of their agencies, authorizing the changing of the natural course of the Chicago River, and these defendants deny that there is any unlawful alteration, reversal or change in said Chicago River and deny that the diversion of the Chicago River is against the rights of the complainant, but these defendants show that the allegations contained in paragraph 25, concern and relate to control of the navigable waters about which the said complainant has no right or jurisdiction to complain, and therefore defendants move that the said allegations of paragraph 25 of said Bill of Complaint be stricken, and said Bill of Complaint as to such allegations be dismissed.

26.

These defendants deny that the alleged lowering of the levels of the Great Lakes which are interrelated and interdependent, particularly lakes Michigan and Huron, which are in fact but one lake, the body of water connecting them being approximately 4 miles in width, has seriously diminished the navigability or navigable capacity of said Great Lakes, their ports, and harbors, or has caused a resultant or any impairment or partial or any destruction of the great natural highway, as alleged in paragraph 26 of said Bill of Complaint. These defendants admit that on said lakes there is a great commerce, domestic and foreign, and many freight and passenger ships operate on all of said lakes and waterways between the State of Michigan and the other States adjacent thereto and to and with other States and countries, and defendants admit that in addition thereto, there are great ships particularly of a type peculiar to the Great Lakes, and known as bulk freighters and having an enormous carrying capacity and capable of operation at very low freight rates when loaded to maximum capacity, carrying from the great wheat producing areas of the American Northwest (which, however, defendants respectfully show unto the Court is no part of the State of Michigan, complainant herein) the grain there produced to lower lake ports and to the ocean (which lower lake ports defendants respectfully show unto the Court, are not situated within the State of Michigan) and that said bulk freighters also carry from the large mineral territories of Northern Michigan and Minnesota and Canada, large mineral deposits, particularly of iron and copper ore, to the industrial districts of the United States, and particularly of Illinois, Ohio, Indiana, Pennsylvania and New York. But defendants are not advised as to whether the said ore is carried to the industrial districts of the Province of Ontario in the Dominion of Canada, or to the industrial districts of the State of Michigan, but pray strict proof of said allegations so far as the same may be material. Defendants admit that every inch of the normal draft of said vessels which they are unable to utilize, reduces the cargo carrying capacity by a number of tons, provided the draft of such vessels is greater than the depth of water in the harbors or other waters sought to be navigated by them. Defendants aver that the diversion of water from the Great Lakes by means of the Sanitary District works has not in any way affected the draft which vessels entering said ports are able to utilize and that their cargo carrying capacity has not been, and is not, reduced because of any such diversion. Defendants further aver that the commerce described in paragraph 26 of said Bill of Complaint, is interstate commerce and is carried on, over and upon those navigable waters of the United States, over which the United States has, and has assumed, exclusive jurisdiction, and that the complainant herein has no right to complain of any supposed interference with said navigable waters of the United States. Defendants further aver that all of said harbors or ports described in said Bill of Complaint require, for their maintenance, constant dredging each year under normal conditions, and any dredging made necessary by virtue of any supposed effect of said diversion upon said ports or harbors would be and is negligible and of no consequence, and defendants aver that all of said harbors have been dredged and the channels improved by the United States Government since the opening of said Sanitary District channel and such dredging operations have been made under the supervision and direction of the United States and at the cost of the United States; and have been made upon the basis of the withdrawal of 10,000 cubic feet of water per second at Chicago; and that, therefore, the withdrawal of water at Chicago, has not had any effect upon the navigable depth of water in said harbors or in said connecting channels. Defendants aver that the commerce described in paragraph 26 of said Bill of Complaint, is commerce carried on over and upon the navigable waters of the United States, over which Congress has assumed and has exclusive jurisdiction; that the supposed injury and damage so alleged in said Bill of Complaint, concerns and relates to interference with navigable waters of which the said complainant has no right or jurisdiction to complain, and therefore defendants move that the said allegations in paragraph 26 of said Bill of Complaint be stricken, and that the said Bill of Complaint as to such allegations be dismissed.

27.

These defendants deny that the State of Michigan in its proprietary capacity or in its quasi-sovereign capacity is injured by the alleged impairment of alleged riparian rights, if any such rights exist, in that portion of Lakes Superior, Michigan, Huron, St. Clair and Erie and their connecting waterways lying within its boundaries, and deny that there is any impairment of riparian or any other rights of said complainant State of Michigan resulting from the impairment and lowering of the levels of the Great Lakes consequent upon the diversion of the waters from the Great Lakes and their watershed by these defendants. Defendants respectfully show unto the Court, that the diversion of water at Chicago could have and has had, no effect whatever upon the level of Lake Superior.

28.

These defendants deny that the State of Michigan in its quasi-sovereign, or in any other capacity, has constantly sustained great, irreparable or any injury through any loss to its people, its trade, commerce, or shipping, or to owners of riparian rights in the Great Lakes and their connecting waterways, due to the lowering of the levels of the Great Lakes consequent upon the diversion of water from the Great Lakes by these defendants.

These defendants admit that a great number of citizens within the borders of complainant own riparian rights in the Great Lakes and their connecting waterways, of a value of a large amount of money, but defendants are not advised as to the extent of the value of such riparian rights, and therefore ask strict proof as to such value. Defendants deny that the value of said riparian rights is largely or to any extent dependent for their usefulness and value upon the maintenance of the levels of the Great Lakes. Defendants aver that it may be that the value of such riparian rights is largely dependent upon the maintenance of navigation facilities by the United States necessary for the demands of commerce upon such navigable waters. These defendants deny that the alleged impairment and lowering of the lake levels of said Great Lakes is destructive of riparian rights of citizens of complainant located within its borders, and that there has been or is any destruction incidental or otherwise to the value of docks, wharves, ship yards, boat-houses, warehouses and landing places. In this connection defendants aver that the riparian rights and the value of riparian rights of the citizens of Michigan is entirely dependent and subordinate to the control of navigable waters of the United States by Congress; that the State of Michigan has no right, authority or power to complain of the destruction or impairment of any such rights. Defendants deny that the said riparian rights or the value of said riparian rights of any of the citizens of the State of Michigan have been destroyed or in any manner affected by the interests of sewage disposal or hydro-electric power needs or desires or pretended or other economies of the defendant Sanitary District; that if there has been any impairment of such riparian rights or the value of such riparian rights of citizens of said complainant, it has been entirely through and by virtue of the exercise by the United States of its control of navigable waters.

29.

These defendants are not advised as to whether large numbers of citizens of the State of Michigan own interests in ships and ship yards within its borders, save by the allegation contained in said Bill of Complaint, but pray strict proof thereof so far as said allegations may be material, but these defendants deny that said ships or ship yards are being injured by the diversion and abstraction of water from the Great Lakes by these defendants, and deny that there is a consequent decrease in the navigable capacity of the Great Lakes or the navigable capacity of the ports and harbors of the Great Lakes. These defendants admit that the ports and harbors of the Great Lakes have been improved at a great expense by the Government of the United States, and that the ports and harbors of Canada have been improved by the Dominion of Canada, as alleged in paragraph 29 of the said Bill of Complaint, but deny that there has been any great or irreparable loss, or any loss to the complainant, or its people, or its trade or commerce.

30.

These defendants deny that the complainant in its proprietary capacity, or in any other capacity, has title to vast quantities or to any fish found in the Great Lakes, and on the contrary aver that the right of fishing in the Great Lakes navigable waters of the United States is a right common to the citizens of the United States, and such right does not belong to the citizens of any particular state.

These defendants are not advised, save by the allegations contained in said Bill of Complaint, as to the amount of the fish industry of the State of Michigan, and its people, as alleged in paragraph 30 of said Bill of Complaint, and defendants pray strict proof so far as the same may be material, but defendants deny that the said diversion of water has had, or will have, any effect upon the alleged fish industry, or will cause any injury to the complainant state or its people.

31.

These defendants deny that said acts in diverting water from the Great Lakes are in violation of the legal rights of complainant and the people of the State of Michigan, as alleged in paragraph 31 of the said Bill of Complaint.

(a) These defendants deny that by said alleged acts, or by any other acts, are they, or either of them, interfering with the common law or vested right or paramount easement of highway, if any such right or rights exist, of the State of Michigan or its people, or of the public generally, to have the free and unobstructed use of the Great Lakes waterway within and without the borders of the State of Michigan, for purposes of navigation, trade and commerce or for any other purpose, free from any and all interference with the present and prospective natural navigable capacity of the said waterway, and its usefulness as a public highway. These defendants respectfully show unto the Court that the said ports and harbors within the State of Michigan have been improved by the United States Government over their natural navigable capacity, and have been made more navigable than they were in a state of nature, and that the regulation of such harbors and ports and the use of the Great Lakes waterway is under the exclusive jurisdiction of the Congress of the United States, concerning which this complainant has no right or jurisdiction to complain.

(b) These defendants deny that by any acts mentioned in the said Bill of Complaint or by any other acts, have they interfered with the right, if any such right be, of the people of the State of Michigan, or of the people generally, to the free and unobstructed navigation of Lakes Superior, Michigan, Huron, St. Clair, Erie and Ontario, and the navigable waters between said lakes, and from said lakes into the Atlantic Ocean, which rights, if any there be, belong to the said people of the State of Michigan by the common law or by guarantee, if there be any common law right, or if there be any guarantee contained in the ordinance for the government of the territory of the United States northwest of the Ohio River, enacted by Congress on June 13, 1787, but defendants do not admit that the ordinance of June 13, 1787, constitutes such a contract between the Government of the United States and the several states, as to prevent the United States from issuing the permits issued by the Secretary of War, to this defendant, or for the improvement of the navigable waters of the United States, and they aver that the withdrawal and diversion of water, as authorized by the Secretary of War on the date of March 3, 1925, and the regulation of the navigable waters of the United States are under the exclusive jurisdiction of the Congress of the United States, concerning which the Complainant has no right to complain.

(c) These defendants deny that said alleged acts constitute any present or any increasing burden upon either intrastate or interstate commerce, and deny that it is impairing or destroying a natural highway used and useful in interstate commerce.

(d) These defendants deny that said act of diverting water from the Great Lakes is impairing the capacity of the said lakes, or is destructive of the fisheries thereof, or the riparian rights or shipping and commercial rights of the citizens of the Complainant State, on or in said Great Lakes or their connecting waterways, and they are not advised as to the allegations contained in sub-paragraph d of said paragraph 31 of said Bill of Complaint, as to the fishing industry, but defendants deny that said alleged acts have injured or will injure said fishing industry of the citizens of Complainant State. Defendants aver that whatever rights in fish, rights of fishing or whatever fishing industries there may be in the said complainant state or the citizens thereof, so far as said Great Lakes are concerned, are subject to the control of navigation by the United States.

(e) Defendants show that under the Act of Congress of the United State September 19, 1890, entitled "An Act making appropriations for the construction, repair and preservation of certain public works on Rivers and Harbors, and for other purposes" (26 U. S. Stat., at L. 426), the United States undertook certain control and regulation of all navigable waters of the United States; that thereafter Congress of the United States, on March 3, 1899, passed an act entitled "An Act making appropriations for the construction, repair and preservation of certain public works on rivers and harbors, and for other purposes" (30 U. S. Stat., at L. 1121); that under said act, particularly Sections 3 to 20, both inclusive, the Congress of the United States undertook complete and full regulation and control of all navigable waters; that Section 10 of said act is as follows:

> "Sec. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers

> and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

That said Act of Congress of March 3, 1899, invests the Secretary of War, upon the recommendation of the Chief of Engineers, with authority to fix and control the amount of the said diversion of water from Lake Michigan; that under said act the Congress of the United States has exercised and is exercising control of such diversion; that the Secretary of War, upon the recommendation of the Chief of Engineers, under said act has exercised and is exercising the control and regulation of the amount and manner of said diversion and abstraction of water from Lake Michigan; that the Secretary of War, upon the recommendation of the Chief of Engineers, has issued from time to time various permits authorizing, empowering and approving the diversion of various quantities of water from Lake Michigan at Chicago through said Sanitary and Ship Canal of defendant; that on or about March 3, 1925, the Secretary of War, upon the recommendation of the Chief of Engineers of the United States Army, issued a permit to this defendant regarding the amount, manner and the conditions of said diversion, which permit is in words and figures as follows, to-wit:

> "Whereas, By Section 10 of an Act of Congress, approved March 3, 1899, entitled 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any

port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same;

And Whereas, Application has been made to the Secretary of War by *The Sanitary District of Chicago, Illinois,* for authority to divert an annual average of 10,000 cubic feet of water per second from Lake Michigan through the channels of said Sanitary District;

And Whereas, In the judgment of the Secretary of War, an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

Now, Therefore, This is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provisions of the aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

1. That there shall be no unreasonable interference with navigation by the work herein authorized.
2. That if inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.
3. That no attempt shall be made by the permittee, or the owner, to forbid the full and free use by the public of any navigable waters of the United States.
4. That the Sanitary District of Chicago shall

carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

5. That the Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the United States District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Desplaines Rivers.

8. That if, within six months after the issuance of this permit, the City of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum, thereafter this permit may be revoked without notice.

9. That if, in the judgment of the Chief Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice.

10. That this permit is revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress.

11. That this permit, if not previously revoked

or specifically extended, shall cease and be null and void on December 31, 1929.

WITNESS my hand this 3rd day of March, 1925.
(Signed) H. TAYLOR,
Major General, Chief of Engineers.

WITNESS my hand this 3rd day of March, 1925.
JOHN W. WEEKS,
Secretary of War."

That the said permit has been since its issuance and still is in full force and effect; that the said permit has never been revoked by the Secretary of War or by any other person authorized to revoke same; that defendant, the Sanitary District, has complied with, fulfilled and performed each and every of the conditions, requirements and obligations of said permit; that each and every of the conditions of said permit has been met and complied with; that the defendant District has not diverted or abstracted from Lake Michigan any water in excess of the amount fixed by said permit, and that the defendant, the Sanitary District, in diverting said water has so diverted and abstracted same from Lake Michigan in the manner and under the conditions provided by said permit.

(e) These defendants aver that the allegations contained in paragraph 31 and in sub-paragraph a, b, c, and d, of said paragraph 31, relate to the regulation and control of the navigable waters of the United States, over which congress had assumed or has, the exclusive jurisdiction; but the supposed injury and damage so alleged in said paragraph of the said Bill of Complaint concern and relate to the control of said navigable waters of which the said complainant has no right or jurisdiction to complain, and therefore defendants move that the said allegations contained in said paragraph 31 and said sub-paragraphs a, b, c, and 4, of said paragraph 31 of said Bill of Complaint be stricken, and that said Bill of Complaint as to such allegations be dismissed.

32.

These defendants deny that the acts of defendants, or either of them, have caused, are now causing, or will continue to cause, serious or any interference with the trade and commerce of the people of the State of Michigan in their commerce and among themselves, with neighboring states or the world, or in its proprietary capacity, and deny that either the people of the Complainant State, or the said Complainant State, have had, or will have, any pecuniary loss or losses, and defendants deny that the Complainant State of Michigan has any right to bring this Bill of Complaint, either on behalf of itself or in its proprietary capacity, or on behalf of the people of the said state, for the purpose of establishing and protecting the legal rights of said state.

33.

These defendants aver:

(a) The Continental Divide separating the watershed of the Great Lakes basin and the watershed of the Mississippi River basin, passes within approximately eight miles of the shore line of Lake Michigan at Chicago. Said Continental Divide at the point mentioned is insignificant and its summit is but a few feet above the mean surface elevation of Lake Michigan. Originally, in a state of nature, the West Fork of the South Branch of the Chicago River emptied into the South Branch of said Chicago River. Said South Branch in confluence with the North Branch formed the Chicago River. The West Fork of the South Branch passed within a short distance of the Desplaines River, and it in confluence with the Kankakee River forms the Illinois River which flows through a large and fertile valley and empties into the Mississippi. Originally at times the waters of the West Fork of the South Branch of the Chicago River flowed across the said Continental Divide and into the Desplaines River and mingled with the waters thereof. Prior to the admission of the State of Illinois into the Union in 1818, and subsequent thereto, said Lake Michigan, Chicago River, South Branch thereof and the West Fork of the South Branch, a small portage in dry weather times of the year across said Continental Divide, and said Desplaines and Illinois Rivers were navigated by the early explorers, fur traders and others, and formed a continuous line of water navigation accommodating a large and extensive commerce. In wet times or times of high water, the connection in said water route between the West Fork of the South Branch of the Chicago River and said Desplaines River, was made through an expanse of water known as Mud or Portage Lake, and at such times boats passed to and from the Desplaines to the West Fork of the South Branch, entirely by water.

(b) The above mentioned water route between the Great Lakes and the Mississippi River and its connection with the Great Mississippi River Navigation System extending to the Gulf of Mexico, early determined the policy of the United States Government with reference to the division of the Northwest Territory. The cession of Virginia of 1783 provided that the Northwest Territory should be divided into states of not less than 100 square miles and not more than 150 square miles in area. A report made to and adopted by Congress, dated March 24, 1786, recommended the division to conform to the possibilities of navigation routes in the Northwest Territory, and among other things stated:

> "Whereas it appears * * * that the laying it out and forming it into states of the extent mentioned in the resolution of Congress of the tenth of October, 1780, and in one of the conditions contained in the cession of Virginia, will be productive of many and great inconveniences; that by such a division of the country, some of the new states will be deprived of the advantages of navigation, some will be improperly intersected by lakes, rivers and mountains, and some will contain too great a proportion of barren, unimproved land, and of consequence will not for many years if ever have sufficient number of inhabitants to form a respectable government, and entitle them to a seat and voice in the federal council: And whereas in fixing the limits and dimensions of the new states, due attention ought to be paid to natural boundaries and a variety of circumstances which will be pointed out by a more perfect knowledge of the country, so as to provide for the future growth and prosperity of each state, as well as for the accommodation and security of the first adventurers."

Pursuant to said report, article 5 of the Ordinance of 1787 was made to provide that the said Northwest Territory should be divided into not less than three nor more than five states, and that the northern boundary of three of said states might be fixed by Congress to be a line drawn through the southern bend or extreme of Lake Michigan, and that the territory north might be divided into one or two states, and, further, in contemplation of the importance of navigation, article 4 was by Congress made to provide

> "the navigable waters leading into the Mississippi and St. Lawrence and the carrying places between them, shall be common highways and forever free as well to the inhabitants of the said territory as to the citizens of the United States and those of any other states that may be admitted into the Confederacy, without any tax, impost or duty therefor."

The State of Virginia on December 30, 1788, ratified the said Ordinance of 1787. The Illinois Territory prior to the passage by Congress of the Enabling Act, only extended north to an east and west line drawn through the southern end of Lake Michigan. On April 3, 1818, when this Enabling Act was being considered by the House of Representatives in Committee of the Whole, the said act was amended, defining the boundaries of Illinois Territory, or of the new state, to be the boundaries as they exist today, and Mr. Pope in support of said amendment, among other things said (as shown by the proceedings of Congress):

> "The object of this amendment, Mr. P. said, was to gain, for the proposed State a coast on Lake Michigan. This would afford additional security to the perpetuity of the Union, inasmuch as the State would thereby be connected with the States of Indiana, Ohio, Pennsylvania and New York, through the Lakes. The facility of opening a canal between Lake Michigin and the Illinois River, said Mr. P., is acknowledged by every one who has visited the place, giving to the proposed State the port of Chicago (embraced in the proposed limits), will draw its attention to the opening of communication between the Illinois River and that place, and the improvement of that harbor."

(c) Shortly after Illinois became a State of the Union, a report was made by Graham and Phillips of April 4, 1819, and by Major Stephen H. Long, and transmitted to Congress by John C. Calhoun, Secretary of War, December 28, 1819, describing said water route from Lake Michigan to the Illinois River and recommending its improvement. The necessity of the improvement of said water route was further emphasized by the refusal of Great Britain to permit the citizens of the United States the free navigation of the St. Lawrence River, and the controversy as to the navigation of the

St. Lawrence River extended from about the year 1822 until about the year 1854, when by treaty the privilege only was granted to the citizens of the United States. Consequently, on March 30, 1822, to authorize the construction of a canal to connect Lake Michigan with the Illinois River, Congress passed the following act:

> "An Act to Authorize the State of Illinois to Open a Canal Through the Public Lands to Connect the Illinois River with Lake Michigan. (Approved and in force March 30, 1822.)
>
> Section 1. Be it enacted by the Senate and the House of Representatives of the United States of America, in Congress Assembled: That the State of Illinois be, and is hereby authorized to survey and mark, through the public lands of the United States, the route of the canal connecting the Illinois River with the southern bend of Lake Michigan; and ninety feet of land on each side of said canal shall be forever reserved from any sale to be made by the United States, except in the cases hereinafter provided for, and the use thereof forever shall be, and the same is hereby vested in the said State for a canal, and for no other purpose whatever; on condition, however, that if the said State does not survey and direct by law said canal to be opened, and return a complete map thereof to the treasury department, within three years from and after the passage of this act; or, if the said canal be not completed, suitable for navigation within twelve years thereafter; or, if said ground shall ever cease to be occupied by, and used for, a canal suitable for navigation; the reservation and grant hereby shall be void and of none effect; Provided, always, and it is hereby enacted and declared, that nothing in this act contained, or that shall be done in pursuance thereof, shall be deemed or construed to imply any obligation on the part of the United States to appropriate any money to defray the expenses of surveying or opening said canal; Provided, also, and it is hereby further enacted and declared, that the said canal, when completed, shall be and forever remain a public highway for the use

> of the Government of the United States, free from any toll or other charge whatever, for any property of the United States, or persons in their service passing through the same."

On or about January 20, 1825, Edward Coles, as Governor of Illinois, transmitted to James Monroe as President of the United States, a complete map showing the survey made by the State of Illinois for the location of the canal provided by said act. The letter accompanying the delivery of said map to the President of the United States, is in part as follows:

> "In compliance with request of the Legislature of this State, I have the honor to transmit to you a copy of the 'Report of the Canal Commissioners of the State of Illinois,' together with a map of the country between the headwaters of the Illinois River and Lake Michigan on which is delineated the proposed canal to connect these navigable waters."

The General Assembly of the State of Illinois had theretofore provided by law for the making of said survey by the Canal Commissioners and for the opening of said canal, and had within the three years provided by said act, performed all things required of it, and the said Act of March 30, 1822, has been since its passage and is now in full force and effect. The importance of constructing said canal was further called to the attention of Congress in a memorial by the General Assembly of Illinois in the year 1826, which, among other things, asked the United States to aid the State of Illinois to build said canal. Consequently, on March 2, 1827, for such purposes, the Congress of the United States passed an act, the title of which and the act are as follows:

> "An Act to grant a quantity of land to the State of Illinois for the purpose of aiding in opening a canal to connect the waters of the Illinois River with those of Lake Michigan. (Approved and in force March 2, 1827.)

> Section 1. Be it enacted by the Senate and House of Representatives of the United States of America, in Congress Assembled, That there be and hereby is granted to the State of Illinois, for the purpose of aiding the said State in opening a canal to unite the waters of the Illinois River with those of Lake Michigan, a quantity of land equal to one-half of five sections in width, on each side of said canal, and reserving each alternate section to the United States, to be selected by the Commissioner of the Land Office, under the direction of the President of the United States, from one end of the said canal to the other; and the said land shall be subject to the disposal of the Legislature of the said State, for the purpose aforesaid, and no other; *Provided, That the said canal when completed, shall be and forever remain a public highway for the use of the Government of the United States, free from any toll, or other charge, whatever, for any property of the United States, or persons in their service passing through the same;* Provided, That said canal shall be commenced within five years and completed in twenty years, or the State shall be bound to pay to the United States the amount of any lands previously sold, and that the title to purchasers under the State shall be valid."

Said act has been, since its passage, and is now, in full force and effect.

After surveys, investigation and reports made by engineers and others for the State of Illinois, on January 9, 1836, the General Assembly of Illinois passed an act providing for the construction of said canal, and under that act and certain acts amendatory thereof, the canal was finally completed in 1848. Section 16 of said act, among other things, provided:

> "Sec. 16 (Description-Proviso.) The said canal shall not be less than forty-five feet wide at the surface, thirty feet at the base and of sufficient depth to insure a navigation of at least four feet, to be suitable for ordinary canal boat navigation, to

> be supplied with water from Lake Michigan and such other sources as the Canal Commissioners may think proper, and to be constructed in the manner best calculated to promote the permanent interest of the country; reserving ninety feet on each side of said canal, to enlarge its capacity, whenever in the opinion of the Board of Canal Commissioners, the public good shall require it."

The original plan for the construction of said canal provided for its being so built that water for its operation would be taken from Lake Michigan by gravity through that portion of the canal which cut through the said Continental Divide. This plan was known as the Deep Cut Plan. For lack of funds, that portion of the canal between the West Fork of the South Branch of the Chicago River and the Desplaines River at or near Joliet, was completed upon what was called the Shallow Cut Plan, by which water for its operation was taken partly from said West Fork and partly by way of a feeder known as the Calumet Feeder, extending from the said canal at Sag, Illinois, about twenty miles below its northern terminus, to the Little Calumet River, at or near what is now Blue Island, Illinois.

In 1861, the General Assembly of Illinois, with the view of enlarging the entire waterway from Lake Michigan to the Mississippi River, and to supply additional water for the Illinois River to provide greater depths for navigation in said river, passed a resolution directing the Trustees of the Illinois and Michigan Canal to make a survey and report as to the best methods of improving said waterway which should be supplied with water from Lake Michigan "through the enlargement and deepening of the Illinois and Michigan Canal, or otherwise, or by opening a channel from Lake Michigan, by way of the South Branch of the Chicago River and Mud Lake to the Desplaines River, and down said canal to a point that would secure a free, flowing, ample and never-failing supply of water, sufficient for the navigation of the Illinois River at all seasons and times." It was further provided by said resolution that the channel to be constructed should be of "sufficient size to admit of full and free steamboat navigation from the Illinois River to Chicago and Lake Michigan, as well as a size sufficient for supplying water for all the deficiencies of navigation in the Illinois River at all seasons." The said resolution contemplated either the enlargement of the Illinois and Michigan Canal in the stretch extending across the Continental Divide or the construction of an entirely new canal substantially parallel with it at such place and places to withdraw from Lake Michigan for navigation purposes a large quantity of water. This enlargement was provided for by both the Act of Congress of 1822, which reserved a strip of land 90 feet on each side of the canal, and by the Act of Illinois, under which the canal was constructed, reserving the same number of feet on each side of the canal for the purpose of enlargement. In the furtherance of this plan for the enlargement of said waterway, the General Assembly of Illinois, on February 16, 1865, passed an act providing for the enlargement of said canal between Chicago and Joliet upon the original deep cut plan. The said Act is in part as follows:

> "Whereas, it has been represented that the City of Chicago, in order to purify or cleanse Chicago River, by drawing a sufficient quantity of water from Lake Michigan, directly through it, and through the summit division of the Illinois and Michigan Canal, will advance a sufficient amount of funds to accomplish this desirable object; and, whereas, the original plan of the said canal was to cut down the summit so as to draw a supply of water for navigation directly from Lake Michigan, which plan was abandoned for the time being, after

> a large part of the work had been completed, only in consequence of the inability of the State to procure funds for its further prosecution; and, whereas, under the law creating the trust the plan of the summit division of the canal was changed, the level being raised so as to require the principal supply of water to be obtained through the Calumet feeder, subject to serious contingencies, and by pumping on to the summit with the hydraulic works at Bridgeport; now, therefore,
>
> "Section 1. Be it Enacted By the People of The State of Illinois, Represented in the General Assembly, That to secure the completion of the summit division of the Illinois and Michigan Canal, upon the original 'deep cut' plan, with such modifications and changes of line, if necessary, as will most effectually secure the thorough cleansing or purification of the Chicago River, and facilitate the execution of the work, the City of Chicago, through its constituted authorities, may at once enter into an arrangement with the Board of Trustees of said canal, with a view to the speedy accomplishment of the work."

Purusant to said Act of the General Assembly of Illinois last mentioned, the City of Chicago, pursuant to an ordinance of its City Council, passed June 5, 1865, in 1871 completed said canal on said deep cut plan, whereby water was drawn for its operation and for the purpose of reversing the Chicago River at substantially all times of the year except in flood times. About the year 1872 Chicago was reimbursed by defendant, State of Illinois, for its expenditure of about $3,000,000 to complete said canal. The Congress, by its Rivers and Harbors Act of June 23, 1866, took cognizance of the desire and joined in the plan of the General Assembly of Illinois to enlarge said waterway—and the necessity therefor—by directing a survey to be made. Thereupon, on February 12, 1867, a report was made by the Engineer Corps of the United States Army known as the Report of General Wilson, which report was transmitted to Congress, concerning the improvement of this waterway. The report describes the waterway. Among other things, the said report stated:

> "* * * The data herein contained, together with the existence of a canal of limited capacity already in operation, demonstrate beyond a doubt that the waters of the lake may be carried into the Illinois River through a navigable channel of any required dimensions, and at a cost which cannot be regarded as excessive when the objects to be obtained are duly considered."

After the said Illinois and Michigan Canal had been completed by the City of Chicago upon the deep cut plan, a report was made on January 9, 1875, by Assistant Engineer F. C. Doran, which report was transmitted to Congress, and it recited the completion of said canal upon the deep cut plan. This report was followed on May 10, 1880, by a report made by General Lydecker pursuant to the Rivers and Harbors Act of March 3, 1879, which said Lydecker report was submitted to Congress. Among other things, the said report stated:

> "The question of a through line of water communication from the Mississippi to Lake Michigan, via the Illinois River, has been before Congress since an early date. In 1822, the State of Illinois was authorized to make through the public lands of the United States a route for a navigable canal connecting the Illinois River with Lake Michigan, and between that date and 1854, Congress had granted to the State 321,760 acres of land to assist in its construction. The canal was first opened to navigation in 1848, its cost up to that time being $6,409,509.95; since then the State has spent a great deal towards its enlargement and maintenance. In the meantime several surveys, having in view the improvement of the Illinois River, have been made, the first in 1838 by Capt. Howard Stansbury, Topographical Engineers; the next of any considerable

importance was made under the direction of General J. H. Wilson, in 1866, the object of which was 'to obtain such specific and accurate information in regard to obstructions to navigation in that river as will enable you to submit estimates for its improvement, so that the largest boats navigating the Illinois and Michigan Canal, and steamboats drawing four feet of water, will be enabled to pass through the river to St. Louis during the season of extreme low water without breaking cargo.'

His report on this survey led Congress to direct a more complete survey in 1867 (act approved March 2), the object of which was to prepare plans and estimates 'for a system of navigation by way of the Illinois River, between the Mississippi and Lake Michigan, adapted to *military, naval,* and *commercial* purposes.' This duty was committed to a Board of Engineers composed of General J. H. Wilson and Mr. William Gooding, Civil Engineer, the latter having been for a long time the Chief Engineer of the 'Illinois and Michigan Canal.' The report of this board was submitted to the Chief of Engineers under date of December 17, 1867, and is published in his annual report for 1868, pages 438 to 468. It recommended that the Illinois River be improved by the construction of five locks and dams, creating thereby a slack water system with a navigable depth of 7 feet at the lowest stage, from the mouth of the river at Grafton to Utica, 227 miles above; the lock chambers were to be 350 feet long, 75 feet wide, and the estimated cost of the entire work was $1,953,600. To complete the through line to Lake Michigan, an enlargement of the canal was recommended, the estimated cost of this enlargement being, in round numbers, $16,250,000.

No appropriations were made by Congress to carry out the plan of improvement above indicated, but the State of Illinois, in substantial conformity with that plan, has constructed *two* of the proposed locks and dams (viz., at Henry and Copperas Creek), at a cost of $747,747, while the annual appropriations by Congress for improving the Illinois River (aggregating to date $589,150) have been applied mainly to ameliorating its navigable condition by dredging channels through the worst bars, and constructing dikes and wing-dams for contracting the waterway. For a more detailed description of these operations I would respectfully refer to my report dated August 30, 1878 (which was published as House Ex. Doc. No. 81, 45th Congress, 3rd Session), a copy of which is transmitted herewith.

The several surveys and reports above referred to gives so complete a description of the physical characteristics of the route, and present the arguments in favor of its improvement so forcibly, that it seems unnecessary to extend this report by repeating what has been so fully set forth before * * *.

* * * * *

The laws of Congress require that reports of surveys of rivers and harbors shall contain 'statements of all existing facts tending to show to what extent the general commerce of the country will be promoted by the several works of improvements contemplated by such examinations and surveys. In fulfillment of this requirement it seems only necessary to note that the improvement of the Illinois River, supplemented by the enlargement of the Illinois and Michigan Canal as heretofore proposed, will furnish a reliable and commodious channel of water communication from the Mississippi River to the Northwestern lakes; by this means the vast Mississippi Valley, and all the country tributary thereto, is brought into direct water communication with Lake Michigan, at the great City of Chicago, with its flood of commerce eastward and westward; the route exists as a practicable one of considerable importance today, and the question is simply one of enhancing its value by increasing its capacity to a degree commensurate with the important interests involved.

* * * * *

Considering this simple statement, the facts so fully set forth in previous elaborate reports, and noting the wonderfully rapid development of the entire western country, it would seem that nothing further is necessary to indicate 'to what extent the general commerce of the country will be promoted' by the contemplated improvement, nor to show how

> desirable it is that the work should be accomplished with the least delay practicable."

In 1881, the General Assembly of Illinois authorized the City of Chicago to install pumps at Bridgeport, the northern terminus of the Illinois and Michigan Canal. These pumps were installed by the City of Chicago about the year 1884, and thereby a larger quantity of water was taken from the West Fork of the South Branch of the Chicago River into and through said Illinois and Michigan Canal.

(d) The agitation for the enlargement of the waterway from Lake Michigan to the Illinois River continued; the necessity therefor was recognized by officials of the State and Federal Government; and, further, during the decade beginning with 1880, there was a great demand for not only the enlargement of the waterway from Lake Michigan to the Illinois River, whereby a sufficient quantity of water would be withdrawn from Lake Michigan to provide a never-failing supply of water in the Illinois River, but also for the enlargement and deepening of the Mississippi River to the Gulf of Mexico, and organizations called "Deep Waterway Associations" were formed to further this project. The interest of the United States Government in the project is shown by the Acts of Congress and by reports of the Engineer Corps, transmitted to Congress. Major Benyaurd made two reports upon this subject—one dated September 2, 1882, and the other dated March 5, 1884, respectively, and Major Handbury, in 1887, pursuant to the Rivers and Harbors Act of August 5, 1886, made a report upon the same subject. Among other things, the said report of Major Handbury stated:

> "The United States and the State of Illinois have long been committed to the project of opening a water communication between the Mississippi River

and the northern lakes of capacity sufficient for the wants of commerce and for the exigencies of our national defense, should these ever arise.

* * * * *

The distance by this route from the Gulf of Mexico to the southern end of Lake Michigan is about 1,620 miles. When the projected improvement of the Illinois River below Copperas Creek, on which we are now working, has been finished, more than 1,520 miles of this distance will be available for the water transportation of commerce in bulk between these points. Pushing this improvement through to the lake, the connecting link will be formed which will join the northern lakes with the vast network of navigable rivers whose waters flow commensurate with the importance of the commerce that will be affected by it. The mere fact that such a route is available will serve as a wholesome regulator to the rates that would be exacted by other methods of transportation were this one not in existence. Besides the immense commercial advantages that may be expected from the completion of the project, there are military and naval exigencies that might easily arise where it would figure as a prominent factor in the problem of our national defenses. From whatever point we look at the subject there is nothing local or sectional in it. It is true that all the work to be done happens to be in the State of Illinois. The benefits to be derived belong to the nation at large. It is fortunate, too, that at this time the subject is unencumbered by any phase of a political character. The problem of connecting Lake Michigan with the Mississippi River by a commodious waterway, that could be used for commercial, military and naval purposes, has received attention from our most thoughtful statesmen from the day of Albert Gallatin to the present."

During the said decade beginning with the year 1880, the population of the City of Chicago and its adjoining suburbs had increased to approximately 1,000,000 people. While the Chicago River and its branches into which principally the sewage of Chicago was emptied, had been, since the enlargement of the Illinois and Michigan Canal upon the deep cut plan, to some extent cleansed by reason of said reversal of the Chicago River during dry weather times, nevertheless, the principal amount of the drainage of Chicago, including its sewage, found its way into Lake Michigan, which was the only drinking water supply for the people of Chicago. About the year 1885 a very extraordinary and extensive rain occurred during which, in a short time, a vast amount of water was delivered to the Chicago River from its drainage area, carrying into the lake and to the water supply an unusual amount of the accumulated sewage and filth deposited in the river. While on the occasion of rains a certain amount of the sewage and filth was washed into the lake from the river, by reason of the fact that the Illinois and Michigan Canal was not of sufficient capacity to keep the Chicago River at all times reversed in its flow, this flood of 1885 caused an extraordinary large number of deaths from water-borne diseases—such as typhoid, and others—causing the people of Chicago and Illinois to be greatly alarmed.

The agitation and demand for a deep waterway to the Gulf and the health conditions at Chicago caused the City Council of Chicago, pursuant to an ordinance passed on January 27, 1886, to appoint a commission known as "The Drainage and Water Supply Commission," composed of the most eminent engineers of the United States, to make investigations and surveys and to report upon the best method of solving the waterway and water supply problems. The members of said Drainage and Water Supply Commission, after making complete investigation and survey, made a report to the City Council on January 30, 1887. The said report reviewed the conditions then existing as to drainage and water supply and the demands and the necessities for the enlargement of the waterway from Lake Michigan to the Mississippi River. An estimate was made by the said committee, as stated in its report, of the future population of Chicago and its environs. The said commission also considered, as shown by said report, the adaptation of the various then known means of disposing of sewage—among others, discharging the sewage into Lake Michigan at one end of the city and taking water from the lake at the other for drinking purposes, the disposal of the sewage on land and the diversion of the sewage and drainage to the Desplaines River by way of a canal, which would serve the purpose of providing a deep waterway from the West Fork of the South Branch of the Chicago River to the Desplaines River at or near Joliet, and the use of the water from Lake Michigan to provide a never-failing water supply for navigation on the Illinois River and for the purpose of oxidizing the sewage and drainage so that such sewage and drainage, when passing through the Desplaines and Illinois Rivers, would not be injurious to the health of the people residing along the said rivers or to fish life therein. The commission recommended the diversion method mentioned as stated in its report as follows:

> "Besides the economical advantages of the Desplaines scheme, its superiority is still further emphasized by advantages of another kind. The proposed canal will, from its necessary dimensions and its regular discharge, produce a magnificent waterway between Chicago and the Mississippi River, suitable for navigation of boats having as much as 2,000 tons burden. It will establish an available water power between Lockport and Marseilles fully twice as large as that of the Mississippi River at Minneapolis, which will be of great commercial value to the State. The Calumet region will be much enhanced in value by having a direct navigable chan-

> nel to the Desplaines River and by a lowering of the flood heights of Calumet Lake and River. Within the city the water of the Chicago River and its South Branch will get a much better circulation if it flows by gravity than if it has to be pumped, the necessity for which would remain even if the sewage should be discharged through intercepting sewers, either into the lake or upon land. Upon either of the latter conditions an occasional overflow from the sewers into the river during heavy rains would be more objectionable than a constant discharge of sewage into a more rapidly flowing stream. Flood waters entering the lake by way of the Chicago River would carry into it much filthy matter, either suspended or deposited, notwithstanding the existence of intercepting sewers, but the proposed diversion of such waters before reaching the populated districts will for all time obviate this undesirable occurrence. Lowering the level of the North Branch at Bowmanville by its diversion to the lake will be equivalent to raising the low prairie extending towards Evanston and Niles and greatly benefit parts of these towns.
>
> ### THE WATER SUPPLY.
>
> In reaching the conclusion that the sewage of the city should be discharged into the Mississippi Valley the question of water supply is materially simplified, because the lake will then at all times furnish good water wherever intakes are desired for an extension of the works."

The subject-matter of the said report of the Drainage and Water Supply Commission of Chicago, above mentioned, was considered by the General Assembly of Illinois at its session held during the year 1887, but no act was passed. Instead, a committee of the House and Senate was appointed to make further investigations of the subject *ad interim* and to make a report to the 1889 session of the General Assembly. In the meantime, the agitation and demand for a deep waterway to the Gulf of Mexico of a depth not less than 14 feet, depths of 20 to 24 feet being proposed, increased, so that Congress provided in the Rivers and Harbors Act of August 11, 1888, for an engineering survey and report, as follows:

> "And for the purpose of securing a continuous navigable waterway between Lake Michigan and the Mississippi River, having capacity and facilities adequate for the passage of the largest Mississippi River steamboats, and of naval vessels suitable for defense in time of war, the Secretary of War is authorized and directed to cause to be made the proper surveys, plans, and estimates for a channel improvement and locks and dams in the beds of the Illinois and Desplaines rivers from LaSalle to Lockport, so as to provide a navigable waterway, not less than one hundred and sixty feet wide, and not less than fourteen feet deep, and to have surveyed and located a channel from Lockport to Lake Michigan, at or near the City of Chicago, such channel to be suitable for the purposes aforesaid; the necessary expenses of such surveys, estimates, plans and location to be paid out of the sum herein appropriated for the improvement of the Illinois River."

Thereafter, and in line with the general plan and program of the defendant, the State of Illinois, and the United States, to enlarge and complete the said Lakes-to-the-Gulf Waterway, the Act of May 29, 1889, was passed, providing for the creation of the defendant District and specifically providing that the canal to be constructed under and pursuant to the act should be of such dimensions and capacity to allow the passage along it of the largest boats, not only then navigating the Great Lakes, but such boats as would probably be used upon the Great Lakes in the future. And the said act provided also for the passage through the said canal from Lake Michigan of a sufficient quantity of water to provide a never-failing water supply for navigation. The said act also provided for the removal of dams constructed by the State in the Illinois River, intending thus to free the Illinois River of such obstructions and to provide free river navigation. The said act substantially carried out the recommendations of the said Drainage and Water Supply Commission concerning navigation between Lake Michigan and the Mississippi River, and relating the protection of the water supply for the people of Chicago. In providing for the construction of said works, the Drainage and Water Supply Commission, the committee above mentioned appointed by the Legislature to investigate and sit *ad interim* as above mentioned, and the General Assembly of Illinois, intended that the works to be constructed for navigation and incidentally to furnish an outlet for the drainage and sewage arising at Chicago, should be of sufficient extent and size to take care of the conditions that might arise in the future.

At the time of the passage of said Act of 1889 making provision for the construction of said works, the General Assembly of Illinois understood that it was acting in pursuance of the Acts of Congress of March 30, 1822, and March 2, 1827, aforesaid, and the various other acts of Congress above mentioned, providing for surveys and reports upon the building of a deep waterway from Chicago to the Gulf of Mexico. At that time and for a great number of years thereafter, the sewage and drainage of metropolitan populations in the United States were disposed of by discharging the same into rivers and streams, wherein the sewage and drainage would be oxidized and purified by what is known as the dilution method of sewage disposal, and no other method was then known or used which could be adapted to the conditions at Chicago.

The said waterway policy of the State of Illinois, then immediately to be carried out under the said Act of May 29, 1889, and future then contemplated legislation, is indicated by the joint legislation of the House and Senate of said defendant State of Illinois, passed on May 28, 1889.

Among other things, the said resolution stated:

> "That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practicable depth and usefulness for navigation from Lake Michigan via the Desplaines and Illinois Rivers to the Mississippi River. * * * That the United States is requested to aid in the construction of a channel not less than 160 feet wide and 22 feet deep with such a grade as to give a velocity of 3 miles per hour from Lake Michigan at Chicago to Lake Joliet, a pool of the Desplaines River, immediately below Joliet, and to project a channel of similar capacity and not less than 14 feet deep from Lake Joliet to LaSalle, all to be designed in such manner as to permit future development to a greater capacity."

(e) Immediately after the passage of said Act of 1889, the Sanitary District of Chicago was organized by vote of the people, and defendant District continued and completed the surveys for the Main Channel, known as the Sanitary and Ship Canal, extending parallel to and but a short distance from the Illinois and Michigan Canal from the West Fork of the South Branch of the Chicago River, twenty-eight miles, to Lockport, and construction of said canal was immediately commenced, and it was finally completed about the year 1898 with a depth of 24 feet, 160 feet wide in its rock sections and approximately 225 feet in width at the top in the earth sections, and the declivity was such that it was capable of passing through it pursuant to the express provisions of Section 23 of said Act of May 29, 1889, a maximum of 600,000 cubic feet of water per minute, or 10,000 cubic feet per second. Said volume of water was the amount then considered necessary and required for the construction and development of a deep waterway of the depths contemplated through and along the Desplaines and Illinois Rivers to the Mississippi River. The said volume of water is the amount now required for the Illinois Waterway now under construction and hereinafter more particularly mentioned. It was also contemplated that the said volume of water so to pass through said Sanitary and Ship Canal, would reverse at all times the flow of the Chicago River, thus preventing pollution of the water supply of the people of Chicago. At the time the said Sanitary and Ship Canal was laid out and projected, at the time of the passage of the said Act of May 29, 1889, and at the time the construction work on said canal was commenced, it was contemplated and provided that the Chicago River, the South Branch and the West Fork thereof to the northern terminus of said Sanitary and Ship Canal, should be so deepened and widened that the necessary water could pass through same without creating a current injurious to navigation, and of a depth sufficient to accommodate vessels capable of navigating the Great Lakes and the said Sanitary and Ship Canal when constructed. Such intention to so improve the Chicago River and its branches mentioned, and the project therefor, was shown by resolution of the Board of Trustees of defendant district passed April 21, 1891, a copy of which was sent to the Secretary of War and the Congress of the United States. Pursuant to said resolution and other ordinances of said district and the authority of the United States and the State of Illinois, the said Chicago River, its South Branch and West Fork to the northern terminus of said Sanitary and Ship Canal, was deepened from 17 to 26 feet, widened at all points to 200 feet, obstructive center pier bridges were replaced with modern bascule type of bridges, also the bridges over the said Sanitary Ship Canal were built so that they could be moved or swung to permit the free passage of boats, the cost of enlarging Chicago River and its said branches being approximately $13,000,000. During the construction of said Sanitary and Ship Canal, the Congress of the United States was informed, each year, through the Chief of Engineer's reports of the progress of its construction.

Defendant District deepened and widened the South Branch of the Chicago River and the West Fork thereof to the northern terminus of the Sanitary and Ship Canal, as above mentioned. The United States, pursuant to various acts of Congress passed beginning with the year 1892, deepened and widened the Chicago River proper to connect with the said improvement of the South Branch and said West Fork made, and then being carried out by the defendant District. Plans and specifications for the enlargement of said South Branch of the Chicago River were submitted to and approved by the Chief of Engineers and the Secretary of War, and permits were from time to time issued by said Chief of Engineers and Secretary of War authorizing said enlargement and improvement of said river.

May 8, 1899, the Secretary of War, by permit, authorized the opening of said canal and the withdrawal of water through it to its capacity, subject only to limitation of the volume of water in the event a current should be created in the Chicago River, the South Branch and West Fork, unreasonably obstructive to navigation thereon.

Thereupon, pursuant to said permit of May 8, 1899, defendant District, on January 17, 1900, placed in operation the Sanitary and Ship Canal.

At the southern terminus of said Sanitary and Ship Canal, locks have been constructed connecting it with the Illinois and Michigan Canal and with the Illinois Waterway now under construction, and the said Sanitary and Ship Canal has taken the place for navigation of the old Illinois and Michigan Canal between the West Fork of the South Branch and the southern terminus of said Sanitary and Ship Canal. Since the issuance of said permit of May 8, 1899, and the opening of said Sanitary and Ship Canal, appellant District has expended upwards of fifty million dollars in and about the deepening and widening of the South Branch and West Fork of the South Branch of the Chicago River and in the construction and completion of intercepting sewers, pumping stations and diversion works supplementary to the Sanitary and Ship Canal, and in the construction of sewage purification and treatment works used in connection with the maintenance of said waterway.

The enlargement of the said South Branch of the Chicago River and the West Fork thereof, as made by defendant district and the enlargement of the Chicago River as made by the United States, has been such that the volume of water authorized by said permit of the Secretary of War of March 3, 1925, may be withdrawn from Lake Michigan through said river channels without creating a current in said rivers, interfering with navigation or objectionable to the Chief of Engineers and the Secretary of War.

(f) During the years beginning with the year 1899 when the said Sanitary and Ship Canal was completed, up to almost the present time, the Congress of the United States had passed many acts providing for surveys and reports to be made, and such surveys and reports have been made in relation to a deep waterway from the Great Lakes to the Gulf of Mexico, which waterway, according to those surveys and in accordance with the directions expressly provided by acts of Congress, was to be built with the diversion from Lake Michigan to be used in its operation of at least the amount authorized by said permit of March 3, 1925, and also Congress provided for surveys and reports to be made, and such surveys and reports were made with reference to the construction of what are known as compensatory or regulatory works to be built at the outlets of various lakes for the purpose not only of offsetting for the theoretical effect of the diversion at Chicago, but also for the effect of diversions from Lake Erie by way of the Welland Canal, New York Barge Canal and for power purposes at Niagara Falls.

All the reports made under all the said acts of Congress relating to the construction of compensating or regulating works, which reports were transmitted to Congress, find that the supposed lowering of the water surfaces of the Great Lakes system due to the said diversions, may be compensated for or offset by the construction of either fixed weirs or movable dams at the outlets of Lakes Huron, Erie and Ontario, and recommended that such works be installed. Defendant District a number of years ago offered to defray such expense to offset or compensate for the diversion at Chicago, and in accordance with the condition of said permit of March 3, 1925, it has posted a guarantee of a million dollars with the Secretary of War, as heretofore alleged. The use of the said diversion at Chicago is required for the efficient and proper regulation of the levels of Lakes Michigan-Huron, Lakes St. Clair and Erie for the benefit of navigation upon said Great Lakes and their connecting waters, that is to say, in order that the out-flow of the said lakes at or above Niagara Falls may be regulated so that the lake surfaces will not be as low or as high as they would be in a state of nature, it is necessary that the natural outlets of said lakes be enlarged, which is accomplished by the maintenance of the said diversion at Chicago.

The treaty of January 11, 1909, between the United States and Great Britain relating to Canadian boundary waters, provides that jurisdiction as to the diversions of water from Lake Michigan is reserved to the United States and the various states; that the treaty should have no effect upon diversions from said lake then existing; that the order of precedence of the uses of boundary waters should be:

(1) Uses for domestic and sanitary purposes;
(2) Uses for navigation, including service of canal for purpose of navigation;
(3) Uses for power and irrigation purposes.

34.

These defendants, further answering, say:

The construction of the said Sanitary and Ship Canal at the time it was projected and being constructed, was known as a great engineering feat, and when said canal was constructed it was the largest artificial canal in the world. The fact that said canal was to be and was being constructed, was known to the people and officials of the complainant state and to the people of the United States generally. Likewise was known to the same people and persons the purpose of the construction of said canal, namely, as the important link in the deep waterway to the Gulf of Mexico, furnishing by its operation water from Lake Michigan ultimately to its capacity, 10,000 cubic second feet, for the purpose of providing a water supply for the Illinois River and for the operation of the proposed enlarged waterway. The acts of Congress and the surveys and reports made thereunder with reference to the use of the Sanitary and Ship Canal and the water diverted by it for navigation and for sanitary purposes, were likewise known to the complainant. Yet the said complainant, until the filing of the bill of complaint herein, made no protest or complaint nor instituted any suit with reference to the construction of said Sanitary and Ship Canal and its supplementary works, and permitted the defendant District to expend upwards of ninety millions of dollars in the construction of said works without any objection from said complainant. And the said complainant has long acquiesced in the carrying out by these defendants of the plan and program herein mentioned for the construction of said waterway, and in the use of the waters to be diverted for navigation and for sanitary purposes, and is therefore estopped from obtaining any of the relief sought by said amended bill.

Wherefore, these defendants move that this suit be dismissed because of the laches, acquiescence and estoppel above alleged.

35.

These defendants aver that pursuant to said Acts of Congress hereinabove mentioned, and to said waterway policy of the State of Illinois as expressed by resolutions and acts of its General Assembly, said General Assembly passed an Act entitled:

> "An Act in relation to the construction, operation and maintenance of a deep waterway from the water power plant of The Sanitary District of Chicago at or near Lockport, Illinois, to a point in the Illinois River at or near Utica, and for the development and utilization of the water power thereof;" approved June 17, 1919; in force July 1, 1919.

that under said Act the waterway to be constructed is to be known and called "The Illinois Waterway"; that said Act provided for the route of the said waterway, as stated in the title thereof, from the southern terminus of the Main Channel of the Sanitary District of Chicago at or near Lockport along the Desplaines and the Illinois Rivers to Utica on said latter named river; that the channel of the waterway is to be according to said Act not less than 150 feet bottom width and the minimum depth not less that 8 feet in the earth sections and 10 feet in the rock sections; that the minimum depth over mitre sills not less that 14 feet and minimum width of locks is to be not less that 110 feet with minimum length not less than 600 feet usable length; that the purpose of making the depth over mitre sills not less than the depth provided and the length and width of the locks as stated, was to permit of the enlargement of said waterway to a 14 foot depth; that the diversion of water from Lake Michigan to the amount provided for by said permit of March 3, 1925, is necessary for the operation of said waterway not only at the said depth of 14 feet, but also at the depth of 9 feet, which will be provided by the excavation for said waterway now being carried on; that said diversion to said amount will permit of the extension of said waterway from Utica on said Illinois River to its mouth, and thence along the Mississippi River to Cairo, Illinois, by the United States Government or by said State of Illinois, in conjunction with said Illinois Waterway construction and said diversion to the amount of said permit is necessary for the construction and operation of said waterway through said Illinois River to the Mississippi River; that in addition, the use of said waters so diverted will permit of the removal of the state dams at Henry and Copperas Creek on the Illinois River and the government dams at Kampsville and LaGrange on the Illinois River, thus permitting navigation on said Illinois River from Utica to its mouth, to be free and unobstructed by locks or dams.

The plans of the State of Illinois for the construction of said Illinois Waterway from the southern terminus of the Sanitary and Ship Canal to the Illinois River at or near LaSalle, Illinois, have been approved by the Chief of Engineers and the Secretary of War, and permits for such construction have been issued by the Secretary of War. The defendant State of Illinois has, pursuant to amendment to its constitution and acts passed thereunder, issued the necessary bonds for the construction of said Illinois Waterway and has in such construction work built certain of the locks of the dimensions above described and has performed a vast amount of other work necessary for the construction of said waterway, and has at this time expended in the construction of said waterway, upwards of $3,000,000.

The said defendant State of Illinois has in the construction of said Illinois Waterway and the expenditure of said moneys therefor, constructed and completed the lock located at Marseilles, Illinois, in the Illinois River, of the dimensions above specified. The said lock provided to be built as above stated at the southern terminus of the Sanitary and Ship Canal to connect with the Illinois Waterway in the Desplaines River, is now 60 per cent completed, and will be entirely completed within the year 1925. Bids have been invited to be received January 6, 1926, for the letting of the contracts for the construction of the dam and lock at Starved Rock, in the Illinois River, of the size and dimensions above described, and the construction of retaining walls in the Desplaines River through the City of Joliet required to be built to carry out said plans for the construction of said Illinois Waterway. The remaining two dams, one at the mouth of the Desplaines River and the other at Brandon's Road

Bridge, just south of the City of Joliet, across the Desplaines River, and each of the locks connected with the respective dams, will be placed under construction during the year 1926—all with the approval of and by the authority of, the United States.

36.

These defendants further answering say:

Upwards of forty years ago the defendant State of Illinois constructed two dams with locks in the Illinois River in the reaches of said river immediately south of La Salle, Illinois. One of said dams with its locks was constructed at Henry and the other at Copperas Creek, Illinois. The United States constructed two dams with locks in the lower reaches of the said Illinois River. One of said dams with its lock is located at Kampsville, and the other one is located with its lock at La Grange, Illinois. The United States and the said State of Illinois in constructing said dams, sought thereby to improve navigation in said Illinois River below La Salle, Illinois, for the purpose of enabling the maintenance by the United States and State of Illinois of at least seven feet in depth of water at all points in said river. About the same time, the United States constructed what is known as the Hennepin Canal, extending from the Illinois River at or near Bureau, to Rock Island, Illinois. The project depth of water in said canal for navigation was and is seven feet. Since the construction of the said Sanitary and Ship Canal and the placing of the same in operation, with its diversion of water from Lake Michigan, the said United States and the said defendant State of Illinois, have sought to provide and to so improve navigable conditions upon said Illinois River below La Salle, Illinois, that navigation could be carried on on said river to its mouth without the use of the said dams and locks therein built as aforesaid. The addition to the Illinois River of the amount of water authorized by said permit of March 3, 1925, increases to a number of feet the depths of water in said river for the purposes of navigation, and said water insures better and greater depths for navigation. The said volume of water provided by said permit added to the said Illinois River, increases from three to five feet for navigation purposes the low water depths at the critical points of navigation or where the water is ordinarily shallow. During practically all of each year when navigation is carried on upon the Illinois River, the said additional water authorized by said permit makes it possible for boats navigating the said river to pass over said dams without being required to consume the time necessary in passing through the locks adjacent to said dams. Thereby navigation is greatly facilitated. The addition of said volume of water has made it possible and will make it possibe to maintain said project depths in said Illinois River without the expenditure of the amount of money for dredging that would be required if said volume of water authorized by said permit were not in said river, and said water is now required to maintain navigation upon said Illinois River and to maintain the depths fixed by Congress for such navigation on said river. The said volume of water provided by said permit added to the Mississippi River below the mouth of said Illinois River, materially increases the navigable depths of water in said river, and insures and makes more easy the maintenance of the project depths fixed by the Congress of the United States for navigation in said river. From the mouth of the said Illinois River to Cairo, Illinois, the low water depths in said Mississippi River are increased and will be increased thereby at low water times upwards of one foot, and in greater amounts at certain so-called critical points of navigation. The said volume of water also increases the depths for navigation in said Mississippi River at various points below Cairo, Illinois.

The natural run-off of the drainage area of the said Illinois River produces, when delivered to said Illinois River, variable volumes of water. At times the volume of water flowing in said Illinois River in a state of nature, did not exceed 500 cubic feet per second, and at times it has been known to be higher than 100,000 cubic feet per second. To maintain depths for navigation and insure such depths to persons navigating said Illinois River, it is necessary and required that a volume of water such as the amount authorized by said permit of the Secretary of War be added to the natural and ordinary flow in said river for and in the interest of navigation and interstate commerce. The said volume of water added when the run-off is great is but a small percentage of the total amount, but when the run-off is slight, said added volume from Lake Michigan provides better and greater depths for navigation than would exist if said volume of water were not turned into said Illinois River.

The addition of said volume of water, authorized by said permit, to the Desplaines River, also increases by upwards of one foot and a half, the project depth of water in said Illinois Waterway now under construction between the southern terminus of the Sanitary and Ship Canal to the Illinois River at La Salle, Illinois. It will not be practicable or feasible to construct and maintain a waterway from the southern terminus of the Sanitary and Ship Canal to the mouth of the Illinois River of nine feet depth to connect with waterways of similar depth in the Ohio River and in the Mississippi River, without the use of substantially the volume of water authorized by said permit of March 3, 1925.

The amount of water authorized by said permit of March 3, 1925, improves and facilitates navigation and makes navigation more convenient upon the said waterway extending from Lake Michigan on the Chicago River, its South Branch and the West Fork of its South Branch, on the Sanitary and Ship Canal, on the Illinois and Michigan Canal and therefrom upon the Illinois River to the Mississippi River, and upon the Mississippi River substantially to its mouth.

37.

These defendants aver that in addition to the sewage and drainage of Chicago and its environs, being that arising within the limits of the territory of the defendant Sanitary District, there are many cities, towns and villages located upon the Desplaines and Illinois Rivers, such as Joliet, Morris, Ottawa, La Salle, Peru, Bureau, Peoria, Pekin and Beardstown, and many others whose sewage, drainage and wastes are discharged into said Desplaines and Illinois Rivers; that the volume of water authorized to be withdrawn, and under the conditions imposed, by said permit of March 3, 1925, is necessary and required for said Desplaines and Illinois Rivers, in order that the sewage, drainage and wastes now being discharged into said rivers, may be oxidized and diluted so that the said Illinois River may thereby be maintained in such condition that navigation may be carried on thereon conveniently and without injury to the health of the persons so navigating said river, and that fish life may be preserved in said river, and that the health of people residing along said rivers may not be injured; that the withdrawal of said water, in the amount and under the conditions provided by said permit, is required in order that navigation may be carried on upon the Chicago River, its North Branch, South Branch and

West Fork, and on the Sanitary and Ship Canal, without inconvenience or injury to the health of persons navigating same; that if the said volume of water were not withdrawn from Lake Michigan, or if an amount materially less than said volume were so withdrawn the said Chicago River, its North Branch, South Branch, West Fork, the Sanitary and Ship Canal, the Illinois and Michigan Canal, the Desplaines River and the Illinois River would be in such condition that noisome and disagreeable odors would arise therefrom, disease breeding conditions would exist, the health of people residing along same would be injured and navigation thereon could not be carried on with any convenience, if at all, and fish life in said Illinois River would be absolutely destroyed; that, furthermore, at times the Chicago River would flow into Lake Michigan, carrying with it its sewage and drainage pollution, polluting Lake Michigan, injuring navigation thereon and injuring the health of the people using Lake Michigan for a water supply; that within the period of said permit, to-wit, December 31, 1929, it would be impossible for the people residing within the limits of the defendant District or the people residing along the said Desplaines and Illinois Rivers, to so artificially treat or purify the sewage arising from said cities, towns and villages, that there would not be required to be withdrawn from Lake Michigan to the said Desplaines and Illinois Rivers substantially the amount fixed by said permit.

38.

These defendants aver that in issuing the said permit of March 3, 1925, the Secretary of War was acting pursuant to the authority granted by the Rivers and Harbors Act of March 3, 1899, in the regulation of interstate commerce and that the said Secretary's action in issuing said permit was pursuant to said act and was connected with the regulation of interstate commerce.

39.

Defendants further aver:

(a) The facilities for navigation in the ports and harbors along complainant's shores have been provided by the United States under improvement projects specified by various Acts of Congress. The depth of water in all such harbors has been increased from time to time under said improvement projects, so that the project depth now maintained by the United States in each and every of said harbors is many feet greater than the original depth, and such improvements in facilities of navigation, including width of channels, safety of entrance to harbors, depth of harbor basins and channels were all made solely and only at the expense of the United States, to which the complainant or any of its people have not directly contributed. The said facilities for navigation in the various forms mentioned have been provided by the United States to suit the demands of commerce in said harbors. Each and every one of said harbors has been improved in some of the various ways mentioned since said Sanitary and Ship Canal was opened. The United States, in making said improvements, determined the project depths for each of said harbors, and took into consideration, in so doing, effects upon the surface elevation of the water of Lake Michigan, if any there were or should be due to diversions of water for all purposes, at all points.

(b) The United States about the year 1894 provided for and caused the installation of certain works at the outlet of Lake Superior, whereby the out flow through the St. Mary's River has been controlled, and said out flow has at times been greatly diminished, thus causing a decrease in the supply of water to Lakes Michigan, Huron, Erie and Ontario. The United States has and has assumed jurisdiction of navigation and of the facilities for navigation upon the entire Great Lakes system by the various works and improvements that it has constructed, including said controlling works at the outlet of Lake Superior, and also by the improvement of the channels connecting the different ones of the Great Lakes.

The Canadian Government with the consent of the United States, constructed at the Galops Rapids a dam known as the Gut Dam, whereby one of the channels of the St. Lawrence River was entirely cut off, thus causing the raising of the surface elevation of Lake Ontario to an amount greater than the claimed lowering of the surface elevation of said lake due to the diversion of water at Chicago. Said dam was constructed about the year 1903.

The United States, in providing a complete system for navigation upon all of the Great Lakes, including their harbors and conecting channels, in addition to the matters above stated, has deepened at various points the St. Clair River, Lake St. Clair and the Detroit River, whereby the surface elevations of the waters of Lakes Michigan and Huron have been lowered upwards of one foot, that is, the surface elevation of the water of said lakes is upwards of one foot lower than it would have been had such improvements not been made, and to a certain extent thereby, the surface elevation of the waters of Lake Erie has been increased, and the United States has, in the interest of navigation, further permitted diversions from Lake Erie by way of the Welland Canal, to the extent of approximately 4.500 cubic second feet and from Lake Erie for the operation of the New York Barge Canal, of approximately 1,500 cubic second feet. The United States has permitted the use of waters at Niagara Falls for power purposes. The said uses of the waters of Lake Erie for navigation and power purposes mentioned, have decreased the ordinary surface elevation of Lake Erie an amount almost equal to the claimed effect of the Chicago diversion upon Lake Erie. In making the said improvements in navigation upon the Great Lakes system, the United States has changed, as above set forth, the ordinary and natural flow of rivers connecting said lakes, and thereby the ordinary surface elevations of the said lakes. The United States has expended upwards of one hundred and six million dollars in making said improvements and providing said system of navigation upon said Great Lakes, their harbors and connecting channels, and has assumed exclusive jurisdiction and control of navigation upon said Great Lakes and the harbors located thereon, including each and every of the harbors mentioned in said amended bill.

(c) As heretofore alleged, the United States has assumed jurisdiction in this matter and has provided for the building of compensating or regulatory works to offset, and compensate for, any such diversion, by inserting in the permit of March 3, 1925, a requirement that the defendant Sanitary District should file a bond for the cost of such regulating works and the defendant Sanitary District, has, as heretofore set out, executed and filed said bond in accordance with said permit, so that upon the completion of such regulating and controlling works there will be no lowering of the levels of said lakes, because of any diversion therefrom.

(d) The United States, in its control and regulation of all the navigable waters of the United States and in its improvement and maintenance and/or creation of the inland waterway system of the United States, connecting by water transport and waterways the various watersheds, regions and parts of the country with each other, has exercised and is exercising complete and full control of the Great Lakes waterway, and of the system of waterways represented by the Mississippi River and its tributaries to the Gulf of Mexico and of the connection between said two systems of waterways by means of the Chicago River, the Sanitary and Ship Canal and Illinois and Michigan Canal to the Illinois River. And the United States, in such connection, has adopted said Sanitary and Ship Canal with its attendant diversion of water from Lake Michigan, as a part of said inland waterway system, and has recognized, approved and adopted each and every of the acts of defendants complained of.

40.

Defendants, and each of them, move to dismiss the bill of complaint filed herein for the following reasons (some of which have been hereinbefore stated):

(a) The case is not one justiciable in this court;

(b) The subject-matter set forth in the bill of complaint is within the exclusive jurisdiction of the United States assumed and being exercised;

(c) The permit of March 3, 1925, is valid and constitutes complete authorization for the diversion complained of, and the permit regulates and controls the amount and conditions of such diversion;

(d) The United States is a necessary and indispensable party to this suit;

(e) The subject-matter set forth in said bill of complaint is exclusivelly within the jurisdiction of the political department of the Government;

(f) Complainant is barred of any action by its laches and acquiescence and it is estopped from obtaining the relief prayed.

41.

These defendants deny that the complainant is entitled to the relief, or any part thereof, as in said bill of complaint demanded, and these defendants state that said bill of complaint is inadequate and insufficient in law and does not on its face entitle the said complainant to the relief, or any part thereof, prayed for in and by said bill of complaint; and these defendants furthermore move that the bill of complaint be dismissed; and these defendants, as to each and every allegation of said bill of complaint not herein admitted, answered or specifically denied, hereby expressly deny the same; and these defendants pray the same advantage in this answer as if they had pleaded or demurred to said bill of complaint, and pray that they be dismissed with their reasonable costs and charges in this behalf most wrongfully sustained.

THE STATE OF ILLINOIS,
By Oscar E. Carlstrom,
Attorney General,
Cyrus E. Dietz and
Hugh S. Johnson,
Its Solicitors.

THE SANITARY DISTRICT OF CHICAGO,
By Hector A. Brouillet,
Attorney,
Morton S. Cressy,
Assistant Attorney,
Its Solicitors.
Defendants.

O.T. 1930 ORIGINAL NOS. 8, 10 & 11,

Office Supreme Court, U. S.
FILED
JUN 1 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

No. ~~6~~ 7 Original, in Equity.

STATES OF WISCONSIN, OHIO, PENNSYLVANIA AND MINNESOTA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants,
and
THE STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA,
Intervening Defendants.

ANSWER OF ILLINOIS TO AMENDED BILL OF COMPLAINT.

OSCAR E. CARLSTROM,
Attorney-General of Illinois.
CYRUS E. DIETZ,
HUGH S. JOHNSON,
Solicitors for Illinois.

BARNARD & MILLER PRINT, CHICAGO

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1925.

No. 16 Original, in Equity.

STATES OF WISCONSIN, OHIO, PENNSYLVANIA AND MINNESOTA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants,
and
THE STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA,
Intervening Defendants.

ANSWER OF ILLINOIS TO AMENDED BILL OF COMPLAINT.

This defendant, the State of Illinois, by Oscar E. Carlstrom, Attorney-General, and Cyrus E. Dietz and Hugh S. Johnson, its solicitors, reserving to itself all right of exception to, and herein and hereby renewing its motion to dismiss, the said amended bill of complaint, for answer thereunto says:

1. This defendant hereby joins in and adopts the answer of the defendant, the Sanitary District of Chicago, and the answer of the intervening defendants, Mis-

souri, Kentucky, Tennessee and Louisiana, heretofore filed herein (except such portions of Paragraphs Nineteen of said answers as aver that the lowering of the mean level of Lakes Michigan, Huron, Erie and Ontario, by reason of the diversion, as alleged in Paragraph Nineteen of said amended bill, does not and will not exceed four and three-fourths inches) and this defendant, in so joining in and adopting said answers, asks and prays the same benefit and advantage of the said answers as if the statements and averments therein contained, were herein fully and specifically set forth.

2. This defendant denies that as a result of the diversion of water from Lake Michigan, as averred in said amended bill of complaint, the mean level of the water in Lakes Michigan, Huron, Erie and Ontario and in the various waterways connecting said lakes and in the St. Lawrence River above tidewater has been lowered to any extent below the level that would exist in said lakes and waterways in the absence of such diversion.

3. This defendant, further answering and insisting upon the following as a distinct and separate matter of defense in bar of the said amended bill of complaint, says that, as is alleged and averred in the said answers, the United States, in its control and regulation of all the navigable waters of the United States and in its improvement and maintenance and/or creation of the inland waterway system of the United States, connecting by water transportation and waterways the various watersheds, regions and parts of the country, has exercised and is exercising complete and full control of the Great Lakes waterway and of the system of waterways represented by the Mississippi River and its tributaries to the Gulf of Mexico and of the connection between said two systems of waterways by means of the Chicago River,

the Sanitary and Ship Canal and Illinois and Michigan Canal to the Illinois River. And the United States, in such connection, has authorized and adopted said Sanitary and Ship Canal, with its attendant diversion of water from Lake Michigan, as a part of said inland waterway system, and has authorized, recognized, approved and adopted each and every of the acts of defendants, complained of in said amended bill.

4. This defendant, further answering and insisting upon the following as a distinct and separate matter of defense in bar of the said amended bill of complaint, says that, as is alleged and averred in the said answers, the said complainants and each of them, by reason of the several matters and things in the said answers set forth, have been guilty of laches and have acquiesced in all of the acts of the defendants complained of in, and that the said complainants and each of them, therefore, are estopped from obtaining any of the relief sought by, said amended bill.

And this defendant, further answering, denies that the complainants are entitled to the relief, or any part thereof, as in the said amended bill demanded, and prays that it may be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

STATE OF ILLINOIS.
By Oscar E. Carlstrom,
Attorney-General.

Cyrus E. Dietz,
Hugh S. Johnson,
Solicitors for Illinois.

Office Supreme Court, U. S.
FILED
JUN 1 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

Original in Equity Number [redacted] [redacted] [redacted]

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

NOTICE OF MOTION FOR LEAVE TO FILE INSTANTER THE JOINT AND SEVERAL ANSWER OF THE DEFENDANTS AND TO RENEW THE MOTION FOR CONSOLIDATION WITH No. 16 IN EQUITY, WISCONSIN, et al., vs. ILLINOIS, et al., TO TAKE PROOFS AND FOR HEARING.

OSCAR E. CARLSTROM,
Attorney General of Illinois,
CYRUS E. DIETZ,
HUGH S. JOHNSON,
Solicitors for Defendant, State of Illinois.
HECTOR A. BROUILLET, Attorney,
MORTON S. CRESSY,
Solicitors for Defendant, The Sanitary District of Chicago.

BARNARD & MILLER PRINT, CHICAGO

IN THE

Supreme Court of the United States,

OCTOBER TERM, A. D. 1925.

Original in Equity Number 27.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

NOTICE.

To Honorable

ANDREW B. DOUGHERTY,
Attorney General, State of Michigan, Complainant, Solicitor for Complainant;

To Honorable

HERMAN L. EKERN,
Attorney General of Wisconsin;

RAYMOND T. JACKSON,
Special Assistant Attorney General of Wisconsin;

RALPH M. HOYT,
Special Assistant Attorney General of Wisconsin;

CLIFFORD L. HILTON,
Attorney General of Minnesota;

C. C. Crabbe,
Attorney General of Ohio;

Newton D. Baker,
Special Assistant Attorney General of Ohio:

George W. Woodruff,
Attorney General of Pennsylvania;

Phillip Wells,
Deputy Attorney General of Pennsylvania;

Solicitors for Complainants in No. 16, Original in Equity, October Term, 1925, entitled "*States of Wisconsin, et al.* v. *State of Illinois et al.*"

To Honorable

North T. Gentry,
Attorney General of Missouri;

Frank M. Thompson,
Attorney General of Tennessee;

Frank E. Daugherty,
Attorney General of Kentucky;

Percy Saint,
Attorney General of Louisiana;

Daniel N. Kirby,
Cornelius Lynde,
Solicitors for Intervening Defendants in No. 16.

Original in Equity, October Term, 1925, entitled "*States of Wisconsin, et al.* v. *State of Illinois et al.*"

Please take notice that on Tuesday, June 1, 1926, we shall present the motion of the defendants in the above entitled cause for leave to file instanter the joint and several answers of the defendants, the State of Illinois and the Sanitary District of Chicago, to the Bill of Complaint, including therein, the motion to dismiss the said Bill of Complaint, copy of which answer is enclosed herewith, and at the same time renew the motion heretofore filed on May 24, 1926, for consolidation of this cause for the purpose of taking proofs and hearing with cause No. 16, Original in Equity, October Term, 1925, entitled "*States of Wisconsin, et al.* v. *State of Illinois, et al.*" at which time and place you may be present, if you see fit.

State of Illinois,
By Oscar E. Carlstrom,
Attorney General of Illinois.
Cyrus E. Dietz,
Hugh S. Johnson,
Its Solicitors.

The Sanitary District of Chicago,
By Hector A. Brouillet,
Attorney,
Morton S. Cressy,
Assistant Attorney,
Its Solicitors,
Defendants.

Office Supreme Court, U. S.
FILED
SEP 30 1926
WM. R. STANSBURY
CLERK

In The Supreme Court of the United States

OCTOBER TERM, 1925

No. [redacted], ORIGINAL. [redacted] 10

STATE OF MICHIGAN AND STATE OF NEW YORK;
Complainants,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION TO AMEND BILL OF COMPLAINT.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan,

ALBERT OTTINGER,
Attorney General of the State of New York,

Solicitors for Complainants.

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In the Supreme Court of the United States

October Term, 1925

No. 27, Original.

State of Michigan and State of New York, Complainants, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	

MOTION TO AMEND

And now comes the State of Michigan, complainant, and begs leave to file in this cause, the amended bill, a copy of which is hereto attached, and the State of New York begs leave to be joined as complainant in said action.

Dated September 17th, 1926.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan,

ALBERT OTTINGER,
Attorney General of the State of New York,
Solicitors.

IN THE SUPREME COURT
of the
UNITED STATES.

October Term, 1925

No. 27, Original.

State of Michigan and State of New York, Complainants, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	

NOTICE OF MOTION FOR LEAVE TO AMEND AND TO JOIN AS COMPLAINANT.

OSCAR E. CARLSTROM,
Attorney General of the State of Illinois,
Solicitor for Defendant State of Illinois,

HECTOR A. BROUILLET,
Solicitor for Defendant, Sanitary District of Chicago:

Please take notice that the annexed motion for leave to amend and to join as complainant will be submitted at the opening of court on the fourth day of October, 1926, or as soon thereafter as counsel can be heard.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan,

ALBERT OTTINGER,
Attorney General of the State of New York,
Solicitors.

IN THE SUPREME COURT
# of the
UNITED STATES.

October Term, 1925

No. 27, Original.

State of Michigan and State of New York, Complainants,	
vs.	
State of Illinois and Sanitary District of Chicago, Defendants.	

AMENDED BILL OF COMPLAINT.

To the Honorable, the Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of Michigan, one of the United States, by its solicitor, Andrew B. Dougherty, Attorney General of said State, and the State of New York, one of the United States, by its solicitor, Albert Ottinger, Attorney General of said State, bring this bill of complaint against the State of Illinois and the Sanitary District of Chicago and your orators complain and allege:

I.

The State of Michigan and the State of New York, each, is one of the States of the United States of America and this action is brought on its and their behalf, in the Supreme Court of the United States in the exercise of the original jurisdiction of said court on the ground that it is an action in equity relating to a controversy between two or more states of the United States and also between a state of the United States and a citizen of another state.

II.

The defendant, State of Illinois, is also one of the States of the United States of America and the defendant, Sanitary District of Chicago is a public corporation organized and existing under and by virtue of the laws of said State of Illinois and is a citizen of said last named State.

III.

The State of Michigan has approximately one thousand six hundred and twenty-four miles of shore line along Lakes Superior, Michigan, Huron, St. Clair and Erie and their connecting waterways which lakes, together with Ontario, and their connecting waterways constitute a group of interrelated and interdependent inland seas or oceans, commonly known as the Great Lakes, and provide a natural water highway from the head or westernmost point of Lake Superior to the Atlantic Ocean by way of the river St. Lawrence.

IV.

The State of New York is one of the original thirteen states of the United States of America. The State of New York has approximately five hundred and fifty-eight miles of continuous shore line on Lakes Erie and Ontario, the Niagara River, and that part of the St. Lawrence River forming the international boundary line between said State and the Province of Ontario, Canada. The State of New York owns all of the beds of these lakes and rivers lying within its boundaries, subject only to the right of the public to navigate the same and subject to the right of the Congress to regulate commerce thereon under the commerce clause of the Constitution, and as a down stream riparian owner is entitled to the full and natural flow of the water therein.

The order of precedence in the use of the waters of this waterway is (1) domestic and sanitary purposes in the ordinary, reasonable and generally approved manner in the use of water for such purposes, after which use water so used must be returned to the stream or body of water from which it is taken; (2) navigation; (3) development of power and other legitimate uses. The use of the waters of this waterway for navigation purposes is general—each State possessing equal rights. The residue of the water available for power belongs to the State and the citizens of the State adjoining that particular part of the waterway where power may be developed. A flow of ten thousand cubic feet per second of water through the Niagara River and the international section of the St. Lawrence River is capable of developing approximately four hundred thousand horse power. The right to use this water for the development of power is a property right of the State of New York and its citizens, which property right neither the defendants nor the Congress of the United States has a right to destroy or impair by abstracting or diverting water from Lake Michigan or any other part of the Great Lakes and St. Lawrence waterway into the Mississippi waterway.

V.

The Great Lakes waterway lies partly within the United States of America and partly within the Dominion of Canada, one of the states or dominions of the colonial empire of Great Britain and the continuation of that highway connecting the Great Lakes with the Atlantic Ocean through and by the St. Lawrence River, passes for a great distance wholly through Canadian territory; that all of said waterway lying within international waters has been opened by treaties between the United States of America and Great Britain and the Dominion of Canada, as free water so that American vessels including the ships of citizens of complainants and the trade and commerce of their people are secured equal rights of navigation with Canadian vessels in the many harbors, approximately fifty in number, which the Canadian government has improved for shipping on the Great Lakes, their connecting waters and the St. Lawrence River, all of which rights and benefits of navigation are of great and continuing benefit to complainants, their people, their trade and commerce and the prosperity of their shipping interests.

VI.

That the Great Lakes waterway lies within a single water shed and constitutes a natural highway which may be improved but may not be destroyed or impaired by either Federal or State authority.

VII.

That the State of Michigan was admitted to the union of States comprising the United States of America in 1837, being created from a portion of the territory known as the North West Territory established by an ordinance of the Congress of the United States on July 13th, 1787, from territory previously ceded to the United States by the State of Virginia upon the condition, among other things, that from said ceded territory there should in time be created not less than three nor more than five states; said ordinance by article four thereof expressly provided:

> "The navigable waters leading into the Mississippi and St. Lawrence and the carrying places between the same shall become highways and forever free as well to the inhabitants of the said territory as to the citizens of the United States and those of any other states that may be admitted into the confederacy without any taxes, imposts or duty therefor."

Which provision of said ordinance was a recognition that the people of said territory should have the same rights of free ingress and egress as were secured to the citizen by the fourth article of the confederation between the states.

VIII.

That the State of Michigan on its admission to the union of the states took and had the title to all of the submerged or subaqueous lands within its borders which included the lakes, bottoms of that portion of the Great Lakes, Superior, Michigan, Huron, St. Clair and Erie, within its borders.

IX.

That the State of Michigan in *its proprietary capacity* and *in trust for its people*, its *shippers*, its shipping and its *commerce*, *had* and continues to have a *vested right* in said Great Lakes *waterway* as a *public highway* and a *perpetual paramount easement for highway purposes*, which right was, prior to the admission of said State into the Union, vested in and held in trust for the public, first by the British Crown, second by the State of Virginia, third by the United States and the organized territorial division thereof known as the North West Territory.

X.

That the State of *Michigan's vested right* in and to the Great Lakes waterway as a *highway of commerce* is *concurrent with the rights of all other states of the United States bordering* upon said waterway and of the Dominion of Canada also bordering thereon and that said natural waterway is lawfully entitled to receive all of the water from rivers and streams in the same water shed provided by nature for the purpose of keeping up and maintaining the waters in said water shed as such natural highway.

XI.

In the year 1889 the legislature of the State of Illinois enacted a statute entitled "An act to create sanitary disricts and remove obstructions in the Des Plaines and Illinois Rivers," approved May 29th, 1889, and published in the laws of Illinois for the year 1889 commencing at page

186; which act authorized the organization of public corporations to be known as sanitary districts, with power, among other things, to construct, maintain and operate drainage canals or channels for the disposal of drainage and sewage. By sections 23 and 24 of the said act, it was further provided as follows, to-wit:

> "Sec. 23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers, such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute and to be of a depth of not less than fourteen feet and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom, capable of producing a depth of not less than eighteen feet of water. If the population of the district drained into such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harm-

less the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel. * * *

"Sec. 24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the Des Plaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes."

XII.

In November and December of the year 1889, defendant, the Sanitary District of Chicago, was organized as a sanitary district under the act of 1889 hereinbefore referred to, and has since continuously existed as such sanitary district under the said act of 1889 and the acts amendatory thereof and supplementary thereto. At the time of its organization said defendant district consisted of a territory about 185 square miles in area. By successive acts of the legislature of Illinois the area of said defendant district has been increased from time to time, and as your orators are informed and verily believe and therefore aver, its area is now approximately 395 square miles, extending from the Illinois-Indiana State line on the south and east to the northerly boundary of Cook county on the north, with about 33 miles of frontage on Lake Michigan, and comprises the entire city of Chicago together with large areas of land to the south, west and north of said city.

XIII.

On or about the 3rd day of September, 1892, defendant Sanitary District of Chicago, acting as a subordinate agency of the defendant, State of Illinois, pursuant to the act of 1889 hereinbefore referred to, commenced the construction of a canal or channel commencing at a point in the west fork of the south branch of the Chicago river about 6 miles above the mouth of said river, which river was a navigable stream tributary to and a part of the Great Lakes watershed, and extending in a general westerly direction for a distance of about 32 miles to a point near the city of Joliet, Illinois. At its westerly terminus said canal was made to connect with the Des Plaines river, a stream flowing in a westerly and southwesterly direction and forming a tributary of the Illinois river, which latter river in turn flows in a westerly and southwesterly direction and forms a tributary of the Mississippi river.

XIV.

In the construction of said canal it was at all times the plan of the defendant, State of Illinois, and the defendant, Sanitary District of Chicago, that the said canal should be used as a passage-way for the sewage of the territory comprising the Sanitary District of Chicago, to the end that such sewage might be carried down the said canal into the Des Plaines and Illinois rivers; and in order to accomplish the said purpose it was the intention of said defendants at and prior to the commencement of the construction of said canal to divert from Lake Michigan, and pass through the said canal, such amounts of water as might be deemed by said defendants to be necessary for the proper dilution of the said sewage and its propulsion through the canal and the Des Plaines and Illinois rivers. In pursuance of such intention, and prior to the completion of said canal, the legislature of the defendant State of Illinois enacted in the year 1895 an amendment to section 20 of the act of 1889 hereinbefore referred to, which amendment is published in the Laws of Illinois for the year 1895 commencing at page 168 thereof, and provides that any sanitary district organized under the provisions of the act of 1889 and maintaining a channel which causes the discharge of sewage into or through any river beyond the limits of such district, "shall, at the time any sewage is turned into or through any such channel or channels, turn into such channel or channels not less than 20,000 cubic feet of water per minute for every 100,000 inhabitants of said district, and shall thereafter maintain the flow of such quantity of water."

XV.

Upon the completion of the said canal, the defendant, Sanitary District of Chicago, in compliance with section 27 of the said act of 1889, applied to the Governor of the State of Illinois for authority to commence the use of said canal, and such authority was granted by the said governor on behalf of the defendant State of Illinois, and thereupon, on or about the second day of January, 1900, said defendant District commenced the abstraction of water from Lake Michigan and its diversion into the Chicago river and thence into and through the said canal, in such amounts and at such velocity as to reverse the flow of the Chicago river and create a steady and uninterrupted flow of water, from said day down to the present time, from Lake Michigan through the Chicago river to the said canal thence through the said canal to the Des Plaines river near Joliet, and thence down the Des Plaines and Illinois rivers to the Mississippi river.

XVI.

The primary object and purpose of the act of 1889 hereinbefore referred to, as said act was construed by the highest court of the State of Illinois in the case of *People v. Nelson,* 133 Ill. 565, 27 N. E. 217, and *Beidler v. Sanitary District of Chicago,* 211 Ill. 628, 71 N. E. 1118, was to provide a method of disposing of the sewage of the city of Chicago and contiguous territory, and the canal constructed by the defendant district as hereinbefore described has been continuously used for such purpose since the month of January, 1900. By the terms of the act of 1895 referred to in paragraph 14 hereof, defendant State of Illinois has undertaken to make it the legal duty of the defendant, Sanitary District of Chicago, to pass water through the said canal at the rate of 20,000 cubic feet per minute or 333 1-3 cubic feet per second, for every 100,000 inhabitants of the territory composing the Sanitary District of Chicago. At the time of the passage of said act of 1895, and at all times since, it was well known to the legislature of the State of Illinois and to the officers of the defendant Sanitary District of Chicago, that the only source from which water in such quantities as required by said act could be obtained was by the abstraction of water from Lake Michigan, and it was at all of said times the intention of said legislature that the duty which it sought to impose upon the defendant District by the said act of 1895 should be performed by means of such abstraction, according to the census of 1920, the population of the Chicago Sanitary District was 2,963,090 in that year, and as your orators are informed and verily believe and therefore aver, the population of said district is now in excess of said number, and therefore the effect of the said act of 1895 is to direct the defendant, Sanitary District of Chicago, to abstract water from Lake Michigan at the present time at the rate of not less than 9,876 cubic feet per second.

XVII.

Subsequent to the opening of the said canal, and in the year 1903, the defendant, State of Illinois, by an act of its legislature approved May 14th, 1903, and published in the Laws of Illinois for the year 1903 commencing on page 113, undertook to authorize the defendant, Sanitary District of Chicago, to construct and operate a plant for the generation of electrical energy by hydraulic power derived from the water passing from Lake Michigan through the said canal. The provisions of said act with reference to said subject are as follows:

> "Sec. 5. That the said sanitary district of Chicago is hereby authorized to construct all such dams, waterwheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now, or hereafter, constructed by said district.
>
> "Sec. 6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy, and shall be transmitted to the various cities, villages and town within said sanitary district, or adjacent to the main

channel of said sanitary district and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said sanitary district: Provided, however, that it shall be the duty of said sanitary district to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said sanitary district."

XVIII.

Under and by virtue of the authority attempted to be conferred on the defendant District by the defendant State of Illinois in said act of 1903, said District constructed and placed in operation a hydro-electric power plant at Lockport near the western terminus of the said canal, and has continuously operated the same since its completion in the month of November, 1907. The said power plant is capable of developing in excess of 36,000 horsepower of electrical energy and does in fact develop and generate, as your orators are informed and verily believe and therefore aver, in excess of 20,000 horsepower continuously throughout the year. The electrical energy thus generated is mainly transmitted to the city of Chicago and there sold for municipal and commercial purposes; and, as your orators are informed and verily believe and therefore aver, the operations of said plant since the year 1907 have produced many millions of dollars of gross revenue to the defendant Sanitary District of Chicago and have earned for the said District many millions of dollars of profits over and above the cost of operating the said plant, including proper allowances for depreciation and a reasonable return upon investment therein.

XIX.

Since the completion of said hydro-electric development near the western terminus of said canal, the object and purpose of the defendants in the operation of the said canal and in the abstraction of water from Lake Michigan through the same has been and is now two-fold, to-wit: the disposition of the sewage of the defendant Sanitary District of Chicago, and the generation and sale of electrical energy.

XX.

According to the reports of the engineers of the defendant, Sanitary District of Chicago, the yearly mean amount of water passing through the said canal at its westerly terminus, practically all of which is water abstracted from Lake Michigan, is as follows for the years 1900 to 1917, inclusive:

Year	Cubic Feet per second	Year	Cubic Feet per second
1900	2,900	1909	2,766
1901	4,046	1910	3,458
1902	4,302	1911	6,445
1903	4,971	1912	6,424
1904	4,793	1913	7,191
1905	4,480	1914	7,105
1906	4,473	1915	6,971
1907	5,116	1916	7,325
1908	4,421	1917	7,786

—which figures, as your orators are informed and believe and therefore aver, are based on methods of calculation which result in very considerably under estimating the actual amounts of flow through the canal. Your orators are informed and verily believe and therefore aver that the actual mean abstraction of water from Lake Michigan through said canal for the year 1917 was about 8,800 cubic feet per second, and that such abstraction beginning with the year 1918 and taken down to the present time has been in excess of 8,800 cubic feet per second; which abstraction is on the basis of average amount of water taken and which is greatly increased at certain periods in the exercise of the judgment and appropriating desires of the defendant, Sanitary District, and which increases have no relation to the needs of navigation on the Great Lakes and which at times of low water or barometric pressure are still further adversely affected by the further lowering of lake levels and the consequent decrease in the navigable capacity of said Great Lakes, their rivers and harbors.

XXI.

Complainants are informed and believe and therefore aver it to be true that the rivers and streams of the State of Illinois contribute naturally to the Great Lakes watershed less than an average of one thousand cubic feet per second of water; that the defendants are now withdrawing permanently from said Great Lakes watershed an average of eleven thousand seven hundred cubic feet per second, including the natural flow of the Chicago River wholly reversed and appropriated by the defendant Sanitary District and diverted into another watershed, and the pumpage of said defendant Sanitary District from the Great Lakes which is not returned in its natural course to said Great Lakes but is diverted into another watershed by means of said defendant Sanitary District's canal; and complainants are informed and believe and therefore aver it to be true that the said defendant Sanitary District from time to time increases its abstraction, appropriation and diversion of water from the Great Lakes to a total of fourteen thousand two hundred cubic feet per second with resultant and resulting increased impairment of the levels of the Great Lakes, particularly during periods of low water or barometric pressure thereon, thereby increasing the hazards of navigation and causing an increased reduction in the navigable capacity of said Great Lakes, their connecting waterways and ports and harbors.

XXII.

That the Chicago River is a navigable stream within the Great Lakes watershed which contributes in its natural state, your orators are informed and believe and therefore aver as true, approximately one thousand cubic feet per second to the waters of the Great Lakes, in the use of which complainants and their people, their trade and commerce, ships and shipping, have a vested right for purposes of navigation and a paramount easement for highway purposes; that complainants both in their proprietary capacity and quasi-soverign capacity as lower riparian proprietors have riparian rights in said natural flow of said Chicago River, but notwithstanding the rights and interests of complainants and of their people and the rights of navigation and of all people adjacent and having a right of highway in the Great Lakes waterway, including the Dominion of Canada, the defendant, Sanitary District, has wholly diverted the flow of said river from said watershed and appropriated it to its own use in the operation of a sewage disposal canal and the production of hydro-electric power to the entire destruction of all riparian rights of said complainants and of their people and the navigation rights of all interests navigating the Great Lakes.

XXIII.

All of the water abstracted from Lake Michigan by the defendants in the manner hereinbefore set forth is carried into the Mississippi valley and hence is permanently abstracted from the Great Lakes system and its own natural watershed. As the result of such abstraction, the mean level of the water in Lakes Michigan, Huron, Erie and Ontario and in the various waterways connecting said lakes, and in the St. Lawrence River above tide-water, has been lowered not less than six inches below the level that would exist in said lakes and waterways in the absence of such abstraction; and as the amount of abstraction in cubic feet per second becomes greater, the amount of lowering of the level of said lakes and waterways increases in proportion.

XXIV.

That because of unexplained conditions resulting possibly in part from deforestation of the great timbered areas formerly adjacent to the Great Lakes basin, there is an unexplained reduction in the amount of water in the Great Lakes basin with a resultant decrease in the levels of the Great Lakes amounting as your orators are informed and believe and therefore aver to be true, to the extent of approximately three feet less than the levels existing ten years ago and consequent corresponding decrease in the navigable capacity of said Great Lakes, their connecting waters, ports and harbors; that the Great Lakes and their connecting waters and harbors and also in large areas of the lake bottom are so shallow that their levels are already dangerously lowered to the impairment of their navigation under the conditions and development of modern commerce; that although connecting waterways and channels are susceptible of deepening by dredging, it is a practical impossibility to change large shoal areas of the ocean bottom of these inland oceans constituting the Great Lakes water system, so that in times of violent storm, the shoal places may be a sufficient distance from the normal surface of the lake to permit of navigation in safety and if lake levels are permitted to be impaired by the abstraction of large volumes of water, whether under pretended authority of the legislature of a State or of the Congress of the United States, to the point where the large ships of modern commerce, because of the increasing hazards of open water navigation in time of storm, may only navigate under fair weather and placid water conditions, it will necessarily result in a destruction and retirement of the present commercial carriers of the said Great Lakes with incidentally great loss of property, great increase in freight costs due to the necessity of carriage of smaller cargoes in a new type of cargo carrier, with a consequent impairment of the prosperity of the states, people, cities and industries adjacent to the Great Lakes waterway and the states to the west thereof now dependent thereon and to the prosperity of the States of Michigan and New York and of their people and industries in which complainants are particularly interested and with respect whereof they particularly complain.

XXV.

Neither the Congress of the United States nor any Federal agency or authority nor the legislature of the State of Illinois or any agency of that or any other State has the authority to abstract from the Great Lakes basin any water to be diverted into any other natural or artificial watershed, whether for the purpose of operating, maintaining and flushing an open sewer maintained in violation of modern standards of sanitation, or even for the purpose of navigation; the power of the Congress of the United States is expressly restricted to the control of the waters of the Great Lakes as a navigable waterway under the powers vested in it by the commerce clause of the Constitution of the United States which power is that of regulation, not of destruction.

XXVI.

There is no authority in the government of the United States or of any of the states or of any of their agencies authorizing the changing of the natural course of the Chicago River and its unlawful alteration, reversal and change by the defendants is against the rights of these complainants as well as against the rights of all parties and interests in the Great Lakes water system.

XXVII.

The lowering of the levels of the Great Lakes which are interrelated and interdependent, particularly lakes Michigan and Huron which are in fact but one lake, the body of water connecting them being approximately four miles in width, has seriously diminished the navigability and navigable capacity of said Great Lakes, their ports and harbors, with resultant impairment and partial destruction of the great natural highway in which the States of Michigan and New York and their people have an interest as hereinbefore enumerated. On said lakes there is a great commerce, domestic and foreign, and many freight and passenger ships operate on all of said lakes and waterway between the state of Michigan and the other states adjacent thereto and to and with other states and countries and in addition thereto, great ships particularly of a type perculiar to the Great Lakes and known as bulk freighters and having an enormous carrying capacity and capable of operation at very low freight rates when loaded to maximum capacity, carry from the great wheat producing areas of the American Northwest, the grain there produced to lower lake ports and to the ocean and also carry from the large mineral territories of northern Michigan and Minnesota and Canada, large mineral deposits particularly of iron and copper ore to the industrial districts of the United States and particularly of Illinois, Ohio, Indiana, Pennsylvania and New York and the industrial districts of the Province of Ontario in the Dominion of Canada and to the industrial districts of the States of Michigan and New York in which complainants are particularly and peculiarly interested—while upbound these ships carry in addition to the vast variety of manufactured commodities known to commerce, the coal produced in the coal regions of the eastern part of the United States and necessary to the manufacturing, industrial, domestic and governmental uses of millions of the people of the United States on and adjacent to the borders of the upper lakes of said Great Lakes region, including not only the states of the northwest and of Canada but also Minnesota, Wisconsin, Illinois, Ohio, Indiana and particularly the States of Michigan and New York in which states and the needs of their people, their industries, their commerce and their own governmental institutions, your orators are peculiarly interested. That for every inch of the normal draft of said vessels which they are unable to use because of the reduction in the navigable capacity of the Great Lakes waterway, their cargo carrying capacity is reduced by many tons with the resulting increase in freight costs per ton which becomes a burden upon the complainant states in their proprietary capacity and upon the many thousands of people of these States, a burden upon intra and interstate commerce and an impairment of the use and the usefulness of the great natural highway created by nature for the use of the people adjacent thereto and expressly dedicated to said people by the Congress of the United States prior to the organization of the republic.

XXVIII.

That the complainant States in their proprietary capacity and also in their quasi-sovereign capacity are injured by the impairment of their riparian rights in that portion of Lakes Superior, Michigan, Huron, St. Clair, Erie, Ontario and the St. Lawrence River and their connecting waters lying within their respective boundaries resulting from the impairment and lowering of the levels of the Great Lakes consequent upon the unlawful and unnatural diversion and abstraction of water from the Great Lakes and their water shed by the defendants.

XXIX.

That the complainant States in their quasi-sovereign capacity have constantly sustained great and irreparable injury through the loss to their people, their trade, commerce and shipping and to owners of riparian rights in the Great Lakes and St. Lawrence River and their connecting waterways, due to the lowering of the levels of the Great Lakes consequent upon the unlawful and unnatural divirsion and abstraction of water from the Great Lakes water shed by the defendants; and complainants aver that a great number of their citizens own within their respective borders, riparian rights in the Great Lakes and the St. Lawrence River and their connecting waterways, of a value of many millions of dollars which rights are largely dependent for their usefulness and value upon the maintenance of the levels of the Great Lakes; that the impairment and lowering of the lake levels of said Great Lakes is destructive of such valuable riparian rights of citizens of Michigan and New York located within their respective borders, with incidental destruction of the usefulness and value of docks, wharves, ship yards, boat houses, warehouses and landing places; and complainants aver that all of such rights existing and exercised under the law, may not be destroyed in the interests of the sewage disposal or hydro-electric power needs or desires or pretended economies of the defendant, Sanitary District, or of any other person.

XXX.

That large numbers of the citizens of the States of Michigan and New York own interests in ships and ship yards within their respective borders which together with the privately dredged and maintained channels leading to ship yards and landing places have a value in the aggregate of many millions of dollars and which are dependent upon the continued and successful operation of commerce, intrastate and interstate upon the Great Lakes and St. Lawrence River and their connecting waters; all of which great and extensive interests, essential both to the prosperity of great numbers of their people and of great importance to complainants themselves in the proprietary sense in the payment of taxes and other revenues, are being injured by the unlawful and unnatural diversion and abstraction from the Great Lakes and their watershed by the defendants with the resultant lowering of the levels of the Great Lakes and consequent decrease in their navigable capacity and the navigable capacity of the ports and harbors thereof improved at great expense by the government of the United States and by the municipal and port authorities of the respective ports and harbors, and also of the ports and harbors thereof improved at great expense by the Dominion of Canada, and causing great and irreparable loss to complainants and their people and their trade and commerce having equal rights of use with the people of the Dominion of Canada under international treaty.

XXXI.

That the State of Michigan in its proprietary capacity has the title to vast quantities of fish found in the Great Lakes and within its borders; that said fish are taken from the waters of the Great Lakes to the extent of millions of pounds annually and constitute a substantial part of the food supply of the people of the United States, particularly of the States adjacent to said Great Lakes, including the people of the State of Michigan; that said fishing, including the marketing thereof has for many years constituted an industry in the State of Michigan in which many of its people are employed and in which many others of its people own valuable property rights; that great numbers of complainant's people adjacent to the Great Lakes derive much pleasure and recreation from fly, rod and still fishing which said fishing is one of the attractions which draws annually to the State of Michigan many thousands of people who contribute greatly to the prosperity and wealth of many sections of the State of Michigan bordering upon the Great Lakes and engaged in the operation of summer hotels and summer resorts with a resultant increase in property values and consequent increasing tax revenues to complainant; that the continued lowering of the levels of the Great Lakes with resultant exposure of shallow and inshore areas of lake bottom used for feeding and spawning grounds by the fish of the Great Lakes, including the ports of said lakes and their connecting waters within the borders of the State of Michigan, is destructive of fish life and continued fish propagation with consequent decrease in the fish life of said lakes and reduction in the scope and extent and prosperity of the fishing industry in said State and reduction in the food supply of its people by reason of which its people sustain great and irreparable injury.

XXXII.

The acts of the defendants hereinbefore set forth and described, in abstracting water from the Great Lakes Basin, and the rivers, streams and waters naturally contributary thereto and diverting them into the canal of the defendant District and into an entirely different watershed are in violation of the legal rights of complainants and of the people of the States of Michigan and New York in the following respects, to-wit:

(a) In that the defendants by said acts are interfering with the common law and vested right and paramount easement of highway of the States of Michigan and New York and of their people and of the public generally, to have the free and unobstructed use of the Great Lakes waterway and the various ports and harbors thereof both within and without the borders of the State of Michigan for purposes of navigation, trade and commerce, free from any and all interferences with the present and prospective natural navigable capacity of said waterway and its usefulness as a public highway.

(b) That the acts of said defendants constitute an interference with the right of the people of the State of Michigan as well as of the people generally, to the free and unobstructed navigation of Lakes Superior, Michigan, Huron, St. Clair, Erie and Ontario and the navigable waters between the said lakes and from said lakes into the Atlantic Ocean, which rights belong to the said people of the State of Michigan both by common law and by the express guaranty contained in the ordinance for the government of the territory of the United States northwest of the river Ohio, enacted by Congress on June 13th, 1787, and constituting a contract between the government of the United States and the several States bordering on the Great Lakes and among said States bordering on the Great Lakes, which neither the government of the United States nor any of said States has the right to impair.

(c) That the acts of the defendants hereinbefore complained of constitute a present and constantly increasing burden upon intra-state and interstate commerce in that they are impairing and destroying a natural highway used and useful in interstate commerce.

(d) That the acts of the defendants hereinbefore complained of in abstracting water from the Great Lakes and Great Lakes watershed and thereby impairing their capacity, are destructive of the fisheries thereon and the riparian rights and shipping and commercial rights of complainants' citizens on and in said Great Lakes and their connecting waters; that complaintants own the fish in the Great Lakes adjacent to and within their borders which are available for and used by its people in connection with the fishing industry which is of very large and extensive scope within complainants' borders and also as a portion of the food supply of the people of the States of Michigan and New York and that complainants and their people as well as the people generally, adjacent to and having an interest in said Great Lakes waterway, have a right to have such natural waters in the Great Lakes watershed maintained therein for the use and maintenance of the pleasure and convenience of the people of said States and for the purposes hereinbefore recited.

XXXIII.

The said violations of the legal rights of the States of Michigan and New York and of their people have caused and now cause and will continue to cause~~, so~~ long as they are permitted to continue, serious interference with the trade and commerce of the people of the States of Michigan and New York in their commerce within and among themselves, with neighboring States and with the world, and in their proprietary capacity, resulting in large and constantly increasing pecuniary losses to the said people and the said States which cannot be actually estimated and for the recovery of which no adequate remedy exists at law. The State of Michigan and the State of New York therefore bring this action on behalf of themselves and each in its proprietary capacity and on behalf of the people of said States for the purpose of establishing and protecting the legal rights of said States and their people against the encroachment of the defendants and for the purpose of terminating a condition which is destructive to the welfare and prosperity of said States and of their people.

Wherefore, your orators pray that the defendants may be required to answer the allegations hereinbefore set forth in this amended bill of complaint and that upon final hearing of this cause an injunction be issued under the Seal of this court, restraining the defendants and each of them and each of their officers, agents or servants from taking or causing to be taken, any water whatever from Lake Michigan and its natural tributaries in such manner as to permanently divert the same from the said lake and said watershed.

Your orators pray that upon the final hearing of this cause, an injunction be issued under the Seal of this court restraining the defendants and each of them and each of their officers, agents and servants from reversing the flow of the Chicago River or in any manner obstructing its natural flow so as to prevent it from flowing in the course of nature into the Great Lakes, or to take or cause to be taken any water whatever from said Chicago River in such manner as to permanently divert the same from the Great Lakes watershed.

And your orators also pray for such other and further relief as to this Honorable Court may seem meet and consistent with equity and good conscience.

May it please your Honors to grant unto your orators a writ of subpoena under the Seal of this court directed to the Governor and Attorney General of the defendant, the State of Illinois, and to the Sanitary District of Chicago, commanding them and each of them on a day certain to be therein named and under a certain penalty, to be and appear in this honorable Court then and there to answer, but not under oath (answer under oath being expressly waived) all and singular the matters and things hereinbefore set forth and to abide such further order and decree of the court as may be made against the said defendants or either of them.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan,

ALBERT OTTINGER,
Attorney General of the State of New York,
Solicitors for Complainants.

United States of America,
State of Michigan, } ss.:
County of Ingham.

ANDREW B. DOUGHERTY, being first duly sworn, on oath says that he is the duly elected, qualified and acting Attorney General of the State of Michigan; that he has read the foregoing amended bill of complaint and knows the contents thereof; and that the same is true to his own knowledge except as to the matters therein stated on information and belief, and as to such matters he believes it to be true; and that as such Attorney General he is duly authorized to pray leave to file the said amended bill of complaint.

ANDREW B. DOUGHERTY.

Subscribed and sworn to before me this 17th day of September, 1926.

Albert H. Graham,
Notary Public, Ingham County, Michigan,
My commission expires April 19th, 1927.

Office Supreme Court, U. S.
FILED
OCT 7 1926
WM. R. STANSBURY
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1926.

No[redacted]ig[redacted]n Equity. 10

STATE OF MICHIGAN, Complainant,

vs.

STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, Respondents.

Memorandum of the Respondents in Opposition to the Pending Motion to Amend Bill of Complaint and to Admit the State of New York as a Co-complainant.

OSCAR E. CARLSTROM,
Attorney General, State of Illinois.
CYRUS E. DIETZ,
HUGH S. JOHNSON,
Counsel for the State of Illinois.
HECTOR A. BROUILLET,
GEORGE F. BARRETT,
EDMUND D. ADCOCK,
LOUIS J. BEHAN,
MORTON S. CRESSY,
For the Sanitary District.

JAMES M. BECK,
Of Counsel.

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1926.

No. 13, Original. In Equity.

STATE OF MICHIGAN, Complainant,

vs.

STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, Respondents.

Memorandum in Opposition to Complainant's Motion to Amend.

Respondents object to complainant's motion, which embodies two separable applications, and assign the following reasons:

The above-entitled case has now become a part of the case of Wisconsin *et al. vs.* The Sanitary District (No. 7, Original).

In that suit this Court, on June 7, 1926, referred the cause to Charles Evans Hughes, as Special Master, and in this order permitted the State of Michigan, if it so elected, "to participate in the taking of evidence and in the hearing before the Special Master, *in like* *manner and with like effect as if that suit had been consolidated with this cause by the Court's order."*

The State of Michigan subsequently elected to participate in the Wisconsin suit and under the conditions of said order.

The Wisconsin suit was begun on June 5, 1922, and has, therefore, been pending in this Court over four years. The issues in the case, as defined by the pleadings, involve the question whether the abstraction of the waters of Lake Michigan by the Sanitary District injuriously affects the navigability of the Great Lakes to the prejudice of the citizens of the complaining States.

The issues thus joined and the taking of testimony about to begin, the State of Michigan, at this late day, not only asks leave to amend its bill in equity, but, in the same motion, the State of New York, not as yet a party to the suit, asks leave to join with Michigan in filing the amended bill.

To this, respondents would not object, if no new issue were raised by the amended bill.

Unfortunately paragraph IV of the proposed amended bill raises a new issue in behalf of and peculiar to New York, which involves new and important questions.

As stated, the other complaining States, including the State of Michigan, claim, in their capacity as *quasi-sovereigns,* to restrain a diversion of water to the extent that it affects the *navigability* of the Great Lakes.

One claim of New York, as set forth in the proposed amended bill, is that such abstraction is an injury to the State of New York in its *proprietary* capacity, as the owner of the Niagara and St. Lawrence River water rights and the injury averred is in reference to these alleged rights.

This issue, if it is to be determined in the Wisconsin case, raises new and important questions with reference to the application of the powers of the Federal Water Power Commission and may involve the constitutionality of the Federal Water Power Act. The other complaining States, including Michigan, have no justiciable interest in these water rights.

To permit the State of New York to inject this issue into the Wisconsin case at this late day is to complicate the question and possibly to delay the proceedings before the Special Master.

With this explanation of facts, we suggest three objections to the motion:

I. The right of Michigan, as an existing party to the cause, to amend its bill should not be mingled in the same motion with an application of the State of New York to file an original bill. New York should first get permission of this Court to file an original bill and when the issue in that case is formulated, this Court can then determine whether it desires to consolidate it with the Wisconsin case.

II. The motion, if granted, would violate Rule 26 of the Federal Equity Rules, which provides that "where there is more than one plaintiff, the causes of action joined must be joint." If New York only claimed an injury to its citizens from the alleged impaired navigability of the Great Lakes, its cause of action could be properly joined with that of the other States. When, however, it seeks to inject an issue as to its right to enjoy the flow of lake waters in the Niagara and St. Lawrence River, for water power purposes, free from any use for the same or other purposes by the city of Chicago, it seeks to create an issue in which, as stated, neither the States of Michigan, Ohio, Pennsylvania, Minnesota or Wisconsin, have or claim any justiciable interest.

III. The application of New York comes too late and should be denied on the ground of *laches*. The Wisconsin case has been in this Court for over four years. During all this time, New York could have asked leave to file an original bill to vindicate its alleged water power rights, or it could have asked leave to join as a party complainant with the other States in any case in which the States were jointly interested.

It has, however, waited until issue has been joined upon the question of navigability and a reference made to a Special Master, and then seeks to inject a new issue into the case at the eleventh hour.

Conclusion.

We submit that the Court should deny this motion. Such denial can, if the Court sees proper, be without prejudice to the right of the State of Michigan to make a new motion to amend its bill and without prejudice to the State of New York, in a separate motion, to ask leave to file an original bill.

Should such motions be granted, we assume that this Court will give an opportunity to respondents either to file an answer or to move to dismiss, if so advised.

When an issue is thus joined on the new amended bill of Michigan and a new bill by the State of New York, it can then be determined whether the cases should be consolidated with the Wisconsin case.

Respectfully submitted,

OSCAR E. CARLSTROM,
Attorney General State of Illinois.
CYRUS E. DIETZ,
HUGH S. JOHNSON,
Counsel.
HECTOR A. BROUILLET,
Attorney, The Sanitary District of Chicago.
MORTON S. CRESSY,
Assistant Attorney.

JAMES M. BECK,
Of Counsel.

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CLERK

IN THE

Supreme Court of the United States

October Term, 1925

[redacted] 10

No. 27, ORIGINAL

STATE OF MICHIGAN AND STATE OF NEW YORK,
Complainants,

against

STATE OF ILLINOIS AND SANITARY DISTRICT, OF CHICAGO,
Defendants.

MEMORANDUM IN SUPPORT OF MOTION TO JOIN NEW YORK AS PARTY COMPLAINANT AND AMEND BILL OF COMPLAINT.

ANDREW B. DOUGHERTY,
Attorney-General of the State of Michigan,

ALBERT OTTINGER,
Attorney-General of the State of New York,

CLARENCE S. FERRIS,
Deputy Attorney-General,
Solicitors for Complainants.

In the Supreme Court of the United States

OCTOBER TERM, 1925.

No. 27, ORIGINAL.

STATE OF MICHIGAN AND STATE OF NEW YORK,
Complainants,
v.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

MEMORANDUM IN SUPPORT OF MOTION TO JOIN NEW YORK AS PARTY COMPLAINANT AND AMEND BILL OF COMPLAINT.

In support of the above motion, presented to the Court on the 4th instant by the States of Michigan and New York, said States submit the following:

1. The only new matter added by way of amendment is paragraph IV on pages 4 and 5, and the words "and by the municipal and port authorities of the respective ports and harbors" in lines 8 and 9 page 23. The only other changes in the complaint are those made necessary by reason of there being two complainants instead of one.

2. The State of New York is interested equally with the States of Michigan, Ohio, Pennsylvania, Wisconsin, Indiana and Minnesota in the question of navigation and the effect on navigation caused by the withdrawal of water at

Chicago. The port of Buffalo in the State of New York is the second in importance on the Great Lakes. The annual amount of tonnage entering this port is upwards of 20,000,000 tons.

3. A diversion of 10,000 cubic feet of water per second at Chicago obviously means so much less water passes downstream through the Great Lakes and through the Niagara and St. Lawrence rivers. This amount of water is capable of developing 400,000 horsepower of hydro-electric power on the Niagara and St. Lawrence rivers. The State of New York, as a downstream state and riparian owner, claims that it has the right to the full flow of the stream and the right to use the surplus water, over and above the amount required for navigation, for the development of hydro-electric power, and that such right is a property right of the State of New York and its citizens.

4. The defendants, State of Illinois and Sanitary District of Chicago, have brought into this case the question of power development by pleading by way of defense the Act of June 17, 1919, in force July 1, 1919, of the State of Illinois, at the bottom of page 65 and on following pages of their joint and several answer in this case. Furthermore for several years last passed at hearings before the Rivers and Harbors Committee of the House of Representatives and various committees in the Senate these defendants have stated as one of the reasons why the Chicago diversion should be permitted that a large amount of power can be developed therefrom on the Desplaines and Illinois rivers.

5. The importance of this case and the judgment and decree to be rendered herein to all of the Great Lakes States would seem to make it not only appropriate but necessary that New York be joined as a party.

6. We are assured by counsel for the State of Wisconsin and other States in the suit now pending between those states as complainants and the State of Illinois and Sani-

tary District of Chicago as defendants that they not only consent but desire that the State of New York shall join in this litigation.

7. There will be no delay in the trial of this litigation by reason of New York becoming a party thereto. The State of New York is prepared to proceed with the trial at any time, and the States of Michigan and New York will participate in the trial of the Wisconsin case before Hon. Charles E. Hughes, Special Master, with the purpose of trying both cases together.

The complainants respectfully request the Court to grant the motion allowing the State of New York to join as a party complainant and to amend the complaint as proposed.

Dated: October 4, 1926.

ANDREW B. DOUGHERTY,
Attorney General of the State of Michigan,

ALBERT OTTINGER,
Attorney General of the State of New York,

CLARENCE S. FERRIS,
Deputy Attorney General,
Solicitors for Complainants.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1926

No. [redacted] Original [redacted] 11

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

BILL OF COMPLAINT

ALBERT OTTINGER,
Attorney-General of the State of New York.
Solicitor for Complainant.

In the Supreme Court of the United States

October Term, 1926

No. Original

State of New York,
Complainant,
vs.
State of Illinois and Sanitary District of Chicago,
Defendants.

State of New York files this bill of complaint herewith in the above entitled suit in pursuance of an order of this Court made on the 11th day of October, 1926.

ALBERT OTTINGER,
Attorney-General of the State of New York,
Solicitor for Complainant.

IN THE SUPREME COURT OF THE UNITED STATES

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No. ORIGINAL

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

BILL OF COMPLAINT

The State of New York, one of the United States of America, by its solicitor, Albert Ottinger, Attorney-General of said State, brings this bill of complaint against the State of Illinois and the Sanitary District of Chicago and your orator complains and alleges:

I

The State of New York is one of the states of the United States of America and this action is brought on its behalf, in the Supreme Court of the United States in the exercise of the original jurisdiction of said court on the ground that it is an action in equity relating to a controversy between two or more states of the United States and also between a state of the United States and a citizen of another state.

II

The defendant, State of Illinois, is also one of the States of the United States of America and the defendant, Sanitary District of Chicago, is a public corporation organized and existing under and by virtue of the laws of said State of Illinois and is a citizen of said last named State.

III

The State of New York is one of the original thirteen states of the United States of America. The State of New York has approximately five hundred and fifty-eight miles of continuous shore line on Lakes Erie and Ontario, the Niagara river, and that part of the St. Lawrence river forming the international boundary line between said State and the Province of Ontario, Canada. The State of New York owns all of the beds of these lakes and rivers lying within its boundaries, subject only to the right of the public to navigate the same and subject to the right of the Congress to regulate commerce thereon under the commerce clause of the Constitution, and as a down stream riparian owner is entitled to the full and natural flow of the water therein.

The order of precedence in the use of the waters of this waterway is (1) domestic and sanitary purposes in the ordinary, reasonable and generally approved manner in the use of water for such purposes, after which use water so used must be returned to the stream or body of water from which it is taken; (2) navigation; (3) development of power and other legitimate uses. The use of the waters of this waterway for navigation purposes is general—each State possessing equal rights. The residue of the water available for power belongs to the State and the citizens of the State adjoining that particular part of the waterway where power may be developed. A flow of ten thousand cubic feet per second of water through the Niagara river and the international section of the St. Lawrence river is capable of developing approximately four hundred thousand horse power. The right to use this water for the development of power is a property right of the State of New York and its citizens, which property right neither the defendants nor the Congress of the United States has a right to destroy or impair by abstracting or diverting water from Lake Michigan or any other part of the Great Lakes and St. Lawrence waterway into the Mississippi waterway.

IV

The Great Lakes waterway lies partly within the United States of America and partly within the Dominion of Canada, one of the states or dominions of the colonial empire of Great Britain and the continuation of that highway connecting the Great Lakes with the Atlantic Ocean through and by the St. Lawrence river, passes for a great distance wholly through Canadian territory; that all of said waterway lying within international waters has been opened by treaties between the United States of America and Great Britain and the Dominion of Canada, as free water so that American vessels including the ships of citizens of complainant and the trade and commerce of its people are secured equal rights of navigation with Canadian vessels in the many harbors, approximately fifty in number, which the Canadian government has improved for shipping on the Great Lakes, their connecting waters and the St. Lawrence river, all of which rights and benefits of navigation are of great and continuing benefit to complainant, its people, its trade and commerce and the prosperity of its shipping interests.

V

That the Great Lakes waterway lies within a single water shed and constitute a natural highway which may be improved but may not be destroyed or impaired by either Federal or State authority.

VI

That the State of *New York has a vested right* in and to the Great Lakes waterway as a *highway of commerce concurrent with the rights of all other states of the United States bordering* upon said waterway and of the Dominion of Canada also bordering thereon and that said natural waterway is lawfully entitled to receive all of the water from rivers and streams in the same water shed provided by nature for the purpose of keeping up and maintaining the waters in said water shed as such natural highway.

VII

In the year 1889 the legislature of the State of Illinois enacted a statute entitled "An act to create sanitary districts and remove obstructions in the Des Plaines and Illinois Rivers," approved May 29th, 1889, and published in the laws of Illinois for the year 1889 commencing at page 186; which act authorized the organization of public corporations to be known as sanitary districts, with power, among other things, to construct, maintain and operate drainage canals or channels for the disposal of drainage and sewage. By sections 23 and 24 of the said act, it was further provided as follows, to-wit:

> "Sec. 23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers, such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute and to be of a depth of not less than fourteen feet and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom,

capable of producing a depth of not less than eighteen feet of water. If the population of the district drained into such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des

Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel. * * *

"Sec. 24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the Des Plaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes."

VIII

In November and December of the year 1889, defendant, the Sanitary District of Chicago, was organized as a sanitary district under the act of 1889 hereinbefore referred to, and has since continuously existed as such sanitary district under the said act of 1889 and the acts amendatory thereof and supplementary thereto. At the time of its organization said defendant district consisted of a territory about 185 square miles in area. By successive acts of the legislature of Illinois the area of said defendant district has been increased from time to time, and as your orators are informed and verily believe and therefore aver, its area is now approximately 395 square miles, extending from the Illinois-Indiana State line on the south and east to the northerly boundary of Cook county on the north, with about 33 miles of frontage on Lake Michigan, and comprises the entire city of Chicago together with large areas of land to the south, west and north of said city.

IX

On or about the 3rd day of September, 1892, defendant Sanitary District of Chicago, acting as a subordinate agency of the defendant, State of Illinois, pursuant to the act of 1889 hereinbefore referred to, commenced the construction of a canal or channel commencing at a point in the west fork of the south branch of the Chicago river about 6 miles above the mouth of said river, which river was a navigable stream tributary to and a part of the Great Lakes watershed, and extending in a general westerly direction for a distance of about 32 miles to a point near the city of Joliet, Illinois. At its westerly terminus said canal was made to connect with the Des Plaines river, a stream flowing in a westerly and southwesterly direction and forming a tributary of the Illinois river, which latter river in turn flows in a westerly and southwesterly direction and forms a tributary of the Mississippi river.

X

In the construction of said canal it was at all times the plan of the defendant, State of Illinois, and the defendant, Sanitary District of Chicago, that the said canal should be used as a passage-way for the sewage of the territory comprising the Sanitary District of Chicago, to the end that such sewage might be carried down the said canal into the Des Plaines and Illinois rivers; and in order to accomplish the said purpose it was the intention of said defendants at and prior to the commencement of the construction of said canal to divert from Lake Michigan, and pass through the said canal, such amounts of water as might be deemed by said defendants to be necessary for the proper dilution of the said sewage and its propulsion through the canal and the Des Plaines and Illinois rivers. In pursuance of such intention, and prior to the completion of said canal, the legislature of the defendant State of Illinois enacted in the year 1895 an amendment to section 20 of the act of 1889 hereinbefore referred to, which amendment is published in the Laws of Illinois for the year 1895 commencing at page 168 thereof, and provides that any sanitary district organized under the provisions of the act of 1889 and maintaining a channel which causes the discharge of sewage into or through any river beyond the limits of such district, "shall, at the time any sewage is turned into or through any such channel or channels, turn into such channel or channels not less than 20,000 cubic feet of water per minute for every 100,000 inhabitants of said district, and shall thereafter maintain the flow of such quantity of water."

XI

Upon the completion of the said canal, the defendant, Sanitary District of Chicago, in compliance with section 27 of the said act of 1889, applied to the Governor of the State of Illinois for authority to commence the use of said canal, and such authority was granted by the said governor on behalf of the defendant State of Illinois, and thereupon, on or about the second day of January, 1900, said defendant District commenced the abstraction of water from Lake Michigan and its diversion into the Chicago river and thence into and through the said canal, in such amounts and at such velocity as to reverse the flow of the Chicago river and create a steady and uninterrupted flow of water, from said day down to the present time, from Lake Michigan through the Chicago river to the said canal thence through the said canal to the Des Plaines river near Joliet, and thence down the Des Plaines and Illinois rivers to the Mississippi river.

XII

The primary object and purpose of the act of 1889 hereinbefore referred to, as said act was construed by the highest court of the State of Illinois in the case of *People v.*

Nelson, 133 Ill. 565, 27 N. E. 217, and *Beidler v. Sanitary District of Chicago,* 211 Ill. 628, 71 N. E. 1118, was to provide a method of disposing of the sewage of the city of Chicago and contiguous territory, and the canal constructed by the defendant district as hereinbefore described has been continuously used for such purpose since the month of January, 1900. By the terms of the act of 1895 referred to in paragraph 10 hereof, defendant State of Illinois has undertaken to make it the legal duty of the defendant, Sanitary District of Chicago, to pass water through the said canal at the rate of 20,000 cubic feet per minute or 333 1-3 cubic feet per second, for every 100,000 inhabitants of the territory composing the Sanitary District of Chicago. At the time of the passage of said act of 1895, and at all times since, it was well known to the legislature of the State of Illinois and to the officers of the defendant Sanitary District of Chicago, that the only source from which water in such quantities as required by said act could be obtained was by the abstraction of water from Lake Michigan, and it was at all of said times the intention of said legislature that the duty which it sought to impose upon the defendant District by the said act of 1895 should be performed by means of such abstraction, according to the census of 1920, the population of the Chicago Sanitary District was 2,963,090 in that year, and as your orators are informed and verily believe and therefore aver, the population of said district is now in excess of said number, and therefore the effect of the said act of 1895 is to direct the defendant, Sanitary District of Chicago, to abstract water from Lake Michigan at the present time at the rate of not less than 9,876 cubic feet per second.

XIII

Subsequent to the opening of the said canal, and in the year 1903, the defendant, State of Illinois, by an act of its legislature approved May 14th, 1903, and published in the Laws of Illinois for the year 1903 commencing on page 113, undertook to authorize the defendant, Sanitary District of Chicago, to construct and operate a plant for the generation of electrical energy by hydraulic power derived from the water passing from Lake Michigan through the said canal. The provisions of said act with reference to said subject are as follows:

> "Sec. 5. That the said sanitary district of Chicago is hereby authorized to construct all such dams, water-wheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now, or hereafter, constructed by said district.
>
> "Sec. 6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy, and shall be transmitted to the various cities, villages and towns within said sanitary district, or adjacent to the main channel of said sanitary district and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said sanitary district: Provided, however, that it shall be the duty of said sanitary district to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said sanitary district."

XIV

Under and by virtue of the authority attempted to be conferred on the defendant District by the defendant State of Illinois in said act of 1903, said District constructed and placed in operation a hydro-electric power plant at Lockport near the western terminus of the said canal, and has continuously operated the same since its completion in the month of November, 1907. The said power plant is capable of developing in excess of 36,000 horsepower of electrical energy and does in fact develop and generate, as your orators are informed and verily believe and therefore aver, in excess of 20,000 horsepower continuously throughout the year. The electrical energy thus generated is mainly transmitted to the city of Chicago and there sold for municipal and commercial purposes; and, as your orators are informed and verily believe and therefore aver, the operations of said plant since the year 1907 have produced many millions of dollars of gross revenue to the defendant Sanitary District of Chicago and have earned for the said District many millions of dollars of profits over and above the cost of operating the said plant, including proper allowances for depreciation and a reasonable return upon investment therein.

XV

Since the completion of said hydro-electric development near the western terminus of said canal, the object and purpose of the defendants in the operation of the said canal and in the abstraction of water from Lake Michigan through the same has been and is now two-fold, to-wit: the disposition of the sewage of the defendant Sanitary District of Chicago, and the generation and sale of electrical energy.

XVI

According to the reports of the engineers of the defendant, Sanitary District of Chicago, the yearly mean amount of water passing through the said canal at its westerly terminus, practically all of which is water abstracted from Lake Michigan, is as follows for the years 1900 to 1917, inclusive:

Year	Cubic Feet per second	Year	Cubic Feet per second
1900	2,900	1909	2,766
1901	4,046	1910	3,458
1902	4,302	1911	6,445
1903	4,971	1912	6,424
1904	4,793	1913	7,191
1905	4,480	1914	7,105
1906	4,473	1915	6,971
1907	5,116	1916	7,325
1908	4,421	1917	7,786

—which figures, as your orator is informed and believes and therefore avers, are based on methods of calculation which result in very considerably under estimating the actual amounts of flow through the canal. Your orator is informed and verily believe and therefore avers that the actual mean abstraction of water from Lake Michigan through said canal for the year 1917 was about 8,800 cubic feet per second, and that such abstraction beginning with the year 1918 and taken down to the present time has been in excess of 8,800 cubic feet per second; which abstraction is on the basis of average amount of water taken and which is greatly increased at certain periods in the exercise of the judgment and appropriating desires of the defendant, Sanitary District, and which increases have no relation to the needs of navigation on the Great Lakes and which at times of low water or barometric pressure are still further adversely affected by the further lowering of lake levels and the consequent decrease in the navigable capacity of said Great Lakes, their rivers and harbors.

XVII

Complainant is informed and believes and therefore avers it to be true that the rivers and streams of the State of Illinois contribute naturally to the Great Lakes water-

shed less than an average of one thousand cubic feet per second of water; that the defendants are now withdrawing permanently from said Great Lakes watershed an average of eleven thousand seven hundred cubic feet per second, including the natural flow of the Chicago river wholly reversed and appropriated by the defendant Sanitary District and diverted into another watershed, and the pumpage of said defendant Sanitary District from the Great Lakes which is not returned in its natural course to said Great Lakes but is diverted into another watershed by means of said defendant Sanitary District's canal; and complainant is informed and believes and therefore avers it to be true that the said defendant Sanitary District from time to time increases its abstraction, appropriation and diversion of water from the Great Lakes to a total of fourteen thousand two hundred cubic feet per second with resultant and resulting increased impairment of the levels of the Great Lakes, particularly during periods of low water or barometric pressure thereon, thereby increasing the hazards of navigation and causing an increased reduction in the navigable capacity of said Great Lakes, their connecting waterways and ports and harbors.

XVIII

That the Chicago river is a navigable stream within the Great Lakes watershed which contributes in its natural state, your orator is informed and believes and therefore avers as true, approximately one thousand cubic feet per second to the waters of the Great Lakes, in the use of which complainant and its people, its trade and commerce, ships and shipping, has a vested right for purposes of navigation and a paramount easement for highway purposes; that complainant both in its proprietary capacity and quasi-sovereign capacity as lower riparian proprietor has riparian rights in said natural flow of said Chicago river, but notwithstanding the rights and interests of complainant and of its people and the rights of navigation and of all people adjacent and having a right of highway in the Great Lakes waterway, including the Dominion of Canada, the defendant, Sanitary District, has wholly diverted the flow of said river from said watershed and appropriated it to its own use in the operation of a sewage disposal canal and the production of hydro-electric power to the entire destruction of all riparian rights of said complainant and of its people and the navigation rights of all interests navigating the Great Lakes.

XIX

All of the water abstracted from Lake Michigan by the defendants in the manner hereinbefore set forth is carried into the Mississippi valley, and hence is permanently abstracted from the Great Lakes system and its own natural watershed. As the result of such abstraction, the mean level of the water in Lakes Michigan, Huron, Erie and Ontario and in the various waterways connecting said lakes, and in the St. Lawrence river above tide-water, has been lowered not less than six inches below the level that would exist in said lakes and waterways in the absence of such abstraction; and as the amount of abstraction in cubic feet per second becomes greater, the amount of lowering of the level of said lakes and waterways increases in proportion.

XX

That because of unexplained conditions resulting possibly in part from deforestation of the great timbered areas formerly adjacent to the Great Lakes basin, there is an unexplained reduction in the amount of water in the Great Lakes basin with a resultant decrease in the levels of the Great Lakes amounting as your orator is informed and believes and therefore avers to be true, to the extent of approximately three feet less than the levels existing ten years ago and consequent corresponding decrease in the navigable capacity of said Great Lakes, their connecting waters, ports and harbors; that the Great Lakes and their connecting waters and harbors and also in large areas of the lake bottom are so shallow that their levels are already dangerously lowered to the impairment of their navigation under the conditions and development of modern commerce; that although connecting waterways and channels are susceptible of deepening by dredging, it is a practical impossibility to change large shoal areas of the ocean bottom of these inland oceans constituting the Great Lakes water system, so that in times of violent storm, the shoal places may be a sufficient distance from the normal surface of the lake to permit of navigation in safety and if lake levels are permitted to be impaired by the abstraction of large volumes of water, whether under pretended authority of the legislature of a State or of the Congress of the United States, to the point where the large ships of modern commerce, because of the increasing hazards of open water navigation in time of storm, may only navigate under fair weather and placid water conditions, it will necessarily result in a destruction and retirement of the present commercial carriers of the said Great Lakes with incidentally great loss of property, great increase in freight costs due to the necessity of carriage of smaller cargoes in a new type of cargo carrier, with a consequent impairment of the prosperity of the states, people, cities and industries adjacent to the Great Lakes waterway and the states to the west thereof now dependent thereon and to the prosperity of the State of New York and of its people and industries in which complainant is particularly interested and with respect whereof it particularly complains.

XXI

Neither the Congress of the United States nor any Federal agency or authority ~~nor~~ the legislature of the State of Illinois or any agency of that or any other State has the authority to abstract from the Great Lakes basin any water to be diverted into any other natural or artificial watershed, whether for the purpose of operating, maintaining and flushing an open sewer maintained in violation of modern standards of sanitation, or even for the purpose of navigation; the power of the Congress of the United States is expressly restricted to the control of the water of the Great Lakes as a navigable waterway under the powers vested in it by the commerce clause of the Constitution of the United States which power is that of regulation, not of destruction.

XXII

There is no authority in the government of the United States or of any of the states or of any of their agencies authorizing the changing of the natural course of the Chicago river and its unlawful alteration, reversal and change by the defendants is against the rights of this complainant as well as against the rights of all parties and interests in the Great Lakes water system.

XXIII

The lowering of the levels of the Great Lakes which are interrelated and interdependent, has seriously diminished the navigability and navigable capacity of said Great Lakes, their ports and harbors, with resultant impairment and partial destruction of the great natural highway in which the State of New York and its people have an interest as hereinbefore enumerated. On said lakes there is a great commerce, domestic and foreign, and many freight and passenger ships operate on all of said lakes and waterway between the State of New York and the other states adjacent thereto and to and with other states and countries and in addition thereto, great ships particularly of a type peculiar to the Great Lakes and known as bulk freighters and having an enormous carrying capacity and capable of operation at very low freight rates when loaded to maximum capacity, carry from the great wheat producing areas of the American Northwest, the grain there produced to lower lake ports and to the ocean and also carry from the large mineral territories of northern Michigan and Minnesota and Canada, large mineral deposits particularly of iron and copper ore to the industrial districts of the United States and particularly of Illinois, Ohio, Indiana, Pennsylvania and New York and the industrial districts of the Province of Ontario in the Dominion of Canada and to the industrial districts of the State of New York in which complainant is particularly and peculiarly interested—while upbound these ships carry in addition to the vast variety of manufactured commodities known to commerce, the coal produced in the coal regions of the eastern part of the United States and necessary to the manufacturing, industrial, domestic and governmental uses of millions of the people of the United States on and adjacent to the borders of the upper lakes of said Great Lakes region, including not only the states of the northwest and of Canada but also Minnesota, Wisconsin, Illinois, Ohio, Indiana and particularly the State of New York in which state and the needs of its people, its industries, its commerce and its own governmental institutions, your orator is peculiarly interested. That for every inch of the normal draft of said vessels which they are unable to use because of the reduction in the navigable capacity of the Great Lakes waterway, their cargo carrying capacity is reduced by many tons with the resulting increase in freight costs per ton which becomes a burden upon the complainant state in its proprietary capacity and upon the many thousands of people of these States, a burden upon intra and interstate commerce and an impairment of the use and the usefulness of the great natural highway created by nature for the use of the people adjacent thereto and expressly dedicated to said people by the Congress of the United States prior to the organization of the republic.

XXIV

That the complainant State in its proprietary capacity and also in its quasi-sovereign capacity is injured by the impairment of its riparian rights in that portion of Lakes Superior, Michigan, Huron, St. Clair, Erie, Ontario and the St. Lawrence river and their connecting waters lying within its boundaries resulting from the impairment and lowering of the levels of the Great Lakes consequent upon the unlawful and unnatural diversion and abstraction of water from the Great Lakes and their water shed by the defendants.

XXV

That the complainant State in its quasi-sovereign capacity has constantly sustained great and irreparable injury through the loss to its people, its trade, commerce and shipping and to owners of riparian rights in the Great Lakes and St. Lawrence river and their connecting waterways, due to the lowering of the levels of the Great Lakes consequent upon the unlawful and unnatural diversion and abstraction of water from the Great Lakes water shed by the defendants; and complainant avers that a great number of its citizens own within its borders, riparian rights in the Great Lakes and the St. Lawrence river and their connecting waterways, of a value of many millions of dollars which rights are largely dependent for their usefulness and value upon the maintenance of the levels of the Great Lakes; that the impairment and lowering of the lake levels of said Great Lakes is destructive of such valuable riparian rights of citizens of New York located within its borders, with incidental destruction of the usefulness and value of docks, wharves, ship yards, boat houses, warehouses and landing places; and complainant avers that all of such rights existing and exercised under the law, may not be destroyed in the interests of the sewage disposal or hydroelectric power needs or desires or pretended economies of the defendant, Sanitary District, or of any other person.

XXVI

That large numbers of the citizens of the State of New York own interests in ships and ship yards within its borders which together with the privately dredged and maintained channels leading to ship yards and landing places have a value in the aggregate of many millions of dollars and which are dependent upon the continued and successful operation of commerce, intrastate and interstate upon the Great Lakes and St. Lawrence river and their connecting waters, all of which great and extensive interests, essential both to the prosperity of great numbers of its people and of great importance to complainant itself in the proprietary sense in the payment of taxes and other revenues, are being injured by the unlawful and unnatural diversion and abstraction from the Great Lakes and their watershed by the defendants with the resultant lowering of the levels of the Great Lakes and consequent decrease in their navigable capacity and the navigable capacity of the ports and harbors thereof improved at great expense by the government of the United States and by the municipal and port authorities of the respective ports and harbors, and also of the ports and harbors thereof improved at great expense by the Dominion of Canada, and causing great and irreparable loss to complainant and its people and its trade and commerce having equal rights of use with the people of the Dominion of Canada under international treaty.

XXVII

The acts of the defendants hereinbefore set forth and described, in abstracting water from the Great Lakes basin, and the rivers, streams and waters naturally contributary thereto and diverting them into the canal of the defendant District and into an entirely different watershed are in violation of the legal rights of complainant and of the people of the State of New York in the following respects, to-wit:

(a) In that the defendants by said acts are interfering with the common law and vested right and paramount easement of highway of the State of New York and of its people and of the public generally, to have the free and unobstructed use of the Great Lakes waterway and the various ports and harbors thereof both within and without the borders of the State of New York for purposes of navigation, trade and commerce, free from any and all interferences with the present and prospective natural navigable capacity of said waterway and its usefulness as a public highway.

(b) That the acts of said defendants constitute an interference with the right of the people of the State of New York as well as of the people generally, to the free and unobstructed navigation of Lakes Superior, Michigan, Huron, St. Clair, Erie and Ontario and the navigable waters between the said lakes and from said lakes into the Atlantic Ocean, which rights belong to the said people of the State of New York both by common law and by the express guaranty contained in the ordinance for the government of the territory of the United States northwest of the river Ohio, enacted by Congress on June 13, 1787, and constituting a contract between the government of the United States and the several States bordering on the Great Lakes and among said states bordering on the Great Lakes, which neither the government of the United States nor any of said states has the right to impair.

(c) That the acts of the defendants hereinbefore complained of constitute a present and constantly increasing burden upon intra-state and interstate commerce in that they are impairing and destroying a natural highway used and useful in interstate commerce.

(d) That the acts of the defendants hereinbefore complained of in abstracting water from the Great Lakes and Great Lakes watershed and thereby impairing their capacity, are destructive of the fisheries thereon and the riparian rights and shipping and commercial rights of complainant's citizens on and in said Great Lakes and their connecting waters; that complainant owns the fish in the Great Lakes adjacent to and within its borders which are available for and used by its people in connection with the fishing industry which is of very large and extensive scope within complainant's borders and also as a portion of the food supply of the people of the State of New York and that complainant and its people as well as the people generally, adjacent to and having an interest in said Great Lakes waterway, have a right to have such natural waters in the Great Lakes watershed maintained therein for the use and maintenance of the pleasure and convenience of the people of said state and for the purposes hereinbefore recited.

XXVIII

The said violations of the legal rights of the State of New York and of its people have caused and now cause and will continue to cause, so long as they are permitted to continue, serious interference with the trade and commerce of the people of the State of New York in their commerce within and among themselves, with neighboring states and with the world, and in its proprietary capacity, resulting in large and constantly increasing pecuniary losses to the said people and the said State which cannot be actually estimated and for the recovery of which no adequate remedy exists at law. The State of New York therefore brings this action on behalf of itself and in its proprietary capacity and on behalf of the people of said State for the purpose of establishing and protecting the legal rights of said State and its people against the encroachment of the defendants and for the purpose of terminating a condition which is destructive to the welfare and prosperity of said State and of its people.

Wherefore, your orator prays that the defendants may be required to answer the allegations hereinbefore set forth in this bill of complaint and that upon final hearing of this cause an injunction be issued under the seal of this court, restraining the defendants and each of them and each of their officers, agents or servants from taking or causing to be taken, any water whatever from Lake Michigan and its natural tributaries in such manner as to permanently divert the same from the said lake and said watershed.

Your orator prays that upon the final hearing of this cause, an injunction be issued under the seal of this court restraining the defendants and each of them and each of their officers, agents and servants from reversing the flow of the Chicago river or in any manner obstructing its natural flow so as to prevent it from flowing in the course of nature into the Great Lakes, or to take or cause to be taken any water whatever from said Chicago river in such manner as to permanently divert the same from the Great Lakes watershed.

And your orator also prays for such other and further relief as to this Honorable Court may seem meet and consistent with equity and good conscience.

May it please your Honors to grant unto your orator a writ of subpoena under the seal of this court directed to the Governor and Attorney General of the defendant, the State of Illinois, and to the Sanitary District of Chicago, commanding them and each of them on a day certain to be therein named and under a certain penalty, to be and appear in this honorable Court then and there to answer, but not under oath (answer under oath being expressly waived) all and singular the matters and things hereinbefore set forth and to abide such further order and decree of the court as may be made against the said defendants or either of them.

ALBERT OTTINGER,

Attorney-General of the State of New York,

Solicitor for Complainant.

United States of America,
State of New York,
County of Albany. } ss.:

Albert Ottinger, being first duly sworn, on oath says that he is the duly elected, qualified and acting Attorney-General of the State of New York; that he has read the foregoing bill of complaint and knows the contents thereof; and that the same is true to his own knowledge except as to the matters therein stated on information and belief, and as to such matter he believes it to be true; and that as such Attorney-General he is duly authorized to pray leave to file said bill of complaint.

ALBERT OTTINGER.

Subscribed and sworn to before me
this 15th day of October, 1926.

Randall J. Le Boeuf, Jr.

Notary Public,

Albany County,

State of New York.

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Office Supreme Court, U. S.
FILED
OCT 22 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1926

No. [redacted] Original 11

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION FOR ORDER OR DIRECTION THAT PARTIES MAY PARTICIPATE IN TRIAL OF RELATED SUIT OF STATE OF WISCONSIN ET AL. v. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO.

ALBERT OTTINGER,
Attorney-General of the State of New York,
Solicitor for Complainant,
The Capitol, Albany, N. Y.

C. S. FERRIS,
Deputy Attorney-General.

In the Supreme Court of the United States

OCTOBER TERM, 1926

No. ORIGINAL

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

OSCAR E. CARLSTROM,

Attorney-General of the State of Illinois,
Solicitor for Defendant State of Illinois.

HECTOR A. BROUILLET,

Solicitor for Defendant, Sanitary District of Chicago.

PLEASE TAKE NOTICE, that the annexed motion for an order or direction that complainant be permitted to participate in the trial of the case of Wisconsin, Minnesota, Ohio and Pennsylvania *v.* State of Illinois and Sanitary District of Chicago, under the terms and conditions allowing the parties to the suit brought by State of Michigan *v.* State of Illinois and Sanitary District of Chicago to participate in said trial, will be submitted at the opening of Court on the 8th day of November ~~October~~, 1926, or as soon thereafter as counsel can be heard.

That said motion will be submitted on the bill of complaint herein, the affidavit of Clarence S. Ferris, verified October 16, 1926, hereto annexed, and upon the memorandum also hereto annexed, and upon the pleadings in the so-called Wisconsin suit and so-called Michigan suit and upon all papers and proceedings had therein.

Dated, Albany, N. Y., October 16, 1926.

ALBERT OTTINGER,
Attorney-General of the State of New York,
Solicitor for Complainant.

IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1926

No. ORIGINAL

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

Motion for order or direction that parties may participate in trial of related suit of State of Wisconsin et al. *v.* State of Illinois and Sanitary District of Chicago.

Now comes the State of New York by its Attorney-General, Albert Ottinger, and respectfully moves this Honorable Court for an order or direction that the complainant, State of New York, may participate in the trial of the related suit of States of Wisconsin, Minnesota, Ohio and Pennsylvania *v.* State of Illinois and Sanitary District of Chicago, now pending in this Court, October Term, 1925, No. 16, original, in equity, before Honorable Charles Evans Hughes, Special Master, to whom the Wisconsin case has been referred by order of this Court, for the following reasons:

1. The issues in this case are practically the same as the issues in the Wisconsin case.

2. There is pending in this court a suit by the State of Michigan vs. State of Illinois and Sanitary District of Chicago, October Term, 1925, No. 27, Original, in which the issues are practically the same as in the Wisconsin case.

3. The order referring the Wisconsin case to Honorable Charles Evans Hughes as Special Master provides that the parties to the Michigan suit may participate in the taking of evidence and in the hearing before the Special Master in like manner and with like effect as if that suit had been consolidated with the Wisconsin suit by the Court's order.

4. The Complainant, State of New York, desires to participate in the taking of evidence and in the hearing before the Special Master on the same terms and conditions upon which permission has been given to the parties in the Michigan suit to so participate.

5. The Special Master has fixed November 8, 1926, as the time for commencing the trial of the Wisconsin suit and the city of Washington, D. C., as the place for such trial.

6. The State of New York is prepared to participate in the trial of the Wisconsin suit at the time and place above stated.

7. It would seem desirable that the Wisconsin suit, the Michigan suit and the New York suit be tried virtually as one suit for the reason that the issues in the three suits are substantially identical.

Dated, Albany, N. Y., October 16, 1926.

ALBERT OTTINGER,
Attorney-General of the State of New York,
Solicitor for Complainant,
The Capitol, Albany, N. Y.

C. S. Ferris,
Deputy Attorney-General.

IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1926

No. Original

State of New York,
Complainant,

vs.

State of Illinois and Sanitary District of Chicago,
Defendants.

United States of America,
State of New York,
County of Albany.
} ss.:

Clarence S. Ferris, being first duly sworn, on oath says that he is a duly appointed, qualified and acting Deputy Attorney-General of the State of New York and is authorized to make this affidavit to be used on the motion hereto annexed. That practically the same issues are presented in the case of States of Wisconsin, Minnesota, Ohio and Pennsylvania vs. the State of Illinois and the Sanitary District of Chicago in the Supreme Court, October Term, 1925, No. 16, Original, in equity. The question of hydro-electric power development is raised by the complainant in this action in the bill of complaint in paragraph No. 3. The question of hydro-electric power development is also raised by the pleadings in the Wisconsin case. The Wisconsin case has been referred to Hon. Charles Evans Hughes, by order of this Court, as Special Master, with directions and authority to take the evidence and report the same to the Court with his findings of fact, conclusions of law and recommendations for a decree. The order referring said cause to Hon. Charles Evans Hughes provides that the parties to the related suit of State of Michigan vs. State of Illinois and Sanitary District of Chicago, now pending in this Court, may participate in the taking of evidence and in the hearing before the Special Master in like manner and with like effect as if that suit had been consolidated with the Wisconsin case by the Court's order.

Deponent further says that the Wisconsin case has been set for trial at Washington, D. C., before the Special Master for November 8, 1926, and that the State of New York desires to participate in the trial of said cause on the terms and conditions laid down in the order appointing the Special Master and permitting the parties to the Michigan case to participate in the trial of the Wisconsin case.

CLARENCE S. FERRIS.

Subscribed and sworn to before me this 16th day of October, 1926.

(Notarial Seal)

Randall J. LeBoeuf, Jr.,
Notary Public,
Albany County,
State of New York.

Office Supreme Court, U. S.
FILED
OCT 22 1926
WM. R. STANSBURY
CLERK

IN THE

Supreme Court of the United States

October Term, A. D. 1926.

No. [redacted] ina[redacted] 11

STATE OF NEW YORK,
Complainant,
vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

MEMORANDUM OF DEFENDANTS IN OPPOSITION TO MOTION OF COMPLAINANT FOR LEAVE TO PARTICIPATE IN WISCONSIN SUIT.

OSCAR E. CARLSTROM,
Attorney General, State of Illinois,
CYRUS E. DIETZ,
HUGH S. JOHNSON,
Counsel.
HECTOR A. BROUILLET,
Attorney, The Sanitary District of Chicago,
MORTON S. CRESSY,
Assistant Attorney.

JAMES M. BECK,
Of Counsel.

BARNARD & MILLER PRINT, CHICAGO

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IN THE

Supreme Court of the United States,

OCTOBER TERM, A. D. 1926.

No. 14 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

MEMORANDUM OF DEFENDANTS IN OPPOSITION TO MOTION OF COMPLAINANT FOR LEAVE TO PARTICIPATE IN WISCONSIN SUIT.

These defendants object to the said motion of the said complainant and assign the following reasons:

First. The issues in this case are neither the same nor "practically the same" as the issues in the Wisconsin case. The issues in this case and the issues in the Wisconsin case are entirely separate, different and distinct issues. The issues in the Wisconsin case and in the Michigan case, referred to in said motion, are confined entirely to the alleged rights of said complaining states as *quasi-sovereigns* to restrain the diversion at Chicago to the extent *only* that such diversion is alleged to impair the *navigable capacity* of the Great Lakes and to the extent *only* that such diversion is *"not reasonably necessary"* for the *purposes of navigation* on the Lakes-to-the-Gulf Waterway. The Bill of Complaint in this case (see Paragraph III) alleges that such diversion results in an injury to New York in its *proprietary* capacity, as the alleged owner of water and water-power rights in the flow of the Niagara and St. Lawrence Rivers. The other States, which are complainants in the Wisconsin and Michigan cases, have no justiciable interest in these alleged water and water-power rights. Therefore, the New York case involves entirely separate, different and distinct questions of fact and raises entirely separate, different and distinct principles of law and the causes of action, sought to be joined or consolidated, *are not joint.*

Second. The said motion seeks to permit New York to participate in the said Wisconsin suit "in like manner and with like effect as if" this suit "had been consolidated with" said Wisconsin suit. The said motion is, therefore, equivalent to a motion on behalf of New York to *join* in said Michigan and Wisconsin suits. The right of New York to so "participate" and so join *has been adjudicated adversely to New York,* upon the recent motion of New York to join in said Michigan suit, which motion was denied by this Court upon October 11th, 1926.

Third. The allowance of the said motion "to participate" would be equivalent to allowing New York *to join* in the Michigan and Wisconsin cases and, therefore, would violate Rule 26 of the Federal Equity Rules, which provides that "Where there is more than one plaintiff, the causes of action joined must be joint."

Fourth. The issues in this case are not settled. These defendants were not served with process in this case until October 25th, 1926. These defendants now, in good faith, desire, by demurrer or motion to dismiss, to test the sufficiency of the Bill of Complaint in this case and, particularly, that part (Paragraph III) thereof, which sets up the alleged water and water-power rights of the said complainant in its *proprietary* capacity, to the full flow of the Niagara and St. Lawrence Rivers and an alleged injury to such alleged rights.

Fifth. These defendants have at all times desired, and now desire, to have consolidated and heard together all of the suits of the said complaining States, with reference to the said diversion, which can properly and expeditiously and without serious and vital prejudice to these defendants, be so consolidated and heard together and, as evidence of such desire on the part of these defendants, they have heretofore presented their motion to consolidate the said Michigan suit with the said Wisconsin suit and, as a result of such motion, Michigan has been permitted, if it so elected, "to participate in the taking of evidence and in the hearing before the Special Master, *in like manner and with like effect as if that suit had been consolidated with this cause by the Court's order*" and Michigan has heretofore elected to so participate, so that *a virtual consolidation* of the said Wisconsin suit and the said Michigan suit has been effected, *at the instance, and upon the motion, of these defendants.*

Sixth. That the taking of testimony before the said Special Master in the said Michigan and Wisconsin cases has been set to begin on the 8th day of November, 1926, and that these defendants are not now prepared, and by that time cannot possibly be prepared, to meet the new issues and questions of law and of fact, which would necessarily be injected and brought in to the said hearing before the said Special Master, if the said motion of New York to participate is allowed.

CONCLUSION.

Wherefore these defendants respectfully submit that the said motion of New York should be denied and request that a reasonable time be given to these defendants to answer or make other defense to the said Bill of Complaint.

Respectfully submitted,

Oscar E. Carlstrom,
Attorney General, State of Illinois.
Cyrus E. Dietz,
Hugh S. Johnson,
Counsel.
Hector A. Brouillet,
Attorney, The Sanitary District of Chicago.
Morton S. Cressy,
Assistant Attorney.

James M. Beck,
Of Counsel.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

Office Supreme Court, U.
FILED
NOV 1 1926
WM. R. STANSBUR
CLERK

IN THE

Supreme Court of the United States.

October Term, A. D. 1925.

No. 7 16 Original in Equity.

STATES OF WISCONSIN, OHIO, PENNSYLVANIA AND MINNESOTA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA,
Intervening Defendants.

PETITION OR MOTION OF THE STATE OF MISSISSIPPI BY ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT AND ADOPT THE ANSWER HERETOFORE FILED BY THE ABOVE NAMED INTERVENING DEFENDANTS.

State of Mississippi,
By Rush H. Knox,
Its Attorney General,
Daniel N. Kirby,
Cornelius Lynde,
Solicitors for the State of Mississippi.

GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

No. 16 Original. In Equity.

STATES OF WISCONSIN, OHIO, PENNSYLVANIA AND MINNESOTA,

Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,

Defendants,

STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA,

Intervening Defendants.

PETITION OR MOTION OF THE STATE OF MISSISSIPPI BY ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT AND ADOPT THE ANSWER HERETOFORE FILED BY THE ABOVE NAMED INTERVENING DEFENDANTS.

The State of Mississippi, by Rush H. Knox, its Attorney General, respectfully states that:

1. He is the Attorney General of the State of Mississippi, duly authorized to appear in any proceeding or tribunal in which the interests of said state are involved, —and on behalf of said state respectfully presents this

petition for leave to the State of Mississippi to intervene in the above entitled cause and become a defendant therein, and to join in and adopt as the answer of the State of Mississippi, the answer heretofore filed by the intervening defendants, states of Missouri, Kentucky, Tennessee and Louisiana.

2. Said cause is a suit in equity wherein the states of Wisconsin, Minnesota, Ohio and Pennsylvania, as joint complainants against the State of Illinois and The Sanitary District of Chicago, as defendants, seek to invoke the jurisdiction of this Honorable Court for the purposes:

(a) Of enjoining the last named defendants from diverting any water whatever from Lake Michigan into the "Lakes-To-The-Gulf" Waterway, which waterway consists of the Chicago River from Lake Michigan, the Sanitary and Ship Canal of the Sanitary District of Chicago, connecting the Chicago River with the Des Plaines River, and the Des Plaines and Illinois and Mississippi Rivers.

(b) Of asking this Honorable Court to usurp the powers and functions that this court has held to be vested in the Secretary of War, acting upon the recommendation of the chief of engineers, in respect of the navigable waters of the United States, by determining and decreeing in this case what quantity of water to be diverted from Lake Michigan, "is reasonably required for the purpose of navigation" in said "Lake-To-The-Gulf" Waterway; and by enjoining all such diversion of water in excess of the quantity so to be determined by this Honorable Court.

(c) Of asking this Honorable Court, by its decree herein, to exercise control over the navigable condition of said waterway; and by enjoining the injection into the

Chicago, Des Plaines and Illinois Rivers of such sewage or waste as would interfere with navigation on said rivers, and to do so at the request of the complainant states, none of which is located upon or below the said rivers alleged to be so polluted.

3. The State of Mississippi is located in the lower Mississippi Valley with its western boundary along the banks of the Mississipi River, and said state and the people thereof are respectively interested in the subject matter of said cause, and would be prejudiced by the granting of the relief therein prayed by complainants in respect of the diversion of water from Lake Michigan into the "Lakes-To-The Gulf" Waterway, a navigable water of the United States.

4. The State of Mississippi and its inhabitants are interested in the subject matter and issues of said cause: first, in respect to the navigability of the "Lakes-To-The-Gulf" Waterway, and the rendering of the same, available for the transportation of the products of the State of Mississippi and of those things which must be brought into the state for consumption therein; second, in respect of the preservation of the navigability of the Mississippi Waterway from Grafton, the mouth of the Illinois River, south, to which waterway the water diverted from Lake Michigan is essential for the maintenance of adequate navigation depths; third, in respect of the continued maintenance of conditions which will render practicable and feasible, the continued operation on said Mississippi River of the Mississippi-Warrior Barge Line, now operated by the Inland Waterways Corporation, an agency of the Government of the United States; and fourth, in respect of the continued maintenance of favorable railroad rates for the movement out of the State of Mississippi of the products of said state and of other prod-

ucts into said state to be thereon consumed, the continuance of which favorable rates are dependent upon the continuance of water transportation furnished by the Inland Waterways Corporation and the waterways above referred to.

5. There are many individuals, partnerships and corporations residing and located within the State of Mississippi, and doing business at various points in the entire Mississippi Valley, who have developed their respective businesses and industries and have heretofore conducted the same, and are now conducting the same, through the use of the facilities for transportation now afforded by the "Lakes-To-The-Gulf" waterway, and relying upon the assumption that the navigable channel that has for many years constituted the public highway or water route on the Mississippi River from Cairo, Illinois, and St. Louis, Missouri, would forever be maintained as a navigable water route with an adequate flow of water, sufficient to meet the constantly growing needs of common carriers by water, and shippers and receivers of freight transported upon said waterway between Cairo and St. Louis on the north and Vicksburg, Mississippi, and other points of origin and distribution on the south.

6. The State of Mississippi is informed and believes, and upon information and belief avers the fact to be, and prays the opportunity to offer evidence in support of this averment, that for many years last past the water diverted as aforesaid from Lake Michigan through the said "Lakes-To-The-Gulf" waterway into the Mississippi, has constituted and now constitutes more than one-fourth of the low water volume in the Mississippi River at St. Louis, and if such diversion be discontinued or materially decreased there are many points in the

Mississippi River between St. Louis and as far south as Vicksburg, Mississippi, where the low water navigable depths would be thereby reduced in amounts varying from at least one foot at Vicksburg to 2½ to 3 feet at St. Louis; that any material reduction in said diversion of water, as aforesaid, would interfere with navigation over the "Lake-To-The-Gulf" Waterway, and at considerable periods of the year would entirely prevent the same to any commercial extent.

The State of Mississippi avers that the relief sought by the complainants in the above entitled cause to prevent said diversion of water, would operate to the great and material injury of the State of Mississippi and its citizens, as aforesaid.

7. The development and maintenance of this waterway from Lake Michigan to the Gulf of Mexico has long been a subject of public consideration, and of great public importance to the United States, particularly to the states and their peoples in and tributary to the Mississippi Valley, whose commerce is served by it.

By the Federal Control Act of Congress (40 Stat. L. 451), the President of the United States was authorized to spend such amounts as he deemed necessary for the utilization of waterways and the creation of water transportation agencies, and the policy of the Congress to engage in inland water transportation services and facilities, was declared in Sections 201 and 500 of the Transportation Act of 1920 (41 Stat. L. 449) and by Section 201 of said act the federal facilities for such transportation, acquired pursuant to the Federal Control Act, were transferred to the Secretary of War, who was authorized and directed to operate the same. That these facilities became, under the operation of the Secretary of War the barge line freight service on the Mississippi River from St. Louis to New Orleans, and on the Black Warrior River in Alabama known as the Mississippi-Warrior Barge Line; that this service was subsequently taken over by the Inlaid Waterways Corporation, organized pursuant to an act of Congress entitled, "An Act to Create the Inland Waterways Corporation for the Purpose of Carrying Out the Mandate and Purpose of Congress as Expressed in Sections 201 and 500 of the Transportation Act, and for Other Purposes," approved June 3. 1924. That the Secretary of War is charged with many duties in connection with the waterways of the United States, their development, preservation, maintenance and regulation, and is particularly authorized by the provisions of Section 10 of the Rivers and Harbors Act of March 3, 1899, upon recommendation of the chief of engineers to authorize and permit the alteration of the course, location, condition or capacity of any of the navigable waterways of the United States, and that pursuant to such authority, upon recommendation of the chief of engineers, the Secretary of War, on March 3, 1925, authorized and permitted, by a permit or order referred to in the amended bill of complaint herein, the diversion of water from Lake Michigan, in the amount therein specified, by the defendant, The Sanitary District of Chicago.

And the State of Mississippi avers that the amount of water authorized, as aforesaid, and now diverted, pursuant to such authorization into said Mississippi Waterway System, is vital and essential to the continuance in said Mississippi River of such conditions as are adequate for and reasonably required and essential to the maintenance of navigation thereon.

8. The State of Mississippi is advised that its pres-

ence as a party defendant would be proper; that it possesses in the premises legal rights which are entitled to the consideration of this Honorable Court, in that it will be materially injured and damaged if the relief prayed in the amended bill of complaint as aforesaid, be granted, and states that if it be permitted to intervene as a defendant it will adopt the answer heretofore filed by the intervening Mississippi Valley States of Missouri, Kentucky, Tennessee and Louisiana, for which it asks the permission of this Honorable Court, and will produce and offer evidence to sustain the averments herein contained.

Wherefore, this petitioner prays this Honorable Court to grant leave to petitioner to file this its petition for leave to intervene as a party defendant to said cause, and for an order making it a defendant therein, and for leave to join in and adopt as its answer to the amended bill of complaint herein, the answer heretofore filed by the States of Missouri, Kentucky, Tennessee and Louisiana, and for leave thereafter to participate in the defense of said cause as it may be advised; and for such other and further relief as to this Honorable Court may seem meet and proper in the premises.

State of Mississippi,
By Rush H. Knox,
Its Attorney General.

Daniel N. Kirby,
Cornelius Lynde,
Solicitors for the State of Mississippi.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

Office Supreme Court, U. S.
FILED
NOV 1 1926
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CLERK

IN THE

Supreme Court of the United States.

October Term, A. D. 1925.

7

No. 16 Original in Equity.

STATES OF WISCONSIN, OHIO, PENNSYLVANIA AND MINNESOTA,
Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA,
Intervening Defendants.

PETITION OR MOTION OF THE STATE OF ARKANSAS BY WILLIAM B. APPLEGATE, ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT AND ADOPT THE ANSWER HERETOFORE FILED BY THE ABOVE NAMED INTERVENING DEFENDANTS.

State of Arkansas,
By W~~illiam B~~. Applegate,
N.W., *Its Attorney General.*
Daniel N. Kirby,
Cornelius Lynde,
Solicitors for the State of Arkansas.

Gunthorp-Warren Printing Company, Chicago.

IN THE

Supreme Court of the United States

October Term, A. D. 1925.

No. 16 Original in Equity.

STATES OF WISCONSIN, OHIO, PENNSYLVANIA AND MINNESOTA,
Complainants.
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE AND LOUISIANA,
Intervening Defendants.

PETITION OR MOTION OF THE STATE OF ARKANSAS BY WILLIAM B. APPLEGATE, ITS ATTORNEY GENERAL, FOR LEAVE TO INTERVENE AND BECOME A PARTY DEFENDANT AND ADOPT THE ANSWER HERETOFORE FILED BY THE ABOVE NAMED INTERVENING DEFENDANTS.

The State of Arkansas by William B. Applegate, its Attorney General, respectfully states that:

1. He is the Attorney General of the State of Arkansas, duly authorized to appear in any proceeding or tribunal in which the interests of said state are involved, —and on behalf of said state respectfully presents this

petition for leave to the State of Arkansas to intervene in the above entitled cause and become a defendant therein, and to join in and adopt as the answer of the State of Arkansas, the answer heretofore filed by the intervening defendants, States of Missouri, Kentucky, Tennessee and Louisiana.

2. Said cause is a suit in equity wherein the States of Wisconsin, Minnesota, Ohio and Pennsylvania, as joint complainants against the State of Illinois and The Sanitary District of Chicago, as defendants, seek to invoke the jurisdiction of this Honorable Court for the purposes:

(a) Of enjoining the last named defendants from diverting any water whatever from Lake Michigan into the "Lakes-To-The-Gulf" Waterway, which waterway consists of the Chicago River from Lake Michigan, the Sanitary and Ship Canal of the Sanitary District of Chicago, connecting the Chicago River with the Desplaines River, and the Desplaines and Illinois and Mississippi Rivers.

(b) Of asking this Honorable Court to usurp the powers and functions that this court has held to be vested in the Secretary of War, acting upon the recommendation of the Chief of Engineers, in respect of the navigable waters of the United States, by determining and decreeing in this case what quantity of water to be diverted from Lake Michigan, "is reasonably required for the purpose of navigation" in said "Lakes-To-The-Gulf" Waterway; and by enjoining all such diversion of water in excess of the quantity so to be determined by this Honorable Court.

(c) Of asking this Honorable Court, by its decree herein, to exercise control over the navigable condition of said waterway; and by enjoining the injection into the Chicago, Desplaines and Illinois Rivers of such sewage or waste as would interfere with navigation on said rivers, and to do so at the request of the complainant states, none of which is located upon or below the said rivers alleged to be so polluted.

3. The State of Arkansas is located in the Mississippi Valley with its eastern boundary along the banks of the Mississippi River, and said state and the people thereof are respectively interested in the subject matter of said cause, and would be prejudiced by the granting of the relief therein prayed by complainants in respect of the diversion of water from Lake Michigan into the "Lakes-To-The-Gulf" Waterway, a navigable water of the United States.

4. The State of Arkansas and its inhabitants are interested in the subject matter and issues of said cause: first, in respect to the navigability of the Illinois waterway, and the rendering of the same available for the transportation of the products of the State of Arkansas and of those things which must be brought into the state for consumption therein; second, in respect of the preservation of the navigability of the Mississippi Waterway from Grafton, the mouth of the Illinois River, south, to which waterway the water diverted from Lake Michigan is essential for the maintenance of adequate navigation depths; third, in respect of the continued maintenance of conditions which will render practicable and feasible, the continued operation on said Mississippi River of the Mississippi-Warrior Barge Line, now operated by the Inland Waterways Corporation, an agency of the Government of the United States; and fourth, in respect of the continued maintenance of favorable railroad rates for the movement out of the State of Arkansas of the

products of said state and of other products into said state to be therein consumed, the continuance of which favorable rates are dependent upon the continuance of water transportation furnished by the Inland Waterways Corporation and the waterways above referred to.

5. There are many individuals, partnerships and corporations residing and located within the State of Arkansas, and doing business at various points in the Mississippi Valley, who have developed their respective businesses and industries and have heretofore conducted the same, and are now conducting the same, through the use of the facilities for transportation now afforded by the "Lakes-To-The-Gulf" Waterway, and relying upon the assumption that the navigable channel that has for many years constituted the public highway or water route on the Mississippi River from Cairo, Illinois and St. Louis, Missouri, would forever be maintained as a navigable water route with an adequate flow of water sufficient to meet the constantly growing needs of common carriers by water, and shippers and receivers of freight transported upon said waterway between Cairo and St. Louis on the north and New Orleans and other points of origin and distribution on the south.

6. The State of Arkansas is informed and believes, and upon information and belief avers the fact to be, and prays the opportunity to offer evidence in support of this averment, that for many years last past the water diverted as aforesaid from Lake Michigan through the said "Lakes-To-The-Gulf" Waterway into the Mississippi, has constituted and now constitutes more than one-fourth of the low water volume in the Mississippi River at St. Louis, and if such diversion be discontinued or materially decreased there are many points in the Mississippi River between St. Louis and as far south as

Vicksburg, Mississippi, where the low water navigable depths would be thereby reduced in amounts varying from at least one foot at Vicksburg to 2½ to 3 feet at St. Louis; that any material reduction in said diversion of water, as aforesaid, would interfere with navigation over the "Lakes-To-The-Gulf" Waterway, and at considerable periods of the year would entirely prevent the same to any commercial extent.

The State of Arkansas avers that the relief sought by the complainants in the above entitled cause to prevent said diversion of water, would operate to the great and material injury of the State of Iowa and its citizens, as aforesaid.

7. The development and maintenance of this waterway from Lake Michigan to the Gulf of Mexico has long been a subject of public consideration, and of great public importance to the United States, particularly to the states and their peoples in and tributary to the Mississippi Valley, whose commerce is served by it.

By the Federal Control Act of Congress (40 Stat. L. 451), the President of the United States was authorized to spend such amounts as he deemed necessary for the utilization of waterways and the creation of water transportation agencies, and the policy of the Congress to engage in inland water transportation services and facilities, was declared in Sections 201 and 500 of the Transportation Act of 1920 (41 Stat. L. 449) and by Section 201 of said Act the Federal facilities for such transportation, acquired pursuant to the Federal Control Act, were transferred to the Secretary of War, who was authorized and directed to operate the same. That these facilities became, under the operation of the Secretary of War the Barge Line Freight Service on the Mississippi River from St. Louis to New Orleans, and on the

Black Warrior River in Alabama known as the Mississippi-Warrior Barge Line; that this service was subsequently taken over by the Inland Waterways Corporation, organized pursuant to an Act of Congress entitled, "An Act to Create the Inland Waterways Corporation for the purpose of Carrying out the Mandate and Purpose of Congress as Expressed in Sections 201 and 500 of the Transportation Act, and for other purposes," approved June 3, 1924. That the Secretary of War is charged with many duties in connection with the waterways of the United States, their development, preservation, maintenance and regulation, and is particularly authorized by the provisions of Section 10 of the Rivers and Harbors Act of March 3, 1899, upon recommendation of the Chief of Engineers to authorize and permit the alteration of the course, location, condition or capacity of any of the navigable waterways of the United States, and that pursuant to such authority, upon recommendation of the Chief of Engineers, the Secretary of War, on March 3, 1925, authorized and permitted, by a permit or order referred to in the amended bill of complaint herein, the diversion of water from Lake Michigan, in the amount therein specified, by the defendant, The Sanitary District of Chicago.

And the State of Arkansas avers that the amount of water authorized, as aforesaid, and now diverted, pursuant to such authorization into said Mississippi Waterway System, is vital and essential to the continuance in said Mississippi River of such conditions as are adequate for and reasonably required and essential to the maintenance of navigation thereon.

8. The State of Arkansas is advised that its presence as a party defendant would be proper; that it pos-

sesses in the premises legal rights which are entitled to the consideration of this Honorable Court, in that it will be materially injured and damaged if the relief prayed in the amended bill of complaint as aforesaid, be granted, and states that if it be permitted to intervene as a defendant it will adopt the answer heretofore filed by the intervening Mississippi Valley states of Missouri, Kentucky, Tenessee and Louisiana, for which it asks the permission of this Honorable Court, and will produce and offer evidence to sustain the averments herein contained.

Wherefore, this petitioner prays this Honorable Court to grant leave to petitioner to file this its petition for leave to intervene as a party defendant to said cause, and for an order making it a defendant therein, and for leave to join in and adopt as its answer to the amended bill of complaint herein, the answer heretofore filed by the States of Missouri, Kentucky, Tennessee and Louisiana, and for leave thereafter to participate in the defense of said cause as it may be advised; and for such other and further relief as to this Honorable Court may seem meet and proper in the premises.

State of Arkansas,
By ~~William B~~. Applegate,
H. W. *Its Attorney General.*
Daniel N. Kirby,
Cornelius Lynde,
Solicitors for the State of Arkansas.

Office Supreme Court, U. S.
FILED
APR 6 1927
WM. R. STANSBURY
CLERK

In the Supreme Court of the United States

OCTOBER TERM, 1926

No. [redacted] [redacted] 11

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION FOR ORDER, RULE OR DIRECTION REQUIRING THE DEFENDANTS TO ANSWER THE BILL OF COMPLAINT HEREIN.

ALBERT OTTINGER,
Attorney General of the State of New York,

RANDALL J. LE BOEUF, JR.,
Deputy Attorney General,

Solicitors for Complainant.

In the Supreme Court of the United States

OCTOBER TERM, 1926.

No. 14, ORIGINAL.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

OSCAR E. CARLSTROM,
Attorney General of the State of Illinois.
Solicitor for Defendant State of Illinois.

EDMUND S. ADCOCK,
Solicitor for Defendant, Sanitary District of Chicago.

Please take notice that the annexed motion for an order, rule or direction requiring the defendants to answer the bill of complaint of the complainant, State of New York, will be submitted at the opening of Court on the 11th day of April, 1927, or as soon thereafter as counsel can be heard.

That said motion will be submitted on the bill of complaint herein, and the affidavit of Randall J. LeBoeuf, Jr., verified April 2, 1927.

Dated, Albany, New York, April 2, 1927.

ALBERT OTTINGER,
Attorney General of the State of New York,
Solicitor for Complainant.

IN THE SUPREME COURT
of the
UNITED STATES

OCTOBER TERM, 1926.

No. 14, ORIGINAL.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION FOR ORDER, RULE OR DIRECTION REQUIRING THE DEFENDANTS TO ANSWER THE BILL OF COMPLAINT HEREIN.

The State of New York by its Attorney General, Albert Ottinger, respectfully moves this Honorable Court for an order, rule or direction requiring the defendants, State of Illinois and Sanitary District of Chicago, to answer the bill of complaint of the complainant, State of New York herein, and to serve upon the solicitor for the said complainant a copy of such answer or for such other order, rule or direction in the premises as to this Honorable Court may seem proper.

The special reasons which prompt the complainant to so move this Honorable Court at this time are as follows:

1. The bill of complaint of the complainant, State of New York, was duly served upon the defendant, State of Illinois, on October 30, 1926, and on the defendant, Sanitary District of Chicago, on October 22 1926, and neither of said defendants have answered, demurred or otherwise pleaded thereto.

2. This Honorable Court, by order dated November 23, 1926, permitted complainant, State of New York, to participate in the trial of the related suit of the State of Wisconsin et al. against the Sanitary District of Chicago et al.

3. The trial of said suit of the State of Wisconsin et al. against the Sanitary District of Chicago et al. is being had before Honorable Charles E. Hughes, Special Master of this Honorable Court.

4. Subsequent to the making of the order permitting the State of New York to participate in the trial of the case of the State of Wisconsin et al. against the Sanitary District of Chicago et al. the Honorable Special Master, referring to said order of this Honorable Court, stated:

> "I shall receive the evidence which may be offered by the State of New York, in like manner as if its suit had been consolidated with the suit of the State of Wisconsin against the State of Illinois and Sanitary District of Chicago. It will be noted, however, that the order of the Supreme Court to that effect reserves the matters set forth in the third paragraph of the bill of complaint in the case of the State of New York against the State of Illinois and Sanitary District of Chicago.
>
> Accordingly, I shall not receive evidence with respect to any matter set forth in the third paragraph of the bill of complaint in that suit, until the further order of the Supreme Court."

And again, the Honorable Special Master, in construing the above mentioned order of this Honorable Court, said:

> "The Supreme Court, in ruling with reference to the admission of New York to participate in this hearing, expressly reserved the matters set forth in the third paragraph of the bill of the State of New York. I find by looking at the objections which were made to the motion of New York to participate that

it was stated that the defendants here, the State of Illinois and the Sanitary District of Chicago, desired by demurrer or motion to dismiss to test the sufficiency of the bill of complaint and particularly paragraph third.

It would appear that it was that statement which underlay the provision of the order of the Supreme Court that the Court made its order without prejudice to authority to make the order which it may deem proper respecting matters set forth in the third paragraph and the issues which may arise from that paragraph and the bill of complaint. In other words, if the defendants, as indicated in their motion papers were to make a motion to strike or propose a demurrer to the bill of New York, then the Supreme Court would rule upon the question as to whether or not evidence should be taken with respect to the issues reserved."

5. Neither the defendant, the State of Illinois, nor the defendant, the Sanitary District of Chicago, have made any motion either to dismiss the bill of complaint of the State of New York or to strike out any part or paragraph of that bill.

6. The State of New York has participated in the trial of the Wisconsin case in accordance with the order of this Honorable Court as interpreted by the Honorable Special Master as hereinabove set forth.

7. So that there may be no misapprehension on the part of this Honorable Court or the solicitors for the respective parties defendant hereto regarding the issues intended to be raised by the third paragraph of the New York bill of complaint, your orator respectfully declares that the complainant, the State of New York, did not intend thereby to raise and does not now raise nor will it hereafter raise, in the trial of this suit, the issue as to the constitutionality of the Federal Power Act as applicable to the waters of the State of New York. The complainant, State of New

York, desires only to present proof and offer testimony under the third paragraph of its bill of complaint tending to show that the State of New York has certain interests in the power resources of the Niagara and St. Lawrence rivers and that the diversion of water from Lake Michigan by the defendants has and will impair such water power rights and that the Secretary of War is and was without power or authority to permit such injury to such water power rights through the issuance of any permit either past or future.

The issues involved in both the case of the State of Wisconsin et al. v. The Sanitary District of Chicago et al. and in the case of New York v. Sanitary District of Chicago et al., are of great importance and involve the consideration of extensive testimony. It is, therefore, desirable to eliminate the further issue of the constitutionality of the Federal Power Act in this case, which is not necessary to a determination of the issues raised by the Chicago diversion of Lake Michigan waters. By so doing, however, the State of New York does not waive the right to contest the constitutionality of said Federal Power Act by any later appropriate proceeding.

8. It is desirable before the final submission of the Wisconsin case that the defendants be required to answer, or otherwise plead, to the New York bill of complaint to the end that this Honorable Court will have before it at one time all the issues raised by the complainant states regarding the diversion of water by the defendants from Lake Michigan and the effect thereof.

Dated, Albany, N. Y., April 2, 1927.

ALBERT OTTINGER,
Attorney General of the State of New York,
Solicitor for Complainant,
The Capitol, Albany, N. Y.

Randall J. LeBoeuf, Jr.,
Deputy Attorney General.

IN THE SUPREME COURT
# of the
UNITED STATES

OCTOBER TERM, 1926.

No. 14, ORIGINAL.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

United States of America,
State of New York,
County of Albany,
ss.:

Randall J. LeBoeuf, Jr., being first duly sworn, on oath says that he is a duly appointed, qualified and acting Deputy Attorney General of the State of New York, in charge of the above entitled case, and is authorized to make this affidavit to be used on the motion hereto annexed.

That the bill of complaint of the complainant, State of New York, was duly served on the defendant, State of Illinois, on the 30th day of October, 1926, and on the Sanitary District of Chicago on the 22nd of October, 1926; that said defendants nor either of them have answered, demurred or otherwise pleaded to the bill of complaint of the complainant, State of New York herein; that said defendants, nor either of them, have made any motion to dismiss said bill of complaint or to strike out any part or paragraph or portion of said bill of complaint.

Deponent further says that in the related suit of the State of Wisconsin et al. against the State of Illinois and Sanitary District of Chicago et al. the taking of testimony before Honorable Charles E. Hughes, Special Master, was begun November 8, 1926, at Washington, D. C., and has continued from time to time and was concluded March 31, 1927.

Proposed findings of fact and conclusions of law are to be submitted to the Special Master and the final argument had on May 31, 1927, and immediately thereafter.

Deponent further says that while the State of New York has participated in the trial of the Wisconsin case, pursuant to the order of this Honorable Court, its participation has been limited by the order of this Court as stated by the Honorable Special Master and set forth in the motion hereto attached.

Deponent respectfully says that he deems it desirable that the New York case may be submitted to this Honorable Court simultaneously with the Wisconsin case, so that at one time the Court may determine all of the issues raised by the Chicago diversion of Lake Michigan waters.

RANDALL J. LE BOEUF, JR.

Subscribed and sworn to before
me this 2nd day of April, 1927.
Margaret E. Dumpleton
Notary Public,
Albany County, (Notarial Seal)
State of New York.

Office Supreme Court, U. S.
FILED
APR 11 1927
WM. R. S[illegible]RY
CLERK

IN THE

Supreme Court of the United States

October Term, A. D. 1926.

Number [redacted]iginal 11

STATE OF NEW YORK,
Complainant.

vs.

STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

SUGGESTIONS OF DEFENDANTS IN RESPONSE TO MOTION OF COMPLAINANT FOR ORDER ON DEFENDANTS TO ANSWER.

OSCAR E. CARLSTROM,
Attorney General of Illinois,
CYRUS DIETZ,
HUGH S. JOHNSON,
Solicitors for Illinois,
MACLAY HOYNE,
Attorney for The Sanitary District of Chicago,
GEORGE F. BARRETT,
EDMUND D. ADCOCK,
Solicitors for The Sanitary District of Chicago.

JAMES M. BECK,
JAMES HAMILTON LEWIS,
Of Counsel for The Sanitary District of Chicago.

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1926.

Number 14 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

SUGGESTIONS OF DEFENDANTS IN RESPONSE TO MOTION OF COMPLAINANT FOR ORDER ON DEFENDANTS TO ANSWER.

And now come the State of Illinois and The Sanitary District of Chicago, the defendants in the above entitled cause, and, in response to the motion of complainant for an order on defendants to answer the bill of complaint herein, move the Court:

First: That the answer heretofore filed by these defendants to the bill of complaint in the related case of the *State of Michigan, Complainant,* v. *The State of Illinois and The Sanitary District of Chicago, Defendants,* now pending in said court as No. 13, original, stand and be treated as and for their answer to the bill of complaint, except Paragraph III thereof, in the above entitled cause and that an order to that effect may be forthwith entered herein; and for grounds of such motion show:

(*a*) That the bill of complaint herein, except as to Paragraph III thereof, is substantially identical with the bill of complaint in the said Michigan case.

(*b*) That on the 7th day of June, 1926, an order was entered in the case of *Wisconsin, et al.*, v. *the State of Illinois, et al.*, No. 7, original, giving leave to the parties in the Michigan case to participate in the taking of evidence and in the hearing before the Special Master in the Wisconsin case, in like manner and with like effect, as if the Michigan suit had been consolidated with the Wisconsin case, and that thereafter the State of Michigan elected to so participate and has, in all such hearings, so participated.

(c) That, since the entry of the order herein of November 23, 1926, giving leave to the complainant herein to also participate in such hearings, the said complainant has so participated and, with respect to the above entitled cause, such hearings have proceeded in the same manner as if the issues had been joined herein with respect to all the allegations of the bill of complaint herein, except Paragraph III thereof, and as if answer had been filed to that part of the said bill of complaint in the form as actually filed to the bill of complaint in the Michigan case.

Second: That these defendants may have leave to file herein, instanter, their motion (herewith presented) to strike said Paragraph III of said bill of complaint, for the reasons in said motion stated.

By Paragraph 7 of its reasons accompanying its said motion, complainant states the real purpose of its motion to be—to compel defendants to answer Paragraph III of its bill of complaint in order that complainant may present evidence thereunder before the Special Master under the pending reference, notwithstanding the taking of testimony before the Special Master has been closed and final arguments, upon the record as now made before the Special Master, have been set to begin May 31, 1927.

Insofar as the said application of the said complainant seeks to inject the issues involved in said Paragraph III into the

said related cases and the hearings of said related cases, before the said Special Master, under the pending reference, these defendants oppose such action for the following reasons:

(*a*) The bills of complaint in the Wisconsin and Michigan cases seek injunction against the diversion, complained of, solely because of an alleged impairment of navigation upon the Great Lakes System of Waterways. There is no question of impairment of, or injury to, water power or water power rights involved in those suits. Therefore, the alleged cause of action, attempted to be stated in Paragraph III of the bill of complaint herein, is not common to all or any of the complainants in the related suits and any such issue is entirely foreign to the issues involved in the hearings in those related cases.

(*b*) The order of the Court of November 23, 1926, granting leave to the complainant herein to participate in the hearings before the said Special Master in the related Wisconsin case, among other things, provides:

> "But this order is made without prejudice to the authority of the Court hereafter to make any order which it may deem proper respecting the matters set forth in the third paragraph of the bill of complaint in the case of the *State of New York* v. *the State of Illinois and Sanitary District of Chicago,* and respecting the issues that may arise from the presence of that paragraph in that bill of complaint."

The defendants opposed the motion of complainant (resulting in said order) to participate upon the ground, among others, that said Paragraph III of the bill of complaint presented an alleged cause of action not common to all or any of the complainants in the two related suits (Wisconsin and Michigan cases).

(*c*) There is no allegation in the bill of complaint that any water power plant or any defined water power project on the Niagara and St. Lawrence Rivers in the State of New York has been, or will be, injured by the diversion or that the cessation of the diversion would benefit any such projects. There is presented by said Paragraph III only a moot question. Whether there might be water power projects projected in these international waters, after consent of the United States and Canada, is purely speculative, conjectural and hypothetical and upon such a showing no finding or relief could be based.

Defendants should not be required to answer Paragraph III of said bill of complaint and no testimony should be taken upon that issue until there is a determination by this Court that said Paragraph III presents a case or controversy appropriate for the exercise of judicial power. *New Jersey* v. *Sargent,* 269 U. S. 271.

(*d*) During the said hearings the Special Master struck out certain evidence presented by the complainants as to the possible power that might be developed in the Niagara and St. Lawrence Rivers from the water diverted and as to the use that might be made of such power. At page 5434 of the record of such hearings there appears a colloquy between the Special Master and the Hon. Newton D. Baker, one of complainants' counsel, with relation to that subject, as follows:

> "The Special Master. Well, I understand that. But the point is that this relates to a possible hypothetical development in the St. Lawrence-Niagara section, not to any development that has yet been made, or even the subject of any defined project upon which anybody has entered.
>
> Mr. Baker. That is true."

On the same subject the Special Master further said:

> "Do you suppose any court would act upon a purely hypothetical and speculative damage of that kind?" (Rec. 5438.)

* * *

> "And New York does not absolutely control the development of power. The United States has to be considered and Canada has to be considered." (Rec. 5442.)
>
> * * *
>
> "This testimony that is now the subject of the motion is testimony with regard to the St. Lawrence-Niagara section. I do not think I should allow that to remain in the record, thus to invite contradiction or evidence upon those points which might take up a great deal of time and which, personally, I should not make the basis of a finding." (Rec. 5444.)

It is apparent on the face of the record that said Paragraph III should now be stricken, without further proceedings.

Respectfully submitted,

OSCAR E. CARLSTROM,
Attorney General of Illinois.

CYRUS DIETZ,
HUGH S. JOHNSON,
Solicitors for Illinois.

MACLAY HOYNE,
Attorney for The Sanitary District of Chicago.

GEORGE F. BARRETT,
EDMUND D. ADCOCK,
Solicitors for The Sanitary District of Chicago.

JAMES M. BECK,
JAMES HAMILTON LEWIS,
Of Counsel for The Sanitary District of Chicago.

Office Supreme Court, U. S.
FILED
APR 11 1927
WM. R. ST[illegible]
CLERK

IN THE

Supreme Court of the United States

OCTOBER TE[redacted] D. 1926.

Number [redacted]inal 11

STATE OF NEW YORK,
Complainant.

vs.

STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION OF DEFENDANTS TO STRIKE PARAGRAPH III OF THE BILL OF COMPLAINT.

OSCAR E. CARLSTROM,
Attorney General of Illinois,

CYRUS DIETZ,
HUGH S. JOHNSON,
Solicitors for Illinois,

MACLAY HOYNE,
Attorney for The Sanitary District of Chicago,

GEORGE F. BARRETT,
EDMUND D. ADCOCK,
Solicitors for The Sanitary District of Chicago.

JAMES M. BECK,
JAMES HAMILTON LEWIS,
Of Counsel for The Sanitary District of Chicago.

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1926.

Number 14 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION OF DEFENDANTS TO STRIKE PARAGRAPH III OF THE BILL OF COMPLAINT.

Now come the defendants, The State of Illinois and The Sanitary District of Chicago, and move the Court that an order be entered herein striking from the bill of complaint in said cause, paragraph numbered III thereof, upon the following grounds:

1. Paragraph III of said bill of complaint does not present a case or controversy appropriate for the exertion of judicial power, but only an abstract question respecting the supposed authority of the State of New York in dealing with water power upon the Niagara River in the State of New York and upon the St. Lawrence River in the international section of said river.

2. There is no allegation in said bill of complaint that any water power plant now existing has been or will be injured by the diversion complained of, or that the cessation of said diversion will benefit any such water power plant or increase the amount of water power that may be developed by any such plant or plants.

3. There is no allegation in said bill of complaint that any defined project for the development of water power on the

Niagara and St. Lawrence Rivers has been or will be injured by the diversion complained of, or that the cessation of said diversion will benefit any such project or increase the amount of water power that may be developed by any such project.

4. There is no allegation that all of the power from water now flowing in the Niagara River has been or ever will be developed.

5. The Niagara and St. Lawrence Rivers are international waters, the use of which waters for power development requires the consent of Canada and the United States Government, and there is no showing that consent of either one or both of said governments has been obtained as to any future development of water power thereon.

6. The amount of water that may be used and diverted from the Niagara River for water power development is the subject of a treaty now existing between the United States and Great Britain, and it is not alleged that the full use of said waters under said treaty is in any way affected or impaired because of the diversion complained of.

Respectfully submitted,

Oscar E. Carlstrom,
Attorney General of Illinois.

Cyrus Dietz,
Hugh S. Johnson,
Solicitors for Illinois.

Maclay Hoyne,
Attorney for The Sanitary District of Chicago.

George F. Barrett,
Edmund D. Adcock,
Solicitors for The Sanitary District of Chicago.

James M. Beck,
James Hamilton Lewis,
Of Counsel for The Sanitary District of Chicago.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

Item 3

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NOV 23 1927
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CLERK

IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, *vs.* State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7, Original.
State of Michigan, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 11, Original.
State of New York, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 12, Original.

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IN THE

SUPREME COURT OF THE UNITED STATES.

October Term, 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.
No. 7, Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 11, Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 12, Original.

REPORT OF THE SPECIAL MASTER.

To the Supreme Court of the United States:

In the cause entitled, *State of Wisconsin, et al.,* v. *State of Illinois and Sanitary District of Chicago, State of Missouri, et al.,* intervening defendants, being No. 7, Original, October Term, 1927, this Honorable Court appointed me as Special Master, by its order dated June 7, 1926, as follows:

> "It is ordered that this cause be referred to Charles Evans Hughes, Esquire, as the special master with directions and authority to take the evidence and to report the same to the Court with his findings of fact, conclusions of law, and recommendations for a decree—all subject to examination, consideration, approval, modification, or other disposal by the court. The special master shall have authority (1) to employ competent stenographic and clerical assistants, (2) to fix the times and places of taking the evidence, and (3) to issue subpoenas to secure the attendance of witnesses and to administer oaths. When the special master's report of his findings of fact, conclusions of law, and recommendations for a decree is completed the clerk of the court shall cause the same to be printed; and when the same is presented to the court in printed form the parties will be accorded a reasonable time, to be fixed by the court, within which to present exceptions. The special master shall be allowed his actual expenses and a reasonable compensation for his services to be fixed hereafter by the court. The allowances to him, the compensation paid to his stenographic and clerical assistants, and the cost of printing his report shall be charged against and be borne by the parties in such proportions as the court hereafter may direct. If the parties to the related suit of State of Michigan *v.* State of Illinois and Sanitary District of Chicago, now pending in this court, so elect and so notify the special master they shall be permitted to participate in the taking of evidence and in the hearing before the special master in like manner and with like effect as if that suit had been consolidated with this cause by the court's order; and the court specially reserves to itself authority to order such a consolidation if it becomes proper to do so. If the appointment herein made of a special master is not accepted, or if the place becomes vacant during the recess of the

> court, the Chief Justice shall have authority to make a new designation, which shall have the same effect as if originally made by the court herein."

By order of November 23, 1926, the Court directed that the parties to the suit of the *State of New York* v. *State of Illinois and Sanitary District of Chicago* be permitted to participate in the taking of evidence in the hearing befor the Special Master in like manner as if the suit of the State of Wisconsin and that of the State of New York had been consolidated.

All the parties, complainants and defendants, in the above-entitled suits appeared before me, as Special Master, by their respective counsel, at public hearings in the city of Washington, District of Columbia, at various times between November 8, 1926, and June 3, 1927, and have presented their evidence, and have been heard in argument, with respect to the findings of fact, conclusions of law, and recommendations for a decree, which they have requested, respectively.

Now, pursuant to the above-mentioned orders, I have reported the testimony and the exhibits, received by me as Special Master, by filing the same in the office of the Clerk of this Court with my certificate; and I herewith submit to the Court my findings of fact, conclusions of law and recommendations.

Respectfully submitted,

CHARLES E. HUGHES
Special Master.

IN THE

SUPREME COURT OF THE UNITED STATES.

October Term, 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, *vs.* State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7, Original.
State of Michigan, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 11, Original.
State of New York, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 12, Original.

REPORT OF THE SPECIAL MASTER.

The Pleadings.

The original bill was filed by the State of Wisconsin on July 14, 1922. The bill sought an injunction against the diversion of water from Lake Michigan through the Sanitary and Ship Canal, which extends from the Chicago River to the Des Plaines River. At the time the suit was brought there was pending in this Court an appeal by the Sanitary District of Chicago from a decree in a suit brought by the United States enjoining the Sanitary District from diverting water from Lake Michigan in excess of 250,000 cubic feet per minute, or 4167 cubic feet per second, the amount then allowed by a permit of the Secretary of War. In January, 1925, this Court affirmed that decree, without prejudice, however, to any permit that might be issued by the Secretary of War according to law. On March 3, 1925, the Secretary of War gave a permit allowing a diversion not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon certain conditions.

On October 5, 1925, by leave of Court, the State of Wisconsin filed an amended bill, and the States of Minnesota, Ohio and Pennsylvania became co-complainants. The amended bill, like the original, alleged that the diversion at Chicago had caused a lowering of the level of Lakes Michigan, Huron, Erie and Ontario, and of the waterways connecting these lakes, and of the St. Lawrence River above tide-water, not less than six inches below the level that would otherwise exist, to the serious injury of the complainants. It was alleged that the defendant, Sanitary District of Chicago, had not complied with the conditions of the permit of March 3, 1925; that the acts of the defendants in the diversion of water from Lake Michigan had never been authorized by Congress and were in violation of the legal rights of the complainant States, and of their people, to the free and unobstructed use of Lake Michigan, and the ports and harbors thereof within the borders of said States, for the purposes of navigation, trade and commerce, free from any interference with the navigable capacity of such waters, by any agency other than the complainant States, or the United States Government, and their rights to the free and unobstructed navigation of Lakes Michigan, Huron, Erie and Ontario, and the navigable waters between these lakes and from them into the Mississippi River and the Atlantic Ocean, both under the common law and under the express guaranty in the Ordinance of June 13, 1787, for the government of the Northwest Territory; and also that the acts of the defendants were in violation of the provisions of the Act of Congress of March 3, 1899, and particularly of Section 10 of that act.

The amended bill seeks an injunction restraining the defendants from causing any water to be taken from Lake Michigan, in such manner as permanently to divert the same from the lake. There is a further prayer that, if the Sanitary and Ship Canal shall be used as a navigable waterway of the United States and be subject to the same control on the part of the United States as other navigable waterways, the defendants shall be restrained against permanently diverting any water from Lake Michigan in excess of the amount which the Court shall determine to be reasonably required for navigation in and through said canal and the connecting waters to the Illinois and Mississippi Rivers, without injury to the navigable capacity of the Great Lakes and their connecting waters. It is also prayed that the defendants be restrained from dumping or draining into the Sanitary District canal any sewage or waste in such quantity and manner as excessively to pollute and render the canal, the Chicago, Des Plaines and Illinois Rivers, unsanitary and injurious to the people of the complainant States navigating said waterways.

To the amended bill the State of Illinois filed a demurrer and the Sanitary District of Chicago filed its answer, which included a motion to dismiss. The States of Missouri, Kentucky, Tennessee and Louisiana, by leave of Court, became intervening co-defendants and moved to dismiss the bill. The demurrer was overruled and the motions to dismiss were denied, without prejudice, on March 22, 1926; and thereupon the intervening defendants and the defendant the State of Illinois filed their respective answers. The States of Mississippi and Arkansas were permitted to intervene as defendants, and adopted the answers filed by the other intervening defendants.

The answer of the defendant Sanitary District of Chicago denied the injuries alleged, set forth the nature of the site, the history of the canal and of the diversion of water from Lake Michigan, and its purposes, and averred authority for the diversion under acts of the legislature of Illinois, and under acts of Congress and permits of the Secretary of War authorized by Congress in the regulation of interstate commerce. The answer alleged full compliance with the conditions of the permit of the Secretary of War of March 3, 1925. It also set up the defense of laches, acquiescence and estoppel, it being alleged that the fact that the canal was to be, and was being, constructed, its purposes and the diversion of water from Lake Michigan, were known to the people and the officials of the complainant States, and that no protest or complaint had been made in their behalf, prior to the filing of the original bill of complaint.

It was alleged in the answer of the defendant Sanitary District of Chicago that the lowering of the mean lake levels of Lakes Michigan, Huron, Erie and Ontario and the connecting waterways, due to the Chicago diversion as authorized by the permit of March 3, 1925, did not, and would not, exceed four and three-quarters inches. The answer of the intervening defendants was substantially to the same effect. The answer of the State of Illinois adopted the answer of the defendant Sanitary District of Chicago, and the answers of the other defendants, except that part which averred that the lowering of the mean level of the Lakes and connecting waterways, by reason of the diversion, did not exceed four and three-quarters inches, and denied that the mean level of these waters had been lowered to any extent greater than that which would exist in the absence of such diversion. While presenting similar defenses to those of the Sanitary District of Chicago, the answer of the intervening defendants stressed the point that the diversion of water from Lake Michigan improved the navigation of the Mississippi River, and was an aid to the commerce of the Mississippi Valley.

The State of Michigan, on March 8, 1926, filed its bill in this Court against the State of Illinois and the Sanitary District of Chicago, for the same relief; and the defendants filed their answers on June 1, 1926.

On October 22, 1926, the State of New York filed its bill in this Court against the State of Illinois and the Sanitary District of Chicago, for the same relief; and on April 18, 1927, it was ordered that the answer filed by the defendants in the suit brought by the State of Michigan should be accepted and treated as their answer to the bill of complaint, other than the third paragraph thereof; and subsequently, on May 31, 1927, this paragraph was stricken out, without prejudice.

Findings of Fact.

The facts deemed to be established by the evidence, and which may be considered material to the contentions of the parties in relation to the site and the history of the canal, the extent and effect of the diversion, the action of the State and Federal Governments, the plans for the disposal of the sewage and waste of Chicago and the other territory within the Sanitary District, and the character and feasibility of works to compensate for the lowering of lake levels, or to regulate such levels, are as follows:

1. *The site.*—The city of Chicago lies on a low prairie, between Lake Michigan and the Des Plaines River. The continental divide, separating the drainage basins of the Great Lakes-St. Lawrence system and the Mississippi River system, passes about ten miles to the west of the southwestern end of Lake Michigan and, in a state of nature, was from ten to eleven feet above the level of that lake. Between the divide and the lake lay the basin of the Chicago River, with its two branches, both near the shore of the lake, the North Branch, which flows in a southerly direction, and the South Branch, flowing northerly. About one mile from the lake, these branches unite to form the main channel of the river. It has been shown to be the opinion of competent students that, in a remote past, an earlier Lake Michigan, with a higher level, had an outlet through a river filling the lower portion of the Des Plaines valley. But I find no reason to doubt, after consideration of the testimony and early maps and narratives, that during the time of which we have records of discovery, exploration and settlement of this continent, and prior to the artificial changes about to be described, there was the continental divide above mentioned, and that in a state of nature, as known within historic time, the Chicago River and the waters of its drainage basin, flowed into Lake Michigan.

The Little and Grand Calumet Rivers rise in the State of Indiana, and flow in a westerly direction, across the boundary line between the States of Indiana and Illinois.

After entering the State of Illinois, these rivers curve to the north and east, and in a state of nature, as known within historic time, the waters of the Little and Grand Calumet Rivers, and of their drainage basins, flowed into Lake Michigan.

On the other side of the divide is the Des Plaines River, which rises in southern Wisconsin and flows in a southerly direction, parallel to the lake shore, until it reaches a point about due west of the mouth of the Chicago River, where it turns to the southwest and joins the waters of the Kankakee River to form the Illinois River, which flows into the Mississippi.

Between the Des Plaines River and the South Branch of the Chicago River there was a swampy tract, known as Mud Lake, through which, in times of freshet, the waters of the Des Plaines poured over the divide into the Chicago River basin. The early explorers were able at such times to navigate canoes and bateaux across the divide, and even in dry weather there was only a short portage. This naturally became a principal route between Lake Michigan and the Mississippi River for exploration, colonization and trade. The feasibility of a canal to afford a continuous connection between Lake Michigan and the Illinois River was early pointed out, and the importance of such a waterway, for both military and commercial purposes, was emphasized.

2. *The Illinois and Michigan Canal.*—By Act of March 30, 1822 (3 Stat., 659), Congress authorized Illinois to survey and ~~mark,~~ through the public lands of the United States, the route of a canal connecting the Illinois River with Lake Michigan. The Act provided for a perpetual reservation of 90 feet on either side for the use of the canal. This Act was modified by the Act of March 2, 1827, (4 Stat. 234), by which Congress made a further grant to aid the construction of the canal. It was completed in 1848. The State Act (January 9, 1836, Illinois Laws, 1834-37, p. 118) provided for a canal not less than 45 feet in width at the surface, 30 feet at the base, of a depth to insure navigation of

at least four feet, to be supplied with water from Lake Michigan, and such other sources as the canal commissioners should think proper. This canal crossed the continental divide between the Chicago and Des Plaines Rivers, on a summit level eight feet above the lake, and then paralleled the Des Plaines and the Upper Illinois Rivers to La Salle, Illinois, where it entered the latter stream. The summit of the canal was supplied with water by pumps located in a plant on the Chicago River. Originally, only enough water was pumped to answer the needs of navigation. In 1861 (Illinois Laws, 1861, p. 277), the legislature of Illinois provided for surveys and estimates to disclose the comparative costs and benefits of different methods proposed for improving the navigation of the Illinois River, by dredging or excavation of the channel and wing dams, or by supplying water from Lake Michigan, through the enlargement of the Illinois and Michigan Canal or otherwise, or by opening a channel from Lake Michigan, by way of the South Branch of the Chicago River and Mud Lake, to the Des Plaines River, and down said canal to a point that would secure an ample supply of water, sufficient for the navigation of the Illinois River at all times when not obstructed by ice.

The Chicago River, in its natural state, was a sluggish stream, especially in its lower reaches. Receiving the sewage of a rapidly growing city, together with the waste of industrial plants, it became very offensive. In 1865 (Illinois Laws, 1865, p. 83), upon the representation of the city that, in order to purify the river by drawing a sufficient quantity of water from Lake Michigan, and through the summit division of the canal, the city would advance sufficient funds to cut down the summit level so as to provide a gravity flow from the lake, the legislature of Illinois authorized this plan of construction, known as the "deep cut plan", which had been the original plan but had been abandoned for lack of funds. In the same year, for the immediate relief of the city, an arrangement was made by the municipal authorities by which the canal commissioners agreed to pump water from the river in excess of the needs of navigation. This pumping was done chiefly in the summer and early fall and the usual rate was 200 cubic feet per second, or a little less.

By 1872, the summit level of the canal had been lowered, and it was hoped that this would result in the establishment of a permanent flow of lake water through the South Branch of the Chicago River, sufficient to keep it in good condition. This result was not achieved. The volume discharged down the canal was less than had been expected, while, under certain conditions of wind, rainfall and lake level, the flow toward the lake was re-established. In 1879, there was a lakeward current for thirty days, and no perceptible current either way for ten days. The mean flow was less than 300 c. f. s.[1] The canal was grossly polluted.

In 1881, the legislature of Illinois (Illinois Laws, 1881, p. 159) passed a resolution reciting the inadequacy of the deepening of the canal, the pollution of the Des Plaines and Illinois Rivers, the consequent injury to fish life, and the spread of disease germs through the river valleys, and authorizing the installation of pumps at Bridgeport, the northern terminus of the canal, with a capacity of not less than 1,000 c. f. s., to draw water from Lake Michigan through the Chicago River and the canal. Pumps were installed by the city of Chicago accordingly, and pumping was begun in 1883. For a few years, this afforded sufficient dilution in the canal. But at that time, Lake Michigan stood at a high stage, and the pumps had sufficient capacity to provide 1,000 c. f. s. only under that condition. In 1886, the lake level began to fall, and it continued to fall, until in 1891 it was about two feet lower than when the pumps were installed. Their capacity was thus reduced to a little more than 600 c. f. s. As the city continued to grow, the nuisance along the canal was at times as bad as ever.

3. *The authorization of sanitary districts and of a greater canal between Lake Michigan and the Des Plaines*

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[1] For convenience, the abbreviation c. f. s. will be used for cubic feet per second.

River.—(*a*) Between 1880 and 1889, much had been done to create a public sentiment demanding better drainage and water supply. There were investigations, discussions and reports. In 1887, a preliminary report of a commission of engineers consisting of Rudolph Hering, Samuel G. Arlingstall, and Benezette Williams, known as the Drainage and Water Supply Commission, considered three methods of sewage disposal, and recommended as most economical the discharge into the Des Plaines River through a canal across the continental divide, providing a waterway of such dimensions as would furnish ample dilution. Besides the economical advantage of this plan, the commission pointed out that "the proposed canal will, from its necessary dimensions and its regular discharge, produce a magnificent waterway between Chicago and the Mississippi River, suitable for navigation of boats having as much as 2,000 tons burden. It will establish an available water power between Lockport and Marseilles fully twice as large as that of the Mississippi River at Minneapolis, which will be of great commercial value to the State. The Calumet region will be much enhanced in value, by having a direct navigable channel to the Des Plaines River, and by a lowering of the flood heights of Calumet Lake and River."

(*b*) The legislature of Illinois, by Act of May 29, 1889 (Illinois Laws, 1889, p. 125), authorized the creation of sanitary districts to provide for drainage, with power to construct channels, to improve any navigable or other waterways, and for this purpose to condemn property. This Act required (section 20) that any channel constructed which should cause the discharge of sewage outside the district should be of sufficient capacity to produce a continuous flow of water of at least 200 cubic feet per minute for each 1,000 of population. The following provisions of the Act relate explicitly to the canal subsequently constructed and through which the diversion complained of is effected:

> "§ 23. If any channel is constructed under the provisions hereof by means of which any of the waters

of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet, and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water.

"If the population of the district drained into such channel shall at any time exceed 1,500,000, such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom.

"In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel.

"And the Canal Commissioners, if they shall find at any time that an additional supply of water has been added to either of said rivers, by any drainage district or districts, to maintain a depth of not less than six feet from any dam owned by the State to and into the first lock of the Illinois and Michigan Canal at LaSalle, without the aid of any such dam, at low water, then it shall be the duty of said Canal Commissioners to cause such dam or dams to be removed. This act shall not be construed to authorize the injury or destruction of existing waterpower rights.

"§ 24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the DesPlaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes."

(*c*) At about the same time, May 28, 1889, the legislature of Illinois passed a joint resolution (Illinois Laws, 1889, p. 376), providing as follows:

"1. That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practicable depth and usefulness for navigation from Lake Michigan via the Des Plaines and Illinois Rivers to the Mississippi River, and to encourage the construction of feeders thereto of like proportions and usefulness.

"2. That the United States is hereby requested to stop work upon the locks and dams at La Grange and at Campsville, and to apply all funds available and future appropriations to the improvement of the channel from La Salle to the mouth, with a view to such a depth as will be of present utility and in such manner as to develop progressively all the depth practicable, by the aid of a large water supply from Lake Michigan at Chicago.

"3. That the United States is requested to aid in the construction of a channel not less than 160 feet wide and 22 feet deep, with such a grade as to give a velocity of three miles per hour from Lake Michigan at Chicago to Lake Joliet, a pool of the Des Plaines River immediately below Joliet, and to project a channel of similar capacity and not less than 14 feet deep from Lake Joliet to La Salle, all to be designed in such manner as to permit future development to a greater capacity."

(*d*) By Act of June 10, 1895 (Illinois Laws, 1895, p. 168), section 20 of the Act of 1889 was amended, so as to provide that the sanitary district constructing a channel under that act shall, at the time any sewage is introduced therein, turn into said channel "not less than twenty thousand cubic feet of water per minute for every one hundred thousand inhabitants of said district, and shall thereafter maintain the flow of such quantity of water."

4. *The Sanitary District of Chicago.*—The defendant, the Sanitary District of Chicago, was organized under the Illinois Act of 1889. Its organization was completed in 1890. Originally, the district embraced an area of 185

square miles. By later acts this was increased so that the district now comprises approximately 438 square miles, extending from the Illinois State line on the south and east, to the northern boundary of Cook County on the north, with about 34 miles of frontage on Lake Michigan, thus embracing what may be called the metropolitan area of Chicago, consisting of Chicago and its suburbs, a total of 54 cities, towns and villages.

5. *The Sanitary and Ship Canal and its connections.*—(*a*) The Sanitary District of Chicago at once entered on the construction of the principal canal, called the Sanitary and Ship Canal, which extends from the West Fork of the South Branch of the Chicago River, near Robey Street (a point about six miles from Lake Michigan), to the Des Plaines River at Lockport, a distance of about 28 miles. It was dug 13 miles through earth to Willow Springs, 24.4 feet deep, measured from hydraulic grade line established by an assumed flow of 14,000 c. f. s. with the lake at Chicago city datum, and from 250 to 300 feet wide. It was blasted out of solid rock from Willow Springs to Lockport, with a width of 161 feet and a depth of 24.4 feet. Thirteen bridges were built over this main canal, with a clearance of 16½ feet; and they are so built that they may be moved out of the way of passing vessels. Controlling works were built at Lockport,—seven sluice gates, each 30 feet wide, and a movable dam 160 feet long. By the opening of these gates, or the lowering of the dam, the amount of water flowing in the main channel could be regulated at all times.

In connection with the construction of this canal, the Des Plaines River was straightened for many miles above Lockport, and its channel was improved from Lockport down through Joliet, so that it would be capable of taking the combined floods of the Des Plaines River watershed and the Chicago River watershed, or a total of about 25,000 c. f. s.

The actual construction of this main drainage canal was begun in 1892, and it was opened on January 17, 1900.

Since that time, the flow of the Chicago River has been reversed; that is, it has been made to flow away from Lake Michigan.

(*b*) This canal, as originally constructed and opened, ended in a non-navigable tail-race. There was no lock at the southwestern end. By Act of May 14, 1903 (Illinois Laws, 1903, p. 113), the legislature of Illinois extended the corporate limits of the Sanitary District of Chicago, authorized the construction of additional channels, gave the right to use what had been known as the Calumet Feeder of the Illinois and Michigan Canal, and adjacent lands, and also gave the right to construct a channel across the Illinois and Michigan Canal, without any obligation to restore that canal, or the feeder, to its former usefulness. The act also provided that the rules of the United States Government then in force regulating the navigation of the Chicago River should govern navigation in the channels of the Sanitary District and that the speed of all vessels while passing through the earth sections should not exceed eight miles per hour. The Sanitary District of Chicago was also authorized to construct dams, water wheels, and all such other works, north of the upper basin of the Illinois and Michigan Canal, as might be appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels then or thereafter constructed by the District.

Pursuant to this statute, the main channel was extended from the basin at the controlling works at Lockport, to the proposed site of the power-house, some 11,000 feet. This work, including the construction of the power-house, the installation of the machinery and the completion of the transmission lines and the tail-race, was finished in 1907.

In 1908, the Constitution of Illinois was amended, so as to authorize the legislature to provide for the construction of a deep waterway or canal, from the water-power plant of the Sanitary District of Chicago, at or near Lockport, to a point on the Illinois River at or near Utica, and for the installation and maintenance of power plants, locks, bridges, dams and appliances sufficient for the development and utilization of the water-power of such waterway, it also being provided that all power so developed might be leased, in part or whole, as the legislature might authorize, the rental to be subject to a re-valuation every ten years and the income to be paid into the State treasury.

From the power-house the channel was extended to the upper basin at Joliet, about 11,000 feet, to provide for carrying away the outfall from the power-house and discharging it into the Des Plaines River. When the lock at the power-house was completed in 1910, through navigation to the Illinois River, by way of the drainage canal to Joliet, and by the Illinois and Michigan Canal to La Salle, was provided.

(*c*) The sewer system of Chicago, built and extended from time to time from 1856, is a combined system, carrying both storm water and sewage. It originally drained principally into the Chicago River and its branches. A considerable portion of the city sewers were emptied at different places directly into Lake Michigan. To obviate this separate intercepting sewer systems were constructed and by 1910 were fully installed. On the south side, the interceptors converged at 39th Street and the lake, intercepting the sewers discharging directly into the lake. At the point of convergence, a pumping station was constructed, together with a conduit from the lake to the South Fork of the South Branch of the Chicago River, from which the sewage, flushed with water from the lake, finds its way into the drainage canal. The North Side intercepting sewer system, serving a similar purpose, led to a pumping station at Lawrence Avenue and the lake, where the sewage, with water from the lake, was turned into the North Branch of the Chicago River, and thence into the main drainage canal. The intercepting sewers and pumping stations and conduit for the North and South Side systems were built by the city of Chicago, and thereafter were turned over to the Sanitary District, and have since been operated by it.

(*d*) What is known as the North Shore channel, about eight miles long, with a depth of 13½ feet, a bottom width of 26 to 30 feet, and a surface width of about 80 feet, was constructed between 1907 and 1910, and was put into service in 1911. It starts from Lake Michigan at Wilmette, and connects with the North Branch of the Chicago River at or near Lawrence Avenue in Chicago. Connected with this channel is a sewer system, built between 1913 and 1916, intercepting the sewage of the North Shore towns which formerly dicharged their sewage into Lake Michigan. The Evanston interceptor, which diverts the sewage of Evanston from the lake, was built between 1916 and 1920. The full capacity of the North Shore channel is 1000 c. f. s., and the water is pumped into it from Lake Michigan by a pumping station at its northern terminus. It has a lock by which boats may pass into the lake.

(*e*) The Calumet Sag Channel extends from the Little Calumet River to the main channel, near Sag. It has a depth of about 20 feet, is 60 feet wide in the rock sections, and in the earth sections the width at the bottom is 36 feet and at the surface from 115 to 120 feet. It was begun in 1911, and put into service in 1923. The sewers south of 87th Street, in the city of Chicago, formerly drained into Lake Calumet and the Calumet River. The Calumet intercepting sewer system, with its pumping station and conduits, drains the sewage into the Calumet Sag Channel. The maximum capacity of the channel is 2,000 c. f. s.

(*f*) By the works thus described, all the sewage of the district is diverted from Lake Michigan. The construction cost of these works, as it appears on the books of the Sanitary District of Chicago, to December 31, 1926, amounted to $83,689,636.52, and, with the addition of administration, legal, clerical and incidental expenses, and interest on bonds for construction, to $109,021,613.21.

6. *Quantity of water taken from Lake Michigan.*—The quantities of water withdrawn from Lake Michigan and passed through the drainage canal, consist, (1) of the quantity taken directly from the lake by the Sanitary District through its various channels; and (2) of the amount pumped from the lake by the city of Chicago through its waterworks for the purpose of obtaining its water-supply. The mean annual quantities of water taken from Lake Michigan and passed through the Sanitary District canal, from the opening of the canal on January 17, 1900, to December 31, 1926, that is, the total flow at Lockport, embracing both the water diverted from the lake by the Sanitary District and the amount taken by means of the city of Chicago's intakes and pumping works, have been as follows:

Year	Total Flow at Lockport	Sewage Flow (Chicago Water Works Pumpage)	Water directly abstracted from Lake Michigan by Sanitary District
1900	2990 C.F.S.	449 C.F.S.	2541 C.F.S.
1901	4046 "	531 "	3515 "
1902	4302 "	554 "	3748 "
1903	4971 "	582 "	4389 "
1904	4793 "	618 "	4175 "
1900-04	4220 "	547 "	3673 "
1905	4480 "	636 "	3844 "
1906	4473 "	676 "	3797 "
1907	5116 "	704 "	4412 "
1908	6443 "	726 "	5717 "
1909	6495 "	744 "	5751 "
1905-09	5401 "	697 "	4707 "
1910	6833 "	803 "	6086 "
1911	6896 "	785 "	6111 "
1912	6938 "	853 "	6085 "
1913	7839 "	894 "	6945 "
1914	7815 "	949 "	6866 "
1910-14	7264 "	857 "	6407 "

Year	Total Flow at Lockport		Sewage Flow (Chicago Water Works Pumpage)		Water directly abstracted from Lake Michigan by Sanitary District	
1915	7738	C.F.S.	939	C.F.S.	6799	C.S.F.
1916	8200	"	972	"	7228	"
1917	8726	"	993	"	7733	"
1918	8826	"	1018	"	7808	"
1919	8595	"	1106	"	7489	"
1915-19	8417	"	1006	"	7411	"
1920	8346	"	1176	"	7170	"
1921	8355	"	1199	"	7156	"
1922	8858	"	1216	"	7642	"
1923	8348	"	1220	"	7128	"
1924	9465	"	1274	"	8191	"
1920-24	8674	"	1217	"	7457	"
1925	8278	"	1338	"	6940	"
1926	8283	"	1395	"	6888	"

The mean monthly flow is calculated every month by the Sanitary District, and the annual flow as shown in the above table is the mean of the twelve monthly flows. The table also gives the average annual flow for the years 1900 to 1904; 1905 to 1909; 1910 to 1914; 1915 to 1919; and 1920 to 1924.

The above total flow of water through the drainage canal has passed into the Mississippi watershed and has been permanently lost to the Great Lakes-St. Lawrence system.

It has been computed that the mean annual run-off of the portion of the Chicago basin of the Great Lakes-St. Lawrence system which lies within the boundaries of Illinois, is 503 c. f. s., which, under natural conditions, would constitute the mean annual contribution of the territory within the State of Illinois to the water supply of that system. It also appears that the construction of the works above described of the Sanitary District has prevented any portion of the flood waters of the Des Plaines

River from flowing into the Chicago River basin, and thence into Lake Michigan.

7. *Power development.*—(*a*) Since 1907, power has been generated by the Sanitary District at the western terminus of its main channel, the actual output at the power-house being less than the theoretical capacity because of the present inefficiency of the installation. The following table shows the total quantity of electrical power actually generated from 1908 to 1926, that is, the average flow for each year, through the power-house, and the yearly average output of power:

Year	Flow Through Power House C. F. S.	Lockport Power House Output K W H[2]
1908	1640	21,000,000
1909	3399	50,534,040
1908-09	2520	35,767,020
1910	4262	72,861,101
1911	5287	83,663,000
1912	5580	88,908,800
1913	6195	98,208,590
1914	6672	106,764,600
1910-14	5599	90,077,618
1915	7047	109,631,300
1916	7387	112,326,700
1917	7454	119,374,900
1918	7511	120,201,000
1919	8030	126,375,200
1915-19	7486	117,581,820
1920	7910	120,581,400
1921	7657	117,875,300
1922	8178	122,551,800
1923	8031	124,135,700
1924	8938	126,572,600
1920-24	8142	122,343,360
1925	8032	117,747,200
1926	8245	118,196,700

[2] Kilowatt-Hours.

(*b*) The above table of flow does not show the entire flow through the channel; and the following table shows the total flow, the flow through the power-house, and the percentage of the total flow used for power:

Year	Total Flow	Flow Through Power House	Per Cent Used for Power
1908	6643	1640	25.4
1909	6495	3399	52.3
1910	6833	4262	62.5
1911	6896	5287	76.6
1912	6938	5580	80.5
1913	7839	6195	79.0
1914	7815	6672	85.3
1915	7738	7047	91.1
1916	8200	7387	90.0
1917	8726	7454	85.5
1918	8826	7511	85.1
1919	8595	8030	93.5
1920	8346	7910	94.8
1921	8355	7657	91.6
1922	8858	8178	92.2
1923	8348	8031	96.2
1924	9465	8938	94.4
1925	8278	8032	97.1
1926	8283	8045	97.2

(*c*) The power thus generated has been used in the works of the Sanitary District, and also for street and park lighting in the city of Chicago and other municipalities within the Sanitary District. A considerable portion of the power developed has been sold to commercial consumers. Both the commercial and the municipal load on the power plant increased from 1908 to about 1917, when the plant was carrying its limit. From that time, there has been a greater municipal demand; and as the Sanitary District's need for power has increased, the commercial consumers have been dropped. The mean annual power production for the period 1920 to 1924, inclusive, was 122,343,360 kilowatts, or about 18,721 horse-power. It cost about $26.40 per horse-power to make the power. The Sanitary District has supplied the power at cost to the city of Chicago and other municipalities, and where power has been sold commercially the price has been about $55 per horse-power. It is estimated that when the plants, sewage treatment plants hereinafter described, which are now being built by the Sanitary District, are finished, the Sanitary District will need for these plants and its pumping stations, in 1945, annual power to the amount of about 200,000,000 kilowatt-hours.

Prior to 1925, the Sanitary District regulated the flow through the canal in accordance with the demands for power produced at Lockport. This resulted in a larger flow in the evening and during the night, when the power load was heaviest. In 1918, at the request of the United States Fuel Administrator, and in order to save fuel, an arrangement was made with the Commonwealth Edison Company for an exchange of power; and similar temporary agreements were made in later years. Since 1925, the power plant of the Sanitary District has been connected with the Commonwealth Edison Company, so as to permit a continuous and automatic exchange of power, as required, and to maintain a uniform flow. It does not appear that the mean monthly or mean daily flow at any time during the operation of the drainage canal exceeded the amount required by the State of Illinois, under the Act of 1889, as amended, for dilution purposes, that is, 20,000 cubic feet per minute for each 100,000 of population.

8. *Federal action prior to the permit of March 3, 1925.* (*a*) The attention of Congress had been called to the military and commercial importance of enlarging the Illinois and Michigan Canal, and improving the Illinois River, by President Lincoln. The Act of June 23, 1866 (14 Stat. 74), directed an examination or survey to be made of the Illinois River from its mouth to La Salle, and the Act of March 2, 1867 (14 Stat. 422), directed continuance of this work. Reports under these and later Acts emphasized the value of a

waterway from Lake Michigan to the Gulf of Mexico. By Act of Congress of August 11, 1888 (25 Stat. 419), for the stated purpose of securing a continuous navigable waterway between Lake Michigan and the Mississippi River, having capacity and facilities adequate for the passage of the largest Mississippi River steamboats, and of naval vessels suitable for defense in time of war, the Secretary of War was directed to cause to be made the proper surveys, plans and estimates for a channel improvement and locks and dams in the beds of the Illinois and Des Plaines Rivers, from La Salle to Lockport, so as to provide a navigable waterway not less than 160 feet wide and 14 feet deep, and also for a channel from Lockport to Lake Michigan, at or near Chicago. Pursuant to this provision, a report was made by Captain W. L. Marshall, then United States engineer at Chicago, which appears in the Report of the Chief of Engineers for the year 1889 (pp. 2122 *et seq.*). Annexed to this report was a copy of the act of Illinois of May 29, 1889, authorizing the construction of the Chicago Drainage Canal, and also a copy of the joint resolution of the legislature of Illinois, of May 28, 1889, above mentioned (*supra,* p. 16).

(*b*) In the Rivers and Harbors Act of September 19, 1890 (26 Stat. 454, 455) Congress provided as follows:

> "Sec. 7.—That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty, or structure of any kind outside of established harbor-lines, or in any navigable waters of the United States where no harbor-lines are or may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters, and it shall not be lawful hereafter to commence the construction of any bridge, bridge-draw, bridge piers and abutments, causeway or other works over or in any port, road,

roadstead, haven, harbor, navigable river, or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works shall have been submitted to and approved by the Secretary of War, or to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War: *Provided,* That this section shall not apply to any bridge, bridge-draw, bridge piers and abutments the construction of which has been heretofore duly authorized by law, or be so construed as to authorize the construction of any bridge, drawbridge, bridge piers and abutments, or other works, under an act of the legislature of any State, over or in any stream, port, roadstead, haven or harbor, or other navigable water not wholly within the limits of such State.

* * * * * *

"Sec. 10. That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction, is hereby prohibited. The continuance of any such obstruction, except bridges, piers, docks and wharves, and similar structures erected for business purposes, whether heretofore or hereafter created, shall constitute an offense and each week's continuance of any such obstruction shall be deemed a separate offense. Every person and every corporation which shall be guilty of creating or continuing any such unlawful obstruction in this act mentioned, or who shall violate the provisions of the last four preceding sections of this act, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five thousand dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court. The creating or continuing of any unlawful obstruction in this act mentioned may be

> prevented and such obstruction may be caused to be removed by the injunction of any circuit court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the Attorney General of the United States."

(*c*) The annual report of the Chief of Engineers for 1890 (pp. 2419-2452, 2550-2574) included a further report of Captain Marshall, under date of February 28, 1890, upon a survey of a waterway from Lake Michigan to the Illinois River, which referred to the project of the Sanitary District; and to this report there were annexed not only the Illinois act and joint resolution of 1889, above mentioned, but also the report of the Drainage and Water Supply Commission of Chicago of 1887 and the communication of the Mayor to the City Council of Chicago which transmitted that report.

The Sanitary District of Chicago transmitted to the Secretary of War the resolution of its board of trustees of April 21, 1891, for the widening and deepening of the Chicago River, so as to provide a sufficient supply channel for the proposed drainage canal.

The Act of Congress of July 13, 1892 (27 Stat., 93) appropriated $72,000 for completing improvement of the harbor at Chicago, and the engineer in charge was directed to submit a report stating what improvement should be made by the Government in the Chicago River. The Report of the Chief of Engineers for 1892 (pp. 2255-2259) contained a report upon the improvement of the Illinois River and the action of the Sanitary District in constructing its main channel. On August 9, 1893, Captain Marshall made the report required by the Act of 1892, and recommended certain improvements in the Chicago River and its branches, in the course of which he said:

> "The insufficient discharge of the pumps into the canal" (referring to the Illinois and Michigan Canal)

"results, in rainless weather, in a very feeble current from the lake toward the pumps at Bridgeport, and in an indescribable state of putridity and offensiveness in the Chicago River, due to domestic sewage and a discharge from manufacturing establishments through the sewers into the river. At ordinary rains, upon freshets in the Des Plaines or Chicago rivers drainage areas, great volumes of putrescent matter are disgorged into the lake through the mouth of the Chicago River, threatening the water supply of the city, which, in the main is taken through tunnels under the bed of the lake from two inlet cribs, situate, one north of and the other south of, and a few miles distant from the mouth of the river. To remedy the, at times, insupportable and disgusting condition of the river and its branches; to purify the river and to preserve the city water, relief is now sought under State laws by constructing a drainage canal from the South Branch of Chicago River to the Des Plaines River above Joliet, capable of discharging into the Illinois River Valley from 300,000 to 600,000 cubic feet of water per minute.

* * * * * *

"This channel has been located from the South Branch of the Chicago River to Lockport, and is under construction, but no provision has yet been made for channels of supply from Lake Michigan. Whatever the outcome or plans of the local officials having this work in charge may be, it can be said that the Chicago River and its branches cannot, in their present condition, supply materially more than from one-third to one-half of the minimum requirements of the law, without producing currents that will be prohibitory to navigation at some of the bridges and obstructions now existing. It is certainly evident, granting the proposition that effective channels for the purpose will be constructed, that if this method of solving the drainage problem is to be carried to conclusion there must be a complete remodeling of Chicago River throughout both its branches, and there must be also artificial channels of large capacity to furnish even approximately effective outfalls to the sewerage system of a great city founded on low lands extending some 22 miles along, and for miles back from the lake, as well as other large feeders connecting the lake with such channels.

"Without criticizing in any way the local measures taken for local relief, it may be said that the State laws, if effectively executed for the purposes specified, seemingly require changes in the capacity of Chicago River and its branches that may increase, may diminish, or may even entirely destroy their value for commercial purposes. In any case under existing laws, no alteration in the capacity of Chicago River can be made without the consent of the Secretary of War, or without full examination by agencies established by Congress, and the execution of the State laws are therefore limited by superior authority.

* * * * * *

"In the present condition of Chicago River no material widening or deepening of the channel can be effected without great expense. A large proportion of the docks or bulkheads must be reconstructed, and in some cases precautions are necessary to prevent damage to buildings if the water is materially deepened against their foundations.

"There should always be at least 2 feet of water between the bottoms of vessels and the crowns of tunnels to guard against damages to vessels by chance obstructions of small extent lodging temporarily over the rigid crowns. To secure 18 feet available water the three tunnels under the river should be lowered until there will be from 20 to 21 feet of water over their crowns. If the improvement be made on the basis of 18 feet and the use of Chicago River and its branches be conceded by the United States to the State of Illinois as a drainage channel, of the capacity indicated by the State law, the modifications therein must be radical and costly whether the expense thereof be borne by the United States or the City of Chicago.

* * * * * *

"It will soon be necessary for Congress to provide for the extension to Lake Michigan of the navigation established on the Illinois River below La Salle, and to determine to what extent, if at all, it will utilize for navigation the great channel now being cut by local authorities in the rock divide separating Lake Michigan from the Mississippi Valley. The question is at hand and must be determined at some date not far in the future, whether the national highway will utilize this cut and Chicago River as part of this communication, or the Calumet River route in connection with this local channel, or otherwise. There are no other practicable routes.

* * * * * *

"It seems, therefore, that before making appropriations for the improvement of Chicago River, the question of the future uses of this stream should be settled, whether it shall continue to be as now simply a long slip or succession of private slips, docks and wharves, utilized, indeed, for interstate and foreign commerce, but mainly for private and corporate gain, and for the main sewer of a great urban community, or whether it shall constitute a connecting link under Federal control between the navigation of the Great Lakes and that of the Mississippi River and tributaries.

"This opinion is given as required by the law of July 13, 1892, but for the information of Congress the following is respectfully submitted:

"To reasonably accommodate existing commerce without extensive changes in the Chicago River and without reference to future developments, the following work would be in the interest of commerce and navigation:

"First: That the Chicago River from its mouth to the stock yards on the south branch and to Belmont avenue on the north branch as far as may be permitted by existing docks and wharves be dredged to admit passage by vessels drawing 16 feet of water.

"Second: All encroachments on the stream by docks within the original meandered lines of the streams obstructive to navigation, as it exists today, should be removed at the expense of the encroaching parties, and obstructive bridges be required altered or changed.

"To admit the passage of the largest lake vessels drawing not exceeding 16 feet of water at load draft, with no changes in the dock lines beyond the obstructive abutments of bridges and projecting obstructive angles of docks, will require 1,200,000 cubic yards of dredging, approximately, and 8,000 linear feet of docking, at an expense of about $700,000, first cost, with an annual charge for dredging of from $80,000 to $120,000 to maintain the channel.

"The cost of maintenance, for reasons stated above, should evidently be borne by the city of Chicago as long as sewage is emptied into the river, and the United States should be released from all damages to property by reason of the improvement in Chicago River, as required on the Calumet River.

"Should a discharge of 250,000 cubic feet per minute be required through the south branch and main river, wholesale modification of bridges, tunnels and docks, and a widening of the river at many points will be required, and deepening to at least 18 feet of water below Chicago city datum with a slope necessary for this discharge, will be required at an estimated cost of $6,000,000, primarily, not including consequential damages, and an annual expenditure for maintenance of from $60,000 to $75,000." (House Ex. Doc. 1, Part 2, 53d Cong., 2d Sess., 1893-94, vol. 6, pp. 2796-2801.)

By the Act of August 18, 1894 (28 Stat. 344), Congress appropriated $25,000 for the improvement of the Chicago River up to its forks. On August 16, 1895, a board of three engineers, which had been appointed by the Secretary of War, reported to him concerning the effect of a diversion of 10,000 c. f. s. through the Sanitary and Ship Canal. This report stated that the contemplated diversion would lower the levels of the Great Lakes (except Lake Superior) but the amount of such lowering could be determined only by actual measurements.

By Act of June 3, 1896 (29 Stat. 228), Congress made appropriation for the improvement of the Chicago River, which was to be dredged to admit passage by vessels drawing 16 feet of water, according to the recommendation of Captain Marshall.

(*d*) *Permit of July 3, 1896.*—The first application by the Sanitary District of Chicago for a permit of the Secretary of War to authorize the enlargement of the cross-section of the Chicago River was made on June 16, 1896. In this application it was said that the work of the Sanitary District had progressed so far "that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey St., Chicago to Lockport in Will County, twenty-eight miles distant." A map was submitted, showing the plans for widening and deepening the river at the points indicated. It was desired "to so correct and regularize the cross-section of the river as to secure a flowage capacity of 300,000 cubic feet per minute, with a velocity of one and one-quarter miles per hour."

The Secretary of War granted a permit on July 3, 1896, in a communication to the president of the Sanitary District, as follows:

> "I have the honor to acknowledge the receipt of your letter of 16th ultimo, requesting permission to make certain changes in the capacity of the channel of the Chicago River, for drainage purposes, at points indicated on the map accompanying the application, and in reply beg to say that upon investigation it is found that the permission requested can be granted upon the following conditions:
>
> "1. That while the general plan is approved, the Sanitary District of Chicago, must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass, and each new dock or wharf, proposed to be built, in order that the Secretary of War may act intelligently in each case.
>
> "2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of

> Chicago to introduce a current into Chicago river. This latter proposition must be hereafter submitted for consideration.
>
> "3. That it will not cover obstructions to navigation, by reason of this work while in progress, or when completed.
>
> "4. That the United States shall not be put to expense by reason of this work.
>
> "5. That this authority will expire by limitation in two years from date unless extended."

Other permits relating to the same subject were issued by the Secretary of War, November 16, 1897, for the construction of by-passes and docks; November 30, 1898, for a cofferdam; January 13, 1899, for a new bridge; May 12, 1899, for a cofferdam.

(*e*) The Act of Congress of June 3, 1896 (29 Stat. 236), had required the Secretary of War to cause a preliminary examination to be made of the upper Illinois River and lower Des Plaines River with a view to the extension of navigation from the Illinois River to Lake Michigan, at or near Chicago. In response, Captain Marshall made a report on January 27, 1897, transmitted to Congress on March 3, 1897 (House Doc. No. 333, 54th Cong., 2d Sess.), referring to the fact that the Sanitary District had nearly completed a canal for drainage purposes, from the Chicago River to Lockport, which could be made available as part of any enlarged waterway over the route in question, and was "of much greater dimensions than required by any commercial canal adapted for the conditions and requirements of present or prospective traffic by water between Lake Michigan and the region along the watercourses of the Mississippi Valley." Reference was also made to the Illinois statute, as to the amount of discharge "which at present requires more than 300,000 cubic feet" (per minute) "and in a few years will require the full 600,000 cubic feet" (per minute) "discharge through the canal." It was noted, as to the situation then existing, that the deep channel abruptly terminated at Lockport, where it was proposed "to discharge the water through controlling gates into a non-navigable tail-race, down the slope to and through the city of Joliet, into the lower Des Plaines and Illinois Rivers."

By Acts of June 4, 1897, and July 1, 1898, Congress made further appropriations for the improvement of the Chicago River (30 Stat. 47; 632).

The Act of March 3, 1899 (30 Stat. 1146) directed the Secretary of War to appoint a board of three engineers, to make a survey and estimate of cost for the improvement of the upper Illinois River and lower Des Plaines River, with a view to the extension of navigation from the Illinois River to Lake Michigan, at or near Chicago, the estimate to be for a channel seven feet deep, and also for a channel eight feet deep, throughout the proposed route; and the survey and estimates were to be made according to the recommendations of Captain Marshall's report of January 27, 1897.

By the same Act (30 Stat. 1156), Congress directed the Secretary of War to cause a survey and estimate of cost to be made for deepening the Chicago River, as follows:

> "Improving Chicago River, in Illinois: Survey and estimate of cost for a channel twenty-one feet deep from its mouth to the stock yards on the South Branch, and to Belmont avenue, on the North Branch, so far as may be permitted by existing docks and wharves, exclusive of cost of removing or constructing bridges or piers or lowering tunnels; and the aforesaid depth of twenty-one feet is hereby adopted as the project depth for the improvement in lieu of that fixed by the Act of June third, eighteen hundred and ninety-six: *Provided,* That all the work of removing and reconstructing bridges and piers and lowering tunnels necessary to permit a practicable channel with said depth to be obtained shall be done, or caused to be done, by the city of Chicago without expense to the United States."

(*f*) The Act of March 3, 1899, also amplified the provisions of the earlier acts as to obstructions to navigation and alteration of navigable capacity, by enacting sections 9 and 10 (30 Stat. 1151, U S. C., Tit. 33, Secs. 401, 403), as follows:

> "Sec. 9.—That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War: *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further,* That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.
>
> "Sec. 10.—That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build, or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans

recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

(*g*) *Permit of May 8, 1899.*—In view of the completion of the main drainage canal, the Sanitary District applied to the Secretary of War for permission to divert the waters of the Chicago River and cause them to flow into the canal, and a permit was issued by the Secretary of War on May 8, 1899, as follows:

"Whereas, by section 10 of an act of Congress, approved March 3, 1899, entitled 'An act making appropriations for the construction, repair, and preservation of certain public works on the rivers and harbors, and for other purposes', it is provided that it shall not be lawful to alter or modify the course, location, condition, or capacity of the channel of any navigable water of the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same; and

"Whereas the Sanitary District of Chicago, a municipal corporation organized under the laws of the State of Illinois, has constructed an artificial channel from Robey Street, Chicago, to Lockport, and has heretofore been granted permission by the Secretary of War to make certain improvements in the Chicago River for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of 1¼ miles an hour, it being intended to connect the said artificial channel with the West Fork of the South

Branch of Chicago River at Robey Street in the city of Chicago; and

"Whereas the said Sanitary District of Chicago has now applied to the Secretary of War for permission to divert the waters of the said Chicago River and cause them to flow into the said artificial channel at Robey Street, as aforesaid; and

"Whereas the said Sanitary District of Chicago represents that such movable dams and sluice gates as are necessary to at all times secure absolute and complete control of the volume and velocity of flow through the Chicago River have been constructed:

"Now, therefore, the Chief of Engineers having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said Sanitary District of Chicago to open the channel constructed and cause the waters of Chicago River to flow into the same, subject to the following conditions:

"1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"2. That if, at any time, it become apparent that the current created by such drainage works in the South and main branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"3. That the Sanitary District of Chicago must assume all responsibility for damage to property and navigation interests by reason of the introduction of a current in Chicago River."

(*h*) *Permits of July 11, 1900.*—In April, 1900, plans were adopted by the board of trustees of the Sanitary District for the deepening and widening of the channels of the Chicago River; and application for permission to do so with respect to a part of the river was made to the Secretary of War on April 26, 1900. On June 7, 1900, a similar application was made with respect to another part of the river. The Secretary of War on July 11, 1900, granted two permits accordingly, with conditions identical with those of the permit of May 8, 1899. These permits contained this statement:

> "I beg to inform you that there is no objection on the part of the War Department to the prosecution of work of improvement of Chicago River specified in the above-mentioned letter and delineated on the maps which accompanied the same, it being understood that this statement as to the attitude of the War Department shall not be understood as involving the general government in any way with the expense incident to the carrying out of the project, and does not in any way invalidate, waive or affect the right of the Secretary of War to regulate or revoke the permit granted under date of May 8, 1899, to the Sanitary District of Chicago, to divert the waters of the Chicago River and cause them to flow into the artificial channel, such permission being subject to the following conditions" —the conditions of the former permit already quoted.

(*i*) The Board of Engineers appointed under the Act of Congress of March 3, 1899, made a preliminary report on March 17, 1900, and a final report on November 17, 1900 (House Doc. No. 112, 56th Cong., 2nd sess.). This final report, among other things, stated (*id.* p. 3):

> "The Board finds the most economic route for waterways of 7 feet and 8 feet depth to be from Utica to Marseilles in the bed of the river, 11.4 miles; thence around the Marseilles rapids by canal, 7.4 miles; thence in the bed of the river to near the mouth of Kankakee River, 21.2 miles; thence by enlarging the Illinois and Michigan Canal to the Joliet Basin, 18.3 miles; thence

> by canal through Joliet Basin and along the east bank of the Des Plaines River, 4½ miles, connecting with the Sanitary Canal at Lockport, and thence through the Sanitary Canal and the Chicago River to Lake Michigan, thus complying with the terms of the act of March 3, 1899."

The Act of June 6, 1900 (31 Stat. 580) had authorized the same Board of Engineers to report the estimates of costs for channels 10 feet, 12 feet, and 14 feet deep, respectively, through the proposed route from Illinois River to Lake Michigan and directed that "the said estimates cover and include a proper connection at Lockport with the sanitary and ship canal which has been constructed by the sanitary district of Chicago." The report of the Board, under date of November 18, 1900, transmitted to Congress December 18, 1900 (House Doc. No. 220, 56th Cong., 2nd sess.), referred (*id.* p. 5) to the drainage canal as of "sufficient depth and width for any possible requirement of navigation", and pointed out that "from the west end of this canal the waters of Lake Michigan, in a steady flow amounting to from 5,000 to 10,000 cubic feet per second, are discharged into the bed of the Des Plaines River, and are carried thence down through the Illinois to the Mississippi."

(*j*) *Permits of April 9, 1901 and July 23, 1901.*—While the application for the permits of 1900 were under consideration by the Secretary of War, the Lake Carriers' Association requested (May 16, 1900) action by the Secretary of War modifying the amount of discharge through the drainage canal, in order to avoid excessive current in the Chicago River; but the Chief of Engineers advised against the modification. On April 9, 1901, the Secretary of War, heeding the protests of commercial and navigation interests, directed the Sanitary District to regulate the discharge so that the maximum flow through the Chicago River and its South Branch should not exceed 200,000 cubic feet per minute. This was followed, on July 15, 1901, by a request from the Sanitary District for an increased flow, stating that the result of an observance of the restriction of the order of April 9, 1901, was "that the water in the Main Drainage Channel has become greatly polluted and very offensive both to sight and smell, and is working such hardship upon the valley communities as to evoke frequent protest from various cities and municipalities along the Des Plaines and Illinois Valleys." Thereupon, the Secretary of War made an order, on July 23, 1901, amending the former order so as to permit an increase in the flow into the canal to 300,000 cubic feet per minute between 4 p. m. and 12 midnight daily; it being the opinion of the Chief of Engineers that the request of the Sanitary District should be granted, subject to revocation in case the increase was found to be dangerous to navigation.

(*k*) *Permit of December 5, 1901.*—On a further application by the Sanitary District, the Secretary of War, on December 5, 1901, allowed a diversion of 250,000 cubic feet per minute during the entire day. This permit, omitting the recitals, was as follows:

> "Now, therefore, this is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto said Sanitary District of Chicago permission to regulate said discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, upon the following conditions:
>
> "1. That this permission shall be in lieu of the present authorized rates of flow as stated above.
>
> "2. That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.
>
> "3. That said Sanitary District of Chicago shall be responsible for all the damage inflicted upon navigation interests by reason of the increase in flow herein authorized."

(*l*) On January 17, 1902, the Secretary of War approved plans for the improvement of the Chicago River, reserving full liberty of action as provided in the conditions of the permit of May 8, 1899. By the Act of June 13, 1902 (32 Stat. 363, 364), Congress appropriated about $300,000, for continuing the improvement of the Chicago River, and an additional $200,000 for a survey to determine the feasibility of, and to prepare and report plans and estimates of cost, for a navigable waterway 14 feet in depth, from Lockport, Illinois, by way of the Des Plaines and Illinois Rivers, to the mouth of said Illinois River and thence by way of the Mississippi River to St. Louis.

(*m*) *Permit of January 17, 1903.*—Another permit (subject, like the earlier permits, to modification) was issued by the Secretary of War on January 17, 1903, allowing a diversion of 350,000 cubic feet per minute until March 31, 1903, during the closed season of navigation, in order to carry off the accumulations of sewage deposit lining the shores along the city, with the provision that, after said date, the flow should be reduced to 250,000 cubic feet per minute, as required by the permit of December 5, 1901.

(*n*) Congress, by Joint Resolution of April 21, 1904 (33 Stat. 589), authorized the Secretary of War, with the concurrence of the Chief of Engineers, to permit the Sanitory District, at its expense, to lower the height of the Government dams in the Illinois River at Kampsville and Lagrange, Illinois, in accordance with such plans as he might prescribe and subject to such conditions as he might deem necessary to protect the interests of the United States.

(*o*) The report of the Board of Engineers required by the Act of June 13, 1902 (32 Stat. 364), was transmitted to Congress on December 18, 1905. (House Doc. 263, 59th Cong., 1st sess.) The Board gave the results of its surveys and examinations, with respect to the feasibility and cost of a waterway, as described, from Lockport to Grafton.

With respect to the Chicago drainage canal, the Board said (*id.*, pp. 10, 11):

> "The Chicago Drainage Canal was then constructed, and was brought into use in January, 1900. It has not yet been completed to its full capacity as designed. When fully completed, it will have a capacity of about 10,000 cubic feet per second, flowing at a low velocity. As now constructed, it has a depth of about 22 feet and a bottom width in different parts 110 feet, 160 feet, and 202 feet, respectively. It constitutes a navigable channel, able to accommodate the largest vessels now navigating the Great Lakes. This extends from the Chicago River to Lockport, where it discharges into the Des Plaines River * * * At present, it has no navigable connection with the streams below, but under State legislation a connection is to be made. It creates an important water power. Although the primary object of the Chicago drainage canal was the discharge of Chicago sewage, its function as a channel for navigation was kept in view from the beginning. All of the bridges over it are draw bridges, with ample openings.

* * * * * *

> "The taking of large quantities of water from Lake Michigan for drainage purposes has not been authorized by Congress. It has been the policy of the War Department thus far to regulate the quantity of water which is admitted to the canal by the necessities of navigation in the Chicago River. The capacity of that stream at present is such that not more than about 4,200 cubic feet per second can pass without creating velocities which will unreasonably obstruct navigation. The quantity of water admitted to the canal is, for the present, limited to that amount, or, as expressed in the permit of the Secretary of War, to 250,000 cubic feet per minute. This is less than is required by the State law. It will no doubt be increased as the obstructions in the Chicago River are removed, and its discharging capacity increased, a work upon which the Sanitary District is now engaged. In preparing its estimates

> the Board has assumed that the full discharge of 10,000 cubic feet per second contemplated in the plans of the Sanitary District will eventually be permitted by the Secretary of War."

The Board also stated (*id.*, p. 11), that "the effect upon the level of Lake Michigan of withdrawing 10,000 cubic feet per second for an indefinite period has been the subject of elaborate investigation under the office of the Lake Survey at Detroit, and the conclusion reached is that the final effect will be to lower the level about six inches."

(*p*) *Reports of International Waterways Commission and Niagara Falls Act.*—On March 15, 1906, Congress, by Joint Resolution (34 Stat. 824), directed the members representing the United States upon the International Waterways Commission, created pursuant to Act of Congress of June 13, 1902 (32 Stat. 373), to report to Congress what action, in their judgment, was necessary and desirable to prevent the further depletion of water flowing over Niagara Falls. The commission had been formed with three members from the United States and three from Canada. In the report of the United States members, made on March 19, 1906, it was recommended, as a step in the direction of obtaining mutual agreement between the two countries, that legislation be enacted containing, among others, the provision that the Secretary of War be authorized to grant permits for the diversion of 28,500 cubic feet per second, and no more, from the waters naturally tributary to Niagara Falls, distributed as follows:

	Cubic feet
"Niagara Falls Hydraulic Power & Manufacturing Co.	9,500
"Niagara Falls Power Company.........	8,600
"Erie Canal, or its tenants, (in addition to lock service)	400
"Chicago drainage canal	10,000".

In a report to their Government on April 25, 1906, the Canadian members of this Commission recommended that a treaty should be negotiated between the United States and Great Britain, and with respect to the diversions from the Niagara River, the Commission was of opinion that not more than 36,000 c. f. s. should be allowed on the Canadian side and on the American side to the extent of 18,500 c. f. s., exclusive of the amount required for domestic uses; and it was said that, while this would give an apparent advantage to Canadian interests, it was "more than counterbalanced by the complete diversion of 10,000 cubic feet by way of the Chicago Drainage Canal to the Mississippi River." The report stated that the Chicago diversion should be limited to that amount.

The Joint Commission, by its report of May 3, 1906, made the following recommendations to the two Governments:

> "3. The Commission, therefore, recommend that such diversions, exclusive of water required for domestic use or the service of locks in navigation canals, be limited on the Canadian side to 36,000 cubic feet per second, and on the United States side to 18,500 cubic feet per second, (and in addition thereto, a diversion for sanitary purposes not to exceed 10,000 cubic feet per second, be authorized for the Chicago drainage canal), and that a treaty or legislation be had limiting these diversions to the quantities mentioned."

Congress, on June 29, 1906, passed the Niagara Falls Act (34 Stat. 626), providing, in section 1, as follows:

> "That the diversion of water from Niagara River or its tributaries, in the State of New York, is hereby prohibited, except with the consent of the Secretary of War as hereinafter authorized in section two of this act: *Provided*, That this prohibition shall not be interpreted as forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of

> which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States under its direction."

Section 2 of this Act authorized the Secretary of War to grant permits for power purposes, within certain limitations. By Section 4, the President was requested to open negotiations with Great Britain for the purpose of effectually providing by suitable treaty, for such regulation and control of the waters of Niagara River and its tributaries as should preserve the scenic grandeur of Niagara Falls and of the rapids. In view of the last-mentioned provision, an amendment of the bill, proposed by Senator Hopkins of Illinois, had been adopted in the Senate as follows (Cong. Rec., Vol. 40, Pt. 10, 59th Cong., 1st sess., pp. 9097, 9098):

> "*Provided, however,* That nothing contained herein shall be construed to hold or concede that the waters of Lake Michigan shall be or are subject of international agreement."

The House of Representatives refused to concur in this amendment, as it might embarrass the President in conducting negotiations. The conference committee receded from the amendment. Senator Lodge, on reporting to the Senate the action of the conference committee and replying to Senator Hopkins, said:

> "Mr. LODGE. Mr. President, I had supposed that the Senator from Illinois (Mr. HOPKINS) realises that the report of this bill in its present condition would not in any way endanger the rights of Chicago to have water from the lake. Certainly I should have adhered to the amendment if I had thought that the drainage canal of Chicago would have been in any way endangered by the Commission. The House would not accept this amendment. It is attached to a clause which requests the President to enter upon negotiations. It, of course, is merely advisory. * * * The result of putting

> on this clause beforehand would have been to have made any negotiations impossible. No country would enter into negotiations with a limitation on the other side like that.
>
> "The first section of the bill protects the rights of Chicago. No treaty would be made by our Commissioners which would impair or infringe those rights.
>
> * * * * * *
>
> "Every right is safeguarded. The conferees were as anxious as the Senator from Illinois could possibly be to protect the drainage canal at Chicago, but they did not feel warranted in allowing the whole legislation for such an important object to fail."

On January 4, 1907, the International Waterways Commission made a special report upon the Chicago Drainage Canal. This gave a full description of the canal. It concluded with the following recommendation:

> "A careful consideration of all the circumstances leads us to the conclusion that the diversion of 10,000 cubic feet per second through the Chicago River will, with proper treatment of the sewage from areas now sparsely occupied, provide for all the population which will ever be tributary to that river, and that the amount named will therefore suffice for the sanitary purposes of the city for all time. Incidentally, it will provide for the largest navigable waterway from Lake Michigan to the Mississippi River which has been considered by Congress.
>
> "We therefore recommend that the Government of the United States prohibit the diversion of more than 10,000 cubic feet per second for the Chicago Drainage Canal."

(*q*) *Application for Calumet Sag Channel denied March 14, 1907.*—The rock section of the drainage canal was designed for a maximum capacity of 10,000 c. f. s.; but its actual capacity was found to be 14,000 c. f. s. A plan was developed to build the Calumet Sag Channel to the Little

Calumet River, with a maximum capacity of 4,000 c. f. s., which would keep that river and the main Calumet River reversed practically at all times. Application was made by the Sanitary District for a permit to accomplish this purpose. On this application, the Chief of Engineers reported unfavorably, under date of February 23, 1907, as follows:

> "3. In my opinion, this abstraction will undoubtedly lower the levels of all the waters of the Great Lakes, except those of Lake Superior, and thus diminish the navigable capacity and depth of the various channels and harbors which have been deepened and improved under authority of Congress.
>
> "4. Leaving out Lake Superior, there are more than 100 works of river and harbor improvement on the Great Lakes and their connecting waters, for which appropriations aggregating more than 80 millions of dollars have been made. The application of this vast sum has resulted in securing and maintaining specified depths and widths of channel, which Congress has decided to be required for the accommodation of the traffic using these waters.
>
> "5. To diminish these depths, even to a slight extent, would not only prove a serious injury to the traffic, but would practically undo the work which has been accomplished by Congressional direction and necessitate the expenditure of further large sums of money for restoration. Any project that tends, in a measure, to annul or reverse the orders of Congress, as expressed in the various river and harbor acts appropriating funds for improving the harbors and channels connecting with the Great Lakes, should meet the disfavor of the Department, unless it has been sanctioned by that body. In my judgment, such a project is the one under consideration, and for this reason I am unable to recommend favorable action thereon, assuming that the Department is empowered to take such action, as is held by the Judge Advocate General."

On March 14, 1907, the Secretary of War accordingly denied the application of the Sanitary District. Referring to the fact that the application was made under section 10 of the Act of March 3, 1899 (30 Stat. 1151), the Secretary of War stated that the Chief of Engineers was at first of opinion that such a change in the flow of the Calumet River was not within the power of the Chief of Engineers to recommend, or within the power of the Secretary of War to permit. The Judge Advocate General, however, to whom the question was submitted, held that section 10 applied to the case, and that it was one in which the work could be allowed under the recommendation of the Chief of Engineers and the permission of the Secretary of War. Upon this construction of the statute, the Secretary of War requested the Chief of Engineers to make his recommendation. After quoting the adverse decision of the Chief of Engineers, the Secretary concluded as follows:

> "It is quite evident from the reading of the statute, that Congress intended in this statute, as in many others, to give the Chief of Engineers authority, independent of the Secretary of War, in reaching a conclusion as to the wisdom and propriety of granting a permit under the section, and that unless the Chief of Engineers shall recommend the granting of the permit, the Secretary of War is without power to give the requisite authority. It follows, therefore, that the application must be denied, whatever my view of the case.
>
> "The decision of the Chief of Engineers and its final character has made it unnecessary for me to consider the merits of the question, but I may say this much, that the application for the change in the Calumet River is to be made the basis for the withdrawal of a large amount of water from Lake Michigan and that all interested in the enormous lake traffic view the settlement of the question with grave apprehension. Added to this, is the international complication which is likely to arise in the threatened lowering of the lake level in the ports and harbors and canals of Canada. On the other hand, it is maintained with great emphasis and elaboration of detail that the

change in the Calumet River is essential to the healthful sanitation of Chicago, and that the threatened injury to navigation is so small as to be negligible. Between two such great interests, the decision must be affected more or less by large public policy and expediency, and while I agree in the construction of the Judge Advocate General that the issue is left by statute to the recommendation of the Chief of Engineers and the concurrent decision of the Secretary of War, it may be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States.''

(*r*) *Permit of September 11, 1907.*—A permit for the construction of the drainage channel known as the North Shore channel, from Lake Michigan at Wilmette to the North Branch of the Chicago River, was granted on September 11, 1907, by a communication from the Acting Secretary of War to the Sanitary District, as follows:

> ''Referring to your letter of 2d instant, in which you request approval of proposed drainage channel to connect Lake Michigan at Wilmette, Ill., with the North Branch of the Chicago River; also permission to construct a pile crib in Lake Michigan at mouth of same, and to deposit filling within the limits of such crib, I beg to inform you that the War Department will interpose no objection to the project as set forth in your letter and indicated on drawing submitted, provided the following conditions are complied with:
>
> ''1. That the pier construction, the filling behind the same, and the excavation of the proposed channel shall be done subject to the supervision and approval of the local officer of the Corps of Engineers, United States Army, at Chicago, so far as to see that the work authorized is not exceeded;
>
> ''2. That the total diversion of water from Lake Michigan through the Chicago River into the Illinois River shall be no greater than already authorized by past War Department permits;

"3. That the work shall be commenced before December 31, 1908, and completed within five years thereafter."

(*s*) *Suit by United States, 1908.*—As the Sanitary District apparently intended to proceed with the construction of the Calumet Sag Channel, the United States brought suit in 1908, in the Federal Circuit Court for the Northern District of Illinois, Eastern Division, to prevent the construction of such a canal and the diversion of any water in addition to that already permitted through the Chicago River, save upon the recommendation of the Chief of Engineers and the permission of the Secretary of War.

(*t*) *Canadian Boundary Waters Treaty.*—In 1909, the Canadian boundary waters treaty was signed, and was approved by the Senate. Ratifications were exchanged on May 5, 1910 (36 Stat. 2448). One of the main objects of this treaty was recited to be the prevention of "disputes regarding the use of boundary waters." A preliminary article defined "boundary waters" as follows:

> "Preliminary Article.
>
> "For the purposes of this treaty boundary waters are defined as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers, and waterways, or waters flowing from such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary."

After this definition, there were the following provisions:

> "Article I. The High Contracting Parties agree that the navigation of all navigable boundary waters shall forever continue free and open for the purposes of

commerce to the inhabitants and to the ships, vessels, and boats of both countries equally, subject, however, to any laws and regulations of either country, within its own territory, not inconsistent with such privilege of free navigation and applying equally and without discrimination to the inhabitants, ships, vessels, and boats of both countries.

"It is further agreed that so long as this treaty shall remain in force, this same right of navigation shall extend to the waters of Lake Michigan and to all canals connecting boundary waters, and now existing or which may hereafter be constructed on either side of the line. Either of the High Contracting Parties may adopt rules and regulations governing the use of such canals within its own territory and may charge tolls for the use thereof, but all such rules and regulations and all tolls charged shall apply alike to the subjects or citizens of the High Contracting Parties and the ships, vessels, and boats of both of the High Contracting Parties, and they shall be placed on terms of equality in the use thereof.

"Article II. Each of the High Contracting Parties reserves to itself or to the several State Governments on the one side and the Dominion or Provincial Governments on the other as the case may be, subject to any treaty provisions now existing with respect thereto, the exclusive jurisdiction and control over the use and diversion, whether temporary or permanent, of all waters on its own side of the line which in their natural channels would flow across the boundary or into boundary waters; but it is agreed that any interference with or diversion from their natural channel of such waters on either side of the boundary, resulting in any injury on the other side of the boundary, shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion or interference occurs; but this provision shall not apply to cases already existing or to cases expressly covered by special agreement between the parties hereto.

"It is understood, however, that neither of the High Contracting Parties intends by the foregoing provision to surrender any right, which it may have, to object to any intereference with or diversions of waters on the other side of the boundary the effect of which would be productive of material injury to the navigation interests on its own side of the boundary.

"Article III. It as agreed that, in addition to the uses, obstructions, and diversions heretofore permitted or hereafter provided for by special agreement between the Parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdictions and with the approval, as hereinafter provided, of a joint commission, to be known as the International Joint Commission.

"The foregoing provisions are not intended to limit or interfere with the existing rights of the Government of the United States on the one side and the Government of the Dominion of Canada on the other, to undertake and carry on governmental works in boundary waters for the deepening of channels, the construction of breakwaters, the improvement of harbors, and other governmental works for the benefit of commerce and navigation, provided that such works are wholly on its own side of the line and do not materially affect the level or flow of the boundary waters on the other, nor are such provisions intended to interfere with the ordinary use of such waters for domestic and sanitary purposes.

"Article IV. The High Contracting Parties agree that, except in cases provided for by special agreement between them, they will not permit the construction or maintenance on their respective sides of the boundary of any remedial or protective works or any dams or other obstructions in waters flowing from boundary waters or in waters at a lower level than the boundary

> in rivers flowing across the boundary, the effect of which is to raise the natural level of waters on the other side of the boundary unless the construction or maintenance thereof is approved by the aforesaid International Joint Commission.
>
> "It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other."

The treaty provided that the United States might authorize the diversion within the State of New York of waters of the Niagara River above the Falls, for power purposes, not exceeding in the aggregate a daily diversion at the rate of 20,000 c. f. s., and that the United Kingdom, by the Dominion of Canada, or the Province of Ontario, might authorize a diversion of said waters, for power purposes, not exceeding a daily diversion at the rate of 36,000 c. f. s. (Art. V).

The International Joint Commission, under the treaty, is composed of six members, three appointed by each Government (Art. VII). It has jurisdiction over and passes upon all cases involving the use or obstruction or diversion of the waters with respect to which under Articles III and IV of the treaty the approval of the Commission is required. The Commission is to be governed by certain declared principles. Each of the High Contracting Parties, on its own side of the boundary, is to have "equal and similar rights in the use of the waters hereinbefore defined as boundary waters." With reference to the use of boundary waters, it was provided that the following order of precedence should be observed among the various uses enumerated in the treaty for these waters, to-wit: (1) uses for domestic and sanitary purposes; (2) uses for navigation, including the service of canals for the purposes of navigation; (3) uses for power and for irrigation purposes. These provisions were not to "apply to or disturb any existing uses of boundary waters on either side of the boundary" (Art. VIII).

It was agreed that any other questions or matters of difference arising between the High Contracting Parties involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along the common frontier between the United States and the Dominion of Canada, should be referred from time to time to the International Joint Commission for examination and report, upon the request of either Government. In such cases the International Joint Commission was authorized to examine into and report upon the facts, with such conclusions and recommendations as might be appropriate, subject to the restrictions or exceptions which might be imposed by the terms of the reference. But such reports should not be regarded as decisions either on the facts or the law and should not have the character of an arbitral award (Art. IX). And it was further agreed that any questions or matters of difference arising between the High Contracting Parties involving rights, obligations, or interests of the United States or of the Dominion of Canada either in relation to each other or to their respective inhabitants, might be referred for decision to the International Joint Commission on the consent of both parties (Art. X).

The statement of the Secretary of State (Elihu Root) before the Foreign Relations Committee of the Senate when this treaty was under consideration shows that it was not intended to cover Lake Michigan as a boundary water or to affect the diversion through the drainage canal at Chicago. Among other things, Secretary Root said to the committee:

> "The treaty starts with defining the boundary waters as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural

channels would flow into such lakes, rivers, and waterways or waters flowing from such lakes, rivers, and waterways.

"I have very carefully guarded the terms of this treaty in order not to include Lake Michigan and in order not to involve Senator Cullom's constituents in the drainage canal in the treaty in any way.

"Then the treaty provides for what is now and what has been for our entire existence as a nation the free navigation by both countries of the boundary waters, with the provision that the same right of navigation shall extend to the waters of Lake Michigan, providing that so long as the present treaty remains in force the same right of navigation shall extend to the waters of Lake Michigan and to all canals connecting boundary waters and that the same rules and regulations and the same tolls shall apply to both the high contracting parties.

* * * * * *

"The great bulk of the water goes on the Canadian side, and the Waterways Commission that was appointed some time ago to deal with the question of the lake levels reports, I think, that 36,000 feet can be taken out on the Canadian side and 18,500 on the American side, without injury to the Falls. I thought it wise to follow the report of the Commission and I put in 1500 feet in addition to get round numbers, so our limit is higher than we want but their limit could not be cut down below what it is because there are three companies on the Canadian side who have the right and works there. * * * Then there is this further fact why we could not object to this 36,000 provision on the Canadian side. We are now taking 10,000 cubic feet a second out of Lake Michigan at Chicago, and I refused to permit them to say anything in the treaty about it.

* * * * * *

"The definition of boundary waters was carefully drawn in order to exclude Lake Michigan. * * *

"* * * In the third place" (referring to the reasons for allowing the United States to divert but

20,000 c. f. s., while Canada was allowed 36,000 c. f. s.) "they consented to leave out of this treaty any reference to the drainage canal, and we are now taking 10,000 cubic feet per second for the drainage canal which really comes out of this lake system"

(*u*) The work of the Sanitary District in deepening, to 26 feet, and widening to 200 feet, the channels of the Chicago River, South Branch and West Fork of the South Branch, under permits of the Secretary of War, was practically completed about 1910. The South Fork of the South Branch was improved by the Federal Government to a depth of about 20 feet. The North Branch of the Chicago River, to the terminus of the North Shore Channel of the Sanitary District, was deepened to about 21 feet by the Federal Government. In the improvement of the South Branch and West Fork of the South Branch of the Chicago River, the Sanitary District removed about twelve center-pier bridges and replaced them with bascule bridges, and it also substituted bascule bridges for two centre-pier bridges in the Chicago River proper. The Federal Government deepened the Chicago River proper to about 21 feet. The Act of Congress of June 25, 1910 (36 Stat. 659, 660), appropriated $1,000,000 for the construction of a waterway from Lockport, Illinois, to the mouth of the Illinois River, and provided for the appointment by the Secretary of War of a board of five members to report on the feasibility and advisable dimensions of such waterway, and also upon such measures as might be required properly to preserve the levels of the Great Lakes and to compensate, so far as practicable, for the diminished level in these lakes and connecting waters by reason of any diversion of water from Lake Michigan. (The report of this Board, dated August 15, 1913, was transmitted to Congress on February 18, 1914. See Finding 17, *infra*, p. 125.)

(*v*) *Permit of June 30, 1910.*—The Sanitary District had changed its plans for the Calumet Sag Channel, so that the capacity of this channel was fixed at 2,000 c. f. s., and in 1910 an application was made to construct it, with the statement that the total amount to be taken from Lake Michigan through all the channels of the district was not to exceed 10,000 c. f. s. On June 30, 1910, the Acting Secretary of War gave a permit for the construction of this channel, but limited the entire withdrawal to 4,167 c. f. s. After reciting previous action, the permit stated:

> "So long as the water flow remains unchanged there seems to be no special objection to its extension to both rivers instead of confining it to a single one, especially since if the new (Calumet) route be developed later to a navigable state the double route will be advantageous to navigation interests. Accordingly, in view of the favorable recommendation of the Chief of Engineers and of the consent thereto by the Attorney-General, under the conditions hereinafter prescribed, the department hereby modifies the existing permission so as to allow the division of the already permitted water flow in such a manner as to reach the sanitary district canal by way of the Calumet River, and a connecting channel, as well as by way of its present route through the Chicago River, subject to all pertinent conditions of the existing permissions and to other express conditions, as follows:
>
> "(a) That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.
>
> "(b) That if at any time it becomes apparent that the current created by such drainage work in the Calumet as well as Chicago Rivers be unreasonably obstructive to navigation, or injurious to property, the Secretary of War reserves the right to close the discharge through said channels or rivers, or to modify it to such an extent as may be demanded by navigation and property interests along said rivers.

"(c) That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in the Calumet as well as Chicago Rivers.

"(d) That the amount of water withdrawn from Lake Michigan, through the Chicago and Calumet Rivers together, shall not exceed the amount of 250,000 cubic feet per minute (4,167 cubic feet per second) already authorized to be withdrawn through the Chicago River alone.

"(e) That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"(f) That this permission shall in no wise affect or in any manner be used in the friendly suit now pending in the Circuit Court of the United States for the Northern District of Illinois, brought by the United States of America against the Sanitary District of Chicago, to determine the right of the said sanitary district to divert from Lake Michigan for sanitary purposes an amount of water in excess of that now being diverted without having first obtained a permit from the Secretary of War.

"(g) That the War Department shall have free access at all times to the water-flow records of the Sanitary District of Chicago, and free access also to the regulating works and all other parts of its canals for the purpose of checking records or making water-flow measurements.

"(h) That the plans for the proposed work shall be submitted to and approved by the Chief of Engineers and the Secretary of War.

"(i) That the work shall be subject to the supervision and approval of the Engineer officer of the United States Army in charge of the locality."

(*w*) *Refusal, January 8, 1913, of permit for increased diversion.*—On February 5, 1912, the Sanitary District applied for permission to withdraw 10,000 c. f. s. from Lake

Michigan, through the Chicago and Calumet Rivers. The needs of the city of Chicago, with a population at that time of 2,500,000, were set forth. The War Department gave the questions presented the most serious consideration. The Chief of Engineers advised (February 28, 1912) that a diversion of less than 1,000 c. f. s. from Lake Michigan would supply any reasonable demands of navigation from Lake Michigan to the Mississippi River, and that any greater diversion was a greater injury than benefit to navigation; that the works of the Sanitary District were found to be large enough for a total diversion of 14,000 c. f. s.; that the amount requested, while perhaps needed at the time, would not be necessary later, after the full installation of the more modern improved methods of treating sewage; that a diversion of the waters of the Great Lakes from their natural outlet, so far as desired merely for aid to power development, was of doubtful legality; and that great care should be taken not to authorize a diversion beyond the amount actually necessary for sanitation alone. Summarizing his conclusions, the Chief of Engineers pointed out the importance of maintaining the levels of the Great Lakes, and that every cubic foot per second of water from Lake Michigan in excess of its natural outflow through Lake Huron and the St. Clair River was a permanent loss to the water flow of the St. Lawrence Basin, and tended to injure navigation over the entire waterway from Lake Michigan to the Gulf of St. Lawrence; that the dumping of sewage into rivers was becoming yearly more objectionable; that it was to be expected that the provisions made elsewhere against sewage contamination would be duplicated in Illinois, after which there would be no reason for continuing the diversion of large quantities of Lake Michigan water, except for local benefit, as such diversion would no longer be necessary for sanitation and was not required for navigation between Lake Michigan and the Mississippi; that from the standpoint of conservation of water-power, diversion from Lake Michigan into the Illinois River was an economic loss; further, that, on the assumption that the waterway to the Mississippi River should in the future provide for the passage of boats of over 20-foot draft, or any other greatest draft useful in the Great Lakes, such a navigation could be maintained with a diversion from Lake Michigan of less than one-fifth of that at present in progress, and less than one-fourteenth of that then desired by the State authorities. The later report of the district engineer at Chicago (March 11, 1912) expressed substantially the same views and stated, after raising the question of the authority of the Secretary of War, that the Sanitary District could not use 10,000 c. f. s. without creating a current in the Chicago River which would be injurious to navigation; that a diversion to that extent could only be used without injury to navigation after the Sag Channel and other works contemplated for the removal of sewage in the Calumet region, recently placed under construction, had been completed, which would not be for several years; that the current existing in the river was injurious to navigation, as shown by collisions between vessels and bridges and the difficulty of stemming the current; that the withrawal of water from Lake Michigan had undoubtedly resulted in a permanent lowering of the water surfaces of all the Great Lakes; and that the practical effect of withholding an increased allowance would be to force the Sanitary District and the city of Chicago to adopt another system of sewage disposal, or a combination of the present system with another system. It was further stated that the diversion, while beneficial, was not necessary for the improvement of navigation on the Illinois River or Lake Michigan.

On January 8, 1913, the Secretary of War rendered an elaborate opinion denying the application. In the course of this opinion the Secretary said:

> "In a word, every drop of water taken out at Chicago necessarily tends to nullify costly improvements made under direct authority of Congress throughout the Great Lakes, and a withdrawal of the amount now ap-

plied for would nullify such expenditures to the amount of many millions of dollars, as well as inflict an even greater loss upon the navigation interests using such waters.

"On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. There is involved in this case no issue of conflicting claims of navigation. The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a deep waterway from the Great Lakes to the Mississippi over the route of the Sanitary Canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over 1,000 feet per second, or less than a quarter of the amount already being used for sanitary purposes in the Canal. This estimate is confirmed by the report of the Special Board of Engineers on the deep waterway from Lockport, Illinois, to the mouth of the Illinois River, dated January 23, 1911. It is also confirmed by the practical experience of the great Manchester Ship Canal in England. From the standpoint of navigation alone in such a waterway, too great a diversion of water would be a distinct injury rather than a benefit. It would increase the velocity of the current and increase the danger of overflow and damage to adjacent lands.

"We have therefore presented in this case claims of entirely different characters and jurisdictions—the claim of sanitation on the one side and of navigation on the other; the vital interest of a single community on the one side and the broad interest of the commerce of the Nation on the other. The discretion given to the Secretary of War under Sections 9 and 10 of the Act of 1899 is very broad, but I have very grave doubts as to whether it was intended to authorize him to grant a permit which would inflict a substantial injury upon commerce in order to benefit sanitation. The entire purpose and scope of that legislation was to make him the guardian of the commercial interests of the Nation represented in their waterways. And while he sometimes under that statute must decide that the interests of one class of transportation are less important and must yield to the conflicting interests of another class, I have considerable doubt whether it was intended to give him authority to sacrifice substantial interests of navigation to entirely different claims over which he normally has no jurisdiction whatever.

"But however that may be, and without resting my decision upon the question of my legal authority, I am quite clear as a matter of discretion that under the facts presented by this case no further diversion of water should be permitted at Chicago without the direct sanction of the Congress of the United States.

* * * * * *

"It is therefore quite conceivable that compliance with their sanitary needs according to this method of sanitation may eventually materially change this great natural water-course now existing through the Lakes. The weighing of the sanitation and possibly the health of one locality over against the commerce of the rest of the Nation, and the consideration of our relations and obligations to Canada in respect to a great international waterway, are not matters of mere technical or scientific deduction. They are broad questions of national policy. They are quite different in character, for example, from the question of fixing the proper location of a pierhead line or the height or width of a drawbridge over a navigable stream—fair samples of the class of questions which come to the Secretary of War for decision under the above-mentioned Act of 1899. While the researches and opinions of experts in the respective fields are necessary and useful as an assistance towards reaching a fair and proper policy, the final determination of that policy should belong, not to an administrative officer, but rather to those bodies to whom we are accustomed to entrust the making of our laws and treaties.

* * * * * *

"I have carefully examined, however, the evidence which both sides have introduced bearing upon the sanitary needs of the city of Chicago, and my conclusion is in no way shaken. I am not persuaded that the amount of water applied for is necessary to a proper sanitation of the city of Chicago. The evidence indicates that at bottom the issue comes down to the question of cost. Other adequate systems of sewage disposal are possible and are in use throughout the world. The problem that confronts Chicago is not different in kind but simply larger and more pressing than that which confronts all of the other cities on the Great Lakes, in which nearly three millions of the people of this country are living. The urban population of those cities, like that of Chicago, is rapidly increasing, and a method of disposition of their sewage which will not injure the potable character of the water of the Lakes must sooner or later be found for them all. The evidence before me satisfies me that it would be possible in one of several ways to at least so purify the sewage of Chicago as to require very much less water for its dilution than is now required by it in its unpurified condition. A recent report of the Engineer of the Sanitary Commission (October 12, 1911) proposes eventually to use some such method but proposes to postpone its installation for a number of years to come, relying upon the present more wasteful method in the meanwhile. It is manifest that so long as the city is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage. This is particularly true in view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport. But it must be remembered that for every unit of horsepower realized by this water at Lockport, four units of similar horsepower would be produced at Niagara, where the natural conditions are so much more favorable. Without, therefore, going more into detail in a discussion of this question, I feel clear that no such case of necessity has been presented by the evidence before me as would justify the proposed injury to the many varied interests in the great waterways of our lakes and their appurtenant rivers.

* * * * * *

"In short, after a careful consideration of all the facts presented, I have reached the following conclusions:

"1st. That the diversion of 10,000 cubic feet per second from Lake Michigan as applied for in this petition would substantially interfere with the navigable capacity of the navigable waters in the Great Lakes and their connecting rivers.

"2nd. That that being so, it would not be appropriate for me, without express Congressional sanction, to permit such a diversion, however clearly demanded by the local interest of the sanitation of Chicago.

"3rd. That on the facts here presented, no such case of local permanent necessity is made evident.

"4th. That the provisions of the Canadian treaty for a settlement by joint commission of 'questions or matters of difference' between the United States and Canada offer a further reason why no administrative officer should authorize a further diversion of water, manifestly so injurious to Canada, against Canadian protest."

This ruling left in effect the order limiting the diversion to 4,167 c. f. s.

(*x*) On June 30, 1917 (40 Stat. 241), Congress passed a joint resolution, requiring the Secretary of War to make a comprehensive and thorough investigation of the entire subject of water diversion from the Great Lakes and the Niagara River, including navigation, sanitary and power purposes. The report made pursuant to this joint resolution, by Colonel J. G. Warren, the division engineer of the Lakes diversion (called the Warren report), dated August 30, 1919, with its appendices, was a comprehensive presentation of the facts relating to the diversions from the Great Lakes and the effect of such diversions.

The Board of Engineers for Rivers and Harbors, to which the Warren report was submitted, made their report, under date of August 24, 1920, and both reports, with a memorandum of the Chief of Engineers, were transmitted to Congress by the Secretary of War on December 7, 1920. In reviewing the Warren report, the Board of Engineers for Rivers and Harbors said, with respect to the Chicago diversion (pp. 20-21):

> "15. There can be no doubt that a real need existed at Chicago for a remedy for the polluted state of its water supply and of the various streams near by that discharged into Lake Michigan. At the time the main sanitary canal was projected the art of sewage purification was in its infancy and a project so extensive as that of treating all the sewage and trade wastes of a population of over a million people had nowhere been seriously considered.
>
> "16. The remedy chosen by Chicago for the polluted state of its water supply and of its watercourses was, however, damaging to other interests. It is definitely known that the diversion of the amount of water authorized to be taken by the terms of the permit of 1903, namely, 4,167 cubic feet per second, at mean stages, would lower the level of Lakes Michigan and Huron about 0.2 foot, of Lakes Erie and Ontario about as much, and of the St. Lawrence River at Lock 25 about 0.28 foot. The average diversion for 1917, 8,800 cubic feet per second, being uncompensated, has lowered the level of Lakes Michigan and Huron about 0.43 foot, of Lakes Erie and Ontario about 0.41 foot, and of the St. Lawrence River at Lock 25 about 0.57 foot. Damage, varying in amount with the locality, extends from the lower miter sills of the locks at Saulte Ste. Marie through all the lakes and connecting channels to tide water in the lower St. Lawrence River, and its amount increases in the same proportion as the diversion at Chicago increases.
>
> "17. The dilution plan of the Chicago Sanitary District has not completely protected its domestic

water supply. The uncertainty as to the quality of the water arises from the freshets of the Chicago and Calumet Rivers, which often exceed the volume of lake water diverted through the corresponding channels, the coincident temporary reversal of the currents of these rivers causing corresponding pollution of the lake. This condition is sure to increase with population and industrial activity unless the amount of the diversion is also largely increased, or unless steps are taken for the treatment of the sewage and trade wastes now finding their way into the two streams.

"18. The report emphasizes the harm done by the Chicago Sanitary Canal in lowering the levels and diminishing the depths available for navigation from the lower sills of the locks at Saulte Ste. Marie clear down to tidewater, but the division engineer feels forced to make some concession to the existing status of affairs, and he therefore, with evident reluctance, recommends that the Sanitary District of Chicago be authorized to divert not exceeding 10,000 cubic feet per second, conditioned upon supervision of the diversion by the Secretary of War at the expense of the sanitary district, and upon the further stipulations that no dangers to navigation shall be caused by the diversion, that the district assume responsibility for all damages incident to the diversion, that it pay its due share of the cost of necessary compensating works, that it agree not to request or make any greater diversion, that it pay to the United States a tax or fee dependent on the additional amount of power that the diverted water could develop in the Niagara and St. Lawrence Rivers, and that it secure authority from the State of Illinois for the provision of works for sewage disposal other than by dilution and then provide such facilities as needed to care for the growth of its population."

The Board recommended (*id.*, p. 60) that the maximum permitted for the Chicago diversion should be 6,800 c. f. s.; it regarded the provision suggested by the division engineer for exacting payment as inexpedient but otherwise agreed with the division engineer's report as to Chicago. The Chief of Engineers concurred in the conclusions of the Board, except with respect to permitting the increase of the Chicago diversion (*id.*, pp. 13, 14), saying:

> "In respect to this, the trustees of the district have already been advised that the Chief of Engineers would not recommend to Congress any diversion greater than 250,000 cubic feet per minute, the limit set in the permit of the Secretary of War dated January 17, 1903, until the district had worked out and presented a suitable and comprehensive plan for treating its sewage so as to render it inoffensive and innocuous and at the same time reduce to a minimum the quantity of water necessary for its dilution and transportation. This office has been informed that the Sanitary District is now making the necessary studies and that plans based upon them will ultimately be presented for the approval of the War Department. Decision as to the diversion of the Chicago Sanitary Canal should therefore be deferred."

(*y*) On March 23, 1921, Colonel W. B. Judson, district engineer at Chicago and division engineer of the Northwestern Division, made a report which, with the report of October 18, 1921, of the Board of Engineers for Rivers and Harbors, was submitted to Congress on November 1, 1921 (H. R. Committee on Rivers and Harbors, Doc. No. 2, 67th Cong., 1st. sess.). These reports dealt, at the request of the committee on rivers and harbors of the House of Representatives, with the cost of a navigable channel 8 feet in depth in the Illinois River, between Utica and the mouth, and of a navigable channel 9 feet in depth from Utica to a connection with the 9-foot channel in the Mississippi River at or below Cairo, Illinois. In his report, Colonel Judson stated that "for a 9-foot channel, with an increment of 4,167 second-feet, the cost either with dams retained or removed appears almost prohibitive, and the probability that Congress will limit the increment to 4,167 second-feet is, in my opinion, so remote that this hypothesis may be left out of consideration. With increments of 7,500 or 10,000 second-feet, the figures show conclusively the advisability of removing all dams.'' He concluded that, ''to most reasonably conform to the probable conditions of the future, an 8-foot project should now be adopted, based on a 7,500 second-feet withdrawal for purposes of estimate and with all dams removed. Then should Congress place the limit of the amount of water to be withdrawn from Lake Michigan at 10,000 second-feet, which I deem probable and, under proper conditions, advisable, that increment would of itself increase the depth to 9 feet. The computations show that with all dams removed, an increment of 10,000 second-feet will increase the depth due to the increment of 7,500 second-feet by about 1.25 feet at Utica, about one foot at Peoria and Havana, and slightly less than one foot at the mouth'' (*id.*, pp. 17-19).

The Board of Engineers for Rivers and Harbors, in commenting upon this estimate, stated:

> ''It will be seen from the district engineer's report that the estimates for the Illinois River are largely influenced by the amount of water discharged into it through the Chicago Sanitary Canal. The present permit authorizes a withdrawal of 4,167 second-feet from Lake Michigan, but apparently the actual amount withdrawn is about 8,500 second-feet. Estimates are given for a flow of 4,167, 7,500 and 10,000 feet. The district engineer believes that the minimum that will be withdrawn from Lake Michigan is 7,500 second-feet and that it may eventually reach 10,000 second-feet. The effect of this additional volume of water will be readily understood when it is considered that the normal low-water flow in the Illinois River is only about 500 second-feet. The existing locks and dams were found necessary to secure the project depth of 7 feet when the normal flow only was available. With the increased volume of 4,167 feet, they are of doubtful necessity in connection with either an 8 or 9 foot chan-

> nel, and with the probable minimum increment of 7,500 second-feet, or possibly 10,000 second-feet, the locks and dams become an obstruction to navigation rather than an aid and should be removed.''

Before the diversion began in 1900, the official reference datum for Federal improvements and for obtaining and maintaining the established project depth in the Illinois River was the low water of 1879. Since then, this reference datum has been officially changed from time to time, so as to conform to existing low water as affected by the diversion.

(*z*) On February 2, 1922, the Secretary of War, in a communication to Congress concerning a pending bill (H. R. 9046, 67th Cong., 1st sess.), thus stated the policy of the Department:

> ''It is clear that, under the condition of affairs created by the Chicago Sanitary District, the diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago. It is by no means established, however, that the quantity required for that purpose, either now or in the future, is 10,000 cubic feet per second. I regard it as inadvisable to permit the diversions in that amount, or in any amount exceeding the amount now fixed by the Department, without full and complete information concerning the necessity therefor. It is my view that the quantity authorized should be limited to the lowest possible for sanitation, after the sewage has been purified to the utmost extent practicable before it is discharged into the sanitary canal. I regard it as extremely inadvisable to grant the city of Chicago, or any other agency, the right in perpetuity to take from the lake a definite quantity of water. It is not improbable that within a generation a method may be found to separate the valuable fertilizing elements from sewage, as a consequence of which the withdrawal of water from the lake to dilute the sewage will no longer

> be necessary. In view of the substantial and widespread damage done to many activities throughout the United States by the diversion, damage which can be but partly compensated for by the construction of the works proposed in the bill, the diversion should not be continued beyond the time when its necessity ceases to exist."

On April 18, 1924, the Chief of Engineers transmitted to the Secretary of War a report made by Major Rufus W. Putnam, the district engineer at Chicago, which set forth a description of the existing and proposed works, including sewage treatment plants, of the Sanitary District, and included a study of sanitary conditions.

9. *The decree, January, 1925, in the suit of the United States against the Sanitary District.*—In October, 1913 the United States filed another bill in the same court in which the bill of 1908 had been filed, to enjoin the Sanitary District from diversion of more than 250,000 cubic feet per minute of water from Lake Michigan, the two suits were consolidated and heard as one. In June, 1920, Judge Landis gave an oral opinion in favor of the Government. Decree not having been entered before Judge Landis resigned, his successor, Judge Carpenter, heard argument and directed judgment for the relief demanded by the United States. From this decree, entered June 18, 1923, an appeal was taken to the Supreme Court, where the decree was affirmed in January, 1925. (*Sanitary District of Chicago* v. *United States*, 266 U. S. 405, 432.) The decree thus affirmed provided:

> "That the defendant, the Sanitary District of Chicago, its Board of Trustees, officers, agents, attorneys, representatives, employees and servants, and all other persons acting or claiming or assuming to act under its authority, be, and they hereby are, and each of them hereby is, enjoined from diverting or abstracting any waters from Lake Michigan over and above or in excess of 250,000 cubic feet per minute."

The Supreme Court directed that the decree should

> "go into effect in sixty days—without prejudice to any permit that may be issued by the Secretary of War according to law."

10. *Permit of March 3, 1925.*—Immediately after the decision of the Supreme Court, the Sanitary District applied to the Secretary of War for permission to divert 10,000 c. f. s. The application and the accompanying papers set forth at length the sanitary conditions of the district and the existing exigency. Among other things, it was submitted that the population (3,284,000), and trade waste equivalent of population (1,580,000) of the Sanitary District made a total at that time of 4,864,000, and that it was estimated that in 1945 a corresponding total would amount to 6,785,000; that 10,000 c. f. s. of water from Lake Michigan was necessary not only for the purpose of eliminating offensive conditions along the Illinois River, but also to keep the Chicago River reversed at all times, so that even during storm periods it would not pour sewage into Lake Michigan; that the dry weather run-off of the Chicago River drainage area was 1,200 c. f. s., the maximum flood run-off of the same area being 10,000 c. f. s.; that the run-off from the drainage area of the Chicago River exceeded 4,167 c. f. s. from seven to eight times a year; that it exceeded 5,000 c. f. s. from five to six times a year; 7,500 c. f. s. from three to four times a year, and 9,500 c. f. s. about once a year; so that, if a flow of 4,167 c. f. s. were maintained at all times, Chicago sewage would flow into the lake about the number of times above mentioned for the different quantities stated; that a heavy storm could concentrate in six hours, discharging the flood run-off of 10,000 cubic feet per second, with its sewage and scourings of deposits from sewers; and that it would take more than twelve hours to effect any appreciable increase in the flow through the Chicago River by the manipulation of the controlling gates at Lockport; that since 1892, the Sanitary

District had expended in the construction of the Sanitary and Ship Canal, in widening, deepening and improving the Chicago River, construction of bridges, and other channels and appurtenances, and sewage disposal and treatment plant, approximately $130,000,000; that the operation of the Sanitary District's dilution works had practically eliminated all water-borne diseases from Chicago; that the death rate from typhoid fever had declined from a maximum of 174 per 100,000 of poulation in 1891, to 1.1 per 100,000 population at the time of the application; that from the year 1908, the Sanitary District had made extensive investigations of artificial sewage treatment; that construction of treatment plants, begun in 1914, was delayed by the world war and had rapidly progressed since 1920; that the Sanitary District had expended on sewage treatment projects, to the end of the year 1924, approximately $30,000,000; that the future sewage treatment program required the expenditure, between the years 1925 and 1945, of about $95,000,000, and that this program contemplated 85 per cent. treatment for a population of 1,917,000, 94 per cent. treatment for the equivalent of a population of 1,725,000, and 33 1/3 per cent, treatment for a population of 3,140,000, and that this would be equal to 100 per cent. treatment for a population of 4,300,000; and that this would leave in 1945 the untreated sewage of a population of 2,482,000 which, with a diversion of 10,000 c. f. s., would make for satisfactory conditions along the Illinois River. That, to provide for continued growth in population it would be necessary to supply complete treatment for a larger proportion of the sewage than was now projected, and that this would require the expenditure, between 1945 and 1955, of an additional $35,000,000.

The Sanitary District also set forth its financial resources, its bonding power, taxing power, income from all sources, and the amounts required to be expended for its various corporate purposes. The Sanitary District also submitted to the Secretary of War the findings of an Engineering Board of Review, consisting of engineers who had been invited to make an investigation and present a program of remedial measures.

The Acting Attorney General advised the Secretary of War (February 13, 1925) that the latter was authorized under Section 10 of the Act of March 3, 1899, to determine in his official discretion, after considering all the pertinent facts and the appropriate protection of the interests of navigation, whether the Sanitary District should be permitted to divert a greater or less quantity of water than that authorized by previous permits.

The Secretary of War held a public hearing, at which representatives of the parties interested in supporting or opposing the application submitted their views. The district engineer at Chicago recommended the granting of a permit for a period of five years, for an average annual diversion of 8,500 c. f. s., with an instantaneous maximum of 11,000 c. f. s., on certain conditions. He explained that by "diversion" he meant "the amount of water which is actually withdrawn from Lake Michigan by the Sanitary District of Chicago, through its main drainage canal and auxiliary channels, and is not inclusive of the amount flowing in the channels which come from the sewers of the locality"; in other words, "diversion" is taken "to be the gross flow at Lockport less the amount of water used by the city of Chicago for domestic purposes."

The Chief of Engineers, concurring in the recommendation of the district engineer, reported as follows:

> "3.—The first condition recommended by the district engineer provides for the adoption and execution of a program of construction of modern sewage disposal plants at such a rate as to provide before the end of five years for treatment of the sewage of a human population of 1,200,000. This figure is believed to be the maximum practicable under existing conditions, and the proposed construction is the first step in a program which will permit the ultimate reduc-

tion of the amount of water diverted, to 4,167 cubic feet per second, or lower, as treatment plants are installed.

"4.—The program of construction recommended is limited to five years, as it is not possible to predict what advances may be made in the science of sewage disposal during the next five years. It is entirely within the realms of possibility that, during that period, such advance may be made as to warrant the Department's insisting on an even more rapid rate of progress thereafter, should a renewal of this permit be sought. A shorter period for the permit is not believed advisable, as it would be difficult to prescribe sufficient progress in the way of construction of sewage treatment plants and require a substantial reduction in the diversion upon the renewal of the permit.

"5. It is estimated that the construction of sewage treatment plants for a population of 1,200,000 will permit a reduction in the necessary diversion from Lake Michigan of about 1,250 cubic feet per second. In other words, such construction would permit a reduction in the authorized diversion, by December 31, 1929, to about 7,250 cubic feet per second. As stated above (paragraph 4), it is probable that a still more rapid rate of reduction of diversion may be practicable thereafter.

"6. It is, of course, highly desirable that the excessive diversion of water from Lake Michigan be reduced to reasonable limits with the utmost despatch. For humanitarian reasons, it is impracticable to make the desired reduction instantaneously, and it is believed that the procedure proposed by the district engineer is the most reasonable and just to all concerned that can be adopted.

"7. As further means of relieving the present undesirable situation with respect to lake levels, the district engineer recommends, as conditions of the permit the prompt adoption and execution of a program for metering Chicago's water supply, the construction of controlling works to prevent the discharge of Chicago River into Lake Michigan in times of heavy storms, and also that the Sanitary District be required to pay a share of the cost of such regulating or compensating works for restoring lake levels as may be constructed, posting a bond of $1,000,000 as a guarantee of their good faith in the matter.

"8. I concur in the views of the district engineer, and recommend the issuance of a permit in accordance with the draft herewith."

The Secretary of War, on March 3, 1925, accordingly issued a permit to the Sanitary District, as follows:

"War Department

"**Note.**—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See Cummings *v.* Chicago, 188 U. S. 410).

"Permit

"WHEREAS, By Section 10 of an act of Congress approved March 3, 1899, entitled 'An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' it is provided that it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same;

"AND WHEREAS, Application has been made to the Secretary of War by The *SANITARY DISTRICT OF CHICAGO, ILLINOIS,* for authority to divert an annual average of 10,000 cubic feet of water per second from Lake Michigan through the channels of said Sanitary District;

"AND WHEREAS, In the judgment of the Secretary of War, an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

"NOW, THEREFORE, This is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provisions of the aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

"1. That there shall be no unreasonable interference with navigation by the work herein authorized.

"2. That if inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.

"3. That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of any navigable waters of the United States.

"4. That the Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

"5. That the Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

"6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

"7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the U. S. District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

"8. That if, within six months after the issuance of this permit, the City of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum thereafter, this permit may be revoked without notice.

"9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice.

> "10. That this permit is revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress.
>
> "11. That this permit, if not previously revoked or specifically extended, shall cease and be null and void on December 31, 1929."

In transmitting the permit, the Secretary of War wrote to the Sanitary District, under date of March 3, 1925, saying:

> "Your attention is invited to the conditions to which this authorization is subject, particularly those prescribing certain definite accomplishments on the part of your locality. This Department has always held and continues to hold that the taking of an excessive amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost despatch. I appreciate that the desired reduction cannot be made instantaneously, but with the view of making a substantial reduction by the time this permit expires, the conditions require, among other things, the artificial treatment of the sewage of a large population, the construction of controlling works to prevent the discharge of the Chicago River into the lake, and the metering of the water service of the city of Chicago.
>
> "I cannot emphasize too strongly the importance of diligent and prompt execution of the conditions imposed. If it is necessary to increase the bonding power of the Sanitary District from three to five per cent of the assessed valuation of the taxable property, or if increased taxing power is imperative, the requisite legislative permission should be obtained promptly. While it is not in my province to dictate, I sincerely urge the reduction of your expenses to the lowest possible requirements, and, further, that arrangements be made with the packers and the Corn Products interests to treat their waste before discharging it into the sewers.

> "I believe that steps should be taken which will enable Chicago to complete the entire work within ten years."

It is under this permit that the Sanitary District is now withdrawing water from Lake Michigan. The amount mentioned in the permit is exclusive of the domestic pumpage in Chicago, which in 1924 amounted to 1,274 c. f. s., in 1925 to 1,338 c. f. s., and in 1926 to 1,395 c. f. s. In the report of the Board of Engineers for Rivers and Harbors, under date of March 23, 1926, in response to a resolution of the Committee on Rivers and Harbors of the House of Representatives, it was stated: "At present, the flow at Lockport might, so far as concerns the conditions of the permit of March 3, 1925, be as high as about 9,700 cubic feet per second annual average, and over 12,000 cubic feet instantaneous maximum." If the domestic pumpage of Chicago is estimated on the basis of 1926 (1,395 c. f. s.), the total withdrawal covering that pumpage and the diversion authorized by the permit of March 3, 1925 (8,500 c. f. s.) would amount to an annual average of about 9,900 c. f. s. As shown by the table of annual withdrawals (*supra*, p. 22) this total has not actually been reached, the highest annual total being 9,465 c. f. s. in the year 1924. The average of the totals for the years 1925 and 1926 is about 8,280 c. f. s.

11. *Compliance with conditions of permit of March 3, 1925.*—It appears from the evidence that, up to the time of the taking of the testimony herein, the Sanitary District had substantially complied with the conditions of the permit. This is shown by the testimony of Colonel Edward H. Schulz, district engineer of the United States Army at Chicago. With respect to the progress of the Sanitary District in carrying out the program of sewage treatment, Colonel Schulz said:

> "In pursuance of carrying out this permit the drainage district is establishing a North Side treatment

> plant; has begun work on a West Side treatment plant; has in operation a Des Plaines treatment plant and a Calumet treatment plant, and in connection with the Corn Products Company of Chicago, has rendered treatment of a certain part of the wastes of the Corn Products factory. The proportion down to the present time is fully up to the requirements of the permit for this period, the permit having run now about 22 months."

The Sanitary District has given a bond running to the United States, in the amount of $1,000,000, for the payment of its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed.

With respect to plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms, Colonel Schulz testified:

> "In connection with these plans the Sanitary District has consulted the District Engineer Office several times during the past year, and tentative plans have been prepared with a view to placing caisson gates at the mouth of the river. The final plans have not yet been submitted to me, nor have I submitted them to the Secretary of War for approval, but I have no doubt that the work will be finished by about July 1, 1929."

As to the program for metering the water service of the City of Chicago, Colonel Schulz said:

> "This provision of the permit has been carried out up to the present time, up to about 40 per cent of the average for the year. I have been in close touch with the city. It will be noted that this condition is carried out by the city of Chicago, and not by the Drainage District. The requirement involves some 36,000 meters to be placed each year for nine years, first, that they must adopt an ordinance in six months, which they

> did, and within three months after that, last January, they appropriated $1,000,000 to begin this metering. There had been a good deal of trouble industrially to get the matter started and rapidly executed. The reading of the provision was that 40 per cent should be executed, and that would amount to 14,400 meters, and the average rate 10 per cent. It is evident that the average rate must increase beyond 10 per cent in the next few years to carry out that permit."

Colonel Schulz testified that there had been compliance with the other conditions of the permit. The permit has not been revoked.

12. *Diplomatic correspondence.*—It appears that, after the granting of the permit of March 3, 1925, and on May 7, 1925, the Government of Canada, through the British Embassy, asked the Secretary of State for information as follows:

> "First.—What has been the actual average flow of the water passing Lockport during the year ending 3rd March, 1925;
>
> "Second.—By what amount will this average flow of water passing Lockport be immediately reduced under the terms of the permit of 3rd of March;
>
> "Third.—By what amount will this average flow be further reduced by 31st of December, 1929, the date upon which the new permit terminates."

In reply, the Secretary of State, under date of June 15, 1925, informed the British Chargé d'Affaires as follows:

> "First: The actual average flow of the water passing Lockport during the year ending March 3, 1925, has been 9,700 cubic feet per second.
>
> "Second: This average flow of water passing Lockport will not be immediately reduced by any amount under the terms of the permit issued by the Secretary of War on March 3, 1925.

"Third: This average flow may be reduced by December 31, 1929, by an amount varying from 1,750 to 3,000 cubic feet per second.

"By way of explanation of the wide range over which the amount of reduction by December 31, 1929, varies, it should be stated that the amount of reduction depends upon the decrease in the sewage load on the water in the Drainage Canal. The permit prescribes that a minimum population of 1,200,000 be provided with the equivalent of 100% treatment. The program of sewage treatment plant construction contemplates the completion of plants which will give 100% treatment to a population of slightly over 1,400,000. If this program is carried to completion a larger reduction may be made in the flow than if only the requirements of the permit are carried out.

"Furthermore, when the controlling works which are required to be placed in the Chicago River or Drainage Canal to prevent reversals into Lake Michigan in times of flood are completed and in operation it may be found practicable to make a much larger reduction in the flow of water with safety to the water supply of the City of Chicago during winter season, a time when the oxygen content of the diluting water is much higher than it is during the summer season.

"It is also expected that there will be a substantial reduction in the amount of water consumed in the locality for domestic purposes as the result of a requirement of the permit of March 3, 1925, which makes it necessary for the City of Chicago to adopt and carry into execution a program of metering its water supply. By December 31, 1929, this reduction will vary between 400 and 600 cubic feet per second.

"The net result of all these varying influences will be to make it possible to reduce the average flow by a minimum amount of 1,750 cubic feet per second, and possibly by the maximum amount of 3,000 cubic feet per second.

"To explain the apparent inconsistency between the amount of water specified in the permit (8,500 cubic feet per second measured at the intakes) and the flow at Lockport (9,700 cubic feet per second) it might be stated that the difference represents the amount of domestic water consumption by the City of Chicago which could not be authorized or included properly in a permit issued to the Sanitary District of Chicago, a separate municipality, other than to make the permit nonoperative in case of failure on the part of the former agency to adopt certain measures of conservation which were specified. Condition 8 of the permit of March 3, 1925, looks to a substantial reduction of this portion of the flow in the Chicago Drainage Canal, at the same time condition 4 makes possible a reduction in the amount of water used for dilution of sewage."

13. *The Rivers and Harbors Act of January 21, 1927* (44 Stat, Pt. 2, 1010, 1013), directed a modification of the existing project on the Illinois River, so as to provide a channel with least dimensions of nine feet in depth and 200 feet in width, from the mouth to Utica, with provisos, as follows:

> "Illinois River, Illinois: Modification of existing project so as to provide a channel with least dimensions of nine feet in depth and two hundred feet in width from the mouth to Utica: *Provided,* That the State of Illinois transfers to the United States without cost all rights and titles in the two State-owned dams on the Illinois River; and that local interests furnish the United States without cost all necessary areas for the economical disposal of material dredged in creating and maintaining the channel herein and hereby authorized: *Provided, further,* That nothing in this Act shall be construed as authorizing any diversion of water from Lake Michigan: *Provided, further,* That there is hereby authorized to be appropriated for this project a sum not to exceed $3,500,000."

14. ***Effect of the Chicago Diversion on the Level of the Great Lakes.—***

(*a*) *Fluctuations in lake levels.*—The Great Lakes are essentially a series of natural reservoirs in which are stored large volumes of water collected from their respective drainage basins. The connecting and outflow rivers are the overflows for these reservoirs. The amounts of water in storage are dependent upon the differences between supply and overflow and are measured by the heights of water in the reservoirs. Variations in lake levels thus register the variable differences between net supply and discharge. When the rate of supply to a lake is greater than the discharge, the amount of storage increases and the stage of the lake rises, and when less the storage decreases and the lake falls.

The supply of water to the Great Lakes is furnished by the inflow of the many relatively small rivers of their drainage basins, increased by the rainfall on the lakes themselves and decreased by the evaporation from the lake surfaces. The total area of the drainage basins of the lakes is approximately 300,000 square miles, of which nearly one-third is occupied by lake surface. Computations show that the average supply received from the land areas about equals that received as rainfall on the lakes, but that roughly 40 per cent. of this total gross supply is lost by evaporation. The net supply varies widely. The records show rates of net supply to the whole lake system exceeding 800,000 c. f. s. for a month, and they also show months during which the evaporation from the lakes exceeded the water received from all sources, with a consequent negative net supply. The average monthly net supply for the months of April and May is at a rate exceeding 500,000 c. f. s, and the average net supply for the month of November is at a rate of less than 20,000 c. f. s. The lakes absorb the great variations in supply; because of the rise and fall of their levels. When the supply is high they rise and store water; when it is low they fall and deliver the stored water. The average annual rise and fall of the various lakes due to the seasonal variations in supply is from 1¼ to 2 feet, but extreme variations in seasonal supply have caused fluctuations in lake levels ranging from 2.67 feet on Lake Superior to over 4 feet on Lake Ontario. Extreme high and low lake levels are reached at the ends of periods of excessive or deficient supply extending over several years. The period of low rainfall occurring during the past few years has brought down the levels of the lakes, and with other factors has produced record low levels on Lakes Michigan, Huron and Erie.

(*b*) *Mean levels.*—The monthly mean levels of the Great Lakes, and the mean levels for each year, are shown by the records of the United States Lake Survey, which is charged with the duty of charting the Great Lakes and recording their levels. The mean level of the Great Lakes is determined with reference to the mean level of tidewater at New York.

Lake Superior.—As Lake Superior is higher than Lake Michigan and Huron, it is not influenced by the conditions existing in the lower lakes. The extensive diversions of water for power development at St. Mary's Falls, amounting approximately to 50,000 c. f. s., has made necessary the installation of gates across the river at the head of the falls, to control the outflow and levels of Lake Superior. The gates are operated and the diversions are controlled by an international board of control, in accordance with conditions laid down by the International Joint Commission, May 26-27, 1914. Their operation substitutes artificial for natural control of the levels of Lake Superior, and has, in general, increased the levels of that lake at low water, and somewhat diminished those at high water.

Lakes Michigan and Huron.—The levels of these lakes are substantially the same. As the calculations of averages for periods of years depend upon the periods selected, the official records of the mean annual levels of Lake Michigan, that is, elevations above tidewater for all the years from 1860 to 1925 are set forth, as follows:

Mean Annual Levels of Lake Michigan Above Mean Tidewater at New York

Year	Feet	Year	Feet	Year	Feet
1860	582.68	1883	582.37	1905	580.98
1861	582.66	1884	582.47	1906	581.05
1862	582.62	1885	582.72	1907	581.06
1863	582.15	1886	582.96	1908	580.99
1864	581.53	1887	582.32	1909	580.50
1865	581.29	1888	581.71	1910	580.15
1866	580.96	1889	581.16	1911	579.60
1867	581.40	1890	581.05	1912	580.07
1868	580.91	1891	580.49	1913	580.68
1869	581.03	1892	580.38	1914	580.24
1870	581.94	1893	580.67	1915	579.73
1871	581.87	1894	580.78	1916	580.35
1872	580.59	1895	579.74	1917	581.16
1873	581.24	1896	579.47	1918	581.40
1874	581.73	1897	580.13	1919	580.91
1875	581.48	1898	580.31	1920	580.56
1876	582.61	1899	580.32	1921	580.10
1877	582.38	1900	580.28	1922	579.98
1878	582.07	1901	580.53	1923	579.38
1879	581.15	1902	580.21	1924	579.09
1880	581.27	1903	580.36	1925	578.24
1881	581.70	1904	580.86		
1882	582.19				

The record for the year 1926 is in evidence only to and including September, and shows a variation from 577.35 feet in January, to 578.60 feet in September.

It will be observed that the mean level above tidewater was as high as 582.68 feet in the year 1860; that, after a fall to as low as 580.59 in 1872, it returned to 582.61 in 1876; and after another fall, rose in 1886 to 582.96. It then fell so that, for the year 1899, the year before the opening of the drainage canal, the mean level was 580.32, or 2.36 feet, a little over 28 inches, lower than the mean level of 1860, and 2.64 feet, or over 31½ inches lower than the mean level for the year 1886.

In the years 1900 to 1905, the mean level was between 580 and 581, the lowest being 580.21 feet in 1902, and the highest being 580.98 feet in 1905. Thus in 1905, the mean level of Lake Michigan was nearly 8 inches higher than for the year 1899.

After 1905, the mean level slightly rose, and then fell in 1909 to 580.50 feet, which was still about two inches higher than the level of 1899. There followed a lowering of the mean level to 580.15 in 1910, and to 579.60 in 1911, but this was restored to 580.68 in 1913, and after another fall, the level came back to 580.35 in 1916, approximately the same mean level as that of 1899. It then rose as high as 581.40 feet in 1918, falling to 580.56 in 1920, which was still higher than the mean level of 1899. Since then, there has been a decided drop; so that in 1924, the mean level was 579.09 feet and for 1925 it was 578.24, showing a fall in the mean level from 1920, to the end of 1925 of over 27 inches.

(c) The Monthly Weather Review of the United States Weather Bureau, Department of Agriculture, for March, 1926 (vol. 54, No. 3, pp. 98-100), in a statement by P. C. Day, in charge of climatological division, United States Weather Bureau, on the precipitation in the drainage area of the Great Lakes, 1875 to 1924, with discussion of the levels of the separate lakes and their relation to the annual precipitation, thus summarizes conditions, referring to the United States Lake Survey records:

> "*Lakes Huron and Michigan.*—As these lakes stand at practically the same elevation (average for the 50-year period, 580.9 feet above sea level), and their drainage areas receive usually similar amounts of precipitation, condition affecting the level of one will be reflected promptly in the other, and they may be considered as a single lake.
>
> "Like Superior, they were at high stages near the beginning of the period, the level in 1876, 582.61 feet, being within a few inches of that in 1886, 582.96, the highest in the 50-year period. The levels of these lakes also fell off rapidly, as did Superior, during the three years following 1876, due to diminishing precipitation,

but the fall was somewhat less rapid than was that of Superior, probably on account of continued excessive discharge from that lake.

"Under the influence of much the heaviest precipitation in the 50 years over the drainage basins of these lakes, from 1880 to 1885, supplemented by a nearly normal discharge from Lake Superior, they again rose steadily to a level of 582.96 feet by 1886, the highest, as previously stated, in the 50-year period and probably with one or two exceptions the highest since 1838, the year of maximum known stage, 584.34 feet.

"Beginning in 1886 there was a sharp decrease in precipitation, which, with slight recoveries in 1890, 1892 and 1893, continued until 1895, inclusive, the last-named year having the least of the 50 years. The lake levels fell off during this period, the decline being augmented by the low stages of Lake Superior, whose drainage area during a portion of the period was likewise experiencing an important reduction in precipitation with diminishing run-off.

"There was a sharp fall of slightly more than 1 foot in the levels of Lakes Huron and Michigan from 1894 to 1895, the drought years, the greatest change within 1 year for the entire 50 years, and a continued slight fall in 1896 brought the level of Lake Michigan to an elevation of 579.47 feet, 3.49 feet lower than in 1886, as quoted from the report of the Deep Waterways Commission noted above, and within 0.41 foot of the stage of 1924, 579.06 feet, the lowest of record for the 50-year period. The 1925 stage was only 578.21 or 0.85 foot lower still.

"With increasing precipitation over the basins during the 8 to 10 years following 1895, augmented by more than normal discharge from Lake Superior due to the same cause, the levels of these lakes gradually rose to slightly above normal stage of 580.90 feet, continuing steadily at 581 feet thereafter for several years.

"Since 1908 there have been several sharp increases and decreases due to changing precipitation in both the Huron-Michigan and Superior basins and to increasing or decreasing discharge from Lake Superior, the lakes rising in 1918 to the highest point since 1889.

"Since 1916, excepting 1921, the precipitation in the basin of these two lakes, as well as that of Lake Superior during the whole period, has been constantly below normal, the average deficiency for the 8-year period being 1.7 inches per year, or a total of 13.6 inches for the period. During the 9 years, 1893 to 1901, inclusive, the average precipitation was slightly less in this basin than indicated above, but in this period Lake Superior levels were high and the discharge probably was materially above normal, thus offsetting the effect of decreased precipitation in the Huron-Michigan basin.

"Since 1916, precipitation over the Lake Superior basin has been constantly below normal, the average yearly deficiency being 2.84 inches or a total of nearly 23 inches for the 8-year period. As a result, the water level of Superior has been greatly reduced, despite the presence of regulatory works at the Soo, and Lakes Huron and Michigan are now receiving far less discharge from Superior than usual.

"The prompt rise of these lakes in 1917 and 1918 in response to the moderately heavy precipitation over their drainage areas in 1916, with nearly normal discharge from Lake Superior, shows that with an average annual precipitation of slightly more than 32 inches, the normal for the basin, and with the usual discharge from Lake Superior, these lakes will maintain their normal level.

"In connection with the 1924 levels of these lakes, it is interesting to note that in their early history they showed fluctuation as great or possibly greater than any in recent years.

"The report of the Board of Engineers on Deep Waterways (4) gives numerous references to the early levels of the Great Lakes, and shows that the extreme high water to which all levels concerning Lake Michigan are referred, occurred in 1838, when the elevation stood at 584.3 feet, 3.4 feet above the normal. It was nearly as high in 1858-1859.

* * * * * *

"*Lake Erie.*—On account of the smaller area of the drainage basin, and its lower elevation, the levels of this lake are governed largely by the discharge from the higher lakes of the chain.

"In general, the responses to variations in precipitation are more prompt here than in the larger lakes, though, as might be expected, they are less in degree, due to the steadying effects of the discharge from the other lakes.

"Like the lakes previously discussed, Erie was at high stages near the beginning of the period, reaching a maximum in 1876 of 573.7 feet, the normal for the 50-year period being 572.4. The heavy precipitation in the early eighties over most of the Great Lakes was less pronounced in the Lake Erie basin, and the corresponding water levels did not reach the extreme high points shown by Huron-Michigan, though they continued high for a longer period.

"Beginning with 1891 the Lake Erie levels fell off, due to decreasing precipitation over the whole region, and reached the lowest stage of the 50-year period, 571.2 in 1895. This, however, was not so low as in 1925, 570.9, the lowest since 1860.

"Precipitation continued generally less than normal for a number of years following 1895, and the lake level remained at low stages until 1902, following which there were several sharp rises and falls, also shown by the other lakes, Erie reaching comparatively high levels in 1913 and again in 1917 and 1919. Since that time the lake level has been below normal, reaching a low point of 571.4 in 1923, only silghtly higher than the lowest preceding record, 571.2 in 1895, and slightly lower than in 1901 and 1911. Contrary to the case of the lakes discussed previously, Lake Erie showed a slight rise from 1923 to 1924, due evidently to increased precipitation over its watershed; but, as stated above, its stage again fell during 1925.

"*Lake Ontario.*—This lake has an average elevation of 246 feet above sea level, or 326.4 feet lower than Lake Erie. It has generally wider fluctuations than Erie, but they are mainly similar.

"Like the other lakes it was high in 1876, but reached its peak in 1886, 247.6 feet, though it was nearly as high in 1908 and again in 1913. As in the case of Erie it reached its lowest level for the 50-year period, 244.8 feet, in 1895." [The Lake Survey record shows 244.29 feet in 1895.]

"With the other lakes, Ontario has been more or less below its usual level for several years, though the fall has not been so uniform or so extreme. Like Erie it rose slightly during 1924, following a considerable increase in precipitation over its basin, but fell with the other lakes in 1925, despite a continued increase in the precipitation over the drainage area, though in 1925 it did not reach the low average level of 1895 by more than half a foot."

(*d*) *Effect of diversions on lake levels.*—Except when obstructed by ice, the outflow or discharge through the natural outlet increases or decreases with the head or stage of water in the lake and with the slope of the outflowing stream. Under these natural laws there is a constant tendency toward equalization of supply and discharge. For instance, if the supply, which is usually variable from month to month and from year to year, should become constant the stage of water in the lake would soon reach and remain at a height whereby the discharge would exactly equal the supply. If the supply should be increased or decreased by a constant amount, the level of the lake would gradually change until a new level was reached where the supply and discharge would again be equal. There is the same natural tendency toward equalization when through natural or artificial agencies the capacity of the outlet or outlets is changed. Assuming that the stage of a lake is at a height where the supply and discharge are equal, if the outlet is enlarged or an additional outlet is created, the discharge must necessarily be increased for a time, and as the supply is unaffected, the storage is diminished and the stage of water falls. With the falling stage the discharge decreases until the rates of supply and discharge become equal. With a variable supply the effect is fundamentally the same, although it may be masked by the changes in level caused by the change in supply. For instance, if when the outlet is enlarged, the supply happens to increase by a greater amount or faster than the simultaneous increase in capacity of discharge, the result is an increasing stage. However, the increase in stage in such case is less than it would have been without the change in outflow conditions and the lowering effect is real although not apparent.

When water is diverted from the outlet, the lake levels will be steadily lowered, with respect to their natural levels, until the discharge capacity of the outlet has been reduced by an amount corresponding to the diversion, after which the effect of the diversion on lake levels ceases to increase. The time required for the decreasing outflow to reach an equilibrium with the decreased supply due to a diversion depends on the area of the lake in relation to its outlet capacity. Theoretically, the complete effect of a diversion is never shown; that is, a mathematical formula would require infinity. But within practical limits, under present conditions, approximate equilibrium is reached on Lakes Erie and Ontario in about a year, and about five years are necessary to give about 90 per cent. of the full effect of the diversion on the combined areas of Lakes Michigan and Huron.

It appears that the levels of the Great Lakes have been affected by the following artificial factors: the regulating works, already mentioned, in the St. Marys River at the outlet of Lake Superior; the diversion of the Chicago Sanitary District from Lake Michigan; diversions from Lake Erie, for power and navigation, through the Welland Canal, and from the Niagara River; and changes in the discharge capacity of the St. Clair River at the outlet of Lake Huron, and of the St. Lawrence River, affecting Lake Ontario.

(e) *The Chicago diversion.*—As the Chicago drainage canal created a new outlet for the water of Lake Michigan, it is not open to dispute that this diversion has operated to reduce the levels of the Great Lakes (other than Lake Superior) below the levels which otherwise would have existed. The fact that the lake levels have fluctuated does not affect this conclusion. After the introduction of an additional artificial outlet, the surface of the lake will continue to fluctuate in the same manner that it fluctuated before the lowering caused by the diversion took place; but the high water and low water of the lake after the cutting of the artificial outlet will be lower than they would have been had the diversion not been made.

The complainant States contend that the abstraction by the Sanitary District has lowered Lakes Michigan and Huron and the lower St. Marys River six inches at mean lake levels; Lake Erie, five inches; Lake Ontario, five inches; and the St. Lawrence River from over five inches in its upper reaches to 4½ inches at Montreal. It is further contended by the complainants that the abstraction under the permit of March 3, 1925, of 8,500 c. f. s., plus the pumpage at Chicago for its water supply, taken at the amount of that pumpage for 1926 (1395 c. f. s.), or a total of about 9,900 c. f. s., would produce a lowering of an additional inch at mean stages.

The defendants insist that the lowering caused by the diversion probably does not exceed four inches on Lake Michigan, and 3.3 inches on Lake Erie. The Sanitary District also contends that it is chargeable only for its own withdrawal, and not for withdrawals by Chicago for domestic pumpage, pointing out that the city of Chicago is not a party to this suit. But, whatever might be said on the question of remedy, the entire amount withdrawn should be considered for the purpose of determining the effect on lake levels of the withdrawal of water from Lake Michigan through the reversal of the flow of the Chicago River; the domestic pumpage of Chicago is taken from the lake, and, instead of being returned to the lake, goes into the channels of the Sanitary District.

Report of International Waterways Commission.—The International Waterways Commission, in its joint report under date of January 4, 1907, on the Chicago diversion, concluded as follows:

> "The diversion of 10,000 cubic feet per second will lower the levels of Lake Michigan-Huron, Lake St. Clair, Lake Erie, Lake Ontario, and the St. Lawrence River, besides the important connecting channels, the Detroit and St. Clair Rivers, by amounts varying from 4¼ to 6¼ inches for the different waters, and the diversion of 14,000 cubic feet will lower them from 6 to 8½ inches." It was also stated that "the length of time to produce this effect is about five years; about half of it will be produced at the end of 18 months."

Report of Board of Engineers for Rivers and Harbors.—The report of the Board of Engineers for Rivers and Harbors of August 24, 1920, on this point has already been quoted (*supra*, p. 67).

Report of Joint Board of Engineers, United States and Canada.—On March 14, 1924, the President of the United States appointed a commission of nine members, called the "St. Lawrence Commission of the United States", with Herbert Hoover, Secretary of Commerce, as chairman, to act as an advisory committee to the Government on all questions that might arise in consideration of the project for the improvement of the St. Lawrence River. The Government of Canada, on May 7, 1924, appointed a national advisory committee of nine members, having as its chairman George Perry Graham, Minister of Railways and Canals, to advise the government on the matters relating to the project. Following the recommendation of the International Joint Commission (established under the Treaty of 1909), it was agreed by the Governments of the United States and Canada that a Joint Board of Engineers, consisting of three members from each country, should be constituted to review the plans formulated, and to report on additional related matters. The United States Government designated as members of the United States section of the board, and as advisers to the St. Lawrence Commission, Major General Edgar Jadwin, Chief of Engineers, Colonel William Kelley, Corps of Engineers, and Lieutenant Colonel George B. Pillsbury, Corps of Engineers; and the Canadian Government appointed, on recommendation of the Privy Council, Duncan W. McLachlan, of the Department of Railways and Canals, Olivier O. Lefebvre, Chief Engineer, Quebec Streams Commission, and Brigadier General Charles Hamilton Mitchell. The report of this Joint Board of Engineers was made on November 16, 1926. This report (p. 14) gives the following:

> "*Summary of effects of divisions and outlet changes.*—Omitting the small and varying changes resulting from the regulation of Lake Superior, the effect of the various diversions and outlet changes is found to be as follows. The minus sign indicates a lowering of lake levels and the plus sign a raising of lake levels.

"Cause	Amount of Diversion	Effect, in feet, on levels of Lakes—		
		Michigan and Huron	Erie	Ontario
	Cubic feet per second			
Authorized diversions:				
Chicago Sanitary District	8,500	—0.5	—0.4	—0.4
Power diversions, Welland Canal	2,050	—0.25	—0.1	0
All present diversions and outlet changes:				
Chicago Sanitary District	8,660	—0.5	—0.4	—0.4
Welland Canal	3,100	—0.04	—0.15	0
Black Rock Canal.......	1,000	—0.01	—0.05	0
Changes in St. Clair River Outlet—				
Prior to 1908........	....	—0.3	....	....
Subsequent to 1908...	....	—0.3	....	....
Gut Dam	....	....	....	(1) 0.4
Total............	....	—1.15	(1)—0.6	0.0

"(1) Upon the opening of the new Welland Ship Canal the lowering of the level of Lake Erie will be increased to 0.7 foot."

The instructions given to the Joint Board of Engineers, to which the two Governments agreed by an exchange of notes dated February 4 and March 17, 1925, included the following (*id.* p. 42):

> "*Question 6 (A)*.—To what extent and in what manner are the natural water levels in the St. Lawrence River and on the Lakes affected by diversions authorized by license by either Canada or the United States from or in the St. Lawrence River watershed?"

The Joint Board made specific answer to this question, with respect to the Chicago diversion, as follows (*id.*):

> "*Answer*.—The diversion by the Chicago Sanitary District of 8,500 cubic feet per second from the lake basin through the Chicago Drainage Canal, authorized by license by the United States, lowers the water levels on the Great Lakes and the St. Lawrence River as follows:

	Foot
Lakes Michigan and Huron	0.5
Lake Erie	.4
Lake Ontario	.4
St. Lawrence River between Lake Ontario and Montreal:	
At Prescott	.4
At Lock 25 (Iroquois)	.6
At Lock 23 (Morrisburg)	.5
At Lock 21 (Dickinsons Landing)	.4
At Lock 15 (Cornwall)	.3
Lake St. Francis	.2
Lake St. Louis	.3
St. Lawrence River at and below Montreal:	
At Montreal Harbor	.37
At Varennes	.35
At Sorel	.28
At Batiscan	.24
At Lotbiniere	.24
At Platon	.17
At Quebec	.03".

Colonel Pillsbury's testimony.—In support of their contention, the complainants called as a witness Lieutenant Colonel George B. Pillsbury, who was one of the Joint Board of Engineers whose report has been quoted. Colonel Pillsbury has been an officer of the Corps of Engineers of the U. S. Army since 1910. At various times, he has been in charge of river and harbor districts, on military duty, and associate professor of mathematics at the United States Military Academy. Since August, 1924, he has been in charge of the United States Lake Survey. Colonel Pillsbury testified that the United States Lake Survey was charged with the duty of measuring the outflow of the rivers connecting with the Great Lakes, as well as determining the lake levels, and in the course of its investigations the Lake Survey had made numerous careful measurement of the flow of these rivers, and that from these measurements there has been derived the relationship between the levels of the lakes and the flows of the rivers. Colonel Pillsbury testified that the method adopted was as follows:

> "A cross-section of the river was accurately measured, and with current meters the velocity of the stream is measured at frequent intervals across that section. The weighted average of these current measurements gives the mean velocity of the river which, applied to the cross-section, gives the mean discharge, or gives *the* discharge."

From the observation of flows certain formulae had been arrived at for determining the discharge of the St. Clair River for given elevations of Lake Huron and of Lake Erie, and also for ascertaining the lowering of Lakes Michigan and Huron at any particular stage of the lakes for a given diversion. Given an ascertained increment of the outlet river, and the amount of the diversion, the effect of the diversion is obtained. It appears from the testimony of Colonel Pillsbury, and also from that of Mr. Williams, defendants' expert, that by increment is meant that quantity of water which is added to or subtracted from the flow of the outlet stream in consequence of a change of one foot in the elevation of the governing lake. When water is subtracted from the flow of the outlet stream it is called a negative increment. The increment is thus the effect on the flow caused by a change of elevation of one foot, either up or down. When the increment of the outflow river is ascertained, the effect of a given diversion can be determined by dividing the amount of the diversion by the amount of the increment. Colonel Pillsbury gave the result of the computation as to the amount of the lowering of Lakes Michigan and Huron caused by a diversion of 8,500 c. f. s. from Lake Michigan was as follows:

> "When Lake Huron is at an elevation of 581.0 and Lake Erie is at 572.5, we find that a diversion of 8,500 cubic feet per second will result in the lowering of the level of Lakes Michigan and Huron by .488 feet. When Lake Huron is at an elevation of 578, and Lake Erie is at an elevation of 570.25, we find that a diversion of 8,500 cubic feet per second will result in the lowering of the lake by .562 feet. Having regard to the inherent inaccuracies of the data, it is my conclusion that a diversion of 8,500 cubic feet per second would lower the levels of Lakes Michigan and Huron by .5 of one foot."

Colonel Pillsbury also stated that the lowering which he had said would take place in Lakes Michigan and Huron would also take place in all the bays, inlets, rivers and harbor mouths in, or connecting with these lakes which are at the same level, and that when a harbor or port had been dredged at the river mouth the lowering would be felt in that dredged portion of the harbor. He also testified that the effect upon Lake Huron would be felt on the lower St. Marys River by a slightly decreased amount as one proceeds up stream as far as the floor of the locks of the Saulte Ste. Marie. It would also be felt in the St. Clair River and in the Detroit River.

Colonel Pillsbury gave determinations of the increments of the Niagara and St. Lawrence Rivers as well as of the St. Clair River. He testified with respect to the effect on Lake Erie of a given diversion from Lakes Michigan and Huron as follows:

> "I find that when Lake Erie is at an elevation of 572.5, the effect of a diversion of 8,500 cubic second-feet is .386. When Lake Erie is at an elevation of 570.25, the effect of a diversion of 8,500 cubic second-feet is .421. Having regard to the inaccuracies of the lake determinations, it is my conclusion that the effect of the diversion of 8,500 cubic feet per second from Lakes Michigan and Huron lowers the level of Lake Erie by .4 of a foot."

He added that this would be the case—

> "at any lake stage. That within the range of stages actually occurring, the greatest accuracy warranted is the statement that it would lower the level of that lake by .4 of a foot. It would lower it somewhat more at low stages than at high, but the difference is small."

Colonel Pillsbury further testified that, with respect to the effect upon Lake Ontario of a diversion from Lakes Michigan and Huron, he had verified the Warren report and reached the conclusion that the effect was a lowering of .4 of a foot for an abstraction of 8,500 c. f. s. The effect of the abstraction from Lake Michigan would be felt on the St. Lawrence as far as Quebec. (Particular determinations in official reports as to the effect on the levels below Lake Ontario appear to have been taken from reports received from the Canadian Government.)

It was also the testimony of Colonel Pillsbury that for an abstraction of any other amount than 8,500 c. f. s. the extent of the lowering of the lakes would be directly proportional to the effect of the abstraction of 8,500 c. f. s. Thus, for 1,000 c. f. s., the extent of the lowering could be determined by dividing by 8.5 the lowering caused by 8,500 c. f. s. When asked what he meant by "inaccuracies" of the Lake Survey determinations, he said that they "were errors that are necessarily present in any determination of stream flow." Colonel Pillsbury testified that, in his opinion, the method of taking observations and measurements, the instruments and equipment used, and the method of computation employed in arriving at the conclusions he had stated, were regarded as of particular precision; by which he meant that, "on account of the depths of the rivers, the large volume of flow, and the steadiness of the flow, the discharge measurements on the channels connecting the Great Lakes could be carried out to a much higher degree of precision than is possible in the ordinary stream."

Referring to other diversions Colonel Pillsbury stated that a study of the gauge records made by the Lake Survey indicated that, since 1910, the discharge capacity of the St. Clair River had increased by .38 of a foot of stage, and that would be equivalent, until the lakes adjusted themselves to the new discharge capacity, to between 4,000 and 5,000 c. f. s. Colonel Pillsbury further testified that, if the Chicago outlet should be closed up, the result would be to raise the surface of Lakes Michigan and Huron by six inches above the level they would have, had diversion continued, but would not restore the condition in levels that existed before the diversion commenced; it would fail to do so by the amount that the discharge capacity of the St. Clair River had been enlarged.

Testimony for Defendants.—The defendants point out the abtruse character of the calculations to determine increments and the uncertainty of the methods employed, and subject the observations and measurements of the Lake Survey to a critical analysis. They say that diversion tends to lower the lakes, but that no one can tell how much. They presented the testimony of Gardner Stewart Williams, who was civil engineer to the board of water commissioners of Detroit from 1893 to 1898; professor of experimental hydraulics and engineering, in charge of the hydraulic laboratory of Cornell University from 1898 to 1904; professor of civil, hydraulic and sanitary engineering in the University of Michigan from 1904 to 1911, and has later been in professional practice, and is the author of technical publications on hydraulics. He regarded the Lake Survey observations as defective, and the measurements of increment as affording an insufficient basis for a definite opinion. He made his own computation upon selected data of the Lake Survey which he believed would give a more accurate result. Upon his calculations, and taking into consideration the increases in discharge and increment which have occurred since the taking of the measurements upon which the calculations were based, he gave it as his opinion that the present increment of the Niagara River was about, but probably above, 33,000 c. f. s., and of the St. Clair River about 27,000 c. f. s. Assuming an increment on the St. Clair River of 27,000 c. f. s., he testified that the effect of the Chicago diversion of 8,500 c. f. s. upon the levels of Lakes Michigan and Huron would be to lower them a little over 3¾ inches. Assuming the increment of the Niagara River to be 33,000 c. f. s., it was his opinion that a diversion of 8,500 c. f. s. at Chicago would produce a lowering of the level of Lake Erie a little over three inches. If the diversion ceased, assuming that other diversions remained the same, the effect would be to raise the level of the lakes, respectively, to the same extent as they had been lowered by the diversion.

The most favorable view that could be taken of the testimony offered by the defendants would be that the lowering of the levels of Lakes Michigan and Huron, by a diversion of 8,500 c. f. s. at Chicago, would be about 3¾ inches. The evidence offered by the complainants would not support a conclusion that the effect of the diversion of 8,500 c. f. s. at Chicago would lower the levels of Lake Michigan and Huron more than six inches. The controversy, in substance, lies between about four inches and about six inches. In view of the nature of the problem involved in the determination, the necessity for the calculation of increments, the observations and measurements which underlie such a calculation, it is manifest that there are great difficulties in obtaining an exact result. The conclusion must inevitably be an approximation, although a close one. On examining the testimony, I am not satisfied with the range of the data selected by Mr. Williams, and I am of the opinion that no sufficient ground has been shown for rejecting the conclusions reached by the Lake Survey as approximately accurate. These conclusions are based on observations which have been made for many years, by competent persons, in the course of official duty which admittedly had high standards of precision in performance. The officials of the Lake Survey have been entirely disinterested and have had no relation to the contentions of the parties in the present suit. They represent as painstaking an endeavor to ascertain the fact as could be had. While exactitude would seem to be impossible, and some measure of inaccuracy always creeps into observations and calculations of such a nature, the degree of certainty obtained is a matter of expert opinion and I accept the testimony of Colonel Pillsbury as to the conclusions to be drawn from the data of the Lake Survey.

I find that the full effect of a diversion of 8,500 c. f. s. of water from Lake Michigan at Chicago through the drainage canal of the Sanitary District would be to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; the levels of Lakes Erie and Ontario, approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the abovementioned lakes, to the same extent, respectively.

By reference to the tabulation of flow in the Chicago Drainage Canal (*supra*, p. 22), it will be observed that the total flow at Lockport did not exceed 8,000 cubic second-feet until 1916, when it was 8,200 c. f. s., and from that time it exceeded 8,500 c. f. s. until 1920, when the total flow amounted to 8,346 c. f. s., and that the average from 1920 to 1924 was 8,674 c. f. s., and for the years 1925 and 1926 about 8,280 c. f. s. I find that the diversion which has taken place through the Chicago drainage canal has been substantially equivalent to a diversion of about 8,500 c. f. s. for a period of time sufficient to cause, and has caused, the lowering of the mean levels of the lakes and the connecting waterways practically to the extent above stated.

I find, further, that an increase of the diversion at Chicago above 8,500 c. f. s. would cause an additional lowering of the levels of the lakes and their connecting waterways in proportion to the amounts above stated. Thus a diversion of an additional 1,500 c. f. s. or a total diversion of 10,000 c. f. s. would cause an additional lowering in Lakes Michigan and Huron of about one inch, and in Lakes Erie and Ontario a little less than one inch, with a corresponding additional lowering in the connecting waterways having the same levels as the lakes respectively.

I also find that if the diversion at Chicago were ended, assuming that other diversions remained the same, the mean levels of the lakes and rivers affected by the Chicago diversion would be raised in the course of several years (about five years in the case of Lakes Michigan and Huron and about one year in the case of Lakes Erie and Ontario) to the same extent as they had been lowered, respectively, by that diversion.

15. *Damage to the Complainants caused by the Chicago diversion.*—The evidence on the question of damage due to the diversion at Chicago relates to navigation and commercial interests, to structures, to agriculture, to the conveniences of summer resorts, to fishing and hunting grounds, to public parks and other enterprises, and to riparian property generally.

Navigation and Commercial interests. — Upon this branch of the case, the evidence has taken a wide range.

Complainant States border on the Great Lakes, and embrace large areas of these lakes within their boundaries. Thus the evidence shows that Minnesota has within her boundaries 2,514 square miles of Lake Superior; Wisconsin has 2,378 square miles of Lake Superior and 7,500 square miles of Lake Michigan; Michigan has 16,653 square miles of Lake Superior, 12,922 square miles of Lake Michigan, 9,925 square miles of Lake Huron, and 460 square miles of Lake St. Clair and Erie; Ohio has 3,443 square miles of Lake Erie; Pennsylvania, 891 square miles of Lake Erie; and New York, 3,140 square miles of Lakes Ontario and Erie.

By the Transportation Act, 1920, sec. 500 (41 Stat. 499), Congress made it the duty of the Secretary of War to investigate the existing status of water transportation on the inland waterways of the country and any other matter that might tend to promote and encourage inland water transportation, and also to compile and publish such useful statistics and information concerning transportation on inland waterways as he might deem to be of value to commercial interests. "Inland waterways" as used in this provision was explicitly stated to include the Great Lakes. By the Merchant Marine Act of June 5, 1920, sec. 8 (41 Stat. 992), it was made the duty of the United States Shipping Board to make similar investigations in cooperation with the Secretary of War. Accordingly, an extensive report relating to the commerce of the Great Lakes was prepared (under date of June 17, 1925,) by the Board of Engineers for Rivers and Harbors of the War Department in cooperation with the United States Shipping Board, and published in 1926, under the title, "Transportation on the Great Lakes." In April, 1926, the United States Lake Survey office published a Survey of Northern and Northwestern Lakes (Bulletin No. 35), with detailed description of the lakes, connecting channels and Federal improvements. The above-mentioned report and survey, with other reports, have been introduced in evidence, and testimony has also been received with respect to the volume and character of traffic and conditions pertaining to navigation, on the Great Lakes and connecting waterways. It is deemed to be sufficient for the present purpose to state a few of the leading facts thus established.

The Great Lakes and their connecting channels form a natural highway for transportation having a water surface of over 95,000 square miles and a shore line of 8,300 miles, extending from Duluth-Superior, and from Chicago and Gary, to Montreal, at the head of deep-draft ocean navigation on the St. Lawrence. There are approximately 400 harbors on the Great Lakes and connecting channels, of which about 100 have been improved by the Federal Government. The Federal improvements in the case of harbors as a rule consist of the excavation and maintenance of channels from deep water in the lakes to the harbor entrance. Inner or local harbors are located inside of the Federal channels, and the depths in the inner harbors have been obtained and are maintained at local expense. For example, the inner harbor at the city of Milwaukee consists of three rivers which have been improved and maintained at local expense for a distance of eight miles. Inner harbors are necessary to afford practical navigation. Extensive and expensive loading, unloading and other terminal facilities have been constructed in these various ports within the territory of the complainant States, on the Great Lakes, at local expense. The water levels in the inner harbors and channels maintained at local expense and connecting with Federal channels and with the Great Lakes are ordinarily identical with and directly dependent upon the levels of the lakes with which they connect, except that in time of flood there might be some slight slope created at the mouth of the connecting river.

The volume and importance of the commerce of the Great Lakes is shown by the following extract from the official report above mentioned, entitled "Transportation on the Great Lakes" (pp. 420-426):

"Eliminating all known duplications, the recorded traffic of American ports during that year" (1923) "amounted to 125,517,551 tons, valued at $1,383,903,309. * * * Among the ports, Duluth-Superior led with a total of more than 59,000,000 tons of traffic received and shipped in 1923, while Buffalo ranked second with nearly 19,000,000 tons. Other important ports in the order of their rank are Ashtabula, Cleveland, Chicago (including Calumet), Conneaut, Toledo, Lorain, Ashland, Calcite, Escanaba, Milwaukee, Gary, and Indiana Harbor. From the standpoint of commodities, iron ore ranked first, coal second, grain third, and limestone fourth.

"The territory tributary to the Great Lakes is the most important grain producing district in the world. Not only does it include the more important surplus grain producing States in this country, but it includes nearly all of the grain territory of Canada. * * *. The importance of the grain territory tributary to the Great Lakes is shown by the fact that during the 10-year period ending with 1923, the States in this territory produced 71.8 per cent of the wheat, 78.7 per cent of the oats, 66.8 per cent of the corn, 73.1 per cent of the barley and 83.2 per cent of the rye of the United States. * * *

"The enormous volume of grain flowing eastward over the Great Lakes to many foreign and domestic destinations, is practically all shipped from four ports, Port Arthur-Fort William, Ontario, Duluth-Superior, Minn., and Wis., Milwaukee, Wis., and Chicago, Ill.

"Information is not available regarding the origin of all grain received at United States upper lake ports, but it has been possible in this report to show the origin by States of over 350,000,000 bushels arriving at those ports in 1923. Of this amount, Iowa supplied 41.9 per cent, Illinois 25.7 per cent, North Dakota 10 per cent, Minnesota 6.8 per cent, South Dakota 5.3 per cent, Montana 2.1 per cent, and smaller quantities came from other States.

"* * * The figures furnish no warrant for the belief, sometimes expressed that the grain traffic of the Great Lakes is declining. The tables of shipments from upper lake ports for each year show a consistent increase from 48,585,000 bushels in 1868 to 501,741,000 bushels in 1922. During the four-period 1920-1923, 62.3 per cent of the grain was of American origin and 37.7 per cent of Canadian origin. The proportion of Canadian grain is steadily increasing, however, and during 1923 amounted to 46.3 per cent of the total. American grain is shipped out by way of Canadian as well as domestic ports, and much Canadian grain moves through American ports. * * *

''A flow chart contained in this report shows that the total movement of grain on the Lakes during the year 1923 was 409,849,000 bushels, of which Lake Superior ports supplied 369,700,000 bushels, or 90.2 per cent of the total. The shipments from Fort William-Port Arthur alone amounted to 73.1 per cent of the total grain moved on the Great Lakes during that year.

* * * * * *

''From the standpoint of volume, iron ore is the most important commodity moving on the Great Lakes. In 1923 ore shipments constituted nearly 50 per cent of the total lake traffic. The six ranges in the Lake Superior region during that year shipped 80 per cent of the total ore moving from domestic mines. * * *

''The ore moving on the Great Lakes is shipped from the five ports of Duluth-Superior, Two Harbors, Ashland, Marquette, and Escanaba. In 1923, Duluth-Superior shipped nearly 38,000,000 long tons. The ore was received at 14 ports on Lake Michigan and Lake Erie. Ashtabula was the leading port of receipt with 10,499,325 long tons, followed in the order named by Cleveland, Conneaut, South Chicago, Buffalo, Gary, and Lorain. Smaller amounts went to other ports. Of the total receipts at Lake Erie ports, amounting in 1923 to 43,678,000 tons, 9,300,000 tons were consumed at the ports and 34,378,000 tons were forwarded to smelters in the States of New York, Pennsylvania, Ohio, West Virginia, and Maryland. Pittsburg received 14,602,000 tons, Youngstown 7,413,000, Johnstown 2,000,000, Sharon 1,800,000, Steubenville, 1,700,000, and Wheeling 1,310,000.

* * * * * *

"By means of the navigable channels of the Great Lakes and connecting waterways, large quantities of coal from Ohio, Pennsylvania, Virginia, West Virginia, Tennessee, and Kentucky reach consuming markets in the Northwestern States and in the Provinces of Canada. The movement of coal from mines to ports of loading on Lake Erie and Lake Ontario during 1923 amounted to 34,293,373 tons, consisting of 30,760,487 tons of bituminous and 3,532,886 tons of anthracite. Lake Erie ports received 32,866,138 tons, while Lake Ontario ports received 1,427,235 tons. Toledo was the leading shipping port for bituminous coal with a total of 9,100,341 tons, followed by Ashtabula with 5,526,974 and Lorain with 3,608,025 tons. The anthracite coal moved chiefly from Buffalo, with smaller amounts from Charlotte and Sodus Point on Lake Ontario. Of the cargo coal shipped from lower lake ports, Lake Superior received 16,099,000 tons, Lake Michigan 8,087,000, St. Marys River, 1,509,000, Detroit and St. Clair Rivers 1,344,000, Georgian Bay 972,000, and Lake Huron 318,000 tons. Duluth-Superior led all ports with total receipts of 10,897,746 tons.

"Large amounts of coal shipped by lake were consumed at the upper lake ports. During 1923 the rail movement of coal from upper lake ports to northwest territory amounted to 8,621,337 tons. Of this total, 6,548,618 tons moved from the ports of Duluth-Superior and Washburn-Ashland on Lake Superior, and 2,072,719 tons from ports on Lake Michigan. The Lake Superior ports shipped 4,927,594 tons to points in Minnesota, 639,746 tons to Wisconsin, 401,921 tons to North Dakota, 277,119 tons to South Dakota and lesser amounts to Canada, Iowa, upper Michigan, Illinois and other states. From the Lake Michigan ports, a total of 1,191,944 tons were shipped to points in Wisconsin, 556,284 tons to Michigan, 164,276 tons to Iowa, and lesser amounts to the Dakotas, Minnesota, Illinois and Nebraska.

"In addition to iron ore, coal, and grain, the bulk commodities of importance carried on the Great Lakes include stone, sand and gravel, lumber, and petroleum. Of these, stone, consisting principally of limestone, is the most important in tonnage. Together these commodities comprised about 12 per cent of the lake traffic in 1923.

"With the exception of about 700,000 tons, the stone shipped on the Lakes in 1923 originated in the upper peninsula of Michigan. Calcite was the principal shipping point with 7,502,000 tons, while Rockport shipped 865,000 and Alpena 654,000 tons. Other shipping ports were Kelley's Island, Ohio, Sturgen Bay, Wis., and Toledo, Ohio. Calumet (South Chicago) received 1,884,876 tons, leading all ports of receipt, while Buffalo, N. Y., and Gary, Ind., were second and third, respectively. Other important receiving ports were Cleveland, Lorain, and Fairport, Ohio, Duluth-Superior, Minn., and Wis., and Indiana Harbor, Ind.

"The traffic in forest products on the Great Lakes has declined steadily since 1902, when 2,182,942 tons moved through the St. Marys Falls Canal. In 1923 the movement amounted to 378,674 tons. The merchantable lumber of the lake region has been largely exhausted and this territory has changed from an exporting to an importing status.

"Petroleum products are carried in tankers from refineries at Indiana Harbor to various ports on Lake Superior and Lake Michigan, and also to Detroit and Toledo, where they are stored in tanks for local distribution. The movement in 1923 amounted to 1,577,518 tons.

"The movement of sand and gravel is of a local nature, the hauls generally being short. Frequently only the receipts are of record. In 1923 the imports from Canada amounted to 686,130 tons and the domestic receipts to 3,771,160 tons.

"The history of the package freight trade on the Great Lakes discloses a condition wholly dissimilar to that attending the development of important bulk freight. While the population, commerce, and industry of the Lakes region as a whole has been increasing steadily, and the tonnage of rail carriers serving this district shows an important development of high-class traffic, the business of this character on the Great Lakes has experienced a steady decline in recent years, and in 1923 amounted to only 3,000,000 tons, or about 2.5 per cent of the total lake trade.

* * * * * *

"The car-ferry business of the Great Lakes has grown to considerable proportions and special types of carriers have been developed for this purpose. The modern car ferries are constructed of steel and are 360 to 370 feet long. The car ferries across Lake Michigan save considerable time by avoiding passage through the congested Chicago district. The improvements provided by the United States at the lake harbors have permitted the successful development of the car-ferry routes.

"The importance of the water-borne traffic on the Great Lakes will be evident from the following summary of the ton-miles of water haul of the principal bulk commodities during 1923:

	Ton-miles
Iron ore	47,043,965,000
Wheat	7,265,271,000
Oats	569,672,000
Corn	426,348,000
Barley	383,416,000
Rye	637,826,000
Coal	21,579,493,000
Stone	3,560,911,000
Total	81,466,902,000."

The interest of the complainant States and of their people, by reason of their ports on the Great Lakes, in this commerce is manifest, and it is not deemed to be necessary to set forth further statistics with respect to particular places and commodities. The question is with respect to the effect on navigation and commercial interests of the lowering of the Great Lakes caused by the Chicago diversion.

In the report of Colonel E. M. Markham, district engineer at Detroit (May 19, 1925), which, with reports of the Board of Engineers for Rivers and Harbors (January 26, 1926) and of the Chief of Engineers (March 10, 1926), was transmitted to Congress March 11, 1926, pursuant to Act of March 3, 1925, 43 Stat. 1196 (House Doc. 270, 69th Cong., 1st sess.), it is said (*id.*, p. 26): "Accordingly, throughout such channels" (referring to channels improved by the Federal Government between Lake Superior and Lake Erie) "the average depth over project width is generally somewhat over 21 feet below improvement planes as at present authorized." These improvement planes were fixed in 1916 for the several lakes at levels deemed to be representative of lowest probable water, as follows (*id.*, p. 19):

"Lake Superior	601.6
Lake Huron-Michigan	579.6
Lake St. Clair	573.8
Lake Erie	570.8."

In the case of Lake Michigan the actual mean level for 1925 was 578.24, or about one foot and four inches lower than the reference plane, and there were lower monthly mean levels than this mean level for the year.

The amount of permissible draft of vessels carrying the greater portion of the freight traffic between Lake Superior and Lake Erie has been increasingly important.

Colonel Markham, who served as district engineer at Detroit for six years, from 1919 to 1925, states in his report as to capacity of vessels carrying this traffic (*id.*, p.23):

> "By or before 1902, the prospect was observable of materially larger ships and of a greater expansion of tonnage, and was arranged for in 1906 by authorization for a third lock at St. Marys Falls, 80 by 1350 feet, with sills set at a depth of 24½ feet, thus providing at that

> time for future ship drafts consistent with the adopted sill depths. Meantime the business of the lakes has continued to be done upon the presumption that channel depths and widths would be suitable for at least a 20-foot draft. It should be observed in this connection, however, that all freighters constructed since about 1906 have been designed upon a draft theory of 23 to 24 feet, with commensurate length and beam. Practically, even a 20-foot draft through the complete navigation season has rarely been provided for."

Colonel Markham states that the percentage of the season when less than 20-foot drafts were employed through St. Marys River was as follow: 1921, 45 per cent.; 1922, 85 per cent.; 1923, 82 per cent.; 1924, 100 per cent.

The effect of a deprivation of six inches of draft is thus stated in Colonel Markham's report (*id.*, pp. 24, 25):

> "The extent of the adverse consequences to lake shipping due to receding levels below St. Marys Falls is apparent from an analysis of the 1923 Lake Superior trade, for which the very complete records of Sault lockages have been utilized. The year's business was done on the following drafts: from May 1 to 31, 19 feet; May 31 to July 19, 19 feet 6 inches; July 19 to August 28, 20 feet; August 28 to December 17, 19 feet 6 inches.
>
> "Consideration of individual loaded boats and of their respective dimensions shows that, if water had been available for an additional six inches of draft, the fleet could have handled for the year 3,346,000 tons more than was actually transported, or, to put the matter in another light, the season's business could have been done with the elimination from service of about 30 freighters of the 2,000-3,000-ton class. It should be emphasized that the reference is to Lake Superior trade alone. It is estimated that the lost tonnage of the total through business of the Lakes for 1923, incident to a 6-inch deficiency of draft, exceeded 4,000,000 tons. The average water-haul rate for the year was 88 cents per ton.

> "For the year just closed" (1924) "shipping was done on a draft throughout of 19 feet, with occasional exceptions up to 19 feet 6 inches. The year's 'tonnage loss' applicable to the total lake trade, reckoned from a base draft of 20 feet, was probably in excess of seven millions. For the season of 1925, shipping has opened at a draft of 18 feet 6 inches, with the unlikelihood that the best water of the year will permit a safe draft in excess of 19 feet.
>
> "From the above outline of lake commerce, and of the number, dimensions and capacity of the lake freighters doing its bulk business, two facts become evident: First, that the existing fleet could carry seasonally, on drafts for which designed, something like twenty-five to thirty million tons in excess of the cargo possible of transport by the same boats over the channel depths now available; second, that the loss of inches in channel depth due to receding levels or otherwise is a matter of large import with respect to shipping efficiency and to the transportation charges of the bulk commodities concerned."

Colonel Markham, called as a witness for the complainants, gave testimony in support of his report.

The Joint Board of Engineers, United States and Canada, in their report above-mentioned (November 16, 1926) stated (p. 4) that "in the latter part of the navigation season of 1925, the depth available was 18 feet, and at no time during that year did the maximum draft that could be carried from Lake Superior to Lake Erie exceed 19 feet."

In the above mentioned report entitled "Transportation on the Great Lakes" (p. 36) it is said: "With the loss of every inch of draft below 20 feet, the modern lake bulk freighter suffers a loss of from 90 to 100 tons in cargo capacity. It will gain a corresponding amount for every inch of draft in excess of 20 feet." There are critical points of navigation, e. g., in the St. Mary's River, the St. Clair River, Lake St. Clair, and the Detroit River and vessels are loaded with respect to available depths at such points. While there are quite definitely established routes or lanes for vessels plying between the various ports on the Great Lakes, vessels deviate from such courses in bad weather, both because of the difficulty of maintaining the course with precision under such conditions, and because of the necessity of seeking protection under weather shores. At such times, when the vessel is of necessity off the regular steamer track, a lowering of the level of the lakes increases the hazards and dangers of navigation, contributing to groundings or strandings.

The defendants point to other diversions and artificial changes in the Great Lakes and connecting channels, which have contributed to this total lowering of levels. It is evident, however, that during a period in which the level of the Great Lakes is being lowered, an additional lowering, even of six inches, would be even more serious in its consequence than if it occurred at a time when other causes did not operate to lower the levels of the lakes or operated to raise them.

These are not actions for damages, and it is not necessary to attempt to estimate with precision the extent of the damage caused by a lowering of six inches in lake levels. The defendants have introduced evidence for the purpose of showing that the claims of damage have been exaggerated, but after considering the testimony and critical analyses presented by the defendants, I am satisfied that the evidence requires the finding that the lowering of lake levels of approximately six inches has had a substantial and injurious effect upon the carrying capacity of vessels, and has deprived navigation and commercial interests of the facilities which otherwise they would have enjoyed in commerce on the Great Lakes.

With respect to the other items of damage alleged by the complainant States, similar considerations are deemed to be controlling. The witnesses naturally observe the total lowering of lake levels, and much of the testimony permits no satisfactory conclusion as to the damage that can be attributed exclusively to the Chicago diversion accounting for only six inches of the total reduction. But there is sufficient evidence to require the finding that a lowering of six inches has been a substantial contribution to the injury caused by the total reduction, in connection with fishing and hunting grounds, the availability and conveniences of beaches at summer resorts, and public parks.

Evidence was introduced by the complainants to show an injury to agricultural and horticultural interests by the lowering of the level of Lakes Michigan and Huron by reason of the consequent recession of the ground water table, or the level at which hydrostatic or free water is found beneath the soil. The evidence relates particularly to places along the shores in the States of Michigan and Wisconsin, where it is urged that the utility of the land for agricultural and horticultural purposes has been seriously impaired. Considering this evidence, and that introduced by the defendants which included the testimony of Mr. Oscar E. Meinzer, geologist in charge of the Division of Ground Water, United States Geological Survey, I am unable to conclude that the injury alleged to have been sustained in relation to agriculture and horticulture has been sufficiently shown to warrant its consideration in determining the effect of a reduction of approximately six inches in lake levels, due to the Chicago diversion.

Complaint is also made, particularly in the case of Milwaukee, as to the effect of the lowering of the level of Lake Michigan upon the pile foundations of structures. Structures resting upon such foundations are numerous, and it is well established that the piles must be kept submerged, to an extent which will admit, through capillarity, adequate moisture to their tops, in order to avoid decay. Instances of such decay have been given, and the damaging effect at Milwaukee of the lowering of the level of the adjacent waters has been shown. But the extent to which the six-inch reduction in that level has contributed to this injury does not clearly appear.

My conclusion on this branch of the case is that, while the damage proved to have been sustained by the complainants has been due to the combination of causes which have brought about the total lowering of the levels of the lakes and connecting waters, the contribution made by the diversion of the water of Lake Michigan through the Chicago drainage canal must be regarded as substantial, although the proportion of the damage caused by the reduction of approximately six inches is not susceptible of exact computation.

I therefore find that the complainants have established that the diversion through the Chicago drainage canal has caused substantial damage to their navigation, commercial and other interests as above stated.

16. *Effect of the Chicago diversion on the Illinois and Mississippi Rivers.*—The defendants, and especially the intervening defendants, the Mississippi Valley States, have stressed the great importance of the development of the Lakes-to-the-Gulf Waterway. It is urged that the Panama Canal has proved a serious handicap to the industrial development of the Mississippi Valley; that by opening a short all-water route, forcing down rail rates, it has provided cheap transportation from our eastern seaboard to the western coast of both continents, and to the Orient; that this benefit does not appear to be enjoyed by the States of the Mississippi Basin, and that the average cost of the transportation of food products to European markets is injurious to the agricultural interests of these States.

It has not been regarded as being within the scope of the reference to the Special Master that he should attempt to determine the relative values to commerce of the Great Lakes-St. Lawrence Waterway, and the Lakes-to-the-Gulf Waterway, or that he should enter upon the great variety of collateral inquiries necessary to estimate the benefits to particular districts, or the particular advantages as to rates or commodities which might result from the development and maintenance of navigation from Lake Michigan to the Mississippi River and the Gulf of Mexico. These are matters to which Congress has given elaborate consideration. For the purpose of the proper determination of the issues in the present suits, it has been thought that it could be assumed that the commerce of the Mississippi Valley and the improvement of navigation on the Illinois and Mississippi Rivers, were matters of national concern, and that the people of the Mississippi Valley States, and, indeed, other States, would be benefited by improvements in the facilities of transportation. The precise question which may be deemed to be relevant in this controversy is, whether the diversion at Chicago can be regarded as an aid to navigation on the Illinois and Mississippi Rivers, and if so, to what extent, and what would be the effect of cutting off or limiting that diversion.

(*a*) *Illinois River.*—The present commerce on the Illinois River is small. It appears that in 1925, the total commercial freight, both ways, was 96,080 tons. In the same year, the total freight traffic over the Chicago Drainage Canal was 688,295 tons, 97 per cent. of which consisted of stone, largely removed from the spoil banks along the canal.

Illinois Waterway.—Plans for what is called the Illinois waterway, which is under improvement by the State of Illinois, that is, on the upper Illinois River, from Lockport to Utica, about 61 miles, are based on a diversion from Lake Michigan of at least 4,167 c. f. s. The depth designed with such diversion is eight feet, with fourteen feet over the mitre sills of locks, for future improvement. With present diversion, the depth will be about nine feet. If the diversion were reduced materially below 4,167 c. f. s., it would necessitate radical changes in the design and location of the locks, three of which are already either constructed or under construction, and increased outlays. Illinois has authorized the expenditure of $20,000,000 for the completion of the waterway, of which between $5,000,000 and $6,000,000 has been expended, or is payable under contracts. The Illinois waterway as planned will have a capacity of about 60,000,000 tons per annum. There is no adequate water supply for lockage, except by diversion from Lake Michigan. Other plans would involve prohibitive expense.

The Chief of Engineers and the Secretary of War, in approving the plans for the waterway in 1920, stated that it was not to be understood as authorizing the diversion of water from Lake Michigan, but merely expressed approval so far as concerned the public right of navigation, and that the provision was without prejudice to the use by Illinois of such flow as might be existing in the Illinois and Des Plaines Rivers. The profile map accompanying the plans contains a notation that the water services shown were "based on an assumed flow of 4,167 c. f. s., already approved, as a diversion from Lake Michigan, plus the normal flow from other sources in various pools"; that is, the assumption was of 6,000 c. f. s. flow, made up of 500 c. f. s. as an actual low water flow, 4,167 c. f. s. from Lake Michigan, and 1,395 c. f. s., as averaging the amount of Chicago's pumpage.

Lower Illinois River.—The lower Illinois River, from Utica, to Grafton on the Mississippi (230 miles) is a shallow, sluggish stream, carrying from 500 to 1,000 c. f. s. of natural low water flow. In its natural state, it is inadequate for modern river navigation. The Federal project depth has been seven feet; but this could not have been maintained without at least 8,500 c. f. s. from Lake Michigan, which gives, in the lower Illinois, about four feet of the low water depth of seven feet. The Chicago diversion has increased the navigable capacity of the river. This stretch of the river is adaptable to improvement as an open channel, but if there were no diversion at Chicago, a large amount of improvements and several locks and dams would have to be provided. The question appears to be largely one of cost.

Reference has already been made to the Report of Colonel Judson of March, 1921 (*supra*, p. 69), and that of the Board of Engineers for Rivers and Harbors of October, 1921 (*supra*, p. 70), with respect to the effect of various amounts of diversion on the navigable capacity of the Illinois River and the plans for its improvement. It will be observed that Colonel Judson stated that "for a 9-foot channel, with an increment of 4,167 second-feet, the cost either with dams retained or removed appears almost prohibitive," and his recommendation was for the adoption of an 8-foot project, "based on a 7,500 second-feet withdrawal for purposes of estimate and with all dams removed." He added that with the withdrawal of 10,000 c. f. s from Lake Michigan that increment would of itself increase the depth to nine feet.

In the Report of Major Putnam of April, 1924 (*supra*, p. 72), it is said:

> "There is no doubt but what navigation conditions have been improved by the diversion of water from Lake Michigan. Originally the low-water discharge at La Salle was in the neighborhood of 500 cubic feet per second, while at Grafton it was near 1,000 second-feet. The addition of over 8,000 cubic feet per second, while increasing the slope and the velocity slightly, produced a discharge of about 8500 cubic feet per second at La Salle and about 9,000 at Grafton. Depths throughout the entire stream were increased substantially as may be seen from the following table and as indicated by comparing the profiles in Plate VII:

Miles above Grafton	Name of Place	Increased depth with 8,000 cubic feet per second diversion
223.2	La Salle	5.0
88.6	Beardstown	2.2
0.0	Grafton	1.2

* * * * * *

> "* * * Assuming that the existing 7-foot project based on a flow from Lake Michigan of 4,167 second-feet is completed, it will cost about $2,400,000 to pro-

vide a 9-foot channel between La Salle and Grafton with a flow of 5,000 cubic feet per second, or about $800,000 with a flow of 8,000 cubic feet per second. If the flow were increased to 10,000 second-feet the cost would be about $400,000."

By the Act of January 21, 1927, 44 Stat., Pt. 2, 1013, Congress provided for the modification of the existing project for the Illinois River so as to provide a channel with least dimensions of nine feet in depth and 200 feet in width from the mouth to Utica.

The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than 1,000 c. f. s. of water is sufficient to supply all the needs of navigation. I am unable so to find. The needs of navigation on that waterway will depend upon the carrying out of plans already adopted and upon the ultimate decision of Congress with respect to water communication between Lake Michigan and the Mississippi River, the extent to which locks and dams are to be used or installed, that is, the character of the improvements and the amount which it is determined to expend.

(*b*) *Mississippi River.*—The defendants introduced evidence to show that the effect of 10,000 c. f. s. diverted from Lake Michigan to the Mississippi River would be to raise the stage of that river at Grafton, from two feet at low water, to 1.2 feet at mean stage; at St. Louis, from one foot at low water, to six inches at mean stage; at Columbus, Ky., from seven inches to three and one-half inches; and at Vicksburg, from six inches to a little over two inches. The Government reports state that the effect of the diversion of 10,000 c. f. s. at Chicago is to raise the mean stage of the Mississippi River one foot at St. Louis.

Whether, and to what extent, this increment is an aid to navigation on the Mississippi River is disputed. The controversy arises from the peculiar characteristics of the stream. In time of floods or high water, in the absence of appropriate regulation, the increment, instead of being a benefit to navigation, would increase its hazards and might, indeed, be the added flow that would cause serious injury. But the chief difficulties to navigation are usually found in the period of low water. The volume of the Mississippi River above St. Louis is increased by various tributaries, the Illinois, the Missouri, the Ohio, and many important lower streams. The contributions from these tributaries are not always the same, and do not always occur at the same time during each year; so that the records of stage show considerable variations during each year. Beginning with extreme low water at the time of ice formation in the upper river, the volume of water increases, through a period of gradual rise, until the month of July, and from July until the end of the navigation season at St. Louis, usually about the middle of December, the high water of the early part of the year gradually decreases down to extreme low stages. Variations occur in this process. The Missouri pours into the Mississippi a large amount of silt, that moves downstream with the current, and is increased by bank erosions. When there is a decrease in current, any obstruction in the bed of the stream will serve to accumulate a large amount of the water-borne silt. Navigation on the river is conducted through a series of pools, separated by bars, and it is the depths over the bars that limits the depth which tows and barges may draw.

The complainants insist, and they are supported by the testimony of Brigadier General W. H. Bixby former Chief of Engineers, that the increment due to the diversion of water from Lake Michigan does not appreciably aid navigation, for the reason that, as the stage of the river rises, the bars also rise, and as these bars furnish the critical points in the periods of low water, there is no addition, by reason of the Lake Michigan increment, to the available depths for navigation over the bars. This view is set forth in Government reports.

On the other hand, Major John C. Gotwals, United States district engineer at St. Louis, in charge of the Mississippi River between the mouths of the Missouri and the Ohio, and other engineers, testified, in substance, that as the plane of the surface of the river rises, the channel depths over the bars also increase, but not to the same amount in feet or inches as the increase in stage. According to their testimony, the silt accretions to the bars cause them to rise to some extent and under some conditions, but the rise in bars is not so great as the rise in stage, and hence an increase in stage does produce a substantial effect upon navigable depths over bars. Major Gotwals testified, in substance, that the rise of bars as related to rise in stage was, broadly speaking, about one-half.

My conclusion is that the diversion from Lake Michigan through the drainage canal increases to some extent during low water the navigable depths over bars on the Mississippi River, but that the extent of this increase is not the subject of sufficiently accurate determination to warrant a finding. Upon all the facts, it was permissible for the Secretary of War to reach the conclusion that the diversion from Lake Michigan of 8,500 c. f. s., was to some extent, an aid to the navigation of the Mississippi River in time of low water.

The defendants introduced evidence as to the amount expended by the Federal Government in the improvement of the Mississippi, and that since 1918 the United States has itself been conducting a common carrier barge-line transportation on the Mississippi River, between St. Louis and New Orleans. This is said to be an example of the policy of the United States in creating and fostering inland water transportation. It is shown that the towboats and barges of the Inland Waterways Corporation, nationally owned and operated under the control of the Secretary of War, require a channel not less than nine feet deep and 250 feet wide. The difficulties of maintaining such a channel and the delays and consequent losses due to lack of water at critical points, have been set forth.

This evidence simply serves to show the national interest in the navigation of the Mississippi River, and this may well be taken for granted; but the question here is considered to be one with respect to the effect of the Chicago diversion in giving an improved depth of channel. It is not controverted that the Secretary of War had these considerations before him, on the application and hearing which resulted in the permit of March 3, 1925.

17. *Feasibility of remedial works to offset the effect of the Chicago diversion.*—One of the conditions of the permit of March 3, 1925, was that the Sanitary District should pay its share of regulating or compensating works, to restore the levels, or compensate for the lowering of the levels of the Great Lakes system, if and when constructed, and post a guaranty in the way of a bond or certified check, in the amount of $1,000,000, as an evidence of its good faith. From an engineering standpoint, the evidence shows it to be practicable to provide such works. This question has been the subject of inquiry by Congress, and of reports pursuant to its direction (Report of Board of Engineers on Deep Waterways, June 30, 1900; House Doc. 149, 56th Cong., 3nd sess.; International Waterways Commission, 1907, House Doc. 779, 61st Cong., 2nd sess.).

The Act of Congress of June 25, 1910, provided for a special board of engineers, to report upon a waterway from Utica, Ill., to the mouth of the Illinois River, and upon such measures as might be required to compensate for diminished level, by means of any diversion of water from Lake Michigan for the maintenance of the proposed waterway, or diversion for any other purpose. The report (August 15, 1913) of this Board, with the report of the Board of Engineers for Rivers and Harbors (December 16, 1913), was transmitted to Congress on February 18, 1914 (House Doc. 762, 63d Cong., 2nd sess.). The special board reported as follows (*id.*, pp. 11, *et seq.*):

> "To restore the diminished levels in the Lakes by constructing contracting works in their outlets does not,

however, present any serious difficulties. A careful discussion of the proper locations and dimensions of such works is also given in Appendix A.

"At the foot of Lake Ontario, the closure of the Gut channel of the Galops Rapids by the Canadian Government has had the effect of raising the level of Lake Ontario an amount nearly equal to the computed lowering of the Lake by a diversion of 10,000 second-feet at Chicago, and no compensation is at present deemed necessary to restore former conditions in this Lake.

"In Appendix A, it is proposed to diminish the outflow of Lake Erie, by the construction of three submerged weirs in the Niagara River in the vicinity of Squaw Island, which would average about 4.2 feet in height, and would contain about 15,000 cubic yards of masonry. The estimate cost is $150,000.

"To raise the level of Lakes Michigan and Huron, submerged weirs are proposed in St. Clair River, covering three miles of river below the mouth of Black River, at Port Huron. The weirs as suggested in Appendix A have a height of from five to six feet above the river bed, contain about 65,000 cubic yards of material, and their estimated cost is $325,000. It is computed that these weirs will increase the velocity of the water flowing over them slightly (from a mean of 3.28 feet to 3.89 feet per second) but on the other hand, above the mouth of Black River, the river slopes and velocities which are now excessive, will be diminished and navigation on the whole will be considerably benefited.

"The Chicago diversion has no effect on Lake Superior.

"Compensation for the loss of elevation on Lakes Michigan, Huron and Erie, and their connecting waters, due to an assumed diversion from Lake Michigan of 10,000 second-feet, will, by the plan above outlined, involve an expenditure of about $475,000, to which should be added an amount for the maintenance of the weirs, estimated at about $15,000 per year, the total cost being much less than the cost of restoration of

> depths by dredging. It is the opinion of the board that while other plans have been proposed, compensation by fixed contraction works, similar in general to those above described affords the cheapest and most satisfactory method of preserving the levels of the Great Lakes."

The Warren report (*supra*, p. 66) recommended a system of submerged weirs to repair the damage caused to Lake St. Clair, the St. Clair River, and Lakes Huron and Michigan through the lowering of the levels of these waters. Colonel Warren stated (p. 90):

> "128. There are three general methods by which a restoration of depths on the lakes may be sought—first, the deepening of all harbors and channels affected by the artificial lowering of water levels; second, the construtcion of regulating works in the outlets of the lakes to raise the levels of the lakes and to control their elevations within fixed limits; third, the contraction of the outlets by means of fixed obstructions which will raise the levels of the lakes without greatly affecting their natural fluctuations.
>
> "129. The first method is considered altogether too expensive, and has other unsatisfactory features. It is recommended only for a few special cases. The second has frequently been proposed, but upon investigation it is found to be less simple than it appears. It involves obstructions to navigation and difficulties with ice. Moreover, it has been shown that efficient regulation of one lake tends to aggravate the fluctuations of those below it. This system has been adopted at the Soo, where circumstances are particularly favorable to it, but its suitability for the lower lakes is problematical. The third method is the cheapest and simplest, and is considered the most desirable. It is already operating successfully in the case of the Gut Dam.
>
> "130. In section G 7 of Appendix E the works needed at various places to compensate for the effects of all

diversions, present or prospective, are considered in some detail. It is concluded that the project is entirely feasible and that the expense will not be excessive in view of the benefits received. The works involved include wing walls or other methods of narrowing the channels at the head of each of the St. Lawrence Rapids, a long submerged rock weir about the rapids at Niagara Falls, and a series of such weirs near the head of the Niagara River and in the upper reaches of the St. Clair River. To effect the required deepening in Lake St. Clair and at the head of the Detroit River it was thought that dredging would be most satisfactory."

The Board of Engineers for Rivers and Harbors, commenting upon this recommendation of Colonel Warren, said (*id.*, p. 44):

"The division engineer rejects the first and third plans for restoring levels and proposes to restore the levels of Lakes Erie, Huron, and Michigan by the construction of two sets of submerged weirs. One set of five would be at the head of the Niagara River abreast of Squaw Island, cost about $2,000,000, and raise Lake Erie 1.27 feet, Lake St. Clair about 0.55 foot, and Lakes Huron and Michigan about 0.16 foot, leaving 0.28 foot to be compensated by dredging in Lake St. Clair. The second set of about 11 weirs, spaced about one-third mile apart in the St. Clair River, would cost $1,500,000 and would raise Lakes Huron and Michigan 0.60 foot more. The levels of these three lakes and the connecting rivers between them would, at a total cost of about $3,660,000, be not only fully restored, but provision made for the lowering that would be caused by some additional diversion, the margin on Lake Erie being 0.51 foot and on Lakes Huron and Michigan 0.29 foot.

"85. These submerged weirs would leave the natural oscillation of Lakes Erie and Huron undisturbed. They would reduce the discharge capacity of the St. Clair and Niagara Rivers to what it was before any diversions or other artificial changes were made and

> permit the lakes to fluctuate between such levels as would have resulted from purely natural causes, such as changes in precipitation, evaporation, etc. To design the weirs correctly, proper model experiments would be desirable and also prolonged gauge observation. In other respects, the weirs are a sound and workable solution of the problem of improving navigable depths, in some respects preferable at the time they were recommended to any other plan."

The Joint Board of Engineers, United States and Canada, in its report of November 16, 1926 (*supra*, p. 96), stated (pp. 14, 17):

> "78. The levels of the Great Lakes can be raised by works in their outlet rivers, which may be wholly in the form of fixed weirs and contractions, or may be provided with sluice gates. The first of these have come to be termed 'compensating works,' while the second are termed 'regulating works.'
>
> "79. The effect of compensating works is to raise both the high and low lake levels in substantially the same degree, the fluctuation of levels remaining unchanged. After the lake levels have adjusted themselves to the new regimen of the outlet, the outflow from the lake will likewise be substantially the same as if the compensating works had not been built. By operating the gates of regulating works the discharge from a lake, and consequently the levels of the lake, can be controlled within limits to be discussed later.
>
> * * * * * *
>
> "95. The investigations made by the Board show that it is advisable to construct compensating works in the Niagara and St. Clair Rivers to counteract the effect of all diversions and outlet enlargements on the levels of Lakes Michigan, Huron and Erie."

The Board then describes the works proposed in the Niagara River and St. Clair River. The cost of the works proposed on the Niagara River is estimated at about

$700,000, and on the St. Clair River, $2,700,000. The report then continues (*id.*, pp. 17, 18):

> "98. This form of compensating works is selected primarily for the reason that the sills will not reduce the navigable width of this important waterway" (St. Clair River) "nor will they increase the cost of providing a channel depth of 30 feet. While these works once built cannot be altered readily to meet a future reduction in the amount of the Chicago diversion, yet on account of the commercial value of the gravel in the river bed it would not be costly to again enlarge the capacity of the river to meet such a reduction.
>
> "99. *Construction periods.*—To avoid an unwarranted reduction in the flow of the Niagara and St. Lawrence Rivers while the Lakes are being raised by the compensating works, the construction on the Niagara River should be spread over two years and on the St. Clair River over four years time, and the prosecution of the latter should be suspended during any extreme low water periods that may occur at the time they are undertaken.
>
> "100. *Compensation for authorized diversions only.*—The proposed compensating works will counteract not only the effect of diversions authorized by license in the United States and Canada but also the effect of outlet enlargements, diversions for navigation, and diversions not covered by license. The lake levels could be restored by similar but less extensive works to the extent that they have been reduced by diversions authorized by license in the two countries. The cost of such works would be nearly proportional to the amount of compensation of level affected, and is estimated as follows:

Diversion compensated for	Cost of works in Niagara River	Cost of works in St. Clair River
Chicago Sanitary District.......	$400,000	$1,350,000
Power diversions, Welland Canal	100,000	........"

By the instructions given to the Joint Board of Engineers by the Governments of the United States and Canada, the Board was directed to answer the following questions (*id.*, p. 43):

> "*Question 6 (B)*.—By what measures could the water levels of navigable depths affected by the diversions referred to in Section 6 (A)" (which included diversion at Chicago of 8,500 c. f. s. through the drainage canal) "be restored, and what would be the cost thereof?"

The Joint Board answered as follows:

> "240. *Answer*.—The water levels of Lakes Michigan, Huron, and Erie can be restored most advantageously by compensating works in the St. Clair and Niagara Rivers, which should, however, be so designed as to offset all existing diversions and outlet enlargements, as well as the diversions authorized by license. The total cost of these works is estimated at $3,400,000. The cost of similar but less extensive works, designed to restore the effect of authorized diversions only, is estimated as follows:

Diversion compensated for	Cost of works
Chicago diversion	$1,750,000
Power diversions, Welland Canal	100,000

> "241. The effect of the diversions on the levels of Lake Ontario and of the St. Lawrence River above Montreal, will be removed by the works provided for the improvement of this part of the St. Lawrence.
>
> "242. The effect of the authorized diversions on the levels of the St. Lawrence River at and below Montreal can be restored by dredging and accessory works at estimated costs as follows:

Dredging Montreal Harbor	$654,000
Reconstruction of dock walls, Montreal Harbor	1,800,000
Dredging below Montreal	2,154,000
Total	$4,608,000"

18. *Works and plans for treatment of sewage and industrial wastes within the territory of the Sanitary District of Chicago.*—On the opening of the drainage canal, the sewage flowed through the Chicago River into the canal without treatment, save by the dilution effected through the water withdrawn from Lake Michigan. The dilution method of dealing with sewage was at that time the method commonly used. But this method proved to be inadequate. The Sanitary District, beginning about the year 1908, carried on experiments in other methods of sewage treatment. Under pressure of the apparent necessity, and of the insistence of the War Department, a program for the construction and extension of treatment works was laid down. On August 7, 1919, the Board of Trustees of the Sanitary District adopted a program for purifying works, "at such a rate as continuously after the lapse of four years to diminish the amount of sewage including all wastes passing into the Des Plaines river by way of the Main Channel of the Sanitary District, so that within the period of twenty-five years such purification works shall be constructed and in operation, that the amount of raw sewage and wastes so passing into the Des Plaines river shall be at least fifty per cent less than that passing now." The cost was roughly estimated at $140,000,000. About the year 1920, a general program covering the following projects for artificial sewage disposal works was laid out, to-wit: (1) Des Plaines River sewage treatment works; (2) Calumet sewage treatment works; (3) North Side sewage treatment works; (4) industrial wastes treatment works, embracing Corn Products treatment plant and Stock Yards and Packing Town treatment plant; (5) West Side sewage treatment works; (6) South West Side sewage treatment works; (7) miscellaneous sewage treatment plants and sewers; (8) additional works required in connection with existing structures.

The Des Plaines River project covers the towns in the Des Plaines valley, from 12th street north to North avenue, such as Broadview, Bellwood, Maywood, Melrose Park, Elmwood Park, River Forest, Forest Park, and about one-fourth of Oak Park. The present population is over 50,000. The plant was completed in August, 1922, costing with the intercepting sewers, about $3,500,000. It was designed as an experimental plant on a large scale.

The Calumet project covers all the area south of 87th street, and north of the Little Calumet River, but does not include the towns of Harvey, South Holland, and Phoenix. The treatment plant was finished in September, 1922. It is a sedimentation plant, designed to serve a population of about 225,000. There is room for the construction of additional sedimentation tanks and filters, to serve an ultimate population of 450,000 to 500,000. The project including sewers, cost about $19,000,000.

The North Side project covers all the area north of Fullerton avenue, Chicago, to the north line of Cook County. The area is about 62 square miles, and the population served about 800,000. The site was bought in 1921, the sewers were started in 1922, and the construction of the treatment plant was begun in 1923. It is an activated sludge plant. It will serve a population estimated at 830,000. There has been expended on this plant, approximately $25,000,000. It will be completed about 1928, and will cost, including sewers and pumping stations, about $31,000,000.

The industrial wastes project covers the Stock Yards and Packing Town, and the Corn Products Refining Company at Argo. The question whether the packers will bear any part of the burden is in the courts. It has recently been planned to take care of the Packing Town wastes at the Southwest Side plant. Beginning about 1920, the Sanitary District carried on experimental work to determine the best means of dealing with the Corn Products wastes and recently a plan has been worked out by which these wastes will be taken care of by the Company by a process of elimination.

The West Side project covers all the area south of Fullerton avenue, as far as 22nd street, including the Loop district and the West Side, west of the Chicago River and north of the Sanitary and Ship Canal; also towns in the Des Plaines Valley, such as Western Springs, La Grange, Brookville, Lyons and Riverside. Recently, 500 acres of land have been acquired at 39th street and 52nd avenue, as a site for this plant. The population served will be 1,750,000. The first two contracts for construction were let in October, 1926. Another contract was advertised, and plans are being drawn for others. It is estimated that the project will cost about $40,000,000.

The Southwest Side plant covers the region between the West Side project and the Calumet project, the population being about 900,000. No definite plans have yet been drawn for that plant, but studies have been made for it.

Miscellaneous projects cover treatment plants for small towns and villages not covered by the main projects.

In September, 1924, the Sanitary District employed twenty-eight engineers, known as the "Engineering Board of Review", to make a comprehensive examination and report. The board embraced sanitary and hydraulic engineers from various parts of the United States. They made a preliminary report in December, 1924, approving in a general way the plans of the Sanitary District. Later, they made a report on the technical bases of their recommendations. These two reports were made part of the application of the Sanitary District to the Secretary of War for the permit of March 3, 1925, the recommendations of the board having been adopted by the board of trustees of the Sanitary District as the policy of the latter. The Board of Engineering Review recommended that the District proceed, as rapidly as was consistent with sound finance, to carry out the progressive program which substantially conformed to the district's plan above outlined, it being estimated that this program would involve an expenditure of about $125,000,000. These works, the Board stated, provide for complete treatment at the Des Plaines, Calumet, North Side, and at both industrial waste plants, and for partial treatment at the West Side and Southwest

Side treatment works. The Board said that this program should be completed by 1945, or earlier if practicable, including the necessary extensions of these plants to that date. Following the consummation of this program, the Board recommended that supplementary works for the complete treatment of the dry weather sewage and a small fraction of the storm flow be built as may be required to maintain satisfactory conditions in the canal and rivers, and that the District adopt the policy of providing these works, as storm overflows cannot be treated; that the District formally request the city of Chicago to put into effect without delay a practicable program of water waste prevention, including a water waste survey, and the progressive installation of meters; that the District continue to cooperate with all authorities interested in forwarding the Lakes-to-the-Gulf waterway, and that a fair settlement of all damages caused in the Illinois River Valley by the diversion at Chicago, for which the Sanitary District is responsible, should be made promptly; that the District offer to contribute its proper share of the cost of lake regulating works, to be installed in such manner as approved by the War Department; and that the District apply to the Federal authorities for permission to divert from Lake Michigan an annual average of 10,000 c. f. s. of water as measured at Lockport, for sanitary and navigation purposes, until such time as a reappraisal shall indicate that the most beneficial use of the waters of the Great Lakes requires a reconsideration of the amount of such diversion. The Board set forth its findings and conclusions on which its recommendations were based.

The conditions of the Secretary of War's permit of March 3, 1925, changed the program for sewage treatment, by requiring a more rapid rate of construction; and in order to meet that condition, the Illinois legislature amended the Sanitary District Act so as to permit the issue of bonds, to the extent of four per cent. of the assessed valuation, instead of three per cent. The United States engineer at Chicago approved a schedule of design and construction for the period 1925 to 1929, and the Sanitary District is carrying out that program.

Much expert testimony has been given on both sides with respect to the feasibility of sewage treatment works adequate to permit of a large reduction, or a complete cessation, of the diversion of water from Lake Michigan, while at the same time safeguarding the water supply which the lake affords. The position of the complainants is that reducing the abstraction of water through the drainage canal to zero, or to 1,000 c. f. s., will not injure or impair the health of the city of Chicago, provided proper works are constructed for the disposal of sewage and protection of the water supply. The complainants point to conditions in other cities on the Great Lakes which take their water from the adjacent lake, into which also their sewage enters with a certain amount of treatment. These cities do not have the advantage of drawing off their sewage through a canal into another watershed. Thus, Milwaukee, Detroit, Toledo, Cleveland, and other communities must take their water supply from the adjacent waters, and at the same time use these waters as a receptacle for their sewage, partially treated. Complainants also insist that the works necessary to protect the public water supply, so as to provide at Chicago a supply equal or superior to the one now existing, could be constructed in from five to ten years.

The defendants introduced testimony to combat these contentions. They say that the experience of the complainants' witnesses has been limited to problems on a smaller scale than the one presented by the Sanitary District of Chicago; that Chcago now has an uncontaminated water supply and bathing beaches protected from pollution; that sewage treatment works which would not entail a prohibitive cost would not give complete protection; that to have complete processes of sewage treatment and the establishment of new tunnels and intakes for water supply far out into Lake Michigan, with a reconstruction of the sewer systems of the District thus required, would entail an expenditure beyond their means, and would still leave a margin of risk of contamination. It should be added that, while it is apparent that the permit of the Secretary of War of March 3, 1925, was granted with a view to the reduction of the amount of the diversion from Lake Michigan, the defendants take the position that, even after the Sanitary District's program of sewage treatment has been carried out, a diversion of 10,000 c. f. s. will still be necessary for complete protection to the health of the city.

The death rate from typhoid fever per 100,000 of population in cities on the Great Lakes having over 100,000 inhabitants, is shown by the following table, in five-year averages:

TYPHOID FEVER DEATH RATE PER 100,000 POPULATION
CITIES OF OVER 100,000 POPULATION IN GREAT LAKES REGION
FIVE-YEAR PERIOD AVERAGES

	Chicago	Milwaukee	Detroit	Cleveland	Buffalo	Rochester	Hamilton	Toronto
1880-1884..	67.8	34.4	54.0(1)	67.2	53.0(2)	34.0		65.0
1885-1889..	57.8	31.8	46.0	52.6	28.8	33.0	39.4	52.8
1890-1894..	96.4	32.8	43.4	51.8	44.2	34.6	24.6	62.2
1895-1899..	37.6	18.0	19.4	33.4	23.4	20.2	18.2	21.6
1900-1904..	29.2	17.4	22.0	56.8	29.4	15.2	15.4	19.6
1905-1909..	16.6	23.0	21.6	15.2	24.4	12.4	19.4	23.0
1910-1914..	10.1	22.0	18.2	12.1	17.0	10.6	14.08	21.4
1915-1919..	2.9	7.48	11.3	5.6	9.0	3.76	4.52	3.7
1920-1925..	1.36	1.81	6.10	2.17	4.05	1.93	4.06(3)	2.02(3)

(1) Years 1880 and 1881 not included.
(2) Year 1880 not included.
(3) Year 1925 not included.

It will be observed that the highest rate was at Chicago, in the years 1890 to 1894, being 96.4. This was a time of a serious epidemic. This rate had been reduced, prior to the opening of the drainage canal in 1900, to an average of 37.6, for the years 1895 to 1899. The rate was further and greatly reduced until, in the years 1920 to 1925, it was 1.36 per hundred thousand, the lowest of the rates of the lake cities. The other lake cities, however, by the aid of their sewage disposal works had cut down their rate, so that, in the years 1920 to 1925, it was 1.81 at Milwaukee 6.10 at Detroit; 2.17 at Cleveland; 4.05 at Buffalo; and 1.93 at Rochester.

It is evident that the questions presented by the expert testimony on sewage disposal are appropriate for determination by competent administrative authority. They relate to a subject still one of experimentation, requiring constant consideration and progressive adjustments in the light of advancing knowledge. On the question as to the character and extent of the sewage treatment works which would be needed under the conditions at Chicago, the percentage of adequacy obtainable, and the cost involved in construction and operation, in view of the conflict of testimony and the factors of uncertainty, it would be extremely difficult to make precise findings, and in my judgment, such findings are not necessary for the disposition of these suits. It is believed to be sufficient for the present purpose to state the general conclusions warranted by the evidence.

It is plain that the present flow from Lake Michigan through the drainage canal could not be immediately cut off, or reduced to 1,000 c. f. s., and in consequence the sewage of the Sanitary District in its present condition turned into Lake Michigan, without exposing the inhabitants of the District to grave risk of water-borne diseases, by contamination of the water supply taken from the lake. The Chicago River and the waters of the lake about the city would be filthy and noisome, with serious injury to the commerce of Chicago harbor. It appears from the testimony that it would take several years, not less than five years and perhaps ten years, or even more, before the sewage of the district, with such treatment as is practicable, could be turned into the lake and the diversion from the lake stopped or greatly reduced, without serious risk to the health of the people of Chicago. If the work of sewage treatment is efficiently carried on, and is extended by the most approved methods, and additional and appropriate measures are taken for water purification, it appears to be possible largely to reduce or altogether to terminate the diversion from Lake Michigan, and still to give the city of Chicago a reasonable measure of immunity from disease through pollution of its water supply. Within what time this result could be achieved cannot now be definitely determined.

To secure the utmost practicable treatment of the sewage of the Sanitary District, and to reduce as rapidly as possible the diversion of water from Lake Michigan, without creating conditions which would seriously menace the health of Chicago, will require constant and expert administrative supervision, the continuous checking up of the results obtained by the installation of treatment works, and the insistence on such improved methods as from time to time will be available. Apart from the question of authority, which will be considered later, I find upon the facts here shown that the recommendation of the Chief of Engineers, above set forth (*supra,* p. 75) on the application for the permit of March 3, 1925, which underlay the conditions of that permit, was a reasonable one with respect to the measures immediately practicable.

The complainants have recognized the impracticability of ordering an immediate cessation of the diversion, and the suggestion made in the closing argument on their behalf before the Special Master was that the Court should determine the rights of the parties, and direct a discontinuance of the diversion, but should suspend the operation of the decree and hold it in the Court with requirements from time to time as to the action, and the time, that should be taken to bring about a condition which would permit of the decree becoming effective.

Questions of Law.

The questions of law are:

(1) Whether the complainants present a justiciable controversy and have the requisite interest to entitle them to invoke the jurisdiction of the Court; and if so,

(2) Whether the State of Illinois had the right, as against the complainants, to divert the waters of Lake Michigan in the manner and for the purposes shown, without the consent of the United States; and, if not,

(3) Whether Congress has the authority to control the diversion, that is, in its regulation to determine whether and to what extent the diversion should be permitted; and if so,

(4) Whether Congress has given the permission; and, if it has not directly,

(5) Whether the Secretary of War had authority under the Act of March 3, 1899, to regulate the diversion; and if so,

(6) Whether the permit of March 3, 1925, and its conditions, are valid; and, finally,

(7) As to the provisions of the decree which should be entered, in the light of the determination of these questions.

First. *Justiciable controversy.*—In *Cohens* v. *Virginia*, 6 Wheat. 264, 378, Chief Justice Marshall observed that in the case of "controversies between two or more States, between a State and citizens of another State", and "between a State and foreign states, citizens or subjects", the jurisdiction depended "entirely on the character of the parties." "If these be the parties, it is entirely unimportant what may be the subject of the controversy. Be it what it may, these parties have a constitutional right to come into the courts of the Union." But this broad statement has been modified (*Missouri* v. *Illinois,* 180 U. S. 208, 240), and it is recognized that, to give the Court jurisdiction of a controversy between States, it must be of a nature appropriate to the exercise of the judicial power. Chief

Justice Fuller, speaking for the Court in *Louisiana* v. *Texas*, 176 U. S. 1, 15, observed that it was not contemplated that the jurisdiction would be exercised, save where the matter itself was "properly justiciable." "Undoubtedly", said Chief Justice Fuller, "as remarked by Mr Justice Bradley in *Hans* v. *Louisiana*, 134 U. S. 1, 15, the Constitution made some things justiciable which were not known as such at the common law; such, for example, as controversies between States as to boundary lines, and other questions admitting of judicial solution * * * The establishment of this new branch of jurisprudence seemed to be necessary, for the extinguishment of diplomatic relations between the States. Of other controversies between a State and another State, or its citizens, which on the settled principles of public law are not subjects of of judicial cognizance, this Court has often declined to take jurisdiction."

The defendants earnestly contend that the present controversy is of the latter sort. Without attempting to draw a line between what may be regarded as justiciable and non-justiciable (a line which is not to be established by a rigid initial definition, but must be pricked out in the course of the consideration and decision of questions as they arise), there are certain analogies which are persuasive in the instant case.

The Court has repeatedly taken jurisdiction in controversies between States in relation to the diminution of the flow and the pollution of interstate waters. In *Missouri* v. *Illinois and the Sanitary District of Chicago,* 180 U. S. 208, it was alleged that the turning of Chicago's sewage into the Sanitary District's drainage canal polluted the Mississippi River and created a continuing nuisance, dangerous to the health of the people of Missouri. The Court took jurisdiction. In *Kansas* v. *Colorado,* 185 U. S. 125, Kansas filed her bill, on behalf of her citizens as well as in vindication of her rights as an individual owner, seeking relief from being deprived of the waters of the Arkansas

River accustomed to flow through the State. The State of Colorado contended that, as a sovereign State, she was justified, if her geographical situation and material welfare demanded it in her judgment, in consuming for beneficial purposes all the waters of the river within her boundaries, and that as the sources of the river were in Colorado she might wholly deprive Kansas of any use or share in its waters. "Comity", said the Court, "demanded that navigable rivers should be free, and therefore, the freedom of the Mississippi, the Rhine, the Scheldt, the Danube, the St. Lawrence, the Amazon, and other rivers has been at different times secured by treaty; but if a State of this Union deprives another State of its rights in a navigable stream, and Congress has not regulated the subject, as no treaty can be made between them, how is the matter to be adjusted?" While in that case, the bill was ultimately dismissed, without prejudice (206 U. S. 46), as had also been the result in *Missouri* v. *Illinois,* 200 U. S. 496, the Court found no difficulty in sustaining its jurisdiction to determine the merits of the controversy.

In *New York* v. *New Jersey,* 256 U. S. 296, New York sought an injunction against the discharge of a large volume of sewage into that part of New York Harbor known as the Upper Bay, as constituting a serious injury to the health, prosperity and commercial welfare of the people of the State and city of New York. The Court took jurisdiction, but, finding the proofs inadequate, dismissed the bill, but without prejudice to the institution of another suit, if the proposed sewer in operation should prove to be sufficiently injurious to lead New York to believe that she needed the interposition of the Court.

The controversy in *Wyoming* v. *Colorado,* 259 U. S. 419, related to a proposed diversion in Colorado of the waters of the Laramie River, an interstate stream. Wyoming sought to prevent the diversion on two grounds: one, that, without her sanction, the waters of the interstate stream could not rightfully be taken from its watershed and carried into another, where she never could receive any benefit from them; and the other, that, through many appropriations made at great cost, which were prior in time and superior in right to the proposed Colorado diversion, Wyoming and her citizens had become entitled to use a large portion of the waters of the river in the irrigation of lands in that State, and that the proposed diversion would seriously interfere with these prior appropriations. Colorado asserted her right to use the waters within her borders, and further, that in any event she was entitled to an equitable division of the waters of the river in question. The Court took jurisdiction, and finding that each State applied the doctrine of priority of appropriation in her own territory, determined the controversy by applying this doctrine and enjoined the defendants from diverting more than a specified quantity of water from the Laramie River.

In *North Dakota* v. *Minnesota,* 263 U. S. 365, it was decided that, when a State, by changing the method of draining surface waters within her borders, increases the flow of an interstate stream greatly beyond its natural flow, so that the water is thrown upon farms in another State, the latter State could properly resort to the original jurisdiction of the Court for relief. The relief was denied on the facts, but the jurisdiction to determine the merits was sustained.

I am unable to conclude that the rights of the complainant States with respect to the diversion at Chicago of the waters of Lake Michigan, directly resulting in an appreciable diminution of the waters of the Great Lakes and connecting channels, to the alleged injury of the commercial and navigation interests of these States and their people, are any the less susceptible of judicial determination than the rights of Kansas, Wyoming and North Dakota with respect to the waters of interstate streams. The circumstance that the waters are those of lakes, and not of rivers, furnishes no ground for holding that the controversy is justiciable in the one case and not justiciable in the other.

Pennsylvania v. *West Virginia* (262 U. S. 553, 623; 263 U. S. 350), presented the issue whether one State may withdraw a natural product (natural gas), a common subject of commercial dealings, from an established current of commerce moving into the territory of another State. The complainant State asserted that such a withdrawal was an interference with interstate commerce, forbidden by the Constitution. "This", said the Court, "is essentially a judicial question. It concededly is so in suits between private parties and of course its character is not different in a suit between States."

The question of the right of Illinois to provide for the diversion of the waters of Lake Michigan, on the scale, in the manner and with the results described, without the consent of the United States, and the question of the power of Congress to control such a diversion; the question what action has been taken by Congress and its legal effect; the question as to the construction of the Act of 1899, and the validity and effect of the permits of the Secretary of War, are questions of the construction and application of the Constitution of the United States, and of acts of Congress, all of which are appropriate for judicial determination. The contention of the defendants that the Secretary of War acted under the authority of Congress, and thus that the action of the political department of the Government is involved, goes not to the jurisdiction, but to the merits, as the contention proceeds on the assumption of the validity of the acts which the complainant States call into question.

On this question of jurisdiction, I find no difficulty, so far as the interest of the complainant States is concerned. If Missouri and New York could maintain suits to prevent the pollution of their adjacent waters; if Kansas, Wyoming and North Dakota were entitled to invoke the jurisdiction with respect to their rights in interstate streams; if Georgia could bring suit to prevent injury caused by the discharge of noxious gases by a Tennessee corporation across the border and into her territory, on the ground of injuries to the interests of the State and her people; it would seem that the complainant States in this case have similar interests and enjoy the same right. In *Missouri* v. *Illinois,* 180 U. S. 241, the Court said that suits brought by individuals, each for personal injuries threatened or received, would be a wholly inadequate remedy. Substantial impairment of the health and prosperity of the towns and cities of the States situated on the Mississippi River, including its commercial metropolis, would seriously affect the entire State. In *Georgia* v. *Tennessee Copper Company,* 206 U. S. p. 237, it was said that the suit was "by a State for an injury to it in its capacity of quasi-sovereign. In that capacity, the State has an interest independent of and behind the title of its citizens, in all the earth and air within its domain." I should say the same as to water.

In *Pennsylvania* v. *West Virginia,* 262 U. S. p. 592, it was said that the withdrawal of the natural gas from the interstate stream was "a matter of grave public concern in which the State, as the representative of the public, has an interest apart from that of the individuals affected."

Finally, it is urged that, in the present condition of affairs, in view of the exigency at Chicago, the problem presented is not such as to admit of judicial solution. If, however, a suit had been brought at the outset, when the diversion began or was planned and threatened, the practical difficulties would have been less grave and would not have stood, it would seem, in the way of a judicial determination of the questions presented. A judicial solution would have been no more difficult than in the suit instituted by Missouri, relating to the same drainage canal. The question must be whether the controversy, in its nature, is such as to be susceptible of judicial determination; and such, I believe, it must be found to be. The difficulties arising from a lapse of time, the growth of population, the establishment of extensive works involving large expenditures, the adjustment of local interests to present methods, the length of time needed for new measures, are considerations going to the nature and extent of the remedy, if the diversion were found to be unauthorized and unlawful, rather than to the jurisdiction of the Court. The fact that the problem as now presented would seem to be one appropriate for administrative consideration and solution, if such could lawfully be had, does not defeat the jurisdiction to determine whether the administrative action hitherto taken has been valid. The questions whether the diversion is unauthorized and unlawful in the absence of competent federal action, as to the extent of the power, and the exercise of the power, of Congress, and the validity of the action of the Secretary of War, are deemed to be appropriately presented for the decision of the Court.

Second. *The necessity of obtaining the consent of the United States in order to justify the diversion.*—The Sanitary District of Chicago, after stating that the Illinois Act of 1889 requires the diversion of about 9876 c. f. s. of water from Lake Michigan, avers in its answer (paragraph 14) that this defendant "cannot divert said quantity of water, and does not intend to divert said quantity of water or any other quantity, except by and with the authority of the United States according to law." The State of Illinois adopted as its own the answer of the Sanitary District, with this averment.

That it was necessary to obtain the consent of the United States, in order to justify the diversion, is deemed to have been determined by this Court in *Sanitary District of Chicago* v. *United States*, 266 U. S. 405. In giving judgment for the United States enjoining the diversion of a greater quantity of water than that then authorized by the permit of the Secretary of War, the Court said (*id.*, p. 426):

> "The main ground is the authority of the United States to remove obstructions to interstate and foreign commerce. There is no question that this power is superior to that of the states to provide for the welfare or necessities of their inhabitants. In matters where

> the States may act, the action of Congress overrides what they have done. *Monongahela Bridge Co.* v. *United States*, 216 U. S. 177. *Second Employers' Liability Cases*, 223 U. S. 1, 53. But in matters where the national importance is imminent and direct even where Congress has been silent the States may not act at all. *Kansas City Southern Ry. Co.* v. *Kaw Valley Drainage District*, 233 U. S. 75, 79. Evidence is sufficient, if evidence is necessary, to show that a withdrawal of water on the scale directed by the statute of Illinois threatens and will affect the level of the Lakes, and that is a matter which cannot be done without the consent of the United States, even were there no internationad covenant in the case."

Moreover, it is unnecessary to consider what right the State of Illinois would have had to create the diversion in the absence of prohibition by Congress, for if Congress has the power to prohibit, it has effectively prohibited action of this sort save on compliance with specified requirements. By the Act of September 19, 1890, 26 Stat. 454, 455, Congress inaugurated a new policy of general, direct control over the navigable waters of the United States. Section 7 of this Act made it unlawful "to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War." "By this legislation," said this Court in *Southern Pacific Company* v. *Olympian Dredging Company*, 260 U. S. 205, 208, referring to the above-quoted and other provisions of the Act of 1890, "Congress assumed jurisdiction of the subject of obstructions to navigation and committed to the Secretary of War administrative power in so far as administration was necessary." Section 10 of the same Act prohibited "the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction." The words "affirmatively authorized by law" in this section, were held to be satisfied with regard to a boom across a river by authority from a State. *United States* v. *Bellingham Bay Boom Co.*, 176 U. S. 211. The prohibitions of Sections 7 and 10 of the Act of 1890 were extended by Sections 9 and 10 of the Act of March 3, 1899, 30 Stat. 1151, U. S. C., Tit. 33, Secs. 401, 403. For the words "not affirmatively authorized by law" Congress substituted the words "not affirmatively authorized by Congress," in prohibiting the creation of any obstruction to navigable capacity, and amplified the provision as to excavating, filling, or altering or modifying the course, location, condition or capacity, without the authority of the Secretary of War.

There is no room for doubt that Section 10 of the Act of 1899, the construction of which will be considered later (*infra*, p. 176), applies to the diversion in question. This Court has characterized that section as "a broad expression of policy in unmistakable terms" and has said that there "is neither reason nor opportunity for a construction that would not cover the present case," that is, the diversion through the Chicago Drainage Canal. *Sanitary District* v. *United States*, 266 U. S. 405, 429.

The diversion had not yet been effected when the Act of March 3, 1899, was passed and, in any event, this action of Congress rendered nugatory any conflicting authorization either State or Federal. *Union Bridge Co.* v. *United States*, 204 U. S. 364; *Monongahela Bridge Co.* v. *United States*, 216 U. S. 177; *Louisville Bridge Co.* v. *United States*, 242 U. S. 409.

My conclusion is that the action of Illinois in diverting water from Lake Michigan through the drainage canal of the Sanitary District was, and is, unlawful unless validly permitted by Congress either directly or through the action of the Secretary of War.

Third. *The power of Congress to control the diversion, that is, in its regulation to determine whether any diversion* *of the water of Lake Michigan should be permitted, and, if so, to what extent.*

Complainant States challenge the power of Congress to permit the diversion in question, either directly or through authority conferred on the Secretary of War, upon the grounds, (1) that the diversion constitutes a taking of complainants' property without due process of law and without just compensation in violation of the Fifth Amendment; (2) that Congress could not authorize the diversion from the Great Lakes-St. Lawrence watershed to the Mississippi watershed; (3) that the authorization of the diversion would constitute a preference of the ports of one State over those of another in violation of Article I, Section 9, Clause 6, of the Constitution; (4) that the power of Congress extends to the protection and improvement of navigation but not to its destruction or to the creation of obstructions to navigable capacity; and (5) that the diversion is for purposes of sanitation and development of power rather than of navigation and hence is outside the authority of Congress under the commerce clause.

1. The general principles governing the rights of the complainant States and the authority of Congress with respect to the waters of the Great Lakes are well established. The States have sovereign and proprietary rights over the navigable waters, and the lands underlying them, within their boundaries subject to the powers surrendered to the national government. *Port of Seattle* v. *Oregon & Washington R. Co.,* 255 U. S. 56, 63; *United States* v. *Holt State Bank,* 270 U. S. 49, 54; *Appleby* v. *New York,* 271 U. S. 364, 381. Those of the complainants which were not among the original thirteen States were admitted to the Union on an equality with the latter, and they have the same rights as the other States with respect to navigable waters, and the land under such waters, within their respective jurisdictions. *Shively* v. *Bowlby,* 152 U. S. 1. The States have authority to determine for themselves

such rules of property as they may deem expedient with respect to the waters within their borders, both navigable and non-navigable, and the ownership of the lands forming their beds and banks. *United States* v. *Cress*, 243 U. S. 316, 319; *Barney* v. *Keokuk*, 94 U. S. 324. But the rights of all States in navigable waters are subject to the paramount power of Congress in the regulation of interstate and foreign commerce. The provision of Article IV of the Ordinance of July 13, 1787, for the government of the Northwest Territory (1 Stat. 51, 52) that "The navigable waters leading into the Mississippi and Saint Lawrence, and the carrying places between the same, shall be common highways, and forever free", while not subject to repeal by one of the States in relation to the public rights of highway on navigable waters, does not derogate from the power of Congress under the commerce clause. *Economy Light & Power Co.* v. *United States*, 256 U. S. 113, 120, 121. Commerce includes navigation and the power to regulate commerce comprehends control of navigable waters for that purpose. *Gibbons* v. *Ogden*, 9 Wheat. 1, 189, 190, 197. The power of Congress is complete in itself and may be exercised to the utmost extent, and acknowledges no limitations other than are prescribed in the Constitution. *Gibbons* v. *Ogden*, 9 Wheat. 1, 196. Such a limitation is found in the Fifth Amendment, that private property shall not be taken for public use without just compensation (*Monongahela Navigation Co.* v. *United States*, 148 U. S. 312, 333) and, aside from actual expropriation, there may be such a direct invasion of private property as to constitute a "taking" in the constitutional sense. Thus where, under the authority of Congress, dams have been constructed in navigable waters so as to raise their levels and subject private lands to constant or frequent overflows, it has been held that property has been taken within the meaning of the Fifth Amendment. *United States* v. *Lynah*, 188 U. S. 445; *United States* v. *Cress*, 243 U. S. 316. In such a case, it must appear that there has been "an actual, permanent invasion of the land, amounting to an appropriation of, and not merely an injury to the property". *Sanguinetti* v. *United States*, 264 U. S. 146, 149.

The causing of incidental damage through the exercise of the constitutional authority of Congress does not constitute a taking of property for public use. In the discretion of Congress, and through administrative action which Congress authorizes, structures may be erected in the beds of navigable waters, jetties may be constructed, channels may be altered, navigators may be required to pass within a prescribed channel and other channels may be closed, dikes may be built which interfere with, or cut off, accessibility to navigable waters, harbor lines may be laid down and regulating works constructed which preclude uses and improvements of property, otherwise possible and valuable, and riparian proprietors have no ground for complaint by reason of the actual, but incidental, damage thus sustained, for the reason that their ownership is subject to the servitude of the exercise of the governmental power. It is a case of *damnum absque injuria*. *South Carolina* v. *Georgia*, 93 U. S. 4; *Gibson* v. *United States*, 166 U. S. 269; *Scranton* v. *Wheeler*, 179 U. S. 141; *Chicago, Burlington & Quincy Railway Co.* v. *Drainage Commissioners*, 200 U. S. 561; *West Chicago R. R. Co.* v. *Chicago*, 201 U. S. 506; *Union Bridge Co.* v. *United States*, 204 U. S. 364; *Philadelphia Co.* v. *Stimson*, 223 U. S. 605; *United States* v. *Chandler-Dunbar Co.*, 229 U. S. 53; *Jackson* v. *United States*, 230 U. S. 1; *Greenleaf Johnson Co.* v. *Garrison*, 237 U. S. 251; *Willink* v. *United States*, 240 U. S. 572; *John Horstmann Co.* v. *United States*, 257 U. S. 138; *United States* v. *River Rouge Improvement Co.*, 269 U. S. 411, 419.

In *Gibson* v. *United States*, *supra*, the construction of a dike in the Ohio River under authority of the Secretary of War had substantially destroyed the landing on and in front of Mrs. Gibson's farm, by preventing free access to the navigable channel. It was held that this damage was but an incidental consequence of the lawful exercise of governmental power and that the Government's action was not a taking of property for which compensation should be made. On the same principle, when Congress determined that the entire St. Marys River between the American bank and the international line, as well as all of the upland north of the existing ship canal, throughout its entire length, was necessary for the purposes of the navigation of these waters, and the waters connected therewith, it was decided that while compensation must be made for the upland actually taken, it was not necessary to compensate a riparian owner for the depreciation of the opportunity to use the rapids and falls of the river, although the complaining corporation had title to the bed of the stream up to the international boundary, two-thirds of the volume of the water flowed over its submerged lands, and under revocable permits of the Secretary of War it had established structures in the rapids for developing power. *Chandler-Dunbar Co.* v. *United States, supra.*

The decisions which have been cited, and the principle they apply, seem to me to dispose of the contention that, in this instance, if it be assumed that the diversion has been authorized under action of Congress, otherwise competent, the property of the complainant States has been taken in violation of the Fifth Amendment. Where, pursuant to governmental authorization otherwise valid, there is an abstraction of water from navigable lakes and rivers and a consequent lowering of levels by enlarging or opening outlets, the incidental damage to riparian owners affords no ground for asserting the constitutional invalidity of that action. Great States as riparian owners, as well as individuals, are subject to the authority of Congress, and they have no ownership in navigable waters which they can assert in opposition to the exercise of that authority.

2. It is contended that it is beyond the power of Congress to authorize the transfer of water of Lake Michigan from the Great Lakes-St. Lawrence watershed to the Mississippi watershed.

There is no such limitation in the grant to Congress to regulate interstate and foreign commerce. The power to control navigation, comprehended within that commerce, is a national power, and for the purposes of this control navigable waters are the public property of the nation (*Gilman* v. *Philadelphia*, 3 Wall. 713, 725) and subject to such restraint as Congress may deem expedient from a national point of view, not limited by the interests of any particular port, harbor, State or States, watershed, or any territorial division within the national jurisdiction. As Chief Justice Marshall said in *Gibbons* v. *Ogden*, 9 Wheat. 1, 197: "If, as has always been understood, the sovereignty of Congress, though limited to specified objects, is plenary as to those objects, the power over commerce with foreign nations, and among the several States, is vested in Congress as absolutely as it would be in a single government, having in its constitution the same restrictions on the exercise of the power as are found in the Constitution of the United States. The wisdom and the discretion of Congress, their identity with the people, and the influence which their constituents possess at elections, are, in this, as in many other instances, as that, for example, of declaring war, the sole restraints on which they have relied, to secure them from its abuse. They are the restraints on which the people must often rely solely, in all representative governments."

In *South Carolina* v. *Georgia*, 93 U. S. 4, it appeared that by a compact made in 1787 the boundary between the two States was defined as the most northern branch or stream of the Savannah River and it was provided that the navigation of the river along a specified channel should be equally free to the citizens of both States. The Secretary of War, acting under the authority of Congress, undertook to improve another channel which navigators were consequently compelled to use, at the expense of the one described in the compact. In deciding that South Carolina had no ground for complaint, the Court thus expressed its opinion as to the scope of the power granted to Congress (*id.*, p. 12):

> "It" (Congress) "may require all navigators to pass along a prescribed channel, and may close any other channel to their passage. If, as we have said, the United States have succeeded to the power and rights of the several States, so far as control over interstate and foreign commerce is concerned, this is not to be doubted. Might not the States of South Carolina and Georgia, by mutual agreement, have constructed a dam across the cross-tides between Hutchinson and Argyle Islands, and thus have confined the navigation of the Savannah River to the southern channel? Might they not have done this before they surrendered to the Federal government a portion of their sovereignty? Might they not have constructed jetties, or manipulated the river, so that commerce could have been carried on exclusively through the southern channel, on the south side of Hutchinson's Island? It is not thought that these questions can be answered in the negative. Then why may not Congress, succeeding, as it has done, to the authority of the States, do the same thing? Why may it not confine the navigation of the river to the channel south of Hutchinson's Island; and why is this not a regulation of commerce, if commerce includes navigation? We think it is such a regulation."

If Congress decided that it was in the interest of the country as a whole to open and improve a waterway from Lake Michigan to the Mississippi River and the Gulf of Mexico, and for that purpose diverted water from Lake Michigan to the Mississippi watershed, there would seem to be no constitutional difficulty so far as the diversion is concerned. Its practicability, its amount, the effect on the Great Lakes-St. Lawrence watershed, and on the States bordering on the Great Lakes, the question where the balance of national interest lay after appropriate appraisal of all local interests and of international relations, would be matters for the consideration of Congress exercising the sovereign power of the nation in determining national policy.

The case of *Hudson Co. Water Company* v. *McCarter,* 209 U. S. 349, cited by the complainants, related to the authority of the State to prevent one of its corporations from diverting the water from one of its streams into another State, and the question of the authority of Congress in dealing with navigable waters was not involved. In *Missouri* v. *Illinois,* 200 U. S. 496, 526, in speaking of the diversion now in question, the Court noted that "some stress was laid on the proposition that Chicago is not on the natural watershed of the Mississippi, because of a rise of a few feet between the Desplaines and the Chicago Rivers." The Court observed that the "natural features relied upon are of the smallest." The historic route from Lake Michigan to the Mississippi was the subject of consideration by the Court in *Economy Light & Power Company* v. *United States,* 256 U. S. 113, where the United States obtained an injunction against the construction of a dam in the Des Plaines River without the consent of Congress. It had been found in the District Court that there was no evidence of actual navigation at that point within the memory of living men and that there would be no present interference with navigation by the building of the proposed dam. The Circuit Court of Appeals did not disturb this finding. But both courts found that in its natural state the river was navigable in fact, and that it was actually used for the purposes of navigation and trading in the early manner down to the end of the first quarter of the nineteenth century. Describing the natural conditions, the Court said (*id.,* pp. 117, 118):

> "Suffice it to say that there was a well-known route by water, called the Chicago-Desplaines-Illinois route, running up the Chicago River from its mouth on Lake Michigan to a point on the west fork of the south branch; thence westerly by water or portage, accord-

ing to the season, to Mud Lake, about 2 miles; thence to the Desplaines near Riverside, 2 miles; thence down the Desplaines to the confluence of that river with the Kankakee, where they form the Illinois River; thence down the Illinois to its junction with the Mississippi. During the period mentioned the fur trade was a leading branch of commerce in the western territory, and it was regularly conducted upon the Desplaines River. Supplies in large quantity and variety, needed by the early settlers, also were transported over this route between Chicago and St. Louis and other points. Canoes and other boats of various kinds were employed, having light draft but capable of carrying several tons each, and manned by crews of six or eight men. The route was navigated by the American Fur Company regularly during a period of years down to about 1825, after which it was disused because the trade had receded to interior portions of Illinois that could be reached more conveniently with horses. Later, changes occurred in the river, due to the drainage of a swamp in the region of the portage, the clearing away of forests affecting the rainfall and the distribution of the run-off, and thus shortening the duration of the higher stages of water; the construction (under state authority) of the Illinois and Michigan Canal in 1848 and its deepening in 1866 to 1871, which diverted a part of the hill drainage towards the Chicago River; and the construction of the Sanitary and Ship Canal in 1892 to 1894.

"But, in spite of these changes, the Circuit Court of Appeals finds (256 Fed. Rep. 804) that the Desplaines River is a continuous stretch of water from Riverside (at the Chicago divide) to its mouth; and although there is a rapid, and in places shallow water, with boulders and obstructions, yet these things do not affect its navigable capacity; that the same is true of the upper part of the Illinois River above the head of steamboat navigation; and that both streams are navigable and are within the Act of 1899."

The Court then considered the public interest in navigable streams of this character in Illinois and neighboring States as evidenced by the Ordinance of July 13, 1787, for the government of the Northwest Territory, and by various acts of Congress, and found it to be beyond doubt "that the waters of the Chicago-Desplaines-Illinois route 'and the carrying places between the same' constituted one of the routes of commerce intended by the Ordinance, and the subsequent acts referred to, to be maintained as common highways" (*id.*, p. 120), and the Court concluded as follows (*id.*, p. 124):

> "The Desplaines River, after being of practical service as a highway of commerce for a century and a half, fell into disuse, partly through changes in the course of trade or methods of navigation, or changes in its own condition, partly as the result of artificial obstructions. In consequence, it has been out of use for a hundred years; but a hundred years is a brief space in the life of a nation; improvements in the methods of water transportation or increased cost in other methods of transportation may restore the usefulness of this stream; since it is a natural interstate waterway, it is within the power of Congress to improve it at the public expense; and it is not difficult to believe that many other streams are in like condition and require only the exertion of federal control to make them again important avenues of commerce among the States."

I think that recognition of the power of Congress to control the diversion of water from Lake Michigan to the Mississippi watershed, that is to determine whether any such diversion should be permitted, and if so, to what extent, necessarily underlay the decision in *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, for that suit appears to have been brought, prosecuted, and decided in the view that the Sanitary District was limited to the withdrawal of 4167 c. f. s. from Lake Michigan. This limitation was enforced because it was the extent of the permit granted by the Secretary of War under the authority of Congress. The diversion was treated as duly authorized up to that point, but not beyond it. Referring to the arguments of the Mississippi Valley States as *amici curae,* the Court said: "The interest that the River States have in increasing the artificial flow from Lake Michigan is not a right, but merely a consideration that they may address to Congress, if they see fit, to induce a modification of the law that now forbids that increase unless approved as prescribed." (*id.*, p. 431).

It seems to me that the authority of Congress to regulate the diversion in the present instance is not to be denied merely because the water is taken from one watershed to another.

3. The provision of Article I, Section 9, Clause 6 of the Constitution that no preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another, has received but limited judicial construction. By its express terms, it governs the action of Congress in regulating commerce and cannot be understood as applicable to those laws only which are passed for the purpose of revenue. *Gibbons* v. *Ogden,* 9 Wheat. 1, 191. An exposition of the origin and meaning of the clause is found in the *Wheeling Bridge* case (*Pennsylvania* v. *Wheeling & Belmont Bridge Co.,* 18 How. 421). The Court thought (*id.,* p. 435) that "the history of the provision, as well as its language, looks to a prohibition against granting privileges or immunities to vessels entering or clearing from the ports of one State over those of another. That these privileges and immunities, whatever they may be in the judgment of Congress, shall be common and equal in all the ports of the several States." There was deemed to be much included in the prohibition, and certainly it might "embrace any other description of legislation looking to a direct privilege or preference of the ports of any particular State over those of another." But the clause, in terms, seemed to the Court "to import a prohibition against some positive legislation by Congress to this effect, and not against any incidental

advantages that might possibly result from the legislation of Congress upon other subjects connected with commerce, and confessedly within its power." (*id.*, p. 435).

It was contended in that case that the Act of Congress declaring the bridge at Wheeling across the Ohio River to be a lawful structure gave a preference to that port over Pittsburgh, that the vessels to and from Pittsburgh navigating the Ohio and Mississippi Rivers were not only subject to delay and expense in the course of the voyage, but that the obstruction would necessarily have the effect of stopping the trade and business at Wheeling or to divert them in some other direction or channel of commerce. "Conceding all this to be true," said the Court (*id.*, p. 433), "a majority of the court are of opinion that the act of Congress is not inconsistent with the clause of the constitution referred to—in other words, that is not giving a preference to the ports of one State over those of another, within the true meaning of that provision. There are many acts of Congress passed in the exercise of this power to regulate commerce, providing for a special advantage to the port or ports of one State, and which very advantage may incidentally operate to the prejudice of the ports in a neighboring State, which have never been supposed to conflict with this limitation upon its power. The improvement of rivers and harbors, the erection of light-houses, and other facilities of commerce, may be referred to as examples. It will not do to say that the exercise of an admitted power of Congress conferred by the Constitution is to be withheld, if it appears, or can be shown, that the effect and operation of the law may incidentally extend beyond the limitation of the power. Upon any such interpretation, the principal object of the framers of the instrument in conferring the power would be sacrificed to the subordinate consequences resulting from its exercise. These consequences and incidents are very proper considerations to be urged upon Congress for the purpose of dissuading that body from its exercise, but afford no ground for denying the power itself, or the right to exercise it." (*id.*, pp. 433, 444).

The same point was raised in *South Carolina* v. *Georgia*, 93 U. S. 4. South Carolina insisted that the action of the Secretary of War in closing the channel of the Savannah River on the South Carolina side of Hutchinson's Island gave an unconstitutional preference to the ports of Georgia. The Court dismissed the contention, adopting the view expressed in the *Wheeling Bridge* case. I am of the opinion that the diversion in the present case, if otherwise lawfully authorized, cannot be regarded as beyond the power of Congress, as an unconstitutional preference of ports.

4. It is further insisted that the power of Congress extends to the protection and improvement of navigation but not to its destruction or to the creation of obstructions to navigable capacity.

It has been declared by this Court that "the right of the United States in the navigable waters within the several States is limited to the control thereof for purposes of navigation" (*Port of Seattle* v. *Oregon & Washington R. Co.*, 255 U. S. 56, 63) and "while Congress, in the exercise of this power, may adopt, in its judgment, any means having some positive relation to the control of navigation and not otherwise inconsistent with the Constitution, *United States* v. *Chandler-Dunbar Co.*, 229 U. S. 62, it may not arbitrarily destroy or impair the rights of riparian owners by legislation which has no real or substantial relation to the control of navigation or appropriateness to that end." *United States* v. *River Rouge Improvement Company*, 269 U. S. 411, 419. This was ruled in a condemnation proceeding where the United States sought deduction of special benefits and the trial court had erroneously charged the jury that the Government had "the absolute power of control" over navigable streams; and, limiting the rights of riparian owners in this view, the Court had refused the Government's request for an instruction that, with respect to the consideration of the existence and amount of the special benefits due to an improvement, the Government's power over navigable streams could not be arbitrarily and capriciously exercised so as to destroy these riparian rights but must be exercised with reasonable relation to the requirements of navigation (*id.*, pp. 416-418). This is but an illustration of the principle that there is no room in our system of government for the exercise of arbitrary power and every valid exercise of the power conferred by the Constitution must have reasonable relation to the subject of the power.

But it does not follow that when Congress does act in reasonable relation to the control of navigation, the Court may review the exercise of the discretion of Congress and decide for itself whether that which Congress has authorized is a benefit to navigation or the reverse. It is of the essence of the power of Congress that it has the final determination of that question. The improvement of navigation, the protection and promotion of its facilities and the creation or removal of obstructions to it, involve questions of relation and degree. What may appear to be a destruction or obstruction at one point, with respect to the interests of navigation, may be a benefit or improvement to navigation at another point or in the light of a different relation. When it appears that navigation is affected, it also appears that the question is one for Congress to decide in the light of all pertinent facts. A dike or dam, or works regulating the flow or discharge of navigaable waters, may destroy the possibility of navigation at a particular place, but may be a benefit to navigation when other places or sections are considered. The inhabitants or riparian owners of a particular place or port or region have no constitutional right to the exercise of the discretion of Congress in their favor as opposed to others. It is for Congress, after considering, as it is presumed to consider, the interests of particular localities and of all regions that may be affected by its action, and the consequences to navigation in all its aspects, to determine what is or is not to be deemed an obstruction to navigation, and its decision in this respect is not subject to judicial review.

This principle has had abundant illustration. It has direct application to cases of bridges which are built in and across navigable waters and may unquestionably to some extent obstruct navigation. In the *Wheeling Bridge* case, 18 How. 421, the bridge across the Ohio River did in fact impede steamboat navigation and a decree of this Court (13 How. 625) had declared it to be an obstruction to navigation and had directed that the obstruction be removed either by elevating the bridge to a height designated or by abatement. But when Congress, after this decree, and by the Act of August 31, 1852, declared the bridge to be a lawful structure, the Court held that the bridge was no longer an unlawful obstruction and hence that the decree could not be enforced. The Act was held to be a legitimate exercise of the power to regulate commerce. It was on this precedent that the action of Congress, or under its authority, was upheld in *South Carolina* v. *Georgia*, 93 U. S. 4, 12, although it consisted in the practical closing of a channel and throwing water into another channel to the detriment, it was insisted, of South Carolina. When the first bridge was built over the East River from New York to Brooklyn, it was contended that its elevation was such as to seriously obstruct the navigation of the river. *Miller* v. *Mayor*, 109 U. S. 385. The Court said (p. 393):

> "It is contended by the plaintiff with much earnestness that the approval of the secretary of war of the plan and location of the bridge was not conclusive as to its character and effect upon the navigation of the river, and that it was still open to him to show that, if constructed as proposed, it would be an obstruction to such navigation, as fully as though such approval had not been had. It is argued that Congress could not give any such effect to the action of the secretary, it being judicial in its character. There is in this position a misapprehension of the purport of the act. By submitting the matter to the secretary, Congress did not abdicate any of its authority to determine what should or should not be deemed an obstruction to the

> navigation of the river. It simply declared that, upon a certain fact being established, the bridge should be deemed a lawful structure, and employed the secretary of war as an agent to ascertain that fact. Having power to regulate commerce with foreign nations and among the several States, and navigation being a branch of that commerce, it has the control of all navigable waters between the States, or connecting with the ocean, so as to preserve and protect their free navigation. Its power, therefore, to determine what shall not be deemed, so far as that commerce is concerned, an obstruction, is necessarily paramount and conclusive."

Moreover, that which has been authorized by Congress, may subsequently be declared by Congress to constitute an unlawful obstruction. In the case of *Louisville Bridge Co.* v. *United States,* 242 U. S. 409, a bridge which had been erected over the Ohio River in accordance with the Acts of July 14, 1862, and February 17, 1865, was found by the Secretary of War in exercising his authority under the Act of March 3, 1899, to be an unreasonable obstruction. The Court sustained his action and the power of Congress which underlay it, saying (p. 424):

> "It may be conceded that the declaration of Congress in the Act of 1865 that the bridge was a lawful structure was conclusive upon the question until Congress passed some inconsistent enactment. As was said by Mr. Justice Nelson, speaking for the court in the *Wheeling Bridge Case,* 18 How. at p. 430, although it may have been an obstruction in fact, it was not such in the contemplation of the law."

In other words, the character of the bridge as an obstruction or not was conclusively determined by Congress or under its authority. The same view has been taken of other action of Congress with respect to navigation. In *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53, the riparian owner insisted that it had a right in the flow of the stream over the bed which it owned to the extent that the flow was "in excess of the wants of navigation," that is, of every possible requirement of navigation present and future. But the Court held that the determination of Congress that the whole flow of the stream was required was not subject to judicial review. The Court said (*id.*, pp. 64, 65): "So unfettered is this control of Congress over the navigable streams of the country that its judgment as to whether a construction in or over such a river is or is not an obstacle and a hindrance to navigation, is conclusive. Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control. * * * The conclusion to be drawn is, that the question of whether the proper regulation of navigation of this river at the place in question required that no construction of any kind should be placed or continued in the river by riparian owners, and whether the whole flow of the stream should be conserved for the use and safety of navigation, are questions legislative in character; and when Congress determined, as it did by the act of March 3, 1909, that the whole river between the American bank and the international line, as well as all of the upland north of the present ship canal, throughout its entire length, was 'necessary for the purposes of navigation of said waters and the waters connected therewith,' that determination was conclusive."

I find no basis for a different rule with respect to the abstraction of water from Lake Michigan and the consequent lowering of lake levels. The question whether such an abstraction should be altogether prohibited, or the extent to which it should be permitted with regard to the interests of navigation, when and in what circumstances and in what amount a diversion of water from the lake would constitute an obstruction to navigation, are questions within the power of Congress to decide in the exercise of its control over navigable waters for the purposes of navigation. When these questions have been determined by Congress, or under its authority validly conferred, they are not open to reconsideration by the court.

5. But it is the contention of the complainants that the diversion in question is for purposes of sanitation and development of power rather than of navigation, and hence lies outside the power of Congress under the commerce clause.

There is no doubt that the diversion is primarily for the purposes of sanitation. Whatever may be said as to the service of the diverted water in relation to a waterway to the Mississippi, or as to the possible benefit of its contribution to the navigation of that river at low water stages, it remains true that the disposition of Chicago's sewage has been the dominant factor in the promotion, maintenance and development of the enterprise by the State of Illinois and the Sanitary District. The purpose of utilizing the flow through the drainage canal to develop power is also undoubtedly present, although subordinated to the exigency of sanitation. So far as the diverted water is used for the development of power, the use is merely incidental (*supra*, p. 25). This Court in *Sanitary District* v. *United States*, 266 U. S. 405, 424, in describing the channel, looked upon its interest to the Sanitary District "primarily as a means to dispose of the sewage of Chicago" although it was also "an object of attention to the United States as opening water communication between the Great Lakes and the Mississippi and the Gulf." The question remains, however, whether the diversion, although primarily for purposes of sanitation, does not have such relation to navigation that the control of the diversion is within the power of Congress. In determining the constitutional authority of Congress, the purpose of the diversion is not to be considered without regard to its effect. The diversion may affect navigation as well as meet sanitary needs. The basic contention of the complainant States is that the diversion does affect navigation. When navigation is affected, the power of Congress comes into play. The fact that a local or municipal purpose is being served does not remove the action, which directly bears upon navigation, from the national control. It is the consequence, not the purpose, that is important in the national aspect. The Brooklyn bridge, from the standpoint of primary purpose, could be regarded as a mere local facility to aid the intercommuncations of two parts of a metropolitan district within the same State, and now within the same city, but as the bridge was over a navigable waterway Congress had control. *Miller* v. *Mayor,* 109 U. S. 385.

It would hardly be said that Congress is impotent to enact legislation to prevent, by imposing penalties, the diversion of navigable waters and that the only remedy available in case of such a diversion to the injury of navigation interests in other States would be an application to the court for an injunction. Wisconsin, Michigan and the other complainant States cannot legislate to penalize action outside their respective territorial jurisdictions (*Wisconsin* v. *Pelican Insurance Co.,* 127 U. S. 265) and if Congress may not act to prevent by appropriate penalties the diversion in one State, and with its consent, of navigable waters to the injury of the inhabitants of other States, it would seem that the wrong is removed from legislative consideration and the power of Congress, adequate as to structures over or in navigable waters, would wholly fail in the presence of the abstractions of the waters themselves.

But if Congress may prohibit the diversion of navigable waters, it is by virtue of the authority conferred by the commerce clause of the Constitution, and this authority carries with it to this particular subject of its exercise the full discretion which Congress enjoys. It does not appear to be a tenable construction of the commerce clause to say that Congress may prohibit a diversion of navigable waters, because of its direct relation to navigation, and yet may not determine in the exercise of its discretion what diversions it will prohibit, to what extent it will not prohibit or will permit, and may not reach its conclusion in the light of all the circumstances surrounding the diversion in question and of all consequences it may entail. Where a structure in navigable waters, or a diversion of such waters, affects navigation and thus is brought within the control of Congress, there is no warrant in the Constitution for saying that Congress is confined to one course of action and that the Court, on an examination of the facts, will decide what that course of action must be. Congress has the same freedom in exercising the sovereign power as to navigation to deal with the diversion of navigable waters as with the building of a bridge, and its position is no more open to judicial review in the one case than in the other.

I think that it is also within the power of Congress to legislate for the prevention of the pollution of navigable waters as, *e. g.*, by the introduction of sewage and industrial wastes, where pollution affects navigation. Navigation is not an abstract conception. It requires something more than fluid and a boat. There must be water conditions which make navigation practicable, and Congress is concerned with these conditions. While ordinarily the pouring of sewage into streams may not affect navigation, and the provisions of Section 13 of the Act of March 3, 1899 (30 Stat. 1152, U. S. C., Tit. 33, Sec. 407; cp. Act of June 33, 1910, 36 Stat. 593, U. S. C., Tit. 33, Sec. 421) as to the deposit of refuse in navigable waters excepted refuse in a liquid state flowing from streets and sewers, it is quite evident that sewage, as well as industrial wastes, may be introduced in such volume and condition as to be injurious to navigation, and the power of Congress may be exercised in its discretion to prevent, remove, or mitigate this menace as well as others. This is not to say that Congress may build or maintain intrastate sewer systems or deal with merely local questions of sanitation and health, but that Congress may adopt measures to protect navigable waters, and thus navigation, from the interferences and injuries brought about by the pouring of sewage and waste into such waters. When New York brought suit in this Court against New Jersey to enjoin the discharging of a volume of sewage into the waters of Upper New York bay, the Federal Government was permitted to intervene on the allegation that the proposed discharge would cause such a pollution of the waters of the bay as would result in an injury to navigation and commerce. *New York* v. *New Jersey,* 256 U. S. 296. The Court said (*id.,* p. 307):

> "As to the United States: The intervention of the Government was allowed upon allegations that the inadequate treatment of the sewage proposed would result in injury to navigation and commerce: by causing deposits of solid matter, to the extent of thousands of tons annually, which would fill up and shallow the channels of the Bay; by rendering the Port of New York less serviceable and attractive to commerce and offensive and unwholesome to persons using and living near it; and by causing injury to the hulls of vessels by the character of the effluent to be discharged. It was also averred that practically irreparable damage would be caused to extensive properties owned by the Government adjacent to the Bay.
>
> "Having regard to the large powers of the Government over navigation and commerce, its right to protect adjacent public property and its officers and employees from damage and disease, and to the duty and authority of the Attorney General to control and conduct litigation to which the Government may be a party (Rev. Stats., Secs. 359, 367), we cannot doubt that the intervention of the Government was proper in this case and that it was within the authority of the Attorney General to agree that the United States should retire from the case upon the terms stated in the stipulation, which were plainly approved by the Secretary of War, who afterwards embodied them in the construction permit issued to the Sewerage Commissioners."

The stipulation provided in detail (*id.*, p. 305) for treatment of the sewage, that is, for screening and sedimentation and thorough dispersion in water through deeply submerged multiple outlets, the method then most approved. It could hardly be said that the Attorney General could be permitted thus to intervene to protect navigation and commerce from pollution of the waters of New York Bay because of the interest of the national government in that protection, and yet that Congress would have been without power to regulate the discharge into New York Bay in the manner described in the Attorney General's stipulation or in any other way deemed by Congress in its discretion to be appropriate to the exigency. The fact that the purpose of the discharge into New York Bay was sanitation in the interest of the communities of Passaic Valley, and that the particular subject was the creation of an injury to navigation by the pollution of waters, did not derogate from the authority of the Attorney General to take the action he did take with that sort of injury, and, on the same ground, would not have derogated from the authority of Congress, not only to that extent but more comprehensively and adequately, to provide measures to attain the same object.

In the present case, it is my opinion, that it would be within the competency of Congress, in dealing with the diversion, not merely to consider the effect upon navigation of the abstraction of a certain quantity of water from Lake Michigan, but also the effect upon navigation of the flow into Chicago harbor and Lake Michigan of the enormous and increasing volume of the sewage, either untreated or but partially treated, and industrial wastes of the City of Chicago and of other portions of the territory of the Sanitary District. The continuous introduction of such a pestilential mass into the harbor and the lake would not only affect the health of the citizens of Chicago viewed as a question of local police, through the contamination of its only water supply, but also would affect navigation and the allied interests of interstate commerce, a matter of national concern. If Congress had undertaken to deal directly with the situation at the time of the Secretary of War's permit of March 3, 1925, Congress would have been entitled to consider all phases of the problem, that is, to estimate the consequences of whatever action it might take in refusing, allowing, or limiting, the diversion not only with respect to the lowering of lake levels, but also with reference to the creation of a most serious public nuisance in navigable waters, if a sufficient diversion were not allowed to take the sewage in its present condition and industrial wastes away from the lake. Congress would have been entitled to consider what could be done to protect the navigable waters from this pollution, the length of time that it would take to provide appropriate means of sewage treatment, what, if any, diversion of the water of Lake Michigan should be allowed, and how long and on what conditions it should be continued. The evidence in the present suit shows with the greatest clearness the various practical questions which would thus be presented, questions peculiarly appropriate for legislative consideration or administrative action under legislative authority.

When the United States brought suit to prevent a withdrawal from Lake Michigan in excess of 4167 c. f. s., the answer of the Sanitary District of Chicago, as this Court described it, "finally takes the bull by the horns and denies the right of the United States to determine the amount of water that should flow through the channel or the manner of the flow." *Sanitary District* v. *United States*, 266 U. S. 405, 425, 432. The Court overruled this contention and the restriction of the Secretary of War's permit which rested on the authority of Congress was enforced. I find no reason to doubt the power of Congress to meet the exigency.

Congress also has power to consider the advisability of providing for the installation of compensating works to restore the levels of the Great Lakes or compensate for the lowering of their levels due to the diversion. The evidence shows that, as a practical, engineering matter, such compensation can be provided without great difficulty and at relatively small expense. So far as the matter lies within the jurisdiction of the United States, Congress has adequate power to provide for such works, and, so far as it is found that an international agreement is required, the appropriate national authorities have capacity to negotiate it.

Fourth. *The action of Congress.*

If it be assumed that Congress has power to control the diversion, to determine whether and to what extent it should be permitted, the next question is whether it has exercised the power, and, first, whether it has exercised it directly.

It is believed that enough has been set forth in the findings (*supra*, pp. 26-72, 85) to show the grounds for the contention of the defendants with respect to the action of Congress. The defendants refer to the Acts of 1822 and 1827 (*supra*, p. 11) in relation to the Illinois and Michigan Canal. They emphasize the fact that the project of a waterway from Lake Michigan to the Mississippi has from an early date engaged the attention of Congress, and that it has asked for and received many reports upon that subject. Congress was also early and fully advised by official reports as to the action of Illinois in providing for the construction of a drainage canal, its actual construction by the Sanitary District, the plan to divert water from Lake Michigan for the purposes of the canal, and the extent of the diversion contemplated. In these reports, the relation of the drainage canal proposals to a Lakes-to-the-Gulf waterway was clearly shown. As early as 1900 Congress directed (*supra*, p. 41) that the Board of Engineers appointed under the Act of March 3, 1899, report the estimates of cost for channels of specified depth through the proposed route from the Illinois River to Lake Michigan and directed that "the said estimates cover and include a proper connection at Lockport with the sanitary and ship canal which has been constructed by the sanitary district of Chicago." Defendants have stressed the point that at no time since the diversion at Chicago began could the project depth of seven feet in the Illinois River have been maintained without a diversion of at least 8,500 c. f. s. It is also urged that Congress by the improvements it sanctioned and directed affirmatively authorized and actively aided the construction of what is called the Chicago River segment of the Sanitary District's diversion works. Congress made appropriations for the widening and deepening of the Chicago River and for the development of a waterway from Lockport, the terminus of the drainage canal, to the mouth of the Illinois River. Attention is called to the provision of the Act of March 3, 1899 (*supra,* p. 36) for the improvement of the Chicago River directing a survey and estimate of cost for a channel twenty-one feet in depth for a portion of the river with a proviso that the work of lowering tunnels should be done or caused to be done by the City of Chicago without expense to the United States. This work, it is insisted, was for the purpose of converting the river into an integral part of the Sanitary District's engineering works for the diversion of water from Lake Michigan. In *West Chicago Street Railroad Company* v. *Chicago,* 201 U. S. 506, the proviso, above mentioned, was held to be a sufficient authorization to the City of Chicago to require the lowering of a street railway tunnel. In short, the defendants contend that there has been full knowledge on the part of Congress of all relevant facts and that Congress, and officials acting under its authority and reporting to it, have continuously cooperated with the State of Illinois and the Sanitary District in the creation and maintenance of conditions appropriate to the diversion. Congress has also called for and received comprehensive reports on the extent and effect of the diversion of water from Lake Michigan and on the measures that may be practicable to compensate for the lowered level of the Great Lakes (*supra,* p. 125).

It has not been considered necessary to lengthen the findings so as to include all the statements in a multitude of reports in evidence bearing on the question, as, assuming that Congress was fully informed, the question is not as to what was recommended, but as to the action taken by Congress in the light of its knowledge. I am unable to find that Congress, apart from the authority conferred upon the Secretary of War by Section 10 of the Act of March 3, 1899, and his action thereunder, which will be discussed later, has authorized the diversion in question. The Acts of 1822 and 1827 (*supra*, p. 11) relating to the Illinois and Michigan Canal were considered in *Sanitary District* v. *United States,* 266 U. S. 405, 427, 428, and were found to contain nothing with regard to the amount of water to be withdrawn from the lake. In that connection, the Court said:

> "The defendant in the first place refers to two acts of Congress: one of March 30, 1822, 3 Stat. 659, which became ineffectual because its conditions were not complied with, and another of March 2, 1827, c. 51, 4 Stat. 234, referred to, whether hastily or not, in *Missouri* v. *Illinois,* 200 U. S. 496, 526, as an act in pursuance of which Illinois brought Chicago into the Mississippi watershed. The act granted land to Illinois in aid of a canal to be opened by the State for the purpose of uniting the waters of the Illinois River with those of Lake Michigan, but if it has any bearing on the present case it certainly vested no irrevocable discretion in the State with regard to the amount of water to be withdrawn from the Lake. It said nothing on that subject. We repeat that we assume that the United States desires to see the canal maintained and therefore pass by as immaterial all evidence of its having fostered the work. Even if it had approved the very size and shape of the channel by act of Congress it would not have compromised its right to control the amount of water to be drawn from Lake Michigan. It seems that a less amount than now passes through

> the canal would suffice for the connection which the United States has wished to establish and maintain."

Consideration by Congress of the advisability of the proposed waterway from Lake Michigan to the Illinois and Mississippi Rivers, demands by Congress for surveys, plans and estimates, the establishment of project depths, and appropriations for specified purposes, did not in my opinion constitute direct authority for the diversion in question, however that diversion, or the diversion of some quantity of water from Lake Michigan, might fit into an ultimate plan. The appropriations for widening and deepening the Chicago River, and the cooperation with the Sanitary District for several years in that improvement, committed Congress to the work as thus actually prescribed or authorized, but did not go further, whatever the advantage of that work in connection with the purposes of the Sanitary District's Canal. The action which has been taken by Congress may, indeed, be deemed to have an important bearing on the construction of the act of Congress under which, as Congress well knew, the Secretary of War granted permits for the diversion of specified quantities of water from Lake Michigan. But the point now is as to direct authorization by Congress of the diversion as distinguished from action by the Secretary of War under the general authority Congress has conferred upon him.

The defendants invoke the doctrine of *Wisconsin* v. *Duluth*, 96 U. S. 379. There it was found that Congress had developed and was carrying out a system of corporate improvements at Duluth and had made appropriations for that purpose. The Court regarded the suit as an effort to have the Court forbid the execution of the work authorized and dismissed the bill. This decision may be regarded as applicable to the present case, if it be found that the Secretary of War's permit is valid and that the Federal Government under lawful authority has assumed charge of the diversion, its extent, and the conditions on which it is permitted. But the *Duluth* case is not considered to be an authority for a conclusion here that Congress has directly authorized the diversion apart from the action of the Secretary of War.

The argument that Congress, aside from the action of the Secretary of War, has authorized the diversion, at once raises the question—In what amount has the diversion been thus authorized? There is nothing in any of the acts of Congress upon which the defendants rely specifying any particular quantity of water which could be diverted and it could hardly be considered a reasonable contention that the acts of Congress justified any diversion of water from Lake Michigan that the State of Illinois and the Sanitary District might see fit to make. It is manifest that it was the view of the War Department that Congress had not acted directly and whatever the Department did was subject to such action as Congress might take. In the report of the Board of Engineers required by the Act of June 13, 1902, transmitted to Congress on December 18, 1905, the Board said: "The taking of large quantities of water from Lake Michigan for drainage purposes has not been authorized by Congress. It has been the policy of the War Department thus far to regulate the quantity of water which is admitted to the canal by the necessities of navigation in the Chicago River" (*supra*, p. 44). This shows the understanding at that time. In 1907, in denying the application for an increase in the amount permitted to be diverted, the Secretary of War considered that it might "be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States" (*supra*, p. 51). This understanding that Congress had not yet acted directly so as to authorize the diversion in question has continued. It was in this view that the United States prosecuted its suit to decree in this Court to enjoin the defendants from taking more water from Lake Michigan than the Secretary of War had allowed.

Fifth. *The authority of the Secretary of War.*

The question is as to the construction of Section 10 of the Act of March 3, 1899, 30 Stat. 1151, U. S. C., Tit. 33, Sec. 403, (*supra*, pp. 37, 38) under which the authority has been claimed and exercised.

Section 10 is as follows:

> "Sec. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

It is clear that the diversion of water from Lake Michigan, with the reversal of the flow of the Chicago River, falls directly within the third clause of this section making it unlawful "in any manner to alter or modify the course, location, condition or capacity of, any port, roadstead, haven, harbor, canal, lake * * * or of the channel of any navigable water" save on the recommendation of the Chief of Engineers and the authorization of the Secretary of War. *Sanitary District* v. *United States*, 266 U. S. 405, 429. The precise question is whether, in the classes of cases specifically described in the second and third clauses of Section 10 of the Act of 1899, there must be a special authorization by Congress in addition to the recommendation of the Chief of Engineers and the authorization of the Secretary of War.

The policy expressed in the Act of March 3, 1899, had been initiated by the Act of September 19, 1890, 26 Stat. 454, 455. Sections 9 and 10 of the Act of 1899 rearranged and amplified the provisions of Sections 7 and 10 of the Act of 1890. Section 7 of the Act of 1890 (*supra*, pp. 27, 28) comprehended (1) wharves, piers, dolphins, booms, dams, weirs, breakwaters, bulkheads, jetties, and other structures in navigable waters; (2) bridges, bridge-draws, bridge piers and abutments, causeways or other works over or in navigable waters; and (3) excavating or filling, or in any manner altering or modifying the course, location, condition or capacity of navigable waters. The first class, wharves, etc., were not to be built outside of harbor lines, or in navigable waters where no harbor lines are established, in such manner as should obstruct or impair navigation without the permission of the Secretary of War. The second class, bridges, bridge-draws, etc., were not to be constructed under the legislation of a State until the location and plan therefor had been submitted to and approved by the Secretary of War. Finally, excavating and filling, altering or modifying the course, location, condition or capacity of navigable waters was forbidden unless approved and authorized by the Secretary of War. There was a proviso that the section should not apply to bridges, bridge-draws, bridge piers and abutments, the construction of which had theretofore been duly authorized by law, and that the section was not to be construed as authorizing the construction of such structures or other works under State legislation over or in navigable waters which were not wholly within the limits of such State. Section 10 of the Act of 1890 (*supra*, pp. 28, 29) prohibited "the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the

United States has jurisdiction." That section also imposed penalties and authorized proceedings by the Attorney General for an injunction.

In the rearrangement and amplification of these provisions in Sections 9 and 10 of the Act of 1899, a new classification was made. In Section 9 (*supra,* p. 37) were placed the provisions as to bridges, dams, dikes or causeways over or in navigable waters. The building of these structures was forbidden until the consent of Congress had been obtained and until the plans had been submitted to and approved by the Chief of Engineers and the Secretary of War. There was a proviso that such structures might be built under State legislation across rivers and other waterways the navigable portions of which were wholly within the limits of a single State, provided the location and plans were submitted to and approved by the Chief of Engineers and the Secretary of War before the construction was commenced. The provision as to wharves, piers, dolphins, booms, weirs, breakwaters, bulkheads, jetties, and other structures in navigable waters, outside of harbor lines or where no harbor lines are established (which had been in Section 7 of the Act of 1890), was placed in Section 10, and such structures were forbidden except on plans recommended by the Chief of Engineers and authorized by the Secretary of War. The provision as to excavating and filling, and altering and modifying the course, location, condition or capacity of the channel of navigable waters (which had been in Section 7 of the Act of 1890) was amplified so as to include "any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or inclosure within the limits of any breakwater", and such action was forbidden unless the work had been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning same. And these provisions of Section 10 of the Act of 1899 were preceded by the provision which had appeared in Section 10 of the Act of 1890 that the creation of any obstruction to navigable capacity, not affirmatively authorized, was prohibited, with the change to "affirmatively authorized by Congress" from "affirmatively authorized by law."

This change in the words of the first clause of Section 10 was for the purpose of making mere State authorization inadequate. *Sanitary District* v. *United States,* 266 U. S. 405, 429. *United States* v. *Bellingham Bay Boom Company,* 176 U. S. 211. Under this clause, as thus modified, it was decided in the case of a structure, *e. g.,* a dock, in navigable waters wholly within the limits of a State, that while the recommendation of the Chief of Engineers and the authorization of the Secretary of War were required, it was not intended to override the authority of the State to put its veto upon the construction. Both Federal and State approval were necessary in such a case. *Cummings* v. *Chicago,* 188 U. S. 410. It may be observed that the discussion in the *Cummings* case as to the continuance of State authority in such cases, in the light of Section 10 of the Act of 1899, would have been unnecessary if the view had been taken that the specific consent of Congress was needed under that section for the erection of the structure in question, as there was no such specific consent but a permit by the Secretary of War under the general provision of Section 10, and this permit was apparently deemed sufficient so far as the Federal authority was concerned (*id.,* p. 431). It is further to be noted that in the rearrangement in the Act of 1899 there was an unequivocal provision as to the particular structures described in Section 9 (which were not within the proviso as to waters lying wholly within the limits of a single State) requiring the consent of Congress in addition to the approval of the Chief of Engineers and of the Secretary of War, there being a differentiation between this class and those placed in Section 10. Thus, dams had been put with wharves, etc., in Section 7 of the Act of 1890, but in the Act of 1899, dams, dikes and causeways were placed with bridges in Section 9 where the consent of Congress was expressly required, and wharves, etc., and excavating, filling, and altering or modifying course, condition and capacity were put in Section 10. There can be no question of the power of Congress to make this distinction for whatever reasons it may have had. Congress required its specific consent in relation to the particular structures described in Section 9, but was apparently content to leave a broader administrative control of the other structures and work, described in Section 10, with the War Department.

The inquiry, then, is as to the extent of the administrative control thus delegated. With respect to wharves, piers, breakwaters, bulkheads, and other structures described in the second clause of Section 10, it would seem that, except for the requirement of the recommendation of the Chief of Engineers, the same authority was continued in the Secretary of War that had been delegated to him as to such structures by the former Act of 1890. It would be an extreme construction to hold that no wharf, pier, breakwater, bulkhead, or any of the other structures described in the second clause of Section 10 could be built without a special authorization of Congress. But a wharf, pier, breakwater, or bulkhead may be an obstruction to navigable capacity in a particular area, although to the advantage of navigation more broadly considered. Under the second clause of the section, structures are contemplated and plans therefor are to be recommended by the Chief of Engineers and approved by the Secretary of War. Under the third clause, with respect to excavating, filling, and changing course, condition or capacity, it is the "work", the undertaking or enterprise, that is the subject of the administrative control of the War Department. Whether that undertaking should be allowed, with reasonable regard to its effect on navigation, is to be determined by the Secretary of War acting on the recommendation of the Chief of Engineers.

The words "affirmatively authorized by Congress" should be construed in the light of the administrative exigencies which prompted the delegation of authority in the succeeding clauses. "Any obstruction to the navigable capacity of any of the waters of the United States" might be taken to include "anything wherever or however done" which fairly and directly tends to obstruct (that is, to interfere with or diminish) the navigable capacity of a stream." *United States* v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690, 708, 709. This is a wide content, embracing innumerable practical problems appropriate for administrative consideration and determination. It is not to be supposed that Congress was intent on prohibiting, unless it passed a special act, whatever might be regarded in any aspect as an obstruction to navigable capacity. Many questions of relation and degree would require examination. The War Department was equipped with a corps of engineers and by continuous study of navigation problems for this examination and could reach an expert decision. It seems to me to be a reasonable construction that Congress, having stated in Section 9 as to what particular structures its specific consent should be required, intended to leave to the Secretary of War, acting on the recommendation of the Chief of Engineers, the determination of what should be approved and authorized in the classes of cases described in the second and third clauses of Section 10. Accordingly, the prohibition in the first clause of that section, in order to make mere state action insufficient, was followed and should be regarded as qualified by the other clauses covering large and important categories, in which administrative action was deemed to be advisable and was authorized, with the import that such action, taken as prescribed, should be enough so far as concerned the Federal Government. If the section were construed to require a special authorization by Congress whenever in any aspect it might be considered that there was an obstruction to navigable capacity, none of the undertakings specifically provided for in the second and third clauses of Section 10 could safely be undertaken without a special authorization of Congress, as in the absence of that, it would always be a judicial question whether there was an obstruction to navigable capacity, and if there were, the action of the Chief of Engineers and the Secretary of War would be without authority. Unless Congress had acted specifically, every such question would be thrown into the courts and the administrative authority of the Secretary of War which has been regarded as practically essential in the classes of cases described in the second and third clauses of Section 10 would be paralyzed. The fact that Congress amended the provision requiring authorization "by Congress" instead of "by law", to avoid the effect of State action alone, does not seem to require such a construction. In the cases described in the second and third clauses of Section 10, Congress has given its affirmative authorization provided the requirements as to the recommendation of the Chief of Engineers and the authorization of the Secretary of War are met.

The question whether the affirmative authority of Congress must be evidenced in such cases by a specific statute arose in *Maine Water Company* v. *Knickerbocker Steam Towage Company,* 99 Maine, 473, where it was contended that the permit of the Secretary of War for a pipe line across the Kennebec River was not enough without a statute of Congress giving specific authority. The Supreme Court of Maine overruled the contention, saying:

> "We cannot help remarking, in passing, that if the defendant's interpretation of the Act of 1899 is the correct one it leads to a rather surprising condition. It would seem that not a wharf or pier, outside established harbor lines, or where no harbor lines have been established, can now be built, in the navigable waters of the United States, not a dolphin can be anchored for mooring vessels, not a boom can be stretched, nor a weir erected for any purpose, until hereafter authorized by Act of Congress. We think it cannot be assumed that Congress intended any such result unless

the Act in question is so expressed as not to admit of any other reasonable interpretation.

* * * * * *

> "Although in the arrangement of parts, the general prohibition now is found at the beginning of a section which also relates to the specific regulation of the building of wharves, and so forth, instead of being in a section by itself as before, we are not persuaded that Congress, by changing its position, intended to change its effect. It is still general as before. And though general in terms before, we think, as we have stated, that structures impliedly authorized by Congress in the preceding sections were not prohibited. And in this new position we think that the general prohibition is likewise qualified by the sentences which follow. It cannot make any substantial difference whether the general prohibition is at the beginning of a section or at the end, or in a section by itself, if it clearly appears from the language used and from the context, all taken together, that the legislative intention was that the general prohibition was to be regarded as subject to specified qualifications. * * * the implication seems clear to us that such structures, if built according to plans recommended and authorized as provided in the section, are authorized by Congress,—that they are affirmatively authorized,—though the affirmative authority arises by implication,—and that they are lawful without any further action by Congress."

This case was cited with apparent approval, although not directly upon this point, in *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, 210.

An opinion in favor of a contrary construction was expressed by the Circuit Court for the District of New Jersey in *Hubbard* v. *Fort*, 188 Fed. 987. There the bill was filed by the receivers of the Hudson County Water Company, a New Jersey corporation, seeking to enjoin State officers from interfering with the laying of a water main in the bed of the Kill van Kull, a navigable waterway between New

York and New Jersey, for which the Secretary of War had given permission. The Court was of the opinion that the affirmative authorization by Congress required by Section 10 meant the express authorization of a congressional act and that only after such action could the powers delegated to the Secretary of War be put into operation. It appears, however, on the facts of that case, that the actual decision went no further than to hold that Congress had not shown by Section 10 the intent to assert its authority under the commerce clause by authorizing the crossing of an interstate stream and the using of a State's submerged lands by one of its corporations in opposition to its authority. Thus the Court, describing in its final conclusion the nature of the case before it, said (*id.*, p. 999):

> "This is not a case of the United States government seeking to make a crossing of this interstate stream in the exercise of its governmental powers, but an attempt to override a sovereign state's opposition to the use of its submerged land by a corporation of its own creation, under the claim of being engaged in interstate commerce. This can only be successfully accomplished when it shall be shown that Congress in the assertion of its superior rights under the interstate commerce clause of the United States Constitution has clearly and definitely authorized such crossing. Until then the state of New Jersey as against every comer is sovereign master of the situation."

Where an act of Congress is ambiguous, long continued and uniform practice of the executive department charged with the duty of administering it is "persuasively determinative of its construction." *United States* v. *Minnesota,* 270 U. S. 181, 205; *Swendig* v. *Washington Water Power Company,* 265 U. S. 322, 331; *Kern River Company* v. *United States,* 257 U. S. 147, 154; *United States* v. *Burlington & Missouri River R. Company,* 98 U. S. 334, 341; *United States* v. *Hammers,* 221 U. S. 220, 228; *Logan* v. *Davis,* 233

U. S. 613, 627. In the present instance there seems to be no opportunity for dispute as to the long continued and uniform construction of Section 10 of the Act of 1899 by the War Department. It has been its view that in the cases for which provision is made in the last two clauses of Section 10 of the Act of 1899 a specific authorization by congressional act is not required and that the action of the Secretary of War upon the recommendation of the Chief of Engineers is sufficient. The Acting Attorney General in his opinion transmitted to the Secretary of War (February 13, 1925, 34 Op. Atty. Gen. 410, 416) when the application for the permit for the diversion in question was pending, said: "I am informed that for a long period of years it has been the practice of the War Department to issue permits under Section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by special Act of Congress." The Secretary of War gave the initial permit for diversion of water from Lake Michigan through the Sanitary District's drainage canal on May 8, 1899, within about two months after the passage of the Act of March 3, 1899. He acted under Section 10 of that Act and this was an immediate construction of that Act with respect to the authority of the Secretary of War. This was followed in the permits subsequently granted down to that of March 3, 1925. The question of his authority was definitely raised in 1907 in connection with the application for an additional diversion of a large amount of water from the lake through the Calumet Sag Channel. The question was submitted by the Secretary of War to the Judge Advocate General who held that Section 10 of the Act of March 3, 1899, applied to the case and that it was one in which the work could be allowed upon the recommendation of the Chief of Engineers and the authorization of the Secretary of War. As the Chief of Engineers made an adverse recommendation on the merits of the application, the Secretary of War was without power to grant it. But, so far as the construction of the statute was concerned, the Secretary of War stated that he agreed "in the construction of the Judge Advocate General that the issue is left by statute to the recommendation of the Chief of Engineers and the concurrent decision of the Secretary of War" (*supra*, p. 51). On the application, in 1913, for an increase in the amount of the diversion the Secretary of War doubted his authority to grant it but finally stated that he rested his decision denying the application not upon the question of his legal authority but on the appropriate exercise of his official discretion (*supra*, p. 64). The prior permit limiting the diversion to 4167 c. f. s. was not disturbed. It was soon after (October, 1913) that the Attorney General filed his bill to enjoin the Sanitary District from diverting a greater quantity of water from Lake Michigan than that which had been allowed by the Secretary of War, thus recognizing the validity of the Secretary's permit and seeking to enforce the limitation it fixed.

This administrative construction of Section 10 does not lose, but rather gains, in strength from a consideration of the attitude of Congress. From the outset, Congress was promptly and fully advised of the construction of the drainage canal, the plans for the diversion of water from Lake Michigan, the amount of the diversion, and the permits granted by the Secretary of War. Action was taken by Congress in the light of these facts (*supra*, pp. 36, 41, 43). Congress provided for the widening and deepening of the Chicago River which was an essential part of the plans of the Sanitary District for the diversion through the drainage canal (*supra*, p. 58). The use of that canal as a part of a waterway from Lake Michigan to the Missippi was under consideration by Congress and Congress called for surveys and estimates with this in view (*supra*, p. 41). While, as I have said, Congress did not directly authorize the diversion, it was fully conversant with what had been done by the Sanitary District and with what had been permitted by the Secretary of War purporting to act under the general authority conferred by Congress in Section 10 of the Act of March 3, 1899, and it may be regarded as significant that Congress having complete control, all the permits of the Secretary of War being subject to its action, did not at any time adopt measures either to prevent the diversion or to manifest disapproval of the construction which the Secretary of War had placed upon the statute.

When Congress, on June 29, 1906, passed the Niagara Falls Act, 34 Stat. 626 (*supra,* p. 46), it prohibited the diversion of water from the Niagara River and its tributaries except with the consent of the Secretary of War as thereinafter authorized. Provision was made for limited permits for power purposes. The prohibition was followed by a proviso that "this prohibition shall not be interpreted as forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States under its direction." At the time this bill was passed, the International Joint Commission appointed pursuant to action by Congress (Act of June 13, 1902, 32 Stat. 373) had been considering the conditions and uses of the waters of the Great Lakes and tributary rivers, and the questions raised by diversions, and that Commission had made recommendations to the governments of the United States and Canada, including a recommendation that the Chicago diversion should be limited to 10,000 c. f. s. (*supra,* p. 46). When the Niagara Falls bill, above mentioned, was before the Senate, an amendment was offered by Senator Hopkins of Illinois to the effect that nothing contained therein should be construed "to hold or concede that the waters of Lake Michigan shall be or are subject of international agreement" (*supra,* p. 47). The House of Representatives refused to concur in this amendment, as it might embarrass the President in his negotiations. Reporting to the Senate, on behalf of the Senate conferees, the action of the conference committee in receding from the amendment, and replying to Senator Hopkins' criticism, Senator Lodge said (*id.*):

> "I had supposed that the Senator from Illinois realizes that the reporting of this bill in its present condition would not in any way endanger the rights of Chicago to have water from the lake. Certainly, I should have adhered to the amendment if I had thought that the drainage canal of Chicago would have been in any way endangered by the Commission. * * * The first section of the bill protects the rights of Chicago. * * * Every right is safeguarded. The conferees were as anxious as the Senator from Illinois could possibly be to protect the drainage canal of Chicago, but they did not feel warranted in allowing the whole legislation for such an important object to fail."

I find nothing in the Niagara Falls Act which can be deemed to indicate disapprobation by Congress of the construction by the Secretary of War of his authority under the Act of 1899; whatever inference may be drawn from the act seems to me to be to the contrary.

Within a few years after the passage of this act, the Canadian Boundary Waters Treaty was signed (1909). Reference has been made to its provisions and to the construction placed upon them by those who negotiated the treaty on behalf of the United States (*supra*, p. 57). The effect of the Chicago diversion on waters through which the international boundary passes is pertinent to the consideration of the national interests, as distinguished from mere state interests, that are involved, and of the power of Congress to control the diversion with appropriate regard both to internal affairs and to foreign relations. But the question in this suit is between States of the Union and relates to the construction of an act of Congress and the validity and effect of the action taken thereunder in relation to the diversion. It does not seem to me to be necessary to discuss the provisions of the treaty of 1909, or the reservations it contains, and I express no opinion upon them, further than to say that the treaty contains nothing which can be regarded as effecting a repeal of the Act of March 3, 1899, or as operating to deprive the Secretary of War of the authority it conferred in relation to the diversion here in question.

Finally, the authority of the Secretary of War under Section 10 of the Act of 1899, is deemed to have been involved, and to have been passed upon by this Court, in *Sanitary District* v. *United States,* 266 U. S. 405, where the Court said in reference to Section 10 (*id.,* p. 429):

> "There is neither reason nor opportunity for a construction that would not cover the present case. As now applied it concerns a change in the condition of the Lakes and the Chicago River, admitted to be navigable, and, if that be necessary, an obstruction to their navigable capacity, *United States* v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690, without regard to remote questions of policy. It is applied prospectively to the water henceforth to be withdrawn. This withdrawal is prohibited by Congress, except so far as it may be authorized by the Secretary of War."

And in entering the decree for the injunction prohibiting a withdrawal in excess of 250,000 cubic feet per minute, the amount allowed by the Secretary of War's permit, the Court coupled with it the provision "without prejudice to any permit that may be issued by the Secretary of War according to law" (*id.,* p. 432).

I do not think that it can be said that the proviso in the Act approved at the last session of Congress (January 21, 1927, 44 Stat., Pt. 2, 1010, 1013) with respect to a modification of the existing project on the Illinois River, that "nothing in this act shall be construed as authorizing any diversion of water from Lake Michigan", affects the question as to the construction of the Act of 1899 or limits the power of the Secretary of War thereunder. This proviso was inserted in the Act while the present suit was pending and it appears to have been intended to leave the contentions of both parties to this controversy unaffected by the provision which was enacted as to the improvement of the Illinois River. There was a proviso with such a purpose in an act of Congress passed while the case of *Wisconsin* v. *Duluth,* 96 U. S. 379, was pending. The Act of August 14, 1876, making an appropriation for the improvement of the harbor at Duluth, contained the condition that the appropriation should be "without prejudice to either party in the suit now pending between the State of Wisconsin, plaintiff, and the City of Duluth and the Northern Pacific Railroad, defendants." This Court said that "as this suit was then pending the clause that it should be without prejudice to any one in the suit was inserted." But the Court added that the caution was not needed, as the Court held that the Federal Government through the appropriations of Congress and the action of the War Department had already taken charge of the work under consideration.

The Secretary of War's authority under Section 10 of the Act of March 3, 1899, is not to be regarded as unlimited. Such power could not be conferred. His action must have reasonable relation to the exercise of the power granted to Congress by the Constitution and to the purpose of the delegated authority, and must not be arbitrary or capricious. The true intent of the Act of Congress was that unreasonable obstructions to navigation, and navigable capacity, were prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction. The power of Congress to make such a delegation of authority is deemed to be sustained by repeated decisions of this Court. *Southern Pacific Co.* v. *Olympian Dredging Co.,* 260 U. S. 205, 208; *Sanitary District* v. *United States,* 266 U. S. 405, 428; *Field* v. *Clark,* 143 U. S. 649; *Butterfield* v. *Stranahan,* 192 U. S. 470; *Union Bridge Co.* v. *United*

States, 204 U. S. 364, 386; *Monongahela Bridge Co.* v. *United States*, 216 U. S. 177, 192; *Louisville Bridge Co.* v. *United States*, 242 U. S. 409, 424, 425. And when the Secretary of War acts under the authority conferred by Congress, his determination as to what is or is not an unreasonable obstruction to navigation or navigable capacity in the circumstances of the particular case has the same effect and is as immune from judicial review as if Congress had acted directly. *Monongahela Bridge Co.* v. *United States*, 216 U. S. 177, 195; *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, 210.

Sixth. *The validity and effect of the permit of the Secretary of War of March 3, 1925.*

The note which prefaced the permit of March 3, 1925, states that the instrument "does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulation, nor does it obviate the necessity of obtaining State assent to the work authorized. It merely expresses the assent of the Federal Government so far as concerns the public rights of navigation (see Cummings *v.* Chicago, 188 U. S. 410)." This statement in no way detracts from the effect of the permit as expressing the consent of the Federal Government so far as navigation is concerned. The reference to "State assent" should be taken as referring to the assent of the State within whose territory the action allowed by the Secretary of War was to be taken, that is, in this case, the State of Illinois. The decision in *Cummings* v. *Chicago*, which related to the building of a dock, goes no farther. There, as the Court put it, the question was,—"Did Congress, in the execution of its power under the Constitution to regulate commerce, intend by the legislation in question to supersede, for every purpose, the authority of Illinois over the erection of structures in navigable waters wholly within its limits?" (*id.*, p. 428). This question was answered in the negative in the light of the decisions as to the authority of the States with respect to the erection of such structures until Congress superseded that authority. But, so far as other States are concerned which may incidentally be affected by the action authorized, there is no ground for the conclusion that their assent is necessary. In this instance, the contention that the assent of the complainant States was required to give efficacy to the Federal action cannot be sustained. That action, when taken under the power granted by the Constitution, is deemed to be taken on behalf of all the States, and of all the people, save as it may be limited by the doctrine of the ***Cummings*** case with respect to the presumed intention of Congress not to authorize such acts as the erection of structures in navigable waters wholly within the limits of a State without its assent.

In considering the validity of the permit of March 3, 1925, the exigency as it then existed must be considered. The prior permit limiting the withdrawal to 4167 c. f. s. had been enforced by the Court without prejudice to such action as the Secretary of War might lawfully take. The question as to the validity of the permit of March 3, 1925, is narrowed to the point whether in allowing the increase of the diversion from 4167 c. f. s. to 8500 c. f. s. (both exclusive of Chicago's pumpage, *supra*, pp. 22, 81, 85) the Secretary of War acted arbitrarily and without reasonable relation to the purpose of his delegated authority. There had been, and was, an actual withdrawal of far more than this amount. The total flow through the drainage canal in the year 1924 had been 9465 c. f. s., and, exclusive of Chicago's pumpage 8191 c. f. s. (*supra*, p. 23). In exercising his authority under the statute, it was incumbent upon the Secretary of War to consider the interests of navigation, but he was bound to consider those interests in relation to the Chicago River and the Chicago harbor as well as in connection with the effect on other harbors and the levels of the lakes. As the Court had decided that 4167 c. f. s. was the limit of the quantity of water which could lawfully be taken from Lake Michigan, in the absence of a valid permit for an increased withdrawal, the Secretary of War had to consider the effect of an immediate stoppage of any diversion in excess of 4167 c. f. s. There could be no question as to the consequences of such action. They appeared on the application to the Secretary of War substantially as they appear in the evidence here. So clearly do these consequences appear, that the complainants, pressing for a decree to prevent the diversion, at the same time suggest that the Court if it enters the decree should suspend its operation and direct the defendants to meet specified requirements, with a provision that the parties may come before the Court from time to time to show the difficulties encountered, the speed made, whether the delay was too great, asking in short that the Court should direct and supervise the steps necessary to be taken to make it possible ultimately to give effect to such a decree, which, it is recognized could not reasonably be made operative forthwith. And it is plain that this supervision would have to continue for a number of years. The Court would thus be compelled to deal with questions essentially of an administrative character. These questions would concern not simply the health of the citizens of Chicago and the adjacent territory, but also the interests of navigation, questions of the sort which were appropriately before the Secretary of War. It appeared that a diversion of 4167 c. f. s. was not sufficient to keep the Chicago River reversed at all times, and when not kept reversed, the enormous volume of Chicago's sewage would pour into the lake and under present conditions could not fail to create a pestilential condition in the lake, and in the port and harbor of Chicago. The nature of the injury which would be sustained by the interests of navigation and commerce, and the propriety of the intervention of the United States, in such a case were pointed out by the Court in *New York* v. *New*

Jersey, 256 U. S. 296. There the question was merely as to the introduction of sewage into Upper New York Bay by an artificial conduit. Here, in connection with the effect, adequately shown, of the sewage there is the related question of the diversion of navigable waters, the extent to which it should be allowed, and the effect upon navigation of a given diversion, matters directly within Section 10 of the Act of 1899, and requiring the exercise of the administrative discretion of the Secretary of War. Called upon to consider the effect upon navigation of the stoppage, or reduction, of an actual, existing diversion, he had to determine what he would permit in the face of a definite and inescapable exigency. What was necessary to prevent intolerable conditions in the waters of the lake, and in the port and harbor of Chicago? Within what time could steps be taken which would permit a reduction of the quantity diverted with safety to navigation? What should be the nature of the steps to be taken? What supervision should there be of the work necessary to be done? These questions none the less related to navigation because they involved questions of sanitation. If in the circumstances the Secretary of War had authority to allow a withdrawal of water from Lake Michigan to pass through the drainage canal, and if in the exercise of that authority he could fix 4167 c. f. s., I can see no ground for the conclusion that he acted arbitrarily in the conditions confronting him in fixing 8500 c. f. s. If Congress had no power to regulate the diversion, or if it lay outside the authority delegated to the Secretary of War, he could not deal with it at all; but if Congress had the power, and the Secretary of War had the administrative authority to regulate the diversion, there seems to me to be no basis for a decision that he transcended his authority in determining the quantity allowed or that his action is subject to judicial review.

The Secretary of War in granting the permit of March 3, 1925, and fixing its conditions, while meeting the requirements of the existing situation, was obviously aiming at a reduction of the amount of the diversion and providing for arrangements which would make a reduction practicable. His permit was temporary and conditional. The Secretary of War in granting the permit was entitled to impose conditions. "The power to approve implies the power to disapprove and the power to disapprove necessarily includes the lesser power to condition an approval." *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, 208. An examination of the conditions of the permit in question discloses an appropriate exercise of discretion. They were conditions in the interest of navigation, providing for suitable inspection and supervision, and were directed to the object of decreasing the pollution of navigable waters and of bringing about conditions in which the withdrawal of water from Lake Michigan could be diminished. The Secretary of War also had regard to the practicability of providing regulating or compensating works to restore the levels of the Great Lakes or compensate for the lowering of their levels due to the diversion. This had reference to the power of Congress to take steps looking to such compensating works as a practical solution of the problem. The Secretary of War contemplating this possibility demanded that the Sanitary District guarantee a specified portion of the expense. Further, as Chicago increased the amount of water withdrawn from Lake Michigan by pumpage for its water supply, the Secretary of War insisted upon a program for metering with the object of reducing the quantity taken from the lake.

The permit is in terms revocable at the will of the Secretary of War, and is subject to such ~~action~~ as may be taken by Congress. If not revoked, or extended, the permit is to expire on December 31, 1929. It seems to me that the Secretary of War had authority to impose these conditions.

It is said that the permit is wholly ineffective as it provides that "there shall be no unreasonable interference with navigation by the work herein authorized." It is urged that the permit is thus self-contradictory. But this condition must be construed not as withdrawing or rendering nugatory the permission expressly granted but as providing that, in the manner of doing it, all that is done under that permission, and in performing the conditions of the permit, shall be done with reasonable regard for the interests of navigation, and the Secretary of War for this purpose as well as others reserved the right of immediate revocation at any time. This permit, like those previously granted, was only a revocable license. (*Sanitary District* v. *United States,* 266 U. S. 405, 429.) But, as such, the permit was effective. It created no vested right in the Sanitary District. It is at all times subject to review, and the complete control of the diversion remains, as it should remain in view of the national interests involved, with Congress.

In my opinion, the permit of March 3, 1925, is valid and effective. In this view, it should not be overridden by judicial action.

Summary of Conclusions.—My conclusions are:

1. That the complainants present a justiciable controversy.

2. That the State of Illinois and the Sanitary District of Chicago have no authority to make or continue the diversion in question without the consent of the United States.

3. That Congress has power to regulate the diversion, that is, to determine whether and to what extent it should be permitted.

4. That Congress has not directly authorized the diversion in question.

5. That Congress has conferred authority upon the Secretary of War to regulate the diversion, provided he acts in reasonable relation to the purpose of his delegated authority and not arbitrarily.

6. That the permit of March 3, 1925, is valid and effective according to its terms, the entire control of the diversion remaining with Congress.

Recommendations for Decree.

In the light of these conclusions, the bill, in my opinion, should be dismissed. I think, however, that if a situation should develop in which the defendants were seeking to create or continue a withdrawal of water from Lake Michigan without the sanction of Congress or of administrative officers acting under its authority, the complainant States have such an interest as would entitle them to bring a bill to restrain such action.

I therefore recommend that the bill be dismissed without prejudice to the right of the complainants to institute suit to prevent a diversion of water from Lake Michigan in case such diversion is made or attempted without authority of law.

Respectfully submitted,

Charles E. Hughes
Special Master.

Office Supreme Court, U. S.
FILED
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CHARLES ELMORE CROPLEY
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.

No. ~~7~~, 6
Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

No. ~~11~~, 10
Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

No. ~~12~~, 11
Original.

REPORT OF TESTIMONY AND EXHIBITS RECEIVED BY THE SPECIAL MASTER.

IN THE

SUPREME COURT OF THE UNITED STATES.

October Term, 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, *vs.* State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7, Original.
State of Michigan, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 11, Original.
State of New York, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 12, Original.

REPORT OF TESTIMONY AND EXHIBITS RECEIVED BY THE SPECIAL MASTER.

To the Supreme Court of the United States:

I hereby certify that the testimony and exhibits, consisting of forty-two volumes of transcript, pages 1 to 9777, inclusive, with index, and Complainants' Exhibits Nos. 1 to

230, inclusive, and Defendants' Exhibits Nos. 501 to 553, inclusive, and 1001 to 1383, inclusive, constitute the testimony and exhibits received by me as Special Master in the above-entitled suits, under the order of this Court of June 7, 1926; and I hereby report said testimony and exhibits, by filing the same with the Clerk of this Court.

CHARLES E. HUGHES
Special Master.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

FILED
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CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

October Term, 1927

No. 11 ORIGINAL

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, vs. State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7, Original.
State of Michigan, Complainant, vs. State of Illinois and Sanitary District of Chicago, Defendants.	No. 11, Original.
State of New York, Complainant, vs. State of Illinois and Sanitary District of Chicago, Defendants.	No. 12, Original.

Exceptions to the Report of the Special Master Taken by the State of Michigan, Complainant.

WILLIAM W. POTTER,
Attorney General.
ANDREW B. DOUGHERTY,
Special Assistant Attorney General.
WILBER M. BRUCKER,
Assistant Attorney General.
ARTHUR E. KIDDER,
Assistant Attorney General.

ROBERT SMITH COMPANY, LANSING, MICH.

IN THE

Supreme Court of the United States

October Term, 1927

No. 11 ORIGINAL

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.

No. 7, Original.

State of Michigan, Complainant,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

No. 11, Original.

State of New York, Complainant,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

No. 12, Original.

Exceptions to the Report of the Special Master Taken by the State of Michigan, Complainant.

Now comes the State of Michigan, complainant in the above entitled original cause number 11, and excepts to the report filed by Charles Evans Hughes, Esq., the

Special Master in this cause, and for cause of exception shows the following:

First: It excepts to the failure of the Special Master to find in accordance with its proposed finding of fact number VII, in part as follows:

> "All of the abstractions of and requests for consent of the Secretary of War to abstract the waters of the Great Lakes-St. Lawrence system by the Sanitary District of Chicago have been for the purpose of sewage disposal and power development.
>
> "The Congress of the United States has never authorized any diversion of water from the Great Lakes-St. Lawrence watershed at Chicago through the Chicago Drainage Canal for any purpose. None of the Secretaries of war of the United States or other Federal executive officers has authorized or directed any diversion of water from the Great Lakes-St. Lawrence watershed to the Mississippi watershed by way of the Chicago Drainage Canal for purposes of navigation. All consents or permits which have been issued or granted by any of the various Secretaries of War of the United States have been granted or issued at the request of the Sanitary District of Chicago for sewage disposal purposes. All such permits have been temporary and revocable in character and conditioned that there should be no interference with or injury to navigation. They have been reluctantly granted to meet a case of alleged sanitary necessity with obvious fear that a great damage would be done to navigation and other interests."

Second: It excepts to the failure of the Special Master to find in accordance with its proposed finding of fact number IX as follows:

> "From April 1, 1903, to March 3, 1925, the Sanitary District of Chicago grossly and wilfully violated all of the Permits of the Secretaries of War and asserted the right to abstract unlimited quantities

> of water from the Great Lakes- St. Lawrence System without the consent and in defiance of the government of the United States and of the other states bordering on that waterway. *Exhibit 1111, R. 3360.*"

Third: It excepts to the failure of the Special Master to find in accordance with its proposed finding of fact number XXXIII as follows:

> "The artificial lowering of the levels of Lakes Michigan, Huron and Erie, and their connecting waters, caused by the abstraction of the waters of the Great Lakes-St. Lawrence system, by the Sanitary District of Chicago, acting as an agency of the State of Illinois, has injured all of the private and municipal water supplies of all of the communities and industries in the state of Michigan which take such water supplies from Lakes Michigan, Huron, Erie and their connecting waters, by reducing the capacity, utility and life of such intakes, by aggravating ice interference with such intakes, by increasing the amount of sand and sediment at the mouths of the intakes, which is drawn into the same, and which is particularly injurious in the case of industrial water supplies, and by increasing the cost of pumping of all of the water to the people of the communities and industries of the State of Michigan taking their water supplies from Lakes Michigan, Huron, Erie or their connecting waters. *R. 1519, 1674, 1914-1917; 2059-2061.*"

Fourth: It excepts to the failure of the Special Master to find in accordance with its proposed finding of fact number XXXVI in part as follows:

> "The Sanitary District of Chicago is now and has been for many years last past, abstracting large quantities of the waters of Lakes Michigan, Huron, St. Clair and Erie, which are the property of the State of Michigan in its sovereign capacity, and has

caused and is causing a recession of such waters so as to lay bare a portion of the submerged lands thereunder."

Fifth: It excepts to the failure of the Special Master to find in accordance with its proposed finding of fact number XXXIX as follows:

> "The opening of the Chicago Drainage Canal and reversal of the Chicago River introduced a current into the Chicago River which was and is a substantial interference with the navigation of that stream. This interference with navigation in the Chicago River has caused a steady decline in the amount of lake traffic on the Chicago River. *EXHIBIT 102, pages 14 and 27; documents 10, 11 and 39 of exhibit 12; R. 378-379; R. 259-263; R. 265, 266; R. 255-257.*"

Sixth: It excepts to the failure of the Special Master to find in accordance with its proposed finding of fact number XLII as follows:

> "The Sanitary District of Chicago has violated the conditions of the Permit of March 3, 1925, by exceeding the limitation placed by that permit upon an instantaneous maximum diversion and by causing and continuing an unreasonable interference with navigation in the Chicago River and in all of the waters of the Great Lakes, their connecting waters and their outlet river, from St. Mary's Falls in the St. Mary's River to tidewater in the St. Lawrence River at Quebec. *Exhibit 146.*"

Seventh: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor, wherein he finds (Master's Report p. 58 (u) that the Chicago River was deepened and improved, but fails to find that such deepening and improvement was for the purposes of facilitating the abstraction of water from Lake Michigan for the purpose of sewage disposal and not for the purpose of navigation.

Eighth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor, wherein he finds (Master's Report p. 81):

> "The amount mentioned in the permit is exclusive of the domestic pumpage in Chicago, which in 1924 amounted to 1274 c.f.s., in 1925 to 1338 c.f.s., and in 1926 to 1395 c.f.s."

instead of finding in accordance with the evidence that the amount of water diverted and abstracted from Lake Michigan for the domestic pumpage and use of the city of Chicago, is not returned to Lake Michigan and to the great Lakes-St. Lawrence watershed, but is permanently abstracted and diverted therefrom and into the Chicago Sanitary canal for the purpose of sewage disposal, and is permanently abstracted and diverted to the Mississippi watershed, wherefore and whereby the said waters should not be considered as exclusive of the permit but should be considered as a part of the abstraction and diversion of waters from Lake Michigan, and particularly for the purpose of considering the amount diverted under the terms of the Permit by the Secretary of War of March 3, 1925, and for the purpose of determining the number of cubic feet per second mean average, and also for the purpose of considering the number of cubic feet per second instantaneous maximum, because the said abstraction and diversion of waters occurs directly from Lake Michigan and no part thereof is returned to said lake or watershed.

Ninth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor, wherein he finds (Master's Report p. 81):

> "It appears from the evidence that, up to the time of the taking of the testimony herein, the Sanitary District had substantially complied with the conditions of the Permit."

instead of finding in accordance with the evidence that the Sanitary District has not substantially complied with the conditions of the Permit of March 3, 1925 inasmuch as the evidence shows that defendants did create an unreasonable interference with navigation, and also that the program of water metering for the city of Chicago is not being, and has not been carried out as therein required, inasmuch as the evidence shows that there has been a failure upon the part of the city of Chicago to install the number of water meters necessary to bring about the reduction of the water supply of the city of Chicago as contemplated by the Permit; and the evidence also shows that the Sanitary District of Chicago has exceeded the instantaneous maximum provided under such Permit.

Tenth: It excepts to the finding of the Special Master and the reasons assigned therefor, wherein he finds (Master's Report p. 117):

> "I am unable to conclude that the injury alleged to have been sustained in relation to agriculture and horticulture has been sufficiently shown to warrant its consideration in determining the effect of a reduction of approximately six inches in lake levels, due to the Chicago diversion."

instead of finding in accordance with complainant's proposed findings of fact numbers XXXI and XXXII that:

> "The ground water table at its point of junction with the lake surface fluctuates directly with the lake surface which regulates the ground water table so that it can never fall below the level of the lake. When the lake is lowered by natural or artificial causes the ground water table immediately adjoining the lake is lowered to the same extent. * * * In the case of gravelly and sandy soils, there is a point below which the water table cannot recede without impairing or destroying the growth of crops thereon. The artificial lowering of six inches in the level of Lakes Michigan and Huron, caused by the abstraction of the waters of the Great Lakes-St Lawrence system by the Sanitary District of Chicago, acting as an agency of the State of Illinois, has lowered the water table at the point of union with Lakes Michigan and Huron, in the State of Michigan by not less than six inches. *R. 5375-5377, 5379, 1577.* About 75 per cent of the 823 miles of shore line of the State of Michigan, upon Lake Michigan, is of such a character that the artificial lowering of the water table by six inches, produced at the shore line, is continuous to substantially the same extent for a distance of from one-half to three miles back from the shore line. *R. 1110.* * * * The artificial lowering of the water table along the shore line of Lake Michigan in the State of Michigan has substantially reduced the height of water in the wells of that area and has substantially injured and contributed to the death of natural forest trees, growing in that area. * * * The artificial lowering of the water table under the lands in the State of Michigan, adjacent to the shore of Lake Michigan has inflicted a substantial injury upon, and has materially reduced the production of the cherry orchards of the State of Michigan in that area."

Eleventh: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor, wherein he finds (Master's Report p. 122):

> "The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than one thousand c.f.s. of water is sufficient to supply all the needs of navigation. I am unable to so find."

instead of finding that the amount of one thousand c.f.s. of water is sufficient to supply all the needs of navigation in accordance with the evidence, and particularly in view of the adoption of the finding of the Chief of Engineers of the War Department (Master's Report p. 61):

> "That a diversion of less than one thousand c.f.s. from Lake Michigan would supply any reasonable demands of navigation from Lake Michigan to the Mississippi River, and that any greater diversion was a greater injury than benefit to navigation;"

and also the statement of the Secretary of War, (Master's Report p. 63):

> "On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. There is involved in this case no issue of conflicting claims of navigation. The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a deep waterway from the Great Lakes to the Mississippi River over the route of the Sanitary Canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over one thousand feet per second, or less than a quarter of the amount already being used for sanitary purposes in the canal."

Twelfth: It excepts to the failure of the Special Master to find in accordance with complainant's proposed finding of fact XXVI as follows:

> "There are many Canadian ports on the Great Lakes which are used by American vessels. *R. 923.* The navigable depths in these ports are affected in the same way and to the same extent as the American ports on the same lake or connecting channel."

Thirteenth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor, wherein he finds (Master's Report p. 125):

> "It is not controverted that the Secretary of War had these considerations before him, on the application and hearing which resulted in the Permit of March 3rd, 1925,"

instead of finding from the evidence that the Secretary of War did not have such considerations before him concerning the effect of the diversion of the water from Lake Michigan upon the navigation of the Mississippi River at the time of the application and hearing for the permit of March 3, 1925, inasmuch as the evidence shows that no part of the authorized diversion was for the benefit of the Mississippi River, but was only made because of an assumed sanitary necessity for the sewage disposal of the Sanitary District and not otherwise; and also, because the evidence shows from the report of the Chief of Engineers (Master's Report p. 75-77) and the Permit of March 3, 1925 by the Secretary of War (Master's Report p. 77-80) and the letter of transmittal from the Secretary of War (Master's Report p. 80-81) that no such consideration was there mentioned, nor does the evidence show that the same was considered by them in connection with the application for a permit for such diversion.

Fourteenth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor, wherein he finds (Master's Report, p. 125):

> " That regulating or compensating works are feasible to offset the effect of the Chicago diversion."

instead of finding, if any finding was to be made with respect to the feasibility of regulating or compensating works:

> 1. That the construction of such works is solely under the control of Congress and not under the control of the defendants, nor of complainant, and when or if Congress will ever act on this matter is not known nor determined.
>
> 2. That the construction of such works is dependent upon joint action and consent of Great Britain and the United States Government, and that when or if the two Governments will ever act and consent for or to the construction of such works is not known.
>
> 3. That the complainant is not required as a matter of law to construct regulating or compensating works for the purpose of mitigating damages caused by an illegal abstraction and diversion of water constituting a public nuisance, done and created by defendants.
>
> 4. That while some of the damages caused by the illegal abstraction and diversion of water from Lake

Michigan might be mitigated by regulating or compensating works, some damages such as those to water power and other rights could not be so mitigated.

5. That the conditions of the Great Lakes-St. Lawrence waterways would be better with regulating or compensating works without abstraction or diversion of water from Lake Michigan by defendants, rather than such works with diversion.

6. That complainant is entitled to the full benefits which might be obtained by the construction of such regulating or compensating works without mitigation or diminution by the diversion or abstraction of water from Lake Michigan by defendants.

Fifteenth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor, wherein he finds (Master's Report p. 139):

> "To secure the utmost practicable treatment of the sewage of the Sanitary District, and to reduce as rapidly as possible the diversion of water from Lake Michigan, without creating conditions which would seriously menace the health of Chicago, will require constant and expert administrative supervision, the continuous checking up of the results obtained by the installation of treatment works, and the insistence on such improved methods as from time to time will be available."

instead of finding that the authority of the Chief of Engineers and the Secretary of War, in recommending and granting a permit for the diversion of water from Lake Michigan to the Mississippi watershed, if lawful in any case, is to be based upon the authority of Congress to control and regulate navigation, and not upon a consideration of local health conditions nor other extraneous considerations which are neither national in scope nor directly concerned with navigation itself.

Sixteenth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. IX as follows:

> "That the Congress of the United States is without power to authorize the abstraction and transfer of the waters of the Great Lakes and St. Lawrence watershed to or for the benefit of the Mississippi watershed."

Seventeenth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. X as follows:

> "That the Permit of March 3, 1925, is *ultra vires* and void and constitutes no authority for the abstraction of the waters of the Great Lakes-St. Lawrence system by the State of Illinois and the Sanitary District of Chicago."

Eighteenth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XI as follows:

> "That the Permit of March 3, 1925, does not purport to authorize the abstraction of the waters of the Great Lakes-St. Lawrence system, and does not undertake to authorize the invasion or injury of the property and rights of the peoples of the complainant State of Michigan or the proprietary or quasi-sovereign rights of said state."

Nineteenth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XII as follows:

> "That the State of Illinois and the Sanitary District of Chicago, by their acts of which complaint is made, have unlawfully interfered and are unlawfully interfering with and placing a burden upon the freedom of interstate commerce to the injury of the complainant State of Michigan and the peoples of said state."

Twentieth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XIII as follows:

> "All portions of the Act of the Legislature of Illinois approved May 29, 1889, and the Illinois Acts amendatory thereof and supplementary thereto, which purport to authorize and require the Sanitary District of Chicago to abstract the waters of the Great Lakes-St. Lawrence watershed, are unconstitutional and void under the Constitution of the United States and *ultra vires* and inoperative as affecting the rights of the complainant State of Michigan."

Twenty-first: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XIV as follows:

> "That the State of Illinois was and is without power to appropriate and abstract the waters of the Great Lakes-St. Lawrence system to the injury of the complainant State of Michigan or its peoples."

Twenty-second: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XV as follows:

> "That neither the Congress of the United States nor the Secretary of War, by means of the Permit of March 3, 1925, or any prior permit, has appropriated or attempted to appropriate any of the waters of the Great Lakes-St. Lawrence system for navigation purposes in the Des Plaines, Illinois, or Lower Mississippi River."

Twenty-third: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XVI as follows:

> "That the State of Illinois and the Sanitary District of Chicago, by their acts of which complaint is made, have seriously injured, are seriously injuring and are threatening further substantial injury to the value of the property, to the prosperity and to the welfare of large numbers of the peoples of the complainant State of Michigan, of which said state is guardian as *parens patriae* of its people."

Twenty-fourth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XVII as follows:

> "That the State of Illinois and the Sanitary District of Chicago, by their acts of which complaint is made, have substantially injured, are substantially injuring and are threatening further substantial injury to the proprietary rights and the quasi-sovereign rights of the complainant State of Michigan."

Twenty-fifth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XVIII as follows:

> "The State of Michigan in its proprietary capacity, and in its governmental capacity representing the people who own lands bordering on the connect-

> ing waterways between the Great Lakes, within said state, has riparian rights in and upon said waters, which riparian rights are property, which property is being taken and will continue to be taken, without due process of law and without just compensation, in violation of the fifth and fourteenth amendments to the Constitution of the United States, by the lowering of such waters, by reason of the permanent abstraction and diversion of the water of Lake Michigan by defendants, through the Chicago Sanitary Canal."

Twenty-sixth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of Law No. XIX as follows:

> "Neither the Congress of the United States in the exercise of its power to regulate commerce, nor any governmental official of the United States, has any power or authority to authorize or consent to a lowering of the waters of the Great Lakes, to the injury, invasion or destruction of complainant's riparian rights in or upon said waters."

Twenty-seventh: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XX as follows:

> "Neither the State of Illinois, nor the Sanitary District of Chicago, in the exercise of the police power, has any right, power and authority, to lower the waters of the Great Lakes, and the connecting waterways between the same, to the injury, or destruction of complainant's riparian property rights, without due process of law and without just compensation."

Twenty-eighth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XXI as follows:

> "Neither the power of Congress to regulate commerce, nor the police power of the State of Illinois, may be exercised in violation of the fifth and fourteenth amendments of the Constitution of the United States; such powers must be exercised within the limits of the Constitution of the United States, and not in violation of those limits."

Twenty-ninth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XXV as follows:

> "The proprietary and sovereign rights of the State of Michigan to the unappropriated waters, submerged land and land laid bare by the recession of the waters of the Great Lakes, is property which the State of Michigan may use, protect and dispose of according to its own policy, subject only to the paramount right of the Congress of the United States to use and utilize said waters and submerged lands in the regulation of commerce."

Thirtieth: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XXVI as follows:

> "Neither the State of Illinois nor the Sanitary District of Chicago has any power or authority to lower the waters of the Great Lakes within the limits of the territorial boundaries of the State of Michigan; or to withdraw and abstract the waters of Lake Michigan so that a lowering of such waters within the territorial boundaries of the State of Michigan is a necessary result of the acts of said State of Illinois and the Sanitary District of Chicago."

Thirty-first: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XXVII as follows:

> "The lowering of the waters of the Great Lakes within the territorial limits of the State of Michigan by the State of Illinois and the Sanitary District of Chicago is and constitutes a taking of the property of the State of Michigan without due process of law, and without just compensation."

Thirty-second: It excepts to the failure of the Special Master to find in accordance with its proposed conclusion of law No. XXVIII as follows:

> "That the complainant State of Michigan is entitled to a decree enjoining the State of Illinois and the Sanitary District of Chicago, their employees, agents, attorneys and servants, from abstracting any of the waters of the Great Lakes-St. Lawrence system through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency."

Thirty-third: It excepts to the failure of the Special Master to find and recommend a decree in accordance with complainant's proposed recommendations for a decree as follows:

> "This cause coming on to be heard upon the report of the Special Master, Charles Evans Hughes, Esq., to whom it was referred to take the evidence and to report the same to the Court with his findings of fact, conclusions of law and recommendations for a decree, and also upon the exceptions taken to said report on the part of the plaintiff and defendants, and said cause having been argued by counsel for the respective parties and due deliberation had thereon, it is:
>
> Ordered, adjudged and decreed as follows:
>
> (1) That each and all of the exceptions taken to said Special Master's report by either or any of the parties are overruled.

> (2) That the defendants, State of Illinois and the Sanitary Districts of Chicago, their employees, servants, attorneys and agents be and they hereby are ordered to cease, desist and refrain from abstracting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency.
>
> (3) That the Complainant have and recover from the Sanitary District of Chicago and the State of Illinois its costs and disbursements herein to be taxed and noted at the foot of this decree."

Thirty-fourth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor, wherein he finds as the SECOND conclusion of law (Master's Report, p. 148):

> "My conclusion is that the action of Illinois in diverting water from Lake Michigan through the drainage canal of the Sanitary District was, and is, unlawful unless validly permitted by Congress either directly or through the action of the Secretary of War."

instead of finding that the action of Illinois in diverting water from Lake Michigan through the drainage canal of the Sanitary District was, and is, unlawful, and that no authority exists on the part of Congress either directly, or indirectly through the action of the Secretary of War, to permit such diversion of water without observing the requirements of due process of law and without making just compensation, in violation of the Federal Constitution.

Thirty-fifth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor wherein he finds as the THIRD conclusion of law that Congress has power to control the diversion of water from Lake Michigan both as to whether any diversion should be permitted and to what extent (Master's Report, pps. 148-171), instead of finding that Congress has no power to permit the diversion of water from Lake Michigan through the drainage canal of the Sanitary District, because:

1. Such diversion constitutes a taking of complainant's property without due process of law and without just compensation, in violation of the Fifth Amendment.

2. Congress could not authorize the diversion from the Great Lakes-St. Lawrence watershed to the Mississippi watershed.

3. Such diversion would constitute a preference of the ports of one state over those of another, in violation of Article I, Section 9, Clause 6, of the Federal Constitution.

4. The power of Congress extends to the protection and improvement of navigation but not to its destruction or to the creation of obstructions to navigable capacity.

5. Congress has no authority under the commerce clause of the Constitution to permit a diversion of water from Lake Michigan for purposes of sanitation and development of water power, rather than of navigation.

Thirty-sixth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor wherein he finds as the FIFTH conclusion of law (Master's Report, pps. 176-191) that Congress has conferred authority upon the Secretary of War to regulate the diversion, provided he acts in reasonable relation to the purpose of his delegated authority and not arbitrarily, instead of finding that the diversion or abstraction of these waters creates an obstruction to the navigable capacity of the waters of Lake Michigan and the Great Lakes-St. Lawrence waterways, which has not been "affirmatively authorized by Congress," and that the Secretary of War is without authority to permit or regulate any such diversion of water from Lake Michigan.

Thirty-seventh: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor wherein he finds as the SIXTH conclusion of law (Master's Report, pps. 191-196) that the Permit of March 3, 1925, is valid and effective according to its terms, instead of finding that the said Permit was without authority and at most expressed the assent of the Federal Government so far as concerns the public rights of navigation but did not grant property belonging to complainant so that the water of Lake Michigan could lawfully be diverted without its consent, nor without due process of law and after just compensation.

Thirty-eighth: It excepts to the finding of the Special Master heretofore filed in the above entitled cause and the reasons assigned therefor wherein he finds the "Summary of Conclusions" (Master's Report, p. 196), and particularly the following:

> "* * * * * * * *
>
> 2. That the State of Illinois and the Sanitary District of Chicago have no authority to make or continue the diversion in question without the consent of Congress.
>
> 3. That Congress has power to regulate the diversion, that is, to determine whether and to what extent it should be permitted.
>
> * * * * * * * *
>
> 5. That Congress has conferred authority upon the Secretary of War to regulate the diversion, provided he acts in reasonable relation to the purpose of his delegated authority and not arbitrarily.
>
> 6. That the Permit of March 3, 1925, is valid and effective according to its terms, the entire control of the diversion remaining with Congress."

Thirty-ninth: It excepts to the recommendations for final decree made by the Special Master contained in his report heretofore made and filed in said cause as follows: (Master's Report, p. 197),

> "In the light of these conclusions, the bill, in my opinion, should be dismissed. I think, however, that if a situation should develop in which the defendants were seeking to create or continue a withdrawal of water from Lake Michigan without the sanction of Congress or of administrative officers acting under its authority, the complainant States have such an interest as would entitle them to bring a bill to restrain such action.
>
> "I therefore recommend that the bill be dismissed without prejudice to the right of the complainants to institute suit to prevent a diversion of water from Lake Michigan in case such diversion is made or attempted without authority of law."

And the State of Michigan, complainant in original cause No. 11 herein, appeals from and excepts to the findings and report of Charles Evans Hughes, Esq., the Special Master, to the Supreme Court of the United States, and prays for a correction of the errors of the Special Master hereinbefore specified.

William W. Potter
WILLIAM W. POTTER,
Attorney General. A B Dougherty
ANDREW B. DOUGHERTY,
Special Assistant Attorney General. Wilber M. Brucker
WILBER M. BRUCKER,
Assistant Attorney General.
ARTHUR E. KIDDER,
Assistant Attorney General.

Office Supreme Court, U. S.
FILED
JAN 3 1928
CHARLES ELMORE CROPLEY
CLERK

In the Supreme Court of the United States

OCTOBER TERM, A. D. 1927.
BILL IN EQUITY.
ORIGINAL JURISDICTION No. 7.

STATE OF WISCONSIN, STATE OF OHIO,
STATE OF PENNSYLVANIA and STATE OF
MINNESOTA,
Complainants,

vs.

STATE OF ILLINOIS AND SANITARY
DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF TENNESSEE,
STATE OF KENTUCKY, STATE OF ARKANSAS,
STATE OF MISSISSIPPI AND STATE OF LOUISIANA,
Intervening Defendants.

COMPLAINANTS' EXCEPTIONS TO REPORT OF THE SPECIAL MASTER.

JOHN W. REYNOLDS,
Attorney General of Wisconsin,

HERMAN L. EKERN,
Special Assistant Attorney General of Wisconsin,

R. T. JACKSON,
Special Assistant Attorney General of Wisconsin,

HERBERT H. NAUJOKS,
Assistant Attorney General of Wisconsin.

CLIFFORD L. HILTON,
Attorney General of Minnesota,

EDWARD C. TURNER,
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NEWTON D. BAKER,
Special Assistant Attorney General of Ohio,

T. J. BALDRIDGE,
Attorney General of Pennsylvania.

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T. J. BALDRIDGE,
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In the Supreme Court of the United States

October Term, A. D. 1927.
Bill in Equity.
Original Jurisdiction No. 7.

State of Wisconsin, State of Ohio,
State of Pennsylvania and State of
Minnesota,
Complainants,

vs.

State of Illinois and Sanitary
District of Chicago,
Defendants,

State of Missouri, State of Tennessee,
State of Kentucky, State of Arkansas,
State of Mississippi and State of Louisiana,
Intervening Defendants.

COMPLAINANTS' EXCEPTIONS TO REPORT OF THE SPECIAL MASTER.

Complainants in the above entitled Original Cause No. 7, jointly and severally, except to the findings of fact made and filed by the Special Master appointed in this case, to the failure or refusal of the Special Master to make and file findings of fact requested by said complainants, to the conclusions of law made and filed by the Special Master, and to the failure of the Special Master to make and file conclusions of law requested by said complainants in the following particulars, to-wit:

EXCEPTIONS TO FINDINGS OF FACT.

I.

Complainants and each of them except to that portion of the finding of fact No. 5(a), appearing on page 18 of the Special Master's Report, which reads as follows, to-wit:

> "In connection with the construction of this canal, the Des Plaines River was straightened for many miles above Lockport, and its channel was improved from Lockport down through Joliet, so that it would be capable of taking the combined floods of the Des Plaines River watershed and the Chicago River watershed, or a total of about 25,000 c. f. s."

because said finding of fact is immaterial, because said finding of fact is contrary to the evidence, and because if this Court should be of the opinion that said finding is material and that it is supported by the evidence, then and in that event, the Special Master should have found and included in said finding of fact that said improvements in the channel of the Des Plaines River, if made, were made for the purpose of facilitating and increasing the abstraction of waters of the Great Lakes-St. Lawrence system for sanitary purposes and not for the benefit of or in aid of navigation.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "A", page 47 hereof.

II.

Complainants and each of them except to that portion of finding of fact No. 5 (f), appearing on page 21 of the report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The construction cost of these works, as it appears on the books of the Sanitary District of Chicago, to December 31, 1926, amounted to $83,689,636.52, and, with the addition of administration, legal, clerical, and incidental expenses, and interest on bonds for construction, to $109,021,613.21."

because said finding of fact is immaterial and because said finding of fact is not supported by any competent evidence in that said books and records of the Sanitary District of Chicago were never proved so as to entitle them or any of them to be admitted in evidence and because there is no relation between the reasonable value or cost of the works constructed by said Sanitary District and the sums of money actually expended therefor in that a large portion of said expenditures was the result of fraud, graft, and corruption upon which no equity can be builded or maintained in this Court.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "B", page 49 hereof.

III.

Complainants and each of them except to finding of fact No. 8 (h), made and filed by the Special Master herein and appearing on pages 39 and 40 of said report, which reads as follows, to-wit:

> "(h) Permits of July 11, 1900.—In April, 1900, plans were adopted by the board of trustees of the Sanitary District for the deepening and widening of the channels of the Chicago River; and application for permission to do so with respect to a part of the river was made to the Secretary of War on April 26, 1900. On June 7, 1900, a similar application was made with respect to another part of the river. The Secretary of War on July 11, 1900, granted two permits according-

ly, with conditions identical with those of the permit of May 8, 1899. These permits contained this statement:

> "I beg to inform you that there is no objection on the part of the War Department to the prosecution of work of improvement of Chicago River specified in the above-mentioned letter and delineated on the maps which accompanied the same, it being understood that this statement as to the attitude of the War Department shall not be understood as involving the general government in any way with the expense incident to the carrying out of the project, and does not in any way invalidate, waive or affect the right of the Secretary of War to regulate or revoke the permit granted under date of May 8, 1899, to the Sanitary District of Chicago, to divert the waters of the Chicago River and cause them to flow into the artificial channel, such permission being subject to the following conditions'—
>
> the conditions of the former permit already quoted."

because the Special Master should have found and included in the aforesaid finding of fact a finding that all of the work so sought to be done and performed by the Sanitary District of Chicago was solely for the purpose of facilitating and making possible the abstraction of a larger quantity of water from the Great Lakes-St. Lawrence system for sanitary purposes and not for the benefit or in aid of navigation.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "C", page 61 hereof.

IV.

Complainants and each of them except to that part of finding of fact No. 8 (u), made and filed by the Special Master herein and appearing on page 58 of his report, which reads as follows, to-wit:

> "The Act of Congress of June 25, 1910 (36 Stat. 659, 660), appropriated $1,000,000 for the construction of a waterway from Lockport, Illinois, to the mouth of the Illinois River, and provided for the appointment by the Secretary of War of a board of five members to report on the feasibility and advisable dimensions of such waterway, and also upon such measures as might be required properly to preserve the levels of the Great Lakes and to compensate, so far as practicable, for the diminished level in these lakes and connecting waters by reason of any diversion of water from Lake Michigan. (The report of this Board, dated August 15, 1913, was transmitted to Congress on February 18, 1914. See Finding 17, *infra,* p. 125.)"

because said finding of fact is immaterial and because if this Court should be of the opinion that said finding of fact is material, then the Special Master should have found and included in said finding of fact a finding that said statute was repealed by the Congress of the United States at a subsequent session of Congress, that no construction work was done under said appropriation, and that no part of said appropriation was expended for construction work prior to the repeal of said statute.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "D", page 74 hereof.

V.

Complainants and each of them except, insofar as the statements hereinafter quoted from finding of fact No. 8(y), made and filed by the Special Master herein and appearing on pages 69, 70 of his report and substantially repeated in a portion of finding of fact No. 16(a) made and filed by the Special Master herein and appearing on page

121 of his report, are intended to be or constitute findings of fact, which said statements and recitals therein, read as follows, to-wit:

> "In his report, Colonel Judson stated that 'for a 9-foot channel, with an increment of 4,167 second feet, the cost either with dams retained or removed appears almost prohibitive, and the probability that Congress will limit the increment to 4,167 second-feet is, in my opinion, so remote that this hypothesis may be left out of consideration. With increments of 7,500 or 10,000 second-feet, the figures show conclusively the advisability of removing all dams." He concluded that, "to most reasonably conform to the probable conditions of the future, an 8-foot project should now be adopted, based on a 7,500 second-foot withdrawal for purposes of estimate and with all dams removed. Then should Congress place the limit of the amount of water to be withdrawn from Lake Michigan at 10,000 second-feet, which I deem probable and, under proper conditions, advisable, that increment would of itself increase the depth to 9 feet. The computations show that with all dams removed, an increment of 10,000 second-feet will increase the depth due to the increment of 7,500 second-feet by about 1.25 feet at Utica, about one foot at Peoria and Havana, and slightly less than one foot at the mouth" (id., pp. 17-19) (Master's Report, pp. 69, 70).
>
> "It will be observed that Colonel Judson stated that 'for a 9-foot channel, with an increment of 4,167 second-feet, the cost either with dams retained or removed appears almost prohibitive,' and his recommendation was for the adoption of an 8-foot project, 'based on a 7,500 second-foot withdrawal for purposes of estimate and with all dams removed.' (Master's Report, p. 121.)"

because if said statements and recitals therein are intended to be findings of fact, they are immaterial, because said report of Colonel Judson was never accepted or acted upon by Congress, and because the recitals of fact in said quotations from Colonel Judson's report are not supported by the evidence in this case but are contrary to the overwhelming preponderance of the evidence in this case.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendices "E" and "F" pages 79 and 84 hereof.

VI.

Complainants and each of them except to the last sentence of finding of fact No. 8(y), appearing on page 71 of the Master's Report, which reads as follows, to-wit:

> "Before the diversion began in 1900, the official reference datum for Federal improvements and for obtaining and maintaining the established project depth in the Illinois River was the low water of 1879. Since then, this reference datum has been officially changed from time to time, so as to conform to existing low water as affected by the diversion."

because said finding of fact is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "G" page 87 hereof.

VII.

Complainants and each of them except to finding of fact No. 11, made and filed by the Special Master herein, and appearing in his report, pages 81-83, inclusive, which reads as follows, to-wit:

"11. Compliance with conditions of permit of March 3, 1925.—It appears from the evidence that, up to the time of the taking of the testimony herein, the Sanitary District had substantially complied with the conditions of the permit. This is shown by the testimony of Colonel Edward H. Schulz, district engineer of the United States Army at Chicago. With respect to the progress of the Sanitary District in carrying out the program of sewage treatment, Colonel Schulz said:

> "In pursuance of carrying out this permit the drainage district is establishing a North Side treatment plant; has begun work on a West Side treatment plant; had in operation a Des Plaines treatment plant and a Calumet treatment plant, and in connection with the Corn Products Company of Chicago, has rendered treatment of a certain part of the wastes of the Corn Products factory. The proportion down to the present time is fully up to the requirements of the permit for this period, the permit having run now about 22 months."

"The Sanitary District has given a bond running to the United States, in the amount of $1,000,000, for the payment of its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed.

"With respect to plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms, Colonel Schulz testified:

> "In connection with these plans the Sanitary District has consulted the District Engineer Office several times during the past year, and tentative plans have been prepared with a view of placing caisson gates at the mouth of the river. The final plans have not yet been submitted to me, nor have I submitted them to the Secretary of War for approval, but I have no doubt that the work will be finished by about July 1, 1929."

> "As to the program for metering the water service of the City of Chicago, Colonel Schulz said:
>
> "The provision of the permit has been carried out up to the present time, up to about 40 per cent of the average for the year. I have been in close touch with the city. It will be noted that this condition is carried out by the city of Chicago, and not by the Drainage District. The requirement involves some 36,000 meters to be placed each year for nine years, first, that they must adopt an ordinance in six months, which they did, and within three months after that, last January, they appropriated $1,000,000 to begin this metering. There had been a good deal of trouble industrially to get the matter started and rapidly executed. The reading of the provision was that 40 per cent should be executed, and that would amount to 14,400 meters, and the average rate 10 per cent. It is evident that the average rate must increase beyond 10 per cent in the next few years to carry out that permit."
>
> "Colonel Schulz testified that there had been compliance with the other conditions of the permit. The permit has not been revoked."

because said finding is not supported by any competent evidence in this case and because said finding of fact is contrary to all competent evidence herein in that it appears affirmatively that the Sanitary District of Chicago has violated the conditions of the permit of March 3, 1925 in the following particulars, to-wit:

(1) that said Sanitary District of Chicago has unreasonably interfered with navigation on the St. Mary's River below St. Mary's Falls, on Lake Michigan, Lake Huron, on the St. Clair River, on Lake St. Clair, on the Detroit River, on Lake Erie, on the Niagara River, on Lake Ontario, and on the St. Lawrence River down to tidewater at the city of Quebec, in violation of condition No. 1 of the permit of March 3, 1925.

(2) that it conclusively appears from the evidence in this case that the Sanitary District of Chicago violated the terms of said permit of March 3, 1925 by on divers occasions exceeding the instantaneous maximum diversion of 11,000 c. f. s.

(3) because the city of Chicago has not provided for the metering of its water service, as required by condition No. 8 of said permit of March 3, 1925, and particularly because since the close of the taking of evidence in this case before the Special Master, appointed by the Court, the city of Chicago has wilfully abandoned and repudiated the program for the installation of meters for its water service, according to the requirements of this permit and has wilfully abandoned and terminated the reading of meters heretofore installed under the provisions of this permit.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "H" page 97 hereof.

VIII.

Complainants and each of them except to that portion of finding of fact No. 16 (a), made and filed by the Special Master herein, which appears on page 119 of his report and which reads as follows, to-wit:

> "If the diversion were reduced materially below 4,167 c. f. s., it would necessitate radical changes in the design and location of the locks, three of which are already either constructed or under construction, and increased outlays."

because said finding of fact is immaterial and because said finding of fact is not supported by any competent evidence herein and is contrary to all competent evidence herein.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "I", page 128 hereof.

IX.

Complainants and each of them except to that portion of finding of fact No. 16 (a), made and filed by the Special Master herein, and which appears on page 120 of his report and which reads as follows, to-wit:

> "There is no adequate water supply for lockage, except by diversion from Lake Michigan. Other plans would involve prohibitive expense."

because said finding of fact is immaterial and because said finding of fact is contrary to the great weight of the competent evidence in this case.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "J", page 133 hereof.

X.

Complainants and each of them except to that part of finding of fact No. 16 (a), made and filed by the Special Master herein and appearing on page 120 of his report, which reads as follows, to-wit:

> "The Federal project depth has been seven feet; but this could not have been maintained without at least 8,500 c. f. s. from Lake Michigan, which gives, in the lower Illinois, about four feet of the low water depth of seven feet."

because said finding of fact is immaterial and because said finding of fact is not supported by any competent evidence herein and is contrary to the competent evidence in this case.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "K", page 146 hereof.

XI.

Complainants and each of them except to that part of finding of fact No. 16 (a), made and filed by the Special Master herein, appearing on page 120 of his report, which reads as follows, to-wit:

> "This stretch of the river is adaptable to improvement as an open channel, but if there were no diversion at Chicago, a large amount of improvements and several locks and dams would have to be provided."

because said finding of fact is immaterial and because said finding of fact so far as it implies any necessity of providing additional locks and dams in the absence of diversion is not supported by any competent evidence and is contrary to the great weight of competent evidence herein.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendices "E" and "F", pages 79 and 84 hereof.

XII.

Complainants and each of them except to that portion of finding of fact No. 16 (a), made and filed by the Special Master herein and appearing on page 122 of his report, which reads as follows, to-wit:

> "The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than 1,000 c. f. s. of water is sufficient to supply all the needs of navigation. I am unable so to find. The needs of navigation on that waterway will depend upon the carrying out of

> plans already adopted and upon the ultimate decision of Congress with respect to water communication between Lake Michigan and the Mississippi River, the extent to which locks and dams are to be used or installed, that is, the character of the improvements and the amount which it is determined to expend."

because said finding of fact is contrary to the overwhelming weight of the competent evidence in this case.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendices "E" and "L", pages 79 and 151 hereof.

XIII.

Complainants and each of them except to that part of the finding of fact No. 16 (b), made and filed by the Special Master herein and appearing at page 124 of his report, which reads as follows, to-wit:

> "My conclusion is that the diversion from Lake Michigan through the drainage canal increases to some extent during low water the navigable depths over bars on the Mississippi River, * * *. Upon all the facts, it was permissible for the Secretary of War to reach the conclusion that the diversion from Lake Michigan of 8,500 c. f. s., was to some extent, an aid to the navigation of the Mississippi River in time of low water."

because the Special Master should have found that said diversion from Lake Michigan did not increase the navigable depths over bars on the Mississippi River at low water, because the Special Master should have found that under no circumstances of this case was it possible to reach the conclusion that a diversion from Lake Michigan of 8,500 c. f. s. was to some extent an aid to navigation on the Mississippi River in time of low water, because said finding of fact is contrary to the overwhelming weight of the competent evidence in this case.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in appendix "M" page 175 hereof.

XIV.

Complainants and each of them except to that portion of finding of fact No. 16 (b), made and filed by the Special Master herein and appearing on page 125 of his report, which reads as follows, to-wit:

> "It is not controverted that the Secretary of War had these considerations before him, on the application and hearing which resulted in the permit of March 3, 1925."

insofar as said finding of fact implies that the Secretary of War issued the permit of March 3, 1925, in any degree whatever for the purpose of aiding or benefiting navigation on the Mississippi River or for any other purposes than assisting the Sanitary District of Chicago in the disposal of the sewage of that district, because said finding of fact is immaterial, because said finding of fact is not supported by any competent evidence and because said finding of fact is contrary to all the competent evidence in this case.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in appendix "N," page 210 hereof and page 204 of appendix "M."

XV.

Complainants and each of them except to each and every part of finding of fact No. 17, made and filed by the Special Master herein and appearing in his report on pages

125-131, inclusive, to each and every recital contained therein insofar as such recitals, or any of them, are intended to be or constitute a finding of fact, which finding and recitals *in haec verba* read as follows:

> "17. Feasibility of remedial works to offset the effect of the Chicago diversion.—One of the conditions of the permit of March 3, 1925, was that the Sanitary District should pay its share of regulating or compensating works, to restore the levels, or compensate for the lowering of the levels of the Great Lakes system, if and when constructed, and post a guaranty in the way of a bond or certified check, in the amount of $1,000,000, as an evidence of its good faith. From an engineering standpoint, the evidence shows it to be practicable to provide such works. This question has been the subject of inquiry by Congress, and of reports pursuant to its direction (Report of Board of Engineers on Deep Waterways, June 30, 1900; House Doc. 149, 56th Cong., 3rd sess.; International Waterways Commission, 1907, House Doc. 779, 61st Cong., 2nd Sess.).
>
> "The Act of Congress of June 25, 1910, provided for a special board of engineers, to report upon a waterway from Utica, Ill., to the mouth of the Illinois River, and upon such measures as might be required to compensate for diminished level, by means of any diversion of water from Lake Michigan for the maintenance of the proposed waterway, or diversion for any other purpose. The report (August 15, 1913) of this Board, with the report of the Board of Engineers for Rivers and Harbors (December 16, 1913), was transmitted to Congress on February 18, 1914 (House Doc. 762, 63rd Cong., 2nd sess.). The special board reported as follows (id., pp. 11, *et seq.*):
>
> > "To restore the diminished levels in the lakes by constructing contracting works in their outlets does not, however, present any serious difficulties. A careful discussion of the proper locations and dimensions of such works is also given in Appendix A.

"At the foot of Lake Ontario, the closure of the Gut channel of the Galops Rapids by the Canadian Government has had the effect of raising the level of Lake Ontario an amount nearly equal to the computed lowering of the Lake by a diversion of 10,000 second-feet at Chicago, and no compensation is at present deemed necessary to restore former conditions in this Lake.

"In Appendix A, it is proposed to diminish the outflow of Lake Erie, by the construction of three submerged weirs in the Niagara River in the vicinity of Squaw Island, which would average about 4.2 feet in height, and would contain about 15,000 cubic yards of masonry. The estimate cost is $150,000.

"To raise the level of Lakes Michigan and Huron, submerged weirs are proposed in St. Clair River, covering three miles of river below the mouth of Black River, at Port Huron. The weirs as suggested in Appendix A have a height of from five to six feet above the river bed, contain about 65,000 cubic yards of material, and their estimated cost is $325,000. It is computed that these weirs will increase the velocity of the water flowing over them slightly (from a mean of 3.28 feet to 3.89 feet per second) but on the other hand, above the mouth of Black River, the river slopes and velocities which are now excessive, will be diminished and navigation on the whole will be considerably benefited.

"The Chicago diversion has no effect on Lake Superior.

"Compensation for the loss of elevation on Lakes Michigan, Huron and Erie, and their connecting waters, due to an assumed diversion from Lake Michigan of 10,000 second-feet, will, by the plan above outlined, involve an expenditure of about $475,000, to which should be added an amount for the maintenance of the weirs, estimated at about $15,000 per year, the total cost being much less than the cost of restoration of depths by dredging. It is the opinion of the board that while other plans have been proposed, compensation by fixed contraction works, similar in general to those above described, affords the cheapest and most satisfactory method of preserving the levels of the Great Lakes.''

"The Warren report (*supra,* p. 66) recommended a system of submerged weirs to repair the damage caused to Lake St. Clair, the St. Clair River, and Lakes Huron and Michigan through the lowering of the levels of these waters. Colonel Warren stated (p. 90):

> "128. There are three general methods by which a restoration of depths on the lakes may be sought—first, the deepening of all harbors and channels affected by the artificial lowering of water levels; second, the construction of regulating works in the outlets of the lakes to raise the levels of the lakes and to control their elevations within fixed limits; third, the contraction of the outlets by means of fixed obstructions which will raise the levels of the lakes without greatly affecting their natural fluctuations.
>
> "129. The first method is considered altogether too expensive, and has other unsatisfactory features. It is recommended only for a few special cases. The second has frequently been proposed, but upon investigation it is found to be less simple than it appears. It involves obstruction to navigation and difficulties with ice. Moreover, it has been shown that efficient regulation of one lake tends to aggrevate the fluctuation of those below it. This system has been adopted at the Soo, where circumstances are particularly favorable to it, but its suitability for the lower lakes is problematical. The third method is the cheapest and simplest, and is considered the most desirable. It is already operating successfully in the case of the Gut Dam.
>
> "130. In Section G 7 of Appendix E the works needed at various places to compensate for the effects of all diversions, present or prospective, are considered in some detail. It is concluded that the

project is entirely feasible and that the expense will not be excessive in view of the benefits received. The works involved include wing walls or other methods of narrowing the channels at the head of each of the St. Lawrence Rapids, a long submerged rock weir about the rapids at Niagara Falls, and a series of such weirs near the head of Niagara River and in the upper reaches of the St. Clair River. To effect the required deepening in Lake St. Clair, and at the head of the Detroit River it was thought that dredging would be the most satisfactory.''

"The Board of Engineers for Rivers and Harbors, commenting upon this recommendation of Colonel Warren, said (id. p. 44):

"The division engineer rejects the first and third plans for restoring levels and proposes to restore the levels of Lakes Erie, Huron, and Michigan by the construction of two sets of submerged weirs. One set of five would be at the head of the Niagara River abreast of Squaw Island, cost about $2,000,000, and raise Lake Erie 1.27 feet, Lake St. Clair about 0.55 foot, and Lakes Huron and Michigan about 0.16 foot, leaving 0.28 foot to be compensated by dredging in Lake St. Clair. The second set of about 11 weirs, spaced about one-third mile apart in the St. Clair River, would cost $1,500,000 and would raise Lakes Huron and Michigan 0.60 foot more. The levels of these three lakes and the connecting rivers between them would, at a total cost of about $3,660,000, be not only fully restored, but provision made for the lowering that would be caused by some additional diversion, the margin on Lake Erie being 0.51 foot and on Lakes Huron and Michigan 0.29 foot.

"85. These submerged weirs would leave the natural oscillation of Lakes Erie and Huron undisturbed. They would reduce the discharge capacity of the St. Clair and Niagara Rivers to what it was before any diversions or other artificial changes were made and permit the lakes to fluctuate between such levels as would have resulted from purely natural causes, such as changes in precipitation, evaporation, etc. To design the weirs correctly, proper model experiments would be desirable and also prolonged gauge observation. In other respects, the weirs are a sound and workable solution of the problem of improving navigable depths, in some respects preferable at the time they are recommended to any other plan.''

''The Joint Board of Engineers, United States and Canada, in its report of November 16, 1926 (*supra,* p. 96), stated (pp. 14, 17):

''78. The levels of the Great Lakes can be raised by works in their outlet rivers, which may be wholly in the form of fixed weirs and contractions, or may be provided with sluice gates. The first of these have come to be termed 'compensating works,' while the second are termed 'regulating works.'

''79. The effect of compensating works is to raise both the high and low lake levels in substantially the same degree, the fluctuation of levels remaining unchanged. After the lake levels have adjusted themselves to the new regimen of the outlet, the outflow from the lake will likewise be substantially the same as if the compensating works had not been built. By operating the gates of regulating works the discharge from a lake, and consequently the levels of the lake, can be controlled within limits to be discussed later.

* * * * *

''95. The investigations made by the Board show that it is advisable to construct compensating works in the Niagara and St. Clair Rivers to counteract the effect of all diversions and outlet enlargements on the levels of Lakes Michigan, Huron and Erie.''

''The Board then describes the works proposed in the Niagara River and St. Clair River. The cost of the works proposed on the Niagara River is estimated at about $700,000 and on the St. Clair River, $2,700,000. The report then continues (id., pp. 17, 18):

"98. This form of compensating works is selected primarily for the reason that the sills will not reduce the navigable width of this important waterway" (St. Clair River) "nor will they increase the cost of providing a channel depth of 30 feet. While these works once built cannot be altered readily to meet a future reduction in the amount of the Chicago diversion, yet on account of the commercial value of the gravel in the river bed it would not be costly to again enlarge the capacity of the river to meet such a reduction.

"99. Construction periods.—To avoid an unwarranted reduction in the flow of the Niagara and St. Lawrence Rivers while the lakes are being raised by the compensating works, the construction on the Niagara River should be spread over two years and on the St. Clair River over four years' time, and the prosecution of the latter should be suspended during any extreme low water periods that may occur at the time that they are undertaken.

"100. Compensation for authorized diversions only.—The proposed compensating works will counteract not only the effect of diversions authorized by license in the United States and Canada but also the effect of outlet enlargements, diversions for navigation, and diversions not covered by license. The lake levels could be restored by similar but less extensive works to the extent that they have been reduced by diversions authorized by license in the two countries. The cost of such works would be nearly proportional to the amount of compensation of level affected, and is estimated as follows:

Diversion compensated for	Cost of works in Niagara River	Cost of works in St. Clair River
Chicago Sanitary District	$400,000	$1,350.000
Power diversions, Welland Canal	100,000	......"

"By the instructions given to the Joint Board of Engineers by the Governments of the United States and Canada, the Board was directed to answer the following questions (id., p. 43):

> "Question 6 (B).—By what measures could the water levels of navigable depths affected by the diversions referred to in Section 6 (A)" (which included diversion at Chicago of 8,500 c.f.s. through the drainage canal) "be restored, and what would be the cost thereof?"

"The Joint Board answered as follows:

> "240. Answer.—The water levels of Lakes Michigan, Huron and Erie can be restored most advantageously by compensating works in the St. Clair and Niagara Rivers, which should, however, be so designed as to offset all existing diversions and outlet enlargements, as well as the diversions authorized by license. The total cost of these works is estimated at $3,400,000. The cost of similar but less extensive works, designed to restore the effect of authorized diversions only, is estimated as follows:

Diversion compensated for	Cost of works
Chicago Diversion	$1,750,000
Power diversions, Welland Canal	100,000

> "241. The effect of the diversions on the levels of Lake Ontario and of the St. Lawrence River above Montreal, will be removed by the works provided for the improvement of this part of the St. Lawrence.

> "242. The effect of the authorized diversions on the levels of the St. Lawrence River at and below Montreal can be restored by dredging and accessory works at estimated costs as follows:

Dredging Montreal Harbor	654,000
Reconstruction of dock walls, Montreal Harbor	1,800,000
Dredging below Montreal	2,154,000
Total	$4,608,000"

because said finding of fact and the recitals therein contained are irrelevant and immaterial because:

(1) the construction of compensating works in the Great Lakes and their connecting waters is dependent upon the consent and authorization of the Congress of the United States and solely under its control and not within the control of either the complainants or defendants herein, and when or if the Congress of the United States will ever act with reference to said compensating works is not known

(2) because construction of compensating works in the Great Lakes and their connecting waters is dependent upon the consent and joint action of the Kingdom of Great Britain and when or if the government of the Kingdom of Great Britain will ever act with reference to or consent to the construction of compensating works in said waters is not within the control of the complainants or defendants herein and is not known

(3) because the complainants are not required as a matter of law to construct compensating works for the purpose of minimizing the damages inflicted upon them by the creation and maintenance of the nuisance involved herein by the defendants, and

because said finding of fact and the recitals therein are not supported by any competent evidence in this case and because if this Court should be of the opinion that said finding of fact and the recitals therein, or any of them, is or are material and is or are supported by any competent evidence in this case, then and in that event the Special Master should have found and included in said finding the following conclusions, to-wit:

(1) that some of the damages caused by said nuisance and abstraction of waters from the Great Lakes-St. Lawrence system by the defendants could not be mitigated or minimized by the construction of compensating works;

(2) that with respect to such damages as could be mitigated or minimized by the construction of compensating works and all other matters affecting the beneficial use of these waters, conditions would be better with the construction of such compensating works and no diversion from Lake Michigan by the defendants than such conditions would be with the construction of such compensating works and the continuation of the diversion or abstraction from Lake Michigan by the defendants;

(3) that the complainant states and their peoples are entitled to the full benefit which might be obtained by reason of the construction of compensating works in the Great Lakes and their connecting waters free from diminution by reason of the nuisance and abstraction created and maintained by the defendants herein.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "O," page 225 hereof.

XVI.

Complainants and each of them except to that portion of finding of fact No. 18 made and filed by the Special Master herein and appearing on pages 137 and 138 of his report, which reads as follows, to-wit:

> "The other lake cities, however, by the aid of their sewage disposal works had cut down their rate, so that, in the years 1920 to 1925, it was 1.81 at Milwaukee; 6.10 at Detroit; 2.17 at Cleveland; 4.05 at Buffalo; and 1.83 at Rochester."

insofar as said finding of fact implies that the reduction in the typhoid fever date rate at Milwaukee, Detroit, Cleveland, Buffalo and Rochester during the period covered by the table upon which said finding of fact is based reveals or measures the effectiveness of sewage disposal and water purification works in the control of typhoid fever death rates because the Special Master should have found that said reduction in the typhoid fever death rate in these cities was accomplished under conditions ranging from one of no treatment of sewage and no water purification plants to partial treatment of sewage and partial filtration or purification of the water supply, but in no instance with complete treatment of the sewage coupled with filtration or purification of the whole water supply and that a greater reduction in the typhoid fever death rate in said cities could or would be affected by the installation of complete sewage disposal and water purification works.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "P" page 227 hereof.

XVII.

Complainants and each of them except to the statement made and filed by the Special Master herein, appearing on page 165 of his report, insofar as by the reference to finding of fact No. 7 (b) contained in and appearing at pages 25 and 26 of the Special Master's report, it is intended to be or is construed as a finding of fact and which reads as follows:

> "So far as the diverted water is used for the development of power, the use is merely incidental (*supra*, p. 25)."

because if said statement is intended to be or is construed as a finding of fact, it is contrary to all competent evidence herein and not supported by any competent evidence in this case.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "Q," page 230 hereof.

EXCEPTIONS TO FAILURE OR REFUSAL OF SPECIAL MASTER TO GRANT FINDINGS OF FACT REQUESTED BY OR ON BEHALF OF THE COMPLAINANTS:

XVIII.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that part of complainant's requested finding of fact No. 7, appearing on page 8 of complainant's requested findings of fact, which reads as follows, to-wit:

> "(In 1870, the State of Illinois adopted a new constitution which provided in Separate Section 3, that the General Assembly should never loan the credit of the state or make appropriations for the aid of railways or canals. (Exhibit 5, Tr. 209.))"

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth on page 267 of Appendix "R" hereof.

XIX.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that part of the complainant's requested finding of fact No. 7, appearing on page 9 of complainant's requested findings of fact, which reads as follows:

> "In 1887, the legislature of Illinois adopted a joint resolution, appearing in the Laws of Illinois, 1887, page 314, reciting the plan of Chicago to transfer its sewage into the Desplaines and Illinois Rivers and expressing the opinion that such a plan was dangerous to the people of the Illinois Valley by reason of sewage pollution and by reason of disastrous overflows and providing for the appointment of a committee to investigate and report. (Exhibit 7, Tr. 217-218.)"

The portion of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth on pages 271-272 of Appendix "R" hereof.

XX.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that part of the complainant's requested finding of fact No. 7, appearing on pages 16 to 18, inclusive, of complainant's requested findings of fact, which reads as follows, to-wit:

> "On April 24, 1899 the then United States District Engineer at Chicago, pursuant to direction, reported to the Chief of Engineers upon the foregoing application. The material portions of his report are as follows:
>
> > "* * * It is a strange fact that this city has expended, or will expend, over $30,000,000 with the intention of diverting an apparently unlimited amount of water from the Great Lakes to the Mississippi drainage area for sanitary purposes without finding out whether such diversion would be allowed by the

great interests of the United States and the Colonies of Great Britain along the chain of Great Lakes in the navigation of the rivers and harbors of the Great Lakes. Now they ask the authority of an executive officer of the United States to open a channel that will to some unknown extent lower the levels of all the Great Lakes below Lake Superior and their outlets, introduce a current also unknown and not to be ascertained otherwise than by actual experiment, in the Chicago River, the most important navigable river of its length on the Globe, but which is already obstructed by bridges, masses of masonry and bends, and of difficult navigation at best.

"The possible effects of this diversion are not known, further than that to some unknown degree they will be injurious. Whether the amount of this injury will be so small as to be accepted by the interests affected in view of the manifest advantages to and apparent necessities of their neighbors, cannot be determined by other than the interests themselves.

"It is clear to me that I am not competent to make a recommendation as to what should ultimately and definitely be done.

"* * * In my opinion the abstraction of from 300,000 to 600,000 cubic feet per minute will permanently lower Michigan, Huron and Erie from 3 to 8 inches; not more than 8 nor less than 3 inches, corresponding to an extreme reduction of from 160 to 466 tons in carrying capacity of the large vessels of the Lakes, and that it will take from three to four years for this full effect to be attained. But the State law is unlimited in its requirements. 20,000 cubic feet per minute must be taken from Lake Michigan for each 100,000 population of the district; already nearly 400,000 c. ft. must be taken, and at the same ratio of increase for a few decades, in a very short time there must be taken 1,000,000 c. ft. per minute under this indefinite law. The amount should be limited and the injurious effect stopped somewhere.

"The mean current to be introduced in Chicago River upon the opening of the canal is estimated by the Engineers of the Drainage Board at one and one-fourth miles per hour or 110 ft. per minute. This is simply an assumption that with such velocity in an unobstructed river, the amount of 300,000 cubic feet per minute can be discharged through Chicago River but I have seen this River so jammed with vessels, drawing all the water that is in it, that by leaping from deck to deck I could cross the river. What the velocity would be in such condition with Lake Michigan on one side and a great fall on the other side of such vessels, no one knows. But it is a simple mathematical problem to determine the effect on steel-plate vessels of from 2,000 to 4,000 tons mass drifting upon or striking stone piers with a velocity of near two feet a second. They will go to the bottom.

"* * * Yet I may venture to suggest that the entire subject be referred to Congress for final solution, and that a conditional permit or authority be granted to the authorities of the Chicago Sanitary District by the War Department, awaiting action by Congress, to open their channel, and under the following conditions:

"1st: That if, at any time, it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"2nd: That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago River.

"With 300,000 cubic feet per minute discharge it will take one year to lower the level of Lake

> Michigan and Huron one-tenth of a foot, and several years to reach the maximum permanent effect of this discharge, which will not probably much exceed three inches, so that the main injury to navigation, if any, that can be expected before action by Congress, will be in Chicago River, and that can be at once abated.
>
> "All the changes made by the Sanitary District of Chicago, taken by themselves, have been such as to increase the navigable capacity of Chicago River. Taken in connection with the current to be introduced I am not able to say that the river will be as navigable as it was before these changes were made. The changes materially lessen the probable injury to navigation of this current, at the points where the changes have been or will be made."
>
> (Doc. 7, Exhibit 12, Tr. 243-248.)

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth on pages 280-282 of Appendix "R" hereof.

XXI.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that part of the complainant's finding of fact No. 7, appearing on pages 20 and 21 of the complainant's requested findings of fact, which reads as follows, to-wit:

> "Under date of July 15, 1901 the Sanitary District of Chicago made application for permission to flow 300,000 cubic feet of water per minute between the hours of 4 P. M. and 12 o clock midnight for the purpose of sewage disposal, on the ground that such an increased flow during the period in question would not injure navigation, as the effect upon the currents would be confined to the period extending from 12 o'clock, midnight to 6 A. M. of the following day. (Tr. 268-270, Doc. 13 of Exhibit 12.)"

because a finding of the Special Master with respect to said permit of July 15, 1901, appearing on pages 41 and 42 of the report of the Special Master filed herein, fails to disclose that the request for said permit and said permit were based upon an enlarged diversion from 12 o'clock, midnight, to 6 A. M. of the following day solely for the benefit of sewage disposal on the ground that there was no navigation during those hours and navigation would not be further injured by such increase.

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth on pages 292-295 of Exhibit "R" hereof.

XXII.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that part of the complainant's finding of fact No. 7, appearing on page 23 of the complainant's requested findings of fact, which reads as follows, to-wit:

> "The reversal of the Chicago River changed its slope and reduced the navigable depths from the Lake upstream in the main river and the North and South channels. The loss in depth was more than restored in the main stream and in the South branch of the Chicago River by the excavations of the Sanitary District which enlarged those portions of the Chicago River to a width of 200 feet and central depth of 26 feet in order to facilitate the flow of the large volume of water required for the dilution of sewage discharged into the Drainage Canal. The North fork of the Chicago River and the South fork of the South branch were not deepened by the Sanitary District and their navigable depths were reduced. The impairment of the depths in the South fork was serious in extent. The use of the river as the main sewer of Chicago subjected it to de-

> teriorating influences as a navigable channel. The District Engineer recommended the abandonment of the maintenance of portions of the Chicago River theretofore under improvement by the Federal Government, because of their use as sewers with the attendant filling in of the channels, on the ground that the maintenance of such channels for sewer purposes was an obligation of the City or Sanitary District and not of the Federal Government. (Exhibit 13, Tr. 292-293.)"

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth on pages 305-306 of Appendix "R" hereof.

XXIII.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that finding of fact contained in the last sentence of that part of the complainant's finding of fact No. 7, appearing on pages 24 and 25 of complainant's requested findings of fact, which reads as follows, to-wit:

> "Pursuant to this recommendation, under date of January 17, 1903, the Secretary of War granted permission to increase the flow through the Chicago River to 350,000 cubic feet per minute until March 31, 1903, after which it should be reduced to 250,000 cubic feet per minute, upon the following conditions:
>
> "1. That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.
>
> "2. That said Sanitary District of Chicago shall be responsible for all damages inflicted upon navigation interests by reason of the increase of flow herein authorized." (Doc. 24, Exhibit 12, Tr. 302-304.)

> "The foregoing increase was solely for sanitary purposes during the closed season of navigation."

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth on pages 307-311 of Appendix "R" hereof.

XXIV.

Complainants and each of them except to the failure or refusal of the Special Master to grant or find complainants' finding of fact No. 9, appearing on page 44 of complainants' requested findings of fact, which reads as follows, to-wit:

> "IX. All of these abstractions of and requests for consent of Secretary of War to the abstraction of the waters of the Great Lakes-St. Lawrence system by the Sanitary District of Chicago have been for the purpose of sewage disposal and power development."

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendices "Q" and "R," pages 230 and 267 hereof.

XXV.

Complainants and each of them except to the failure or refusal of the Special Master to grant or find complainants' finding of fact No. 10, appearing on pages 44 and 45 of complainant's requested finding of fact, which reads as follows, to-wit:

> "X. The Congress of the United States has never authorized any diversion of water from the Great Lakes-St. Lawrence watershed at Chicago through the Chicago Drainage Canal for any purpose. None of the Secretaries of War of the United States or other Federal executive officers has authorized or directed

> any diversion of water from the Great Lakes-St. Lawrence watershed to the Mississippi watershed by way of the Chicago Drainage Canal for purposes of navigation. All consents or permits which have been issued or granted by any of the various Secretaries of War of the United States have been granted or issued at the request of the Sanitary District of Chicago for sewage disposal purposes. All such permits have been temporary and revocable in character and conditioned that there should be no interference with or injury to navigation. They have been reluctantly granted to meet a case of alleged sanitary necessity with obvious fear that great damage would be done to navigation and other interests."

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendices "Q" and "R", pages 230 and 267 hereof.

XXVI.

Complainants and each of them except to the failure or refusal of the Special Master to grant or find complainant's finding of fact No. 14, appearing on page 47 of complainant's requested findings of fact, which reads as follows, to-wit:

> "XIV. From April 1, 1903, to March 3, 1925, the Sanitary District of Chicago knowingly and intentionally violated all of the Permits of the Secretaries of War and asserted the right to abstract unlimited quantities of water from the Great Lakes-St. Lawrence System without the consent and in defiance of the government of the United States and of the other states bordering on that waterway. (Exhibit 1111, Tr. 3360.)"

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "S" page 372, and page 338 Appendix "R" hereof.

XXVII.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that part of the complainant's requested finding of fact No. 95, appearing on page 100 of complainant's requested findings of fact, which reads as follows, to-wit:

> "No abstraction or diversion of the waters of the Great Lakes-St. Lawrence system is necessary to provide a nine-foot channel for navigation purposes from Lake Michigan by way of the drainage canal, the proposed Illinois waterway and the Illinois River to the mouth of the Illinois River. (Tr. 2117-2123, 2127-2128.)"

The portion of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendices "G" and "L" pages 89 and 151 hereof.

XXVIII.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that part of the complainant's requested finding of fact No. 95, appearing on pages 100 and 101 of complainant's requested findings of fact, which reads as follows:

> "If the water for lockage and navigation purposes on this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion or abstraction of less than 1,000 second feet of water from said watershed is sufficient to supply all of the needs of navigation for said waterway. No water is needed for navigation purposes during a considerable portion of the winter season when navigation is closed. (Exhibit 102, page 33.) Any diversion or abstraction of the

> water of the Great Lakes-St. Lawrence system in excess of 1,000 second feet through the waterway from Lake Michigan to the mouth of the Illinois River is for the purpose of power development or sewage disposal, or both, and not for the needs of navigation. (Tr. 6812, 6813, 1269, 2116-2117, 6993, 389, 383, 399-400, 8039-8040, 2126-2127, Exhibits 62, 182, 209, Documents 40-41 of Exhibit 12.)"

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendices "G," "L," "Q" and "R" pages 89, 151, 230 and 267 hereof.

XXIX.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant complainant's finding of fact No. 104, appearing on page 104 of complainant's requested findings of fact, which reads as follows, to-wit:

> "CIV. The Sanitary District of Chicago has violated the conditions of the permit of March 3, 1925, by exceeding the limitation placed by that permit upon an instantaneous maximum diversion and by causing and continuing an unreasonable interference with navigation in the Chicago River and in all of the waters of the Great Lakes, their connecting waters and their outlet river, from St. Mary's Falls in the St. Mary's River to tidewater in the St. Lawrence River at Quebec. (Exhibit 146.)"

The portions of the transcript and exhibits in this case which are relied upon by the complainants in support of this exception are set forth in Appendix "H," page 97 hereof.

EXCEPTIONS TO CONCLUSIONS OF LAW.

I.

Complainants and each of them except to the second conclusion of law made and filed by the Special Master herein, appearing on page 148 of his report, to-wit:

> "My conclusion is that the action of Illinois in diverting water from Lake Michigan through the drainage canal of the Sanitary District, was, and is, unlawful unless validly permitted by Congress either directly or through the action of the Secretary of War."

and appearing in the summary of conclusions of the Special Master's Report, page 196, *in haec verba,* to-wit:

> "2. That the State of Illinois and the Sanitary District of Chicago have no authority to make or continue the diversion in question without the consent of the United States."

insofar and to the extent that said conclusion of law implies or holds that the United States might authorize the State of Illinois and the Sanitary District of Chicago, or either of them, to make or continue the diversion in question under the circumstances of this case.

II.

Complainants and each of them except to the third conclusion of law made and filed by the Special Master herein and stated by him on page 196 of his report, to-wit:

> "3. That Congress has power to regulate the diversion, that is, to determine whether and to what extent it should be permitted."

III.

Complainants and each of them except to the conclusion of law made and filed by the Special Master herein, designated as Third (1) which is summarized by the Special Master on page 152 of his report, to-wit:

> "The decisions which have been cited, and the principle they apply, seem to me to dispose of the contention that, in this instance, if it be assumed that the diversion has been authorized under action of Congress, otherwise competent, the property of the complainant states has been taken in violation of the Fifth Amendment. Where, pursuant to governmental authorization otherwise valid, there is an abstraction of water from navigable lakes and rivers and a consequent lowering of levels by enlarging or opening outlets, the incidental damage to riparian owners affords no ground for asserting the constitutional invalidity of that action. Great Lakes as riparian owners, as well as individuals, are subject to the authority of Congress, and they have no ownership in navigable waters which they can assert in opposition to the exercise of that authority."

in so far and to the extent that said conclusion of law implies or holds that the Congress of the United States has authority to inflict the damages upon the complainant states and their people established in this case and under the circumstances of this case without violating the Fifth Amendment to the Constitution of the United States.

IV.

Complainants and each of them except to the conclusion of law designated as Third (2) made and filed by the Special Master herein and summarized by the Special Master on page 158 of his report, to-wit:

> "It seems to me that the authority of Congress to regulate the diversion in the present instance is not to be denied merely because the water is taken from one watershed to another."

V.

Complainants and each of them except to the conclusion of law designated as Third (3) made and filed by the

Special Master herein and summarized by the Special Master on page 160 of his report, to-wit:

> "I am of the opinion that the diversion in the present case, if otherwise lawfully authorized, cannot be regarded as beyond the power of Congress, as an unconstitutional preference of ports."

VI.

Complainants, and each of them, except to the conclusion of law designated as Third (4) made and filed by the Special Master herein appearing in the report of the Special Master on pages 160-165 inclusive, wherein and to the extent that the Master concludes that the power of Congress to protect and improve navigation includes power in Congress to destroy, or to create obstructions to, navigable capacity, or that action by Congress which does destroy navigation or create obstructions to navigable capacity is not judicially reviewable under the circumstances of this case.

VII.

Complainants, and each of them, except to the conclusion of law designated as Third (5) made and filed by the Special Master herein, and appearing on pages 165-171 insofar as the Master therein concludes and holds that under the circumstances of this case, Congress has power to authorize the diversion here shown for sanitary purposes under the commerce clause of the Constitution of the United States.

VIII.

Complainants and each of them except to the Fifth conclusion of law made and filed by the Special Master herein and appearing on pages 176-191, inclusive, of his report and summarized by the Special Master at page 196 of his report, to-wit:

> "5. That Congress has conferred authority upon the Secretary of War to regulate the diversion, provided he acts in reasonable relation to the purpose of his delegated authority and not arbitrarily."

insofar and to the extent that it implies or holds that the Congress of the United States has empowered the Secretary of War to authorize the instant diversion under the circumstances of this case.

IX.

Complainants and each of them except to the Sixth conclusion of law made and filed by the Special Master herein and appearing on pages 191-196, inclusive, of the Special Master's report and appearing in the summary of conclusions of the Special Master on page 196 of his report, to-wit:

> "6. That the permit of March 3, 1925, is valid and effective according to its terms, the entire control of the diversion remaining with Congress."

X.

Complainants and each of them except to that part of the recommendation for a decree made and filed by the Special Master herein, which reads as follows, to-wit:

> "In the light of these conclusions, the bill, in my opinion, should be dismissed."

EXCEPTIONS TO FAILURE OR REFUSAL OF SPECIAL MASTER TO GRANT COMPLAINANT'S REQUESTED CONCLUSIONS OF LAW.

XI.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 17, appearing on page 109 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

> "(17) That the Congress of the United States is without power to authorize the abstraction and transfer of the waters of the Great Lakes-St. Lawrence watershed to or for the benefit of the Mississippi River watershed."

XII.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 19, appearing on page 109 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

> "(19) That neither the plans for the building nor the construction of the Chicago Drainage Canal was ever recommended by the Chief of Engineers or authorized by the Secretary of War prior to or since the commencement of construction."

XIII.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 20, appearing on page 109 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

> "(20) That the Permit of March 3, 1925 is *ultra vires* and void and constitutes no authority for the abstraction of the waters of the Great Lakes-St. Lawrence system by the State of Illinois and the Sanitary District of Chicago."

XIV.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 21, appearing on page 109 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

> "(21) That all of the prior Permits by the Secretary of War were and are *ultra vires* and void, and constitute no authority for the abstraction of the waters of the Great Lakes-St. Lawrence system by the State of Illinois and the Sanitary District of Chicago, or either of them."

XV.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 22, appearing on page 109 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

> "(22) That the Permit of March 3, 1925, does not purport to authorize the abstraction of the waters of the Great Lakes-St. Lawrence system, and does not undertake to authorize the invasion or injury of the property and rights of the peoples of all the complainant states or the proprietary or quasi-sovereign rights of said complainant states."

XVI.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 23, appearing on pages 109 and 110 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

> "(23) That all prior Permits issued by the Secretary of War do not purport to authorize the abstraction of the waters of the Great Lakes-St. Lawrence system, and do not undertake to authorize the invasion or injury of the property and rights of the peoples of the complainant states or the proprietary or quasi-sovereign rights of said complainant states."

XVII.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 24, appearing on page 110 of complainant's requested findings of fact, conclusions of law and recommendations for a decree, which reads as follows, to-wit:

> "(24) That neither the Congress of the United States nor the Secretary of War by means of the Permit of March 3, 1925, or any prior Permit, has appropriated or attempted to appropriate any of the waters of the Great Lakes-St. Lawrence system for navigation purposes in the Des Plaines, Illinois, or Lower Mississippi Rivers."

XVIII.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 25, appearing on page 110 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

> "(25) That the State of Illinois and the Sanitary District of Chicago, by their acts of which complaint is made, have unlawfully interfered and are unlawfully interfering with and placing a burden upon the freedom of interstate commerce to the injury of the complainant states and the peoples of said states."

XIX.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 26, appearing on page 110 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

> "(26) That the States of Minnesota, Wisconsin, Ohio and Pennsylvania, in their respective proprietary capacities and in their governmental capacities representing the people who own lands bordering on the Great Lakes and the connecting waterways between the same within said states, have riparian rights in and upon said waters, which riparian rights are property; which property is being taken and will continue to be taken without due process of law, and without just compensation, in violation of the Fifth and Fourteenth Amendments to the Constitution of the United States, by the lowering of said waters, by reason of the permanent abstraction and diversion of the waters of the Great Lakes-St. Lawrence watershed by the defendants, Sanitary District of Chicago and State of Illinois, through the Chicago Drainage Canal."

XX.

Complainants and each of them except to the failure or refusal of Special Master appointed herein to grant complainant's requested conclusion of law No. 27, appearing page 111 of complainant's requested findings of fact, co clusions of law, and recommendations for a decree, whi reads as follows, to-wit:

> "(27) Neither the Congress of the United Stat in the exercise of its power to regulate commerce, n any governmental official of the United States, has ar power or authority to authorize or consent to a lowe ing of the waters of the Great Lakes, to the injury, i vasion or destruction of complainants' riparian righ in or upon said waters."

XXI.

Complainants and each of them except to the failure o refusal of Special Master appointed herein to grant com plainant's requested conclusion of law No. 32, appearing o pages 111 and 112 of complainant's requested findings o fact, conclusions of law, and recommendations for a decree which reads as follows, to-wit:

> "(32) That the complainant states are entitled t a decree dismissing the petitions of the intervening states and enjoining the State of Illinois and the Sanitary District of Chicago, their employees, agents, attorneys and servants, from abstracting any of the waters of the Great Lakes-St. Lawrence system through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency."

XXII.

Complainants and each of them except to the refusal of the Special Master appointed herein to grant or make recommendations for a decree requested by the complainants, appearing on pages 112 and 113 of complainant's requested findings of fact, conclusions of law, and recommendations for a decree, which reads as follows, to-wit:

"(1) Complainants request the Special Master to recommend a decree in this case in substance as follows:

(Caption omitted)

"This cause coming on to be heard upon the report of the Special Master, Charles Evans Hughes, Esq., to whom it was referred to take the evidence and to report the same to the Court with his findings of fact, conclusions of law and recommendations for a decree, and also upon the exceptions taken to said report on the part of the plaintiffs, defendants and intervening defendants, and said cause having been argued by counsel for the respective parties and due deliberation had thereon, it is:

"Ordered, adjudged and decreed as follows:

"(1) That each and all of the exceptions taken to said Special Master's report by either or any of the parties be overruled.

"(2) That the respective petitions of the intervening states of Missouri, Tennessee, Kentucky, Arkansas, Mississippi and Louisiana and each of them are dismissed.

"(3) That the defendants, State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys and agents be and they hereby are ordered to cease, desist and refrain from abstracting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency.

"(4) That the complainants have and recover from the Sanitary District of Chicago and the State of Illinois their costs and disbursements herein to be taxed and noted at the foot of this decree.

By the Court,

............................,

Clerk of the Supreme Court of the United States."

Respectfully submitted,

John W. Reynolds,
Attorney General of Wisconsin.

Herman L. Ekern,
Special Assistant Attorney General of Wisconsin.

R. T. Jackson,
Special Assistant Attorney General of Wisconsin.

Herbert H. Naujoks,
Assistant Attorney General of Wisconsin.

Clifford L. Hilton,
Attorney General of Minnesota.

Edward C. Turner,
Attorney General of Ohio.

Newton D. Baker,
Special Assistant Attorney General of Ohio.

T. J. Baldridge,
Attorney General of Pennsylvania.

APPENDICES OF COMPLAINANTS' EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER FILED HEREIN.

While complainants have endeavored in these appendices, for the convenience of the Court, to set out the respective portions of the transcript, record, and exhibits in this case which are deemed material for the consideration of the complainants' exceptions filed herein, complainants request that such appendices shall not be construed as barring reference to and consideration of any other evidence appearing in the record which may be referred to in complainants' brief in support of these exceptions.

Appendices have been numbered "A" to "S," inclusive.

APPENDIX "A."

"The Witness. In the construction of that drainage canal, the Des Plaines River was straightened for many miles above Lockport, and its channel was improved from Lockport on down through Joliet, so that it would be capable of taking the combined floods of the Des Plaines River watershed and the Chicago River watershed, or a total of about 250,000 second-feet. This channel was built between 1892 and 1900, it was started September 3, 1892, and water was let into it January 2, 1900."

Ramey, Transcript Vol. 14(2) p. 3317.

Q. Will you state your education?

A. I graduated from Carlisle, Kentucky, High School in 1901. I attended Kentucky State College from 1901 to 1903. I attended the University of Michigan from 1903 to 1907, specializing in hydraulic engineering and graduated in 1907 with a degree of Bachelor of Science in Civil Engineering. Ten years later, in 1917, I was given the degree of Civil Engineer by the University of Michigan.

Q. What has been your experience in engineering?

A. Well, I was an instructor in surveying in the University of Michigan in 1906. Since 1907 I have been wit the Sanitary District as rodman, computer, junior engineer resident engineer, assistant engineer, senior assistant engineer, and since 1922 as assistant chief engineer.

Ramey, Transcript 3283.

"In case a channel is constructed in the Des Plaines River as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois Rivers wherever it shall be necessary so to do to prevent overflow or damage along said river."

Exhibit 10 Vol. 2 pp. 223, 224.
Illinois Act of May 29, 1889.

APPENDIX "B."

"Mr. Adcock. I ask to have marked as Defendants' Exhibit No. 1110 the paper which I have in my hand bearing the legend at the top, "Tables showing costs of works in dilution project of the Sanitary District of Chicago to December 31, 1926."

Mr. Jackson. Is that marked for identification, Mr. Adcock?

Mr. Adcock. No.

Mr. Jackson. I wish you would do that.

Mr. Adcock. Mark it for identification.

(The paper referred to is marked, "Defendants' Exhibit for identification No. 1110.")

By Mr. Adcock:

Q. Mr. Ramey, I show you the paper which has been marked Defendants' Exhibit for identification No. 1110. Will you state what you know about that paper and how it was prepared?

A. That paper shows the cost of works in the dilution project of the Sanitary District up to December 31, 1926. The figures were taken from the books of the Sanitary District by an engineering accountant working under my direction.

Q. And the different works that you have described are indicated there and the amount that the construction cost? Is that correct?

A. Yes; the various channels or sewers in the dilution project are indicated by name, the time when they were built is indicated and the cost is shown.

Mr. Jackson. We object to Exhibit No. 1110.

Mr. Adcock. I have not offered it yet.

Mr. Jackson. Pardon me. I thought you had.

By Mr. Adcock:

Q. Was the person who prepared the figures in this exhibit in the employ of the Engineering Department of the District?

A. He is.

Q. And under your authority?

A. He is.

Q. And he has been in that employ for how long?

A. Oh, he has been in the employ for ten or fifteen years.

Q. And you are familiar with the accuracy of his work, are you?

A. He is a very competent accountant.

Mr. Adcock: I will offer the exhibit in evidence.

Mr. Jackson. May I ask a question, please?

By Mr. Jackson:

Q. Mr. Ramey, these figures appearing upon Defendants' Exhibit for identification No. 1110 purport to be taken from the books and records of the Sanitary District of Chicago? Is that correct?

A. Well, there is one item in there for sewers built by the City of Chicago $6,706,804.37.

Q. Does that purport to be taken from the books of the City of Chicago?

A. That is a figure which was furnished to the Sanitary District by the Engineering Department of the City of Chicago. That is the lake front intersecting sewers and pumping stations which were built by the City of Chicago and turned over to the Sanitary District to operate.

Q. It was not sold to the Sanitary District.

A. No.

Q. Is it still owned by the City of Chicago?

A. I do not know who owns the stations.

Q. That figure is one that was given you by the City of Chicago, or some official of it, but has not been checked by you or your accountant? Is that correct?

A. No; I do not believe my accountant checked the details of that figure.

Q. The balance of the figures came from the books of the Sanitary District of Chicago?

A. They did.

Q. Mr. Ramey, there are a good many errors and inaccuracies in the books and financial records of the Sanitary District of Chicago, are there not?

A. Not that I know of.

Q. Was there not a recent audit made of the books of that municipality or organization?

A. There was.

Q. And did not that audit to your knowledge disclose a great many irregularities in the expense accounts and charges on the various projects of the Sanitary District of Chicago?

A. Not to my knowledge.

Q. Did you ever examine the report?

A. No; I have not seen the report.

Q. Have you a copy of the report in your office?

A. No.

Q. Are you willing to swear that you believe that all of the books and accounts of the finance of the Sanitary District of Chicago are true and correct and accurate?

Mr. Adcock. I do not think that is a fair question. In books kept in the regular course of business there may be errors. I do not think it is a fair question to ask this witness.

The Special Master. The proof is not technical, you understand. I suppose the question is directed to the degree of credit which may be given to it, and the witness is asked as to whether he believes it to be correct, or the underlying data to be correct.

A. I believe the figures shown on this tabulation and the distribution of these various figures against the various construction projects shown on this table are correct.

By Mr. Jackson:

Q. Did you personally check the books on that?

A. I have not personally checked the books on that as to figures since about 1920, but prior to that time I did check them.

Q. Did it not come to your attention that the recent audit of the books of the Sanitary District of Chicago disclosed large sums charged to plants that did not exist?

A. No.

Q. That did not come to your attention?

A. No.

Q. Did it come to your attention that there were charged in the various accounts for works and projects employment of large numbers of men prior to elections who were immediately released?

A. No.

Q. None of those things came to your attention?

A. No.

Q. If those things had come to your attention, would you be willing to swear to the whole faith and credit of these books?

A. I do not pretend to know about the general books of the Sanitary District. These figures on this sheet are taken from the accounts of the Engineering Department, and I do know that the charges on these books are properly distributed.

Q. But you do not know whether they are proper in amount?

A. Yes; I do know that the moneys represented by this table were expended on the items indicated in this table.

Q. How do you know that, Mr. Ramey?

A. Because I know that this man working under my direction has checked the vouchers in the Engineering Department and obtained these figures from those vouchers.

Mr. Jackson. We object to the admission of this exhibit, Defendants' Exhibit No. 1110 for identification.

In the first place, we think it is entirely irrelevant and immaterial what expenditures may have been made upon sewer systems in the city of Chicago, and we object to the competency of this table as we do not think it is the best evidence, and it is possible that if the Master deems it relevant, if the defendants were willing to permit our auditor to examine the books of the defendant corporation and ascertain the correctness of these figures, we would not raise any point on that part of it.

Mr. Adcock. I might like to ask the witness just one question as to the intersecting sewer system.

By Mr. Adcock:

Q. The interceptors which you referred on the North Side and on the South Side of the city, and the pumping stations and conduits connected with those interceptors and pumping stations, were originally constructed by the city of Chicago?

A. They were originally constructed by the city of Chicago, and were turned over to the Sanitary District in 1910 to be operated. Since that time they have been maintained and operated by the Sanitary District of Chicago.

Q. Do you know whether there is carried on the books of the Sanitary District, as part of the cost of that diversion project, an item representing the construction cost of these intercepting sewers, pumping stations and conduits?

A. On the books of the Engineering Department is carried an item for certain expenditures that the Sanitary District made. For instance, the 39th street pumping station was built by the city of Chicago and the Sanitary District; the flushing pumps for that system were built by the Sanitary District; the sewage pumps were put in by the city of Chicago; the superstructure and boiler plants were paid for partly by the Sanitary District and partly by the city of Chicago. I think the Sanitary District paid 40 percent of that. All betterments made on these stations since 1910 have been paid for by the Sanitary District.

Q. Is there any item that appears on that table that represents money expended by the city of Chicago itself?

A. Yes, sir. The table indicates the lake front intercepting sewer and the sewage pumping station, the two items, by the city of Chicago, $6,706,000, and by the Sanitary District, $1,342,000. It was an oversight when I mentioned that we got all those figures from the books of the Engineering Department. The table on its face shows that fact.

By Mr. Jackson:

Q. General Taylor, retired Chief of Engineers, investigated some of these works this summer, did he not, to your knowledge?

A. Yes, sir.

Q. Among other things, he reported that there appeared on the Sanitary District's books that a certain works had cost twice as much as had been paid by the

Government for exactly the same kind of work performed at the same time in the city of Chicago or vicinity.

A. There was some statement in General Taylor's report about the high cost of dredging in the Little Calumet River.

Q. And that was twice or more what the Government was paying at the same time for dredging in the same river?

A. Yes, sir; but in a different part of that same river and under entirely different conditions.

By Mr. Adcock:

Q. Do you know how the contracts for all this construction work were let by the Sanitary District of Chicago?

A. The contracts were advertised, bids were taken, and in every case, with very few exceptions, the work is awarded to the lowest bidder.

The Special Master. It seems to me you are putting a good deal of time on a matter which hardly requires quite as much consideration as you seem to be inclined to give it. If the exact amounts expended by the Sanitary District were in question here, as if somebody were trying to recover a sum of money on the ground that these outlays were made, of course, this proof would be entirely incompetent for such a purpose, and no finding of an exact amount could be predicated upon such evidence as this, if objected to, because, of course, there would be hosts of items as to which proof would be required if technical rules were applied.

This, however, is not a case in which the exact amount of money, as I understand it, expended by the Sanitary District must be determined. I suppose no one questions that the Sanitary District has expended a large amount of money. Whether it has expended so many millions as one might say, or so many millions as another might say, is entirely immaterial and will not control any disposition of this case, as you readily will see. Of course, I suppose the idea is the equities which may be supposed to adhere in any large expenditure. A great sanitary system cannot be constructed without very large expenditures, and I do not see that the exact amount is of any great importance.

I shall receive this exhibit upon the statement of the witness that this appears on the books of the Engineering Department, so far as it does appear, or has been received from the city of Chicago, so far as the items relating to expenditures have been furnished by the city. I shall not receive it as proof that that particular sum has actually been expended. Proceed with the case.

Mr. Adcock. I then offer in evidence this Defendants' Exhibit for identification No. 1110.

(Said document was thereupon received in evidence, marked "Defendants' Exhibit No. 1110," and is as follows:)

Table Showing Costs of Works in Dilution Project of the Sanitary District of Chicago

To December 31st, 1926.

Works	*Built*	*Cost*
Main Channel, Controlling Works, Des Plaines River Diversion, Des Plaines River Improvement	1892-1900	$34,690,901.07
Main Channel Extension	1904-1907	3,992,755.74
Lake Front Intercepting Sewers and sewage Pumping Stations		
By City of Chicago	1898-1910	6,706,804.37
By Sanitary District		1,342,248.66
North Shore Channel	1907-1911	4,192,659.95
North Shore Sewer	1913-1916	691,846.38*
Evanston Intercepting Sewer and Pump. Sta.	1916-1920	1,963,343.45*
Calumet Sag Channel	1911-1922	14,159,558.75
Calumet Sewers and Pumping stations	1915-1924	11,960,313.17*
Calumet River Improvement	1915-Date	666,905.19
Chicago River Improvement	1897-1920	13,059,581.16
Auxiliary Sewers		3,195,049.50
General Engineering		1,683,172.13
		$98,305,139.52
Less Items marked * used in Sewage Treatment Project		14,615,503.00
Bare Construction Cost		$83,689,636.52
Administration, Legal, Clerical, etc. Expenses		6,788,564.15
Interest on Bonds for Construction		18,543,412.54
Total		$109,021,613.21

Transcript Vol. 14, pp. 3335-3348.

"Mr. Adcock. I will ask the reporter to mark this document, entitled, "Sanitary District of Chicago, Cost of Lockport Power Plant and Distribution System," as Defendants' Exhibit No. 1115, and offer the same in evidence.

Mr. Jackson. We object to Exhibit 1115, as to its competency and relevancy, if the amount of the figures are material. If it is merely to show they have expended something, which is apparent, we do not care, but we would not want the accuracy of those figures to be accepted.

The Special Master. It will be received in the same way as the other figures to which objection was taken, as showing the amounts which the books show to have been expended, but not as evidence that those amounts were actually expended.

Mr. Adcock. That is, to the exact dollar?

The Special Master. Yes. Of course, as counsel says, the fact that amounts have been expended is shown by the construction of the power house, but if you start in to prove with all the regulations governing that all of these expenditures, just what has been expended, I think you will have to get another Master.

Mr. Adcock. Of course, we do not want to do that.

The Special Master. Of course, I will add to what I just said, that if it were germane to the controversy here in the sense that the exact figures had to be proved, the Master would see it through.

Mr. Adcock. Although it takes all summer.

The Special Master. Yes."

Transcript Vol. 14, pp. 3386-3387.

"Q. Are not contracts let upon a certain price per cubic yard of concrete in the City of Chicago?

A. I think the Sanitary District sewers have been let on a per foot basis, the ones that I know anything about. I have had a number of canvasses of bids in which the bids were received at so many dollars per foot, including concrete, excavation, plant, overhead; the entire cost.

Q. Did you know the bid prices on actual contracts let?

A. Yes.

Q. That is, where they were let to the lowest bidder?
A. Yes.

Q. That is for the same kind of sewer, practically?
A. Yes.

Q. Substantially the same size of sewer, and where there was excavation in tunnel? Is that correct?
A. Yes.

Q. You did not use those?
A. No, for the reason that the ones that I saw as being recent were very exorbitant. The price of those tunnels in clay built by the Sanitary District 20 feet to 30 feet under the ground surface was greater than the cost of rock tunnels of the same type built by the city of Chicago 150 to 160 feet below ground. I, therefore, did not believe, and do not now believe, that those tunnel contracts for sewers which I saw were of much value in the investigation with which we were intrusted, namely, to determine the fair and reasonable cost of the work.
Q. How do you know the cost of the rock tunnels that you say were built by the city?
A. I got them from the city's records."
Transcript of Testimony, Mr. Howson, Pages 9438 to 9440.

"Q. In response to questions from counsel on cross examination with reference to your reasons for not using the contracts let and costs of work done by the Sanitary District as the basis of estimate for the reasonable cost of construction of the necessary works provided in the sewage program, you pointed out certain facts with reference to tunnel construction as a basis for not using such contracts. Were there any other factors involved in the contracts let or work done by the Sanitary District studied by you which led you to consider such contracts and works as unreliable as a basis of estimate of the reasonable cost of the sewage treatment works?

A. Yes. Referring to Table No. 35, page 236, in our report to the District Engineer, on which I was cross examined yesterday, there are four plants to which my cross examination was directed.

At the bottom of this same table is a comparison of these four plants costs with the Chicago Calumet plant. This comparison shows that the weighted averages of the plants in Cleveland, Rochester, Philadelphia and Albany were $5 per capita, whereas the Calumet plant in Chicago was $26.40 per capita, and compared with the price per million gallons capacity basis the weighted averages of these four plants are shown as $30,750, as compared with $86,000 for Chicago.

This range being so great, we asked the Sanitary District for the bids on which this work was done, and that is discussed in this report which we made to the District Engineer.

In this report the tabulation of bids of the Calumet plant showed that the contract for concrete for the tanks, 28,000 cubic yards, was let at a price of $64 per cubic yard, exclusive of reinforcing steel.

In all of the work covered by our experience we had never let concrete work of that or a similar type at a price to exceed $30 per cubic yard, approximately half of that figure.

Reading again from the report:

'The steel, 3,000,000 pounds, was let at a unit price of 23 cents per pound.'

We have let large amounts of work and have never yet paid over 6 cents a pound for reinforcing steel. I never have personally known of a job in which reinforcing steel cost to exceed 6 cents per pound.

This price for 3,000,000 pounds was 23¢ per pound.

Reading again from page 235 of our report:

'The concrete, complete, therefore, was let at a unit price exceeding $85 per cubic yard. The work included 30 tanks, permitting multiple use of forms and plants.'

The excavation on this job was $6.90 per cubic yard, as compared with a maximum of about $2 per cubic yard on any work under our direction. Accordingly I could not adopt these unit prices or the table as a measure of the cost of the work which we were required to estimate. and so state in this report to the Government. The other major type of plant construction was of activated sludge. The comparison on activated sludge plant costs to which my attention was directed on cross-examination is Table 42, page 251 of our report to the District Engineer, in which it is shown that the average cost of the four plants, exclusive of the Chicago plant, on a basis of per capita is $7.45. The Milwaukee plant was $13.78, that being the most expensive. Also, that the weighted average of the complete plant was $10.45 per capita. On the Des Plaines plant, as shown at the foot of this table, it was $30.65. The comparison on the per million gallons daily capacity basis for the complete plant was $74,305, as compared to the Des Plaines plant, $306,500, about four times as much. The Des Plaines plant, handling about five million gallons per day, cost about one-fifth as much as the Milwaukee plant, to handle 85,000,000 gallons per day. That being the case, as stated in the report, our costs are based pretty largely on a study of other plants rather than upon the data on possible costs of the Chicago Sanitary District."

Transcript of Testimony, Mr. Howson, Pages 9546 to 9550.

APPENDIX "C."

"The Sanitary District of Chicago,
Chicago, June 16, 1896.

Dear Sir:—

The work of the Sanitary District of Chicago has progressed so far that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey Street, Chicago, to Lockport in Will County, twenty-eight miles distant.

"Our connection with Lake Michigan must be through the Chicago River with the West Fork of the South Branch of which we make a junction at Robey Street. We send herewith a map showing in a general way our plans for improving the Chicago River by widening and deepening at the points indicated thereon by red hatchings and by figures which refer to explanations given in the legend on the map. It is desired to so correct and regularize the cross section of the river as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of one and one quarter miles per hour. The cross section necessary to accomplish this can be obtained throughout the greater part of the distance between Monroe Street and Robey Street by dredging the river to a depth of 20 feet at mid-stream with 12 feet at dock lines, and a uniform slope away from docks of one foot in five so that the full depth would be reached forty feet from the dock lines; but there are places so narrow that this cross-section can only be obtained by widening the River; and again the depth to be obtained in the vicinity of Van Buren Street is limited by the height of the crown of the Tunnel. To obviate this difficulty it is proposed to secure the requisite cross section by constructing a by-pass to the West of the bridge at Adams, Jackson, and Van Buren Streets as indicated. We ask your permission to proceed with the work upon the lines indicated and so far as is consistent with propriety and cooperation of the United States Engineer Department.

"Awaiting your favorable reply and holding ourselves ready to respond to any call from you for fuller information as to our plans, I am

"Yours respectfully,

B. A. ECKHART,

President.

Application of Sanitary District of Chicago.
Doc. 1, Ex. 12, Tr. 228-230.

Subject: Application of Trustees Sanitary District, Chicago.

UNITED STATES ENGINEER OFFICE,

1637 Indiana Avenue, P. O. Drawer 132.
Chicago and Calumet Harbors
Illinois and Calumet Rivers
Illinois and Mississippi Canal.
Major W. L. Marshall,
Corps of Engineers, U. S. A. Chicago, Ill.,
June 24, 1896.

Brig. Gen. Wm. P. Craighill,
Chief of Engineers, U. S. A.
Washington, D. C.

General:

"I have the honor to report upon the application of Mr. B. A. Eckhart, President Board of Trustees Sanitary District of Chicago, for the authority of the Secretary of War to make certain changes in the capacity of the channel of Chicago River for drainage purposes.

"As far as the work itself is concerned there can be no objection to it, as in every case the navigable channel of Chicago River will be improved, and at this stage I am unable to do otherwise than to recommend the granting of the authority sought.

"The question that must come up later for the action of the War Department, to-wit. Whether the improved channel of Chicago River will be sufficient to carry 300,-

000 cubic feet of water per minute without lessening or destroying the navigability of Chicago River, or whether the City of Chicago will be allowed by the United States and Great Britain to take any water at all from the Great Lakes, with the inevitable result of lowering their levels, is not now under investigation, and is one that will not probably be settled or decided by executive officers. It is, or may rather be considered an international question.

"For the present, I have to respectfully recommend that the necessary authority be granted as requested for the *general* plan, under the following conditions:—

"(1.) That while the general plan is approved, the Sanitary District of Chicago, must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each bypass, and each new dock or wharf, proposed to be built, in order that the Secretary of War, under the law may act intelligently in each case.

"(2.) That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must be hereafter submitted for consideration.

"(3) That it will not cover obstructions to navigation, by reason of this work while in progress, or when completed.

"(4.) That the United States shall not be put to expense by reason of this work.

"(5.) That this authority will expire by limitation in two years from date unless extended.

"Very respectfully,
Your obedient servant,
(Signed) W. L. Marshall,
Major, Corps of Engineers.

Report of U. S. District Engineer,
Doc. 2, Ex. 12, Tr. 230-232.

4th indorsement.

OFFICE CHIEF OF ENGINEERS
U. S. ARMY.

June 29, 1896.

Respectfully returned to the Secretary of War. The Board of Trustees Sanitary District of Chicago requests permission to make certain changes in the capacity of the channel of Chicago River for drainage purposes. The work proposed is shown on the accompanying drawing.

"The matter has been under consideration by Maj. W. L. Marshall, Corps of Engineers, who recommends that the permission asked be granted subject to the following conditions.

"1. That while the general plan is approved, the Sanitary District of Chicago, must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass, and each new dock or wharf proposed to be built, in order that the Secretary of War may act intelligently in each case.

"2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must be hereafter submitted for consideration.

"3. That it will not cover obstructions to navigation by reason of this work while in progress, or when completed.

"4. That the United States shall not be put to expense by reason of this work.

"5. That this authority will expire by limitation in two years from date unless extended.

"I concur in this recommendation.

WILLIAM P. CRAIGHILL,
Brig. Gen., Chief of Engineers.

July 6, 1896—Chief Clerk.
Recd. Office, Chief of Engrs."

15715

Incls. 1 & 2 accomp'g

Recommendation of Chief of Engineers, Doc. 3, Ex. 12.

Transcript Vol. 2 pp. 229-235.

"July 16, 1901,

"The river is being dredged to 26 feet in the narrowest parts, bridges are being re-constructed as rapidly as possible, and condemnation proceedings begun to widen the South Branch to 200 feet."

Excerpt, Report U. S. District Engineer, Doc. 14, Ex. 12.

Transcript Vol. 2 p. 271.

THE SANITARY DISTRICT OF CHICAGO

Oct. 16, 1901

"Hon. Elihu Root,
Secretary of War of the United States
Washington, D. C.

"Dear Sir:

The Undersigned respectfully petition you as Secretary of War to give us permission for an increased flow in the Chicago River, over the 200,000 cubic feet a minute, now in force by your order of July 23, 1901. We, the petitioners, inasmuch as a number of very material improvements have been made in the Chicago River, such as removing center pier bridges, widening the river at many points, and also deepening the same, thereby allowing a much greater flow without any perceptible increase in velocity of the current, believe that we are fully justified in petitioning you to grant to the Board of Trustees of the Sanitary District of Chicago permission to increase the flow from 200,000 to 250,000 cubic feet per minute, during that period of the day allowing a flow of 200,000 cubic feet per minute.

Below we enumerate the following improvements.

The old Randolph Street center pier bridge is now removed and all obstructions which hindered navigation will be out of the way but a few weeks, and a bascule type, with a 140 foot opening, will be erected, similar to that on Taylor Street.

The old Harrison Street center pier bridge is removed, and a new bascule type bridge, with 140 foot opening, with by-passes on each side, is being erected instead.

At Taylor Street the new bascule bridge is in operation, which has a clear opening of 120 feet.

The new bascule bridge of the Chicago Terminal Transfer Railway Company is about ready to be operated, and the old center pier bridge will immediately be removed.

Just north of 12th street the river has been widened, by cutting away of the 12 foot corner, which projected into the river at this place.

From 12th street to Stewart Avenue, the river has been deepened below the hydraulic grade line to a depth of twenty-six feet. Also a strip from 400 feet above 18th Street to Stewart Avenue was made 200 feet wide.

At Canal Street, the old jack-knife bridge with projecting piers has been removed, and a new bridge of the bascule type—the same as at State, Randolph and Harrison Streets—is in process of erection.

The river from Canal Street to 22d Street has been widened in the east side about 30 feet.

The deepening of the river to 26 feet, from 22nd street to about 500 feet west of Main Street, is almost completed. Along this stretch the river has been widened for a distance of about 300 feet at Collision Bend.

From 150 feet east of Halsted Street to 150 feet west of Halsted Street, the river was deepened to 28 feet.

From 900 feet east of Main Street to 300 feet west of Main Street, the river has been widened to 200 feet.

The old center pier bridge and pier at Main Street have been removed, and a new bridge of the same type as at Taylor Street is being erected.

The old center pier bridge and center pier at Ashland Avenue have been removed, and a new bridge of the Page bascule type, with a clear opening of approximately 140 feet with a 40 foot by-pass on each side of the river, is in process of erection.

"The removal of the State Street center pier bridge has been contracted for, and a bridge of bascule type with 140 feet clear opening, and by-passed on each side is to be erected immediately.

In view of the foregoing improvements that are being carried out now, and many others which will follow as quickly as said work can be performed, we feel justified in asking you to permit the Sanitary District of Chicago to increase the flow as hereinbefore suggested."

Doc. 16, Ex. 12, Transcript Vol. 2 pp. 275-277.
Application of Sanitary District of Chicago.

Chicago, Illinois, November 5, 1901.

"The Board now ask that they be permitted to discharge 250,000 cubic feet per minute instead of the 200,000 now authorized between midnight and 4 P. M. They say nothing about the hours from 4 P. M. to midnight, and it may be assumed that they would expect to continue the discharge 300,000 cubic feet now authorized for those hours. They give as a ground for this request the improvements which they have made in the Chicago River, which, they claim, will permit a much greater flow without any perceptible increase of velocity, and they present a list of obstructive bridge piers removed and of places where the river has been widened or deepened by excavation.

The enlargement of the Chicago River has been begun by the Sanitary District under a systematic plan and able management. It has made good progress as shown by the list of improvements; but it is very far from complete. Eight bridges are mentioned, of which one has but just been put out of contract; there are 20 more bridges to be removed. There are three tunnels under the river, which are among the worst obstructions of all; no steps for their removal have been taken. A large amount of widening has to be done. The project contemplates an expenditure of about $9,024,000, and does not include the removal of the tunnels. Of this sum about $1,000,000 has been expended. Some work was done before the adoption of the present project. Roughly-speaking, then, the improvement is about one-ninth completed. Relief has been given to navigation at detached points, but the ground taken that the improvements have been extensive enough to accommodate a much greater flow without detriment to navigation is untenable. If a flow of 250,000 cubic feet per minute would have been a serious injury to navigation last year, it would be so still. Persons representing the navigation interests are decidedly of opinion that it would have been so then and would be so now. Unfortunately this is only an opinion and must remain so until it can be tested by experiment.

The Board of Trustees say nothing about the sanitary question, which is the essential question after all. If it can be shown that the discharge of sewage with the present degree of dilution into the Illinois River is endangering the lives of the people on its banks, either the discharge must be stopped entirely or the dilution must be increased sufficiently to make it harmless. I can see no middle ground."

Doc. 17, Ex. 12, Transcript Vol. 2 pp. 281-283.
(Report of U. S. District Engineer on
foregoing application)

"Complainant's Exhibit No. 13.

Mr. Jackson. The next offer for the record at this point is Complainant's Exhibit No. 13, now reading as follows:

'In 1902 Col. O. H. Ernst, United States Engineer at Chicago, made a report to the Chief of Engineers, Report of Chief Engineers, 1902. App. K. K., p. 2097.

'Since the flow of the Chicago River has been reversed through the South Branch by the discharge into the sanitary canal the slope has also been reversed from the lake upstream and the depth correspondingly reduced. This loss in navigable depth will be more than restored in the main stream and in the South Branch by the excavations of the sanitary district, which, in order to facilitate the flow of the large volume of water required for the dilution of the sewage discharged into the drainage canal, has undertaken to enlarge those portions of the Chicago River to a width of 200 feet and central depth of 26 feet. These dimensions have no relation to the draft of vessels using the river, and if maintained as they should be for drainage purposes will furnish a navigable depth in excess of the requirements. The south fork of the South Branch and the North Fork, however, do not share in these benefits. In the South Fork particularly the dimensions of channel obtained by the operations of the Government were seriously impaired by the change of slope. The sanitary district has undertaken to restore these dimensions, and will no doubt do so, though it has been prevented from fully accomplishing the work by some difficult rock excavation. But it has not undertaken as yet to maintain them.

'The Chicago River is the main sewer of Chicago, and as such is subject to deteriorating influences as a navigable channel from which there is no escape. The city ordinances against dumping solid matter into it are ample, and, I think, generally well observed. But a very large amount of solid matter must of necessity go into it with a perfectly legitimate use of it as a sewer. Periodical dredging will be necessary to maintain it as a navigable channel and, eventually, to maintain it even as a sewer. That work would seem to be as much the duty of the city as the maintenance of any other part of its sewer system. So far as the South Branch is concerned; the question has been solved by the necessities of the drainage canal, as already mentioned, but the sanitary district has not accepted responsibility for maintaining the other branches. Whether that organization or some other representing the people of Chicago should do the work is for them to decide, but it seems to me clear that the United States should not be called upon to do it. Accordingly, no estimate for maintaining the channel excavated under the project of 1896 is submitted.' "

Ex. 13, Transcript Vol. 2 pp. 292-293.

"That the sanitary district had recognized the difficulty of flowing enough water through the Chicago River was evidenced some years before the Secretary of War had indicated his disapproval of producing obstructive currents. On April 21, 1891, the trustees proposed a resolution providing that they 'forthwith enter upon, use, widen, deepen, and improve the Chicago River from its mouth at

Lake Michigan * * * so as to make the same a proper and sufficient supply channel * * *.'

A start was made on this work in 1897 for certain improvements between Harrison and Quincy Streets and a permit for this short piece of work was issued by the Secretary of War on November 16, 1897. However, it was not until April 26, 1900 that the sanitary district made application to the Secretary of War for a permit to widen, deepen, and straighten the whole of South Branch of the Chicago River so as to provide the discharge capacity desired without introducing obstructive currents. A permit was issued by the Secretary of War on July 11, 1900 (Appendix 14), allowing the sanitary district to proceed with this work covering that section of the river between Twelfth Street and Ashland Avenue.

On January 17, 1902 a permit was issued for the rest of the work on the South Branch from Twelfth Street to Lake Street (Appendix 15). Work under these permits was under way for a period of years. Efforts were directed toward obtaining a channel of a minimum width of 200 feet with a depth of 26 feet for the middle 100 feet, shoaling to 16 feet at the dock faces. Up to December 31, 1917, a total of over $12,000,000 was expended by the sanitary district for right of way, dredging, and construction of bridges. At the present time the desired channel improvements have been finished throughout the entire stretch from Lake Street to Robey Street. There are a few bridges yet to be replaced.

It can not be said that all of the results expected from improving the channel have been obtained. Through this portion of the channel the discharge is fairly constant, averaging in the neighborhood of 8000 cubic feet per second. The effect of withdrawing maximum amounts at the power house at Lockport is equalized by the storage capacity of the channel between Lockport and Lake Michigan, so that the variations which occur near the source of supply result largely from fluctuations in the level of the lake. Deliberate efforts on the part of the Sanitary District of Chicago to establish and maintain a uniform flow of 10,000 cubic feet per second through the Chicago River have been unsuccessful. While these attempts were experimental, they indicate that the stream is still too crooked and narrow to permit that volume of discharge under ordinary conditions of head.

The east and west arms of the South Fork of the South Branch were dredged in 1913 by the sanitary district for the stockyard interests to 20 feet in the former arm and to 18 feet in the latter as far as Ashland Avenue, and to 13.5 feet above that street. The portion above Ashland Avenue has since been filled. This deepening was for the purpose of providing an adequate discharge channel for the sewage from Packingtown.

The sanitary district straightened the channel of the North Branch for 2 miles northward from Belmont Avenue, providing 12 feet depth and 90 feet width to the north side of Lawrence Avenue. In 1917 they dredged to Roscoe Street from Belmont Avenue to a depth of 15 feet for a width of 20 feet in mid-channel; also a turning basin along the west dock north of Roscoe Street, about 500 feet long, 50 feet wide, and 15 feet deep. These improvements facilitated the discharge of water through the North Branch by way of the North Shore Channel."

Exhibit 1 pp. 33-35.
Report of Major Putnam, U. S. District Engineer,
Nov. 1923.

"EFFECTS OF CHANGES.

By comparing the projects and work of the Federal Government and the Sanitary District of Chicago it will be seen that while the former agency projected, appropriated for, and completed a 21-foot draft channel from the mouth of the river to Ashland Avenue, the latter have straightened the stream to some extent and provided depths as great as 26 feet over most of the South Branch. Had the sanitary district not done their work the United States would have been required to maintain the channel at project depth since about 1914. Navigation is no beneficiary of the greater depths provided by the sanitary district, as the depths can not be availed of. It is true that current velocities would be greater with equal discharges if the depths were less, but as the production of any current is chargeable to the sanitary district no benefits can be claimed on that account.

The hydraulic grade line of the stream having been reversed, prevailing depths away from the lake have been lessened and the United States has been required to dredge a little more to obtain project depths than it would have been without the diversion. The cost is believed to be negligible.

There was practically no current in the river in its original condition. As a result navigation was comparatively simple where ample depth and width of channel existed. The introduction of current in the river by the sanitary district has been a distinct disadvantage. While the average current may not exceed 1½ miles per hour, there are places and times where currents of 3 to 4 miles per hour have been observed. Sometimes a large vessel gets caught in one side of the draw of a swing bridge, having become unmanageable as a result of the current. Vessels have been known to collide with each other or with the fenders of bridges or dock walls for the same reason. This is a damage of an indefinite valuation which is directly chargeable against the sanitary district.

The sanitary district has improved conditions on the river by constructing 12 modern bascule bridges of large span and clearance in the place of an equal number of swing bridges which were obstructions to navigation. It is highly probable, however, that the work would have been done by the city of Chicago had the sanitary district not taken the initiative. The funds for building the bridges came from the same source, the only difference was in the agency. Too much credit should not reflect on the sanitary district on this account, though it must be granted that the results are a distinct improvement and were accomplished more expeditiously than they would have been otherwise."

Exhibit 1 p. 37.

Report of Major Putnam, U. S. District Engineer,
Nov. 1923.

"No immediate valuation can be placed on the benefits to navigation resulting from these changes and additions to the channels in and near Chicago. The present value is doubtful, and while there is no question as to the future value of the main and Sag canals when the Illinois waterway is completed, the latter improvement is rather far from realization to make any good estimates.

Suppose, on the other hand, that these channels did not exist and either the State of Illinois or the Federal Government were called upon to provide a through channel from Chicago to Joliet of suitable dimensions for barge navigation. The dimensions of such a canal would probably be from 160 feet to 200 feet wide in rock cut, 160 feet wide at bottom of earth cut, and about 10 feet deep (see Plate V.)"

Exhibit 1 p. 39.

Report of Major Putnam, U. S. District Engineer,
Nov. 1923.

"NAVIGATION.

As far as the navigation of the Chicago River and the drainage canal is concerned, if the flow at Lockport were entirely throttled and the power-house gates closed so as to permit no diversion from Lake Michigan, conditions would be decidedly improved. The current which now averages 1½ miles per hour and in some bridge draws is as high as 4, would be practically eliminated, making navigation considerably simpler, especially for the larger vessels whose passage through a narrow bridge draw is apt to increase the current materially."

Exhibit 1 p. 60.

Report of Major Putnam, U. S. District Engineer,
Nov. 1923.

APPENDIX "D."

"Mr. Dietz. Defendants offer in evidence as Exhibit 1270 photostatic copies of the title and the first part of the Rivers and Harbors Act of June 25, 1910, and photostatic copy of the pages or portions of that act which provide an appropriation of one million dollars for the construction of a waterway from Lockport, Illinois, by way of the Des Plaines and Illinois Rivers to the mouth of said Illinois River.

(The document referred to is received in evidence and marked "Defendants' Exhibit No. 1270.")

Mr. Dietz. Defendants also offer in evidence as Exhibit No. 1271 two photostatic sheets of the report of the engineers on the subject of the waterway from Lockport, Illinois, by way of the Des Plaines and Illinois Rivers to the mouth of the Illinois River, showing that the $1,000,000 appropriation provision referred to in Exhibit 1270 was repealed.

Mr. Jackson. What was the date of the Chief of Engineer's report, Exhibit 1271?

Mr. Dietz. The date of the report itself?

Mr. Jackson. Yes.

Mr. Dietz. I think that is in evidence. Do you know, Mr. Barnes?

The Witness. No.

Mr. Dietz. We will get it for you.

(The document referred to is received in evidence and marked "Defendants' Exhibit No. 1271.")"

Transcript Vol. 27 pp. 6198-6199.

"IMPROVEMENT OF RIVERS AND HARBORS.

June 25, 1910. Vol. 36 p. 630.

(H. R. 20686) (Public. No. 264.)

Chap. 382—An Act Making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes.

Rivers and Harbors appropriations.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums of money be, and are hereby, appropriated, to be paid out of any money in the Treasury not otherwise appropriated, to be immediately available, and to be expended under the direction of the Secretary of War and the supervision of the Chief of Engineers, for the construction, completion, repair, and preservation of the public works hereinafter named:

Waterway from Lockport, Ill., to Mississippi River. Board to be appointed.

For the construction of a waterway from Lockport, Illinois, by way of the Des Plaines and Illinois Rivers to the mouth of said Illinois River, one million dollars. The Secretary of War shall appoint a board of five members, to be composed of four engineer officers of the army and one civil engineer taken from civil life. The president of the board of five members authorized under Act of March second, nineteen hundred and seven to examine the Mississippi River below Saint Louis and report to Congress on the project of a fourteen-foot channel, shall be a member of and president of the board herein provided for.

Nature of report.

Said board shall report upon the feasibility of such waterway, and the most advisable depth and dimensions therefor, in case the same is recommended; also upon such measures as may be required to properly preserve the levels of the Great Lakes and to compensate, so far as practicable, for the diminished level in said lakes and the connecting waters thereof by reason of any diversion of water from Lake Michigan for the maintenance of the proposed waterway herein described, or diversion for any other purpose; and further, also upon the influence on volume and height of waters in the Mississippi River below Cairo; and further, also, as to the effect upon the climate of the Lake States by a change in the natural currents of Lake Michigan.

Extent of cooperation of Illinois. Recommendations.

The board shall, after full conference with the authorized agency of the State of Illinois, submit a report upon the extent to which the United States may properly cooperate with the State of Illinois in securing the construction of a navigable waterway from Lockport to the mouth of the Illinois River in conjunction with the development of water power by said State between Lockport and Utica, for which the people of the State of Illinois have authorized their general assembly to appropriate twenty million dollars; the report shall state the extent and character of the cooperation recommended and the conditions considered necessary in connection therewith to fully protect the interests of the United States.

Plans and estimates to be submitted.

Should the board consider cooperation to be advisable, the report herein called for shall include plans and estimates of cost of the work recommended to be done by the United States alone or in cooperation with the State of Illinois; and until these plans and estimates have been submitted and a project for the improvement adopted by Congress the appropriation of one million dollars herein made shall not be available for expenditure.

Report on dams at Jefferson Barracks and Commerce.

The board also shall consider and report upon the improvement of the Mississippi between the mouth of the Illinois River and the mouth of the Ohio River by the construction of a dam at or near Jefferson Barracks and a dam at or near Commerce, and the development of water power incidentally created by such dams. In the performance of its duties the board may consider all reports heretofore made; and the force, plant, and records of the Mississippi River Commission and the several engineer districts between Chicago and Cairo shall be available for the use of the board. The members of the board herein authorized shall be entitled to compensation at the rate of six thousand dollars per annum, but the official salary of any officer appointed on said board from the Engineer Corps of the Army shall be deducted from the compensation provided for in this Act. For salaries and expenses of said board, including all necessary clerical and other personal services, there is hereby appropriated the sum of fifty thousand dollars. The reports herein called for shall be submitted to the Chief of Engineers not later than November first, nineteen hundred and ten, reviewed by the Board of Engineers for Rivers and Harbors, and submitted to Congress not later than the first Monday in December, nineteen hundred and ten.

Exhibit 1270.

WATERWAY FROM LOCKPORT, ILL., BY WAY OF THE DES PLAINES AND ILLINOIS RIVERS, TO THE MOUTH OF THE ILLINOIS RIVER, ETC.

Under the provisions of section 1 of the river and harbor act of June 25, 1910, a board, consisting of Brig. Gen. William H. Bixby, Chief of Engineers, United States Army; Col. C. McD. Townsend Corps of Engineers; Maj. Charles Keller, Corps of Engineers; Maj. J. B. Cavanaugh, Corps of Engineers; and Mr. John Bogart, civil engineer, was appointed by the Secretary of War to consider and report upon the construction of a waterway from Lockport, Ill., by way of the Des Plaines and Illinois Rivers, to the mouth of the said Illinois River; the said board to report upon the feasibility of such waterway and the most advisable depth and dimensions therefor, in case the same is recommended; also upon such measures as may be required to properly preserve the levels of the Great Lakes and to compensate as far as practicable for the diminished levels in said lakes and the connecting waters thereof by reason of any diversion of water from Lake Michigan, etc. The said act made an appropriation of $1,000,000, subject to the provision that "until these plans and estimates have been submitted and a project for the improvement adopted by Congress the appropriation of one million dollars herein made shall not be available for expenditure."

Reports dated November 1, 1910, and January 23, 1911, on the proposed waterway and certain related subjects called for by the said act were transmitted to Congress and printed in House Documents Nos. 1061 and 1374, Sixty-first Congress, third session, respectively.

Final report on the above and all related subjects was submitted on August 15, 1913, transmitted to Congress, and printed in House Document No. 762, Sixty-third Congress second session, which also includes a reprint of the partial reports of November 1, 1910, and January 23, 1911. A project is presented by the special board which involves an original outlay by the United States of $1,050,000 for the Illinois River and $3,710,000 for the Mississippi River, or a total of $4,760,000 for a navigable channel 8 feet deep from Utica to St. Louis.

By the provisions of section 12 of the river and harbor act approved March 4, 1915, the section of law appropriating the $1,000,000 above referred to was repealed and the balance of the appropriation remaining unexpended required to be covered back into the Treasury. No portion of the appropriation had been expended, and it will all be covered back into the Treasury in accordance with the law mentioned.

Excerpt, Report of Chief of Engineers, 1915.

Exhibit 1271.

APPENDIX "E."

"EXCERPTS FROM HEARING BEFORE THE COMMITTEE ON RIVERS AND HARBORS

AND

THE SENATE COMMERCE COMMITTEE

RELATIVE TO

THE AMOUNT OF WATER REQUIRED FOR PURPOSES OF NAVIGATION ALONG THE ILLINOIS RIVER.

Excerpts are from the following documents:

Hearings before the Select Committee on Nine-Foot Channel from the Great Lakes to the Gulf. U. S. Senate, Sixty-eighth Congress, Second Session, Vol. 2, 1925.

Hearings before the Committee on Rivers and Harbors, House of Representatives, Sixty-Ninth Congress, First Session, 1926.

Hearings before the Committee on Commerce, U. S. Senate, Sixty-Ninth Congress, First Session, H. R. 11616.

HEARINGS

BEFORE THE

SELECT COMMITTEE ON NINE-FOOT CHANNEL FROM THE GREAT LAKES TO THE GULF

UNITED STATES SENATE

Sixty-Eighth Congress
Second Session
Vol. 2-1925

Senator Brookhart. One of the matters we would like to know about is the amount of water that would be required at Chicago for navigation of the 9-foot channel down the Illinois River.

General Taylor. That is a matter which has been under investigation a number of times. I think the first formal report that was made on it was made by a board which was convened by authority of the river and harbor act of June 25, 1910. In the report of that board it was stated a number of times that a diversion of more than 1,000 second-feet is not necessary for navigation purposes.

On page 14 of House Document No. 762, Sixty-third Congress, second session, this statement appears:

> But the board reiterates that a diversion exceeding 1,000 second-feet is not necessary for navigation purposes alone in the Illinois River, and that an added discharge will produce a slight and inadequate effect on the Mississippi River.

Statements to that same effect are found in numerous places in that report.

It has been investigated a number of times and I think the conclusions reached by that Board have always been concurred in.

Of course, the amount of water depends entirely upon how the improvement shall be made. We could get 8 or 9 feet in the Illinois River with 1,000 second-feet or with 10,000 second-feet diversion but by different methods of improvement and at different costs.

* * * * *

Senator Brookhart. That is with or without locks?

General Taylor. With 1,000 second-feet you would have to have locks and with 10,000 second-feet no locks would be required; that is, below Utica.

Exhibit 209.

HEARINGS

Before the

COMMITTEE ON RIVERS AND HARBORS
HOUSE OF REPRESENTATIVES

Sixty-Ninth Congress
First Session 1926

Mr. Mooney. I see, but you have had no reason for changing your own opinion that 1,000 cubic feet is all that is necessary for navigation?

General Taylor. It is all set out in this report, the various costs of the project under various amounts of diversion, ranging from—there is a table on page 3 which shows what can be done with various amounts of diversion, what the costs will be, with average diversion, ranging from 1,000 second-feet to 10,000 second-feet.

The Chairman: This is for an average of 1,650 feet maximum?

General Taylor. Yes, sir.

Mr. Mooney. Pardon me. I am asking this because I really want to know. You have not changed your judgment that by the expenditure of that money that navigation can be provided for any of these amounts which you have named?

General Taylor. That is correct.

General Taylor. It is shown in the table and published in the report that the channel can be obtained with any amount of diversion annually from 1,000 up to 10,000. That answers your question.

Exhibit 209.

"HEARINGS

BEFORE THE

COMMITTEE ON COMMERCE
UNITED STATES SENATE

Sixty-Ninth Congress
First Session
on
H. R. 11616

General Taylor. There is a certain amount of water used for domestic purposes, approximately 1,200 second-feet, and that would go back into the river and go down the river. With a diversion there at Lockport of only 1,000 second-feet, which is less than the amount they are using at the present time for domestic consumption, the cost would vary. With complete canalization it would be $2,666,000, and with partial canalization, by taking the State dams out, it would be $5,133,000. In other words, with a flow from the lake of only 1,000 second feet, the cost would be between $2,555,000 and $5,133,000.

* * * * *

General Taylor. Yes, and in addition to that there are a number of streams that enter the river below Lockport that ordinarily give water enough so that even if we did not get any water from the lake in any form, this improvement would still be useful. There will be times of extreme low water, of course, when we would have to either limit the lockage or perhaps suspend altogether, but those periods ordinarily would be short, and very infrequent. Many very important improvements are made where navigation would have to be closed for considerable periods of time. For instance, take the Great Lakes. They are closed for some five or six months every year, but nobody thinks they are not worth while making, because they are not available throughout the whole 365 days in the year. This waterway down the Illinois would be a perfectly good waterway and would be available for probably 99 per cent of the time, even if there was not any water taken from Lake Michigan.

* * * * *

Senator Copeland. If the diversion is limited to 1,200 feet, the present amount used for domestic purposes, what will be the cost of this improvement?

General Taylor. With the diversion of 1,000 second-feet on an average, it would be, with complete canalization $2,666,000 and with partial canalization $5,133,000. In other words, it will vary between, in round numbers, two and a half million dollars and a little over $5,000,000.

* * * * *

Senator Willis. So that any diversion other than a thousand second-feet is for some purpose other than navigation.

General Taylor. Navigation can be provided for with a thousand second-feet."

Exhibit 209, Transcript Vol. 40(2) pp. 9243-9245.

APPENDIX "F."

"5. For any of the three depths referred to in the resolution, the river can be improved by two or more of at least four different methods, viz., (1) complete canalization, using five locks and dams; (2) partial canalization, using the four existing locks and dams; (3) partial canalization, using the two existing Federal locks and dams and partially removing the two State dams; and (4) open-channel improvement, involving partial removal of all four dams. The district engineer submits estimates on all the cases involved. The division engineer and the board concur in his estimates, subject to the qualifications contained in paragraph 7 (e) of the board's report. The following condensed table shows costs for a 9-foot channel:

Illinois River, Ill.

Method of Improvement	Instantaneous maximum diversion, Lockport, cubic feet per second	Annual average diversion, Lockport, cubic feet per second	Cost, thousands of dollars [1] First cost	Maintenance and operation	Annual charge (maintenance and operation) plus 4 per cent first cost
Complete canalization[2]	1,650	1,000	2,666	226	[2]333
Partial canalization (State dams out)			5,133	210	415
Complete canalization[2]	3,300	2,000	2,619	216	[2]321
Partial canalization[2] (State dams out)			5,108	171	375
Open channel			6,050	105	347
Partial canalization (present dams retained)[2]	4,580	3,000	1,914	191	[2]268
Partial canalization (State dams out)			3,697	147	295
Open channel			4,482	97	277
Partial canalization (present dams retained)	6,050	4,167	1,383	180	235
Partial canalization (State dams out)[2]			2,262	133	[2]224
Open channel			3,465	89	277
Partial canalization (present dams retained)	7,050	5,000	1,264	178	229
Partial canalization (State dams out)			1,789	130	202
Open channel[2]			2,365	87	[2]182

---

[1] On the assumption that the flow is regulated primarily in the interests of navigation.

[2] Indicates method which, considering, first, maintenance and operation costs, is cheapest, in terms of Federal money expended, for the given diversion."

Method of Improvement	Instantaneous maximum diversion, Lockport, cubic feet per second	Annual average diversion, Lockport, cubic feet per second	Cost, thousands of dollars [1]		
			First cost	Maintenance and operation	Annual charge (maintenance and operation) plus 4 per cent first cost
Partial canalization (present dams retained)	8,250	6,000	1,141	168	214
Partial canalization (State dams out)			1,349	126	180
Open channel[2]			1,925	80	[2]157
Partial canalization (State dams out)	10,050	7,500	942	122	160
Open channel[2]			1,540	76	[2]138
Partial canalization (State dams out)	11,250	8,500	171	114	[2]121
Open channel			1,320	70	123
Partial canalization (State dams out)	13,050	10,000	171	105	112
Open channel[2]			990	63	[2]102

---

[1] On the assumption that the flow is regulated primarily in the interests of navigation.

[2] Indicates method which, considering, first, maintenance and operation costs, is cheapest, in terms of Federal money expended, for the given diversion.''

Exhibit 18 p. 2, 3.
House Doc. 4, 69th Cong. 1st Sess.

Report of Board of Engineers for Rivers and Harbors on Illinois River, Illinois.

"7. On the basis of the data in the reports of the district and division engineers, the board states that the least possible diversion which will permit of 9-foot navigation at all times in the Illinois River may be taken as approximately 1,000 cubic feet per second annual average and 1,650 cubic feet per second instantaneous maximum, based on the worst navigation conditions of record in the Illinois River, and subject to the qualifications contained in paragraph 7 (e) of the board's report. This figure is approximate only, since it involves complete canalization of the Illinois and is computed on the flow necessary for lockages, with due allowance for seepage, evaporation, etc.;

and computations on lockages necessarily turn on assumptions as to the future traffic."

Exhibit 18 p. 3.
House Doc. 4, 69th Cong. 1st Sess.

Report of Board of Engineers for Rivers
and Harbors on Illinois River, Illinois.

"8. The estimated cost of a navigation improvement, which is the question asked, depends both on the amount of diversion and the method of improvement. For any of the three depths, the river can be improved by one or more of at least four different methods; complete canalization, using five locks and dams; partial canalization, using the four existing locks and dams; partial canalization, using the two existing Federal locks and dams and taking out the two State dams; and open channel improvement. The following table shows, for a channel 9 feet by 200 feet, the costs by these methods, for the five diversions given in the resolution and for additional diversions as well (1,000, 3,000, 5,000 and 6,000 c.f.s.). It is assumed that by 'diversions' the committee meant 'average annual diversions based upon the year most unfavorable to navigation.' (Par. 7-c, col. 1). The diversion engineer concurs in these cost estimates. The board also concurs and submits them, as the answer to the first question, as regards the 9-foot depth. Data on 7-foot and 8-foot depths and certain alternative estimates for 9-foot depths appear in the district engineer's report and appendices thereto. (Table in preceding quotation then follows.)"

Exhibit 18 p. 10.

House Doc. 4, 69th Cong. 1st sess.
Report of Board of Engineers for Rivers
and Harbors on Illinois River, Illinois.

APPENDIX "G."

16. Illinois River, LaSalle to the mouth.—The existing Federal project adopted in 1880 provides, in connection with the State project, for a navigable channel 7 feet deep at low water of 1879 from LaSalle to the mouth of the river, by the construction of four locks and dams and dredging the bars.

Exhibit 18, H. Doc. 4, 69th Cong.
1st Session, page 175.

— Report of Board of Engineers for Rivers and Harbors on Illinois River, Illinois.

18. Illinois River, LaSalle to the mouth.—The existing Federal project adopted in 1880 provides, in connection with the State project, for a navigable channel 7 feet deep at low water of 1879 from LaSalle to the mouth of the river, by the construction of four locks and dams and dredging the bars. From LaSalle to Copperas Creek, the upper limit of the original United States project, the State of Illinois has made the improvement, principally by the construction of locks and dams at Henry and Copperas Creek, 27.2 and 86.5 miles, respectively, below LaSalle. From Copperas Creek to the mouth United States has improved the river by dredging and construction of locks and dams at LaGrange and Kampsville, 145.6 and 191.7 miles, respectively below LaSalle. The full width of channel has not yet been accomplished but low water mid-channel depths in the open river are in excess of 7 feet for a width of

about 75 feet. All locks mentioned are 350 feet long and 75 feet wide with 7 feet on miter sills. All dredging since 1914 has been done by the United States dredging plant, and to a depth of 7 feet below low water of 1901, the lowest stage of river since the opening of the Sanitary Canal.

Exhibit 1360, H. Doc. 2, 67th Cong.
1st Sess., page 9.

Report by U. S. District Engineers, on Illinois and Mississippi Rivers between Utica and Cairo, Ill.

2. The Illinois River is formed by the confluence of the Kankakee and Des Plaines Rivers in northeastern Illinois and flows generally west and south for 273 miles into the Mississippi River. It is under improvement by the United States in accordance with a project providing for a channel 7 feet deep at low water of 1879 from the mouth to LaSalle, a distance of 223 miles, to be obtained by two Federal locks and dams, at Kempsville and LaGrange, respectively, and by dredging. There are two other locks and dams in this stretch of the river, at Henry and at Copperas Creek, which were built and are operated and maintained by the State of Illinois, and for passage through which the State charges tolls; these were however necessary for navigation up to LaSalle previous to the present large diversion of water from Lake Michigan.

Exhibit 18, H. Doc. 4, 69th Cong.
1st Sess., page 8.

Report of Board of Engineers for Rivers and Harbors on Illinois River, Illinois.

REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1890, Part I, page 261.

"The present project contemplates the extension of the work heretofore done by the State of Illinois from the mouth of the Copperas Creek to the Mississippi River, a distance of about 135 miles, which project includes the building of two locks, 350 feet long, between mitre-sills, 75 feet width of lock chamber, with 7 feet of water over the mitre-sills at low water of 1879, and dredging the channel where necessary to obtain 7 feet depth at low water in the pools thus created."

REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1893, Part I, p. 362.

"The present project was adopted in 1880, and contemplates the extension of the slack-water improvement begun by the state of Illinois from the mouth of Copperas Creek to the Mississippi River a distance of about 135 miles."

"The project includes the construction of two locks 350 feet long between mitre sills, 75 feet in width of lock chamber, with a depth of 7 feet in water over sills at low water of 1879, and dredging the channel where necessary to secure 7 feet depth of water at low water in the pools thus created."

This appears also in Report of Chief of Engineers, U. S. Army

1894, Part I, p. 334
1895, Part I, p. 372
Part IV, p. 2714
1896, Part I, p. 327
Part IV, p. 2597
1897, Part I, p. 416
1898, Part I, p. 404
1899, Part I, p. 480
1900, Part I, p. 505

Exhibit 207

REPORT OF THE CHIEF OF ENGINEERS, U. S. ARMY, 1897, Pt. LV, p. 2815.

"The present project was adopted in 1880 and contemplates the extension of the slack-water improvement begun by the State of Illinois from the mouth of Copperas Creek to the Mississippi River at Grafton, Illinois, a distance of 135 miles. The project includes the construction of two locks each 350 feet in length of chamber, 75 feet in width, and with 7 feet depth at low water over sills, and dredging the channel where necessary to secure that depth of water at low water throughout the pools created by the dams."

This also appears in Report of Chief of Engineers, U. S. Army,

1898, Part IV, p. 2436
1899, Part IV, p. 2841
1900, Part V, p. 3799
1901, Part IV, p. 3006

Exhibit 207

REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1901, Part I.

Illinois River, Ill. (a) Below Copperas Creek—"The project, which contemplates the extension of slack-water improvement begun by the State of Illinois from Copperas Creek Lock to the Mississippi River, and which includes the construction of two locks, 350 feet long between sills, 75 feet width of chamber, with 7 feet of water over sills at low water of 1879, and dredging the channel where necessary to obtain 7 feet depth at low water was adopted in 1880. This also appears in Report of Chief of Engineers U. S. Army

1902, Part I
1903, Part I
1904, Part I, p. 541
1905, Part I, p. 548
1906, Part I, p. 609
1907, Part I, p. 635
1908, Part 1, p. 682
1909, Part I, p. 718
1910, Part I, p. 796
1911, Part I, p. 853
1912, Part I, p. 1012
1913, Part I, p. 1133

Exhibit 207

REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1907, Part I, p. 636.

"(b) From Copperas Creek to LaSalle. The first appropriation for this section of the River was made March 2, 1907, and the approved project for its expenditure provides for securing the same navigable conditions from Copperas Creek to LaSalle as are planned for the lower river i.e. a channel depth of 7 feet at low water."

This also appears in report of Chief of Engineers, U. S. Army

1908, Part I, p. 682
1909, Part I, p. 719-20
1910, Part I, p. 797
1911, Part I, p. 835
1912, Part I, p. 1021
1913, Part I, p. 1133

Exhibit 207

REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1910, Part II, pp. 2164-65.

Improvement of Illinois River, (a) Below Copperas Creek

"The approved project provides for a channel 200 feet wide and 7 feet deep at low water of 1879."

This appears also in Report of Chief of Engineers, U. S. Army,

1911, Part II, pp. 2367-2368
1912, Part II, p. 2555
1913, Part II, p. 2817

Exhibit 207

REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1912, Part I, p. 1020, *et seq.*

Illinois River, Illinois.

"Improvement work is referred to Memphis datum which is 587.04 feet below Chicago City datum, or 7.01 feet below New York mean tide." (p. 1021)

"(a) Below Copperas Creek. The project, which contemplates the extension of slack-water improvement begun by the state of Illinois from Copperas Creek Lock to the Mississippi River, and which includes the construction of two locks 350 feet long between sills, 75 feet width of chamber, with 7 feet of water over sills at low-water level of 1879, and dredging the channel where necessary to obtain 7 feet depth at low water, was adopted in 1880." (p. 1021)

"(b) From Copperas Creek to LaSalle.—The first appropriation for this section of the River as made March 2, 1907, and the approved project for its expenditure provides for securing the same navigable conditions from Copperas Creek to LaSalle as are planned for the lower river, i.e., a channel depth of 7 feet at low water.

Exhibit 207

REPORT OF CHIEF OF ENGINEERS,

U. S. ARMY, 1914, Part I, pp. 1170-72.

Illinois River, Ill. "The admission to the Illinois River of Lake Michigan water via the Chicago Drainage Canal has raised the lower water plane; but inasmuch as the quantity of water which may thus be admitted is a matter of present litigation, it is impracticable, as yet, to ascertain what the low water plane will be." (p. 1171)

"(a) Below Copperas Creek (General Improvement) The existing project for work below Copperas Creek adopted in Act of June 14, 1880, contemplates improvement to a 7 foot depth at low water by dredging and by the construction of one lock each at Kampsville, 31 miles above the mouth of the river (completed and in use since 1894), and at LaGrange, 79 miles above the mouth (completed and in use since 1890). Each lock is 350 feet long, between sills and 75 feet wide, with 7 feet on the mitre sills at low water of 1879. Estimated cost $1,692,837.81. There has been no modification of this project. (p. 1171).

"(b) Copperas Creek to LaSalle. At the lower end of this section 137 miles above the mouth of the river, and at Henry, 199 miles above the mouth, the state of Illinois, assisted by the United States has built locks 350 feet long between sills and 75 feet wide with 7 feet on the mitre sills at low water of 1879. The state operates these locks and imposes charges for their use." (p. 1172).

Exhibit 207

ANNUAL REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1915, Part 1, p. 1266.

Illinois River (Note on p. 1266) 1. "The admission to the Illinois river of Lake Michigan water via the Chicago Drainage Canal has raised the low water plane; but inasmuch as the quantity of water that may thus be admitted is a matter of present litigation, it is impracticable to ascertain what the future low water plane will be. At present there is admitted nearly 8000 cubic feet per second as against 4,166 cubic feet per second authorized."

2. "Improvement work is referred to Memphis datum, which is 587.04 feet below Chicago City datum, or 7.01 feet below New York mean tide."

"(a) Below Copperas Creek (General Improvement); The existing project for work below Copperas Creek adopted in Act of June 14, 1880, contemplates improvement to a 7 foot depth at low water by dredging and by the construction of one lock each at Kempsville, 31 miles above the mouth of the river, and at LaGrange, 79 miles above the mouth. Each lock is 350 feet long between sills and 75 feet wide with 7 feet on the mitre sills at low water at 1879." (p. 1256).

"(b) Copperas Creek to LaSalle: At the lower end of this section, 137 miles above the mouth, the State of Illinois assisted by the United States has built locks 350 feet long, between sills and 75 feet wide with 7 feet on the mitre sills at low water of 1879." (p. 1267.)

Note on bottom of page in above reports as follows:

"The admission to the Illinois river of Lake Michigan water via the Chicago Drainage Canal has raised the low water plane; but inasmuch as the quantity of water that may thus be admitted is a matter of present litigation, it is impracticable, as yet, to ascertain what the future low-water plane will be."

This appears also in the report of Chief Engineers, U. S. Army

1917, Part I, p. 1423
1918, Part I, p. 1470
1919, Part I, p. 1595
1920, Part I,
1921, Part I, p. 1575
1922, Part I, p. 1593

Exhibit 207

A. R. Chief of Engineers, U. S. Army, 1916, Part I, p. 1367.

Illinois River "(a) Below Copperas Creek (General Improvement) The existing project for work below Copperas Creek adopted in River and Harbor Act of June 14, 1880, contemplates improvement to a 7 foot depth at low water by dredging and by the 31½ miles above the mouth of the river, and at La Grange, 77½ miles above the mouth. Each lock is 350 feet long between sills and 75 feet wide, with 7 feet on the miter sills at low water at 1879." (p. 1368)

(b) Copperas Creek to LaSalle. Since 1880 this section had not been a part of the general improvement prosecuted by the United States, but the River and Harbor Act of March 2, 1907, specifically appropriated $50,000.00 for this section, to be applied to dredging and other improvements.

This appears also in report of Chief of Engineers, U. S. Army

1917, Part I, p. 1423
1918, Part I, p. 1470
1919, Part I, p. 1595
1920, Part I,
1921, Part I, p. 1576

REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1922, Part I, p. 1593.

Illinois River.

"Existing project. This provides for the improvement of the River from its mouth to Copperas Creek, a distance of 137 miles, by construction of two locks and dams, and by dredging to afford a depth of 7 feet at low water of 1879; and for the improvement of the river from Copperas Creek to LaSalle, a distance of 86 miles, by dredging and other improvements, to afford the same depth.

Exhibit 207

REPORT OF CHIEF OF ENGINEERS, U. S. ARMY, 1923, Part I, p. 1451.

Existing project. This provides for the improvement of the river from its mouth to LaSalle, a distance of 223 miles, by the construction of two locks and dams, and by dredging to afford a depth of 7 feet at low water of 1879.

This appears also in report of Chief of Engineers United States Army

1924, Part I, p. 1448 1924, Part I, p. 1358

"Existing project. This provides for the improvement of the river from its mouth to LaSalle a distance of 223 miles, by the construction of two locks and dams, and by dredging to afford a depth of 7 feet at low water of 1879." (p. 1378)

"2. The admission to the Illinois river of Lake Michigan water via the Chicago Drainage Canal has raised the low water plane, but inasmuch as the quantity of water that may thus be admitted is subject to progressive production, it is impracticable as yet to ascertain what the future low water plane will be." (p. 1378)

Exhibit No. 207.

"Illinois River, Illinois: Modification of existing project so as to provide a channel with least dimensions of nine feet in depth and two hundred feet in width from the mouth to Utica: Provided, That the State of Illinois transfers to the United States without cost all rights and titles in the two State-owned dams on the Illinois River; and that local interests furnish the United States without cost all necessary areas for the economical disposal of material dredged in creating and maintaining the channel herein and hereby authorized: Provided further, That nothing in this Act shall be construed as authorizing any diversion of water from Lake Michigan: Provided further, That there is hereby authorized to be appropriated for the project a sum not to exceed $3,500,000."

Rivers and Harbors Act, 1926.
Exhibit 214, Transcript 9255.

APPENDIX "H."

"And whereas, in the judgment of the Secretary of War, an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

"Now therefore, this is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provisions of aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

Exhibit 12, Doc. 45, Trans. 433.
Permit of March 3, 1925.

"U. S. Engineering Office, Chicago, Ill., March 2, 1925.
To the Chief of Engineers, Washington, D. C.

"1. This is an application from the Sanitary District of Chicago, a municipality created under the laws of the State of Illinois, to divert 10,000 cubic feet per second of water from Lake Michigan, for the purpose of keeping the sewage of that locality from contaminating its water supply and for reducing the sewage by dilution.

* * * * *

"4. In the issuance of a permit, the exact meaning of the word 'diversion' should be understood. In the recommendations which follow, by diversion is meant the amount of water which is actually withdrawn from Lake Michigan by the Sanitary District of Chicago through its main drainage canal and auxiliary channels, and is not inclusive of the amount flowing in the channels which come from the sewers of the locality.

"In other words, 'diversion' is taken to be the gross flow at Lockport less the amount of water used by the city of Chicago for domestic purposes."

5. It is recommended that a permit be issued to the Sanitary District of Chicago, covering a period of five years, to divert from Lake Michigan, through its main

drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second; the instantaneous maximum not to exceed 11,000 cubic feet per second. This permit should be made conditional upon the following:

Exhibit 12, Doc. 43, Trans. 418, 419, 420.
Report of District Engineer on application of
Sanitary Dist. for Permit of March 3, 1925.

November 24, 1925.

His Excellency,
The Right Honorable
Sir Esme Howard, G. C. M. G., K. C. B., C. V. O.,
Ambassador of Great Britain.

Excellency:

Referring further to your Embassy's note No. 813 of September 15, 1925, bringing to my attention certain remarks and inquiries of the Canadian Government in regard to the diversion of water from Lake Michigan by the Sanitary District of Chicago, I take pleasure in submitting the following statements:

* * * * *

The expression "measured at the intakes," used to designate the places where the total actual flow should not exceed that specified in the permit, is hypothetical as it is impracticable to measure the diversion at the numerous intakes with accuracy. For this reason, the practical enforcement of the limitation placed upon the diversion will be carried out at Lockport. Measurements taken there will determine the gross diversion, sanitary and domestic, and, as accurate information is available in regard to the amount of water pumped by the City of Chicago for domestic purposes, the sanitary diversion may be computed by subtracting the domestic diversion from the gross flow at Lockport.

"The term 'diversion' as used in the permit is construed to include the discharge of the Chicago and Calumet Rivers. In view of the methods employed in computing the amount of the diversion the discharge of these streams will be included within the 8,500 cubic feet per second authorized by the permit of March 3, 1925.''

Ex. 17, Tr. 442-443.
Diplomatic correspondence between United States and Great Britain.

SANITARY DISTRICT OF CHICAGO
MAXIMUM OR PEAK FLOW AND K. W. OUTPUT

1920 to 1926 inclusive.

Items 4 & 5		*K. W.*	*Total C. F. S.*
1920 June 20	3:05 A. M.	18,950	19,610
1921 June 25	12:30 Noon	7,700	13,325
1922 July 3	8:00 A. M.	9,800	14,715
1923 Aug. 11	10:30 A. M.	12,500	15,385
1924 Aug. 6	12:00 M. N.	17,900	13,285
1925 Nov. 16	5:00 P. M.	25,000	13,415
1926 Sept. 23	4:30 P. M.	17,600	12,765

Exhibit 146.

SANITARY DISTRICT OF CHICAGO

Tabulation of Flow in Sanitary and Ship Canal

Year	Total Flow at Lockport		Sewage Flow (Chicago Water Works Pumpage)		Water directly abstracted from Lake Michigan by Sanitary District	
1900	2990	C.F.S.	449	C.F.S.	2541	C.F.S.
1901	4046	"	531	"	3515	"
1902	4302	"	554	"	3748	"
1903	4971	"	582	"	4389	"
1904	4793	"	618	"	4175	"
1900-04	4220	"	547	"	3673	"
1905	4480	"	636	"	3844	"
1906	4473	"	676	"	3797	"
1907	5116	"	704	"	4412	"
1908	6443	"	726	"	5717	"
1909	6495	"	744	"	5751	"
1905-09	5401	"	697	"	4707	"
1910	6833	"	803	"	6036	"
1911	6896	"	785	"	6111	"
1912	6938	"	853	"	6085	"
1913	7839	"	894	"	6945	"
1914	7815	"	949	"	6866	"
1910-14	7264	"	857	"	6407	"
1915	7738	"	939	"	6799	"
1916	8200	"	972	"	7228	"
1917	8726	"	993	"	7733	"
1918	8826	"	1018	"	7808	"
1919	8595	"	1106	"	7489	"
1915-19	8417	"	1006	"	7411	"
1920	8346	"	1176	"	7170	"
1921	8355	"	1199	"	7156	"
1922	8858	"	1216	"	7642	"
1923	8348	"	1220	"	7128	"
1924	9465	"	1274	"	8191	"
1920-24	8674	"	1217	"	7457	"
1925	8278	"	1338	"	6940	"
1926	8283	"	1395	"	6888	"

Ex. 1111, Tr. 3361-2.

1. That there shall be no unreasonable interference with navigation by the work herein authorized.

Exhibit 12, Doc. 45, Trans. 433.
Permit of March 3, 1925.

Question 6 (a) To what extent and in what manner are the natural water levels in the St. Lawrence River and on the Great Lakes affected by diversions authorized by license by either Canada or the United States from or in the St. Lawrence River watershed?

237. *Answer:* The diversion by the Chicago Sanitary District of 8,500 cubic feet per second from the lake basin through the Chicago Drainage Canal, authorized by license by the United States, lowers the water levels on the Great Lakes and the St. Lawrence River as follows:

	Foot
Lakes Michigan and Huron	0.5
Lake Erie	.4
Lake Ontario	.4
St. Lawrence River between Lake Ontario and Montreal:	
At Prescott	.4
At Lock 25 (Iroquois)	.6
At Lock 23 (Morrisburg)	.5
At Lock 21 (Dickensons Landing	.4
At Lock 15 (Cornwall)	3
Lake St. Francis	.2
Lake St. Louis	.3
St. Lawrence River at and below Montreal:	
At Montreal Harbor	.37
At Varennes	.35
At Sorel	.28
At Bastican	.24
At Lotbiniere	.24
At Platon	.17
At Quebec	.03

Exhibit 147, page 42.
Report of Joint Board of Engineers
on St. Lawrence Waterway.

Q. Will you read into the record the result of your computation on the lowering of Michigan and Huron from the abstraction of 8,500 cubic second feet at the lake stage or stages used in your computation?

A. When Lake Huron is at an elevation of 581.0, and Lake Erie is at 572.5, we find that diversion of 8,500 cubic second feet will result in the lowering of the level of Lakes Michigan and Huron by .488 feet. When Lake Huron is at an elevation of 578, and Lake Erie is at an elevation of 570.25, we find that diversion of 8,500 cubic feet per second will result in the lowering of the lakes by .562 feet. Having regard to the inherent inaccuracies of the data, it is my conclusion that a diversion of 8,500 cubic feet per second would lower the levels of Lakes Michigan and Huron by .5 of one foot.

Pillsbury, Tran. 876.

Q. The figures which you have quoted there show an abstraction of 8,500 cubic second feet. Will you state whether the extent of the lowering would be directly proportional or otherwise for any abstraction of another amount?

A. It would be directly proportional.

Q. For instance, for 1,000 cubic second feet, it could be determined by dividing by 8.5?

A. Yes, sir.

Q. Colonel Pillsbury, did you make a computation with reference to the effect of a given abstraction from Lakes Michigan and Huron upon Lake Erie?

A. Yes, sir.

Q. What did you find to be the effect?

A. I find that when Lake Erie is at an elevation of 572.5, the effect of a diversion of 8,500 cubic second feet is point three eight six. When Lake Erie is at an elevation of 570.25, the effect of a diversion of 8.500 cubic second feet is .421. Having regard to the inaccuracies of the lake determinations, it is my conclusion that the effect of the diversion of 8,500 cubic feet per second from Lakes Michigan and Huron lowers the level of Lake Erie by .4 of a foot.

Q. At what lake stage?

A. At any lake stage. That within the range of stages actually occurring, the greatest accuracy warranted is the statement that it would lower the level of that lake by .4 of a foot. It would lower somewhat more at low stages than at high, but the difference is small.

Q. You referred to inaccuracies in the data. Did you have in mind some known error of undetermined extent, or errors that are necessarily present in the most careful measurements of stream flows?

A. The errors that are necessarily present in any determination of stream flow.

Pillsbury, Tran. 879-880.

Q. Colonel Pillsbury, have you from the records and computations, surveys, and investigations of the Lake Survey, made any determination or computation as to the effect of the abstraction through the Chicago Drainage Canal of an ascertained amount upon the level of Lake Ontario?

A. Yes.

Q. What conclusion did you reach?

A. I verified the effect found in what is known as the Warren Report.

Q. Can you express in feet or fractional parts of a foot the lowering from the given abstraction?

A. It was .4 of a foot for an abstraction of 8,500 cubic feet per second.

Pillsbury, Trans. 881.

Q. Colonel Pillsbury, will the lowering which you state to take place in Michigan and Huron be felt in all of the bays, inlets, rivers and harbor mouths in Lakes Michigan and Huron?

A. All those which are at the same level as the respective lakes.

Q. With a port at a harbor dredged out of a river mouth, would the lowering be felt in that dredged portion of the harbor?

A. Yes.

Q. And the effect which you have stated to take place in Lake Huron, would that be felt upon the lower St. Marys River?

A. By a slightly decreased amount as you proceed upstream.

Q. Up as far as the floor of the locks of the Soo?

A. Yes.

Q. State whether the effect of the abstraction or the lowering effect would be felt in the St. Clair River.

A. Yes.

Q. Would it be felt in Lake St. Clair?

A. Yes.

Q. Would it be felt in the Detroit River?

A. Yes.

Pillsbury, Trans. 881-882.

Q. You have stated that the extent of the lowering in Michigan and Huron would be directly proportional for variation of the amount of the abstraction?

A. Yes; for abstraction of the order here considered.

Q. Well, for instance, from 1,000 to 12,000 cubic feet per second?

A. Yes.

Q. Would the same condition apply with reference to the lowering of Lakes Erie and Ontario?

A. Yes.

Q. Will you state whether, in your opinion, a given abstraction through the Chicago Drainage Canal has any effect on lowering the St. Lawrence River.

A. Yes; it has.

Q. How far down the St. Lawrence does that lowering extend?

A. To Quebec.

Q. Where in relation to tidewater?

A. At Quebec the St. Lawrence is but slightly above sea level. It is tidal for a considerable distance above that, but the effect is felt on the tidal portion above Quebec, as well as in the non-tidal portion.

Q. Colonel, when I asked you about the lowering of Huron did I also ask you about the lowering of Michigan?

A. Michigan and Huron are substantially the same level. Anything that affects Huron affects in the same degree Lake Michigan.

Q. So that the figures which you may have stated for lowering of either Michigan or Huron would apply to the other lake?

A. Yes.

Pillsbury, Trans. 885-886.

I find that the full effect of a diversion of 8,500 c. s. f. of water from Lake Michigan at Chicago through the drainage canal of the Sanitary District would be to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; the levels of Lakes Erie and Ontario, approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the above-mentioned lakes, to the same extent, respectively.

By reference to the tabulation of flow in the Chicago Drainage Canal (*supra*, p. 22), it will be observed that the total flow at Lockport did not exceed 8,000 cubic second-feet until 1916, when it was 8,200 c. f. s., and from that time it exceeded 8,500 c. f. s. until 1920, when the total flow amounted to 8,346 c. f. s., and that the average from 1920 to 1924 was 8,674 c. f. s., and for the years 1925 and 1926 about 8,280 c. f. s. I find that the diversion which has taken place through the Chicago drainage canal has been substantially equivalent to a diversion of about 8,500 c. f. s. for a period of time sufficient to cause, and has caused, the lowering of the mean levels of the lakes and the connecting waterways practically to the extent above stated.

I find, further, that an increase of the diversion at Chicago above 8,500 c. f. s. would cause an additional lowering of the levels of the lakes and their connecting waterways in proportion to the amounts above stated. Thus a diversion of an additional 1,500 c. f. s. or a total diversion of 10,000 c. f. s. would cause an additional lowering in

Lakes Michigan and Huron of about one inch, and in Lakes Erie and Ontario a little less than one inch, with a corresponding additional lowering in the connecting waterways having the same levels as the lakes respectively.

Special Master's Report, pp. 104-05.

Q. The Complainants produce a document entitled: "Great Lakes Ship Channel, Duluth, Minnesota to Buffalo, New York," Document 270, House of Representatives, 69th Congress, First Session, which is marked "Complainants' Exhibit 67, for identification." Colonel Markham, I show you this exhibit and ask you whether you had any part in the preparation of that document?

A. I prepared a portion of that document, starting on page 11, beginning "War Department, United States Engineer Office, Detroit, Michigan; Subject; Preliminary examination of ship channel between Duluth and Buffalo," and continuing to my name on page 31.

Mr. Jackson. We offer Complainants' Exhibit No. 67 for identification in evidence.

Mr. Adcock. May I ask a few questions there?

Mr. Jackson. Yes.

Mr. Adcock. Was this report prepared pursuant to some Act of Congress?

A. Yes, sir; the law is quoted in the second or third paragraph on page 11.

Mr. Adcock. No objection.

The Special Master. It will be received and marked "Exhibit 67" in evidence.

(The document so identified was marked "Complainants' Exhibit No. 67.")

By Mr. Jackson:

Q. I ask you to turn to page 22 of Complainants' Exhibit No. 67, and ask you to explain the source and meaning of table No. 4.

A. In the statistical records maintained at the Soo there are various facts usually running from year to year, on about pages 14-15, that carried the data applicable to the indicated year.

Q. And from that data you computed the percentage growth of commerce during the period covered?

A. It was merely an abstraction or arithmetical deduction from the detail appearing in pages 14-15 in the statistical reports.

Q. In the second paragraph on page 22, below the table in question appears this sentence:

"For the last twenty years the average water rate had been less than 9/10 mill per ton mile."

Q. What was the course of your information upon that rate?

A. These statistical matters again, maintained at the Soo, which for the year appear, in each case of the particular year's pamphlet, on about page 2. As illustrated for the year 1925, the ten mile rate was estimated to be 1.08 mills. On the same page, for the year 1923, the ten mile rate for that year was estimated to be 1.1 mills. We then went back for the period referred to and averaged them.

Q. You further state: "The lowest rail rate on similar commodities has been no less than three mills per ton mile." What was the basis of your information for that statement?

A. In the preparation of this report and the purpose to brief the ton mile rail and lake relations, we secured from various sources the rail rate, and my recollection is, we could find now here that on the class of bulk with which we were concerned, could we uncover a rate of, I think, less than 3.41.

Q. Was your search extensive or prolonged?

A. It was just as extensive as we felt fitted the case. We had published tariffs and utilized, without my remembering details, practically every source that we could that would give us the bulk rate.

Q. From your study of the ton mile rates by land and water, what do you estimate to be annual saving from the use of water transportation on Lake Superior traffic?

A. I stated it there to be something like $120,000,000 per year.

Q. On what basis did you compute that?

A. We took various classes of commodities and attempted to find, with such agencies and sources as we had, what was the difference between the presumed rail rate from the mine to the source of consumption, in the one case, and the rail, lake, rail rate in the other, and from such calculation as were made respecting such commodities, we reached the conclusion that the saving was probably in excess of $120,000,000 for Lake Superior trade.

Q. Did you then make an estimate for the whole lake trade?

A. I did not make an estimate for the whole lake trade, but I roughed it to the extent stated in the last sentence in that paragraph.

Q. And what was that statement?

A. "It is thought to be a fair statement that as applicable to the lake trade * * * the economy exceeds $150,000,000."

The basis for that has been our conclusion from looking at it a great many times, bearing in mind that the single source of exact record of traffic in the lakes is the Soo, but working it out with the best judgment available, I reached the conclusion that the total lake bulk trade was about 130 per cent of that recorded at the Soo.

Q. And was that determination of that relationship from a study of the records?

A. Oh, yes.

Q. Referring to table 5 at the bottom of page 22 in this exhibit, what was the source of the data from which you compiled that table?

A. It is again in the statistical reports, or if, preceding the date of their publication, in the Soo records, illustrated by, perhaps reference to page 10.

By the Special Master:

Q. When you say in the statistical reports, will you indicate what statistical reports you have in mind?

A. Yes, those issued annually.

Q. That is, issued by whom?

A. By the Engineer Department, and headed as stated here: "Statistical Report of Lake Commerce passing through the Canals," etc.

Q. That is issued by the War Department?

A. Issued by the War Department; yes, sir.

Mr. Adcock. What year?

A. To get the information contained in table 5—table 5 goes back, as you see, to 1899. Therefore we use statistical reports as far back as published and then the Soo reports to get back to the year with which we start that table—1899.

By Mr. Jackson:

Q. Referring to the Soo records, or the statistical report of Lake Commerce Passing through the falls at St. Ste. Marie, to which you have referred for various years, the source of those tables is based upon the original records of the Soo, is it not?

A. Exactly.

Q. What do you find from the study from which you deduced table 5, with reference to the trend of building in lake vessels? Was it stationary or decreasing or increasing?

A. Obviously it was increasing rather rapidly from and after 1899, and jumping considerably through 1906 and 1907, and thereafter.

Q. And from your experience while you were stationed at the Soo, have you any opinion as to the cause for this increase?

A. The cause for the increase is doubtless improved channels justifying the construction of bigger and more economical carrying vessels.

Q. In your table it appears that for the year 1924 there were a smaller number of vessels carrying cargo, and, in the preceding column number of tons, a smaller number by 10,000 tons, than carried in 1919. Can you explain that?

A. That is stated to be due to the fact that between the two years there was a lowering of the depths in the channel to be traversed by those carriers, and that thus in the low water year—I mean the latter year—in the larger vessel was carrying less than the smaller vessel of the preceding year of better water.

Q. That is, the physical proportions of the vessels using the lakes in the latter year were equally as large or larger but the draft they could utilize was less.

A. Correct.

Mr. Adcock. Just a minute. I didn't get the first year that you mentioned. The last year was 1919, wasn't it?

Mr. Jackson. He spoke of the comparison between 1924 and 1919, in table No. 5.

Mr. Johnson. And what was the answer?

(The answer was read)

The Witness. I think if I may read my paragraph on page 23, at the top, it might help. "The reduction in the number of vessels burdened to 10,000 tons or more, shown for 1924, is due not to withdrawal from service, but to the fact or loss of carrying capacity on account of the deficiency of channel depths."

By Mr. Jackson:

Q. Will you read the next short paragraph there? It seems to be further explanatory of that.

A. "The effect of receding levels is observable in that the maximum cargo of the 1924 carrier was less by 1500 tons than that of the 1919 carrier, a vessel of something like 8 per cent smaller capacity. The vessel drafts in the two cases were 19′3″ and 20′6″, respectively.

Q. Colonel Markham, referring to the table at the middle of page 23, entitled "Percentage of Season when less than 20 foot drafts were employed through St. Mary's River, for 1921, 2 3 and 4," will you state the source of your information upon which you based that table?

A. We have at the Soo as an official record the draft of every boat of every day for each of these years. We merely in each case took the total number of navigation days and observed from our record when boats were drawing 20 feet or more or less, and then took the percentage of the days related to the total season when the draft could not be maintained at 20 feet.

Q. Referring to the table No. 7, page 24 of Complainants' Exhibit No. 67, will you please explain the source of your data for that table and the meaning of the table?

A. The basic matter related to that table is shown in this bunch of work sheets I have here. Without its use for the moment, I can explain what was done. Every boat in the lake trade was listed, its dimensions, and the facts carried out in tabular form. The records through the Soo were unearthed to the point of finding, with the number of cargoes for each boat, what it was carrying when it passed through the Soo at a draft of 19 feet. If that exact draft could not be found for a particular boat, the nearest draft to 19 feet was taken and additions or deductions were made to create its capacity as a *de facto* thing for a draft of 19 feet. The boats were separated into classes, based upon their registered tonnage.

Q. Colonel, did you find how many vessels navigating the lakes could utilize a draft of 21 feet or better?

A. We did.

Q. And how many vessels navigating the lakes at that time could utilize a draft of 21 feet or better?

Mr. Adcock. It seems to me, if your Honor please, that he ought to describe the vessels and how he reaches that conclusion first. It is asking for a conclusion of the witness.

By the Special Master:

Q. State how you reached your conclusion.

A. We divided all vessels of which we had record of passing the Soo into the several classes indicated by the table of registered tonnages; of 6,000 or over; 5,000 to 6,000; 4,000 to 5,000; 3,000 to 4,000; 2,000 to 3,000. We then reduced each vessel to its length between perpendicular and its molded depth. We then found for each class what was the average keel length and average molded depth for the class. We then assumed that a boat should have about a minimum of 7 feet of its molded depth when loaded to its maximum. We then took the loading capacity of a 19-foot draft for each boat, and aggregating for each class the average keel length, the average molded depth, and utilizing what is known as a block co-efficiency, we determined the displacement value of each class in the aggregate. In arriving at the further compilation of this table we began to throw out boats of 21, 22, 23, 24, that could not load to those drafts, based upon the report of the molded depths. We thus finally built arithmetically the displacement value of the fleet for an inch of draft and, accordingly, for any multiple thereof. That addition per unit was thereupon compiled into the column indicative of the additional fleet capacity in tons per season of 28 loaded trips, with available drafts increased from 19 feet to the common loading.

Q. From your computation can you state the number of vessels navigating the Lakes that you found would be able to utilize a 21 foot draft?

A. I cannot state that from this table.

Q. I would like to direct your attention to the first column showing the number of vessels included in all classes.

A. Yes, sir.

Q. And I would like further to direct your attention to the column headed "1 feet draft," in the second part of the table, and to ask you whether from an analysis of those two columns you can answer the question?

A. The number of boats that we began to consider as indicative in the first column is 367.

Q. Now, comparing your column headed "20 feet draft" in the second part of the table with your column headed "21 feet draft" in the same part of the table, can you state whether you found that all of the vessels so listed in all of your classes could utilize the 21 feet draft or not?

A. Yes, sir. I get the point. The table shows that the increment for one foot, from 19 to 20, in other words, for the lower classes is 815,000 tons. It shows the increment for the same class of 22 feet, which is an increment of 2 feet, to be 1,630,000 tons, which is twice the number of tons indicated in the 20 foot column, and therefore indicates that all boats are included in the 21 foot draft.

Q. From that study, Colonel, and directing your attention to the second paragraph below the table which you have just been discussing on page 24 of Complainants' Exhibit No. 67, I will ask you whether you made any computation as to quantity of additional freight which could have been handled by the Lake fleets on Lake Superior with 6 inch additional draft?

A. Yes, sir; based upon the increment value, I will call it, of an inch for the total fleet as just explained by the average of these classes, and by the multiplication of six we found that the Lake Superior fleet in the year 1923 could have carried 3,346,000 more tons than were actually transported if each boat could have been drafted to an additional six inches.

Q. Did you make any estimate or computation for the whole of the lake commerce, as well as the Lake Superior traffic for 1923, on the basis of the increase of six inches of available draft for the lake fleet?

A. I assumed, as stated before, that the total lake bulk is about four-thirds that recorded at the Soo, and thus made the statement that the 3,346,000 tons accounted for on 6 inches for Superior trade, the total through business of the Lakes for that year, incident to the six inch difference of level, related to something in excess of four million tons.

Q. Colonel, I direct your attention to a paragraph at the bottom of page 24 and top of page 25 of Complainants' Exhibit No. 67, reading as follows:

"From the above outline of lake commerce, and of the number dimension, and capacity of the lake freighters doing its bulk business, two facts become evident: first, that the existing fleet could carry seasonally, on drafts for which designed, something like twenty-five to thirty million tons in excess of the cargo possible of transport by the same boats over the channel depths now available; second, that the loss of inches in channel depths due to receding levels or otherwise is a matter of large import with respect to shipping efficiency and to the transportation charges of the bulk commodities concerned. It would thus be a matter of not difficult resolution, to recommend that the connecting ways be deepened to provide for drafts of 20 feet below the improvement planes hereinbefore proposed as representative of low water stages. Actual accomplishment, however, involves contrary considerations which are believed to be controlling." Will you please explain first what you meant by the "improvement planes hereinbefore proposed" in that paragraph?

A. The law or the legislative item under which this preliminary report is being revised reads:

"Great Lakes from Duluth, Minnesota, to Buffalo, New York with a view to such improvement as may be required for a through channel suitable for vessels drawing 20 feet at lake stage corresponding to the Lake Huron level of 578.5 feet above mean sea level."

The channels have been about completed for a draft of 20 feet below Lake Huron improvement plane 579.6. The proposed new improvement plane differed from that just roughly about a foot and a tenth. I regarded it as ill-advised and inappropriate to attempt merely to lower it by that amount in order to provide merely for the continuance of a 20 foot draft. That for the reason I thought I saw plainly that from an investigation of all conditions in all regions the time and cost elements would be exorbitant in the removal of that thin layer.

By Mr. Adcock:

Q. Have you finished your answer?
A. I think so.

By Mr. Jackson:

Q. Referring to page 21 of Complainants' Exhibit No. 67, does that table show the proposed improvement or datum plane in the right hand column which you had under consideration?

A. It does.

Q. What was the reason for proposing the new datum planes which were lower than the ones then prevailing?

A. The Chief of Engineers fixed that basic figure at 578.5 because Lake Huron had then reached about that stage, and I think he presumed that Lake Huron would not be likely to go lower.

Q. Did it go lower?
A. Very much lower.

Q. So, as I understand you, your failure to recommend a 20 foot channel was not because such a draft would not be desirable and would not be utilized for a large commerce, but because of the relatively large expense for a small deepening?

A. Correct.

Q. I refer you to page 21 of Complainants' Exhibit No. 67, and direct your attention to this paragraph or sentence:

"It is thought to be utterly unsafe to assume that minimum lake stages have been reached, and particularly to assume an early return to normal levels. To the contrary, it is deemed to be imperative that the probability of low water, for perhaps an extended period be accepted, and that future recurrences of stages as low, or lower, than the present be contemplated. Accordingly, it is essential that new improvement planes be adopted for the service of shipping on 20 foot drafts, more safely in approximation of present low water."

That was then your opinion?

A. Yes, sir.

Q. Is it still your opinion?

A. Yes, sir.

Markham, Trans. 743-759.

Q. Do you think that lakes ought to be constructed to fit ships or ships to fit lakes?

A. I would answer that by saying that in my scrutiny of the history of the lakes it is obvious that the owner will build for the last inch of whatever depth the Government will provide, so that the ship will be made to fit the water.

Q. Does not that seem to indicate that he will build beyond what the Government will provide and then try to get the Government to provide more?

Mr. Baker. I object to that.

The Special Master. It is cross examination, Mr. Baker, and it will be allowed. It is testing the witness' opinion and process of reasoning.

A. It is my opinion that the ship owner has built to fit the third and fourth lock which the Government contemplated and built or authorized, I think, in 1907, with a still depth of 24½ feet. That to me has been the most obvious reason why ship-builders would build beyond the 20-foot draft. The two locks are there suggestive of the purpose ultimately to make the channels fit the locks that have been installed.

By Mr. Johnson:

Q. The construction of the lock is something to which a sort of hope could be pinned that the rest of the system would be built deep enough to comport with the lock?

A. I would say that the Government agencies probably anticipated that in time commercial channels would be put down to fit a 24½ foot still depth which was adopted.

Q. You referred to your table No. 5 on page 22 of your report and were asked to compare and did compare the number of vessels carrying 10,000 tons or over in 1919 with the number carrying 10,000 tons or over in 1924. How did 1919 compare with others of the past 35 years as to water depths in the lake?

A. Well, I would have to have a graph, of course, but it was a comparatively high water year. I merely recall that 1918 was a high water year. We began to lose water in 1918, but it was a comparatively high water year.

Q. Were not those years the highest years in the period?

A. I would not recall that, but it was a comparatively high water year.

Q. Referring to page 6 of the statistical report for 1925, the second table in the report, will you read the lines in the first two columns; that is, read the line across the first two columns. By that I mean the title column and the next colmun.

A. In the second table, sir?

Q. Yes.

A. The table is headed "Average and Maximum Dimensions and Percentages of Total Freight Carried by Vessels of Different Classes." The table is made up with heading seriatum from left to right, class, number of boats of class using canal, aggregate registered tonnage, average register.

Q. I just wanted you to read the first two.

A. Under the first column, "Class," we find tons net register between one and one thousand with the second column applicable to that register; number of boats of class using canal, and the number is 181. The second line of the first column is one thousand to two thousand net register, and the number thereof is 126. For two thousand to three thousand the number is 80. For three thousand to four thousand the number is 137. For four thousand to five thousand the number is 89. For five thousand to six thousand the number is 77. For six thousand to seven thousand the number is 38. For seven thousand to over the number is 1. The total of the first column being the number of those boats, is 729.

Q. Are we entitled to deduce from that table that the bulk of this freight is carried in the boats with registered tonnage of 6,000 and under?

A. By all means.

Q. I should have said 5,000 and under.

A. I think I can turn you to a table that gives that exactly.

Q. All right. As a matter of fact, it is given in the next table.

A. Yes, the last column of Table 3 on page 6 answers that fully.

The Special Master. For the sake of the record, what is the answer?

A. The percentage of total freight carried by boats with net register of one to one thousand is 1 per cent; net register of one thousand to two thousand is 3 per cent; net register of two thousand to three thousand is 9 per cent; net register of three thousand to four thousand is 20 per cent; net register of four thousand to five thousand is 24 per cent; net register of five thousand to six thousand is 26 per cent; net register of six thousand to seven thousand is 16 per cent; and net register over seven thousand is 1 per cent.

Markham, Trans. 898-902.

Q. To what draft could your vessels load in the event that the water depths were sufficient to permit the maximum loading of your vessels for which designed?

A. Our largest vessels could load, so we are advised, from 23½ to 24 feet, if their drafts permitted it.

Q. Have you any vessel which could not load to 21 feet?

A. No, sir.

Q. What is the depth of the vessels in your fleet which could load to a maximum of 21 feet?

A. Twenty-eight feet.

Q. What allowance for freeboard is usual and customary in navigation on the lakes?

A. In my experience 7 feet.

Q. How is the depth to which the vessels of your fleet are currently loaded determined?

A. The maximum draft is determined by the recommendations of the Lake Carriers Association, posted at all loading ports.

Q. Do you give any instructions to your captains or sailing masters with respect to the depth of loading of the vessels of your fleet?

A. Our instructions to masters are to load not in excess of the recommended drafts of the Lake Carriers Association, but if, in their judgment, the recommended drafts are at any time excessive, to load to such draft as they consider safe.

Q. Mr. McGean, when the vessels of your fleet, of the type which you have described, are required to load one inch less deeply because of a lack of available drafts, to what extent, if any, does that affect the carrying capacity of one of your vessels?

A. Our experience is that the large ships of our fleet, when loading between 18 and 20 feet, lose approximately 80 to 90 tons per inch with each inch of reduction in water.

Q. And as to those of your vessels which are designed to load to drafts above 20 feet, what is the loss in carrying capacity with a loss of draft on one inch for those vessels between a draft of 20 feet and the maximum draft for which they are designed?

A. We have never had any experience in loading, as I recall it, beyond 21 feet or approximately 21 feet, so above that is theoretical, but we are advised by the folks who built the ships that when you get into drafts beyond 21 feet, the loss per inch would be many more and on big ships would run up to, perhaps, 100 tons, when it got above 21 feet.

McGean, Trans. 917-918.

Q. The point I am trying to get at, Mr. Schneider, is the differential intended to be equivalent to what you would receive for a full load, in the prevailing depth, if that harbor were able to take them? I do not know whether I make it clear or not.

A. Well, I do not know just what you mean. As I understand it, you want to know what actual rate we charge to a slow port, as against a full draft port—I mean a shallow port as against a full draft port. Is that what you mean?

Q. It was suggested by one of the witnesses yesterday that, in the case of a port of restricted draft, the differential was ordinarily intended to make up for the freight on the last load?

A. Yes, I think I stated that before.

Q. Well, I did not have it clearly in mind. What can you say with respect to the expense of unloading the additional amount of ore, or coal, or stone, which might be carried by an extra six inches of draft?

A. Well, there would not be any additional cost to the boat.

Q. Well?

A. So far as the unloading cost is concerned, I believe that is your question?

Q. Yes.

A. There would not be any for the ship.

Q. Well, what would be the additional cost to the person who was paying for the unloading?

A. Well, there would not be any additional cost to the man; he pays so much a ton for unloading. There would probably be a difference in cost to the dock, if that is what you mean.

A. Well, what difference of cost would there be to the dock?

A. Well, the more cargo a boat can carry, the less clean-up, in proportion to the cargo. And the clean-up is the most expensive and the slowest operation. So that the fuller the boat, the less clean-up in proportion and in the cost, correspondingly the less per ton.

Schneider, Trans. 1054-1056.

Q. Is there any rule that you have with reference to the relationship between draft and depth?

A. Only that we found from practical experience. We found that we should have a certain space, so much water between the bottom of the boat and the sweepings of the channel. We have established a fairly good basis for that. We find that when we exceed that we have more or less trouble with our boats, and we are liable to have damage, so we keep it within certain lines as close as we can.

Q. What are those lines

A. About .7 of a foot we allow in the West Neebish Channel.

Q. Captain, how does the Captain of a vessel, who is operating one of these freight-carriers, determine to what draft he will load this vessel?

A. At every loading port we have a bulletin and whenever we raise or lower it that bulletin is changed to correspond, and the Lake Carriers send out reports of the Shore Captains' decisions.

Q. Do Captains exceed that recommended draft?

A. No, sir. That is the maximum they are allowed to load. Very often they load to less.

Q. Are there any temporary or local fluctuations in the water levels of the lakes?

A. Quite a number.

Q. Please explain how the captain of a vessel, as a practical matter, takes care of that fluctuation in the navigation of his vessel.

A. Suppose you were going up Lake Erie and the Detroit River. We have a signal at the bar point, an arrow that gives you automatically the amount of water through the dredged channel. That is automatically operated. Coming down the Detroit River, right below Detroit where you go into the Livingston Channel, we have another that is not operated automatically, but the signal is an arrow, and if the water is going up that points upward. At night there is a light behind it so it will show at night time the exact amount of water it is safe to go with over the Livingston Channel. If we haven't sufficient water we will anchor until that signal is changed and we have sufficient water to go over. At the Soo Locks they have reports from down the river just what water, that the draft of water is, and he stops at the Soo Locks if the water is not sufficient for him to go over in safety.

Q. To what draft are your vessels designed, Captain, the vessels of your fleet?

A. Well, as we have loaded them—this has been our practical expecience; of course, our latest vessels we have never loaded to their maximum depth. There are some boats that we have loaded down to 21 feet. And we have no smaller boats than those having a 28-foot molded depth; that is, from the bottom to the top of the boat. And we have loaded those to 21 feet. Now the majority of those smaller boats that are not over what we call the 400 foot class, I think that is sufficient draft for them. Our larger boats have a molded depth of 32 feet, and there is no doubt in my mind—while I have not loaded them—there is no doubt in my mind that we can load that to a safe draft of 24 feet.

Q. Well, are your vessels, in the practical operation of your fleet, loaded to utilize each inch of the draft which has been recommended?

A. Of course, we do if we can, but we do not put any restrictions on the captain to make him load to that draft. He has to exercise his own judgment, but he is not to exceed that. If he thinks that is too much in the fall of the year, he is authorized to cut it down.

Wood, Trans. 945-949.

UNITED STATES SHIPPING BOARD,
Washington.

No. 1176.

For Release in morning papers of Monday, November 29, 1926.

The magnitude of water-borne traffic on the Great Lakes is shown in statements prepared by the Bureau of Research, United States Shipping Board, in cooperation with the Board of Engineers for Rivers and Harbors, War Department, indicating that more than 210,300,000 cargo tons of freight were handled through Great Lake ports in 1925, an increase of 31,000,000 tons, 11.8%, over the total of the preceding year. Nearly 44% of the total waterborne commerce of the United States was conducted on the waters of the Great Lakes. The 197,500,000 tons of coastwise commerce of Great Lakes ports exceeded the total coastwise trade of ocean ports by more than 30,000,000 cargo tons, and the 12,800,000 tons of foreign commerce passing through Great Lakes ports constituted 13.8% of the total foreign commerce of the United States in 1925.

In the relative standing of all United States ports by volume of cargo tonnage handled, Duluth-Superior, with a total of 45,600,000 tons, ranks second to New York. Fifteen other Great Lakes ports handled more than 5,000,000 tons of freight each. The total cargo tonnage passing through these sixteen ports exceeded 172,900,000 tons and included 82.4% of the coastwise traffic as well as 78.3% of the United States foreign trade conducted on the Great Lakes in 1925.

The 1925 foreign and coastwise trade of these sixteen leading ports was as follows:

	Total	*Foreign*	*Coastwise*
Duluth-Superior	45,604,323	841,639	44,762,684
Buffalo, N. Y.	15,917,489	5,092,259	10,825,230
Toledo, Ohio	14,171,694	1,318,789	12,852,905
Calumet, Ill.	10,831,051	....	10,831,051
Cleveland, Ohio	10,803,443	426,406	10,377,037
Conneaut, Ohio	9,639,901	91,445	9,548,456
Ashtabula, Ohio	8,800,420	356,605	8,443,815
Calcite, Mich.	7,590,859	31,339	7,559,520
Ashland, Wis.	7,356,764	253,593	7,103,171
Agate Bay, Minn.	6,199,549	....	6,199,549
Detroit	6,148,033	5,935	6,142,098
Lorain, Ohio	6,088,682	188,024	5,900,658
Milwaukee, Wis.	6,061,033	90,199	5,970,834
Escanaba, Mich.	6,060,431	175,381	5,885,050
Gary, Ind.	6,035,714	....	6,035,714
Sandusky, Ohio	5,601,085	1,163,133	4,437,952
TOTAL	172,910,471	10,034,747	162,875,724

Exhibit 144.

Q. Can you make any comparison between the total lake tonnage and the total of the railroads of the United States?

A. The last published statistical report of the Interstate Commerce Commission shows that the railroads of the United States, generally known as Class 1 Roads, carried in 1924, 1,187,295,744 tons. That is the amount of freight which the railroads originated. In 1924 the total tons of the Great Lake Commerce amounted to 101,493,084 tons, or the lake commerce amounted to 8.6 per cent of the total railroad traffic of the United States.

By the Special Master:

Q. You say an amount equal to.

A. Equal or equivalent to, yes. In ton mileages the comparison is more striking. The ton mileage of the railroads is given in the reports of the Interstate Commerce Commission and the ton mileage carried on the Great Lakes is given on page 1 of this exhibit, and the ton mileage of the Great Lakes amounts to 18¼ per cent of the ton mileage of the railroads carried, or an amount equivalent to 12.25 per cent of the total railroad ton mileage of the country. I made another comparison to show the amount of business on the Great Lakes as compared with the railroads and found that for 1924 the amount of ton miles produced Great Lakes commerce was substantially the same as the ton miles of freight carried by the Pennsylvania Railroad, the New York Central and the Baltimore & Ohio.

Q. Of the three railroads combined?

A. Of the three railroads combined.

By the Special Master:

Q. You mean their system?

A. Their system.

By Mr. Jackson:

Q. Have you got the years, other than 1924, for comparison of the lakes commerce and the railroads?

A. I have not. I took 1924 because that was the last year I could get for the railroads.

Trumbower, Trans. 1232-1233.

In these years lake levels were high and the vessels were able to load to a draft of 21 feet or more. In 1924, however, due to lower lake levels, the vessels were never loaded to a draft exceeding 19 feet. With the loss of every inch of draft below 20 feet, the modern lake bulk freighter suffers a loss of from 90 to 100 tons in cargo capacity. It will gain a corresponding amount for every inch of draft in excess of 20 feet.

Exhibit 95, page 36.

"Transportation on the Great Lakes," by War Department and U. S. Shipping Board.

Considered both from the standpoint of their area and the extent of their commerce, the Great Lakes with their connecting channels constitute the most important body of fresh water in the world. They afford access to regions notable for the magnitude of their natural and industrial resources. They permit the grain of the western prairies and the Canadian Provinces to reach eastern mills and ports of export at substantial savings, compared with all-rail routes.

During the last few years, however, the depths have been much below normal, due in large measure to a periodic recurrence of low water conditions, and to some extent to artificial diversions of water.

Exhibit 95, page 418.

"Transportation on the Great Lakes," by War Department and U. S. Shipping Board.

The importance of the grain territory tributary to the Great Lakes, is shown by the fact that during the 10-year period ending with 1923, the States in this territory produced 71.8 per cent of the wheat, 78.7 per cent of the oats, 66.8 per cent of the corn, 73.1 per cent of the barley and 83.2 per cent of the rye of the United States.

Exhibit 95, page 420.

"Transportation on the Great Lakes," by War Department and U. S. Shipping Board.

In the above mentioned report entitled "Transportation on the Great Lakes" (p. 36) it is said: "With the loss of every inch of draft below 20 feet, the modern lake bulk freighter suffers a loss of from 90 to 100 tons in cargo capacity. It will gain a corresponding amount for every inch of draft in excess of 20 feet." There are critical points of navigation, e. g., in the St. Mary's River, the St. Clair River, Lake St. Clair and the Detroit River and vessels are loaded with respect to available depths at such points. While they are quite definitely established routes or lanes for vessels plying between the various ports on the Great Lakes, vessels deviate from such courses in bad weather, both because of the difficulty of maintaining the course with precision under such conditions, and because of the necessity of seeking protection under weather shores. At such times, when the vessel is of necessity off the regular steamer track, a lowering of the level of the lakes increases the hazards and dangers of navigation, contributing to groundings or strandings.

The defendants point to other diversions and artificial changes in the Great Lakes and connecting channels, which have contributed to this total lowering of levels. It is evident, however, that during a period in which the level of the Great Lakes is being lowered, an additional lowering, even of six inches, would be even more serious in its consequence than if it occurred at a time when other causes did not operate to lower the levels of the lakes or operated to raise them.

These are not actions for damages, and it is not necessary to attempt to estimate with precision the extent of the damage caused by a lowering of six inches in lake levels. The defendants have introduced evidence for the purpose of showing that the claims of damage have been exaggerated, but after considering the testimony and critical analyses presented by the defendants, I am satisfied that the evidence requires the finding that the lowering of lake levels of approximately six inches has had a substantial and injurious effect upon the carrying capacity of vessels, and has deprived navigation and commercial interests of the facilities which otherwise they would have enjoyed in commerce on the Great Lakes.

Special Master's Report, pp. 115-116.

8. That if, within six months after the issuance of this permit, the City of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the aver-

age rate of ten per cent per annum, thereafter, this permit may be revoked without notice.

Exhibit 12, Doc. 45, Trans. 435.

Permit of March 3, 1925.

Since the close of the hearing before the Special Master and the final submission of this case to him on June 3, 1927, the City of Chicago, acting through its duly elected officers, has refused to further carry out condition No. 8 of the permit of March 3, 1925, by refusing to install further meters to measure the domestic water supply of the city and by refusing to further read meters theretofore installed under the provisions of the ordinances of the City of Chicago passed pursuant to the requirements of condition No. 8 of said permit. Obviously these facts cannot appear in the record of the testimony taken before the Special Master, but complainants are confident that the defendants will not deny the truth of these facts.

APPENDIX "I."

Q. Would a change or reduction in diversion require any alteration of design in your lock at Lockport?

A. No, it would not, because the lock is done.

Q. Well, it would not require any alteration for the purpose of obtaining a [illegible]-foot channel, as far as the lock is concerned?

A. Well, the law does not fix the channel at 9 feet.

Q. I understand that the law does not fix the channel at 9 feet.

A. It fixes it at 14 feet.

Q. But we are talking now about a 9-foot channel, Mr. Barnes, and I wish you would answer my question on the assumption I have made.

A. I cannot answer on the assumption you have made, because there is no such thing as a 9-foot channel in the lock. The law specifies it shall be 14 feet.

Q. Then, in short, without a diversion the lock as designed, and without any change, would be more than ample to take care of traffic which was limited by the controlling depth of a 9-foot channel; is that true?

A. It is true without any diversion, but it is not a question of—

Q. I just want to get at one thing at a time.

Barnes, Trans, 6806-6808.

Q. Mr. Barnes, if the quantity of water diverted at Chicago were reduced to a thousand second feet, the only effect that would obtain upon the construction of the Illinois waterway would be on the question of the excavation of the channel between those locks, would it not?

A. No.

Q. What additional factor would be involved, if any?

A. There would be the additional depth it is necessary to go in the location of the locks and the design of the locks, the depth on the bottom of the sills.

Q. You have just told me that as the locks are now designed, they would provide for all traffic over a waterway having a controlling depth of 9 feet.

A. But, mind you, we must make those locks 14 feet.

Q. But we will confine ourselves for the time to 9 feet, and assuming a waterway of 9 feet, would there be any effect by way of the reduction of the Chicago diversion to 1,000 second feet other than the question of possible additional excavation in the channels between these various locks and dams?

A. Nothing between the locks and dams; but I must insist that those locks must be made lower; that is, we must go lower in order to comply with the law of the state.

Q. Mr. Barnes, I would like to insist that we leave aside the legal questions that you may or may not have involved in your state, and have you answer my question as to whether or not with a diversion reduced to a thousand second feet a 9-foot waterway might be obtained in this stretch which is shown upon your exhibit 1194, without any further change other than possibly additional excavation in the channels between the locks.

A. That is true for a 9-foot waterway.

Q. That is the answer I have been trying to elicit or at least to find out what the fact was.

A. That only thing I am trying to say is that I cannot build a waterway based on the present plans because I cannot comply with the State laws and so do.

Q. But you could build it so that a boat drawing 9 feet could still get through?

A. You can do most anything, if you want to do it illegally.

Q. Illinois would not want to do anything illegal, of course, or Chicago, I understand that. Now, Mr. Barnes, are you able to tell me just what difference it would make in excavation between the Lockport lock and the Brandon Road lock to obtain a 9-foot channel with a reduction of the diversion to a thousand second feet?

A. I cannot tell you definitely, because no accurate surveys have been made. The best estimate I can make is that there is between 8 and 9 feet of water on the rock cliff noted on these plans between those two locks. If the diversion is cut to 1,000 second feet the slope will be so far reduced that I am very confident that a part of that rock cliff, which is about two miles, or a little less than two miles in length, must be removed. That is solid limestone rock and it probably would cost from four to six and possibly eight dollars a yard to remove it, for the amount necessary.

Barnes, Trans. 6812-6814.

Q. Mr. Barnes, will you tell me what is the slope of the section between the foot of the lock and dam at Lockport and the one on Brandon Road with a flow of 10,000 second feet?

A. I cannot do it from memory. I am not so sure that it is shown in the plans with sufficient detail so that you can determine definitely.

Q. Can you tell me the slope in any of the pools of the Illinois waterway with a flow of 10,000 second feet?

A. Not from memory, no.

Q. Have you any design which you have prepared that you can produce for us?

A. No design, no, sir.

Q. So there is nothing in existence in your office which would show what these slopes would be?

A. There is an estimate, but no design.

Q. Nor for any other flow through those channels?

A. The 6,000 in the long pool is shown in the plans approved by the Secretary of War.

Q. That is, from these plans attached to Exhibit 1194 the slope for a 6,000 second feet flow at the pools is shown?

A. In the long pool. In the other pools the slope is so slight that I do not think you can tell very definitely what it is.

Q. That is, the long pool is the one between the Dresden Island Lock and the Marseilles Lock and dam. Is that correct?

A. Yes, sir.

Q. The other pools are so short that it would be very difficult to determine any change in slope. Is that the situation?

A. Not quite that. The scale is so small there that you cannot tell definitely what it is. It would take a detailed map to determine definitely what that slope is.

Q. It would be very small in those pools, I presume?

A. The first or the lower pool is not very small. I remember that the slope there is sufficient so that if the discharge is lowered materially there is considerable rock and shale excavation at the upper end of the pool.

Q. Which pool are you referring to?

A. The lower pool.

Q. The long pool?

A. No, sir; the lower pool. And above the long pool there is some considerable slope which requires, if the discharge is reduced, some excavation above and below Lake Joliet. In fact, I think some excavation is required in Lake Joliet itself.

Q. Mr. Barnes, have you the height of the water below the dam at Lockport with the 10,000 second foot flow?

A. It is a matter of record, of course, in our office or in the Sanitary office, and it can be obtained. I do not have it with me.

Q. Is it 14 feet above the elevation of the sills of the lock?

A. I do not remember. As I testified yesterday, I do not remember exactly what it is, but it is at least 14 feet.

Q. Fourteen feet or better?

A. Yes, sir.

Q. Would that be true below each of the locks?

A. Yes, sir. It is at least 14 feet, but it is undoubtedly more than 14 feet.

Barnes, Trans. 6982-6984.

Q. Does or does not the amount of diversion of water from Lake Michigan through the Sanitary and Ship Canal or through the Illinois and Michigan Canal have any bearing upon the cost of construction or upon the navigable capacity of the Illinois waterway?

A. I think it has.

Q. In what way and to what extent?

A. As the amount of water from Lake Michigan is increased, the cost of excavating and forming the channel decreases. Also, the structures must be modified in accordance with the amount of water obtainable from Lake Michigan. Based on a flow of 10,000 cubic feet of water from Lake Michigan, the extra cost for channel only, if the diversion were decreased to 1,000 cubic feet per second, I estimate to be about $1,400,000.

Q. Let me see if I understand you. That is the difference between cost of construction of what?

A. Between a flow of 10,000 and a flow of 1,000. That is the increase in cost.

Q. How much?

A. About $1,400,000.

Barnes, Trans. 5644.

APPENDIX "J."

Q. General, is there any addition to the natural flow of the Illinois River necessary for its improvement for a 9-foot channel?

A. If the 9-foot channel is secured by locks and dams there is no need of any extra water.

Q. How many locks and dams would that require in that section of the river?

A. The improvement of the river for a navigation of 9 feet, under the existing circumstances, can not be properly secured until there is a dam in the Mississippi River below the mouth of the Illinois, such as was estimated for by the 14-foot waterway board, from Lockport to St. Louis. They found that they would have to put a dam in the Mississippi River, down in the neighborhood of Alton, to back the river up, the Mississippi, high enough to get sufficient depth at the outlet of the Illinois River, so that boats could get out of the Illinois River into the Mississippi River, and then from above this dam at Alton down to St. Louis, by a canal.

Q. General, has the Corps of Engineers of the War Department ever recommended a greater depth of improvement for the Illinois River than 9 feet?

A. They have never recommended anything higher than 9 feet. They have been called on time and time again for estimates of cost for securing 14 feet in the Mississippi, between Cairo and St. Louis; in the Illinois between Grafton and Chicago; in the Mississippi and the Illinois between St. Louis and Chicago; but in the report, from Lockport to St. Louis, the 14-foot Waterway Board, of which General Ernst was chairman—the estimates were according to the orders of Congress, to determine what it would cost to have 14 feet, and how they could get 14 feet. But the report, when it was submitted, was transmitted to Congress by General Mackenzie, then Chief of Engineers, December 12, 1905, with a report ending up this way:

"No opinion is expressed in this report as to the possibility of undertaking the project. Such opinion is not called for in the act ordering the survey."

It never has been recommended.

Q. Is there any season of the year during which navigation is closed on the Illinois River?

A. Several of the reports intimate that navigation will be closed for perhaps three months during the winter on account of ice; and the Mississippi itself has sometimes been closed and navigation stopped by ice, even as far down as Cairo.

Q. Perhaps you will answer this question. In your opinion is any other method of navigation than by locks and dams possible for the section of the Des Plaines River from Lockport to Utica?

A. It is possible to make a depth of water from Lockport to Utica of a greater draft, if you get water enough to turn into it, but it would not be a navigation route that would be safe for any vessel to navigate. The great trouble with that portion of the Illinois River is that at low water you have not enough for open navigation and when the floods come along they are so great, so large, that it is very dangerous because they rise so high and the currents are so swift.

Q. You are now referring to this deep section of the river from Lockport to Utica?

A. Yes.

Q. That is principally the Des Plaines River?

A. That is the Des Plaines River, part of it. From Lockport down to Kankakee is the Des Plaines and from Kankakee down to Utica is the Illinois, and that section would be dangerous for navigators in high water.

Q. In your opinion how much lockage of water would be necessary to operate a 9-foot channel from Lockport to Utica?

A. The channel from Lockport to Utica being slack water navigation, lock and dam navigation, you only need enough water to keep the pools full, and the pools will stay full, except for evaporation unless boats are passed through the locks; so that all that is necessary is to furnish water enough for the lock passage of the boats through the locks, to furnish lockage water plus a very small amount to cover evaporation.

Q. In your opinion how much would that lockage water be?

A. The board that was called on by Congress to report on this route from Lockport to Utica--

The Special Master. You were asked for your opinion, General.

A. My opinion?

The Special Master. Yes.

A. From 500 to 1000 feet per second will furnish all the lockage water that is necessary for about 60,000,000 tons a year down the river.

Q. Of course during the closed season of navigation no lockage water would be required.

A. None is needed during the closed season of navigation for navigation purposes, and, therefore, none for locking purposes.

Q. Is there any source of supply for this lockage water other than Lake Michigan?

A. The Illinois River and its tributaries carry a lot of water. I refer now to the geological copy of water supply papers from 1916 to 1925, in which they give the mean monthly flow and the minimums that have happened and the maximums that have happened on a great many tributaries and on the main river. In the tributaries of the Illinois River, the Des Plaines itself at Lamond, which is above Lockport, averages 390 second-feet each year from 1916 to 1925. The Kankakee averages 3500 second-feet from 1916 to 1925. Those are monthly means. The Fox River which is a tributary to the Des Plaines—well, it is one of the upper tributaries of the Illinois—averages 1201 second-feet. The Fox and the Kankakee were both mentioned in some of the past reports as places from which water could be secured for the locks in the upper river. The upper Fox River is parallel to the Des Plaines, both of them rising up in Wisconsin, and running fairly parallel to each other—not very far apart. The Fox River at Algonquin, Illinois, which is up 150 feet above Lake Michigan at that point, has a monthly mean flow of 169 feet per second, with a maximum of 4000. It will be possible to take water from the upper Fox and run it over into the Des Plaines. Algonquin is about 40 miles away from the canal, but it is only about ten miles away from the Des Plaines—up in that neighborhood at Antioch. The Kankakee River at Momence, which is pretty near the dividing line between Illinois and Indiana, where it is 32 feet above Lake Michigan, and about twenty miles away from the head of the old feeder canal from the Calumet into the summit level, has a monthly mean of 1628 feet per second and a minimum of 432 and a monthly maximum of 5632. The head waters from Kankakee up from Momence are pretty near the marshes up the Kankakee, and not very much different in level from the neighborhood of the Little Calument. It ought to be fairly easy to get some communication from the upper Kankakee over to the Blue River portion which was the end of the Calumet feeder, so that water could be run over into the summit level. Both of them might be used as feeders. I doubt whether the matter ever was investigated, because of the fact that it was so much simpler to take the water out of Lake Michigan, but these figures that I give are the monthly minimum, as quoted from the geological supply papers, and they are the lowest amount that ever flowed for a single day in any single month of the year; so that with the Fox at Algonquin, which has a monthly minimum of 168, it means that in the whole of those ten years, from 1916 to 1925, there never was but one day that the water got down as low as 169 second-feet, and the monthly mean of 860 gives you an idea of what the average flow was.

With the Des Plaines at Lamond the monthly minimum which is 18 second-feet, means that that is the average of the lowest flow of a single day in each one of those years. In some years there were times when there was no flow and other times when 152 feet was the lowest flow of any month in the year, but a monthly mean of 398 feet per second shows what the upper Des Plaines could do, and three hundred and ninety-eight second feet mean would be enough to carry about fifty million tons a year of lockages. That region in the upper Des Plaines is a region of lakes. There are a lot of lakes up there and it might possibly be found that some of those lakes could be used as reservoirs, so that the monthly mean could be converted into a gentle flow throughout the whole year. Then there are other ways of getting water which of course, are, some of them, more expensive.

Q. Let me ask you one question there, if I may. These rivers which you have described are all in the State of Illinois?

A. All in the State of Illinois.

Q. And are all of these rivers or some point on them of sufficient elevation so that the water could be transferred by feeders for use as lockage water in this canal?

A. I have said that the Fox at Algonquin was 150 feet above Lake Michigan, and the Des Plaines at Lamond was 3.9 feet above Lake Michigan, and right near the canal. The Kankakee is 32 feet above Lake Michigan, so that it would be possible to have water from either one of them transferred over to the Illinois, over to the summit level of the canal.

Q. So those rivers all naturally flow into the Mississippi Basin?

A. They all naturally flow into the Illinois.

Q. The Illinois River?

A. The Illinois River; consequently, the Mississippi Basin.

Q. Are there any other feasible methods of reducing the amount of water needed for lockage?

A. There are quite a number. For instance, in the barge canal in New York, at Little Falls, they have a very high lift of lock, and they have put in what they call a saving basin, so that after the water entering the lockage is run off into a side basin they use it the next time the lock is full.

Over on the Trent River in Canada they have two high locks, one 65 foot lift that is a pneumatic lift. They take 400-ton boats up and down there and only use about 25 feet per second of water throughout the whole year for a large tonnage. So the boats pass equally in two directions and do not use any water, except just enough to operate the movement of the boat floating.

In some places over in Europe they operate them by electricity and do not use any water at all. If the loaded boats are going down stream they keep pumping water. Every time a boat goes down they pump water into the upper level. If the boat is going upstream it is the other way and very little water is used. But if it is balanced there is no water used at all, practically. They have hydraulic lift locks.

The same is done in other places in England where they have high lifts by inclines. Boats running through there run by inclined railway. The Manchester Canal, a big ship canal, the upper lock for ocean vessels is a 25-foot lift. They have to get their water from the drainage right around the city of Manchester. They found they were short of water to fill the summit level, so they put in these saving basins, and after they had been in a few years they found they were something of a nuisance to them, although they were saving water, and so they installed pumps and they pumped the water by electric power from the lower level into the upper level to fill the summit level. I saw that at Manchester, and Mr. Cooley told the House Committee at one of his last appearances before them, that he had been at Manchester and had seen that arrangement where they pumped the water from the low level up into the summit level. So that there are several ways of getting water except running it on a large scale.

Bixby, Tran. 2113-23.

Q. As I understand it, General, you believe it would be possible to provide water for lockage in a canal or waterway from Lockport to Utica without diverting any water from Lake Michigan. Is that correct?

A. It would be possible; yes. It would be costly, naturally, but it is possible. There is another feature about it.

Q. That is, you could pump the water up to the summit level?

A. You could follow the example at Manchester.

Q. Or you could dam up the headwaters of the Fox River or the Des Plaines and divert water that way?

A. Yes, sir. Fox River has a lot of lakes at its head, so that it would not have to be dammed very much. It could be taken out of the lakes.

Q. You would have enough water to dam up or conserve some way so as to take care of the low water flow of those rivers?

A. The geological water supply shows they have plenty of water up there, if you could take it.

Bixby, Trans. 2127-28.

Q. The total capacity of a canal is not affected particularly by the number of locks, is it?

A. If there are no locks the capacity of the canal is dependent upon the capacity of the channel. As soon as locks are interposed, then the capacity of the canal is fixed by the capacity of the locks.

Q. Assuming that you have one lock in this channel: the ultimate capacity of the channel would not be decreased by the addition of two more locks?

A. It might be; yes.

Q. It would take a vessel just as long to go through one lock as the other, would it not?

A. Yes, but there might be delays at one lock and none at the other.

Those questions are very difficult to explain, but it is a fact that the interposition of a lock delays navigation, and the greater the number of locks the greater the delays.

Q. Mr. Barnes, when you said it was impossible to operate the Illinois waterway without diversion, you meant that it was impossible to operate the locks without water from some source. Is that true?

A. The only source that I concede that there is water available for the summit level is the Lake Michigan water, and therefore we would have to have diversion.

Q. Mr. Barnes, why could you not pump water from the mouth of the Kankakee?

A. There is not enough.

Q. You can pump it back again, can you not, each time?

A. We could if there was enough water there and you wanted to pay that expense.

Q. Do you mean to say that there is not enough water to fill the pool?

A. I mean to say that there is not enough water in the Kankakee River to supply the summit level, whether you pump it or divert it.

Q. You could pump it from the Kankakee and the mouths of the other tributaries that come in at that place, could you not, or near there?

A. There is no other there of any consequence.

Q. It would not be very expensive to pump water, would it?

A. Indeed, it would; it would be very expensive, both the first cost and the operation.

Q. Is it not a fact that you could pump lockage water from the Kankakee on an assumed tonnage of 30,000,000 tons a year, at a cost of one-sixth of a mill per ton per mile?

A. I do not know.

Q. As a matter of fact, you never made any computations to see what the cost of pumping the water would be?

A. I never made a computation on that basis; no.

Q. You stated that the only way that you could get water would be from the Fox River by a tunnel with a capacity of 2,000 second feet and with an available water supply of 100 second feet. Why did you propose to build a tunnel with a capacity of 2,000 second feet if all of the available capacity was 100 second feet?

A. Because the water that we can obtain from the Fox River must be obtained at flood time when there is a flow in excess of a thousand second feet; and if we must go to that stream for water we must take the flood flow of the stream, or a portion of the flood flow of the stream, which I have assumed to be 2,000 second feet for this purpose. If we want to take a greater flow of the stream we would have to build a larger tunnel.

Q. You also stated that when taking water from the Kankakee, which you stated could be done, you would propose to construct a tunnel at large cost that would have a capacity of 3,000 second feet. Is that it?

A I do not remember what it was. It is in the record. It was either 2,000 or 3,000. I think it was 3,000.

Q. And that the available water supply would be 90 second feet?

A. For the same reason that you must construct your tunnel large enough to take the flood flow.

Q. Mr. Barnes, what would be your purpose in taking 3,000 second feet at any season of the year, when it was much more than you would need for lockage water?

A. Well, you have to store it up in the lake in order to take it out again.

Q. You were proposing to carry this water by tunnel into Lake Michigan?

A. Yes, sir.

Q. And not just to the summit level?

A. Well, that is the summit level. Lake Michigan is the summit level.

Q. But, you were not going to carry it to the pool at Lockport, but you were going to carry it clear out to Lake Michigan?

A. The cheapest way would be to put it into Lake Michigan, and then take the water from Lake Michigan as required.

Q. Would it not be much cheaper to pump this water than to construct these tunnels that you have suggested?

A. I do not know. I have not gone into that, and you could not pump the flood waters. If you put down pumps you would probably pump the water as it was required for lockage purposes.

Q. It is perfectly feasible to install pumps and pump it into the pool and then pump it from one pool to the other as it is required for lockage, is it not?

A. Oh, it is feasible, of course. It is not the economical thing to do.

Q. You mean by that, that it is very expensive to pump water?

A. I do, yes.

Q. What?

A. Yes. It is very expensive.

Q. Can you tell me what it costs the city of Chicago to pump water, per million gallons?

A. Not definitely. My recollection is it is about 6 cents a thousand gallons, but I would not say definitely. I would not want to go on record as saying what the cost was.

Q. You would not care to make an estimate of what the cost of pumping this water would be?

A. Well, I should say, based on the city's experience, that it is about six cents a thousand gallons. That is running in my mind as what their cost is. I may be wrong about that.

Q. Assuming we need lockage water of a thousand second feet, how much would it cost to pump a thousand second feet?

A. If my computation is right, it would be about $450 per second.

Q. Per second foot?

A. No. Per second.

Q. I do not quite understand the term.

A. You asked me how much it would cost to pump a thousand cubic feet per second?

Q. Yes.

A. One thousand cubic feet per second is 7½ thousand gallons. At 6 cents a thousand—I beg your pardon—that would be 45 cents per second.

Q. 45 cents per second?

A. Yes.

Q. And then, to get the cost per day, you would have to multiply that by the number of seconds in a day? Do I understand you correctly?

A. Yes.

Q. Do you not know that 6 cents is altogether an exorbitant figure for pumping?

A. I do not know, no, sir. I am taking from—

Q. Really, you are not competent to make any estimate of the cost of pumping, are you?

A. I am competent to make an estimate, but I am not competent here on the stand to state what that estimate is, now.

Q. Well, I mean, presently you are not able to make any estimate?

A. No.

Q. —That you would wish to support?

A. No.

Q. With respect to the reasonableness of the cost of pumpage, will you state what, in your opinion, would be an outside figure for the expense of lockage water for the Illinois waterway, which you would consider reasonable?

A. Not without going into a computation. It would be of little value to make a guess on anything of that kind.

Q. You could state what, in your opinion, the expenditure or cost for lockage water, this waterway could stand, economically, could you not?

A. How much the waterway can stand, is of course, a matter of opinion. Every expense put on to the waterway is an expense that must be absorbed in the freight rates. If the expense becomes excessive, it means that the waterway is not feasible. What this pumping cost is, I could not state now, without a computation.

Q. Assuming the pumpage cost was $450,000 a year for lockage water, would you consider that that rendered the waterway not feasible?

A. $450,000 a year?

Q. Yes.

A. Well, that is capitalization of $11,250,000 at 4 per cent. That is a pretty heavy capital cost to put on a waterway of this kind. In studying the situation in 1921 and 1922, Colonel Judson said that it was not within reason—

Q. I do not want you to give any one else's opinion.

A. I am trying to state this whole situation.

The Special Master. Yes, but you are asked for your opinion.

The Witness. My opinion is that that is an unreasonable cost to place upon commerce, for an unreasonable method of getting water.

By Mr. Jackson:

Q. If that were the estimated cost of lockage water, and we assume a total tonnage, which you heretofore assumed of 30,000,000 tons a year, it would be probably about one-sixth of one mill per ton mile, would it not?

A. That would be practically a mill per ton mile. That is capital cost.

Q. Did you figure on the tonnage going over the whole waterway or only a part of it?

A. I figured on the tonnage going 400 miles.

Q. It would be one mill?

A. Capital cost would be about one mill.

Q. I do not want capital cost. I want to know what the actual cost per year would be.

A. Well, actual cost per year is a different matter.

Q. The cost per ton mile.

A. If the cost to the public is $450,000, and the ton miles is 30,000,000 times 400 miles, the cost, as I make it here, is about four one-hundredths of a mill.

Q. Four one-hundredths of a mill per ton mile?

A. Yes, unless I have made some mistake in my calculations.

Q. That would be the increased cost of transportation, under the assumed fact?

A. No. Under the assumed conditions.

Q. Now, Mr. Barnes, is it your opinion that the Illinois waterway is not of sufficient economic service to be justified, if you had to pay four one-hundredths of a mill per ton mile for lockage water?

A. Four one-hundredths of a mill per ton mile is a pretty small item.

Q. Then, if you assume one-sixth of a mill per ton mile, would your answer be the same?

A. One-sixth of a mill per ton mile is quite a large item in the transportation of freight on waterways. The total cost of transportation on the Great Lakes is only about six times that.

Q. It is much more on inland rivers, is it not?

A. On the river from your own State, it is only about a mill and a half per ton mile.

Q. Is that the Fox River?

A. Yes.

Q. Is it your opinion that the addition of a cost of transportation of one-sixth of a mill per ton mile or four one-hundreths of a mill per ton mile would render it impossible for the Illinois waterway to compete with railways and to render any economic service, justifying its construction?

A. One-sixth of a mill per ton mile might be sufficient to discourage the use of the canal for the cheaper commodities. For the higher priced commodities it probably would not discourage them.

Q. Would the answer be the same for four one-hundredths of a mill per ton mile?

A. Of course, that is much less.

Q. Would the answer be different then?

A. No.

Q. It would be the same?

A. Yes. Of course, the effect of four one-hundredths is much less than the effect of one-sixth of a mill.

Q. The average railroad rate is one and one-half cents per ton mile, is it not?

A. No, sir.

Q. Is it 1.1 cents per ton mile, or do you know anything about it?

A. I am inclined to think it is a little greater than that, on the average for the country, but, it is not far from that, but that is not on low-priced commodities.

Tr. Barnes, pp. 7098-7110.

APPENDIX "K."

3. In the valley of the Des Plaines and upper Illinois Rivers, excellent foundations for locks are available; the lower Illinois has a gentle slope, so that any reasonable depth can be obtained by dredging, and the present diversion of water from Lake Michigan through the Chicago Drainage Canal is more than sufficient for navigation purposes.

H. Doc. No. 762, 63rd Cong. 2nd sess.

Q. At any time since the beginning of the diversion from Lake Michigan into this waterway through the Sanitary and Ship Canal down to the present time, would that project depth and that project width have been available without any diversion from Lake Michigan in the stretch of the Illinois River from LaSalle to the mouth of it?

A. No, sir.

Q. By how many feet would the depth have fallen short of seven feet at low water at critical points of navigation?

A. About 4 feet.

Tr. Woermann, 4167.

Q. Since 1900 have there been sufficient appropriations for the improvement of that stretch of the Illinois River to have maintained a project dept of 7 feet without the diversion of water from Lake Michigan?

A. No, sir.

Q. At any time during that period?

A. No, sir.

Tr. Woermann, p. 4226.

Q. That is, Congress was providing a 7-foot channel as in its judgment sufficient for navigation on the Illinois River, and the engineers took such steps as they found necessary as conditions developed to give the 7-foot channel? Is that correct?

A. That is correct, if I understand it.

Q. When you state that but for this diversion the water in the Illinois River would have been 9 feet lower than at La Salle—am I correct?

A. Yes.

Q. And 6.5 feet lower at Peoria, and 4.3 at Kampsville, do you mean that if the Engineer Corps had done no more work in maintaining and improving the river the depths provided by the project would not have existed? Is that correct?

A. I mean that if the flow through the drainage canal was suddenly shut off the water would drop that amount.

Q. Yes; and that is because the Corps of Engineers did not do any more work during this period than was necessary to maintain 7 feet with the water that happened to be flowing in the river?

A. That might be stated that way.

Q. And, of course, it is ordinarily true in most projects that rivers must be dredged and maintained annually or the depth provided by the Government will not exist?

A. That is correct.

Q. And the Illinois River is no different in that respect than other rivers?

A. No, sir.

Q. In fact, the lower Illinois River is a much easier river in which to maintain depths by dredging than the majority of rivers in the United States, is it not?

A. Yes, sir.

Tr. Woermann, 4177-78.

Q. Was the seven-foot project adopted in 1880 by the Federal Government ever completed?

A. No, sir, except in the sense that I indicated Saturday, that by taking advantage of the increased flow it had been completed.

Q. Only in the sense that they happened to develop an artificial flow in that river which raised the depth of water. Is that correct?

A. That is correct.

Q. And, of course, all projects require constant dredging to maintain,

A. Yes, sir.

Q. And you would not expect any project adopted in 1880 to continue to have the required depth unless there was constant and regular maintenance dredging for that purpose, would you?

A. That is true.

Tr. Woermann 4207.

Q. On the 3rd of March, 1925, as conditions then existed, how long in ordinary practice would it have taken to have dredged or otherwise improved that stretch of the Illinois River from LaSalle to its mouth, so as to have made the project depth of seven feet and the project width of 200 feet available, with a diversion of only 3,000 cubic second feet?

A. About five years.

Q. How long would it take from the present time to accomplish the same result?

A. Practically the same.

Q. How long would it take now to accomplish that work without any diversion from Lake Michigan?

A. Well, roughly, I would say it would take two to two and a half times as long.

Q. That would be about how many years?

A. Ten or twelve years, anyway.

Tr. Fuller, pp. 4255-56.

A. From Utica to Grafton is a distance of about 23 miles, and in that 230 miles it drops only about 33 feet So that in the improved river there were eventually fou locks of about 8 feet lift each

Now, the river for that distance is down in an alluvi plain, practically. The banks are quite level, and easil overflow in high waters. And the banks are alluvial, the bed of the stream is alluvial. It is a very level, slow moving river under ordinary circumstances, and it continues in that way until you get almost down to the Mississippi, and there the river has to go out into the Mississippi through a cut in between the high banks, at least on one side.

Q. State whether that section of the Illinois River would be difficult or easy to dredge?

A. Which section?

Q. From Utica to the mouth?

A. From Utica to the mouth is a section which is quite —has always been considered by all the various boards as exceedingly easy to dredge, and in one of the reports of the Chief of Engineers, annual reports, it was stated that, in the pools, places where the water had been dredged 20 feet, they had still held their depth for a great many years.

Mr. Adcock. I wonder if the General could state what report that was, so that the record will show.

By the Special Master:

Q. What report do you refer to General Bixby?

A. (Examining paper) I thought I had that, but I do not find it.

Mr. Adcock. Well, if it is not convenient, we will not take up the time to have him look for it.

The Special Master. We will proceed, It is hardly necessary to take time for that reference.

Mr. Adcock. No.

By the Special Master:

Q. Go on, General. You say the report is—?

A. The report is the report of Marshall's 1895. I think it is given in House Document No. 16—well, I will find it for you.

Mr. Adcock. I did not intend to ask him to look for it. I thought the General had it at hand.

The Special Master. Go ahead.

The Witness. Just one moment. Page 2716 Annual Report of 1895 reads as follows, in the report of Major Marshall:

"The channels dredged in the Illinois River are found to be nearly permanent. Channels dredged twenty years ago are but little deteriorated, and it is surprising to find that there has been no deterioration in the channels created by the Henry and Corpus Creek dams after from 15 to 28 years' use. We can then expect the cost of maintenance to be very little."

Tr. Bixby, 2107-9.

APPENDIX "L."

The board has also shown in discussing the sixth subject that the effect of diverting 10,000 cubic feet per second through the Chicago Drainage Canal from the Great Lakes will appreciably injure their navigability, and in its preceding report that such a diversion was not necessary to obtain either the 8 or 9 foot navigation recommended from Chicago to the mouth of the Illinois River. * * * (pp. 12-14)

If large amounts of water are to be admitted into the river, the removal of dams would reduce the damage to the valley from overflow from this discharge; but the board reiterates that a diversion exceeding 1,000 second-feet is not necessary for navigation purposes alone in the Illinois River, and that an added discharge will produce a slight and inadequate effect on the Mississippi River.

The object of diverting 10,000 or more second-feet from Lake Michigan is not primarily to benefit navigation, but to dilute sewage and to create power, and the United States should not be burdened with the cost of protecting the low-lands of the Illinois Valley from overflow where such diversion and overflow are unnecessary for navigation alone. (p. 14)

The existing projects for improving the navigation of the Mississippi River contemplate a channel 6 feet deep at low water from the mouth of the Illinois to St. Louis, and 8 feet deep from St. Louis to the mouth of the Ohio. These depths are ample for all existing river navigation. To provide for a reasonably prospective commerce, this board, in its report dated January 23, 1911, House Document No. 1374, Sixty-first Congress, Third session, recommends that an 8-foot channel be made from St. Louis up the Illinois River, thus affording a depth of 8 feet from the upper Illinois to the mouth of the Ohio, and that, should an increasing traffic demonstrate the necessity for additional facilities, a channel 9 feet deep be made. A depth of 8 or 9 feet; properly utilized, is sufficient for an enormous traffic.

The construction of the two dams referred to in the portion of the Act of June 25, 1910, quoted above, is not necessary to create depths of 8 or 9 feet. The desired improvement may be made at a much less cost, by the simpler methods of regulation and dredging. (p. 16)

W. H. Bixby,
Brigadier General, U. S. Army, retired, President of the Board.

C. McD. Townsend,
Colonel, Corps of Engineers, U. S. Army.

C. Keller,
Major, Corps of Engineers, U. S. Army.

J. B. Cavanaugh,
Major, Corps of Engineers, U. S. Army.

John Bogart,
Civil Engineer. (p. 22)

APPENDIX B.

THE INFLUENCE ON VOLUME AND HEIGHT OF WATERS IN THE MISSISSIPPI RIVER VALLEY BELOW CAIRO.

New York, August 13, 1913.

Brig. Gen. William H. Bixby,
President, Lakes-to-Gulf Water Way Board.

Sir:

I have the honor to submit the following report upon the influence on volume and height of waters in the Mississippi River below Cairo by reason of any diversion of water from Lake Michigan for the maintenance of the proposed Lakes-to-the-Gulf Waterway.

The influence in volume of any diversion from Lake Michigan will be an increase in discharge approximately equal to the amount of the diversion, since the losses due to evaporation and other causes will not be large. At ordinary low water the percentage of increase in the volume of discharge due to the present authorized diversion will vary from about 2½ per cent at Cairo to 1½ per cent at New Orleans, and at extreme high water will be less than one-fourth of 1 per cent from Cairo to the mouth of the River.

Except as increase in volume results in increases of gauge height or of depth of water available for purposes of navigation, it will be of no importance within any limits of diversion heretofore considered as permissible.

The effect of any diversion upon gauge height will always be small, and at the highest stages practically nothing, but the exact effect at any time or at any stage is impossible to determine, since this effect will be complicated or obscured by various other changes in the regimen of the river.

An extended series of discharge observations of the Mississippi River was taken under the direction of the Mississippi River Commission from 1879 to 1885, at Columbus, Ky., below the mouth of the Ohio River; at Helena, Ark., below the mouth of the St. Francis River; at Arkansas City, Ark., Wilsons Point, Miss., and Hays Landing, below the mouths of the White and Arkansas Rivers; at Warrenton, Miss., below the mouth of the Yazoo River, at Red River Landing and at Carrollton, La. Mean discharge curves have been derived from these observations, and extended and checked by numerous observations made at later dates.

There is inclosed herewith a drawing containing a set of standard curves showing the mean or average relation between discharges and gauge heights at Columbus, Ky., Helena, Ark., Vicksburg (and Warrenton), Miss., and Red River Landing, the curves of relation for a rising river being flatter and for a falling river steeper than these standard curves. On the same drawing and at the left of the corresponding curves is also given a second set of curves showing in tenths of a foot the theoretical increase in gauge heights at any stage due to an increase in discharge of 10,000 cubic feet per second, the second set being deduced from the first set by assuming that the increase in gauge heights due to this increase in discharge will be at the rate indicated by these standard curves. From these two sets of curves some idea can be had as to the increase in gauge height at any stage of the river which would result from any diversion from Lake Michigan.

However, the idea can be approximate only, for the increase in gauge heights due to a permanent increase in discharge would be more nearly indicated by the curve of relation for a rising river; and as this is flatter than the standard curve, the actual increase would probably be less than indicated by the curves shown.

Moreover, if the flow of the river at Cairo be permanently increased by diversion, any resulting increase in gauge height would bring about increased velocity due to the increase in slope, and the re-adjustment of conditions which would follow would tend to make the increase in gauge height due to the diversion less than that deduced from the standard curve shown.

Assuming that the increase in gauge height will not be accompanied by changes in cross section of river or that its effect will not be otherwise obscured, the diagram indicates that at all four places considered it would require an increase in discharge considerably exceeding 10,000 cubic feet per second to increase the gauge heights by 1 foot even at the lowest stages of the river.

Under similar assumptions, at stages corresponding to 40 feet at Columbus, the curves indicate that it would require an increase of over 50,000 cubic feet per second to increase the gauge height 1 foot at Columbus, Helena, and Red River Landing, or over 5,000 cubic feet per second to affect the gauge one-tenth of a foot.

At higher stages the effect would be even less, and it is evident that on extreme flood heights the effect of any permissible diversion would be trifling and would have no important bearing upon the heights of levees or other works designed to afford protection against floods.

The increase of navigable depths at lower stages due to any diversion would be less than indicated by the theoretical increase in gauge height, for elevation of the surface of the river has been found to be accompanied by a corresponding, though smaller, elevation of its bed.

In the Report of the Board of Engineers on Survey of Mississippi River from St. Louis, Mo., to its mouth, published in House Document No. 50, Sixty-first Congress, first session, page 44, it is stated as follows:

Repeated measurements (see graphical plot hereto appended) on the bar crossing of the Mississippi between St. Louis and Cairo show that up to a stage of about 20 feet above low water the available depth across the new bar is increased on an average only about one-half foot for every foot in the rise of water. (Between Cairo and Red River similar measurements show even less increase in navigable depth per foot or rise of water surface.)

Due to the permanent character of the diversion, the above ratio of elevation of water surface and river bed would not hold, and any permanent increase in gauge height would be less than that indicated by the standard curve, and would represent a change in the regimen of the river which would be accompanied by a rise of the river bed practically equal to such increase. In any case, the gain in navigable depth would be insignificant for any permissible diversion.

Very respectfully,

J. B. Cavanaugh,
Major, Corps of Engineers.
(pp. 38, 39, 40)

For purposes of navigation a diversion from Lake Michigan of less than 1,000 second-feet of water is all that will be necessary. For purposes of sanitation the works of the Sanitary District of Chicago were designed to allow the diversion of 10,000 second-feet and now contemplate a total of 14,000 second-feet, the additional 4,000 second-feet to be obtained by the diversion of water through the

Calumet River and a connecting canal following the Sag Route. The War Department, while awaiting the definite action of Congress, has so far permitted the diversion of 4,167 second-feet and the Sanitary District is understood to be using about 7,000 second-feet.

As the water which is at present being diverted from the lake appears to have already seriously affected the navigation of its harbors and connecting waterways, prompt congressional action is recommended to limit the diversion.

While it appears to have been assumed that the Sanitary District may be allowed to divert 10,000 second-feet so long as actually necessary for sanitary purposes, the diversion of the waters of the Great Lakes from their natural outlet for power development alone is inadmissible, under the recent treaty between the United States and Great Britain.

The future diversion of water from Lake Michigan for any purpose is fraught with difficulties. Not only has Canada an interest in the maintenance of lake levels which the United States must recognize, but every foot of water flowing through the Chicago Drainage Canal lessens the flow at Niagara Falls and at the power sites along the St. Lawrence River, where, due to the fall available, the same amount of water will create about four times the power that can be generated from it on the Des Plaines and Illinois Rivers.

The treaty enables riparian owners of Canada, as well as of the United States, who consider themselves injured by such diversion, to bring suit in United States courts to protect their interests. The claim that more than 1,000 cubic feet per second is required for purposes of navigation cannot be maintained.

The treaty, however, recognizes as proper the use of water for sanitary purposes and it is the opinion of the Board that only such water should be diverted from Lake Michigan as is indispensable for sanitation, and then only with a provision for proper compensating works in the outlets of the lakes to prevent a lowering of their levels.

Water thus diverted may be used incidentally for power purposes, but care must be exercised in authorizing the diversion of water for sanitary purposes, to restrict it to the amount necessary for these purposes alone. (pp. 106-107.)

Exhibit 171, Trans. 8031-40.

Excerpts from H. Doc. 762, 63rd Cong. 2nd sess.

EXCERPTS FROM OFFICIAL DOCUMENTS RELATIVE TO THE AMOUNT OF WATER REQUIRED FOR PURPOSES OF NAVIGATION ALONG THE ILLINOIS RIVER.

Exhibit 182.

Excerpts are from the following documents:

H. Doc. No. 1374, 61st Cong., 3rd sess.

H. Doc. No. 762, 63rd Cong., 2nd sess.

Decision of Secretary of War, Henry L. Stimson, dated January 8, 1913.

Warren Report, dated August 30, 1919.

Letter of Brig.-Gen. W. H. Bixby, Chief of Engineers, to Secretary of War, dated Feb. 28, 1912.

H. Doc. 1374, 61st Cong., 3rd sess:

Waterway from Lockport, Illinois, to mouth of Illinois River.

Page 7:

The board considers a bottom width of 160 feet in canal and 200 feet in the open river above the mouth of the Illinois sufficient for a channel of 8 or 9 feet available depth. For safety and ease of navigation the channel should be excavated to 11 feet in rock cuts and canals, and the locks should be given 11 feet depth, 80 feet width, and 600 feet useful length. With these lock dimensions three barges carrying about 9,000 tons of freight, may be locked through with their tow boat. A waterway of these dimensions would have a capacity exceeding 100,000,000 tons per annum, and would accommodate barge tows carrying about nine times the ordinary train load of this vicinity. In addition, the vessels using it would be capable of navigating the Ohio and lower Mississippi Rivers. Such a waterway will not require a diversion of more than 1,000 second-feet from Lake Michigan, and this amount would not injuriously lower lake levels nor cause excessive flooding of lands in the Illinois Valley.

Page 8:

For purposes of navigation a diversion from Lake Michigan of less than 1,000 second-feet of water is all that will be necessary. For purposes of sanitation the works of the Sanitary District of Chicago were designed to allow the diversion of 10,000 second-feet and now contemplate a total of 14,000 second-feet, the additional 4,000 second-feet to be obtained by the diversion of water through the Calumet River and a connecting canal following the Sag route. The War Department, while awaiting the definite action of Congress, has so far permitted the diversion of 4,167 second-feet and the Sanitary District is understood to be using 7,000 second-feet. As the water which is at present being diverted from the lake appears to have already seriously affected the navigation of its harbors and connecting waterways, prompt congressional action is recommended to limit the diversion.

Page 9:

The claim that more than 1,000 cubic feet per second is required for purposes of navigation cannot be maintained.

H. Doc. No. 762, 63rd Cong., 2nd sess:

Final Report—Waterway from Lockport, Illinois to Mouth of Illinois River.

Page 14:

* * *; but the board reiterates that a diversion exceeding 1,000 second feet is not necessary for navigation purposes alone in the Illinois River, and that an added

discharge will produce a slight and inadequate affect on the Mississippi River.

Decision of Secretary of War, Henry L. Stimson, dated January 8, 1913, denying the application of the Sanitary District of Chicago to withdraw from Lake Michigan 10,000 cubic feet per second of water:

"On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. There is involved in this case no issue of conflicting claims of navigation. The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a deep waterway from the Great Lakes to the Mississippi over the route of the sanitary canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over 1,000 feet per second, or less than a quarter of the amount already being used for sanitary purposes in the canal. This estimate is confirmed by the report of the special board of engineers on the deep waterway from Lockport, Ill., to the mouth of the Illinois River, dated January 23, 1911. It is also confirmed by the practical experiences of the great Manchester Ship Canal in England. From the standpoint of navigation alone in such a waterway too great a diversion of water would be a distinct injury rather than a benefit. It would increase the velocity of the current and increase the danger of overflow and damage to adjacent lands.

WARREN REPORT, Dated August 30, 1918.

Last 2 sentences in Par. on top of page 109:

"It is estimated that 500 cubic feet per second would be ample to serve any navigation requirements of the present canal. Should the Des Plaines and Illinois Rivers be improved to accommodate navigation of 8-foot draft to the Mississippi, a diversion of 1,000 cubic feet per second might be required to meet the needs of navigation only."

Par. in middle of page 111:

"The Board of Engineers considered a volume of flow of water of 1,000 cubic feet per second more than sufficient for such a waterway."

First Par. on page 116:

"*Diversion:* It has never been necessary to estimate the diversion of water from Lake Michigan which would be required to operate the drainage canal as a navigable waterway, provided no sewage or water for sewage dilution or water for power development purposes were discharged into it, but it seems probable that 500 cubic feet per second would suffice amply. If the Des Plaines and Illinois Rivers route for 8-foot navigation is developed, 1,000 cubic feet per second may be required from Lake Michigan."

Par. 15, page 62:

"It is estimated that 500 cubic feet per second would be ample to serve any navigation requirements of the present canal. Should the Des Plaines and Illinois Rivers be improved to accommodate navigation of 8-foot draft to the Mississippi, a diversion of 1,000 cubic feet per second might be required to meet the needs of navigation only. The present use of the canal for navigation is very small, there having been only 160 lockages at the power house in 1917, the longest boat locked through being 75 feet long."

Last Conclusion in Par. 11, page 19:

"The diversion through the Chicago Sanitary Canal averaged 8,800 cubic feet per second in 1917, although some daily averages were 10,000 cubic feet per second or more. Of this diversion, 6,800 cubic feet per second is incidentally used in the development of power, as will be explained later. Such small navigation as now exists would be amply served by a diversion of 500 cubic feet per second, and twice that amount would be sufficient for the needs of the greatest probable commerce of the so-called Lakes-to-Gulf Waterway."

Letter of General W. H. Bixby, Chief of Engineers, U. S. Army, dated February 28, 1912, for the Secretary of War (memorandum as to the Sanitary District diversion of water from Lake Michigan through the Chicago River, Sanitary District Canal, Illinois River, to the Mississippi Valley.) Published in Hearings on the subject of the improvement of the Illinois and Mississippi Rivers and Diversion of water from Lake Michigan and the Illinois River, before committee on Rivers & Harbors, H. R., 68th Congress, 1st Session, 1924, Part 2, page 728:

"For the purposes of navigation alone by canal and canalized river from Lake Michigan to the Mississippi River, on the Illinois River and its headwater and connecting canals, and to keep the locks and pools full, a diversion from Lake Michigan of less than 1,000 second-feet of water will easily supply any reasonable demands and is all that will be actually necessary, and any greater diversion is a greater injury than benefit to navigation."

Exhibit 182.

Q. In your opinion, how much lockage of water would be necessary to operate a 9-foot channel from Lockport to Utica?

A. The channel from Lockport to Utica, being slack water navigation, lock and dam navigation, you only need enough water to keep the pools full, and the pools will stay full, except for evaporation, unless boats are passing through the locks; so that all that is necessary is to furnish water enough for the lock passage of the boats through the locks, to furnish lockage water plus a very small amount to cover evaporation.

Q. In your opinion, how much would that lockage water be?

A. The board that was called on by Congress to report on this route from Lockport to Utica—

The Special Master: You were asked for your opinion, General.

A. My opinion?

The Special Master: Yes.

A. From 500 to 1,000 feet per second will furnish all the lockage water that is necessary for about 60,000,000 tons a year down the river.

Q. Of course during the closed season of navigation no lockage water would be required?

A. None is needed during the closed season of navigation for navigation purposes, and, therefore, none for lockage purposes.

Bixby, Trans. 2116-17.

Q. General, are you familiar with the quantity of lockage water used by the Panama Canal?

A. The lockage used by the Panama Canal is given in their official report for 1925 and 1926.

Mr. Adcock. If the General knows approximately, let him state it.

A. (continuing) The annual report of the Panama Canal for 1925, pages 4, 13, and 14, shows that through the summit level in both directions, to and from the Atlantic and Pacific Oceans, the passage of 23,958,836 cargo tons, loaded in 16,877 vessels, by means of 1448 locks, using 31,300,000,000 cubic feet of water, which reduced to second feet per year amounts to 992 second feet per year. The annual report for 1926 shows a similar movement of 26,000,000 cargo tons and 989 second feet per year.

That is based on the fact that one second foot per year is equivalent to 31,536,000 cubic feet. That 989 and 992 feet per second is from the summit level both ways, to both oceans. So that from the summit level to both oceans, on the average, it is less than 500 feet per second for the whole cargo tonnage of the Panama Canal. There is a lot of surplus water running to waste at the spillway which greatly exceeds the amount of the lockage, so they do not have to be very economical.

By Mr. Jackson:

Q. General, is the lockage from Lockport to Utica run both ways or just one way?

A. Only one way, from Lockport to Utica, the summit level being the highest level and nothing from the summit level into Lake Michigan. The summit level and Lake Michigan are the same.

Bixby, Trans. 2126-27.

Q. Assuming that, Colonel, in the proposed waterway of the State of Illinois from Lockport to Utica, the locks are 600 feet long, 110 feet wide, with a maximum lift of 41 feet, what quantity of water, in your opinion, would be required to operate those locks for a 9-foot waterway, for any commerce which could reasonably be anticipated for that waterway?

A. At the time that I was a member of the Board that you have just referred to, I was directly chargeable by the Board with making an analysis of the requisite water supply for a waterway somewhat similar in its dimensions to those mentioned by you as being the adopted dimensions for the waterway now under consideration by the State of Illinois, and my conclusion was that a water supply for which a 1,000-second feet per day for the 365 days of the year would be more than sufficient to accommodate a traffic of 100,000,000 tons annually.

Keller, Trans. 1269.

Q. In your opinion, would any such tonnage be available for such a water way?

A. I made no direct attempt to analyze the traffic possibilities of the Illinois waterway. My private opinion is that the possibilities are large, but that they will ever exceed 100,000,000 tons annually within a measurable period of time I somewhat doubt. I have compared the tonnages, the traffic actually recorded for some of the great ports of the world with this figure of 100,000,000 tons, and I have prepared a brief table which, if it is agreeable to you, I will be very glad to repeat here.

Q. Will you produce that table?

A. I cannot, of course, remember the figures.

Q. Will you read that into the record, such part of it as you wish to use in your testimony?

Mr. Adcock. Just a minute.

By Mr. Adcock:

Q. Was that prepared by you, Colonel Keller, or was it prepared just for this occasion?

A. It was prepared some time ago, but for this occasion, however.

Q. I see.

A. And it was prepared at the office of the Board of Engineers for Rivers and Harbors, from the best available figures accessible to that Board.

Q. Well, is the table which you have before you, and from which you are about to read—I understand that that was prepared in the office of the Board of Engineers for Rivers and Harbors?

A. Yes.

Q. Was that before you retired?

A. No, quite recently. I retired three years ago.

Q. What I want to get at is this: It was in response to a request for certain information that you asked for, is that correct?

A. I asked for the foreign commerce of certain named ports.

Q. Yes.

A. Which was included in this table. Now the Board of Engineers, as you probably know—

Q. Had that information?

A. Is constantly engaged in researches requiring them to have this information available for them, and so my request was merely a routine request, such as they would honor for any private individual.

Q. I understand. I had not raised any question about that. I merely wanted to know how the table came to be prepared.

A. It was prepared at my request for the purpose of getting some definite measure of the traffic in tons for some of the great ports of the world, my idea being this: that with this waterway constructed and actually used, Chicago will be in a condition, so far as commerce is concerned, which will be comparable to some of these great ports; that is, the business will be similar to that of some of these great ports. So that I wanted to measure the likelihood of whether the traffic would be limited to that figure that I gave, namely, 100,000,000 tons annually.

Q. So that you asked the Board of Engineers for certain information?

A. Yes.

Q. And they prepared this table that you now have and sent you this table?

A. Yes, sir.

Mr. Adcock. That is all.

Mr. Jackson. Is there any objection to its being read?

Mr. Adcock. No.

Witness: Now, these figures are only those of foreign commerce, that is, of imports and exports for the port named.

The first one is New York: Imports 10,481,786 tons. Exports 10,174,880 tons.

These figures being for the year 1923, the calendar year, the latest complete year available for all the ports in the table.

London was 13,995,000 tons imports and 8,385,000 tons of exports.

Antwerp, 12,188,000 tons of imports; 7,600,000 tons of exports.

Amsterdam, 3,461,000 tons of imports and 1,200,000 tons of exports.

Hamburg, 14,546,000 tons of imports and 11,858,000 tons of exports.

The Panama Canal returns are totalized, without separating them into imports and exports, since it is all through traffic, and the figures for 1923 were 21,916,000 tons.

Rotterdam, 13,533,000 tons of imports and 3,742,000 tons of exports.

Liverpool, 9,918,000 tons of imports and 9,620,000 tons of exports.

Marseilles, 3,999,000 tons of imports and 2,265,000 tons of exports.

Hongkong, 16,830,000 tons of imports and 17,622,000 tons of exports.

The largest total in the table is that of Hongkong, just read amounting to, roundly, 34,400,000 tons of imports and exports.

In addition, it should be noted that, for the Port of New York, we have more comprehensive figures relating to the entire traffic of the port, domestic as well as foreign; and I have appended to the table a footnote relating solely to the Port of New York, subdivided as follows:

Coastwise receipts, 18 271,371 tons.

Coastwise shipments, 9,861,816 tons.

Internal traffic, 8,875,254 tons.

Local traffic, 10,473,520 tons.

Intra-port traffic, 48,977,348 tons.

Making a total domestic of 96,459,309. Adding in the foreign traffic for that year, we have a grand total of 117,115,975 tons—all short tons.

By Mr. Jackson.

Q. Do you know whether the intra-port traffic is largely car ferry traffic?

A. It is exclusively car ferry traffic, of a character peculiar to the Port of New York, arising from the fact that most of the terminals of the railroads entering the Port of New York are on the New Jersey side of the Harbor, and that foreign traffic must be transferred back and forth between Manhattan and Brooklyn and the Jersey on car floats or car ferries.

Q. Colonel, in asking a question in regard to the quantity of water required for lockage in this waterway, I mentioned one lock of 41 feet?

A. Yes.

Q. Assuming that that is the summit lock, and there are four other locks in that waterway, of lesser lift, would that in any way vary your estimate as to the quantity of water required?

A. No, for through traffic the lock of maximum lift is the one the water demands.

Mr. Jackson. Cross examine.

Cross Examination.

By Mr. Adcock:

Q. Now with reference to the amount of water that you speak of, 1,000 second feet, that related solely and only to the amount required for the locks between the southern terminus of the Sanitary and Ship Canal of the Sanitary District of Chicago and the Illinois River?

A. Yes, the mouth of the Illinois River.

Q. What is that?

A. The mouth of the Illinois River.

Q. Well, then, you were assuming that there would be locks and dams between the southern terminus of the sanitary canal and Utica, or the Illinois River, were you?

A. Oh, yes.

Q. And also the locks and dams to the mouth of the Illinois River?

A. Oh, yes It was a canalized waterway.

Q. Entirely?

A. Yes, sir.

Q. Your answer was that it was entirely canalized?

A. Yes, sir.

Q. In other words, there would not be a foot of the way but what you would be upon slack water, is that true?

A. Yes, except below the last lock.

Q. Except below the last lock?

A. Yes, sir.

Q. And you did not intend your answer as to that 1,000 second-feet to relate in any way to the water that might be required in the Illinois River for navigation, in the event that there were no locks and dams in that river?

A. No, sir, because the project that the Board of which I was a member considered and recommended required a slack water channel.

Q. Yes, and that was the one you were considering?

A. That is the one we considered as justified at that time.

Keller, Trans. 1269-1276.

TOTAL DISCHARGE OF LAKE SUPERIOR AND WATER USED BY NAVIGATION CANALS AT THE ST. MARYS FALLS, MICHIGAN-ONTARIO.

Year	Total Discharge Lake Superior C. F. S.	Used by Navigation Canals c. f. s. U. S. Canal	Canada Canal	Total
1918	61,105	662	134	796
1919	54,135	824	112	936
1920	67,412	1,409	108	1,517
1921	51,385	681	107	788
1922	44,441	727	104	831
1923	51,219	783	110	893
1924	50,326	740	98	838
1925	56,486	796	106	902
Mean	54,564	828	110	938

Exhibit 62.

Q. Mr. Sabin, your attention has been called to complainants' exhibit 62, which was the table produced and identified by Colonel Dent, as the amount of water used for lockages in the Soo Canal, and your attention was directed particularly to the fact that the lockages for 1921 seemed to be larger than for the following years. For a number of years, you testified the other day—nineteen years down to 1925—you were superintendent of the locks at the Soo. Do you know of anything that happened or any special condition existing there in 1920 that would explain that increased lockage water?

A. May I refer to that table? I think you have mentioned the wrong year, unless I am mistaken. I think I recall it. The year of large supply was 1920.

Q. 1920, that is the year I intended to state.

A. In the fall of 1919, in November, the guard gates, the upper gates of the third lake, which are used in pumping out the lock to unwater the lock, were injured by a storm. They were drawn away from the sides where they are anchored, and were wrecked, to such an extent that it was impracticable to close them that fall for pumping out the lake. And during that water, the repairs were made to them, and it was desired to replace the gates in the spring, and in order that there should not be too great a thickness of ice to contend with in the spring, the water was allowed to flow through that lock freely during the winter months, from December to March, inclusive, until the gates had been repaired and replaced to permit pumping out. That, I think, would account easily for the difference.

Q. It was the year 1920 that I had in mind, Mr. Sabin. So that at that time there was water going through the locks that was not actually being used for lockage purposes?

A. There were, I think, about four months when the water was running freely through the culverts.

Sabin, Trans. 1278-80.

Q. What do you know about the amount of cargo which commerce carriers during the season of 1925 and 1926 could carry through the ship canal and locks of the Sault Ste. Marie?

A. The exact figures are in the room somewhere, but I can say roughly that it was around 90,000,000 tons.

Dent, Trans. 635-36.

Q. And with those stable banks and beds there is no doubt in your mind that a 9-foot channel can be obtained in the Illinois River with a diversion of a thousand second-feet, or less, is there?

A. Yes, there is.

Q. In March of 1926 you testified at the hearings before the Committee on Rivers and Harbors, House of Representatives, 69th Congress, 1st session, on the subject of the improvement of the Illinois River and the abstraction of water from Lake Michigan?

A. I presume so, but I do not remember the dates.

Q. I read to you from what purports to be your testimony or statement on page 61 of that document; and to make it clear to you, I will read the questions with your answers:

"Mr. Chalmers. I think that is the most important question in the whole problem, whether any more water is required for navigation purposes by the removal of those locks.

"Mr. Barnes. The Engineering Board has dealt with this in its report. They say that open river navigation can be obtained with any flow above, I believe, 2,000 cubic feet per second—

"Mr. Chalmers (interposing). Right there, before you go on: With two locks in the river the flow can be controlled for 1,000 feet. Is not that true? Is not that sufficient?

"Mr. Barnes. No, sir.

"Mr. Mooney. One thousand six hundred, is it not?

"Mr. Barnes. No, that is not sufficient. I beg your pardon. If you go on and excavate sufficiently, then you can do it."

Did you so testify before that committee?

A. I presume I did, but that is not slack water navigation.

Q. Then it is now your testimony that with that flow of water you could obtain a 9-foot channel without slack water navigation, but that you could not obtain it with slack water navigation. Is that it?

A. By enormous expense you can do almost anything in any stream. The Illinois River has a fall of about 35 feet, as I recall it, in its full length. Various methods of making slack water navigation have been proposed, all the way from six locks to only one lock; and it is a matter of cost and a matter of damage as to which method is the more practical and feasible to use.

Q. The enormous cost to which you refer is one in which the Federal Government is concerned, if any one, is it not?

A. If the Federal Government is to improve it.

Q. Regardless of your opinion as to the desirability or undesirability of locks, do you wish to testify that you cannot obtain a 9-foot channel in the Illinois River with locks and dams and with a diversion of 1,000 second feet or less?

A. I would testify that you can make a canal. I say it is inadequate and inappropriate for the purpose, but a canal can be obtained for a thousand cubic feet per second if enough locks are put in to make complete slack water.

Q. With a channel fully as large in area as the channel which you are providing in the Illinois waterway?

A. No.

Q. As to width?

A. No, sir.

Q. You mean, it would be better than 160 feet?

A. Of course you can excavate it to any width you want.

Q. You mean that the water would not supply the channel of the same width as that of the Illinois section of the waterway?

A. No.

The Special Master: Do you mean to say, no, it would not supply that—or—no, that you did not mean that?

The Witness: The Illinois waterway has channels from a minimum of 150 feet to as much as a thousand feet in width. The slack water navigation of the Illinois River, with the locks that have been proposed, does not give as full width and as full a depth as will obtain in the Illinois River. However, it is entirely possible to so locate the locks and so make your excavations as to give as great width as we will have in the Illinois waterway above.

Barnes, Tans. 7095-98.

Q. Mr. Barnes, I would like to direct your attention to a statement of General Taylor made before the same committee on pages 284 and 285 of the same document, where he says:

"Senator Willis. Some one said, it was my impression that it was you, that without any diversion at all, there was sufficient water in this drainage basin to operate this canal without taking any water at all from Lake Michigan.

"General Taylor. That is, from Utica to the Mouth?

"Senator Willis. Yes.

"General Taylor. Yes, sir; that is correct. There might be, at times of extreme low water, a short period when there would not be sufficient water to operate the waterway to its full capacity, but those times are few and far between and the periods would be short. Ordinarily there is water enough there to operate that waterway from Utica to the mouth, without any water from the Lake."

Do you agree with that statement?

A. If you assume that there were some locks remaining in, you could operate from Utica to the mouth in many years, without water from Lake Michigan. However, Utica is nearly 100 miles from Chicago and there is no commerce at Utica worth the name, and no engineer would recommend the improvement of the lower Illinois without extending it to Chicago.

Q. Yes. Well, we will take that separate section up individually, because different conditions prevail; but, as to the section covered by General Taylor in this statement, do you agree with him?

A. I agree that if you make slack water navigation, with five or six or seven locks in the reach between St. Louis and Utica, you can secure a fair amount of water ordinarily for lockage purposes.

Barnes, Trans. 7045-47.

Q. Mr. Barnes, if the quantity of water diverted at Chicago were reduced to a thousand second feet, the only effect that would obtain upon the construction of the Illinois waterway would be on the question of the excavation of the channels between those locks, would it not?

A. No.

Q. What additional factor would be involved, if any?

A. There would be the additional depth it is necessary to go in the location of the locks and the design of the locks, the depth of the bottom of the sills.

Q. You have just told me that as the locks are now designed, they would provide for all traffic over a waterway having a controlling depth of 9 feet.

A. But mind you, we must make those locks 14 feet.

Q. But we will confine ourselves for the time to 9-feet, and assuming a waterway of 9 feet, would there be any effect by way of the reduction of the Chicago diversion to 1,000 second feet other than the question of possible additional excavation in the channels between these various locks and dams?

A. Nothing between the locks and dams; but I must insist that those locks must be made lower; that is, we must go lower in order to comply with the law of the state.

Q. Mr. Barnes, I would like to insist that we leave aside the legal questions that you may or may not have involved in your state, and have you answer my question as to whether or not with a diversion reduced to a thousand second-feet a 9-foot waterway might be obtained in this stretch which is shown upon your exhibit 1194, without any further change other than possibly additional excavation in the channels between the locks.

A. That is true for a 9-foot waterway.

Barnes, Trans. 6812-13.

Q. Mr. Barnes, I note that on page 5886 of your testimony you made this statement, after referring to the low water flow of the Illinois as 500 cubic second feet at La Salle, as you have just stated:

"This increases down stream until at the mouth it will have a flow of approximately 1,000 cubic feet per second. That is not sufficient to economically develop an adequate channel, without the intervention of locks."

In that statement did you mean to infer that, by the intervention of locks, an adequate channel might be economically developed?

A. Well, I do not think it would be adequate, but a channel can be obtained; there is no question about that.

Q. Well, you would have just as large locks, would you not?

A. You could have locks—the locks would have to be governed by the quantity of water to supply them, or by the commerce. I do not think that the size of the locks is governed very much by the sufficiency of the water for lockage purposes.

Q. And in view of that fact, Mr. Barnes, you would have just the same size locks, or could have, as you would have on the Illinois waterway, could you not?

A. Yes, sir.

Q. And those locks would have much lower life requirements than on the Illinois waterway?

A. Yes.

Q. And would require a much smaller quantity of lockage water for a given commerce?

A. Yes.

Q. And you could dredge to the same depth that you would have in the proposed waterway, of 9 feet, could you not?

A. I suppose so.

Q. Well, there is no question in your mind but what you could dredge that way?

A. I think there is no question of that. There is a very serious question as to the economy of any such thing.

Barnes, Trans. 7114-16.

APPENDIX "M".

GENERAL W. H. BIXBY.

a witness heretofore called by and on behalf of the plaintiff, and duly sworn, was recalled for further examination and testified as follows:

Direct Examination by Mr. Le Boeuf.

Q. General Bixby, you have previously stated your educational and professional qualifications as an engineer. I ask you now to specifically state your special experience with reference to the improvement of rivers for navigation, with particular reference to your observation, engineering work and experience on the Mississippi River.

A. I claim to have had unusual experience in matters concerning the Mississippi.

Mr. Adcock. I move to strike that out.

The Special Master. Yes, General. The point is not whether you think it is unusual, but what it is.

The Witness. Yes. On the Mississippi, I was not only the district engineer for a while, in direct charge of the work, from St. Louis down to Cairo, but also the division engineer, to inspect and supervise all the work of the districts of the Mississippi, including the Missouri and the Upper Mississippi and the Lower Mississippi, and the Illinois, as a tributary. I was also the president of the Mississippi River Commission for several years. So that under me, as President of the Commission, I had all the dredging work of the river to look after, and all the bank protection to look after and supervise, with the assistance of four or five other men, who were scattered along the river from St. Louis to Memphis, and Vicksburg to New Orleans. That work also included the supervision of the work away down to the Gulf. That required me to go over the river several times. It required me to go over the Mississippi River with the Commission at high water, when the banks were being overflowed, and the crevasses were in action. Also to go over it at dead low water, when the banks were all in sight—or the bank revetments were in sight, and when the condition of the banks could be easily seen, and the effect of the water flow on them judged.

It included, of course, the inspection of the upper river in the same way, and the reservoirs up in Minnesota, that supplied water at times to the navigation of the river at St. Paul.

As already stated, I was chairman of the two boards, for survey of the ports on the Mississippi River, from Chicago to Lockport—I mean Lockport to St. Louis, and Chicago to St. Louis, and St. Louis to the Gulf. And one board was in 1909 and the other board was in 1913.

In between those two boards, I had the opportunity of going with the International Waterways Commission, to Europe, and inspecting all the rivers there, and checking up in that way, and while I was of assistance to the board, I had an opportunity to check up with the foreign engineers the work we were doing on the Mississippi River, and see how our work compared with their work, and to get their ideas. And so that came in between 1909 and 1913, on those two boards.

Of course, after that, as Chief Engineers, all the work was under my general supervision, and that brought in any question as to the Mississippi River, because the Mississippi River Commission was acting under the supervision of the Chief of Engineers.

Also, while I was at St. Louis, in 1908 or 1910, and also during the World War, I was under the Department of Commerce as Light House Inspector. That also required me to go over the river with another set of officers and men. So then I had the opportunity of talking with the captains and pilots of the Light House Service. On the other trips I had the opportunity of talking with the captains and pilots of the river service. The work of the district and of the division and of the Mississippi River Commission came back to me again during the World War. So that, even then I had all of those, and later, after a while, had the Missouri River also, with its offices at Kansas City; so that I could check up on the work there.

By Mr. Le Boeuf:

Q. General, will you please describe the condition and character of the Mississippi River? And by that I mean its natural characteristics, rather than those affected by works of improvement.

A. Well, the Mississippi River is a river with a shifting, movable bottom, bed and banks. And that is the peculiarity of the Mississippi River which puts it in line with all rivers with a movable bottom, a changing or shifting bottom. The river itself, the Mississippi River, from Grafton—well, from St. Paul down to St. Louis, is a small river with a comparatively hard bottom, wide and shallow. It carries the mass of the water flow, during the average of the year, into the river above St. Louis. While the river is not as long from St. Paul down, as it is from the Yellowstone Park down (as the Missouri), still the character of the bottom is such, and the meteorological conditions, due to climatic conditions, are such that it furnishes more water to the river, the Upper Mississippi River does, than the Missouri River does. But the Upper Mississippi River, while furnishing more water, does not carry very much in the way of sediment, sand, or other material. It is the Missouri, with the little lesser flow, but the higher floods and the large volumes during the floods, that tears up the beds and the banks and sends down the sand rolling along the bottom, and the sediment that is transported by the water.

Now, from the time that you get to the confluence of the Missouri and the Upper Mississippi, which is just above St. Louis, then we have the peculiar characteristics of the Mississippi, that it is composed of deep pools, separated for three or four miles by bars. The average depth of the river is much greater than any draft that we asked for for navigation. The river itself—

By Mr. LeBoeuf:

Q. What is the average depth, exclusive of bars?

A. I do not carry the average depth in my head, so I want to refer to my notes. The average depth in the river from St. Louis to Cairo is 18 feet. From Cairo down to Memphis is 31 feet. From Memphis down to Vicksburg it is 57 feet. From Vicksburg down to the mouth of the river it is 48 feet. So if it were not for the bars there would be plenty of draft for ocean vessels. But these bars occur every three or four miles between Cairo and the mouth of the Red River. When you get down to the mouth of the Red River there are large bars on the bottom of the river, but they are so far down that they rarely ever interfere with navigation.

By the time you get down to Baton Rouge, or a little below Baton Rouge, the river is so deep over these bars that any steamer that can come in from the Gulf through the passes at the mouth of the Mississippi can go all the way up to Baton Rouge without difficulty.

These pools are not constant any more than are the bars. The pools between St. Louis and Cairo vary so that in some places they are 90 to 100 feet deep in spots. In places we sound one year and find a moderate depth and a few years afterwards in the same place we find that the depth has increased enormously, showing that the pools gradually fill up and gradually scour away, in the same way that the bars rise and form and then afterwards scour away.

The depth in that way between Cairo and St. Louis, as I say, has at some times been found to be thirty or forty feet and at other times it may be one hundred feet.

Mr. Adcock. I was wondering if there is a question pending.

The Special Master. Yes; the question pending is as to a description of the Mississippi.

Mr. Adcock. That was the natural condition. The question should be confined to that.

The Special Master. Yes.

The Witness. I am talking now about the natural conditions. Of course, we have to find out the condition of the bars which govern the navigation of the boats under natural conditions before any improvement, and we do that by looking up back records and also by checking up on what happens during periods that we actually have seen.

So that the natural depth between St. Louis and Grafton at times has been not over 18 inches or two feet, between Grafton and the mouth of the Missouri.

Between the mouth of the Missouri and Cairo the natural depth on the bars has been somewhere between three and four or five feet; even in recent years the bars have developed at very low stages, showing the river, if left alone, would only have three or four or five feet. Below Cairo down to Vicksburg the natural depth is between 4½ and 6½ feet.

The Special Master. You are speaking of over the bars?

The Witness. Yes; the depth over the bars is as low as that. Now, these bars, as I say, do not stay quiet; they not only rise and fall, but they travel down stream and actual measurements in plotting the results of the surveys have shown that the bars wash away on the upstream side, fill up on the downstream side, and gradually change in their position, so that sometimes a bar is found in a place which the records show many years before was a deep pool.

As these bars move down stream they gradually diminish in height and fade away, as you might say, and as the bar has moved from one position downstream to where it has pretty nearly disappeared in height, another bar begins to form up above and gradually moves down and occupies later on the position that the other bar formerly occupied. So that the bottom of the stream has been found to be constantly changing and the bars constantly moving, the pools constantly filling up and scouring away.

By Mr. LeBoeuf:

Q. General, will you describe a year in the life of a Mississippi bar? Start in the first part of a year and tell us what happens during the year to one of these bars.

A. The general condition of the river from early in the navigation season, which commences about January or February, to the end of the navigation season, which is somewhere about November or December on the Mississippi, between St. Louis and the Gulf, moves along in a regular routine, which is tied up more or less with the stage of water.

In the winter the river is low. Its lowest times are in December. In December the water is away down below the low water of the navigation season. The low water which the reports state at St. Louis which used to be a standard low water of 4 feet on the gauge now is 1 foot on the gauge as the low water of the navigation season and it is not the lowest water by any means on the river.

At the low water of the navigation season the flow of the river has been measured and is taken at 40,000 second feet, but once or twice they have succeeded in getting a discharge at a lower stage than that for the navigation. That is along during the winter when this discharge was as low as 20,000 second feet, and even that was at the stage a couple of feet higher than the other recorded lows. So that the discharge possible at dead low, which has never been measured, but has to be estimated, may run down as low as 15,000 second feet at St. Louis, but nobody seems to pay any attention to that, because the boats are not moving, the river is not being moved, and quite evidently it is full of ice, so that there are no good opportunities for making discharge measurements, and the amount of water flowing has no effect on navigation nor on commerce in any way.

The low water being in December, the stage being way down below the low water navigation, and there being a very small flow in the river, everything is quiet on the bottom of the stream, and the previous work of the season has cut channels through all the bars, so that the draft all through December and January is good and usually 8 feet from St. Louis down to Cairo and 9 feet, or perhaps a little bit more, from there down to Vicksburg. That is the condition during the winter before the navigation season starts in, and that is the condition in February when the navigation recommences.

Then the water gradually rises under the influence of the spring freshets up in the Upper Mississippi and up in the Missouri basin, and as their waters come down with the melting of the snows and the ice the river gradually rises at St. Louis. It goes on with a steady, gradual rise up until about April or May. In May it gets up to pretty nearly the full stage but not quite. During that time the navigation channel is even better than it was before, because as the current of the river is gentle and gradual there is not as much material that comes down the river and lodges on the bars as at other times. If the bars rise a little bit the old dredged channels fill up a little bit, but as the bar does not rise as fast as the river stage rises, there is always an increase in the navigation depths. So that navigation depths may go on increasing and getting better until April or May or even June.

So that the boats always have more than they need and the dredges have nothing to do. That is on the supposition that the water rises gradually. If it should happen to rise for some reason very fast, as with an unusual flood, and then drop very suddenly afterwards, the bars might reform, as they do in the fall, and cause trouble, but that rarely ever happens. So that along in June or July there is nothing up to that time in the way to bother the boats and nothing to require dredges to come out and do any work. But between July and August the river reaches, as a rule, its maximum. Its average is about 20 feet on the gauge.

Q. The gauge at what point?

A. The gauge at St. Louis. However, sometimes between July and August the river goes up to 30 feet. Once in a while it has gone up to over 40 feet. So that at times it gets up to where it occasionally may not only be bankfull, but it may overflow the banks. Of course, during that time there is no trouble with navigation by reason of drafts, because there is probably 20 or 30 feet more than the 8 feet required for navigation.

Commencing in August and from August to September all these floods that have come from the winter's melting of ice and spring rains have begun to disappear.

Q. May I interrupt you, General, to ask you what has been happening to the silt on the river bottom during the period of rising waters in the spring?

A. During that period of rising water in the spring, the silt which is on the bottom is beginning gradually to move, and as it gradually moves the first thing it does is fill up all the dredge cut through the bars and bring the bars up to pretty nearly a fairly level surface on the top. Those bars have been gradually increasing, and I do not think interfere with navigation because the water has gone up so much faster than the bars have gone that they are always getting better water, until the time comes in July or August when the river begins to fall. By that time, in July and August, the water in the Missouri River has got up to the full force. It has begun to tear away the bed of the stream, and has begun to tear away the banks of the stream, and as the river falls it gets away from the banks which it has soaked, and those banks which are soaked and full of water during the high stage, as the water recedes from them they lose the support the water pressure gave them, and they begin to slough off and subside into the river.

As they slide into the river some of this massed material is taken up in suspension, and some of it is rolled along the bottom, and the result is that in the first part of July the Missouri River is full of sediment that is in suspension and silt on the bottom of the river being rolled down. That silt is rolled down stream and emptied out of the Missouri River into the Mississippi. The volume of it is beyond any expectation of anybody who has not looked into it. All the measurements that have been made from time to time to confirm former reports have shown that the volume of such material that rolls out of the Missouri River every year, most of it in July and August, amounts to a volume of 400,000,000 cubic yards. It amounts to a volume which is equal to almost 400 feet depth over a square mile, over 384 feet depth over a square mile of area. As that material is poured out from the Missouri River on the average every year into the Mississippi River above St. Louis and starts on its way down stream, and as it goes down stream during the July and August freshets or floods, as they are dropping it is assisted on the way, it is joined on the way by the material that rolls from the banks and bed of the Mississippi River itself from St.

Louis to Cairo and from Cairo down to Vicksburg and the mouth of the Red River, and all that material is picked up.

Measurements made in the Missouri above its mouth, and measurements made in the Mississippi below the mouth of the Ohio, have shown there is just as much matter going along at Columbus below the mouth of the Ohio as there is at St. Louis below the mouth of the Missouri. So that the river has to be accepted as taking that rolling material, that sediment and silt, all the material in suspension, in mud, you might say, and it is carried all the way down the river. It is deposited from time to time in the eddies of the banks; it is deposited from time to time on the bars; it is picked up again and washed further down from pool to pool and eventually it all goes into the Gulf of Mexico, and shows up either in the extension of the bars or the built up material in the delta of the Mississippi River, running further and further out into the Gulf stream every year.

That has all been checked up and measured, so that it is known that that material is piled up in the Gulf of Mexico in sufficient quantity to justify the statements that have been made that this vast amount of one mile square and 384 feet high is going down the river fresher every year.

Q. What happens to that mass of material going down the river, General, when the river begins to fall in July, August and September?

A. When the river is at full height, flowing with its greatest velocity, all this matter that is in suspension and rolling along the bottom up above St. Louis keeps on going; but at the moment the river begins to fall, its velocity lessens, and the moment the velocity diminishes a lot of that material in suspension and rolling on the bottom stops. The material in suspension settles on the bottom, and that that is rolling stops and lodges on the nearest bar. So that that rapid falling of the river brings on rapid diminution of the nearest bar. So that that rapid falling of the river brings on rapid diminution of the current, piles up a mass of material on these bars, and they apparently rise up from the bed of the river very rapidly, and come up close to the surface. The first thing that the steamboat men know, of the men in charge of the river improvements, is that there is a report that even though the water is at the stage of 23 above dead low—

Q. At what point?

A. Even as high as 23 of the stage.

Q. What stage?

A. 23 feet on the gauge at St. Louis. There have been cases where it is reported that there is only 8-foot draft over some bar down the river, then the dredges necessarily must start out and rush to that bar, make a cut through the bar, so as to establish a new channel.

Q. How do they determine, General, when the dredges are to start cutting through a channel?

A. They only determine when the dredge is needed by reports as to the depth over these crossings. So always in July, in July and August, the Government boats that are going up the river are always sounding over the bars that have made trouble in former years. Between St. Louis and Cairo there are some forty or fifty places where bars might form. In some years they have actually had to work on from 13 to 20 of them, but there are generally a half a dozen of them that always make trouble, and a half a dozen that generally come to the front as an obstruction quicker than others.

So that Government boats going up and down the river always sound every possible bar crossing, and as soon as they report that they have found a depth on one of these bars of something like ten feet where the project was eight, or eleven feet where the project was nine, then somebody goes down there and if the bar still develops promptly the dredge promptly goes down there and starts to work. It has the result of past years of experience.

So that the channels will be more permanent the cut is made through the bars, and each time they know pretty well at each bar where is the best place to put the dredge to make the new cut through the bar rapidly, and in such position that the river current will scour it out and improve it. Just as soon as the dredge goes in there and goes to work it does not expect to dredge the full width of the channel. It makes one cut right straight through, perhaps about 30 feet wide, and it goes on and leaves a ridge of about 30 feet and makes another cut, and by the time it has gone along the length of the proposed tunnel the river has itself scoured away all those intermediate ridges, and they have got a good channel established for practically the full width.

And once established, when that opening has been cut through, then the rise of the bars act as a submerged dam, holds the water back and forces the massed material in the stream to go through those artificially deepened cuts, so that the river itself scours out that channel and in a good many cases that dredge never has to go back to that bar during the season. In a good many cases those cuts when made through last entirely through the season, and especially so if the river in dropping drops gradually and steadily. Just as long as the river goes down with a steady drop the dredge cuts made across the bar remain as a rule through the rest of the year.

But if the river drops and then afterwards rises two or three or five or ten feet, and then drops again, the moment it drops the second time all of the former trouble reoccurs. The river in rising that way has helped to pile up material into that cut, and the river dropping has that effect. As the river rises it picks up a whole lot of material itself, and then the moment the river drops again all that material in suspension and rolling on the bottom piles up on that bar and sometimes fills the old cut up, and the dredges have to go back and make a new cut through. Once in a while, not ordinarily, but once in a while it has happened that the dredge had to go back two or three or four times to dredge a cut through some particular bar, simply because there had been three or four rises of the river subsequent to the first cutting of the channel.

Q. At which stages of the river do these bars usually form and the channel usually fill up?

A. At St. Louis, where the work was for an 8-foot stage, there were plenty of cases where an 8-foot bar, as they call them, would form from 12 up to 18 feet on the gauge. And, as I have just said, they have been known to form at a 23-foot stage on the gauge. So that up to the present time, the moment the river gets down to 20 feet the office is looking out very carefully to see where there is any trouble. At 20 feet they expect to find bars developing somewhere in the stretch between St. Louis and Cairo. Between Cairo and Vicksburg the place which bothers them most is around Columbus, and at a stage of about 13, or 14 or 15 feet the bars begin to build.

Q. That is, that stage of 13 or 14 or 15 feet is on the Columbus gauge?

A. That stage is generally, they generally use the guage at Cairo, but for Columbus they use the gauge at a place that is not far from Columbus, more in the neighborhood of the bars as they regularly form.

Q. As a general rule, do the bars form at low water in the Mississippi River?

A. The bars generally form around the 10 to 20-foot stage at St. Louis, and around the 10 and up to 15-foot stage down below Columbus, and at a stage perhaps a little lower than that down at Vicksburg. The moment they get down to the Red River they have got beyond any bars that trouble navigation.

Q. What stage of the river is best for navigation?

A. The stage of river that would be best for navigation is an intermediate stage. If it were not for the formation of the bars they would be better off on low stages; but as the bars are always sure to be forming somewhere after the river gets below this 20-foot stage, they are much better off at an intermediate stage where there is less danger of bar troubles and where the current is not as severe as at the high stages.

Q. Would you say, General, that a good channel in the Mississippi River depended more upon the volume of water flowing at a particular time or the constancy that a given stage is maintained?

A. The most favorable conditions are where the river is as uniform as possible in its height. If it were not for the floods there would be no trouble in navigation at probably a 10-foot stage.

Q. And the volume of water in itself does not have any particular effect upon a good channel so long as it is constant?

A. The volume of water has almost no effect on the channel. It is the rise and fall of the stage, which in itself means nothing except that there is a greater velocity in the river flow; so it is the change in velocity of river flow that is the cause of a bar, and not the height that is measured on the gauge, not the volume of water that is flowing, which generally is in proportion to the stage that you read off from the gauge. It is not the volume of water; it is not the height of the water in the river; it is the unequal movement of the water in velocity. Wherever the velocity drops there is trouble and a bar develops.

Q. In view of this condition of the Mississippi River and these bars which you have been describing, from your experience in connection with the Mississippi River what, if any, effect would the diversion of 10,000 cubic feet of water per second from Lake Michigan into the Mississippi River have upon its navigable capacity?

A. As I have just stated, a bar forms on a rapidly falling river; and a rapidly falling river means that it may go down 6 inches or a foot in one day. It has been known to go down a foot in one day; and when the river falls a foot in one day there is sure to be a whole lot of trouble in dredging.

Q. If the river falls a foot in one day, say, at St. Louis, about how much change would that be in the volume flowing at that point?

A. At St. Louis it means about twenty to thirty thousand feet per second at the stage at which bars develop. As the river drops and you get down to low water, of course 10,000 feet per second has a different valuation; but at the stage when the dredges have to jump in and cut a passageway through the bar at St. Louis a foot means about 25,000 to 30,000 feet per second.

Mr. Lynde. What stage is that, General?

The Witness. That stage varies. At the 23-foot stage at St. Louis 10,000 second feet is equivalent to a change in—

Mr. Lynde. I do not care to interrupt. I am merely asking what particular stage the witness refers to as the stage when the bar forms.

The Witness. That is anywhere between 15 and 23 feet.

Mr. Lynde. On the gauge at St. Louis?

The Witness. Yes; where you are liable to find the river falling most rapidly.

By Mr. LeBoeuf:

Q. Now, General, will you go back to the question of your opinion as to the effect on the navigable capacity of the Mississippi River of the 10,000 second feet diverted from Lake Michigan.

A. On the capacity of the river?

Q. The navigable capacity.

A. It has virtually no appreciable effect. It may make a difference of half a day in the time when the dredge starts work. After the dredge has once started work that 10,000 feet per second has no more value; and if the river is falling rapidly the 10,000 feet per second effect might be wiped out in a fraction of a day.

Q. So that except for a differenec when the dredges would start work on a forming bar, this diversion would have no appreciable effect on the navigable capacity of the Mississippi?

A. No appreciable effect.

Q. Would it take the dredges any longer to cut through the bars whether or not there was 10,000 cubic feet of water per second additional?

A. Hardly any difference at all, because when a dredge goes to work it knows it has in front of it a falling river, and so it makes a cut through the bar, or endeavors to make a cut through the bar a great deal deeper than the project depth, because the deeper it can make the cut at the start the more quickly will the river take hold and widen and deepen that cut. So that the dredge would make the same cut no matter whether there was 10,000 feet per second more or less there flowing.

Q. And when the channel is finally cut through one of these bars, would it last any longer if there was a Chicago diversion of 10,000 second feet of Lake Michigan water?

A. I do not see why it would, because if the river falls very slowly and very gradually the river itself keeps this cut dredged out beyond the depth that is required for navigation; and if the river does the opposite and does not fall gradually but rises and falls again, the whole work has to be started over again and you have not had any gain from your 10,000 second feet.

Q. And a constant increment, then, of 10,000 second feet would have no effect on the maintenance of these channels?

A. I do not think anybody has ever been able to discover any effect.

The Special Master. The point is, whether you have discovered any effect, General.

The Witness. I have not been able to see any gain.

By Mr. LeBoeuf:

Q. In your opinion, what increment would have to be added to the low water flow of the Mississippi River during the navigation season to maintain a permanent navigable channel of 9 feet from the mouth of the Missouri to the mouth of the Mississippi?

Mr. Dietz. Under what conditions? We object to it unless the conditions are stated. Do you mean the conditions now existing, or the conditions of nature, with improvement or without improvement?

Mr. LeBoeuf. The conditions as now exist in the river today.

Mr. Lynde. And an increment added to how large a volume of water?

Mr. LeBoeuf. The low water flow.

The Special Master. Re-form the question with these additions, not that the General is likely to make any mistake in his appreciation of the question, but just to safeguard the record.

Mr. LeBoeuf. I thought I had them all in, in the first place.

By Mr. LeBoeuf:

Q. Will you state, in your opinion, under present conditions of the Mississippi River, what increment would have to be added to the low water flow of the river during the navigation season to maintain a permanent navigable channel of 9 feet from the mouth of the Missouri to the mouth of the Mississippi?

A. At the low water stage of the season of navigation at St. Louis the volume of the discharge of the river is placed at 40,000 second feet flow.

Mr. Adcock. At the present time, General?

The Witness. At the present time; yes. It used to be at 4 feet on the gauge. Now it is at 1 foot.

Mr. Adcock. That is the low water flow during navigation?

The Witness. The low water flow in the navigation season. It is defined in the Chief of Engineers' report as that stage that gives a discharge of 40,000 second feet.

By Mr. LeBoeuf:

Q. At the St. Louis gate?

A. At the St. Louis gate; and the reason that the gauge is different now from what it used to be is that during these recent years in the general improvement of the river the bed has been lowered, and while the volume that goes through is just the same, of course, as the bottom goes down the water surface goes down, and as the bottom is scoured away some three feet the water surface is three feet lower now at ordinary high water navigation than it used to be. At low water flow it is taken at 40,000 second feet.

In past years they have been fighting for a project of 8 feet. This year Congress has made it 9 feet. While it was 8 feet they found that these bars had developed at St. Louis at a stage sometimes of 23 feet.

If they have got to have a foot more depth in the river it is pretty certain that in future they can expect more bars to develop in 23 feet than in the past. So today I claim that in order to be sure that you have got 9 feet depth of water in the Mississippi between St. Louis and Cairo you have got to be sure that you have got water enough to keep the gauge up to 23 feet; and when the gauge is 23 feet the water flow discharge has been measured up to 350,000 feet per second. 350,000 feet per second diminished by 40,000 feet per second is 310,000 feet per second, which represents the amount of water that would have to be added to the Mississippi River to be sure that you had 9 feet navigation if you did not have any dredging and did not have any regulation work.

Bixby, Trans. 8065-94.

By Mr. Johnson:

Q. But that is not an answer to the question I asked you, General. I asked you if you did or did not make a certain statement to Colonel Randolph in the presence of Mr. Deitz, and I would like to have an answer to that question.

A. If that question means perfect agreement, I should immediately say no. If it means a partial agreement, I should say yes.

Q. Do I understand it to be your testimony that the Chicago diversion adds nothing to the navigable depths of the channels of the Mississippi during the season of navigation?

A. It adds something to the flow. It has no appreciable effect on the handling of boats, or on the channels. I may not understand the question exactly.

(The last preceding question was repeated by the reporter as above recorded.)

The Witness. I do not think that flow has any appreciable effect on the depths. The benefits on depths are all produced by other causes.

By Mr. Johnson:

Q. You think it is insignificant?

A. I think it is insignificant.

Q. And useless?

A. And useless.

Q. Useless to navigation?

A. Yes. At high water stages they have more water than they want. At medium stages it does not help anything except perhaps a short time while the dredges is getting into position. At low water stages the depths are already there and they do not need any water.

Q. You say appreciable. What do you mean by appreciable? How many inches?

A. Well, I do not think it affects any inches at all within the eight or nine feet of project depth.

Q. At the time that the bars begin to form and to impede navigation, take any particular bar, say the depth over it is three feet; under the condition that you would send a dredge out and at that moment of time if the Chicago diversion were instantly cut off, so that the water from the Chicago diversion were not over that bar, is it your testimony that the water would be the same depth over that bar?

A. If the Chicago diversion were cut off, it would take about a month for the water to get there, and the dredge would get its work done inside of two or three days.

Q. Let us go back to the question again now, and I will state it a little differently. We are imagining a bar that has become troublesome because, we will say, there are only three feet over that bar, and I ask you to imagine that from that three feet were subtracted by some magic incident the effect of the Chicago diversion. Would that depth over that bar still be three feet?

A. Between St. Louis and Cairo it might be six inches; below Cairo it might be three inches, for a very short time.

Q. And you think that six inches under those circumstances is useless and insignificant to navigation? Is that so?

A. I do not think it has any value to navigation at all, because when the dredge is in there the navigation cannot get by the dredge, and it has to wait until the dredge gets out of the way, and when the dredge gets out of the way they have their seven or eight or nine feet of project depth, and it may make a little bit of difference in time of the dredges getting in there, depending on how fast the river falls, but if the river falls half a foot a day, or if the river falls a foot a day, then the effect of that water is all wiped out in that day before the dredge has an opportunity to open the channel.

Q. But in the case of but six inches over that bar that may be attributable to the Chicago diversion?

A. Yes; I say it might be. I do not think it would be, but I think it might be.

Q. If you do not think it would be, what amount of that three feet do you think would be attributable to the Chicago diversion?

A. Three feet?

Q. Yes.

A. Of the three feet of the depth over the bar?

Q. Yes; three feet.

A. Well, I think it might have some three to six inches for a half a day.

Q. Why do you say half a day?

A. Because of the rapidity with which the river falls.

Q. I do not know of anything in the question about the river continuing to fall, I said at a moment of time.

A. At that moment of time?

Q. Yes.

A. At that moment of time it would not have any effect, because the dredge would be in position and probably the dredge in position in that cut—

Q. The dredge is no part of this assumption.

A. You have that bar just as it is without any dredge in it?

Q. Yes.

Mr. LeBoeuf. At what stage is the river?

Mr. Johnson. I did not state any stage, but I said when bars were beginning to form and becoming troublesome.

The Witness. Well, the stage makes a great deal of difference. If that three foot bar has formed at the 20-

foot stage the river would be so wide that its flow with the little effect in that cut, would not cut any figure.

By Mr. Johnson:

Q. No part of the three feet would be attributable to the Chicago diversion?

A. Such a small quantity—

Q. What quantity? That is not a difficult question to answer, General. It is a quantitative question.

A. I said between three inches and six inches?

Q. Between three inches and six inches?

A. Yes.

Q. Nearer three than six?

A. I would not be able to say. I do not know any engineer that has ever measured it. I do not know anybody who has not measured it who has any sufficient knowledge to be able to detect that difference.

Q. You know what the increment of the river is at that stage, do you not?

A. That is theoretical.

Mr. Danaher. You have not assumed any stage.

Mr. Johnson. I am assuming one now. The witness is assuming one, 20 feet, and we are adjusting ourselves to that.

The Witness. At that 20-foot stage the increment is about 25,000 feet per second, and that 10,000 feet per second would be 10/25ths of that amount at the most.

By Mr. Johnson:

Q. All right: 10/25ths of the increment?

A. Yes. You might get 10/25ths of a foot in stage and then half of that would have escaped on the bar, but any computation in between three inches and six inches is so tied up with the theories and the characteristics of a river flow that I do not think any engineer could come any closer.

Q. You think that when we start to measuring these hydraulic formulae and get down to between three and six inches we had better not draw any conclusions because they would not be accurate enough?

A. On a river that is flowing 200,000 second feet I do not think they know anything about it with any accuracy greater than that.

Q. You think when we get a river up to 200,000 cubic feet per second we do not know anything about the hydraulics that would enable us to function intelligently in a fall between three and six inches?

A. When you get up there you are dealing with only one or one and a half feet of water flow, and the average engineer thinks he is lucky if he gets that close on any proposition.

Q. And the measurement of rivers, generally speaking, is a science? That is so, is it not?

A. Yes, subject to all engineering formula.

Q. And if it were three to six inches you would regard that as in itself as insignificant?

A. I would under those circumstances.

Q. Suppose instead of this being a three foot bar it was a bar that was 8 feet and 6 inches below the surface. Would that give the same result as with 3 feet to 6 inches?

A. The same result momentarily.

Q. Let us prolong our moments. When does it make a different result?

A. The river may change around and rise six inches in the next few hours, or it may drop a foot or so in the next day. If it rises you have a better channel and do not need your water. If it falls you have an increased scour —it may not be a scour but a condition—

Q. So for that reason you think it would not be of any use to navigation?

A. No, because momentarily there is no navigation there.

Q. In the second case, a ship that only drew 7 feet of water could navigate, could it not?

A. Oh, yes.

Q. Why do you say there is not any navigation?

A. I would admit that there might be a chance for navigation once in a long while.

Q. But on account of this fluctuation and uncertainty both above and below the 6 inches you think the 6 inches would not be very good for the purposes of navigation?

A. At that stage?

Q. Of no practical value?

A. At that stage, at the stage when dredges have to go to work; and when dredges do not have to go to work it cuts no figure at all.

Q. You described very graphically yesterday the water coming down the Mississippi River and encountering the Missouri River and there receiving a great burden of silt; and as I understood your testimony, when the river is flowing rapidly it carries a larger quantity of silt than when it is flowing slowly. Is that correct?

A. Generally.

Q. If a stream carrying its maximum quantity of silt that it can carry without depositing receives an inflow of non-silt bearing water, will it carry the silt further in the presence of a sudden drop in its own head than it would if it had not received the clear water?

A. There might be 1 per cent difference or one-half of one per cent.

Q. In what circumstances? I just asked you the general question. I did not ask for any particular figure.

A. If it received a quantity of water equal to its own.

Q. What would happen then, if it received a quantity of water equal to its own? Would it carry the silt further, or in the event of a decrease in its own head would it carry the burden of silt further on account of the introduction of the new water, or would it deposit it, as a rule?

A. It would depend altogether on the cross section of the river, the shape of the cross section.

Q. Why would it depend upon the shape of the cross section of the river?

A. If the river is like the Mississippi, the more volume you put into it the higher the stage is; and the higher the stage is the wider it is between the edges of the water at the banks, and the higher the stage gets the more chance there is for a big volume. If you put in a double volume you might find the cross section of the river increased three times. Then your current would be diminished. If, on the other hand, you might get an increase of current, it would carry the mud and silt along more effectively than before.

Q. Is it altogether a question of increase in current and not at all a question of added volume of water?

A. Added volume of water practically cuts no figure at all except to mean that you cannot have that volume of water in the river without an increased current, and it is the increased current that counts, and it is practically only the time when that increased current has commenced to diminish, so that it does not carry as much silt in suspension and does not roll as much stuff, such as sand and gravel, etc., along the bottom.

Q. Let us assume a stream with a constant current and banks of such a nature that it would not get three times as wide when it took its own volume of water in addition, and add to that stream a volume of water equal to itself. If the head of that stream decreases and it is bearing silt, will it carry that silt further or not than it would if the added water had not been added?

A. How much velocity of current is coming along with that increased volume of water? Is it dropped in there from the skies in rain, or is it sent along down from a supply of some sort, like a river with a high velocity of its own?

Bixby, Trans. 8330-40.

By Mr. Lynde:

Q. General, I think you said in response to a question by Mr. Adcock that you had had occasion in connection with your 1909 report to examine the previous history of the regularization of the river, did you not?

A. Yes.

Q. And that started with the project of 1881. Is that correct?

A. That is the project under which they were working at the time I went there and the time we made that report.

Q. So that we can shorten the matter, it is a fact that since 1881 there have been regular appropriations by Congress of certain amounts of money which have been spent by the Engineer Corps each year for this so-called partial regularization of the river, is it not?

A. Yes.

Q. That is correct, is it not?

A. That is correct.

Q. With the exception of perhaps a few years when there was not sufficient appropriation and there was no expenditure.

A. That is correct.

Q. That is generally correct?

A. That is generally correct.

The Special Master. A case of perfect agreement.

By Mr. Lynde:

Q. General Bixby, turning your mind particularly to the period from 1895 to 1909, at the time you got out your report, can you think of any year, any particular year, when by reason of expenditure by the Chief of Engineers or the Engineer Corps or the Federal Government in any way anything was done which produced a marked change in the navigable channel of the Mississippi River? Do you get the question?

A. Yes. I do not know about those dates, between those years, but there had been a great deal done before 1909 that had benefited the navigation on the Mississippi River.

Q. I am not particular about those dates. Any particular year, we will say, before 1909.

A. Yes. Well, the river was being improved right straight along and its navigation facilities benefited right along.

Q. That is not my question. I want you to answer this specific question. I mean any year that stands out as different from any of the other years, any normal year, in which there was any unusual achievement or change in the channel.

A. I do not remember any.

Q. You cannot think of any particular year?

A. I cannot.

Q. Have you any record that you could refer to? Would your report indicate any particular year?

A. I don't remember just now. I probably knew all about it in 1909.

Q. You are familiar, of course, with the statement contained in the Chief of Engineer's report, are you not?

A. At that time?

Q. Yes.

A. I think I must have been.

Q. Say from 1900 to 1909.

A. I think I must have been.

Q. In that case you are familiar with the statement on page 391 of the report of the Chief Engineers for 1903 which, after giving certain details of expenditure on the regularization of the river, says:

"The result of the expenditure of this amount has been the partial improvement of the entire reach of the river from St. Louis to Cairo. During the past year there were at all times during open navigation a channel depth of 6 feet or more throughout this reach. The river attained a low water stage of 3.5 feet above standard low water."

Do you remember that statement?

A. I do not remember it, but it seems plausible.

Q. General, it is a fact, is it not, that that same statement in that identical language occurred not only in the 1903 report, but in the 1904 and 1905 reports?

A. I should suppose probably.

Q. And the statement agrees with your recollections, does it not?

A. I do not recollect anything different from it.

Q. Does it agree with your recollection? That is the question.

A. If I haven't got my recollection with me, I simply want to state that I do not recollect anything to the contrary.

Q. Let me call your attention to the statement occurring on page 413 of the 1904 report.

A. Yes, sir.

Q. Following exactly the same form as the 1903 report, that is, going into the details of the nature of the expenditures, the report states:

"The result of the expenditure of this amount has been the partial improvement of the entire extent of the river from St. Louis to Cairo."

You will notice that sentence is exactly the same as the sentence in the 1903 report. Then the report says:

"During the past year there was at all times during open navigation a channel depth of 8 feet or more throughout this section."

What occurred in the year 1904 to produce or effect an improvement in the channel?

A. Very probably a 2-foot difference in the channel, if there was that improvement, and that seems to be indicated there, might very easily be taken care of by the difference in rainfall or run-off on the Mississippi and Missouri rivers. In the last two years the difference in run-off from the two rivers, Mississippi and Missouri, has made a difference in navigation.

Q. I do not want to interrupt you, General, but there is no use wasting time about that, because the 1903 report states:

"The river attained a low water stage of 3.5 feet above standard low water."

The 1904 report says:

"The river reached a low water stage of six-tenths of a foot below standard low water."

A. Yes.

Q. So that in 1904, when there was an 8-foot channel, it was a 4 foot lower stage than there was with a 6-foot channel. You would not say that was an explanation of the improvement, would you?

A. I do not get that statement clearly in my mind right now. Please read it.

Q. Here is the statement in the 1903 report:

"The river attained a low water stage of 3.5 feet above standard low water."

That is the lowest point reached that year as I read that language. Is that correct?

A. I know nothing to the contrary.

Q. I mean that is what that means to an engineer, is it not?

Mr. LeBoeuf. Perhaps if you would hand the sheet to the witness it might help him.

A. Perhaps if I could look at it and see the whole sentence, I might be able to answer it.

By Mr. Lynde:

Q. The portions I have read from each report I have marked with a lead pencil in each case. This is the 1903 report and this is the 1904 report. Have you any explanation now, after looking at them?

A. That seems to imply simply that at a very low stage of water they had a greater depth in the channel. If that has happened on the Missouri several times, I would not be surprised if it happened on the Mississippi, just from water flow.

Q. Let me call your attention to the fact, and I will produce the pages if any question is raised about it, that every year after 1904, for I think ten or twelve years, and then they adopted a slightly different formula, but say the same thing in effect, the Chief of Engineer's report again and again used that exact statement, that there was an 8-foot channel throughout the year. And I think you will find there were all kinds of variations in the low stages of the river?

A. Yes.

Q. Assuming that I am correct about that—

A. I agree with that.

Q. Just let me complete my question.

A. All right.

Q. Assuming that after 1904, or year after year, beginning with 1904, that statement was made, that there had been maintained an 8-foot channel, and also the report showed there had been considerable variation of the low water, some low, some high, just as much variation as there was between 1903 and 1904, would not that indicate that the volume of low water had nothing to do with the maintenance of the 8-foot channel?

A. I should say so.

Q. Then once again, I would like to have you say whether you are able to think of anything that occurred during the years 1903 or 1904 or at any time immediately prior thereto which had the effect of changing in one year the channel depth from 6 to 8 feet?

A. As I just said, a difference in rain fall or run-off would easily explain it.

Q. Did it occur to you that the addition of water from Lake Michigan might have some effect? Rainfall means more water, does it not?

A. Rainfall means a great deal more water, several hundred thousand second feet.

Q. That is the only explanation you can give, the difference in rain fall and run-off?

A. No, I should say that the way in which dredges were being handled was a good deal more responsible for it than any question of water supply at that time; that the dredges were in operation and digging these channels all the time, and they were struggling to keep down to the project depth, and they would generally get the project depth before the end of the season and the depths to which the dredges made their cuts through the bars would help determine the depths in the river at the end of the season of navigation.

Q. Is it not a fact that the Chief of Engineers in this matter was summarizing the work of the Engineering Department? There is no mention of this extraneous condition. He is summing up what he has done. He says as a result of previous work in those years the 6-foot channel and a 8-foot channel was obtained. He is not talking about anything except the effect?

A. I should say that was complimentary to the Engineers in charge and the men that were working under him.

Q. You think that is an attempt by the Chief of Engineers to claim for one year's work the credit for a two-foot difference in the channel, do you?

A. No. It is an attempt of the Chief of Engineers to state facts.

Q. The 2-foot difference in the channel resulted from one year's work. Is that a fact?

A. A 2-foot difference in depth would undoubtedly result from some cause, but whether it was water flow or dredging or rainfall or run-off, it would be extremely difficult to tell.

Q. But in spite of that careful investigation that you made in 1909 summing up all previous work in that careful report that you filed, you are unable to think of anything specifically occurring in 1903 when that marked change in channel occurred?

A. The one thing that occurred there more than anything else was that the officer in charge that year was very effective in seeing that his dredges did all the work that the money would pay for.

Q. As a matter of fact, you know that the amount expended in 1903 was less than the amount expended in 1904, do you not?

A. That might easily be so, because some years they spent but half as much as they did in others, although at the present time they are trying to spend a good deal because they are hampered with not having dredges enough.

Mr. Lynde. I think that is all.

Mr. LeBoeuf. If your Honor please, the re-direct examination will be very short, and we can conclude with the witness.

The Special Master. Proceed.

Re-Direct Examination.

By Mr. LeBoeuf:

Q. General, right along the line of Mr. Lynde's questions as to the causes which might make this 2-foot change between those two years, if the cause was water flow, how much would the volume of water flow have to be, in your opinion?

A. For two feet?

Q. To make that change of two feet in channel depth. Approximately how much?

A. Thirty or forty thousand second feet.

Bixby, Trans. 8348-59.

SANITARY DISTRICT OF CHICAGO TABULATION OF FLOW IN SANITARY AND SHIP CANAL.

Year	Total Flow at Lockport	Sewage Flow (Chicago Water Works Pumpage)	Water directly abstracted from Lake Michigan by Sanitary Dist.
1903	4971 C. F. S.	582 C. F. S.	4389 C. F. S.
1904	4793 C. F. S.	618 C. F. S.	4175 C. F. S.

Exhibit 1111. Tr. 3361.

"Q. What is the existing authorized Federal project in that district?

A. Nine feet deep and three hundred feet wide.

Q. When was that adopted?

A. I haven't the law here. It was approved by the President January 21st of this year. I think my memory is accurate on that.

Q. Was that a modification of an existing project?

A. Quite.

Q. Rather than a new project.

A. Absolutely.

Q. And the modification applied to your method of improvement rather than to change in depth, did it not?

A. It meant a change in depth, too. General Ernst's project of 1881 at one time was 9 feet, for a period of three or four years, and 250 feet wide, in 1903. From then on it was 8 feet deep and 250 feet wide. My review and recommendation was for a channel 9 feet and 300 feet wide, including extending those works to the northern boundary of St. Louis.

Q. And none of these projects depended upon the Chicago diversion?

A. No, sir. They were made in 1881, some of them.

Q. The later ones did not depend on that?

A. It was not considered by me."

Gotwals Transcript 5685-5686.

HOUSE OF REPRESENTATIVES

"63rd Congress
2nd Session

Document
No. 762.

FINAL REPORT, WATERWAY FROM LOCKPORT, ILL., TO THE MOUTH OF THE ILLINOIS RIVER.

"WAR DEPARTMENT,
Office of the Chief of Engineer
Washington, February 17, 1914.

* * * * *

'VII THE INFLUENCE ON VOLUME AND HEIGHT OF WATERS IN THE MISSISSIPPI RIVER BELOW CAIRO.

11. The influence on the volume of the Mississippi River due to any diversion from Lake Michigan will be an increase approximately equal to the amount of water diverted. The effect upon gauge height will be small even at low stages, and at high stages it would scarcely be appreciable and not of any importance.' (p. 7)

'FINAL REPORT BY A SPECIAL BOARD OF ENGINEERS ON WATERWAY FROM LOCKPORT, ILL., TO MOUTH OF ILLINOIS RIVER.

New York City, August 15, 1913.

From: A Special Board of Engineers.

To: The Chief of Engineers, United States Army.

Subject: Report of waterway from Lockport, Ill., to the mouth of Illinois River, and on certain related subjects.' (p. 9)

'VII The influence on volume and height of waters in the Mississippi River below Cairo.

This subject is specially discussed in Appendix B.

The influence on the volume of the Mississippi River due to any diversion from Lake Michigan will be an increase approximately equal to the amount of the diversion, since the losses due to evaporation and other causes will not be large, and at extreme high water the increase due to a 5,000 second-foot diversion, will be less than one-third of 1 per cent from Cairo to the mouth of the river.

Except as increase in volume results in increase of gauge height or depth of water available for purposes of navigation it will be of no importance within any limits of diversion heretofore considered as permissible.

The effect of any diversion upon gauge height will always be small, and at the highest stages practically nothing, but the exact effect at any time or at any stage can not be determined, since this effect will be complicated or obscured by various other changes in the regimen of the river."

Exhibit 171.

House Doc. 762, 63rd Congress, 2nd sess.

"New York, August 13, 1913.

Brig. Gen. William H. Bixby,

President, Lakes to Gulf Waterway Board.

Sir: I have the honor to submit the following report upon the influence on volume and height of waters in the Mississippi River below Cairo by reason of any diversion of water from Lake Michigan for the maintenance of the proposed Lakes to the Gulf Waterway.

The influence in volume of any diversion from Lake Michigan will be an increase in discharge approximately equal to the amount of the diversion, since the losses due to evaporation and other causes will not be large. At ordinary low water the percentage of increase in the volume of discharge due to the present authorized diversion will vary from about 2½ per cent at Cairo to 1½ per cent at New Orleans, and at extreme high water will be less than one-fourth of 1 per cent from Cairo to the mouth of the river.

Except as increase in volume results in increases of gauge height or of depth of water available for purposes of navigation, it will be of no importance within any limits of diversion heretofore considered as permissible.

The effect of any diversion upon gauge height will always be small, and at the highest stages practically nothing, but the exact effect at any time or at any stage is impossible to determine, since this effect will be complicated or obscured by various other changes in the regimen of the river."

* * * * *

"The increase of navigable depths at lower stages due to any diversion would be less than indicated by the theoretical increase in gauge height, for elevation of the surface of the river has been found to be accompanied by a corresponding, though smaller, elevation of its bed.

In the Report of the Board of Engineers on Survey of Mississippi River from St. Louis, Mo., to its mouth, published in House Document No. 50, Sixty-first Congress, first session, page 44, it is stated as follows:

Repeated measurements (see graphical plot hereto appended) on the bar crossing of the Mississippi between St. Louis and Cairo show that up to a stage of about 20 feet above low water the available depth across the new bar is increased on an average only about one-half foot for every foot in the rise of water. (Between Cairo and Red River similar measurements show even less increase in navigable depth per foot of rise of water surface.)

Due to the permanent character of the diversion, the above ratio of elevations of water surface and river bed would not hold, and any permanent increase in gauge height would be less than that indicated by the standard curve, and would represent a change in the regimen of the river which would be accompanied by a rise of the river bed practically equal to such increase. In any case, the gain in navigable depth would be insignificant for any permissible diversion.

Very respectfully,

J. B. Cavanaugh,

Major, Corps of Engineers."

Exhibit 171.

House Doc. 762, 63rd Congress, 2nd sess.

"The other States on the Mississippi have but a theoretical interest in the Chicago diversion. The aid which it affords to low-water navigation is very small above the mouth of the Missouri River and trifling below that point. The additional height of floods which it causes is of no practical importance.

Warren Report,
Enrichment of Miss. R. by
Chicago diversion
Par. 175 on Page 98."

Exhibit 175.

"REPORT ON THE SANITARY DISTRICT OF CHICAGO

War Department,
Office of the Chief of Engineers,
Washington, April 18, 1924.

Subject: Diversion of water from Lake Michigan by the Sanitary District of Chicago.

Memorandum for the Secretary of War:

* * * * *

NAVIGATION ON THE MISSISSIPPI RIVER

The low-water widths of the Mississippi River immediately below the mouth of the Illinois are between 1,500 and 2,000 feet; at bankfull stages the widths are between 2,500 and 4,500 feet. Under present conditions the estimated extreme low-water flow is about 30,000 cubic feet per second including that diverted from Lake Michigan. (See H. Doc. No. 2, 67th Cong. 1st sess.)

The diversion of 8,000 second-feet from the lake constitutes slightly over one-fourth of the low-water flow in the Mississippi River. An inspection of the discharge curve of the river at St. Louis indicates that an increment of 8,000 cubic feet per second produces an increased depth of 1.4 feet (Plate VIII). No other discharge curves are available for that portion of the river between Grafton and Cairo.

It would not be unwise to assume that the average raising of the water surface amounts to about 1 foot, but due to the hydraulics of the Mississippi River, where the elevation of the tops of the bars fluctuates with the height of the surface of the water, it is doubtful if the actual depths are materially increased. For this reason it is impossible to evaluate the benefit if there is any.''

Exhibit 176.

Excerpt from Report of Major Putnam,
U. S. District Engineer, November 1923.

COMMITTEE ON RIVERS AND HARBORS HOUSE OF REPRESENTATIVES, U. S.

''69th Congress — Document
1st Session — No. 4.

ILLINOIS RIVER, ILL.

LETTER
FROM THE
CHIEF OF ENGINEERS, UNITED STATES ARMY
TRANSMITTING
REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON ILLINOIS RIVER, ILL.

* * * * *

104. It would not be unwise to assume that the average raising of the water surface amounts to about one foot between Grafton and Cairo; but due to the characteristics of the Mississippi River, where the tops of the bars seem to rise with the surface of the water, it is doubtful if the actual depths are materially increased. For this reason it is impracticable to evaluate whatever benefit exists.'' (p. 240)

Exhibit 177.

APPENDIX "N."

(Document No. 42 of Complainants' Exhibit No. 12)

"THE SANITARY DISTRICT OF CHICAGO

910 So. Michigan Avenue,
January 31, 1925.

Honorable John W. Weeks,
Secretary of War,
Washington, D. C.

Sir:

"The Sanitary District of Chicago hereby applies for permission to divert an annual average of ten thousand cubic second feet of water from Lake Michigan through the channels of the Sanitary District of Chicago, for the purpose of preserving the lives and health of all of its people, and of the millions of others in constant, daily contact with them.

"We have prepared a brief statement of fact in support of this application, which we present herewith for your consideration, all of which is respectfully submitted.

"Yours very truly,

"SANITARY DISTRICT OF CHICAGO,
By LAWRENCE V. KING,
President.

ALEX N. TODD,
JOHN K. LAWLER,
MORRIS ELLER,
AUGUST W. MILLER,
T. J. CROWE,
JAMES M. WHALEN,
FRANK J. LINK,
MICHAEL ROSENBERG,
Trustees.

EDWARD J. KELLY,
Chief Engineer."

"Attest:
HARRY W. WALLACE,
Clerk."

Tr. 417-418, Doc. 42, Ex. 12.

REPORT OF MAJOR PUTNAM TO CHIEF OF ENGINEERS.

"U. S. Engineer's Office, Chicago, Ill., March 2, 1925.

To the Chief of Engineers, Washington, D. C.

"1. This is an application from the Sanitary District of Chicago, a municipality created under the laws of the state of Illinois, to divert 10,000 cubic feet per second of water from Lake Michigan, for the purpose of keeping the sewage of that locality from contaminating its water supply and for reducing the sewage by dilution.

"2. This question of the diversion of water from Lake Michigan has been so thoroughly investigated by the Department and discussed at such great length in various reports that it is not believed advisable to enter into any description or historical review before presenting the recommendations which are to follow. Detailed information of this character may be found in the report entitled 'Diversion of Water from Lake Michigan,' which was submitted by this office on November 1, 1923.

"3. This application is prompted by the action of the United States Supreme Court on January 5, 1925, by which it sustained the position taken by the local United States Court requiring adherence to the limitations placed by the Secretary of War on the amount of the diversion. The local authorities are faced with the alternative of a reduction in the amount of diversion to 4,167 cubic feet per second by March 15, 1925, or relief from Congress or the War Department.

* * * * *

"12. Condition (3) is considered necessary to permit an ultimate reduction of the diversion to 4,167 cubic feet per second. Controlling works of some sort will be required to keep the Chicago River from discharging into Lake Michigan in times of flood, and at least two types have been suggested which are believed to be practical.

"13. The provision with reference to metering of the water service of the city of Chicago is included for three reasons:

"(a) There will be a substantial saving in the cost of construction and operation of sewage treatment plans due to the decreased amount of sewage to be treated.

"(b) There will be substantial reduction in the amount of lake water used for domestic purposes.

"(c) It will be possible for the city of Chicago to finance a filtration system for its water supply when its water consumption is reduced to a reasonable amount. When the water supply is filtered, the dangers incident to an occasional reversal of the Chicago River will be entirely eliminated.

"14. A shorter time limit for the permit is not recommended, as results produced by the end of 1927, for instance, will not permit a reduction in the amount of the diversion which it is believed should be required in any renewal, no matter when it is made. Furthermore, sufficient performance can not be prescribed for a shorter period to insure completion of a larger program looking to a reduction in diversion to 4,167 cubic feet per second by 1935.

(Signed) Rufus W. Putnam,
Major, Corps of Engineers,
District Engineer."

Ex. No. 12, Doc. 43, Tr. 418-19, 427-428.

"RECOMMENDATION OF CHIEF ENGINEERS.

March 3, 1925.

"To the Secretary of War:

"1. The Sanitary District of Chicago has made application for a permit to divert an annual average of 10,000 cubic feet per second from Lake Michigan through the channels of the Sanitary District.

"2. The District Engineer recommends the issuance of a permit, covering a period of five years, to divert through the main drainage canal and auxiliary canals of the Sanitary District, an amount of water not to exceed an annual average of 8,500 cubic feet per second; the instantaneous maximum not to exceed 11,000 cubic feet per second, such permit to be subject to certain conditions set forth in the first indorsement hereon.

"3. The first condition recommended by the District Engineer provides for the adoption and execution of a program of construction of modern sewage disposal plants at such a rate as to provide before the end of five years for treatment of the sewage of a human population of 1,200,000. This figure is believed to be the maximum practicable under existing conditions, and the proposed construction is the first step in a program which will permit the ultimate reduction of the amount of water diverted to 4,167 cubic feet per second, or lower, as treatment plants are installed.

"4. The program of construction recommended is limited to five years, as it is not possible to predict what advances may be made in the science of sewage disposal during the next five years. It is entirely within the realms of possibility that during that period such advances may be made as to warrant the Department's insisting on an even more rapid rate of progress thereafter, should a renewal of this permit be sought. A shorter period for the permit is not believed advisable, as it would be difficult to prescribe sufficient progress in the way of construction of sewage treatment plants and require a substantial reduction in the diversion upon the renewal of the permit.

"5. It is estimated that the construction of sewage treatment plants for a population of 1,200,000 will permit a reduction in the necessary diversion from Lake Michigan of about 1,250 cubic feet per second. In other words, such construction would permit a reduction in the authorized diversion, by December 31, 1929, to about 7,250 cubic feet per second. As stated above (paragraph 4), it is probable that a still more rapid rate of reduction of diversion may be practicable thereafter.

"6. It is, of course, highly desirable that the excessive diversion of water from Lake Michigan be reduced to reasonable limits with the utmost dispatch. For humanitarian reasons, it is impracticable to make the desired reduction instantaneously, and it is believed that the procedure proposed by the District Engineer is the most reasonable and just to all concerned that can be adopted.

"7. As further means of relieving the present undesirable situation with respect to lake levels, the District Engineer recommends as conditions of the permit the prompt adoption and execution of a program for metering Chicago's water supply, the construction of controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms, and also that the Sanitary District be required to pay a share of the cost of such regulating or compensating works for restoring lake levels as may be constructed, posting a bond of $1,000,000 as a guarantee of their good faith in the matter.

"8. I concur in the views of the District Engineer, and recommend the issuance of a permit in accordance with the draft herewith.

H. Taylor,
Major General, Chief of Engineers."

Ex. No. 12, Doc. 44, Tr. 429-431.

"LETTER OF SECRETARY OF WAR WEEKS TO SANITARY DISTRICT

March 3, 1925.

"Mr. Lawrence F. King,
President, Board of Trustees,
Sanitary District of Chicago,
910 South Michigan Avenue,
Chicago, Illinois.

"Dear Sir:

"With reference to your application of January 31, 1925, for permission to divert an annual average of ten thousand cubic feet of water per second from Lake Michigan through the channels of the Sanitary District of Chicago, it is my pleasure to inform you that after careful consideration by the Chief of Engineers and myself, and acting upon his recommendation, I have issued a permit, effective this date, authorizing the temporary withdrawal of 8,500 cubic feet of water per second until December 31, 1929. One copy of this permit is transmitted herewith.

"Your attention is invited to the conditions to which this authorization is subject, particularly those prescribing certain definite accomplishments on the part of your locality. This department has always held and continues to hold that the taking of an excessive amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost dispatch. I appreciate that the desired reduction can not be made instantaneously, but with a view of making a substantial reduction by the time this permit expires, the conditions require, among other things, the artificial treatment of the sewage of a large population, the construction of controlling works to prevent the discharge of the Chicago River into the lake, and the metering of the water service of the city of Chicago.

"I cannot emphasize too strongly the importance of diligent and prompt execution of the conditions imposed. If it is necessary to increase the bonding power of the Sanitary District from three to five per cent of the assessed valuation of the taxable property, or if increased taxing power is imperative, the requisite legislative permission should be obtained promptly. While it is not in my province to dictate, I sincerely urge the reduction of your expenses to the lowest possible requirements, and, further, that arrangements be made with the packers and corn products interests to treat their waste before discharging it into the sewers.

"I believe that steps should be taken which will enable Chicago to complete the entire work within ten years.

Sincerely yours,

(Signed) JOHN W. WEEKS,
Secretary of War."

Ex. 12, Doc. 46, Tr. 436-37.

"Mr. Henry G. Chilton, C. M. G.,
Envoy Extraordinary and Minister Plenipotentiary,
Charge d'Affaires ad interim of Great Britain.

"Sir:

Referring further to your note No. 467 of May 7, 1925, concerning the diversion of water from Lake Michigan by the Sanitary District of Chicago, I have the honour to furnish you with the following information in reply to the inquiries made by the Canadian Government.

"First: The actual average flow of the water passing Lockport during the year ending March 3, 1925, has been 9,700 cubic feet per second.

"Second: This average flow of water passing Lockport will not be immediately reduced by any amount under the terms of the permit issued by the Secretary of War on March 3, 1925.

"Third: This average flow may be reduced by December 31, 1929, by an amount varying from 1,750 to 3,000 cubic feet per second.

"By way of explanation of the wide range over which the amount of reduction by December 31, 1929, varies, it should be stated that the amount of reduction depends upon the decrease in the sewage load on the water in the Drainage Canal. The permit prescribes that a minimum population of 1,200,000 be provided with the equivalent of 100% treatment. The program of sewage treatment plant construction contemplates the completion of plants which will give 100% treatment to a population of slightly over 1,400,000. If this program is carried to completion a larger reduction may be made in the flow than if only the requirements of the permit are carried out.

"Furthermore, when the controlling works which are required to be placed in the Chicago River or Drainage Canal to prevent reversals into Lake Michigan in times of flood are completed and in operation it may be found practicable to make a much larger reduction in the flow of water with safety to the water supply of the City of Chicago during winter season, a time when the oxygen content of the diluting water is much higher than it is during the summer season.

"It is also expected that there will be a substantial reduction in the amount of water consumed in the locality for domestic purposes as the result of a requirement of the permit of March 3, 1925, which makes it necessary for the City of Chicago to adopt and carry into execution a program of metering its water supply. By December 31, 1929, this reduction will vary between 400 and 600 cubic feet per second.

"The net result of all these varying influences will be to make it possible to reduce the average flow by a minimum amount of 1,750 cubic feet per second, and possibly by the maximum amount of 3,000 cubic feet per second.

"To explain the apparent inconsistency between the amount of water specified in the permit (8,500 cubic feet per second measured at the intakes) and the flow at Lockport (9,700 cubic feet per second) it might be stated that the difference represents the amount of domestic water consumption by the City of Chicago which could not be authorized or included properly in a permit issued to the Sanitary District of Chicago, a separate municipality, other than to make the permit non-operative in case of failure on the part of the former agency to adopt certain measures of conservation which were specified. Condition 8 of the permit of March 3, 1925, looks to a substantial reduction of this portion of the flow in the Chicago Drainage Canal, at the same time condition 4 makes possible a reduction in the amount of water used for dilution of sewage.

"Accept, Sir, the renewed assurances of my high consideration.

"For the Secretary of State:
"JOSEPH C. GREW."

Ex. 17. Tr. 438-39-40.

Diplomatic Correspondence between
the United States and Canada.

"November 24, 1925.

"His Excellency
The Right Honorable
Sir Esme Howard, G.C.M.G., K.C.B., C.V.O.,
Ambassador of Great Britain.

"Excellency:

"Referring further to your Embassy's note No. 813 of September 15, 1925, bringing to my attention certain remarks and inquiries of the Canadian Government in regard to the diversion of water from Lake Michigan by the Sanitary District of Chicago, I take pleasure in submitting the following statements:

* * * * *

"* * * The case before the Secretary of War for action involved the granting of a permit for diversion of water for sanitary purposes only, and the instrument of authority was worded accordingly.

"On the other hand, it seemed to the Secretary of War that the diversion of water for domestic consumption by the City of Chicago was larger than it should be, and that the amount wasted was not a negligible portion of the gross diversion. He also considered that this excessive diversion for domestic purposes made the cost of sewage treatment plant construction and operation unnecessarily high and consequently added to the length of the construction period and the difficulties of financing. For these reasons the Secretary of War took cognizance of the diversion for which the City of Chicago is responsible, in a restrictive way, rather than by permissive means, and included a condition in the permit making the instrument voidable in case the City of Chicago fails to take specified steps looking to a curtailment in the amount of water diverted for domestic purposes.

"In the judgment of the Secretary of War the average diversion which should be authorized for sanitary purposes under the conditions known to exist should not be less than 8,500 cubic feet per second. The safety of the lives and health of citizens of the locality cannot be disregarded, and until the conditions of the permit of March 3, 1925, have been complied with no substantial reduction in the amount of diversion could be made without endangering health if not life.

"The expression 'measured at the intakes,' used to designate the place where the total actual flow should not exceed that specified in the permit, is hypothetical as it is impracticable to measure the diversion at the numerous intakes with accuracy. For this reason, the practical enforcement of the limitation placed upon the diversion will be carried out at Lockport. Measurements taken there will determine the gross diversion, sanitary and domestic, and, as accurate information is available in regard to the amount of water pumped by the City of Chicago for domestic purposes, the sanitary diversion may be computed by subtracting the domestic diversion from the gross flow at Lockport.

"The term 'diversion' as used in the permit is construed to include the discharge of the Chicago and Calumet Rivers. In view of the methods employed in computing the amount of the diversion the discharge of these streams will be included within the 8,500 cubic feet per second authorized by the permit of March 3, 1925.

* * * * *

"The Canadian Government is correct in concluding that no immediate reduction in diversion has been provided, but its conclusion that no definite reduction is assured and that the effect of the permits will actually be to authorize a greater diversion than is now being made cannot be confirmed. The *gross flow* at Lockport will not exceed an average of 9,700 cubic feet per second, and by the time the permit of March 3, 1925, has expired the gross flow may be reduced to 8,000 cubic feet per second and probably to 6,700 cubic feet per second. The sewage treatment program of the Sanitary District has been arranged, so as to make it possible to effect a reduction to a gross flow of 4,167 cubic feet per second by the year 1935 or before.

"I shall be grateful if you will cause the foregoing statements to be brought to the attention of the Canadian Government.

"Accept, Excellency, the renewed assurances of my highest consideration.

(Signed) FRANK B. KELLOGG."

Ex. 17. Tr. 441, 443, 444-445.

Diplomatic Correspondence between
the United States and Canada.

PUTNAM REPORT, PAGES 4, 5 AND 6.

"On March 23, 1908, the Attorney General of the United States caused to be filed in the United States Circuit Court, Northern District of Illinois, Eastern Division, a bill of complaint, No. 29019, seeking to enjoin the Sanitary District of Chicago from constructing the Calumet Sag Canal, diverting through it the waters of Calumet River or Lake Michigan and reversing the current in the Calumet River.

It was alleged by the Government that these acts would lessen, impede, and obstruct navigation in the navigable Calumet River and would lower the level of Lake Michigan and thus decrease its navigability, and therefore were unlawful under section 10 of the river and habor appropriation act of March 3, 1899, because they had neither been authorized by Congress nor recommended by the Chief of Engineers, United States Army, and approved by the Secretary of War.

The respondent answered, denying or belittling each allegation, denying that the Calumet River was navigable within the meaning of the term, or that diverting water from Lake Michigan would lower the level, or that the act of March 3, 1899, was applicable or even a constitutional or valid enactment. At the same time the respondent claimed the project would benefit navigation; that State Law required it to carry out the project; that it was the only authorized agency for providing the needed drainage and sewerage, and the proposed method was the only lawful one under state enactment; that it made application to the Secretary of War for a permit only as a mere matter of comity; and that the old Illinois and Michigan canal laws constituted authorization by Congress. This answer was filed March 23, 1908.

Evidence of the complainant was taken from February 15, 1909, to July 8, 1909. The defendant proceeded to again open negotiations with the War Department and did not for a time make testimony on its own behalf. The Government testimony was directed to the questions of the effect of the diversion upon the navigation capacity of the lakes and their connecting waters, and the resulting injury to the interests of navigation. When, finally, on May 31, and June 1, 1911, the defendant took testimony, it was not directed toward meeting the testimony of the Government witnesses, but rather to establishing the desirability of the project from a sanitary standpoint and to showing that while there were other efficient methods for the disposal of the sewage of the Calumet district, the proposed dilution method was the cheapest.

Thereupon the case rested while the defendant again negotiated with the Secretary of War. On March 18, 1913, the defendant renewed taking its evidence.

On October 6, 1913, because of the refusal of the defendant to comply with the terms of the permit of the Secretary of War respecting the diversion through the Chicago River, the Attorney General caused another bill, equity No. 114, to be filed in the same court, praying that the defendant be enjoined from diverting more than 4,167 cubic feet of water per second from Lake Michigan through the Chicago River.

The two suits were consolidated and heard as one, and the taking of evidence, begun on March 18, 1913, was continued until its final completion on December 19, 1914. Altogether, a large number of expert witnesses were called on each side. The arguments of counsel on the law and facts were presented in 1915.

On June 19, 1920, Federal Judge Landis rendered an oral opinion in the case, which was in effect a finding that the United States was entitled to an injunction restraining the Sanitary District from diverting more than 4,167 cubic feet of water per second from Lake Michigan. Very shortly after this oral opinion was rendered the defendant filed a motion for its reconsideration, July 10, 1920. The court heard the motion on July 12, 1920, and asked both parties to submit authorities.

Federal Judge Landis resigned his position in March, 1922. Upon representation of the United States attorney the case was transferred to Judge Carpenter, who asked that the complainant submit a brief covering the points brought out by the defendant's motion on July 10, 1920. Briefs were submitted, counter proposals offered and rebutted, and after several hearings before the Federal Judge a formal decree was entered on June 18, 1923, findings against the Sanitary District of Chicago and in favor of the Federal Government. (See Appendix X) The court granted a stay of execution of six months for the purpose of allowing the defendants ample time to seek relief from the Supreme Court of the United States or from Congress. The Sanitary District filed an appeal on June 20, 1923.

As a result of its disregard of Federal jurisdiction the Sanitary District has rendered null and void the permits issued for the construction of the Calumet Sag Channel and the construction and operation of the North Shore Channel. Both permits contained the condition that the total diversion of water from Lake Michigan into the Illinois River, should be no greater than already authorized by past War Department permits. As the amount withdrawn has exceeded the amount thus authorized, the permits are null and void, and the structures are illegal.

On November 9, 1921, a resolution was introduced in the House of Representatives, being entitled 'A bill to limit the amount of water which may be withdrawn from Lake Michigan by the Sanitary District of Chicago, giving authority therefor, and fixing the conditions of such withdrawal.' This resolution obviously was drawn up by or for the Sanitary District, the object being to obtain congressional authorization for a diversion of 10,000 cubic feet per second. The Secretary of War, upon being consulted by the Committee on Rivers and Harbors, advised against the passage of the enactment in a letter of February 2, 1922. His recommendations are set forth clearly in the following extract from the letter referred to:

> The diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago. It is by no means established, however, that the quantity required for that purpose, either now or in the future, is 10,000 cubic feet per second. I regard it as inadvisable to permit the diversions in that amount, or in any amount exceeding the amount now fixed by the department without full and complete information concerning the necessity therefor. It is my view that the quantity authorized should be limited to the lowest possible for sanitation, after the sewage has been purified to the utmost extent practicable before its discharge into the sanitary canal. I regard it as extremely inadvisable to grant the city of Chicago, or any other agency, the right in perpetuity to take from the lake a definite quantity of water. It is not improbable that within a generation a method may be found to separate the valuable fertilizing elements from sewage as a consequence of which, the withdrawal of water from the lake to dilute the sewage will no longer be necessary. In view of the substantial and widespread damage done to many activities throughout the United States by the diversion, damage which can be but partly compensated for by the construction of the works proposed in the bill, the diversion should not be continued beyond the time when its necessity ceases to exist.

A bill was presented to Congress on January 27, 1923, shortly before the closing of its last session, modifying the terms of the House resolution of November 9, 1921, and including provisions for a 9-foot waterway from Utica to Cairo, Ill., by way of the Illinois and Mississippi Rivers. These provisions serve to make the measure more attractive to residents of towns along the Illinois River, but do not alter the primary object of the legislation—that of obtaining congressional authority for a diversion of 10,000 cubic feet per second. This bill is to be reported on by a special committee of the Senate at the next session of Congress."

. . . .

Ex. 1-G, Tr. 414-15.

Report of Major Putnam, U. S.
District Engineer, November 1923.

APPENDIX "O."

On November 9, 1921, a resolution was introduced in the House of Representatives, being entitled "A bill to limit the amount of water which may be withdrawn from Lake Michigan by the Sanitary District of Chicago, giving authority therefor, and fixing conditions of such withdrawal." This resolution obviously was drawn up by or for the Sanitary District, the object being to obtain congressional authorization for a diversion of 10,000 cubic feet per second. The Secretary of War, upon being consulted by the Committee on Rivers and Harbors, advised against the passage of the enactment in a letter of February 2, 1922. His recommendations are set forth clearly in the following extract from the letter referred to:

"The diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago. It is by no means established, however, that the quantity required for that purpose, either now or in the future, is 10,000 cubic feet per second. I regard it as inadvisable to permit the diversions in that amount, or in any amount exceeding the amount now fixed by the department without full and complete information concerning the necessity therefor. It is my view that the quantity authorized should be limited to the lowest possible for sanitation, after the sewage has been purified to the utmost extent practicable before its discharge into the sanitary canal. I regard it as extremely inadvisable to grant the city of Chicago, or any other agency, the right in perpetuity to take from the lake a definite quantity of water. It is not improbable that within a generation a method may be found to separate the valuable fertilizing elements from sewage as a consequence of which, the withdrawal of water from the lake to dilute the sewage will no longer be necessary. In view of the substantial and widespread damage done to many activities throughout the United States by the diversion, damage which can be but partly compensated for by the construction of the works proposed in the bill, the diversion should not be continued beyond the time when its necessity ceases to exist.

Exhibit 1-G, Trans. 414-15.

Report of Major Putnam, U. S.
District Engineer, November 1923.

Question 6 (D):

Without considering compensation by the present relative diversions of water from the Niagara River and from Lake Erie and without prejudice to a future consideration thereof, what works, if any, could be constructed to recover on the St. Lawrence River the amounts of power determined under section 6 (c), and what would be the cost of such works?

244. Answer.—The board finds that after the St. Lawrence River has been fully developed for power production no works can be constructed which would recover on the St. Lawrence the power lost by the diversion of water from the watershed.

Exhibit 147, page 44, 6 (D).

REPORT OF JOINT BOARD OF ENGINEERS
ON ST. LAWRENCE WATERWAY.

Evidence with respect to compensating works in the Great Lakes was admitted over objection of complainants.

Transcript 3990-177 to 3990-182; 3903-3904; 5702.

APPENDIX "P."

"Q. Was there any complete sewage treatment at Cleveland during that time?

A. Cleveland has no complete sewage treatment up to the present time. Only a small portion of the sewage is treated.

Q. Does the sewage pass into the lake?

A. The sewage passes into Lake Erie.

By the Special Master:

Q. In what state?

A. In a raw state, with an exception of a small portion of it."

Rockwood, Transcript 8187-8188.

"Q. In your opinion, are there other ways of protecting the public water supply of the city of Chicago and the public health which are equally or more effective than the one of diversion?

A. There are.

Q. Will you explain your reasons for disagreeing with the conclusion reached by Dr. Evans in the statement quoted?

A. I am basing my opinion on the Cleveland experience. In Cleveland the sewage is returned to the Lake only a small portion treated, and the lake is used for a source of supply of water. We do not nor could we, practice diversion of the sewage. Our general death rate, nevertheless, has remained consistently lower than the death rate of Chicago in recent years, and the typhoid rate has remained practically identical with the city of Chicago. On this account I conclude that Chicago could duplicate the Cleveland performance."

Rockwood, Transcript 8209.

"60% water supply filtered 100% chlorinated April 1918
Operation of sewage treatment works started 1922
100% filtration 100% chlorination October 24th, 1925."

Exhibit 190.

Chart "Typhoid Fever Death Rate
Per 100,000 population
Cleveland, Ohio"

"Q. Is the Milwaukee Sewage Plant one of those under your jurisdiction in your official capacity?

A. It is.

Q. Are you familiar with the plant, its operation, and the results that have been secured?

A. I am."

Baker Transcript 8557.

"Q. When did the plant go into operation?

A. I believe the plant went into operation—well, a part of the plant went into operation, I believe, in 1925. I do not recall definitely the date."

Baker Transcript 8560.

"Q. What is the largest water filter plant?

A. Racine.

Q. What other filter plants have you in Wisconsin?

A. Kenosha is probably the next in size—no; I guess Superior is about the same—Kenosha, Superior—I had better take these through in order rather than to miss some.

I will take them in order and not with reference to size. You have asked a general question."

Baker, Transcript 8812.

"Now, Mr. Eddy, you stated that Milwaukee started experimenting in 1914.

A. That is my recollection, yes.

Q. They had built and completed a plan or a design for what number of people?

A. I think about 600,000 plus.

Q. Was it not designed for a somewhat larger population than is presently in the Milwaukee metropolitan area?

A. Not very much. It may have been slightly. It was laid out with a view to enlargement.

Q. Yes. And that was completed in 1925?

A. No. It is not completed now. It was put into partial operation in 1925, but is far from completion now."

Eddy, Transcript 5305-5306.

"The Witness. I might add, just for the purpose of convenience for the record, that, so far as I know, from recently collected data with reference to that table, that in the Lakes Region, in Minnesota, there is one small plant; in Wisconsin there are six plants, the largest of which is Milwaukee. In Illinois, we have on the Lakefront, on the north of the Sanitary District, four plants, on a smaller population. In Indiana, there are no plants on the waterfront. In Michigan, there are two, on Lake Michigan, both on small places, and in Ohio there are three, in the smaller towns, including, however, the work at Cleveland, on a varying degree of treatment."

Pearse, Transcript 4992.

"TYPHOID FEVER DEATH RATE PER 100,000 POPULATION IN CITIES OF OVER 100,000 POPULATION.

Name of City	Population in 1920	Source of Water Supply	Purification of Water Supply
Buffalo	506,775	Lake Erie	Rapid sand filtration and chlorination
Detroit	993,678	Detroit River	Rapid sand filtration and chlorination
Milwaukee	457,147	Lake Michigan	Chlorination
Rochester	295,750	Hemlock Lake	Chlorination"

Exhibit 1178.

APPENDIX "Q."

"Section 5. That the said sanitary district of Chicago is hereby authorized to construct all such dams, water-wheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now, or hereafter, constructed by said district.

Section 6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy, and shall be transmitted to the various cities, villages and towns within said sanitary district, or adjacent to the main channel of said sanitary district, and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said sanitary district: Provided, however, that it shall be the duty of said sanitary district to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said sanitary district."

Exhibit No. 14 Section 5, 6. Act of Legislature of Illinois, approved May 14, 1903, p. 49.

"Reading from Exhibit 1 E, being page 11, first paragraph of the Putnam Report:

'In 1903 work was started on an extension of the main channel leading from the basin at the controlling works to the proposed site of the power house, some 11,000 feet. This work, including the construction of the power house, the installation of the machinery, and the completion of the transition lines and the tail race was finished in the latter part of the year 1907. From the power house the channel was extended to the upper basin at Joliet, some

11,000 feet, to provide for carrying away the outfall from the power house and discharging it into the Des Plaines River."

Exhibit 1-E p. 317-320.

Report of Major Putnam, U. S.
District Engineer, November 1923.

"Amendment of Separate section 3 of Illinois Constitution (1908)

Provided further, that the General Assembly may, by suitable legislation, provide for the construction of a deep waterway or canal from the present water power plant of the Sanitary District of Chicago, at or near Lockport, in the township of Lockport, in the County of Will, to a point in the Illinois river at or near Utica, which may be practical for a general plan and scheme of deep waterway along a route which may be deemed most advantageous for such plan of deep waterway; and for the erection, equipment and maintenance of power plants, locks, bridges, dams, and appliances sufficient and suitable for the development and utilization of the water power thereof; and authorize the issue, from time to time, of bonds of this State in a total amount not to exceed twenty million dollars, which shall draw interest, payable semi-annually, at a rate not to exceed four per cent per annum, the proceeds whereof may be applied as the General Assembly may provide, in the construction of said waterway and in the erection, equipment and maintenance of said power plants, locks, bridges, dams and appliances.

All power developed from said waterway may be leased in part or in whole, as the General Assembly may be law to provide; but in the event of any lease being so executed, the rental specified therein for water power shall be subject to a re-valuation each ten years of the term created, and the income therefrom shall be paid into the treasury of the State."

Exhibit No. 15.

"A message from the Governor by James Whittaker, Secretary to the Governor:

Mr. President—I am directed by the Governor to lay before the Senate the following communication:

State of Illinois, Executive Department.
Springfield, May 10, 1907.

To the Honorable, the Senate:

In my message transmitting to the General Assembly the report of the Internal Improvement Commission of Illinois, I called attention to the importance of the matters with which the commission had to deal, and to the necessity for early legislative action in reference thereto, especially in relation to the assertion and preservation of the rights of the State in the water power to be created through the contemplated improvement of our natural water courses."

* * * * *

"In addition to this great contribution to the national waterway, the Sanitary District will as ~~soon~~ as it interferes with the water power of the State in Joliet at dam No. 1, pay into the State treasury $75,000 per annum, to be used in maintaining the Illinois and Michigan Canal and the navigability of the Illinois river, thus relieving the State of a pecuniary burden which it has heretofore been compelled to bear.

In my biennial message I called attention in the following language to other phases of the benefits which will result to the State from the development of a deep waterway:

In connection with this most prominent feature of the commission's work, the report of the commission shows many incidental advantages which will accrue to our own State from the construction of the proposed waterway. Among these, is the creation of 120,000 electrical horse power, which can be secured without in any way affecting the use of the waterway as a navigable channel. At the minimum estimate of $25.00 per horse power this electrical power would afford an annual income of $3,000,000."

Respectfully submitted,

Charles S. Deneen,

Governor.

Ex. 1351, Transcript 7511, 7513-14.

"(3) To use or to lease, in whole or in part, the surplus waters of such waterway or the power developed therefrom:

(4) To construct, maintain and operate power plants, structures, buildings and appliances relative thereto for the utilization of the surplus waters arising from the construction, maintenance or operation of the waterway, and to lease, sell or otherwise dispose of the whole or any part of the electrical current or energy thereby generated; * * *

Para. 21. Before any lease of surplus waters of such waterway or the power developed therefrom shall be entered into, public notice shall be given of the time and place at which proposals will be received, which notice shall be previously published for at least once a week for four weeks in two daily newspapers printed in the City of Chicago, in two of the principal engineering and contracting journals of general circulation in the United States, and in such other publications as the Department of Public Works and Buildings may deem proper. The lease, if a satisfactory bid is received, shall be awarded to the highest responsible bidder. The successful bidder shall, before entering upon the performance of such lease, enter into a bond in a penal sum to be fixed by the Department of Public Works and Buildings, payable to the people of the State of Illinois, with sureties to be approved by such Department conditioned to comply with all the terms of such lease and faithfully to fulfill any such contract. No contract or lease shall be made for a period exceeding thirty years. Any lease of undeveloped power shall provide that all plans, specifications and contracts for the construction and installation of plants and equipment shall first be submitted to and approved by the Department of Public Works and Buildings and such Department shall keep an accurate account of the actual cost of such approved construction and equipment as the work progresses. Any lease for undeveloped power may be made in either of the following manners.

(1) The contract may provide that the lessee shall amortize the cost of his plant and equipment during the term of the lease and shall deliver such plant and equipment free of cost, to the State at the termination of the lease; or

(2) The contract may provide that the plant and equipment may remain the property of the lessee until the expiration of his lease, or its termination by the State. Said lease may further provide that the State may purchase such plant and equipment at cost, less depreciation at either the expiration or termination of the lease.

If the State decides under the second provision not to take over the plant and equipment at the expiration or termination of the lease, a re-advertisement for bids for use of such surplus waters shall be had in the same manner as provided for in the original letting. In the event that the lessee whose lease has expired or terminated, is not the best bidder or an equal, such lessee shall turn over, transfer and convey to the successful bidder such plant and equipment upon payment by the successful bidder to the lessee whose lease has expired or terminated, of the cost, less depreciation, of such plant and equipment.

The rental specified for surplus waters, water power or for electrical energy shall be subject to revaluation each ten years of the term created.

In determining the depreciation on plants and equipment installed by any lessee and in revaluing surplus waters, water power or electrical energy at each ten year period, the Department of Public Works and Buildings shall appoint one appraiser and the lessee one appraiser, and the two appraisers thus appointed shall agree upon a third appraiser. In the event they cannot agree upon a third appraiser, the Chief Justice of the Supreme Court of Illinois shall appoint a third appraiser. The finding of such appraisers shall be binding upon the state and the lessee.

The Public Utilities Commission shall have the power to fix the rate which shall be charged by the lessee or his assigns for any electrical energy developed from such waterpower in the event of a lease for distribution of such electrical energy. The provisions of this section shall not apply to sales for a period of ten years or less when such sales are made direct to consumers or to industries of any waterpower or electrical energy developed by the State, but such sales for a period of ten years or less when made direct to consumers or industries may be made by the Department of Public Works and Buildings without advertising.

In awarding contracts for the use of undeveloped or developed power, all other things being equal, preference shall be given to municipalities."

Exhibit 1192 Para 7 (part 3 & 4)
and Para 21
Illinois Waterway Act, June 17, 1919

"17. *Illinois River, Utica to La Salle.*—The section of the river between 1 mile above Utica wagon bridge (the lower limit of the Illinois Waterway) and the junction of the Illinois and Michigan Canal with the Illinois River 0.9 mile below La Salle, 7.4 miles, has never been under improvement by the United States and the channel is obstructed by numerous bowlders. Minimum depths at low stage under present conditions are about 4 to 4½ feet. The fall in this section is about 2 feet.

18. *Illinois River, La Salle to the mouth.*—The existing Federal project adopted in 1880 provides, in connection with the State project, for a navigable channel 7 feet deep at low water of 1879 from La Salle to the mouth of the river, by the construction of four locks and dams and dredging the bars. From La Salle to Copperas Creek, the upper limit of the original United States project, the State of Illinois, has made the improvement, principally by

the construction of locks and dams at Henry and Copperas Creek, 27.2 and 86.5 miles, respectively below La Salle. From Copperas Creek to the mouth the United States has improved the river by dredging and construction of locks and dams at La Grange and Kampsville, 145.6 and 191.7 miles, respectively, below La Salle. The full width of channel has not yet been accomplished, but low water mid-channel depths in the open river are in excess of 7 feet for a width of about 75 feet. All locks mentioned are 350 feet long and 75 feet wide with 7 feet on miter sills. All dredging since 1914 has been done by the United States dredging plant, and to a depth of 7 feet below low water of 1901, the lowest stage of river since the opening of the Sanitary Canal."

Exhibit 1360 p. 9.

House Doc. 2, 67th Congress, 1st session.

"59. The link under improvement by the State of Illinois embraces all of that portion of the waterway (except the lower end of the Chicago Drainage Canal where the Sanitary District of Chicago controls a fall of 36 feet) which will afford any profitable development of water power, the fall under control of the State amounting to about 96 feet. The State expects the returns from water power alone to make its investment profitable. The extent of the water powers controlled by the State and the Sanitary District depends of course upon the amount of water which is withdrawn from Lake Michigan through the drainage canal.

60. As to whether the through waterway above described will prove of economic benefit to the Nation sufficient to justify the cost to the Federal Government of the additional improvements which it is called upon to make between Utica on the Illinois and Cairo on the Mississippi, is in my opinion a doubtful question. The State will presumably recover the value of its expenditures from water powers. The sanitary district can perhaps justify its expenditures in excavating the drainage canal by the resulting conveniences afforded for sewage disposal. The United

States will be out of pocket if a through waterway is created which does not prove to be an economical avenue of commerce.''

Exhibit 1360 p. 18.

House Doc. 2, 67th Congress, 1st session.

''Q. You have referred to La Salle and Utica. You have referred to Utica as the southern terminus of the present proposed Illinois waterway, and you have referred to LaSalle as the northern terminus of the stretch of the Illinois River from its mouth up to that point.

A. I meant to use the term Utica. LaSalle had been the head of navigation for federal improvement, but the Illinois waterway stopped six miles above that at Utica, and it had been presumed that the United States would extend its portion of the improvement up to Utica.''

Woermann, Transcript Vol. 16 4101-4102.

''Q. Now, are there several power sites on that section of the Des Plaines River?

A. The plan of the State was to install power plants into each of the four lower locks.

Q. And the Sanitary District has a power plant installed at the first lock, is that correct?

A. Yes, sir.

Q. Now, in order to have waterpower in connection with the waterway slack water system, it is necessary to have surplus water, is it not?

A. Well, surplus water over and above what is needed for lockage, if that is what you mean.

Q. Yes.

A. Yes, sir.

Q. This section which is under improvement by the State of Illinois includes all of the available commercial power sites between Lake Michigan and the Mississippi River, does it not?

A. Well, at Marseilles there is a power dam there, and has been for 50 years, I expect.

Q. Yes, but that is included in the State section, is it not?

A. Well I do not know exactly what you mean by that; in a general way, yes.

Q. I mean by that that it is included in the stretch of the waterway which is proposed to be improved by the State of Illinois?

A. That is right.

Q. And below the southwesterly end of the section proposed to be improved by Illinois, there are no further waterpower sites; is that correct?

A. That is right.

Q. And the improvement of the State of Illinois commences at the first available waterpower site, after you leave Lake Michigan, being the one now operated by the Sanitary District of Chicago; is that correct?

A. That is correct.

Q. Now, these waterpower sites would be quite valuable if you had a large flow of water from Lake Michigan, would they not?

A. I would think, yes.

Q. But if that flow of water were limited to the quantity needed for lockage purposes, these waterpower sites would not have any value, would they?

A. No, sir.

Q. So that the value of these waterpower sites to the State of Illinois depends upon how large a flow of water can be obtained from Lake Michigan; is that correct?

A. I think, in a general way, that is true."

Woermann, Transcript Vol. 18 pp. 4216-4218.

"Q. Will you state in a general way what these plans show which appear in Exhibit 1242 with relation to this proposed power development?

A. In a general way they show the location of the power structures, elevation of the water at each pool, the general size of the structures, and the amount of power that could be developed under different flows in the river.

Q. What amount of power in a general way, minimum and maximum, is it possible to develop by that project? I will modify that question, and ask you to state in a general way the amount of power that may be developed in connection with that project, without referring specifically to the plant.

A. Development on efficiency of 85 per cent, there may be developed at the four state dams about 72,600 horse power, with 10,000 feet of flow from Lake Michigan. In addition to this, there can be developed at the second dam from the lower end, that is, the Marseilles dam, 11,500 horse power now claimed by the private interests on the opposite side of the river. There can also be developed at the Lockport dam at least 34,800 horse power. That gives a grand total of 118,900 horse power.

Q. Now, in a general way, that development would be divided into three divisions, that at Lockport which you say is 34,800 horse power, that at the Marseilles dam of 11,000 horse power, and at intervening points of 72,600 horse power?

A. Yes, sir.

Q. The development at Lockport is the development of the Sanitary District, is it not?

A. Yes, sir.

Q. That would leave available for development by the State of Illinois or by the United States Government in conjunction with the State of Illinois, between Lockport and Marseilles, a possible power of the amount you mentioned, the 72,600 horse power?

A. Yes, sir.

Q. At what cost might that be developed, in your opinion?

A. I have estimated the cost at about seven and one-half million dollars. I believe the application to the Federal power Commission placed that at about $7,600,000. The exact figures are of record in this case.

Q. You used the estimate or the assumption of n efficiency of 85 per cent. Can that degree of efficiency be obtained, in your judgment?

A. I think so, yes, sir.

Q. Have you calculated or determined the value of that power in that locality?

A. I have estimated its value.

Q. At what?

A. My original estimate of the value of that power was $25 per horse power, including maintenance and operation of plant by lessees. The Engineer Corps previous to the time I undertook that work made the same estimate. That was before war times. Recently a contract has been let in that immediate vicinity where a large part of the power is secondary power, on the Fox River, and the rate as stated in the contract is $25 per horse power; but I believe in that instance the lessor pays for maintenance and operation. Since the date of my original estimate and the original estimate by the Engineer Corps, the cost of coal has greatly increased, the cost of labor has increased, and I believe the estimate that I originally made is very conservative, in fact, may be said to be too low.

Q. $25 per horse power per year, do you mean?

A. Yes, sir.

Q. And on the basis of the amount of power that you have calculated might be developed, what is the annual value of that possible development which you say could be created at a cost estimated at about seven and one-half million dollars?

A. The annual income from the 72,600 horsepower should be not less than $1,815,000 net to the State.

Q. What is the proper basis for determining the capital value of that property?

A. I believe the proper basis in this case is the cost to the State to obtain money for the development of this power. The State bonds are sold bearing 4% interest. In my judgment, this power can be leased so as to return to the State not less than $25 per horsepower net, and I am very confident that that figure can be exceeded; but assuming a value of $25 per horsepower per year net this should be capitalized at 4 per cent, the rate at which the State may obtain its money.

Q. And what would that amount to?

A. That would amount to $1,815,000 net income annually.

Q. The capital value is $45,375,000 gross. From this must be subtracted the cost of development, which I have estimated to be $7,500,000, leaving a net value of $37,875,000. This covers only that portion of the power to be developed by the State."

Barnes, Transcript Vol. 24, pp. 5871-5874.

"Q. Mr. Barnes, I hold in my hand a photostatic copy of a message from the Governor of Illinois received by the Senate of Illinois and dated Springfield, May 10, 1907, and appearing in the Journal of the Senate for 1907. I direct your attention to the following language:

'To the Honorable, the Senate:

'In my message transmitting to the General Assembly the report of the Internal Improvement Commission of Illinois, I called attention to the importance of the matters with which the Commission had to deal, and to the necessity for early legislative action in reference thereto, especially in relation to the assertion and preservation of the rights of the State in the water power to be created through the contemplated improvement of our natural water courses.'

Then further on:

'In my biennial message I called attention to the following language to other phases of the benefits which will result to the State from the development of a deep waterway:

'In connection with this most prominent feature of the commission's work, the report of the Commission shows many incidental advantages which will accrue to our own State from the construction of a proposed waterway. Among these, is the creation of 120,000 electrical horsepower, which can be secured without in any way affecting the use of the waterway as a navigable channel. At the minimum estimate of $25 per horse power this electrical power would afford an annual income of $3,000,000.'

Mr. Barnes, do you think the prospect of obtaining annually an income for the State, a net income of $3,000,000 by abstracting the waters of Lake Michigan had any influence upon the voters of Illinois?

A. I do, yes."

Barnes, Transcript pp. 6795-6798.

"Q. Referring to Exhibit 1194, Mr. Barnes, the first power site as you come from Chicago toward the Mississippi River is at Lockport, is it not?

A. Yes, sir.

Q. And at that point begins the easterly section of the Illinois waterway, does it not?

A. I call it the northerly; it is the upper end.

Q. The last power site as you go down from Lake Michigan to the Mississippi River is located at Starved Rock, is it not?

A. Yes.

Q. And where is the lower end of the Illinois waterway?

A. At Starved Rock, about the lower end of the lock. No definite location of the end has been made.

Q. So that the interest of the State of Illinois in a navigable waterway between Lake Michigan and the Mississippi River commenced exactly at the first power site available as you come from Chicago and terminated promptly at the last power site available, down the river towards the Mississippi? Is that correct?

A. No.

Q. Did it go farther down than that?

A. The interest of the State of Illincis extends throughout the entire valley.

Q. The part that was selected by Illinois for improvement did commence and terminate as I have indicated, did it not?

A. That was fixed by what the government had previously undertaken to develop and control. The Sanitary District at Chicago had carried the navigation improvement down to Lockport. The Federal Government had carried the improvement up to La Salle.

That left a reach of about 72-miles unimproved. The State undertook to develop that portion that had not been taken under control by the Federal Government or the Sanitary District.

In our conferences with the district engineers it was agreed that if we would carry the development to or in the vicinity of the Utica bridge, the government could very fairly extend its program up to that point.

Q. Mr. Barnes, the situation was, when you planned this Illinois waterway, that there was no one that had supervision of any improvement between the dam at Lockport and the end of the Federal project at La Salle?

A. That is right.

Q. And you undertook the improvement of not the whole of that section down to connect with the Federal project, but only so much of it as included the last power site down the river. Is that the fact?

A. Not quite. There is about a mile or a mile and a half beyond that that would carry us to the Utica bridge. The exact alignment there has not been fixed.

Q. But you did not undertake the improvement of the seven miles between the Starved Rock lock and dam and power site and the head of the Federal improvement at La Salle?

A. No.

Q. That seven miles is about correct, is it not?

A. I believe so—somewhere in the neighborhood of seven miles.

Q. Mr. Barnes, before you can have any water power at any of the power sites on this waterway from Lockport to and including Starved Rock you must have surplus water over and above that needed for slack water navigation, must you not?

A. Yes—well, that is not strictly true. You can have power in the off-navigation season or in the navigation season when there is little or no traffic.

Q. Of course, then, if you did not use it for power you would not need it for navigation in the closed navigation season?

A. No.

Q. And of course if you had little or no traffic you would not need that lockage water for navigation?

A. No.

Q. So that, strictly speaking, you would have no power unless you had water in excess of that actually used for navigation?

A. That, again, is not quite true. The natural flow of the river is very low, and the development of the natural flow of the stream has not been feasible because of its small quantity.

With the addition of even enough to provide lockage, and with the structures built for canal purposes, then it does become feasible to construct the power sites for the flow of the river exclusive of diversion from other streams.

Q. Mr. Barnes, in so far as the water from Lake Michigan is concerned, you would have none of that water available for power unless you had a surplus above that actually needed for the operation of the waterway?

A. That is right.

Q. And the more water that you can get above the amount needed for the operation of the waterway, the more power you can produce?

A. That is not quite right. When you get above a certain amount, then, the water becomes objectionable, and the cost of land damages and development becomes so excessive that we must limit the amount to a certain fixed amount.

Q. At least, up to 10,000 second feet?

A. Yes; that is quite true.

Q. What do you estimate to be the value of the power site at Lockport?

A. The power site?

Q. Yes.

A. Do you mean the land value?

Q. The value as a power site, and also what the annual income would be.

Mr. Dietz. With what flow?

Mr. Jackson. With 10,000 second feet.

The Witness. I have never been concerned with that, because we are not concerned with the development there, but, I will have to figure somewhat from memory.

By Mr. Jackson:

Q. You have estimated that before Congressional committees two or three times, have you not?

A. No, sir, I do not think so. Will you read the question?

(The pending question was read by the reporter.)

The Witness. I assume that you want the value of the power?

By Mr. Jackson:

Q. Well, you testified the other day, Mr. Barnes, that there was a certain annual net income to be derived from these power sites.

A. Yes.

Q. And capitalized that into income?

A. Yes.

Q. I do not know whether you considered that capitalized value the value of the power site—

A. (Interposing) The value of the power.

Q. Well, what is that?

A. For this location, on the value of $25.00 per horse power year, it would be a value of somewhere between 18 and 19-million dollars, net.

Q. And what would be the annual income, net?

A. About $870,000, if it could all be used for power purposes.

Q. What power output do you figure?

A. I figured that at 34,800 horse power. If a portion of that water is used for canal purposes, of course, that value must be subtracted from this amount. If, for example, the amount used for canal purposes is 1500 cubic feet per second, then the value of the surplus power would be only 85 per cent of what I have estimated.

Q. Is there any other element of value as a power site? That is, if a private corporation wished to purchase that site as an electrical site, and had a right to use that water, would there be any other element of value involved?

A. I do not recall any other value pertaining to power.

Q. Assume that there was no diversion at Lockport, or that it was limited to the actual lockage water used for navigation, what would be the value of this power site?

A. It would be nil.

Q. And the same would be true with respect to the other four power sites of the State, substantially, would it not?

A. No. They could develop some power from the natural flow of the streams.

Q. Will you state to me what is the value of the State power site at Brandon Road dam and lock, with a flow of 10,000 second feet, and what its value would be with no diversion from Lake Michigan or, with a diversion sufficient to make up what lockage water might be needed, in addition to the natural flow, if any?

A. Brandon Road is on the Des Plaines River, and the low water flow of the Des Plaines River is nil, and the mean annual flow is extremely small, so that there would be very little power at that site, other than that brought in from Lake Michigan.

Q. The fact is, if you had no water from Lake Michigan, except what was actually used for navigation, and used none of that for power, there would not be sufficient flow in the Des Plaines River at Brandon Road lock to justify the construction of a power plant, would there?

A. I think that is right.

Q. So that the value of that power site would be nil, without any diversion from Lake Michigan?

A. Well, without diversion and without any canal, it would be; but with the canal we could get some power. The fact of the matter is, there is a power plant and has been a power plant there for many years.

Q. That is, you could profitably build a power plant, if there were a canal from Lake Michigan, although you used no water from Lake Michigan for power itself, and did use what natural flow there was in the stream for navigation purposes?

A. Yes. I think we could put in a small power house that could profitably operate on the natural flow of the stream.

Q. Where would you get your surplus for that needed for navigation, if you appropriated all of the flow of the Des Plaines River and the extra water that was needed from Lake Michigan.

A. Well, if you appropriated all of the water from the Des Plaines, it would not, of course.

Q. The same situation would hold true at every other lock and dam of the State of Illinois, would it not, if you proceed on the assumption that you use the water that is there naturally for its primary purpose, that of navigation, and merely supplement it with such additional water, if any, as may be needed, from Lake Michigan to furnish the necessary lockage water?

A. No, sir. That is not true, and my answer regarding Brandon Road is not strictly true. The Brandon Road lock is only three-quarters the lift of the Starved Rock lock. Hence, it requires only three-fourths the water. The balance of that water could be used for power purposes. As we follow further downstream, the lockage lift becomes still less, and of course, the water must come down from the Lockport lock, and this surplus could be used for power development. Moreover, the streams that enter further down have a greater natural discharge, and the power becomes more valuable.

Q. Assume that you provided your lockage water in your upper lock by pumping from the lower levels, would the answer still be the same?

A. Well, that is an assumption.

Q. Well, I have made the assumption, and you will just answer on the assumption and you will just answer on the assumption, because you are not responsible for its character.

A. Of course, if you go to any such assumptions as that, I do not know what the values would be.

Q. Since we are not agreed that the difference between 10,000 second feet flow and the lockage water or zero diversion from Lake Michigan would produce a change from the values that you have given already on these power sites to one of nil, I wish you would state what would be the value of the power site at Dresden Island lock, with no diversion from Lake Michigan, and also, if there is any difference, with diversion from Lake Michigan, for lockage water only.

A. Well, I could not do that on the stand, without an exhaustive investigation of the flow and so on, which I cannot recall, offhand.

Q. Is there any question in your mind but that, if there were no diversion from Lake Michigan, or if there were no diversion except solely for lockage water, that all of these power sites of the state would be practically valueless?

A. That would not be true. In the first place, if there is no diversion from Lake Michigan, there will be no Illinois waterway. That is an impossibility, speaking in practical terms. If the position of the complainants' case must prevail, it must be my duty—

Q. You need not discuss that. All you need to do is to answer what would be the result, on the facts assumed.

A. Well, on the fact assumed, if there is no diversion, there can be no canal. Therefore, it is an assumption we cannot make. If the diversion is limited to the use for navigation purposes, then, the power downstream from Lockport is practicable, because, for example, at Brandon Road we only require three-fourths the amount of water that we require at Lockport, and at Dresden Island, we would require less than half the amount of water we require at Lockport. The balance would be waste, unless used for power purposes.

Q. To get away from this difficulty about the waterway, will you tell me whether, assuming there was no diversion or no waterway, the power sites at Brandon Road lock, Dresden Island, Marseilles, and Starved Rock, would have any value justifying their commercial development?

A. I can answer that by stating the experience of others on that reach.

Q. I do not want you to state the experience of others. I want you to state your opinion.

Mr. Dietz. Just a minute. We think the witness should be permitted to use his experience and his knowledge.

The Special Master. He can explain on redirect what he has not an opportunity to explain on cross-examination. The question merely asks for his opinion on that assumption.

The Witness. My opinion is that there are power sites that are practical of development upon the reaches you have mentioned, without any flow from Lake Michigan.

By Mr. Jackson:

Q. Will you tell me how many horsepower you think you could develop at those points, under the assumed conditions?

A. I cannot tell you offhand, but we could develop the flow of the stream, which is quite considerable, for eight or nine months in the year.

Q. About what was the low water season, Mr. Barnes?

A. That varies, of course, from year to year. The low water season is usually in July and August.

Q. Just for two months?

A. Some years. Some years it extends into June, other years over into October. Last year, for example, we had high water in the month of August.

Q. What is the low water flow at Starved Rock?

A. The low water flow at Starved Rock is roughly 500 second feet.

Q. What is it at Brandon Road?

A. At Brandon Road the natural low water flow is nil.

Q. Now, Mr. Barnes, I show you Exhibit 1175, or a copy of it, and ask you if it is not true that all of this water that is flowing out through this power house and dam to the river over the lock is surplus water and not needed for navigation?

A. That is surplus water and not needed for navigation at that point.

Q. The same is true of the water flowing out through the power house, as shown on Exhibit 1273, is it not?

A. Yes.

Barnes, Trans. 7008-22.

"By Mr. Jackson:

Q. Now, Mr. Ramey, it has been the practice of the Sanitary District to manipulate this flow for purposes of power, has it not?

A. No, the flow has not been operated primarily for power. The flow has varied in years past.

Q. Well, did that flow vary with the quantity of power load or not?

A. No, the load would vary with the flow.

Q. Well, the power demand, if that is more accurate, Mr. Ramey: Did the flow vary with the power demand?

A. Not directly.

Q. Well, if there was any variation in flow that coincided with the power demand, is it your testimony that that was accidental?

A. No, I would not say that it was accidental. I would say this, that if the operators at the powerhouse were carrying the bulk of the load through the powerhouse and the load dropped off, like it might between the hours of 12 o'clock noon and 1 o'clock, that they might not open the dam for that one hour to let over the amount of water that was shut out of the powerhouse, due to the automatic shutting down of some of the machinery. So the record for that hour would show a low discharge from the end of the channel.

By the Special Master:

Q. Did I understand you to say that in 1926 you actually diverted less water than you were permitted to divert under this permit of the Secretary of War?

A. Yes, sir.

Q. I do not think I got your reason for that?

A. Well, I was not asked to give the reason; but there were some very bad floods in the lower Illinois River in September and the early part of October, and under instructions from Col. Schulz, we cut the flow in the canal down as low as we possibly could.

Q. That was the period of September and October you were referring to?

A. Yes, sir.

Q. Now, during the rest of the period did you divert all of the water that the permit permitted you to divert?

A. No, we diverted all that we could through the channel.

Q. Well, what was the reason—?

A. At that time, the lake was extremely low, and the Calumet River was not improved, so we could not draw through the Calumet River, much as the Sag Channel has been designed to carry.

Q. What amount are you diverting now?

A. Well, we are diverting now, I think, somewhere around 8,200 second-feet.

Q. That is, as compared with the 8,500?

A. A total of 8,200.

Q. A total?

A. Yes, sir.

Q. That is not compared, then, with the 8,500?

A. Oh, no.

Q. What are you diverting now in cubic second-feet, which would compare with the 8,500 which you are permitted to divert under the permit?

A. About 7,000.

The Special Master. You may proceed.

By Mr. Jackson:

Q. Mr. Ramey, I wish to show you complainants' Exhibit No. 145, which is entitled, Sanitary District of Chicago Main Channel, K. W. Output, and Flow at Lockport, Ill., Half Hour Averages, Typical, December Days.

Mr. Adcock. Is that an exhibit that you put in?

Mr. Jackson. It is one that was in before.

Mr. Adcock. Have you referred to it as an exhibit?

Mr. Jackson: Yes, Complainants' Exhibit 145.

By Mr. Jackson:

Q. Turning to page 9 of Complainants' Exhibit 145, that page shows that, from 4 p. m. to 5 p. m. on that day, the flow at Lockport jumped from 269,000 cubic minute feet to 589,000 cubic minute-feet, does it not?

A. It does.

Q. And it shows that the power production jumped from 9,900 kilowatts to 21,600 kilowatts, does it not?

A. It does.

Q. And that is at a time of the year, in December, when your power demand came on heaviest, between four and five o'clock, is it not?

A. That is.

Q. And that was a time when your evening power load and your day load overlapped; is that correct?

A. That is the time when the night load and day load overlapped, for half an hour.

Q. And at that time your night load was much heavier, independently of this overlapping, than your day load, was it not?

A. It was.

Q. And at 12:30, your load would ordinarily be the least, because of the shutting down somewhat of the factories of some of your largest consumers, would it not?

A. Yes, all of that commercial load goes off at noon, and leaves on the line only the load of the Sanitary District itself and the Municipal pumping station, etc.

Q. And that page 9 indicates that, on that day, the flow through the canal was speeded up very rapidly—or the flow at Lockport—between four and five p. m., and continued relatively high until the next morning at seven o'clock, does it not?

A. (Examining paper) That shows that the discharge through the powerhouse was materially increased for an hour or two, and continued heavy on through the night, because the night load then was heavier than the average capacity of the power plant.

Q. And it shows that the flow beginning in the afternoon, as the night flow came on, and continuing until, the next morning, was very much greater than it was during the daytime, does it not?

A. It shows that.

Q. And do you deny that the reasons for that great increase in flow in that time was a manipulation of the flow for the purpose of power production by the Sanitary District?

The Witness. Will the stenographer read that question?

(The Stenographer read the last preceding question.)

A. I will say that that manipulation of the flow was to get as much power out of the flow of the powerhouse as it was possible. But at this same time I know that there was a flow going over the dams. If we took all of the flow through the powerhouse, I would say that your assumption was absolutely correct, but there—

Q. Well, Mr. Ramey, you produced this exhibit 145, as typical December days for the years in question, did you not?

A. Yes, sir.

Q. And is it not true that you can turn to any of typical days in December and find that the flow was increased in that way, between four and five o'clock in the afternoon, and continued through until the next morning, until you get up to the present year?

A. (Examining paper) That is true up to 1925.

Q. Up to 1925?

A. Up to 1925.

Q. And it is likewise true that, commencing in 1925, you were tied in with the Commonwealth Edison Company of Chicago, is it not?

A. Well, we were tied in with the Edison Company as early as 1918.

Q. But only for a very short time, Ramey; is that not true?

A. Well, for the winter months—

Q. Well, are the figures you gave me at the time the complainants' case was put in, and which I had read into the record, a correct statement of the times when your plant was tied in with the Commonwealth Edison Company. That is, you furnished them. I wonder if you recall if they were correct?

A. Well, I furnished you merely a reference to the agreements—that is, I furnished you information from which you could find the actual agreements between the Sanitary District and the Edison Company.

Q. Well, we will not dispute about that state of the record. When was your company tied in with them?

A. I could not tell that without looking at the agreements myself. I know they were tied in in 1918, and I believe they were tied in again in 1919, and--

Q. Continuously?

A. No, I think those earlier agreements just provided that they should be tied in from some time in October, I think, up until around along about the spring months--I think May 1st. The agreement under which we are now working provides that we will be tied in continuously.

Q. Yes, and that is the reason why your flow and your power load is a straight line, is that not true?

A. That is why we can maintain an almost constant flow in that channel at the present time.

Q. Yes, and you could have maintained that before, as far as the flow is concerned, if you were not manipulating it for power purposes, could you not?

A. Yes, that is—

Q. There was no greater difficulty at that time in obtaining a uniform flow than exists now?

By the Special Master:

Q. I wish you would explain just what you mean by "tying in"?

A. Well, our lines are connected with the Commonwealth Edison Company at the present time. And if there is any hour in the day when the load on the Sanitary District is greater than the output of the Sanitary District hydro-electric plant, we take power from the—that is, the Sanitary District takes power from the Edison Company. And if there is any time of the day when the load on the Sanitary District plant is less than the output of the hydroelectric plant, that power automatically feeds into the Commonwealth Edison System.

Q. Yes.

A. So at the present time, our flow is absolutely steady.

Mr. Adcock. That is, it is an exchange of power.

The Special Master. Yes.

By Mr. Jackson:

Q. Mr. Ramey, your sewage load was greater in the daytime than at night, was it not?

A. I do not believe there is much difference, Mr. Jackson, between day and night on the sewage load down that channel.

Q. Did all your trade concerns operate day and night?

A. No; but sewage that might get into the upper end of the North Branch, for instance, might not get down to the middle of the main channel for fifteen or sixteen hours.

Q. Mr. Ramey, I will direct your attention to Complainants' Exhibit No. 153, being entitled, "Sanitary District of Chicago, main channel, d. w. output and flow at Lockport, half-hour averages, on days of maximum flow in each month of the year 1916." That data was prepared by you at our request, was it not?

A. Yes; that was furnished at your request.

Q. If you turn to page 7 of that sheet, being a typical day for June, the jump in the flow and power load comes at about 8:30 in the evening, does it not?

A. About 7:30.

Q. Well, it comes between 7:30 and 8:30?

A. Yes.

Q. As you look at the succeeding pages of that exhibit, being the typical days for July, August, September, October, November and December, is it not true that the time when this doubling of the flow starts goes forward in the afternoon; that is, from 8 to 7:30 and 7:30 to 7 in each month as the days get shorter?

A. Yes; that flow is increased as the street lighting load of the city of Chicago comes on the system.

Q. Then, that was done for the purpose of generating power, that manipulation of flow?

A. Well, that particular change was.

Q. That particular change or manipulation has been constant up to the last two years, has it not?

A. Yes, that flow has varied, but in that year I think we used only 85 per cent of the total flow through the power house.

Q. It has been constantly varied, has it not, for power purposes?

A. Well it has been operated to carry the load that was put on the plant.

Q. Well, you have an electrical engineer in charge of the Lockport power house, have you not?

A. Yes, sir.

Q. And he regulates the flow down there for the purposes of operating the plant as a power house? Is that true?

A. He used to do it.

Q. Well, he did that up to 1925? Is that correct?

A. Yes."

Ramey, Transcript 4342-4354.

"Q. Now, Mr. Ramey, referring to this manipulation of flow in connection with the power load, you stated that was a process of drawing off the storage water in the canal, did you not?

Mr. Adcock. I do not know whether that was called 'manipulation,' or whether that is a Wisconsin term.

The Special Master. I think it has become an Illinois term as well, because both of you used it in your examination, as I noticed at the time. 'Manipulation' can be used without any offensive innuendo, and I suppose both sides have used it. Certainly Illinois has used it.

A. Well, the drawing off of the surplus water in the early evening hours is taking that water from storage at the lower end of the channel.

By Mr. Jackson:

Q. And you said it took three or four hours to draw that storage water off, did you not?

A. No, I do not think I stated any definite time. It would depend on how much stored water there was and the rate at which you drew it off.

Q. Now, this running of a large quantity of water, according to these exhibits, began in the evening as the light load came on and continued fairly well until the load went off the next morning?

A. It did in years past.

Q. I am referring to the period prior to this last year that you pointed out when it had a straight load. Does not that affect the current of the Chicago River?

A. That heavy flow continues as long as the city street-lighting load in Chicago is on the line.

The Special Master. The point is, did it affect the current of the Chicago River?

The Witness. I do not think it did.

The Special Master. That is an answer.

By Mr. Jackson:

Q. That is assuming that the exhibits showed that extra flow to continue in December from 4:30 or 5 in the evening until 7 the next morning, it is your opinion that it did not affect the current of the Chicago River?

A. I stated that it would take sixteen hours or more, possibly up to twenty-four hours, to change from one flow to another. Now the greatest period of time that that heavy load is on the plant is 14 hours in the winter time. So the flow in the Chicago River would be changed slightly, but it would not be altogether changed. That is, if you had a light flow of, say, 5,000 second feet in the Chicago River in the afternoon, in the late afternoon, when you increased that flow that discharge at Lockport up to, say, 10,000 I doubt if at the end of fourteen hours you would have increased the flow in the Chicago River up to 10,000. In fact, I know you would not have raised it that much.

Q. In order that I may understand it, the situation is that when you assume double the flow at 4:30 in the afternoon, and continue it substantially on that basis until the next morning, it would not have doubled the flow in the Chicago River by the next morning, but it would have made a very substantial increase in the flow of the Chicago River by the next morning, would it not?

A. It would have made a substantial increase in the upper end of the main channel, and that increase would continue for some hours after you had shut off the heavy discharge at Lockport.

Q. Because they would be filling in that storage that had been drawn off at the lower end of the canal?

A. Yes, sir.

Q. So that as I understand you, the maximum change in current which you would have obtained in the Chicago River would appear by 7 the next morning when you cut off the heavy night load. Is that correct?

A. Well, the change in the Chicago River would appear some 16 hours after the change appeared at Lockport.

Q. By that you mean that the greatest effect would be felt in 16 hours?

A. No.

Q. Or that the effect would not be felt for 16 hours?

A. No effect at all would be observed for four hours.

Q. In the Chicago River?

A. Then you would observe a slight change, that change gradually increasing until at the end of 24 hours you would probably have 80 per cent of the change.

Q. What would you have at the end of 14 hours?

A. I do not know. You would have some change.

Q. It would be a substantial change, would it not, Mr. Ramey?

A. Not at the upper end of the Chicago River, around the lake part.

Q. Would it not increase the flow in the Chicago River by over 50 per cent in 14 hours? Fifty per cent of an increase, I mean, Mr. Ramey.

A. Yes, it might do that.

Q. And, as I understand your testimony, then that increase would continue for several hours after you had raised the controlling works at Lockport in order to fill up that storage?

A. Yes, it would. That is the flow in the Chicago River always lags hours behind the discharge from the channel at Lockport.

Q. That is what I have been trying to get at.

A. And the further away you get from Lockport, the greater that lag.

Q. And that maximum effect which you said probably would exceed 50 per cent would be felt in the morning when the controlling gates were raised. Is that correct?

A. Yes, it probably would.

Q. And then continue for three or four hours from that time?

A. Yes, sir.

Q. And did that not cause considerable trouble to navigating the Chicago River?

A. I do not think so.

Q. It would increase the current some considerable per cent, would it not?

A. I do not think it would. I do not think the way that canal has been operated that the current in the Chicago River would have been increased in excess of the figure stated in the permit of 1901, that is, a mile and a quarter an hour.

Q. Regardless of the relation to the permit, I want to know if it would not substantially increase the current.

Mr. Adcock. From what point?

A. From what to what?

By Mr. Jackson:

Q. From the current then existing before you started that extra flow.

A. Well, the change in the discharge at Lockport was being made from time to time, and those changes would not reflect back in the Chicago River for hours.

Q. We have been all over that. As I understand it, we have now gotten the fact of 50 per cent of the matter back in the Chicago River by the next morning, to continue for several hours. We have reached that point. Now I want to know if that does not materially increase the current in the river over what obtained before you started this extra flow.

A. If we had—

The Special Master. Just answer the question. It is perfectly clear. Go ahead and answer it.

The Witness. I do not understand the question, Judge.

The Special Master. Read the question, and then the witness may answer it, and let us end this branch of the discussion by taking the witness' answer.

(The last preceding question was read by the reporter.)

The Witness. In other words, you want me to answer that Yes or No.

The Special Master. Yes. I want you to give an intelligent answer. It is a perfectly clear question.

The Witness. Here is a point where you are running a heavy flow for fourteen hours, and a somewhat lighter flow for ten hours, and in that ten hours you would not have established that extremely slow current.

The Special Master. Do you not know whether in the conditions described the current would or would not be increased?

A. By increasing the discharge at Lockport it would increase the flow in the Chicago River some hours later, and by decreasing the flow at Lockport it would decrease the flow in the Chicago River, some hours later.

The Special Master. Now you are asked on a certain assumption, based on your testimony, with regard to the increased flow fourteen hours later, that is, after the change, whether that would affect the current in the Chicago River. What is your answer?

A. It would affect it.

By Mr. Jackson:

Q. Does the storage water in the southwest end of the Drainage Canal have any effect on the rapidity with which you take water off in case of storm?

A. Yes, sir.

Q. It tends to prevent the rapid drawing off of storm water, does it not?

A. No. The more water you have stored in there, the more you can draw off.

Q. That is, the more water you have stored above the dam at Lockport, it is your testimony that the more quickly you can draw water off through the channel?

A. Yes; because you have a greater head there, a greater depth of flow over the dam, and a greater head through the sluice gates.

Q. As I understand you, when you store water you raise the gates in order to back up and accumulate water at that end of the Drainage Canal?

A. Yes, sir.

Q. And it is your testimony that the more you raise the gates and the more you back up the water and accumulate it in the end of the Drainage Canal, the more easily you can draw off storm water from the Chicago River.

A. No, not at all.

Mr. Adcock. The other question did not relate to the Chicago River. It related to the end of the Drainage Canal.

A. You asked me if I could not take more water out at the lower end of the main channel, with more water stored there and a higher head, and I answered that.

By Mr. Jackson:

Q. What I want to know, Mr. Ramey, is when you have accumulated storage water in the way which you have described, does not that hinder the drawing off of storm waters from the Chicago area?

A. Yes. It is better to have the canal lower at Lockport."

Ramey, Transcript 4480-4489.

"Mr. Wisner. You operated an electric power plant while you were Chief Engineer of the Sanitary District?

A. Yes, sir. I built it.

Q. And you sold a part of the electric power? Is that true?

A. Practically sold it all, except what we used ourselves.

Q. And you made a substantial profit on that, did you not?

A. Well, we made a profit in the beginning on the commercial load. We made no profit on the municipal load; in fact, I think we lost money on it.

Q. What profit did you make on the commercial load?

A. I do not recall.

Q. Mr. Wisner, in 1924 you testified before the Rivers and Harbors Committee, did you not?

A. I did, yes, sir.

Q. Referring to page 1623 of Part 2 of the hearings of 1924 before the Rivers and Harbors Committee, I find this testimony by you:

'Mr. Wisner: That is, with the regulating works in use, generally the value of power at Chicago is about three times what it is around Niagara Falls.

'Mr. Hull: Do you mean they would pay three times as much for it?

'Mr. Wisner: No.

'Mr. Hull: You want to explain that?

'Mr. Wisner: I mean the net value of it is about three times as much.

'Mr. Hull: Why is that?

'Mr. Wisner: Because it costs so much to make it at Niagara Falls and costs so much to make it in Chicago. In Chicago it costs $26.40 per horse-power to make the power and we were selling it for $55 per horse power, where we sold it commercially, I mean. That means a profit of about $29.'

Do you think that was substantially correct?

A. I think that was. That was on the commercial load. We did make a profit on that.

Q. The rest of it you used yourself?

A. No; as distinguished between the Sanitary District and the other municipalities; most of it was sold to the city of Chicago and the park systems and pumping stations and public buildings at that price, as I recall it, of $26.40 for horse-power which had been regarded as cost."

Wisner, Transcript 3755-3757.

SANITARY DISTRICT OF CHICAGO
TABULATION OF FLOWS THROUGH LOCKPORT POWER HOUSE, AND OUTPUT OF SAME.

Year	Flow Through Power House C. F. S.	Lockport Power House Output KWH[2]
1908	1640	21,000,000
1909	3399	50,534,040
1908-09	2520	35,767,020
1910	4262	72,861,101
1911	5287	83,663,000
1912	5580	88,908,800
1913	6195	98,208,590
1914	6672	106,764,600
1910-14	5599	90,077,618
1915	7047	109,631,300
1916	7387	112,326,700
1917	7454	119,374,900
1918	7511	120,201,000
1919	8030	126,375,200
1915-19	7486	117,581,820
1920	7910	120,581,400
1921	7657	117,875,300
1922	8178	122,551,800
1923	8031	124,135,700
1924	8938	126,572,600
1920-24	8142	122,343,360
1925	8032	117,747,200
1926	8245	118,196,700

[2] Kilowatt-Hours.

Exhibit 1112, Tr. 3374-3375.

"THE SANITARY DISTRICT OF CHICAGO

ENGINEERING DEPARTMENT

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Subject THE SANITARY DISTRICT OF CHICAGO
Computation Main Channel-K. W. & Flow at Lockport, Ill. No Friday

Computed by ....

	Total flow K. W.	Date Dec. 14, 1923 C. F. M.
12 Midnight	15600	497500
	15500	495500
1	15200	488500
:30	14500	472000
2	14000	429000
:30	14200	434000
3	13900	426000
:30	14100	421000
4	14100	421000
:30	14100	421000
5	14200	423500
:30	14200	423500
	12800	392500
6	9500	
:30	8500	278000
	8900	
7	10100	288500
:30	11200	
8	12800	359000
:30	13300	393500
9	13300	393500
:30	13100	389500
10	13100	389500
:30	13000	387500
11	13000	387500
:30	13200	391500
	12600	379000
	11700	334000

12 Noon	6700	
:30	6800	210500
	11700	
1	12100	331000
:30	12100	335000
2	12100	335000
:30	12000	330000
3	12000	330000
:30	11300	319000
4	10300	299000
30	10300	294000
	14800	
5	18300	483500
	21500	
:30	20900	623000
6	20200	607000
:30	19700	611000
7	19600	609000
:30	19000	594500
8	18600	602000
:30	17800	582500
9	17100	565500
:30	16400	549000
10	15800	517000
:30	15800	517000
11	15800	517000
:30	15700	514560

Exhibit 145, p. 22.

"DIVERSION FOR SANITARY PURPOSES, CHICAGO DRAINAGE CANAL

The flow in the lower end of the canal always varies considerably during the day, being generally small during the daytime and large at night. The flow is regulated mostly by the draft of water at the power house, which carries a heavy lighting load at night. The Saturday and Sunday loads do not differ greatly from the loads of the other week days.

During the 12 hours or more that the heavy night load is on the storage in the canal is being drawn down while the water surface profile along the canal gradually approaches its new position of equilibrium. This equilibrium requires much more than 12 hours for establishment, and it therefore happens that the flow into the upper end of the canal has not become as great as the flow out of the lower end at daybreak when the lighting load is thrown off. During the daytime conditions are reversed, and the inflow is greater than the outflow, the storage being built up slowly."

Exhibit 211 9248-9249.

Warren Report.

"It is manifest that so long as the City is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly a more expensive method of disposing of its sewage. This is particularly true in view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport. But it must be remembered that for every unit of horsepower realized by this water at Lockport four units of similar horsepower would be produced at Niagara, where the natural conditions are so much more favorable."

Exhibit 12, Doc. 41, p. 404.

Opinion of Secretary of War Stimson, 1913.

APPENDIX "R."

The Illinois and Michigan Canal shall never be sold or leased until the specific proposition for the sale or lease thereof shall first have been submitted to a vote of the people of the state, at a general election, and have been approved by a majority of all the votes polled at such election. The general assembly shall never loan the credit of the state, or make appropriations from the treasury thereof, in aid of railroads or canals: Provided, that any surplus earnings of any canal may be appropriated for its enlargement or extension (Separate Sections, 3, Illinois Constitution of 1870, page 59, the Statutes of Illinois by Gross; Vol. 2; 1872)

Ex. 5, Tr. 209.

Complainants' Exhibit No. 6, resolution of Illinois General Assembly.

"Whereas, the state of Illinois, in general assembly, did on the sixteenth day of February, 1865, grant and authorize the city of Chicago, in the state of Illinois, to deepen the Illinois and Michigan canal for the purpose of, and with the intent to better the system of sewage of the said city of Chicago by permitting a free flow of water from Lake Michigan through the Chicago river and said canal to the Des Plaines and Illinois rivers; and the city of Chicago did perfect said improvement in conformity with said permission; and

"Whereas, the great fire in the said city of Chicago on the eighth and ninth days of October, A. D. 1871, did so greatly damage the assessable property of a very large number of its citizens and taxpayers, and the People of the State of Illinois did, by its general assembly, refund to the said city of Chicago the amount of the cost of deepening the Illinois and Michigan canal, said sum refunded being in gross two millions nine hundred and fifty-five thousand three hundred and forty dollars; and

"Whereas, the deepening of the canal as aforesaid has proved to be totally inadequate for the purposes intended, and the large amount of sewage of the city of Chicago being far greater than the capacity of the canal and the water now passing through it to deodorize and render innocuous; and

"Whereas, the foulness of the water annually causes the death of millions of fish in the Des Plaines and Illinois rivers that float to the shores and decay; and

"Whereas, said sewage, in an entirely undecomposed and putrid mass, is carried by the current of the canal into the Des Plaines river, and thence into the Illinois river, and in its foulest condition is thus transported to and below the city of Peoria, in said state, rendering the air, at all points along its passage, so impure and foul as to be exceedingly offensive, and taking with it germs of disease of all kinds prevalent in the city of Chicago, and thus spreading them broadcast through the entire Des Plaines and Illinois river valleys, causing thereby much illness as well as poisoning of the blood, and devilitating the systems of 200,000 people; and

"Whereas, careful investigation leads our people to fear that an epidemic may spread over said section of the state of Illinois from the causes above stated; and

"Whereas, in addition to the above distress, there has been a great loss to property, business industries, and to the communities in said region, by reason of the causes herein mentioned; and

"Whereas, prior to the deepening of said Illinois and Michigan canal, the water necessary for all purposes of navigating said canal and propelling of machinery was obtained from the Des Plaines river and the Calumet feeder, through Lane's Lake; and

"Whereas, the bed of the Des Plaines river, at the summit and thence westward along the line of and adjacent to the canal, is at a low stage of water, eight (8) feet below the surface level of the canal, and will average a supply of water sufficient for all canal and power purposes during the seasons of navigation; and

"Whereas, the supplying of the canal from these sources will so dilute and weaken the sewage of the city of Chicago, to greatly relieve it of its foulness and stench, to the great delight, relief and health of the people near to and bordering upon the line of the canal, the Des Plaines and Illinois rivers; therefore, be it

"Resolved by the Senate, the House of Representatives concurring therein, That the Board of Canal Commissioners of the Illinois and Michigan canal be, and they are hereby, directed to cause sluiceways of sufficient capacity, with the proper guard-gates, to be opened from the Des Plaines river to the canal, at or near the Summit, in Cook County, and at or near Lemont, in Cook County, and also to construct a dam across the former Calumet feeder at such suitable point as will cause the waters from Lane's Lake to flow into the canal; that said canal commissioners shall immediately commence, construct and improve said sluices and feeders in the order named, and pay for the same out of any moneys in their hands or control as canal commissioners, resulting from the earnings of the canal. The amount to be expended as above designated in the prosecution of said improvement shall not, however, exceed the sum of ten thousand dollars; Provided, that the canal commissioners shall first confer with the mayor or other proper authorities of the city of Chicago, and if said city shall proceed without delay to cause a flow into the canal from the Chicago river sufficient to dilute and purify the waters, and thus remedy the evils complained of, said flow to be not less than 60,000 cubic feet per minute, including the ordinary flow into the canal from the Chicago river, or so much thereof as in their judgment said canal can carry, and if this shall be accomplished by the first day of September, 1881, the commissioners shall accept it in lieu of obtaining a supply of water from the other sources named; Provided, further, that said commissioners are hereby directed to take care of the 60,000 cubic feet per minute, above contemplated, if so furnished by the city of Chicago; Provided, further, that the adoption of this resolution shall not commit the state to a system of permanent drainage of Chicago sewage through either the canal or Des Plaines or Illinois rivers, but that the state reserves the right to require the city of Chicago, in future years, to take care of its sewage through other channels.

Ex. 6. Pages 210-214.

Resolution of Illinois General Assembly, 1881.

Complainants' Exhibit No. 3-C.

Mr. Jackson. We now offer to read into the record Complainants' Exhibit No. 3-C, being an extract from the Warren Report, page 173.

"In 1881 the protest of the people of Joliet and other parts of the Des Plaines and Illinois Valleys had become so loud that the State passed a resolution requiring Chicago to provide a flow of 1,000 cubic feet per second or abandon the use of the canal for sewage dilution. In compliance with these resolutions the city built a new pumping station of the required capacity at Bridgeport, together with a lock to prevent back flow from the canal into the river. Pumping commenced in 1883. For a few years this afforded sufficient dilution in the canal and there were no more complaints from the valley. Unfortunately, when the pumping plant was installed Lake Michigan stood at a very high stage and the pumps were given only sufficient capacity to provide the legal 1,000 cubic feet per second under these conditions. In 1886 the lake level began to fall, and continued to do so until in 1891 it was about 2 feet lower than when the pumps were installed. Their capacity thereby being reduced to a little more than 600 cubic feet per second. As the growth of the city had continued at its usual rate, the nuisance along the canal became at times as bad as ever."

Ex. 3-C. Tr. 213.

Warren Report.

Complainants' Exhibit No. 7.

Mr. Jackson. We now offer Complainants' Exhibit No. 7, being a joint resolution of the general assembly of Illinois, entitled "Chicago Sewerage System—Committee to Investigate," appearing in the laws of Illinois of 1887 at page 314:

"Whereas, the city of Chicago contemplates to transfer the vast sewage of the city and the waters of Chicago River into the Des Plaines and the Illinois rivers.

"Whereas, the people of the State living along the river, are alarmed that the waters which in some places are used for domestic purposes, are still more polluted.

"Whereas, the Illinois River at LaSalle will be wholly inadequate to carry off this additional volume of water and cause disastrous overflows; therefore,

"Resolved by the Senate, the House concurring therein, That a committee of ten, four from the Senate and six from the House, be hereby appointed by the respective presiding officers, to inquire into all the above questions, and report to the General Assembly as early as possible.

Ex. 7. Tr. 217-218.

"CHICAGO DRAINAGE SYSTEM—COMMITTEE TO EXAMINE IN VACATION.

Resolved By The House of Representatives, The Senate Concurring Herein. That a commission of five (5), consisting of the Mayor of Chicago, *ex-officio,* two members of the House, selected from different political parties, to be appointed by the Speaker, and two members of the Senate, selected from different political parties, to be appointed by the President of the Senate, shall examine and report to the next session of the Illinois Legislature the subject of the drainage of Chicago and its suburbs. If such commission shall find, upon investigation, that the most practicable solution of the problem is in the construction of a waterway for the sewage from Chicago to the Des Plaines River at or near Joliet, the commission shall report what requirements should be made as to the construction of such water-way and the dilution of such sewage for the protection of the health and comfort of the people along the Des Plaines River at and below Joliet. Said commission shall serve without pay, and the expenses of the same may be paid by the City of Chicago.

And the Speaker appointed as such joint committee on the part of the House, Messrs. MacMillan and Riley, and the President of the Senate appointed, on the part of the Senate, Messrs. Eckhart and Bell."

Exhibit 8, Transcript 218-219.

Resolution, Illinois Assembly, 1887.

Complainants' Exhibit No. 10.

Mr. Jackson. The next offer is Complainants' Exhibit No. 10, being an act of the Illinois Legislature, approved May 29, 1889, appearing in the laws of Illinois of 1889 on pages 126 to 137, inclusive, and entitled "An Act to create sanitary districts, and to remove obstructions in the Des Plaines and Illinois rivers." From that we read beginning with section 20:

* * * * *

"Section 22. Nothing in this act contained shall be so construed as to constitute a contract or grant between the State of Illinois and any sanitary district formed under its provisions, or to prevent, debar or deprive the State of Illinois from, at any time in the future, altering, amending or repealing this act, or imposing any conditions, restrictions, or requirements other, different or additional to any herein contained upon any sanitary district which may be formed hereunder.

"Section 23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet, and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water. If the population of the district drained into such channel shall at any time exceed 1,500,000, such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per minute from such channel may cause the private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom.

Ex. No. 10. Tr. 220, 221-224.

Act of Illinois Legislature of May 29, 1889.

"Bernard A. Eckhart, President
Melville E. Stone, Treasurer
Charles S. Denneen, Attorney
James Reddick, Clerk
Isham Randolph, Chief Engineer

THE SANITARY DISTRICT OF CHICAGO
Rialto Building,

Sanitary District
of Chicago
State of Illinois

Board of Trustees:
William Boldenveck,
Joseph C. Branden
Zina R. Carter
Bernard A. Eckhart
Alexander J. Jones
Thomas Kelly
James P. Mallette
Thomas A. Smyth
Frank Wenter

Chicago, June 16, 1896.

To the Honorable Daniel S. Lamont,
Secretary of War,
Washington, S. D.

Dear Sir:

"The work of the Sanitary District of Chicago has progressed so far that it is now necessary for us to enter upon that which must be done in the Chicago River to make available the artificial channel which we have under construction from Robey Street, Chicago to Lockport in Will County, twenty-eight miles distant.

"Our connection with Lake Michigan must be through the Chicago River with the West Fork of the South Branch of which we make a junction at Robey Street. We send herewith a map showing in a general way our plans for improving the Chicago River by widening and deepening at the points indicated thereon by red hatchings and by figures which refer to explanations given in the legend on the map. It is desired to so correct and regularize the cross section of the river as to secure a flowage capacity of 300,000 cubic feet per minute with a velocity of one and one quarter miles per hour. The cross-section necessary to accomplish this can be obtained throughout the greater part of the distance between Monroe Street and Robey Street by dredging the river to a depth of 20 feet at mid-stream with 12 feet at dock lines, and a uniform slope away from docks of one foot in five so that the full depth would be reached forty feet from the dock lines; but there are places so narrow that this cross-section can only be obtained by widening the river; and again the depth to be obtained in the vicinity of Van Buren Street is limited by the height of the crown of the Tunnel. To obviate this difficulty it is proposed to secure the requisite cross-section by constructing a by-pass to the West of the bridge at Adams, Jackson, and Van Buren Streets as indicated. We ask your permission to proceed with the work upon the lines indicated and so far as is consistent with propriety the co-operation of the United States Engineer Department.

"Awaiting your favorable reply and holding ourselves ready to respond to any call from you for fuller information as to our plans, I am

"Yours respectfully,

"B. A. ECKHART,

President."

Doc. No. 1, Ex. 12, Tr. 228-230.

Subject: Application of Trustees Sanitary District, Chicago.

UNITED STATES ENGINEER OFFICE,
1637 Indiana Avenue, P. O. Drawer 132.
Chicago and Calumet Harbors,
Illinois and Calumet Rivers
Illinois and Mississippi Canal
Major W. L. Marshall,
Corps of Engineers, U. S. A. Chicago, Ill.,

June 24, 1896.

Brig. Gen. Wm. P. Craighill,
Chief of Engineers, U. S. A.
Washington, D. C.

General:

"I have the honor to report upon the application of Mr. B. A. Eckhart, President Board of Trustees Sanitary District of Chicago, for the authority of the Secretary of War to make certain changes in the capacity of the channel of Chicago River for drainage purposes.

"As far as the work itself is concerned there can be no objection to it, as in every case the navigable channel of Chicago River will be improved, and at this stage I am unable to do otherwise than to recommend the granting of the authority sought.

"The question that must come up later for the action of the War Department, to-wit. Whether the improved channel of Chicago River will be sufficient to carry 300,000 cubic feet of water per minute without lessening or destroying the navigability of Chicago River, or whether the City of Chicago will be allowed by the United States and Great Britain to take any water at all from the Great Lakes, with the inevitable result of lowering their levels, is not now under investigation, and is one that will not probably be settled or decided by executive officers. It is, or may rather be considered an international question.

"For the present, I have to respectfully recommend that the necessary authority be granted as requested for the *general* plan, under the following conditions:—

"(1) That while the general plan is approved, the Sanitary District of Chicago, must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass, and each new dock or wharf, proposed to be built, in order that the Secretary of War, under the law may act intelligently in each case.

"(2) That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must be hereafter submitted for consideration.

"(3) That it will not cover obstructions to navigation, by reason of this work while in progress, or when completed.

"(4) That the United States shall not be put to expense by reason of this work.

"(5) That this authority will expire by limitation in two years from date, unless extended.

"Very respectfully,

"Your obedient servant,

"(Signed) W. L. Marshall,

"Major, Corps of Engineers."

Doc. No. 2. Ex. 12, Tr. 230-232.

Recommendation of U. S. District Engineer.

"Improvement of Chicago River.
4554 July 3, 1896.

Sir:

"I have the honor to acknowledge the receipt of your letter of 16th ultimo, requesting permission to make certain changes in the capacity of the channel of the Chicago River, for draining purposes, at points indicated on the map accompanying the application, and in reply beg to say that upon investigation it is found that the permission requested can be granted upon the following conditions:

"1. That while the general plan is approved, the Sanitary District of Chicago, must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass, and each new dock or wharf, proposed to be built, in order that the Secretary of War may act intelligently in each case.

"2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must be hereafter submitted for consideration.

"3. That it will not cover obstructions to navigation, by reason of this work, or when completed.

"4. That the United States shall not be put to expense by reason of this work.

"5. That this authority will expire by limitation in two years from date unless extended.

"Very respectfully,

"JOSEPH B. DOE,

"*Acting Secretary of War.*

B. A. Eckhart, Esq.,
President, The Sanitary District of Chicago,
Rialto Building, Chicago, Illinois."

Doc. No. 4, Ex. 12, Tr. 236-237.

Permit July 3, 1896.

"Permit of November 16, 1897.

"Whereas, by Section 3 of the Act of Congress, approved July 13, 1892, entitled 'An Act making appropriations for the construction, repair and preservation of certain public works on the rivers and harbors and for other purposes,' it is provided that, without the permission of the Secretary of War, it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty or structure of any kind outside established harbor lines or where no harbor lines are or may be established in any port, homestead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce or anchorage of said waters; or to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor or refuge, or inclosure within the limits of any breakwater of the channel of any navigable water of the United States, unless approved and authorized by the Secretary of War;

"And whereas, the Sanitary District of Chicago has submitted to the Secretary of War for his approval the attached plans for the widening of the Chicago River between Quincy and Harrison Streets of said city, by the construction of by-passes and docks;

"Now, therefore, this is to certify that the Secretary of War hereby approves and authorizes the works shown on said plans upon the following conditions:

"1. That while the general plan is approved, the Sanitary District of Chicago must furnish plans in triplicate on an enlarged scale showing each proposed new bridge, each by-pass, and each new dock or wharf, proposed to be built, in order that the Secretary of War may act intelligently in each case.

"2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must be hereafter submitted for consideration.

"3. That it will not cover obstructions to navigation, by reason of this work while in progress, or when completed.

"4. That the United States shall not be put to expense by reason of this work.

"5. That this authority shall expire by limitation in two years from date unless extended.

"Witness my hand this 16th day of November, 1897.

"R. A. Alger,
Secretary of War."

Document No. 5, Ex. 12, Tr. 237-239.

"UNITED STATES ENGINEERS OFFICE
No. 1637 Indiana Ave., Chicago, Ills.
April 24th, 1899.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.,
Washington, D. C.

General:

"I have the honor to report as follows on the application of the Trustees of the Sanitary District of Chicago for authority to open their Drainage Canal. It is a strange fact that this city has expended, or will expend, over $30,000,000 with the intention of diverting an apparently unlimited amount of water from the Great Lakes to the Mississippi drainage area for sanitary purposes without finding out whether such diversion would be allowed by the great interests of the United States and the Colonies of Great Britain along the chain of Great Lakes in the navigation of the rivers and harbors of the Great Lakes. Now they ask the authority of an executive officer of the United States to open a channel that will to some unknown extent lower the levels of all the Great Lakes below Lake Superior and of their outlets, introduce a current also unknown and not to be ascertained otherwise than by actual experiment, in Chicago River, the most important navigable river of its length on the Globe, but which is already obstructed by bridges, masses of masonry and bends, and of difficult navigation at best.

The possible effects of this diversion are not known, further than that to some unknown degree they will be injurious. Whether the amount of this injury will be so small as to be accepted by the interests affected in view of the manifest advantages to and apparent necessities of their neighbors, cannot be determined by other than the interests themselves.

It is clear to me that I am not competent to make a recommendation as to what should ultimately and definitely be done.

The matter of what effect the opening of this channel would have on the levels of the Great Lakes has been heretofore submitted to a Board of Engineers. That Board reported that the Great Lakes would be lowered, but that there was not sufficient data to determine the exact effects of the proposed discharge, and recommended extended investigations, which it is believed are being carried on now by the Deep Waterways Commission, or Board. They have not reported. In my opinion the abstraction of from 300,000 to 600,000 cubic feet per minute will permanently lower Michigan, Huron and Erie from 3 to 8 inches; not more than 8 nor less than 3 inches, corresponding to an extreme reduction of from 160 to 466 tons in carrying capacity of the large vessels of the Lakes, and that it will take from three to four years for this full effect to be attained. But the State law is unlimited in its requirements. 20,000 cubic feet per minute must be taken from Lake Michigan for each 100,000 population of the district; already nearly 400,000 c. ft. must be taken, and at the same ratio of increase for a few decades, in a very short time there must be taken 1,000,000 c. ft. per minute under this indefinite law. The amount should be limited and the injurious effect stopped somewhere.

The mean current to be introduced in Chicago River upon the opening of the canal is estimated by the engineers of the Drainage Board at one and one-fourth miles per hour or 110 ft. per minute. This is simply an assumption that with such velocity in an unobstructed river, the amount of 300,000 cubic feet per minute can be discharged through Chicago River—but I have seen this River so jammed with vessels, drawing all the water that is in it, that by leaping from deck to deck I could cross the river. What the velocity would be in such conditions with Lake Michigan on one side and a great fall on the other side of such vessels, no one knows. But it is a simple mathematical problem to determine the effect on steel-plate vessels of from 2,000 to 4,000 tons mass drifting upon or striking stone piers with a velocity of near two feet a second. They will go to the bottom.

Individually I have to say that I am in entire sympathy with this people in their effort to purify their water supply. I have lost my only son from typhoid fever, produced I believe from drinking water polluted by defective drainage at Chicago, which this channel will correct. In every proper way I have aided the officers of the Drainage district. I would like further to aid them, but I believe this question to be entirely out of my sphere, and too great and important for me even to venture an opinion or make a recommendation about. I yet may venture to suggest that the entire subject to be referred to Congress for final solution, and that a conditional permit or authority be granted to the authorities of the Chicago Sanitary District by the War Department, awaiting action by Congress, to open their channel, and under the following conditions:

"1st: That if, at any time, it becomes apparent that the current created by such drainage works in the South and Main Branches of Chicago River, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"2nd: That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago River.

"With 300,000 cubic feet per minute discharge it will take one year to lower the level of Lake Michigan and Huron one-tenth of a foot, and several years to reach the maximum permanent effect of this discharge, which will not probably much exceed three inches, so that the main injury to navigation, if any, that can be expected before action by Congress, will be in Chicago River, and that can be at once abated.

"All the changes made by the Sanitary District of Chicago, taken by themselves, have been such as to increase the navigable capacity of Chicago River. Taken in connection with the current to be introduced I am not able to say that the river will be as navigable as it was before these changes were made. The changes materially lessen the probable injury to navigation of this current, at the points where the changes have been or will be made.

"I believe their channel will be entirely under control and that if the discharge be injurious it can be at once and at any time shut off, and it is evident that the War Department should reserve the right to control the current and discharge through the controlling works at this channel.

"Very Respectfully,

"Your obedient servant,

"W. L. Marshall,

"Major, Corps of Engineers, U. S. A.

Doc. 7, Ex. 12, Tr. 243-248.

Report of U. S. District Engineer upon Application of Sanitary District to open Chicago Drainage Canal.

4th Indorsement.

OFFICE CHIEF OF ENGINEERS
U. S. ARMY

"Respectfully returned to the Secretary of War.

"The Trustees of the Sanitary District of Chicago desire the permission of the Secretary of War to open their drainage canal as set forth in the within instrument.

"The application has been considered by Major W. L. Marshall, Corps of Engineers, to whose report of the 24th instant attention is respectfully invited.

"Major Marshall expresses the opinion that the final solution of this matter should be remitted to Congress, but that pending action by Congress a conditional permit might be granted subject to the following conditions:

"1. That if, at any time, it becomes apparent that the current created by such drainage works in the South and Main branches of Chicago River, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"2. That the Sanitary District of Chicago must assume all responsibility for damage to property and navigation interests by reason of the introduction of a current in Chicago River.

"I concur in this opinion.

"A protest against granting this application has been filed by the Mayor of the City of St. Louis, a telegram from whom is herewith.

"JOHN M. WILSON,
"Brig. Gen., Chief of Engineers,
U. S. Army.

28918/7

Doc. 8, Ex. 12, Tr. 249-251.

Recommendation of Chief of Engineers upon foregoing Application.

PERMIT OF MAY 8, 1899

"Whereas, by section 10 of an act of Congress, approved March 3, 1899, entitled 'An act making appropriations for the construction, repair, and preservation of certain public works on the rivers and harbors, and for other purposes, "it is provided that it shall not be lawful to alter or modify the course, location, condition, or capacity of the channel of any navigable water of the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same' "; and

"Whereas the Sanitary District of Chicago, a municipal corporation organized under the laws of the State of Illinois, has constructed an artificial channel from Robey Street, Chicago, to Lockport, and has heretofore been granted permission by the Secretary of War to make certain improvements in the Chicago River for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of 300,000 cubic feet per minute, with a velocity of 1¼ miles an hour, it being intended to connect the said artificial channel with the West Fork of the South Branch of Chicago River at Robey Street in the city of Chicago; and

"Whereas the said Sanitary District of Chicago has now applied to the Secretary of War for permission to divert the waters of the said Chicago River and cause them to flow into the said artificial channel at Robey Street, as aforesaid; and

"Whereas the said Sanitary District of Chicago represents that such movable dams and sluice gates as are necessary to at all times secure absolute and complete control of the volume and velocity of flow through the Chicago River have been constructed:

"Now, therefore, the Chief of Engineers having consented thereto, this is to certify that the Secretary of War hereby gives permission to the said Sanitary District of Chicago to open the channel constructed and cause the waters of Chicago River to flow into the same, subject to the following conditions:

"1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"2. That if, at any time, it becomes apparent that the current created by such drainage works in the South and main branches of Chicago River be unreasonably obstructive to the navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.

"3. That the Sanitary District of Chicago must assume all responsibility for damage to property and navigation interests by reason of the introduction of a current in Chicago River.

"Witness my hand this 8th day of May, 1899.

"R. A. Alger,
Secretary of War.

John M. Wilson,
Brigadier General, Chief of Engineers,
United States Army.

Doc. 9, Ex. No. 12, Tr. 251-253.
Permit of May 8, 1899.

Chicago, Illinois, March 14, 1901.

Hon. Elihu Root,
Secretary of War,
Washington, D. C.

Sir:

"By reason of the rapid current in the Chicago River since the waters of Lake Michigan were turned into the Main Drainage Channel, navigation of that stream has been attended with great difficulties and serious damage to all interests. The records in your Department show that the maximum discharge of water has at times exceeded 350,000 cubic feet per minute, causing a velocity of nearly three miles per hour.

"The business interests along the River, which include coal, lumber, grain and manufacturies, represented by the Chicago River Improvement Association; and the owners of vessels upon the Great Lakes, are strongly of opinion that safe and speedy navigation of the River demands that the flow of water should be reduced to a discharge of not to exceed 200,000 cubic feet per minute, thereby producing a current not to exceed one and one-quarter miles per hour, and to remain at such flow until improvements are made in the River from time to time permitting a great discharge.

"The Chicago River Improvement Association therefore respectfully requests that the necessary and proper order be given to the Board of Trustees of the Sanitary District requiring them to reduce immediately the flow of water through the Chicago River to a maximum of 200,000 cubic feet per minute.

"The facts which will be presented to you by Mr. Frank J. Firth, representing the Lake Carriers Association, showing the difficulties under which vessels were moved through the Chicago River last season and the damages which resulted from the excessive current, are all well known to this Association and are fully endorsed by it.

"Yours respectfully,

"GEO. J. BRINE,
"*President.*
"Chicago River Improv. Assn."

Doc. 10, Ex. 12, Tr. 255, 56, 57.
Protest of Chicago River Improvement Association.

UNITED STATES ENGINEER OFFICE,
1637 Indiana Avenue, O. D. Drawer 132.
Chicago, Ill., March 29, 1901.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. Army,
Washington, D. C.

General:

In compliance with your indorsements of March 20 and later dates, I have the honor to submit report upon the requests of the Chicago River Improvement Association and others that the Secretary of War issue an order requiring the Board of Trustees of the Sanitary District of Chicago to reduce the flow of water through the Chicago River to 200,000 cubic feet per minute, and to construct additional controlling works at the junction of the South Branch of the River with the Sanitary Canal.

* * * * *

"The situation therefore is this: A great work has been projected and put in operation for the benefit of the public health of the City of Chicago without endangering the health of the people in the valleys below, and it is the duty of the Sanitary Trustees to obey the State laws with respect to flow and dilution, if possible. They have no discretionary power to modify the provisions of the State laws, but 'shall thereafter maintain the flow of such quantity of water,' which at this time should exceed 300,000 cubic feet per minute. On the other hand the river interests maintain that so great a flow is dangerous to navigation in the Chicago River and its South Branch by reason of obstructive bridges and tunnels, and lack of width and depth, and while they do not wish the flow to be shut off they request it to be reduced, and seem to have agreed upon 200,000 cubic feet per minute through the Chicago River as a maximum. The Sanitary Trustees themselves recognize the dangers to navigation from increased discharge under the present conditions, for a special commission has been created to formulate plans for the enlargement of the Chicago River, and preliminary estimates for several projects have been prepared involving very large expenditures, and probably additional legislation. But even if the Sanitary Trustees had unlimited funds and authority to begin construction at once, some years must elapse before the channel of the Chicago River would be in a condition to take the ultimate flow of 600,000 cubic feet per minute at a moderate current, and in the meantime the Sanitary Trustees must maintain the proportional flow required by State Laws unless restrained by superior authority.

* * * * *

"There should be a provision, however, for increasing the flow in the sanitary canal during the winter when navigation is suspended, or in time of flood to prevent overflow at the spillway reversing the current and carrying sewage down the Chicago River into the Lake.

"With regard to additional controlling works, I am of the opinion that the Secretary of War is not concerned with them, his duties being limited to the interests of navigation of the Chicago River.

"The plan I have suggested seems to me calculated to protect all interests, making navigation reasonably safe in the Chicago River, insuring the greatest dilution of sewage possible under present conditions in Chicago River, protecting the Sanitary Trustees in the discharge of their duties, and placing the War Department in a just and friendly attitude towards all.

"Early action is desirable as navigation will open within a few days.

"Very Respectfully,
"Your obedient servant,
"J. W. Willard,
Major, Corps of Engineers."
Doc. 11. Ex. 12, Tr. 257-263.

Report of U. S. District Engineer.

"4th indorsement
OFFICE, CHIEF OF ENGINEERS
U. S. ARMY.

April 4, 1901.

"Respectfully returned to the Secretary of War.

"By an instrument dated May 8, 1899, the Secretary of War granted the Sanitary District of Chicago permission to divert the waters of Chicago River and cause them to flow into the artificial channel, constructed by the said corporation, known as the 'Drainage Canal.'

"Previously, permission had been given the said corporation to make certain improvements in the river, for the purpose of correcting and regulating the cross section of the river with a view to securing a flowage capacity of 300,000 cubic feet per minute with a velocity of one and one-quarter miles an hour.

"One of the conditions upon which the permit of May 8, 1899, was granted reads as follows:

" 'That if, at any time, it become apparent that the current created by such drainage works in the South and Main Branches of Chicago River, be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.'

"It is alleged by the various commercial and navigation interests that the present discharge from the river into the drainage channel, sometimes exceeding 300,000 cubic feet per minute, causes a velocity of nearly three miles per hour which greatly endangers navigation in the present condition of the river, obstructed as it is by numerous bridges and tunnels and being of limited width and depth. These interests all unite in asking that the discharge be reduced to not exceeding 200,000 cubic feet per minute with a view to reducing the current to not to exceed one and one-quarter miles an hour.

"Inviting attention to the accompanying report of the 29th ultimo from Major Willard, I recommend that in pursuance of the condition above quoted, the Secretary of War issue an order to the Sanitary District of Chicago requiring that the discharge from the river into the drainage canal be so regulated that the maximum flow through the Chicago River and its South Branch shall not exceed 200,000 cubic feet per minute.

"I further recommend that Major Willard be instructed to observe and gauge the river at suitable points, where the greatest and most dangerous velocities may be expected and if he finds that the resulting currents are such as to permit an increase of the maximum flow beyond 200,000 cubic feet per minute without endangering navigation or property, he so report to the Secretary of War with a view to a consideration of the question of a modification of his order.

"John M. Wilson,
"Brig. Gen., Chief of Engineers,
U. S. Army.

Ex. 12. Tr. 264-267.
Recommendation of Chief of Engineers.

"PERMIT OF APRIL 9, 1901.

"Whereas, under date of May 8, 1899, the Secretary of War granted permission unto the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport, and cause the waters of Chicago River to flow into the same, upon the following conditions, *inter alia.*

"2. That if, at any time it become apparent that the current created by such drainage works in the South and main branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch;

"And whereas it is alleged by various commercial and navigation interests that the present discharge from the river into the drainage canal sometimes exceeds 300,000 cubic feet per minute, causing a velocity of nearly 3 miles per hour, which greatly endangers navigation in the present condition of the river;

"Now, therefore, this is to certify that the Secretary of War, upon the recommendation of the Chief of Engineers, hereby directs said sanitary district to regulate the discharge from the river into the drainage canal so that the maximum flow through the Chicago River and its South Branch shall not exceed 200,000 cubic feet per minute.

"Witness my hand this 9th day of April, 1901.

ELIHU ROOT,

"(Seal) *Secretary of War."*

Doc. 12. Ex. 12. Tr. 267, 268.

Permit of April 9, 1901.

"THE SANITARY DISTRICT OF CHICAGO.
"Security Building
"Chicago, July 15, 1901.

To the Honorable Elihu B. Root,
Secretary of War,
"Washington, D. C.

Sir:

"I have the honor to request on behalf of the Sanitary District of Chicago that your order of April 9th, 1901, restricting the flow of water through the Chicago River to 200,000 cubic feet of water per minute, may be so amended as to permit the Controlling Works at Lockport, the outlet of the Main Drainage Channel, to be so regulated as to permit at that point a flow of 300,000 cubic feet of water per minute, between the hours of four P. M. and twelve o'clock midnight.

"The Board of Trustees of the Sanitary District have rigidly observed the restrictions of your order of April 9, 1901, but the result has been that the water in the Main Drainage Channel has become greatly polluted and very offensive both to sight and smell and is working such hardship upon the valley communities as to evoke frequent protest from various cities and municipalities along the Des Plaines and Illinois Valleys.

"By such a modification of your restricting order as is herein petitioned, it would be possible for the Sanitary District to secure much better drainage of the City of Chicago and the purification of the waters of the Chicago River without any hardship or inconvenience whatever to the interests of navigation as the opening of the Controlling Works to a flow of 300,000 cubic feet of water per minute would produce no appreciable effect upon the current of the Chicago River until three hours thereafter and would not produce the full effect until about eight hours after the opening of the gates. Therefore, by again diminishing the flow at midnight to the requirements of your order, or to 200,000 cubic feet of water per minute, the normal condition in the Chicago River would be restored before six A. M. on the following day and thus no hardship or inconvenience occasioned to the navigation interests of the Chicago River.

I have the honor to be,

"Very respectfully yours,

ALEX J. JONES,

President.

Ex. 12, Doc. 13, Tr. 268-270.

"UNITED STATES ENGINEER OFFICE
1627 Indiana Ave., P. O. Drawer 132
Chicago, Ills., July 16, 1901.

"Brig. Gen. G. L. Gillespie,
Chief of Engineers, U. S. Army,
Washington, D. C.

General:

"I have the honor to enclose a copy of a letter to the Honorable Secretary of War from the President of the Board of Trustees of the Sanitary District of Chicago, requesting permission to increase the flow of the canal to 300,000 cubic feet per minute between 4 P. M. and midnight daily.

"It was the intention to ask me to forward the original but through inadvertence it was mailed direct and President Jones named me to forward the enclosure as original, it being duly signed.

"I believe that the increase should be allowed for the preservation of health not only in the Sanitary District but in the River Valley below, the object being to flush the canal and waterway. Boats do not navigate the Chicago river at night, except in the lower part of the main stream, generally east of the Rush Street Bridge. The maximum effect would not be felt until midnight and reduced to present day flow by about 6 A. M.

"A portion of the flow through Chicago River is due to pumping by the State about 40,000 cubic feet per minute into the Illinois and Michigan Canal, and the Controlling Works of the Sanitary Canal are set to draw about 160,000 cubic feet per minute. Wind and lake oscillations make it impracticable to maintain a constant flow of 200,000 cubic feet per minute through the Chicago River, but I am of the opinion that there has been no lack of effort to comply with the permit of April 9, 1901.

"If the 8-hour increase is allowed, the Trustees will publish the fact for the benefit of navigation.

The river is being dredged to 26 feet depth in the narrowest parts, bridges are being reconstructed as rapidly as possible, and condemnation proceedings begun to widen the South Branch to 200 feet.

I recommend that the request of the Board of Sanitary Trustees be granted, subject to revocation by the Secretary of War in case the increase be found dangerous to navigation.

Very respectfully,

Your obedient servant,

J. H. Willard,

Major, Corps of Engineers.

1 enclosure

Doc. 14. Ex. 12, Tr. 270-272.

Recommendation of U. S. District Engineer.

OFFICE CHIEF OF ENGINEERS,
UNITED STATES ARMY.

July 22, 1901.

Respectfully returned to the Secretary of War.

By an instrument dated April 9, 1901, the Secretary of War directed the Sanitary District of Chicago to regulate the discharge from the Chicago River into the Drainage Canal so that the maximum flow through the Chicago River and its South Branch shall not exceed 200,000 feet per minute.

The Sanitary District now asks that this order be so amended as to permit an increase of the flow into the Canal to 300,000 cubic feet per minute between 4 P. M. and 12 midnight daily.

It is the opinion of Major Willard, expressed in the accompanying letter of the 16th instant that the request should be granted, subject to revocation by the Secretary of War in case the increase be found dangerous to navigation.

"I concur in this opinion and recommend that the order of April 9, 1901, be modified accordingly.

G. L. Gillespie,
Brigadier General, Chief of Engineers, United States Army.

(Third indorsement)

War Department,
July 25, 1901.

Approved as recommended by the Chief of Engineers.

E. Root,
Secretary of War."

Doc. 15, Ex. 12, Tr. 274, 275.

THE SANITARY DISTRICT OF CHICAGO
Security Building,
Chicago, October 16, 1901.

"Hon. Elihu Root,
Secretary of War of the United States,
Washington, D. C.

Dear Sir:

The undersigned respectfully petition you as Secretary of War to give us permission for an increased flow in the Chicago River, over the 200,000 cubic feet a minute, now in force by your order of July 23, 1901. We, the petitioners, inasmuch as a number of very material improvements have been made in the Chicago River, such as removing center pier bridges, widening the river at many points, and also deepening the same, thereby allowing a much greater flow without any perceptible increase in velocity of the current, believe that we are fully justified in petitioning you to grant to the Board of Trustees of the Sanitary District of Chicago permission to increase the flow from 200,000 to 250,000 cubic feet per minute, during that period of the day allowing a flow of 200,000 cubic feet per minute.

Below we enumerate the following improvements:

The old Randolph Street center pier bridge is now removed and all obstructions which hindered navigation will be out of the way but a few weeks, and a bascule type, with a 140 foot opening, will be erected, similar to that on Taylor St.

The old Harrison Street center pier bridge is removed, and a new bascule type bridge, with 140 foot opening, with by-passes on each side, is being erected instead.

At Taylor Street the new bascule bridge is in operation, which has a clear opening of 120 feet.

The new bascule bridge of the Chicago Terminal Transfer Railway Company is about ready to be operated, and the old center pier will immediately be removed.

Just north of 12th street the river has been widened, by the cutting away of the 12 foot corner, which projected into the river at this place.

From 12th Street to Stewart Avenue, the river has been deepened below the hydraulic grade line to a depth of twenty-six feet. Also a strip from 400 feet above 18th Street to Stewart Avenue was made 200 feet wide.

At Canal Street, the old jack-knife bridge with projecting piers has been removed, and a new bridge of the bascule type—the same as at State, Randolph and Harrison Streets—is in process of erection.

The River from Canal Street to 22nd Street has been widened in the east side about 30 feet.

The deepening of the river to 26 feet, from 22nd street to about 500 feet of Main Street, is almost completed.

Along this stretch the river has been widened for a distance of about 300 feet at Collision Bend.

From 150 feet east of Halsted Street to 150 feet west of Halsted Street, the river was deepened to 28 feet.

From 900 feet east of Main Street to 300 feet west of Main Street, the river has been widened to 200 feet.

The old center pier bridge and pier at Main Street have been removed, and a new bridge of the same type as at Taylor Street is being erected.

The old center pier bridge and center pier at Ashland Avenue have been removed, and a new bridge of the Page bascule type, with a clear opening of approximately 140 feet with a 40 foot by-pass on each side of the river, is in process of erection.

The removal of the State Street center pier bridge has been contracted for, and a bridge of bascule type with 140 foot clear opening, and by-passes on each side is to be erected immediately.

In view of the foregoing improvements that are being carried out now, and many others which will follow as quickly as said work can be performed, we feel justified in asking you to permit the Sanitary District of Chicago to increase the flow as hereinbefore suggested.

The Sanitary District of Chicago has ample funds to pay for all of these improvements as fast as they are carried out, and many others that are being matured, as the Legislature during last Spring empowered the District to issue $5,000,000.00 additional bonds, besides, the tax levy will be somewhat larger than in the past.

While we believe that the improvements that have been made on the Chicago River, and the additional improvements that will be completed in the very near future, warrant us fully to ask for your permission for a full flow of 300,000 cubic feet per minute, but inasmuch as we desire to give the greatest consideration to the navigation interests on the Chicago River, we will ask only for 250,000 cubic feet per minute until the close of navigation.

Trusting that you will immediately grant us said permission, we are,

Respectfully,

Wm. H. Baker,
Jos. C. Braden,
Zina R. Carter,
Frank X. Cloidt,
Wm. Legner,
Thomas J. Webb,
Frank Wentner,

Board of Trustees of the Sanitary District, of Chicago.

Doc. 16, Ex. 12, Tr. 275-278.

Application of the Sanitary District of Chicago.

CORPS OF ENGINEERS, UNITED STATES ARMY.

Office of Division Engineer
Northwest Division

1637 Indiana Avenue,
Chicago, Illinois.
November 5, 1901.

Brig. Gen. G. L. Gillespie,
Chief of Engineers, U. S. Army,
Washington, D. C.

General:

In compliance with the instructions contained in your indorsement of the 23rd ultimo, I have the honor to submit the following report upon the application dated October 16, 1901, from the Board of Trustees of the Sanitary District of Chicago to the Hon. Secretary of War for authority to increase the flow in the Chicago River.

On the 8th of May, 1899, the Secretary of War granted permission to the Sanitary District of Chicago to turn the waters of the Chicago,—and through that of Lake Michigan,—into the Drainage Canal. The amount of water to be passed through the river into the canal was not specified in cubic feet, but it was provided that if at any time the current in the river should be unreasonably obstructive to navigation, or injurious to property, the Secretary of War reserved the right to stop the flow or modify it to such extent as might be demanded by navigation and property interests along the river. Under this permit the drainage canal was operated during the season of 1899 and 1900, the quantity of water passed through the river being about 300,000 cubic feet or more per minute. The inconvenience and danger to navigation caused by the passage of this volume of water was so great that, in response to loud and repeated complaints of the navigation interest, the Secretary of War, on the 9th of April, 1901, directed the Sanitary District of Chicago to regulate the discharge so that the maximum flow through the river should not exceed 200,000 cubic feet per minute.

The State law, under which the Trustees of the Sanitary District are acting, required that the channel should have a capacity of 300,000 cubic feet per minute, with a current not exceeding 3 miles per hour, and if the population who contributed sewage 3 miles per hour, and if the population who contributed sewage thereto shall at any time exceed 1,500,000 the channel should be made and kept of such size that it would maintain a flow of not less than 20,000 cubic feet per minute for each 100,000 of the population, at a current not exceeding 3 miles per hour. That degree of dilution was deemed necessary to make the discharge of Chicago sewage into the Illinois River harmless to the people dependent upon that river. The law evidently intended to require not only that the channel should be large enough, but that the flow mentioned should be maintained. In the execution of their trust under the law, the Board of Trustees cannot rest satisfied with a flow of less than 300,000 cubic feet per minute whether that amount be really necessary for the proper sanitation of the Illinois River or not.

In response to an appeal from the Board the Secretary of War, on the 23rd of July, last, modified his order of the 9th of April, last, so as to permit a flow of 300,000 cubic feet per minute from 4 P. M. to midnight, the flow during the remaining 16 hours of the day to remain at 200,000 cubic feet per minute.

The Board now ask that they be permitted to discharge 250,000 cubic feet per minute instead of the 200,000 now authorized between midnight and 4 P. M. They say nothing about the hours from 4 P. M. to midnight, and it may be assumed that they would expect to continue the discharge of 300,000 cubic feet now authorized for those hours. They give as a ground for this request the improvements which they have made in the Chicago River, which, they claim, will permit a much greater flow without any perceptible increase of velocity, and they present a list of obstructive bridge piers removed and of places where the river has been widened or deepened by excavation.

The enlargement of the Chicago River has been begun by the Sanitary District under a systematic plan and able management. It has made good progress as shown by the list of improvements; but it is very far from complete. Eight bridges are mentioned, of which one has but just been put out at contract; there are 20 more bridges to be removed. There are three tunnels under the river, which are among the worst obstructions of all; no steps for their removal have been taken. A large amount of widening has to be done. The project contemplates an expenditure of about $9,024,000 and does not include the removal of the tunnels. Of this sum about $1,000,000 has been expended. Some work was done before the adoption of the present project. Roughly speaking then, the improvement is about one-ninth completed. Relief has been given to navigation at detached points, but the ground taken that the improvements have been extensive enough to accommodate a much greater flow without detriment to navigation is untenable. If a flow of 250,000 cubic feet per minute would have been a serious injury to navigation last year, it would be so still. Persons representing the navigation interest are decidedly of opinion that it would have been so then and would be so now. Unfortunately this is only an opinion and must remain so until it can be tested by experiment.

The Board of Trustees say nothing about the sanitary question, which is the essential question after all. If it can be shown that the discharge of sewage with the present degree of dilution into the Illinois River is endangering the lives of the people on its banks, either the discharge must be stopped entirely or the dilution must be increased sufficiently to make it harmless. I can see no middle ground.

It is, in my judgment, quite too late to discuss the question of shutting off the flow entirely and turning the sewage of Chicago back into the lake. The grave necessity which impelled the people to undertake a work upon which they have expended over $35,000,000 has increased rather than diminished with the advance of time. In the face of that necessity a temporary, or even a permanent, injury to the navigation interest becomes a secondary importance. If, as I believe, the Drainage Canal must be accepted as an accomplished fact, the question is narrowed down to the one,—how much flow is required to make it harmless to the people below?

The Board of Trustees in their letter throw no new light upon the subject, but I am reliably informed that the immediate cause of their application is the result of the investigations which have been recently in progress as to the quality of the water below the Drainage Canal. It is found that with the present flow the quality is not satisfactory. Whether so large an increase as that asked for is necessary at this time does not appear, and until it does appear, need not be granted. A discharge of 250,000 cubic feet per minute throughout the 24 hours will give 24,000,000 cubic feet more in a day than the discharge now authorized, or an average increase of 16,666-2/3 cubic feet per minute. It is desirable that the flow be made as uniform as practicable to facilitate observations as to its effect upon the currents in the river. That question is complicated not only by varying stages and slopes of the water, but also by the changes of cross section caused by the more or less crowded condition of the shipping. It is, of course, possible to so enlarge the Chicago River that any reasonable amount of water can be passed through it without unduly obstructing navigation. A very important enlargement has been begun and further enlargements can be made in the future if needed. These works are costly and slow, and the use of the canal cannot await their completion. In the meantime, if injury be inflicted upon the navigation interest, the Sanitary District should be liable to that interest for damage.

It is accordingly recommended that in lieu of the 200,000 cubic feet per minute from midnight to 4 P. M. and the 300,000 cubic feet per minute from 4 P. M., to midnight now authorized, the Board of Trustees of the Sanitary District of Chicago be authorized to regulate the discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, it being understood that the Board is to be responsible for all damages inflicted upon the navigation interest; the question of further increase to remain open, awaiting evidence of its necessity.

Very respectfully,
Your obedient servant,
O. H. Ernst,
Lieut. Col. Corps of Engineers, U. S. A.,
Division Engineer, Northwest Division.

Ex. 12, Doc. 17, Tr. 279-285.

Recommendation of U. S. Division Engineer.

4th Indorsement
OFFICE CHIEF OF ENGINEERS
U. S. ARMY.

November 9, 1901.

Respectfully returned to the Secretary of War.

By direction of the Secretary of War the Sanitary District of Chicago is required to regulate the discharge of water into the Chicago Drainage Canal so that the maximum flow through the Chicago River shall not exceed 200,000 cubic feet per minute from midnight to 4 P. M., nor 300,000 cubic feet per minute from 4 P. M. to midnight.

Application is now made by the Board of Trustees for permission to increase the flow between midnight and 4 p. m., daily, to 250,000 cubic feet per minute.

In the accompanying report of the 5th instant, the local engineer officer Lieut. Col. O. H. Ernst, Corps of Engineers, recommends that, in lieu of the present authorized rates of flow as stated above, authority be granted the applicant to regulate the discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, the Board to be responsible for all damages resulting thereby to navigation interests.

I concur in this recommendation, it being understood that this permission will be subject to modification should the change authorized above prove dangerous to navigation.

Previous papers herewith.

G. S. Gillespie,
*Brig. Gen. Chief of Engineers,
U. S. Army.*

Ex. 12, Doc. 18, Tr. 286-289.

Recommendation of Chief of Engineers.

PERMIT OF DECEMBER 5, 1901.

"Whereas, under date of May 8, 1899, the Secretary of War granted permission unto the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport, and cause the waters of Chicago River to flow into the same, upon the following condition, *inter alia:*

" '2. That if at any time it becomes apparent that the current created by such drainage work in the South and main branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its South Branch.'

"And whereas the Secretary of War subsequently directed said Sanitary District of Chicago to regulate the discharge of water into the Chicago drainage canal so that the maximum flow through the Chicago River shall not exceed 200,000 cubic feet per minute from midnight to 4 P. M. nor 300,000 cu. ft. per minute from 4 P. M. to midnight; and

"Whereas said Sanitary District of Chicago has applied to the Secretary of War for permission to increase the flow between midnight and 4 p. m. daily to 250,000 cubic feet per minute, and Chief of Engineers has recommended that the increase applied for be granted, but that the rate of flow from 4 p. m. to midnight be reduced to 250,000 cubic feet per minute, so that the flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day;

"Now, therefore, this is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto said Sanitary District of Chicago permission to regulate said discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the 24 hours of the day, upon the following conditions:

"1. That this permission shall be in lieu of the present authorized rates of flow as stated above.

"2. That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"3. That said Sanitary District of Chicago shall be responsible for all the damage inflicted upon navigation interests by reason of the increase in flow herein authorized.

"Witness my hand this 5th day of December, 1901.

"Wm. Cary Sanger,

"*Assistant Secretary of War.*"

Doc. 19. Ex. 12. Tr. 290, 291.

Permit of December 5, 1901.

Complainants' Exhibit No. 13.

Mr. Jackson. The next offer for the record at this point is Complainants' exhibit No. 13, now reading as follows:

"In 1902 Col. O. H. Ernst, United States Engineer at Chicago, made a report to the Chief of Engineers, Report of Chief Engineers, 1902, App. K. K., p. 2097.

'Since the flow of the Chicago River has been reversed through the South Branch by the discharge into the sanitary canal the slope has also been reversed from the lake upstream and the depth correspondingly reduced. This loss in navigable depth will be more than restored in the main stream and in the South Branch by the excavations of the sanitary district, which, in order to facilitate the flow of the large volume of water required for the dilution of the sewage discharged into the drainage canal, has undertaken to enlarge those portions of the Chicago River to a width of 200 feet and central depth of 26 feet. These dimensions have no relation to the draft of vessels using the river, and if maintained as they should be for drainage purposes will furnish a navigable depth in excess of the requirements. The south fork of the South Branch and the North Fork, however, do not share in these benefits. In the South Fork particularly the dimensions of channel obtained by the operations of the Government were seriously impaired by the change of slope. The sanitary district has undertaken to restore these dimensions, and will no doubt do so, though it has been prevented from fully accomplishing the work by some difficult rock excavation. But it has not undertaken as yet to maintain them.

"The Chicago River is the main sewer of Chicago and as such is subject to deteriorating influences as a navigable channel from which there is no escape. The city ordinances against dumping solid matter into it are ample, and, I think, generally well observed. But a very large amount of solid matter must of necessity go into it with a perfectly legitimate use of it as a sewer. Periodical dredging wiil be necessary to maintain it as a navigable channel and, eventually, to maintain it even as a sewer. That work would seem to be as much the duty of the city as the maintenance of any other part of its sewer system. So far as the South Branch is concerned, the question has been solved by the necessities of the drainage canal, as already mentioned, but the sanitary district has not accepted responsibility for maintaining the other branches. Whether that organization or some other representing the people of Chicago should do the work is for them to decide, but it seems to me clear that the United States should not be called upon to do it. Accordingly, no estimate for maintaining the channel excavated under the project of 1896 is submitted.'"

Doc. Ex. 13, Tr. 292, 293.

"War Department

January 17, 1902.

"Approved in pursuance of provisions of Section 10 of River and Harbors Act of March 3, 1899, subject to the following conditions:

"1. That this act shall not be construed as involving the General Government in any way with the expense incident to the carrying out of the project; nor as in any way invalidating, waiving or affecting the right of the Secretary of War to regulate or revoke the permit granted under date of May 8, 1899, to the Sanitary District of Chicago, to divert the waters of the Chicago River and cause them to flow into the artificial channel known as the 'Chicago Drainage Canal'; nor as authorizing in any way any invasion or impairment of the legal rights of any person or corporation.

Elihu Root,

Secretary of War."

Ex. 12 Doc. 20. Tr. 295, 296.

Permit of January 17, 1902.

"Thomas A. Smith, President
Frank X. Cloidt, Vice President
James Todd, Attorney
Isham Randolph, Chief Engineer
Fred M. Blount, Treasurer
A. R. Porter, Clerk.

(Seal Sanitary District of
Chicago, State of Illinois.)

THE SANITARY DISTRICT OF CHICAGO
Security Building
Board of Trustees
William H. Baker,
Joseph C. Braden,
Zina R. Carter,
Frank X. Clidt,
Alex. J. Jones,
William Legner,
Thomas A. Smith,
Thomas J. Webb,
Frank Wenter.

"To the Honorable Elihu B. Root,
Secretary of War,
Washington, D. C.

Dear Sir:

This being the closed season of navigation and no vessel interest being jeopardized by an increased current in the Chicago River, we feel it to be in line with the duty we owe to the citizens of Chicago and the obligation which rests upon us to use every endeavor to comply with the State law which brought the Sanitary District into existence, to request you to grant us permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute. We ask this in the interest of the health of the people of Chicago. The work of this District for construction, right of way, administration and interest has already cost our citizens $41,000,000; and other millions are being expended in the work of deepening and widening the Chicago River and substituting bascule bridges for the obstructive center pier structures which are so harmful to navigation. Our wish is, by introducing the largest possible volume of water from the lake during the closed season of navigation, to draw into the channel the largest amount of contamination that can be reached by the current thus introduced. As you know, for long years the discharge of our sewers has been into the lake and the resulting foul sediment defiles the shore line for miles of frontage. When storms, such as we have recently been subjected to, churn up this slimy deposit it often drifts out to our waters intakes making our water supply inpalatable and unhealthful. The more of this turbid water that we can draw into our channel, the better for the health of our people and the sooner shall we be able to carry off the accumulations of sewage deposit which line our shores. We are working with a steadfast purpose of making the Chicago River what it ought to be as a navigable stream and we feel a justifiable pride in what we have already accomplished in that direction.

"We are now in the courts condemning lands for widening and deepening the river which will cost this District enormous sums of money, which we will gladly pay to hasten the results we have set out to attain.

"We recognize your responsibility as the guardian of the interests of navigation but we believe that you will readily admit that even such vast interests ought and must make concessions to conserve the health of two millions of people and we shall hope for your favorable action upon our petition.

Very respectfully,

(Signed) Thomas A. Smyth,
Jos. C. Braden,
Zina R. Carter,
Thomas J. Webb,
Frank X. Cloidt,
Frank Wenter,
Wm. H. Baker,
Wm. Legner,
Alex J. Jones."

Doc. 21. Ex. 12. Tr. 296-298.

Application of the Sanitary District of Chicago.

"Respectfully forwarded to the Chief of Engineers, with the recommendation that the petition be granted for the season closed to navigation; that is, that the flow of 350,000 cubic feet per minute be authorized until March 31st next, after which it shall be reduced to 250,000 cubic feet per minute, as now authorized.

O. H. Ernst.

"Lieut. Col., Corps of Engineers, Division Engineer, N. W. Div."

Ex. 12. Doc. 22. Tr. 301.

Recommendation of U. S. Division Engineer.

"2nd indorsement,

OFFICE CHIEF OF ENGINEERS
U. S. ARMY,

"January 5, 1903.

"Respectfully forwarded to the Secretary of War Concurring in the recommendation of Lieutenant Colonel Ernst in 1st indorsement hereon.

"By instrument dated December 5, 1901, the Secretary of War granted the Sanitary District of Chicago permission to regulate the discharge of water into the drainage canal so that the maximum flow through the Chicago River should not exceed 250,000 cubic feet per minute throughout the 24 hours of the day.

G. S. Gillespie,

Brig. Gen. Chief of Engineer, U. S. Army.

"35242 Incls. 69 and 74 accompanying.

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"Recd. Jan. 5-1903. Record Div. War Dept. Judge Advocate Gen."

Ex. 12. Doc. 23. Tr. 301.

Recommendation of Chief of Engineers.

"Whereas, under date of December 5, 1901, by an instrument supplementary to the original permission granted by the Secretay of War, May 8, 1899, to the Sanitary District of Chicago to open the artificial channel from Robey Street, Chicago, to Lockport, and cause the waters of the Chicago River to flow into the same, the Secretary of War, pursuant to authority reserved in said permission of May 8, 1899, gave permission to the Sanitary District of Chicago to regulate said discharge so that the maximum flow through the Chicago River shall not exceed 250,000 cubic feet per minute throughout the twenty-four hours of the day, upon the following condition, *inter alia:*

'That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require:'

And Whereas, The said Sanitary District of Chicago has applied for permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute during the closed season of navigation, in order to carry off the accumulations of sewage deposit which line the shores along said city:

"Now, Therefore, This is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto said Sanitary District of Chicago permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute, until the 31st day of March, 1903, after which date it shall be reduced to 250,000 cubic feet per minute, as now authorized, upon the following conditions:

"1.—That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

"2.—That said Sanitary District of Chicago shall be responsible for all damages inflicted upon navigation interests by reason of the increase in flow herein authorized.

Witness my hand this seventeenth day of January, 1903.

Wm. Langer,

(Seal) *Assistant Secretary of War.*"

Doc. 24. Ex. 12, Tr. 302-304.

Permit of January 17, 1903.

"THE SANITARY DISTRICT OF CHICAGO,
American Trust Building,
Chicago,

Nov. 23, 1906.

Col. W. H. Bixby,
Corps of Engineers, U. S. A.,
Federal Building,
City.

Dear Sir:

By order of the Board of Trustees of the Sanitary District of Chicago, I have the honor to transmit herewith copy of the permit desired from the Secretary of War.

Yours very truly,

Robert R. McCormick,
President.

Doc. 29. Ex. 12, Tr. 322-323.

WAR DEPARTMENT
Office of the Chief of Engineers
Washington

January 16, 1907.

MEMORANDUM.

In the matter of the application of the Sanitary District of Chicago to reduce the flow of the Calumet River:

It is understood to be the ruling of the Secretary of War that the act of Congress approved June 29, 1906, providing for the control and regulation of the waters of Niagara River, does not apply to the subject matter of this application, but that the project presented by the Sanitary District of Chicago comes within the purview of Section 10 of the river and harbor act of March 3, 1899. That the latter law is applicable appears unquestionable, and it may not be inappropriate to consider the extent and scope thereof.

The essence of section 10 is contained in the first clause, and its obvious purpose is to prevent the erection of any structures, the execution of any work, or the doing of any act, that would tend to obstruct, injure, diminish, or destroy the navigable capacity of any of the navigable waters of the United States, without the explicit assent of Congress.

To better accomplish this purpose, the section makes it unlawful to commence the construction of any structure, or in any manner to alter or modify the course, location, condition or capacity of any navigable water, unless such work has been previously approved or authorized by the Chief of Engineers and the Secretary of War. The effect of this latter is to necessitate the submission of every project of this kind to the Chief of Engineers and the Secretary of War for their consideration, and to impose upon them the duty of determining whether such project will or will not obstruct navigation or injure the navigable capacity of public waterways. The powers delegated to these officials are merely conservative, and intended to facilitate the execution of work that, in their judgment, would be an aid to commerce, Congress having expressly reserved to itself the power to authorize impediments and to determine to what extent the interests of commerce and navigation may be sacrificed, or yielded, in favor of other interests.

The above interpretation of the provisions of section 10 of the act of March 3, 1899, has been uniformly held by the Department, and it would seem that in considering the application of the Sanitary District of Chicago the first question to be determined should be as to the effect of the project upon the navigable waterways involved.

If, in the opinion of the Department, the project is one which fairly and directly tends to obstruct, that is, (using the language of the Supreme Court), interfere with or diminish, the navigable capacity of any public stream or waterway, the Department has no power to grant the application, and the applicant should be remitted to Congress.

The project involves the abstraction and diversion of water from Lake Michigan, and while it is impracticable to state with exactness the effect of this diversion, it is impossible to escape the conclusion that it will cause a lowering of lake levels to a considerable extent, and that this will fairly and directly tend to diminish the navigable capacity not only of the lakes themselves, but of their connecting waters, and of the vast and growing commerce contiguous to these waters.

In view of the foregoing, no executive officer can authorize the execution of the proposed work, and the action of the Department on the application should be limited to advising the applicant that the project is one that requires the sanction of Congress.

A. Mackenzie,
Brig. Gen. Chief Engr's.

Doc. 31, Ex. 12, Tr. 330-333.
Memorandum, Chief of Engineers.

1st Indorsement.
War Department
Office of the Chief of Engineers,
Washington

February 23, 1907.

1. Respectfully returned to the Secretary of War.

2. The subject of the abstraction of water from Lake Michigan has been elaborately investigated by the Lake Survey office at Detroit, and the results are published in the annual reports of the Chief of Engineers for the years 1900, 1902 and 1904. The International Waterways Com-

mission has also given it careful consideration, and its conclusions are set forth in report of January 4, 1907, printed as War Department Document No. 293.

3. In my opinion, this abstraction will undoubtedly lower the levels of all the waters of the Great Lakes, except those of Lake Superior, and thus diminish the navigable capacity and depth of the various channels and harbors which have been deepened and improved under authority of Congress.

4. Leaving out Lake Superior, there are more than 100 works of river and harbor improvement on the Great Lakes and their connecting waters, for which appropriations aggregating more than 80 millions of dollars have been made. The application of this vast sum has resulted in securing and maintaining specified depths and widths of channel, which Congress has decided to be required for the accommodation of the traffic using these waters.

5. To diminish these depths, even to a slight extent, would not only prove a serious injury to the traffic, but would practically undo the work which has been accomplished by Congressional direction, and necessitate the expenditure of further large sums of money for restoration. Any project that tends, in a measure, to annul or reverse the orders of Congress, as expressed in the various river and harbor acts appropriating funds for improving the harbors and channels connecting with the Great Lakes, should meet the disfavor of the Department, unless it has been sanctioned by that body. In my judgment, such a project is the one under consideration, and for this reason I am unwilling to recommend favorable action thereon, assuming that the Department is empowered to take such action, as is held by the Judge-Advocate General.

A. Mackenzie,
Brig. Gen. Chief of Engineers, U. S. Army.

Doc. 31, Ex. 12, Tr. 334-336.

Recommendation of Chief of Engineers.

WAR DEPARTMENT

Washington

March 14, 1907.

In the matter of the application of the Sanitary District of Chicago to reduce the flow of the Calumet River:

This application is made under section 10 of the Act of March 3, 1899 (30 Stat. L. 1151), which provides as follows:

Sec. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers. and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity, of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to the beginning the same.

The application of the Sanitary District is for leave to reverse the flow in the Calumet River in such a way as to make the water to flow out of the lake instead of to flow into it and to discharge the water from the Calumet River into the drainage canal. The Chief of Engineers was at first of opinion that such a change in the flow of the river, it was not within the power of the Chief of Engineers to recommend, or within the power of the Secretary of War to permit. This expression of opinion as to the construction of the statute was submitted to the Judge Advocate General, who holds that Section 10, as quoted above, applies to this case and that it is one in which the work could be allowed under the recommendation of the Chief of Engineers and the permission of the Secretary of War. Upon the construction of the Judge Advocate General I requested the Chief of Engineers to make his recommendation, which he has done as follows:

* * * * *

It is quite evident from the reading of the statute that Congress intended in this statute, as in many others, to give the Chief of Engineers authority, independent of the Secretary of War, in reaching a conclusion as to the wisdom and propriety of granting a permit under the section, and that unless the Chief of Engineers shall recommend the granting of the permit the Secretary of War is without power to give the requested authority. It follows, therefore, that the application must be denied whatever my view of the case.

The decision of the Chief of Engineers and its final character has made it unnecessary for me to consider the merits of the question, but I may say this much, that the application for a change in the Calumet River is to be made the basis for the withdrawal of a large amount of water from Lake Michigan and that all interested in the enormous lake traffic view the settlement of the question with grave apprehension.

Added to this is the international complication which is likely to arise in the threatened lowering of the lake level in the ports and harbors and canals of Canada.

On the other hand, it is maintained with great emphasis and elaboration of detail that the change in the Calumet River is essential to the healthful sanitation of Chicago, and that the threatened injury to navigation is so small as to be negligible.

Between two such great interests, the decision must be affected more or less by large public policy and expediency, and while I agree in the construction of the Judge Advocate General that the issue is left by statute to the recommendation of the Chief of Engineers and the concurrent decision of the Secretary of War, it may be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States.

W. H. Taft,
Secretary of War.

Doc. 32. Ex 12, Tr. 336-342.

Opinion of Secretary of War Taft.

THE SANITARY DISTRICT OF CHICAGO
American Trust Building
Chicago, Ill.

Robert R. McCormick, *President.*
Hoyt King, *Real Estate Agent.*
Isaac J. Bryan, *Clerk.*
George H. Wisner, *Chief Engineer.*
Charles L. Hutchinson, *Treasurer.*
Edward B. Elliott, *Electrical Eng.*
John C. Williams, *Attorney.*

Jan. 10, 1910.

To the Honorable,
The Secretary of War,
Washington, District of Columbia.

Sir:

The Board of Trustees, of the Sanitary District of Chicago proposes to lay out and establish a right of way, from the Main Channel of the Sanitary District of Chicago in Section fourteen (14) Township Thirty-seven (37) North Range eleven (11) East of the Third Principal Meridian to the North and South center line of Section Twenty-five (25) Township Thirty-seven (37) North Range fourteen (14) East of the Third Principal Meridian, connecting at that point with the Calumet River.

The right of way it expects to acquire will include and bisect a part of the Illinois and Michigan Canal and its adjacent strip and also will include and bisect the so called 'Calumet Feeder.' It is also contemplated that said Sanitary District will use for its corporate purposes the entire so called 'Calumet Feeder.'

It is further proposed to construct and maintain along or near the center of said right of way a channel, to be known as the Calumet-Sag Channel as an adjunct to its Main Channel as now constructed.

The approximate location and grade of said Calumet-Sag Channel in the right of way which has been definitely established is shown on the accompanying map and profile —marked Exhibits 'A' and 'B.'

A copy of the Act of the Legislature of 1903 is also herewith submitted to show the authority of the District to construct said channel, marked Exhibit 'C.'

Under the plans herewith submitted it is not proposed to take any water from Lake Michigan through the Main Channel, the North Shore Channel and the Calumet-Sag Channel of the District, in excess of 10,000 cubic feet per second.

The above exhibits of the plan proposed are herewith submitted and the Board of Trustees will greatly appreciate it if you will examine and approve the same in order that work may be begun at the earliest possible date.

Yours very truly,

G. M. Wisner,

Chief Engineer.

Doc. 33, Ex. 12, Tr. 345-347.

Application of Sanitary District of Chicago.

Doc. 35—Ex 12.

2nd Indorsement

WAR DEPARTMENT
Office of the Chief of Engineers.
Washington.

March 1, 1910.

1. Respectfully forwarded to the Secretary of War.

2. The Sanitary District of Chicago requests permission to execute certain work outlined within and exhibited on the accompanying drawings. The project involves the following matters which require the consideration of the Department:

(a) Reversal of the flow of water in Calumet River;

(b) Change of hydraulic grade in Calumet River;

(c) Velocity of current that may be generated in Calumet River;

(d) Diversion of water from Lake Michigan.

3. These matters are fully discussed by Major Rees, the district engineer officer, in his letter of January 17 herewith and he reaches the conclusion that, subject to certain conditions, set forth in paragraph 7, the application may be given favorable consideration, without detriment to the interests of navigation.

4. The diversion of water from Lake Michigan is the most important question involved in this project, and on a similar application presented by the Sanitary District in 1907, the Chief of Engineers declined to recommend favorable action on account of the probable injurious effect upon the levels of the great Lakes. The position taken by this office at that time was that any project, which contemplated the permanent and continuous abstraction of water from Lake Michigan, should have the special sanction of Congress before being approved by the War Department, and the reason therefor is expressed in 1st indorsement on 12721/2 W. D. 1907, to which attention is invited.

5. The Sanitary District is now taking from Lake Michigan through the South Branch of Chicago River, into its main drainage canal, about 4166 cubic feet of water

per second, the privilege being exercised under permit from the War Department. Such privilege was originally granted, as a temporary measure, on the expressed understanding that the questions involved would be subject to such action as Congress might take. The matter was presented to Congress, but no action was taken by that body, either favorable or unfavorable, so that, so far as this diversion is concerned, the Department may logically assume that it has the sanction of Congress.

6. The project now submitted contemplates a further diversion which, inclusive of the aforesaid withdrawal through the main channel, is not to exceed 10,000 cubic feet per second. While this amount of water might possibly be withdrawn from Lake Michigan by the Sanitary District, through its various channels, without injury to navigation in Chicago and Calumet rivers and without lowering the levels of lakes Huron and Michigan more than 6 inches, nevertheless, in view of the results of even a slight reduction in th~~e levels~~ of these lakes, I believe that the question is one that merits the attention and consideration of Congress, and that until Congress has indicated a policy, either special or general, with respect to it, the War Department will not be justified in granting any permission or in approving any project which contemplates the permanent and continuous abstraction of water from Lake Michigan. I am therefore constrained to adhere to the views of my predecessor, and to recommend that so much of the project as covers the diversion, be not given favorable consideration, until sanctioned by Congress. As that body is now in session, a favorable opportunity is presented to obtain its action.

7. Regarding the other features of the project, I should be willing to recommend approval, if the Sanitary District desires such action at this time, and will segregate them from the undesirable feature.

W. L. Marshall,

Chief of Engineers, U. S. Army.

Doc. 35, Ex. 12, Tr. 353-357.

Recommendation of Chief of Engineers.

PERMIT OF JUNE 30, 1910.

Washington, June 30, 1910.

Sir: Referring to your application of the 27th instant on behalf of the board of trustees of the Sanitary District of Chicago to open a channel from the Calumet River to its existing main channel so as to substitute two routes instead of one between Lake Michigan and its canal, I have the honor to advise you to the following effect:

It appears from the records of the department that by an instrument executed May 8, 1899, the Sanitary District of Chicago was given permission to connect its drainage canal with the South Branch of the Chicago River at Robey Street, in the city of Chicago, and to divert the waters of Lake Michigan through the Chicago River into said canal subject to certain specified conditions designed to limit the amount of such diversion and in other ways to protect the public interest. The permission so granted was subsequently modified at various times, and by an instrument executed December 5, 1901, the amount of flow was fixed at not exceeding 250,000 cubic feet per minute equivalent to 4,167 cubic feet per second, which is the present rate allowed. At the time the original permit was given, a connection with the Calumet River was not mentioned, but if it had been it is probable that a connection with that river as well as with the Chicago River would have been allowed.

So long as the water flow remains unchanged there seems to be no special objection to its extension to both rivers instead of confining it to a single one, especially since if the new (Calumet) route be developed later to a navigable state the double route will be advantageous to navigation interests. Accordingly, in view of the favorable recommendation of the Chief of Engineers and of the consent thereto by the Attorney General, under the conditions hereinafter prescribed, the department hereby modifies the existing permission so as to allow the diversion of the already permitted water flow in such a manner as to reach the sanitary district canal by way of the Calumet river and a connecting channel, as well as by way of its present route through the Chicago River, subject to all pertinent conditions of the existing permissions and to other express conditions, as follow:

(a) That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final actions, and that this permit shall be subject to such action as may be taken by Congress.

(b) That if at any time it becomes apparent that the current created by such drainage work in the Calumet as well as Chicago Rivers be unreasonably obstructive to navigation, or injurious to property, the Secretary of War reserves the right to close the discharge through said channels or rivers, or to modify it to such an extent as may be demanded by navigation and property interests along said rivers.

(c) That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in the Calumet as well as Chicago Rivers.

(d) That the amount of water withdrawn from Lake Michigan, through the Chicago and Calumet Rivers together, shall not exceed the amount of 250,000 feet per minute (4,167 cubic feet per second) already authorized to be withdrawn through the Chicago River alone.

(e) That the permission herein given shall be subject to such modification as in the opinion of the Secretary of War the public interests may from time to time require.

(f) That this permission shall in no wise affect or in any manner be used in the friendly suit now pending in the Circuit Court of the United States for the Northern District of Illinois, brought by the United States of America against the Sanitary District of Chicago, to determine the right of the said sanitary district to divert from Lake Michigan for sanitary purposes an amount of water in excess of that now being diverted without having first obtained a permit from the Secretary of War.

(g) That the War Department shall have free access at all times to the water-flow records of the Sanitary District of Chicago, and free access also to the regulating works and all other parts of its canals for the purpose of checking records or making water-flow measurements.

(h) That the plans for the proposed work shall be submitted to and approved by the Chief of Engineers and the Secretary of War.

(i) That the work shall be subject to the supervision and approval of the Engineer officer of the United States Army in charge of the Locality.

Very respectfully,

Robert Shaw Oliver,
Acting Secretary of War.
Doc. 37, Ex. 12, Tr. 363-366.

Permit of June 30, 1910.

THE SANITARY DISTRICT OF CHICAGO
American Trust Building
Engineering Department. Telephone Central 624.

Chicago, February 5th, 1912.

Feb. 7, 192..
War Department.

Sir:

On behalf of the Board of Trustees of the Sanitary District of Chicago, I have the honor to apply for enlargement of the terms of an instrument executed by the Secretary of War May 8, 1899, as modified by instruments similarly executed on December 5, 1901, and June 30, 1910, respectively, in the following particulars and in view of the facts hereinafter set forth, to wit:

The flow of water from Lake Michigan through the canal of the Sanitary District of Chicago is now limited by the said instruments to 4,167 feet per second.

The population of the Sanitary District, the sewage of which is to be disposed of through the channels constructed and to be constructed by the said District, exceeds 2,500,000 persons, and is rapidly increasing. The only method at present available for disposing of the sewage of this population is by diluting the same with water withdrawn from Lake Michigan and flowing through the

Chicago Drainage Canal. The least amount of water necessary to render sewage innocuous by the dilution method has been estimated by well recognized sanitary experts as 1,000 feet per second for every 300,000 inhabitants; so that the amount permitted to be withdrawn by the instruments to which reference has been made is much below the amount at present needed by the District.

The Sanitary District has been for some time engaged in investigating methods and devising plans for the treatment of the sewage with a view to requiring less water for its safe dilution in the future. The methods of other states and countries for such treatment of sewage, are not as yet entirely satisfactory to all concerned, and any changes of methods for large cities must necessarily require several years.

Until these experiments are concluded and proper works installed, the use of additional water from Lake Michigan is essential to the health of the large population of the City of Chicago and of the Sanitary District and of those who live adjacent to the Des Plaines and Illinois rivers into which such waters are discharged.

Subject therefore to such restrictions as to you may seem proper for the protection of the public interest, and to such a method of supervision as you may suggest to promote the general welfare, and pending the completion of the investigations now being conducted to render the use of increasing quantities of water in the future unnecessary; I have the honor to apply for permission for the Sanitary District of Chicago to withdraw from Lake Michigan through the Chicago river and Calumet river—not to exceed ten thousand cubic feet of water per second; such permission to be revocable at any time by the Secretary of War, and subject to such action as the Congress of the United States may see fit to take in the premises.

Respectfully submitted,

George M. Wisner,
Chief Engineer.

Doc. 38, Ex. 12, Tr. 367-369.

Application of Sanitary District of Chicago.

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
508 Federal Building

Chicago, Ill., Mar. 11, 1912.

The Chief of Engineers, U. S. Army.
Washington, D. C.

Sir:

I have the honor to inclose herewith a memorandum prepared as indicated herein, with request that it be transmitted to the Secretary of War.

This memorandum is not intended to be a full discussion of the subject such as has been presented in Document No. 6, 59th Congress, 1st Session, Committee on Rivers and Harbors points that were brought up in conversation with the Secretary, and which he requested should be called to his attention by a memorandum.

Very respectfully,

GEO. A. ZINN,
Lt. Col. Corps of Engineers, U. S. A.

1ST INDORSEMENT. WHB/WSH

War Department
Office of the Chief of Engineers
Washington

March 26, 1912.

1. Respectfully submitted to the Secretary of War, as presenting the personal views of Lieutenant Colonel Zinn, the district engineer officer at Chicago.

2. In the main, these views accord with the past and existing views of the Engineer Department in general and the Chicago office in particular.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

Chicago, Ill., March 11, 1912.

Memorandum prepared in the U. S. Engineer office, Chicago, Ill., in accordance with the verbal instructions of the Secretary of War March 6, 1912, on the matter of the application of the Sanitary District of Chicago to divert 10,000 cubic feet of water per second from Lake Michigan.

The Secretary of War is asked to grant a permit for the withdrawal of 10,000 cubic feet of water from Lake Michigan through the Main Sanitary Canal which terminates near Lockport, Illinois, and discharges into the Des Plaines River at that point, from the Des Plaines River thence into the Illinois River.

Has the Secretary of War jurisdiction in this matter and has he authority to issue such a permit? If it is determined that the Secretary of War has jurisdiction and the necessary authority, the issuance of this permit will then depend upon the relative advantages and disadvantages, benefits and injuries which will follow the granting or withholding of it.

The jurisdiction of the Secretary of War over the navigable waters of the United States is derived from special and general legislation. The general legislation is found in the River and Harbor act approved March 3, 1899, which defines the duties of the Secretary of War and determines the extent of his jurisdiction. It may be inferred that the jurisdiction of the Secretary of War is limited to the items named in that act. Under that act he may order the removal of bridges obstructing navigation, remove wrecks interfering with navigation, establish harbor lines when essential to the preservation and protection of harbors, authorize the creation of obstructions and the alteration of navigable channels in the navigable waters of the United States. Under the river and harbor act of August 18, 1894, it is the duty of the Secretary of War to prescribe rules and regulations for the use, administration and navigation of any and all canals and similar works of navigation that are now or may hereafter be owned and operated by the United States. He is also authorized to prescribe regulations covering the speed and movement of vessels and the opening of draw bridges. The acts of May 9, 1900 and March 3, 1905, further increase the jurisdiction of the Secretary of War over navigable waters. Section 10 of the act of March 3, 1899, may perhaps be interpreted to confer upon the Secretary of War the necessary authority to grant the application of the Sanitary District, although if it be shown that the granting of the application will create an obstruction "not affirmatively authorized by Congress" the Secretary has no authority in the case.

It would appear that the War Department entertained a doubt as to its authority from the language used in the two permits issued under date of July 11, 1900 (E. D. 35041/17 and 18), granting permission to the Sanitary District of Chicago to change, alter and improve the Chicago river. Condition 1 of both of these permits states:

> That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action and that this permit shall be subject to such action as may be taken by Congress.

Let it be assumed that the Secretary of War has both authority and jurisdiction, his action in this matter, as previously stated, will be determined by weighing the relative benefits and injuries, advantages and disadvantages attached to granting and withholding the permit.

Consider the first case of withholding the permit. The City of Chicago now empties all of its sewage and refuse matter flowing from streets, both solid and liquid, into the Chicago River. There are no catch basins at the river ends of the sewers and the street catch basins are inefficient so that large quantities of solid matter necessarily flow into the Chicago River in violation of Section 13 of the River and Harbor Act of March 3, 1899. It is reported that city officials have said that it would be cheaper to dredge the river than to build catch basins. That large quantities of solid matter do go into the river from city sewers and from overflow from streets is shown in the report of Mr. G. M. Wisner dated October 12, 1911, to the Board of Trustees of the Sanitary District of Chicago, in which Mr. Wisner states that the Main Sanitary Canal has been filled to the extent of about 2,340,000 cubic yards which fill must be removed to restore the main channel to its proper capacity. Some shoaling is known to have taken place in the Chicago River after the river was dredged by the United States and the Sanitary District.

The present allowance (permit of Dec. 5, 1901) of 250,000 cubic feet per minute (4,167 cu. ft. per second) is not sufficient to properly dilute and carry off the sewage of the present population of the Sanitary District of Chicago, which includes the City of Chicago and some outlying territory. With the constantly increasing population of the Chicago region, it is evident that there will be a constantly repeated demand for more water for dilution. Many large cities at home and abroad have found themselves obliged to abandon the dilution method. It is not only possible for the Sanitary District to dispose of its sewage without an increase in its present allowance, but also imperative for it to adopt another system; if not now then in the near fuuture. Other systems are available which will not require an increase in the present allowance.

Again, the adoption of some other system will not result in or require the abandonment of the existing channels and works of the Sanitary District.

Under present conditions, the Sanitary District cannot make use of 10,000 cu. ft. per second without creating a current in the Chicago River which will be injurious to navigation. The 10,000 cubic feet required can only be used without injury to navigation after the Sag Canal and other works contemplated for the removal of sewage in the Calumet region, recently placed under construction, have been completed, which event is not expected to take place within several years. The Sanitary District officials admit that they are now withdrawing about 7,000 cubic feet per second from Lake Michigan, the excess above 4167 ft. per second being in violation of the terms of their permit. The current now existing in the river is injurious to navigation, as shown by collisions between vessels and bridges and the difficulty of stemming the current. The withdrawal of water from Lake Michigan has undoubtedly resulted in a permanent lowering of the water surfaces of all the Great Lakes.

At present the War Department has no practical means for determining the amount of water drawn from Lake Michigan. Effective supervision over the operations of the Sanitary District will be difficult and expensive.

The practical effect therefore of withholding an increased allowance will be to force the Sanitary District of Chicago and the City of Chicago to adopt another system of sewage disposal, or a combination of the present system with another system.

Consider now the effect of granting the application of the Sanitary District.

As just stated, the increased allowance cannot be used immediately without injury to navigation in the Chicago River, and the temptation to use it will be very great, as the Sanitary District has up to now succeeded in escaping punishment for its offenses against the United States and navigation interest.

When the Sag Canal is completed and the 10,000 cubic feet per second may be withdrawn without producing injurious currents in the Calumet and Chicago rivers, the other effect, previously referred to, of lowering the lake surfaces of the Great Lakes will be greatly increased, resulting in lesser depths in all lake channels and harbors, greatly diminished carrying capacity in vessels, etc.—an injury which, measured in dollars and cents, will equal in a very few years the total cost of a new sewage system for the City of Chicago.

Has the Secretary of War authority to permit such injury even should he so desire?

There seems to be no question of the right of the United States to divert water flowing in navigable streams from one place in the stream to another place in the same stream for the benefit of navigation. See case of *South Carolina v. Georgia, et al.,* (3 Otto 4). The right of an individual, a State, or the United States to divert water from navigable streams or bodies to non-navigable streams has not been adjudicated to my knowledge.

It may be asserted that the diversion of water in the present case is from one navigable body of water (Lake Michigan) to another (Illinois River). The diversion, while beneficial, is not necessary for the improvement of navigation on Illinois River or Lake Michigan. The right of the State of Illinois to use water from Lake Michigan for purposes of navigation in its Illinois and Michigan Canal, connecting Lake Michigan and the Illinois River, has not been questioned, but the quantity used is practically nothing. Whether the diversion of water for navigation purposes in the Illinois and Michigan waterway in sufficiently large quantities to injure navigation on the Great Lakes would be legal or proper remains to be determined.

The granting of the permit applied for by the Sanitary District would result in an immediate and vast injury to navigation on the Great Lakes and would be of only temporary benefit to the Sanitary District of Chicago. Moreover, it appears to be a question that can properly be determined only by the Congress of the United States.

It is reported that 650,000,000 gallons of water per day are pumped from Lake Michigan by the various water works of the City of Chicago into its water supply system. A very small quantity of this amount of water returns directly to the lake and the rest being discharged from streets and sewers into the Chicago River. This quantity is equal to 1.005 cu. ft. per second and it is presumed that this withdrawal of water is included in the quantity to be withdrawn by the Sanitary District of Chicago.

Attention is invited to Article 111, Treaty between the United States and Great Britain—Boundary waters between the United States and Canada, Proclaimed May 13, 1910, which reads as follows:

> It is agreed that, in addition to the uses, obstructions, and diversions heretofore permitted or hereafter provided for by special agreement between the parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdictions and with

the approval, as hereinafter provided, of a joint commission, to be known as the International Joint Commission.

The foregoing provisions are not intended to limit or interfere with the existing rights of the Government of the United States on the one side and the Government of Canada on the other, to undertake and carry on governmental works in boundary waters for the deepening of channels, the construction of breakwaters, the improvement of harbors, and other governmental works for the benefit of commerce and navigation, provided that such works are wholly on its own side of the line and do not materially affect the level or flow of the boundary waters on the other, nor are such provisions intended to interfere with the ordinary use of such waters for domestic and sanitary purposes.

Geo. A. Zinn,
Lieut. Col., Corps of Engineers.

Doc. 39, Ex. 12, Tr. 371, 373, 374-382.

Report of U. S. District Engineer upon
Application of Sanitary District.

WAR DEPARTMENT
OFFICE OF THE CHIEF OF ENGINEERS
Washington,

February 28, 1912.

Memorandum for the Secretary of War: (As to the Sanitary District diversion of water from Lake Michigan, through the Chicago River, Sanitary District Canal, Illinois River to the Mississippi Valley.)

There are several special features of this Chicago Sanitary District diversion and Illinios River power and waterway proposition which need special explanation to any one studying the proposition.

For the purposes of navigation alone by canal and canalized river from Lake Michigan to the Mississippi River, on the Illinois River and its headwaters and connecting canals and to keep the locks and pools full, a diversion from Lake Michigan of less than 1,000 second-feet of water will easily supply any reasonable demands and is all that will be actually necessary; and any greater diversion is a greater injury than benefit to navigation. The works of the Sanitary District of Chicago originally constructed mainly for purposes of sanitation, were designed to allow the diversion of 10,000 second-feet, which they now request, and they are now found to be large enough for a total diversion of 14,000 second-feet, the additional 4,000 second-feet having been requested by them and refused by the War Department a few years ago (injunction suit still in progress) the extra water to be taken from Lake Michigan through the Calumet River and a connecting canal following the Sag route. The amounts requested, while perhaps needed at the present time, will not be necessary later, after the full installation of the more modern improved methods of treating sewage. The War Department, while waiting the definite action of Congress, has so far permitted the diversion of 4,167 second-feet. The Sanitary District, by its own recent statements, is understood to be using about 7,000 second-feet. While it appears to have been assumed at times that the Sanitary District will be finally allowed by the United States to divert 10,000 second-feet so long as actually necessary for sanitary purposes, the diversion of the waters of the Great Lakes from their natural outlet so far as desired merely for aid to power development is of doubtful legality by reason of the terms of the recent treaty between the United States and Great Britain, which appears to require the approval of such a diversion by the International Joint Commission created pursuant to said treaty. The treaty enables riparian owners of Canada, as well as of the United States, who consider themselves injured by such diversion, to bring suit in United States courts to protect their interests. The treaty also, although recognizing as proper the use of water necessary for sanitary purposes, provides for action, if necessary, by the Commission after request from the United States Congress or the Canadian Parliament, and no other organization has power of final decision. It is the opinion of the Engineer Lakes to the Gulf Waterway Board (January 25, 1911), that in view of the rights and interests of navigation, only such water should be diverted from Lake Michigan as is indispensable for sanitation, and then only with a provision for construction and maintenance of proper compensating works in the outlets of the lakes to prevent the lowering of their levels; and that although water thus diverted may be used incidentally for power purposes, great care must be exercised by the War Department, when waiving the objections of navigation to the diversion of water for sanitary purposes, to not extend such waiver beyond the amount actually necessary for sanitation alone.

Diversion of water from Lake Michigan and the St. Lawrence basin into the Illinois River and the Mississippi River basin is seriously objectionable from many standpoints, and should be permitted under the recent treaty with Canada only to such extent as is necessary for sanitation of the City of Chicago. The objections to such diversion of water are briefly as follows:

(a) The levels of Lakes Michigan, Huron, and Erie, for the last twenty years, and at the present moment, are lower than their average of the last fifty years; and their levels are now again falling. Every foot of draft in the harbors of these Lakes and in the connecting rivers—St. Marys, St. Clair, and Detroit—is exceedingly valuable to navigation and every cubic foot per second of water flow taken out of Lake Michigan in excess of its natural outflow through Lake Huron and the St. Clair River is a permanent loss to the waterflow of the St. Lawrence basin, and tends to injure navigation over the entire waterway from Lake Michigan to the Gulf of St. Lawrence. While compensating works at the outlets of Lake Huron, Lake St. Clair, and Lake Erie, and Lake Ontario may be possible to an extent sufficient to maintain the existing and past levels of these lakes they will be very expensive and cannot in any case prevent loss to the St. Lawrence basin, of any water diverted into the Mississippi basin; and any loss of water by such diversion will make necessary further expensive construction works or dams or dredging in St. Clair, Detroit, and St. Lawrence rivers in order to maintain channel depths. Moreover the same loss of water will permanently injure and diminish the waterpower development capacity of the Niagara and St. Lawrence rivers.

(b) Moreover, the dumpage of sewage into rivers while heretofore allowable, is becoming more objectionable every year and is being prevented more and more every year by enactments of State legislature throughout the country. Chicago, with reference to the Illinois River, is in much the same situation as Worcester, Mass., with reference to the Blackstone River. In days long past the sewage of Worcester flowed into the Blackstone and was carried down through the States of Massachusetts and Rhode Island into Narragansett Bay. The danger and damage to the people and industries of the Blackstone River led to enactments of laws by the Massachusetts Legislature forbidding further sewage contamination of any of the State rivers, thus forcing the inland cities of Massachusetts to the disposal of sewage by modern improved methods based upon mechanical and chemical treatment. As Chicago and the cities along the Illinois River increase in population, it is to be expected that the results of the sewage contamination of the river, and the legislative action of Massachusetts will be practically duplicated in Illinois where the remedy will be possible at a lower cost per head of population; after which the diversion of large quantities of Lake Michigan water into Illinois River, being then no longer necessary for the sanitation of Chicago, and neither now nor then for navigation between Lake Michigan and the Mississippi River, and being already of detriment and serious danger to the important interests of navigation of the Great Lakes system will no longer have any reason for continuance except for local benefit inside the State of Illinois.

(c) Looked at from the point of view of conservation of water power, every cubic foot of water diverted from Lake Michigan into the Illinois River is an economic loss to the United States as a whole as well as to Canada, because the local conditions as regard river slope and fall are such that this water, if sent through the Niagara and St. Lawrence Rivers to the Atlantic can develop twice as much power in the State of New York, and, at the same time, twice as much power in the Dominion of Canada as it can develop in Illinois if sent through the Illinios and Mississippi rivers to the Gulf of Mexico.

From the above it is evident that it is of the greatest importance to the United States that the diversion of water from Lake Michigan into the Illinois River should be limited to merely such amount as is actually indispensable to sanitation; and that the United States should reserve to itself the right to redetermine such amount every few years as local conditions change.

W. H. Bixby,
Chief of Engineers, U. S. Army.

Even on the supposition that the waterway from Lake Michigan to the Mississippi River should at some future time provide for the passage of boats of over 20-foot draft or any other greatest draft useful in the Great Lakes, such a navigation can be maintained with a diversion of Lake Michigan water less than one-fifth of that at present desired by the State authorities.

Doc. 40. Ex. 12. Tr. 383-389.

Report of Chief of Engineers.

"Washington, January 8, 1913.

"The Sanitary District of Chicago applies to the War Department for permission to increase the amount of water it is authorized to withdraw from Lake Michigan from 4,167 cubic feet per second, the amount now authorized, to 10,000 cubic feet per second.

"The Chicago Drainage Canal was opened in January, 1900. It reverses the flow of the Chicago River, which formerly emptied into Lake Michigan, and as a result a portion of the waters of that lake, instead of following their former course through Lakes Huron, Erie and Ontario into the St. Lawrence, are now carried across the watershed into the Illinois River, and through that to the Mississippi and the Gulf of Mexico. The canal thus serves as a system of drainage for the City of Chicago, carrying the sewage of that city southward to the Mississippi, and thus protects the water supply of that city, which is taken from Lake Michigan.

"Permission to divert water from Lake Michigan was first granted by my predecessor, Secretary Alger, on May 8, 1899. He permitted a flowage of 5,000 cubic feet per second, but his permit contained the following conditions:

"1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.

"2. That if, at any time, it becomes apparent that the current created by such drainage works in the south and main branches of Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserves the right to close said discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago River and its south branch.

"Subsequently, during the administration of Secretary Root, the amount of the current permitted to be taken was modified or restricted until December 5, 1901, when it was fixed at the amount now permitted, and these permits contained the condition:

that the permission herein given shall be subject to such modifications as in the opinion of the Secretary of War the public interests may from time to time require.

"On March 14, 1907, an application made for permission to divert an additional 4,000 cubic feet per second for the purpose of reversing the current of the Calumet River and flowing that river also through the canal to drain the southern portion of Chicago was denied by Secretary Taft in an opinion in which he referred once more to the desirability of submitting "this question of capital and national importance to the Congress of the United States."

"It is clear that even under the conditions heretofore manifested on these applications, the proposition to divert the waters of Lake Michigan into another watershed has not been entertained without hesitation and careful restriction by my predecessors. The propriety of obtaining congressional sanction for the project has been pointed out from the beginning; and the form in which the permit has been granted, even for the moderate amount of diversion permitted, has been so phrased as to indicate that the permission was predicated upon the absence of any substantial injury to commerce.

"The sanitary canal has never received the direct sanction of Congress. It was built solely under the authority of the State of Illinois, as given in its 1889 general act for creating sanitary districts. And although pursuant to the suggestion of my predecessors the question of the propriety of its diversion of water from Lake Michigan was presented urgently in the reports of the Chief of Engineers for the years 1899 and 1900 as transmitted to Congress, no action upon the question has ever been taken by that body. In the argument before me it was urged that the present canal represented the growth and development of a national policy expressed in two acts of Congress, 1822 and 1827, which authorized the construction of a canal "to connect the Illinois River with Lake Michigan," thus connecting the two watersheds. (Acts of Mar. 30, 1822 and Mar. 2, 1827.) But these statutes authorized a canal for the purpose of navigation and not sanitation. (*Missouri vs. Illinois,* 200 U. S. 526.) The Illinois and Michigan Canal, actually constructed under their authority, derived its water for navigation purposes from the Calumet, Des Plaines, and Chicago Rivers, and not from the Lakes. And although in the latter part of its existence it was used to a very slight extent to help purify the waters of the Chicago River and thus sanitate the City of Chicago, such a purpose could not have been dreamed of at the time its construction was authorized by Congress, 90 years ago. I cannot see that its authorization and construction offer the slightest congressional sanction for the great canal now under discussion, which was not even contemplated until much more than half a century later. Even at the time when the present canal was constructed and opened it is very evident that its ultimate possible effect upon the navigation of the Great Lakes was not clearly realized by those interested in that navigation. The evidence before me indicates that the withdrawal of water from Lake Michigan at Chicago would require about five years to produce its full effect upon the levels of the Great Lakes (see report of International Waterways Commission on Chicago Drainage Canal, p. 7) and that this effect would be still further obscured by periodic oscillations in the lake levels. These facts may easily explain any inaction on the part of the Nation and their representatives to this withdrawal of water and make it clear that any argument of applied acquiescence must be scrutinized with unusual care.

"In this respect the situation is now very different. The present application was opposed by representatives of 23 Cities and 6 States interested in harbors and commerce upon the Great Lakes, notably the Cities of Duluth, Milwaukee, Toledo, Cleveland and Buffalo. It was opposed by representatives of the navigation interests engaged on the Chicago River as well as on the Great Lakes; and by the official representatives of the Canadian Government as well as private Canadian interests engaged in the navigation of the Lakes and the St. Lawrence River, including representatives of the Cities of Kingston and Montreal.

"A very careful consideration of the voluminous evidence and statements submitted, as well as a consideration of the reports of other commissions and boards of engineers who have investigated the subject, leaves no doubt in my mind that the withdrawal of 10,000 cubic feet per second would substantially interfere with the navigable capacity of the Great Lakes and their connecting rivers. The Chief of Engineers, whose statutory authority in passing upon this application is concurrent with and independent of my own, and whose opinion upon such a question of scientific conclusion must be given especial weight, so states in his recommendation. His conclusions are corroborated by the authority of other boards of investigation, notably the report of the International Waterways Commission of January 4, 1907.

"Careful observations and calculations conducted under the offices of the United States Lake Survey and reported through the Chief of Engineers, covering observations for the last 46 years, indicate that a withdrawal of 10,000 cubic feet per second would reduce levels at various places as follows:

	Inches.
Lakes Huron and Michigan	6.9
Lake St. Clair	6.3
Lake Erie	5.4
Lake Ontario	4.5
St. Lawrence River and Rapide Plat	4.8 Plus

"The foregoing effects would be produced at mean lake levels; the lowering effects would be much greater at low-water periods—the precise time when any additional shortage would be most keenly felt. This reduction would create substantial injury in all of the American harbors of the Great Lakes and in the St. Marys, St. Clair and Detroit Rivers. It would produce equal injury in Canadian harbors on the Great Lakes, and a still greater injury on the lower St. Lawrence, the Canadian officials claiming a probable lowering effect of 12 inches at Montreal at low water.

"The United States has improved about 106 harbors and rivers on the Great Lakes affected by this diversion and has spent on such improvement over ninety millions of dollars. The Canadian Government has improved over 50 harbors on Georgian Bay and Lakes Huron, St. Clair, Erie and Ontario. By treaty, American vessels are accorded equal rights of navigation with Canadian vessels in all these waters, including the St. Lawrence River. The reduction of the water in these harbors and channels would diminish to just that extent the amounts of these improvements, and would nullify to just that extent the effects of the moneys which have been appropriated for that purpose by the respective Governments. Connecting various portions of these waterways are the two canals at the Sault Ste. Marie, the Welland Canal, and a number of canals on the St. Lawrence River. The available depth of water over one or all sills of each of these canals would be affected, and in some cases reconstruction might even be made necessary.

"The enormous lake traffic which uses these harbors and these rivers is increasing with great rapidity, both in gross volume and in the size and average draft of the vessels employed therein. The Chief of Engineers reports that to lower the water surface 6 inches would reduce the permissible load of one of the large modern vessels by from 300 to 550 tons, with a consequent loss of from $3,600 to $7,500 in freights for such vessel per season. The International Waterways Commission reported that it would be a conservative estimate which would make the loss to the navigation interests resulting from a reduction of 6 inches in the depth of water as $1,500,000 per annum, or a sum which, capitalized at 4 per cent, would amount to a loss of $37,500,000 (see third progress report of International Waterways Commission of Dec. 1, 1907, p. 24.) The lowest careful estimate of injury to American vessels alone is reported by the Chief of Engineers at $1,000,000 per year.

"The argument was made before me that, owing to the well-known fact that the levels of the lake vary, owing to winds and change of barometric pressure, by amounts even greater than the reduction which would be caused by this canal, therefore the proposed reduction is of no consequence. This argument is well disposed of in the report of the International Waterways Commission of January 4, 1907, on page 8 as follows:

" 'It is evident that the average level of the lake may be lowered considerably without the change becoming immediately apparent, and that fact has been used as an argument to prove that the lowering caused by the Chicago Drainage Canal is of no consequence to those interested in navigation. Since they cannot see it they will not know it and will not feel it. The argument is fallacious. It is true that they cannot see it immediately, but they will soon feel it and will know it through the most costly means of acquiring knowledge—the injury to their material interests. The oscillations will remain the same as before, but low water will fall lower and high water will rise less high. The average draft of vessels must be diminished by the amount that the average level is lowered unless the depth be restored by remedial works.'

"In a word, every drop of water taken out of Chicago necessarily tends to nullify costly improvements made under direct authority of Congress throughout the Great Lakes, and a withdrawal of the amount now applied for would nullify such expenditures to the amount of many millions of dollars, as well as inflict an even greater loss upon the navigation interests using such waters.

"On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. There is involved in this case no issue of conflicting claims of navigation. The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a deep waterway from the Great Lakes to the Mississippi over the route of the sanitary canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over 1,000 feet per second, or less than a quarter of the amount already being used for sanitary purposes in the canal. This estimate is confirmed by the report of the special board of engineers on the deep waterway from Lockport, Ill. to the mouth of the Illinois River, dated January 23, 1911. It is also confirmed by the practical experience of the great Manchester Ship Canal in England. From the standpoint of navigation alone in such a waterway too great a diversion of water would be a distinct injury rather than a benefit. It would increase the velocity of the current and increase the danger of overflow and damage to adjacent lands.

"We have, therefore, presented in this case claims of entirely different characters and jurisdictions—the claim of sanitation on the one side and of navigation on the other; the vital interest of a single community on the one side and the broad interest of the commerce of the nation on the other. The discretion given to the Secretary of War under sections 9 and 10 of the act of 1899 is very broad, but I have very grave doubts as to whether it was intended to authorize him to grant a permit which would inflict a substantial injury upon commerce in order to benefit sanitation. The entire purpose and scope of that legislation was to make him the guardian of the commercial interests of the nation represented in their waterways. And while he sometimes under that Statute must decide that the interests of one class of transportation are less important and must yield to the conflicting interests of another class, I have considerable doubt whether it was intended to give him authority to sacrifice substantial interests of navigation to entirely different claims over which he normally has no jurisdiction whatever.

"But however that may be, and without resting my decision upon the matter of my legal authority, I am quite clear as a matter of discretion that under the facts presented by this case no further diversion of water should be permitted at Chicago without the direct sanction of the Congress of the United States. I do not for one moment minimize the importance of preserving the health of the great City of Chicago; but when a method of doing this is proposed which will materially injure a most important class of the commerce of the nation and which will also seriously affect the interests of a foreign power, it should not be done without the deliberate consideration and authority of the representatives of the entire nation. The growth of Chicago is phenomenal and its representatives are quite unwilling to put any final limit to the demand which may be made upon the waters of Lake Michigan for its sanitation under the system now in use. I have before me the report of 1911 of the president of the sanitary district in which he says:

" 'I am of the opinion that the presumption that our water supply is to be limited to 10,000 cubic feet per second, or 600,000 cubic feet per minute, is gratuitous and mischievous and should not be voiced by the officials of this district. I believe that we should have the volume requisite to our needs as they appear and are justified.'

"It is therefore quite conceivable that compliance with their sanitary needs according to this method of sanitation may eventually materially change this great natural watercourse now existing through the Lakes. The weighing of the sanitation and possibly the health of one locality over against the commerce of the rest of the Nation and the consideration of our relations and obligations to Canada in respect to a great international waterway are not matters of mere technical or scientific deduction. They are broad questions of national policy. They are quite different in character, for example, from the question of fixing the proper location of a pierhead line or the height or width of a drawbridge over a navigable stream—fair samples of the class of questions which come to the Secretary of War for decision under the above mentioned act of 1899. While the researches and opinions of experts in the respective fields are necessary and useful as an assistance toward reaching a fair and proper policy, the final determination of that policy should belong not to an administrative officer but rather to those bodies to whom we are accustomed to entrust the making of our laws and treaties.

"In my view of the proper exercise of my discretion in this matter the foregoing considerations are sufficient for a decision of this case. Having reached the conclusion that the proposed diversion of the waters of Lake Michigan would substantially injure the interests of navigation on the Great Lakes which it is my legal duty to protect, it would clearly follow that the present application should be denied.

"I have carefully examined, however, the evidence which both sides have introduced bearing upon the sanitary needs of the City of Chicago, and my conclusion is in no way shaken. I am not persuaded that the amount of water applied for is necessary to a proper sanitation of the City of Chicago. The evidence indicates that at bottom the issue comes down to a question of cost. Other adequate systems of sewage disposal are possible and are in use throughout the world. The problem that confronts Chicago is not different in kind but simply larger and more pressing than that which confronts all of the other cities on the Great Lakes, in which nearly 3,000,000 people of this country are living. The urban population of those cities, like that of Chicago, is rapidly increasing, and a method of disposition of their sewage which will not injure the potable character of the water of the Lakes must sooner or later be found for them all. The evidence before me satisfies me that it would be possible in one of several ways to at least so purify the sewage of Chicago as to require very much less water for its dilution than is now required by it in its unpurified condition. A recent report of the engineer of the sanitary commission (Oct. 12, 1911) proposes eventually to use some other method, but proposes to postpone its installation for a number of years to come, relying upon the present more wasteful method in the meanwhile. It is manifest that so long as the City is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage. This is particularly true in view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport. But it must be remembered that for every unit of horsepower realized by this water at Lockport four units of similar horsepower would be produced at Niagara, where the natural conditions are so much more favorable. Without, therefore, going more into detail in a discussion of this question, I feel clear that no such case of necessity has been presented by the evidence before me as would justify the proposed injury to the many varied interests in the great waterways of our Lakes and their appurtenant rivers.

"It remains only to consider certain special arguments that have been pressed upon me. It has been urged that the levels of the lakes, even if lowered, could be restored by compensating works. To a certain extent that is true. But the very nature of this consideration offers another illustration of the importance of having the whole question passed upon by Congress. Such compensating works can only be constructed by the authority of Congress and at very considerable cost. It is not a matter which is in the hands of the Secretary of War. Permission to divert water which will at one and the same time nullify the effect of past appropriations and make necessary similar expenditures in the future, should be granted only with the express consent of the body in whose hands the making of such appropriations and the authorization of such works rest.

"Furthermore, in most cases such compensating works could only be constructed with the joint consent of our neighbor Canada. The United States Government alone would be unable, even if it were willing to spend its own funds, to compensate for the damage done through the lowering of these levels, unless Canada were willing to join in constructing the portion of such works which would necessarily stand upon Canadian soil.

"The question therefore becomes not merely national but international, and this leads me to the consideration of the arguments which were urged by both sides in reference to the treaty with Great Britain in respect to Canada of January 11, 1909. A careful consideration of that treaty fails to indicate to me that it is in any way controlling upon the question now before me. It gives to the citizens of both countries certain mutual rights of navigation in the waters of the Great Lakes and their connecting rivers; but beyond that the question of the right of this diversion at Chicago seems to me to have been carefully excluded. The applicants for the permit have urged upon me that article 8 of the treaty gives a preference to the uses of water of the lakes for domestic and sanitary purposes over the uses of such water for navigation. Article 8, however, applies only to future cases brought before the International Joint Commission; and furthermore I am clearly of the opinion that the domestic and sanitary purposes referred to in that article were intended to be the "ordinary" uses of such waters for domestic and sanitary purposes referred to in article 3. It would be quite contrary to our own national policy to give such a preference to an extraordinary sanitary use of such a character as to create a substantial injury to navigation. The matter has been before our own Supreme Court in the case of *the United States vs. The Rio Grande Dam &*

Irrigation Co. (174 U. S. 690). In that case the Supreme Court held that a company which proposed to take the water of the Rio Grande river for the purpose, among others, "of supplying water to cities and town for domestic and municipal purposes" could be prevented from so doing when the result would be a substantial injury to the navigability of the Rio Grande river farther down. In its opinion the court said:

" 'The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact. In the course of the argument, this suggestion was made, and it seems to us not unworthy of note, as illustrating this thought. The Hudson river runs within the limits of the State of New York. It is a navigable stream and a part of the navigable waters of the United States, so far at least as from Albany southward. One of the streams which flows into it and contributes to the volume of its waters is the Croton river, a non-navigable stream. Its waters are taken by the State of New York for domestic uses in the City of New York. Unquestionably the State of New York has a right to appropriate its waters, and the United States may not question such appropriation, unless thereby the navigability of the Hudson be disturbed. On the other hand, if the State of New York should, even at a place above the limits of navigability, by appropriation for any domestic purposes, diminish the volume of waters, which, flowing into the Hudson, make it a navigable stream, to such an extent as to destroy its navigability, undoubtedly the jurisdiction of the National Government would arise and its power to restrain such appropriation be unquestioned; and within the purview of this section (act of Sept. 19, 1890, ch. 907) it would become the right of the Attorney General to institute proceedings to restrain such appropriation.'

"The treaty, however, contains provisions in its article 10 by which "any question or matters of difference arising between the high contracting parties involving the rights, obligations, or interests of the United States or of the Dominion of Canada, either in relation to each other or to their respective inhabitants, may be referred for decision'' to an international joint commission established by the said treaty. The hearing before me brought forth the fact that the Government of Canada regards the proposal contained in this application as one which affects the material interests of that country. The establishment by formal treaty between the two countries of a tribunal with jurisdiction to decide just such questions seems to me to afford an additional reason against the assumption of jurisdiction to decide the question by an administrative officer of one of those countries.

''In short, after a careful consideration of all the facts presented, I have reached the following conclusions:

''First. That the diversion of 10,000 cubic feet per second from Lake Michigan, as applied for in this petition, would substantially interfere with the navigable capacity of the navigable waters in the Great Lakes and their connecting rivers.

''Second. That that being so, it would not be appropriate for me, without express congressional sanction, to permit such a diversion, however clearly demanded by the local interests of the sanitation of Chicago.

''Third. That on the facts here presented no such case of local permanent necessity is made evident.

''Fourth. That the provisions of the Canadian treaty for a settlement by joint commission of ''questions or matters of difference'' between the United States and Canada offer a further reason why no administrative officer should authorize a further diversion of water, manifestly so injurious to Canada, against Canadian protest.

''The prayer of the petition is therefore denied.

HENRY L. STIMSON,

Secretary of War.''

Doc. 41, Ex. 12, Tr. 390-409.

Opinion of Secretary of War Stimson denying Application of the Sanitary District of Chicago.

On March 23, 1908, the Attorney General of the United States caused to be filed in the United States Circuit Court, Northern District of Illinois, Eastern Division, a bill of complaint, No. 29-19, seeking to enjoin the Sanitary District of Chicago from constructing the Calumet Sag Canal, diverting through it the waters of the Calumet River or Lake Michigan and reversing the current in the Calumet River.

It was alleged by the Government that these acts would lessen, impede, and obstruct navigation in the navigable Calumet River, and would lower the level of Lake Michigan and thus decrease its navigability, and therefore were unlawful under section 10 of the river and harbor act of March 3, 1899, because they had neither been authorized by Congress nor recommended by the Chief of Engineers, United States Army, and approved by the Secretary of War.

The respondent answered, denying or belittling each allegation, denying that the Calumet River was navigable within the meaning of the terms, or that diverting water from Lake Michigan would lower its level, or that the act of March 3, 1899, was applicable or even a constitutional or valid enactment.

At the same time the respondent claimed the project would benefit navigation; that State law required it to carry out the project; that it was the only authorized agency for providing the needed drainage and sewerage, and the proposed method was the only lawful one under state enactment; that it made application to the Secretary of War for a permit only as to mere matter of comity; and that the old Illinois and Michigan canal laws constituted authorization by Congress. This answer was filed March 23, 1908.

Evidence of the complaint was taken from February 15, 1909, to July 8, 1909. The defendant proceeded to again open negotiations with the War Department and did not for a time make testimony on its own behalf.

The Government testimony was directed to the questions of the effect of the diversion upon the navigable capacity of the lakes and their connecting waters, and the resulting injury to the interests of navigation. When, finally, on May 31, and June 1, 1911, the defendant took testimony, it was not directed toward meeting the testimony of the Government witnesses, but rather to establishing the desirability of the project from a sanitary standpoint and to showing that while there were other efficient methods for the disposal of the sewage of the Calumet district the proposed dilution method was the cheapest. Thereupon the case rested while the defendant again negotiated with the Secretary of War. On March 18, 1913, the defendant renewed taking its evidence.

On October 6, 1913, because of the refusal of the defendant to comply with the terms of the permit of the Secretary of War respecting the diversion through the Chicago River, the Attorney General caused another bill, equity No. 114, to be filed in the same court, praying that the defendant be enjoined from diverting more than 4,167 cubic feet of water per second from Lake Michigan through the Chicago River.

The two suits were consolidated and heard as one, and the taking of evidence, begun on March 18, 1913, was continued until its final completion on December 19, 1914. Altogether, a large number of expert witnesses was called on each side. The arguments of counsel on the law and facts were presented in 1915.

On June 19, 1920, Federal Judge Landis rendered an oral opinion in the case, which was in effect a finding that the United States was entitled to an injunction restraining the Sanitary District from diverting more than 4,167 cubic feet of water per second from Lake Michigan.

Very shortly after this oral opinion was rendered the defendant filed a motion for its reconsideration, July 10, 1920. The court heard the motion on July 12, 1920, and asked both parties to submit authorities.

Federal Judge Landis resigned his position in March, 1922. Upon representation of the United States attorney the case was transferred to Judge Carpenter, who asked that the complainant submit a brief covering the points brought out by the defendant's motion on July 10, 1920. Briefs were submitted, counter proposals offered and rebutted, and after several hearings before the Federal Judge a formal decree was entered on June 18, 1923, finding against the Sanitary District of Chicago and in favor of the Federal Government. (See Appendix X). The court granted a stay of execution of six months for the purpose of allowing the defendants ample time to seek relief from the Supreme Court of the United States or from Congress. The Sanitary District filed an appeal on June 20, 1923.

As a result of its disregard of Federal jurisdiction the sanitary district has rendered null and void the permits issued for the construction of the Calumet Sag Channel and the construction and operation of the North Shore Channel.

Both permits contained the condition that the total diversion of water from Lake Michigan into the Illinois River, should be no greater than already authorized by past War Department permits. As the amount withdrawn has exceeded the amount thus authorized, the permits are null and void, and the structures are illegal.

On November 9, 1921, a resolution was introduced in the House of Representatives, being entitled "A bill to limit the amount of water which may be withdrawn from Lake Michigan by the Sanitary District of Chicago, giving authority therefor, and fixing conditions of such withdrawal."

This resolution obviously was drawn up by or for the sanitary district, the object being to obtain congressional authorization for a diversion of 10,000 cubic feet per second. The Secretary of War, upon being consulted by the Committee on Rivers and Harbors, advised against the passage of the enactment in a letter of February 2, 1922.

His recommendations are set forth clearly in the following extract from the letter referred to:

"It is clear that under the conditions of affairs created by the Chicago Sanitary District, the diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago.

"It is by no means established, however, that the quantity required for that purpose, either now or in the future, is 10,000 cubic feet per second. I regard it as inadvisable to permit the diversions in that amount or in any amount exceeding the amount now fixed by the department without full and complete information concerning the necessity therefor. It is my view that the quantity authorized should be limited to the lowest possible for sanitation after the sewage has been purified to the utmost extent practicable before its discharge into the sanitary canal. I regard it as extremely inadvisable to grant the city of Chicago, or any other agency, the right in perpetuity to take from the lake a definite quantity of water. It is not improbable that within a generation a method may be found to separate the valuable fertilizing elements from sewage as a consequence of which the withdrawal of water from the lake to dilute the sewage will no longer be necessary.

In view of the substantial widespread damage done to many activities throughout the United States by the diversion, damage which can be but partly compensated for by the construction of the works proposed in the bill, the diversion should not be continued beyond the time when its necessity ceased to exist."

A Bill was presented to Congress on January 27, 1923, shortly before the closing of its last session, modifying the terms of the House resolution of November 9, 1921, and including provisions for a 9-foot waterway from Utica to Cairo, Ill., by way of the Illinois and Mississippi Rivers.

These provisions serve to make the measure more attractive to residents of towns along the Illinois River, but do not alter the primary object of the legislation—that of obtaining congressional authority for a diversion of 10,000 cubic feet per second. This bill is to be reported on by a special committee of the Senate at the next session of Congress.

Putnam Report, Ex. 1-G, Tr. 410-416.

"THE SANITARY DISTRICT OF CHICAGO
910 So. Michigan Avenue,

January 31, 1925.

Sir:

The Sanitary District of Chicago hereby applies for permission to divert an annual average of ten thousand cubic second feet of water from Lake Michigan through the channels of the Sanitary District of Chicago, for the purpose of preserving the lives and health of all of its people, and of the millions of others in constant, daily contact with them.

We have prepared a brief statement of facts in support of this application, which we present herewith for your consideration, all of which is respectfully submitted.

Yours very truly,

Sanitary District of Chicago,
By Laurence V. King,
President.

Alex N. Todd,
John K. Lawler,
Morris Eller,
August W. Miller,
T. J. Crowe,
James M. Whalen,
Frank J. Link,
Michael Rosenberg,
Trustees.

Edward J. Kelly,
Chief Engineer.

Attest:
Harry E. Wallace,
Clerk.

Doc. 42, Ex. 12, Tr. 417-418.

Application of Sanitary District for Permit of March 3, 1925.

21st Ind.

U. S. Engineering Office, Chicago, Ill., March 2, 1925.

To the Chief of Engineers, Washington, D. C.

1. This is an application from the Sanitary District of Chicago, a municipality created under the laws of the State of Illinois, to divert 10,000 cubic feet per second of water from Lake Michigan, for the purpose of keeping the sewage of that locality from contaminating its water supply and for reducing the sewage by dilution.

2. This question of the diversion of water from Lake Michigan has been so thoroughly investigated by the Department and discussed at such great length in various reports that it is not believed advisable to enter into any description or historical review before presenting the recommendations which are to follow. Detailed information of this character may be found in the report entitled "Diversion of Water from Lake Michigan," which was submitted by this office on November 1, 1923.

3. This application is prompted by the action of the United States Supreme Court on January 5, 1925, by which it sustained the position taken by the local United States Court, requiring adherence to the limitations placed by the Secretary of War on the amount of the diversion. The local authorities are faced with the alternative of a reduction in the amount of diversion to 4,167 cubic feet per second by March 5, 1925, or relief from Congress or the War Department.

4. In the issuance of a permit, the exact meaning of the word "diversion" should be understood. In the recommendations which follow, by diversion is meant the amount of water which is actually withdrawn from Lake Michigan by the Sanitary District of Chicago through its main drainage canal and auxiliary channels, and is not inclusive of the amount flowing in the channels which come from the sewers of the locality. In other words, "diversion" is taken to be the gross flow at Lockport, less the amount of water used by the city of Chicago for domestic purposes.

5. It is recommended that a permit be issued to the Sanitary District of Chicago, covering a period of five

years, to divert from Lake Michigan through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second; the instantaneous maximum not to exceed 1,000 cubic feet per second. This permit should be made conditional upon the following:

(1) The Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

(2) The Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

(3) The Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

(4) The execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the U. S. District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

(5) If, within six months after the issuance of this permit, the city of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum thereafter, this permit may be revoked without notice.

(6) The average diversion from Lake Michigan during 1924 by the Sanitary District has been approximately 8,500 cubic feet per second. This diversion, combined with

the discharge from the sewers of the locality, produced a total flow at Lockport of about 9,700 cubic feet per second. This so closely approximates the flow necessary to safeguard against reversals of the river into the Lake in times of storm (10,000 cubic feet per second) that a permit for diversion of 8,500 cubic feet per second will suffice in this regard. * * * No obligation appears to rest with the Department to prevent any increase in pollution of the Illinois and Des Plaines Rivers; the maintenance of status quo as regards amount of diversion will place the burden of relieving the lower river situation upon the Sanitary District. Until the controlling works (Condition 3) are completed, ample protection against the dangers of a reversal of the river is provided by the authority to divert an instantaneous maximum of 11,000 cubic feet per second.

(7) Condition (1) as proposed provides for the execution of a sewage treatment program which will relieve the load on the Drainage Canal by the equivalent of a population of 1,200,000. * * * Compliance with this condition will make possible a reduction in amount of diversion to 7,250 cubic feet per second, or lower, by the end of 1929. This condition looks to a reduction to 4,167 cubic feet per second by 1935.

* * * * *

12. Condition (3) is considered necessary to permit an ultimate reduction of the diversion to 4,167 cubic feet per second. Controlling works of some sort will be required to keep the Chicago River from discharging into Lake Michigan in times of flood, and at least two types have been suggested which are believed to be practical.

13. The provision with reference to metering of the water service of the city of Chicago is included for three reasons:

(a) There will be a substantial saving in the cost of construction and operation of sewage treatment plants due to the decreased amount of sewage to be treated.

(b) There will be a substantial reduction in the amount of lake water used for domestic purposes.

(c) It will be possible for the city of Chicago to finance a filtration system for its water supply when its water consumption is reduced to a reasonable amount. When the water supply is filtered, the dangers incident to an occasional reversal of the Chicago River will be entirely eliminated.

14. A shorter time limit for the permit is not recommended as results produced by the end of 1927, for instance, will not permit a reduction in the amount of the diversion, which it is believed should be required in any renewal, no matter when it is made. Furthermore, sufficient performance can not be prescribed for a shorter period to insure completion of a larger program looking to a reduction in diversion to 4,167 cubic feet per second by 1935.

Rufus W. Putnam,
Major, Corps of Engineers,
District Engineer.

Doc. 43, Ex. 12, Tr. 418-423, 427-428.

Recommendation of U. S. District Engineer upon Application of Sanitary District for Permit of March 3, 1925.

7510 (Sanitary Chicago)

Subject: Permission to divert water from Lake Michigan.

2nd Ind.

Office C. of E., March 3, 1925.

To the Secretary of War.

1. The Sanitary District of Chicago has made application for a permit to divert an annual average of 10,000 cubic feet per second from Lake Michigan through the channels of the Sanitary District.

2. The District Engineer recommends the issuance of a permit, covering a period of five years, to divert through the main drainage canal and auxiliary canals of the Sanitary District, an amount of water not to exceed an annual

average of 8,500 cubic feet per second; the instantaneous maximum not to exceed 11,000 cubic feet per second, such permit to be subject to certain conditions set forth in the 1st indorsement hereon.

3. The first condition recommended by the District Engineer provides for the adoption and execution of a program of construction of modern sewage disposal plants at such a rate as to provide before the end of five years for treatment of the sewage of a human population of 1,200,000. This figure is believed to be the maximum practicable under existing conditions, and the proposed construction is the first step in a program which will permit the ultimate reduction of the amount of water diverted, to 4,167 cubic feet per second, or lower, as treatment plants are installed.

4. The program of construction recommended is limited to five years, as it is not possible to predict what advances may be made in the science of sewage disposal during the next five years. It is entirely within the realms of possibility that during that period such advances may be made as to warrant the Department's insisting on an even more rapid rate of progress thereafter, should a renewal of this permit be sought. A shorter period for the permit is not believed advisable as it would be difficult to prescribe sufficient progress in the way of construction of sewage treatment plants and require a substantial reduction in the diversion upon the renewal of the permit.

5. It is estimated that the construction of sewage treatment plants for a population of 1,200,000 will permit a reduction in the necessary diversion from Lake Michigan of about 1,250 cubic feet per second. In other words, such construction would permit a reduction in the authorized diversion, by December 31, 1929, to about 7,250 cubic feet per second. As stated above (paragraph 4), it is probable that a still more rapid rate of reduction of diversion may be practicable thereafter.

6. It is, of course, highly desirable that the excessive diversion of water from Lake Michigan be reduced to reasonable limits with the utmost dispatch. For human-

itarian reasons, it is impracticable to make the desired reduction instantaneously, and it is believed that the procedure proposed by the District Engineer is the most reasonable and just to all concerned that can be adopted.

7. As further means of relieving the present undesirable situation with respect to lake levels, the District Engineer recommends as conditions of the permit the prompt adoption and execution of a program for metering Chicago's water supply, the construction of controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms, and also that the Sanitary District be required to pay a share of the cost of such regulating or compensating works for restoring Lake levels as may be constructed, posting a bond of $1,000,000 as a guarantee of their good faith in the matter.

8. I concur in the views of the District Engineer, and recommend the issuance of a permit in accordance with the draft herewith.

H. Taylor,

Major General, Chief of Engineers.

Doc. 44, Ex. 12, Tr. 429-431.

Recommendation of Chief of Engineers upon application of Sanitary District for Permit of March 3, 1925.

WAR DEPARTMENT.

Note. It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining State assent to the work authorized. It merely expresses the assent of the Federal Government so far as concerns the public rights of navigation. (See *Cummings vs. Chicago,* 188 U. S., 410.)

PERMIT.

Whereas, by Section 10 of an act of Congress approved March 3, 1899, entitled "an act making appropriations for the construction, repair and preservation of certain public works on rivers and harbors, and for other purposes, it is provided that it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same;

And, Whereas, application has been made to the Secretary of War by the Sanitary District of Chicago, Illinois, for authority to divert an annual average of 10,000 cubic feet of water per second from Lake Michigan through the channels of said Sanitary District;

And, Whereas, in the judgment of the Secretary of War, an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

Now, therefore, This is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provisions of the aforesaid statute, hereby authorizes the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

1. That there shall be no unreasonable interference with navigation by the work herein authorized.

2. That if inspections or any other operation by the United States are necessary in the interests of navigations, all expenses connected therewith shall be borne by the permittee.

3. That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of any navigable waters of the United States.

4. That the Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

5. That the Sanitary District shall pay its share of the regulating or compensating works to restore the levels to compensate for the lowering of the Great Lakes system if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the U. S. District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

8. That if, within six months after the issuance of this permit, the City of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum thereafter, this permit may be revoked without notice.

9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been

made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice.

10. That this permit is revocable at the will of the Secretaary of War, and is subject to such action as may be taken by Congress.

11. That this permit, if not previously revoked or specifically extended, shall cease and be null and void on December 31, 1929.

Witness my hand this 3rd day of March, 1925.

H. TAYLOR,
Major General, Chief of Engineers.

Witness my hand this 3rd day of March, 1925.

JOHN W. WEEKS,
Secretary of War.

Doc. 45, Ex. 12, Tr. 432-435.

Permit of March 3, 1925.

WAR DEPARTMENT
WASHINGTON.

March 3, 1925.

Mr. Lawrence F. King,
President, Board of Trustees,
Sanitary District of Chicago,
910 South Michigan Avenue,
Chicago, Illinois.

Dear Sir:

With reference to your application of January 31, 1925, for permission to divert an annual average of ten thousand cubic feet of water per second from Lake Michigan through the channels of the Sanitary District of Chicago, it is my pleasure to inform you that after careful consideration by the Chief of Engineers and myself, and acting upon his recommendation, I have issued a permit, effective this date, authorizing the temporary withdrawal of 8,500 cubic feet of water per second until December 31, 1929. One copy of this permit is transmitted herewith.

Your attention is invited to the conditions to which this authorization is subject, particularly those prescribing certain definite accomplishments on the part of your locality. This Department has always held and continues to hold that the taking of an excessive amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost dispatch. I appreciate that the desired reduction can not be made instantaneously, but with the view of making a substantial reduction by the time this permit expires, the conditions require, among other things, the artificial treatment of the sewage of a large population, the construction of controlling works to prevent the discharge of the Chicago river into the lake, and the metering of the water service of the City of Chicago.

I am not emphasizing too strongly the importance of diligent and prompt execution of the conditions imposed. If it is necessary to increase the bonding power of the Sanitary District from three to five per cent of the assessed valuation of the taxable property, or if increased taxing power is imperative, the requisite legislative permission should be obtained promptly. While it is not in my province to dictate, I sincerely urge the reduction of your expenses to the lowest possible requirements, and, further, that arrangements be made with the packers and the Corn Products interests to treat their waste before discharging it into the sewers.

I believe that steps should be taken which will enable Chicago to complete the entire work within ten years.

Sincerely yours,

JOHN W. WEEKS, (Sgd.)

Secretary of War.

Doc. 46, Ex. 12, Tr. 436-437

Letter of Secretary of War transmitting Permit of March 3, 1925.

June 25, 1925.

Mr. Henry G. Chilton, C. M. G.,
Envoy Extraordinary and Minister Plenipotentiary,
Charge d'Affaires adinterim of Great Britain.

Sir:

Referring further to your note No. 467 of May 7, 1925, concerning the diversion of water from Lake Michigan by the Sanitary District of Chicago, I have the honor to furnish you with the following information in reply to the inquiries made by the Canadian Government:

First: The actual average flow of the water passing Lockport during the year ending March 3, 1925, has been 9,700 cubic feet per second.

Second: This average flow of water passing Lockport will not be immediately reduced by an amount under the terms of the permit issued by the Secretary of War on March 3, 1925.

Third: This average flow may be reduced by December 31, 1929, by an amount varying from 1,750 to 3,000 cubic feet per second.

By way of explanation of the wide range over which the amount of reduction by December 31, 1929, varies, it should be stated that the amount of reduction depends upon the decrease in the sewage load on the water in the drainage canal. The permit prescribes that a minimum population of 1,200,000 be provided with the equivalent of 100% treatment. The program of sewage treatment plant construction contemplates the completion of plants which will give 100% treatment to a population of slightly over 1,400,000. If this program is carried to completion a larger reduction may be made in the flow than if only the requirements of the permit are carried out.

Furthermore, when the controlling works which are required to be placed in the Chicago River or Drainage Canal to prevent reversals into Lake Michigan in times of flood are completed and in operation it may be found practicable to make a much larger reduction in the flow of water with safety to the water supply of the City of Chicago during winter season, a time when the oxygen content of the diluting water is much higher than it is during the summer season.

It is also expected that there will be a substantial reduction in the amount of water consumed in the locality for domestic purposes as the result of a requirement of the permit of March 3, 1925, which makes it necessary for the city of Chicago to adopt and carry into execution a program of metering its water supply. By December 31, 1929, this reduction will vary between 400 and 600 cubic feet per second.

The net result of all these varying influences will be to make it possible to reduce the average flow by a minimum amount of 1,750 cubic feet per second and possibly by the maximum amount of 3,000 cubic feet per second.

To explain the apparent inconsistency between the amount of water specified in the permit (8,500 cubic feet per second measure at the intakes) and the flow at Lockport (9,700 cubic feet per second) it might be stated that the difference represents the amount of domestic water consumption by the city of Chicago which would not be authorized or included properly in a permit issued to the Sanitary District of Chicago, a separate municipality, other than to make the permit non-operative in case of failure on the part of the former agency to adopt certain measures of conservation which were specified. Condition 8 of the permit of March 3, 1925, looks to a substantial reduction of this portion of the flow in the Chicago Drainage Canal, at the same time condition 4 makes possible a reduction in the amount of water used for dilution of sewage.

Accept, Sir, the renewed assurances of my high consideration.

For the Secretary of State:

JOSEPH C. GREW.

Ex. 17, Tr. 438-440.

Diplomatic Correspondence between
the United States and Canada.

November 24, 1925.

His Excellency,
The Right Honorable,
Sir Esme Howard, G. C. M. G., K. C. B. C. V.,
Ambassador of Great Britain.

Excellency:

Referring further to your Embassy's note No. 813 of September 15, 1925, bringing to my attention certain remarks and inquiries of the Canadian Government in regard to the diversion of water from Lake Michigan by the Sanitary District of Chicago, I take pleasure in submitting the following statements:

The Sanitary District of Chicago to which the permit of March 3, 1925, was issued by the Secretary of War, is a municipal corporation separate and distinct from the City of Chicago. The operations of the Sanitary District are conducted under direct authority of the legislature of the State of Illinois without reference to the operations of the municipal government of the City of Chicago. Diversion of water for domestic consumption in the City of Chicago being purely a function of the municipal government of the city, it is considered that the authority granted the Sanitary District could not be made to apply to or include this other diversion as well. The case before the Secretary of War for action involved the granting of a permit for diversion of water for sanitary purposes only, and the instrument of authority was worded accordingly.

On the other hand, it seemed to the Secretary of War that the diversion of water for domestic consumption by the City of Chicago was larger than it should be, and that the amount wasted was not a negligible portion of the gross diversion. He also considered that this excessive diversion for domestic purposes made the cost of sewage treatment, plant construction and operation unnecessarily high and consequently added to the length of the construction period and the difficulties of financing. For these reasons the Secretary of War took cognizance of the diversion for which the City of Chicago is responsble, in a restrictive way, rather than by permissive means, and included a condition in the permit making the instrument voidable in case the City of Chicago fails to take specified steps looking to a curtailment in the amount of water diverted for domestic purposes.

In the judgment of the Secretary of War the average diversion which should be authorized for sanitary purposes under the conditions known to exist should be not less than 8,500 cubic feet per second. The safety of the lives and health of citizens of the locality cannot be disregarded, and until the conditions of the permit of March 3, 1925, have been complied with no substantial reduction in the amount of diversion could be made without endangering health if not life.

The expression "measured at the intakes" used to designate the places where the total actual flow should not exceed that specified in the permit, is hypothetical as it is impracticable to measure the diversion at the numerous intakes with accuracy. For this reason, the practical enforcement of the limitation placed upon the diversion will be carried out at Lockport. Measurements taken there will determine the gross diversion, sanitary and domestic, and, as accurate information is available in regard to the amount of water pumped by the City of Chicago for domestic purposes, the sanitary diversion may be computed by subtracting the domestic diversion from the gross flow at Lockport.

* * * * *

The Canadian Government is correct in concluding that no immediate reduction in diversions has been provided, but its conclusion that no definite reduction is assured and that the effect of the permits will actually be to authorize a greater diversion than is now being made cannot be confirmed. The gross flow at Lockport will not exceed an average of 9,700 cubic feet per second, and by the time the permit of March 3, 1925, has expired the gross flow may be reduced to 8,000 cubic feet per second and probably to 6,700 cubic feet per second. The sewage treatment program of the Sanitary District has been arranged, so as to make it possible to effect a reduction to a gross flow of 4,167 cubic feet per second by the year 1935 or before.

I shall be grateful if you will cause the foregoing statements to be brought to the attention of the Canadian Government.

Accept, Excellency, the renewed assurances of my highest consideration.

(Signed) FRANK B. KELLOGG.
Ex. 17, Tr. 441-443.

Diplomatic Correspondence between
the United States and Canada.

FOURTH. The Action of Congress.

If it be assumed that Congress has power to control the diversion, to determine whether and to what extent it should be permitted, the next question is whether it has exercised the power, and, first, whether it has exercised it directly.

It is believed that enough has been set forth in the findings (*supra*, pp. 26-72, 85) to show the grounds for the contention of the defendants with respect to the action of Congress. The defendants refer to the Acts of 1822 and 1827 (*supra*, p. 11) in relation to the Illinois and Michigan Canal. They emphasize the fact that the project of a waterway from Lake Michigan to the Mississippi has from an early date engaged the attention of Congress, and that it has asked for and received many reports upon that subject. Congress was also early and fully advised by official reports as to the action of Illinois in providing for the construction of a drainage canal, its actual construction by the Sanitary District, the plan to divert water from Lake Michigan for the purposes of the canal, and the extent of the diversion contemplated. In these reports, the relation of the drainage canal proposals to a Lakes-to-the-Gulf waterway was clearly shown. As early as 1900 Congress directed (*supra*, p. 41) that the Board of Engineers appointed under the Act of March 3, 1899, report the estimates of cost for channels of specified depth through the proposed route from the Illinois River to Lake Michigan and directed that "the said estimates cover and include a proper connection at Lockport with the sanitary and ship canal which has been constructed by the sanitary district of Chicago." Defendants have stressed the point that at no time since the diversion at Chicago began could the project depth of seven feet in the Illinois River have been maintained without a diversion of at least 8,500 c.s.f. It is also urged that Congress by the improvements it sanctioned and directed affirmatively authorized and actively aided the construction of what is called the Chicago River segment of the Sanitary District's diversion works. Congress made appropriations for the widening and deepening of the Chicago River and for the development of a waterway from Lockport, the terminus of the drainage canal, to the mouth of the Illinois River. Attention is called to the provision of the Act of March 3, 1899 (*supra*, p. 36) for the improvement of the Chicago River directing a survey and estimate of cost for a channel twenty-one feet in depth for a portion of the river with a proviso that the work of lowering tunnels should be done or caused to be done by the City of Chicago without expense to the United States. This work, it is insisted, was for the purpose of converting the river into an integral part of the Sanitary District's engineering works for the diversion of water from Lake Michigan. In *West Chicago Street Railroad Company vs. Chicago,* 201 U. S. 506, the proviso above mentioned was held to be a sufficient authorization to the City of Chicago to require the lowering of a street railway tunnel. In short, the defendants contend that there has been full knowledge on the part of Congress of all relevant facts and that Congress, and officials acting under its authority and reporting to it, have continuously co-operated with the State of Illinois and the Sanitary District in the creation and maintenance of conditions appropriate to the diversion. Congress has also called for and received comprehensive reports on the extent and effect of the diversion of water from Lake Michigan and on the measures that may be practicable to compensate for the lowered level of the Great Lakes (*supra*, p. 125).

It has not been considered necessary to lengthen the findings so as to include all the statements in a multitude of reports in evidence bearing on the question, as, assuming that Congress was fully informed, the question is not as to what was recommended, but as to the action taken by Congress in the light of its knowledge. I am unable to find that Congress, apart from the authority conferred upon the Secretary of War by Section 10 of the Act of March 3, 1899, and his action thereunder, which will be discussed later, has authorized the diversion in question. The Acts of 1822 and 1827 (*supra*, p. 11) relating to the Illinois and Michigan Canal were considered in *Sanitary District vs. United States,* 266 U. S. 405, 427, 428, and were found to contain nothing with regard to the amount of water to be withdrawn from the lake. In that connection, the Court said:

"The defendant in the first place refers to two acts of Congress: one of March 30, 1822, 3 Stat. 659, which became ineffectual because its conditions were not complied with, and another of March 2, 1827, c. 51, 4 Stat. 234, referred to, whether hastily or not, in *Missouri vs. Illinois,* 200 U. S. 496, 526, as an act in pursuance of which Illinois brought Chicago into the Mississippi watershed. The act granted land to Illinois in aid of a canal to be opened by the State for the purpose of uniting the waters of the Illinois River with those of Lake Michigan, but if it has any bearing on the present case it certainly vested no irrevocable discretion in the State with regard to the amount of water to be withdrawn from the Lake. It said nothing on that subject. We repeat that we assume that the United States desire to see the canal maintained and therefore pass by as immaterial all evidence of its having fostered the work. Even if it had approved the very size and shape of the channel by act of Congress it would not have compromised its right to control the amount of water to be drawn from Lake Michigan. It seems that a less amount than now passes through the canal would suffice for the connection which the United States has wished to establish and maintain."

Consideration by Congress of the advisability of the proposed waterway from Lake Michigan to the Illinois and Mississippi Rivers, demands by Congress for surveys, plans and estimates, the establishment of project depths, and appropriations for specified purposes, did not in my opinion constitute direct authority for the diversion in question, however that diversion, or the diversion of some quantity of water from Lake Michigan, might fit into an ultimate plan. The appropriations for widening and deepening the Chicago River, and the cooperation with the Sanitary District for several years in that improvement, committed Congress to the work as thus actually prescribed or authorized, but did not go further, whatever the advantage of that work in connection with the purposes of the Sanitary District's Canal. The action which has been taken by Congress may, indeed, be deemed to have an important bearing on the construction of the act of Congress under which, as Congress well knew, the Secretary of War granted permits for the diversion of specified quantities of water from Lake Michigan. But the point now is as to direct authorization by Congress of the diversion as distinguished from action by the Secretary of War under the general authority Congress has conferred upon him.

The defendants invoke the doctrine of *Wisconsin v. Duluth,* 96 U. S. 379. There it was found that Congress had developed and was carrying out a system of corporate improvements at Duluth and had made appropriations for that purpose. The Court regarded the suit as an effort to have the Court forbid the execution of the work authorized and dismissed the bill. This decision may be regarded as applicable to the present case, if it be found that the Secretary of War's permit is valid and that the Federal Government under lawful authority has assumed charge of the diversion, its extent, and the conditions on which it is permitted. But the *Duluth* case is not considered to be an authority for a conclusion here that Congress has directly authorized the diversion apart from the action of the Secretary of War.

The argument that Congress, aside from the action of the Secretary of War, has authorized the diversion, at once raised the question—In what amount has the diversion been thus authorized? There is nothing in any of the acts of Congress upon which the defendants rely specifying any particular quantity of water which could be diverted and it could hardly be considered a reasonable contention that the acts of Congress justified any diversion of water from Lake Michigan that the State of Illinois and the Sanitary District might see fit to make. It is manifest that it was the view of the War Department that Congress had not acted directly and whatever the Department did was subject to such action as Congress might take. In the report of the Board of Engineers required by the Act of June 13, 1902, transmitted to Congress on December 18, 1905, the Board said: "The taking of large quantities of water from Lake Michigan for drainage purposes has not been authorized by Congress. It has been the policy of the War Department thus far to regulate the quantity of water which is admitted to the canal by the necessities of navigation in the Chicago River" (*supra,* p. 44). This shows the understanding at that time. In 1907, in denying the application for an increase in the amount permitted to be diverted, the Secretary of War considered that it might "be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States" (*supra,* p. 51). This understanding that Congress had not yet acted directly so as to authorize the diversion in question has continued. It was in this view that the United States prosecuted its suit to decree in this Court to enjoin the defendants from taking more water from Lake Michigan than the Secretary of War had allowed."

Special Master's Report 171-175.

APPENDIX "S"

SANITARY DISTRICT OF CHICAGO

Tabulation of Flow in Sanitary and Ship Canal

Year	Total Flow at Lockport	Sewage Flow (Chicago Water Works Pumpage)	Water directly abstracted from Lake Michigan by Sanitary District
1900	2990 C.F.S.	449 C.F.S.	2541 C.F.S.
1901	4046 "	531 "	3515 "
1902	4302 "	554 "	3748 "
1903	4971 "	582 "	4389 "
1904	4793 "	618 "	4175 "
1900-04	4220 "	547 "	3673 "
1905	4480 "	636 "	3844 "
1906	4473 "	676 "	3797 "
1907	5116 "	704 "	4412 "
1908	6443 "	726 "	5717 "
1909	6495 "	744 "	5751 "
1905-09	5401 "	697 "	4707 "
1910	6833 "	803 "	6036 "
1911	6896 "	785 "	6111 "
1912	6938 "	853 "	6085 "
1913	7839 "	894 "	6945 "
1914	7815 "	949 "	6866 "
1910-14	7264 "	857 "	6407 "
1915	7738 "	939 "	6799 "
1916	8200 "	972 "	7228 "
1917	8726 "	993 "	7733 "
1918	8826 "	1018 "	7808 "
1919	8595 "	1106 "	7489 "
1915-19	8417 "	1006 "	7411 "
1920	8346 "	1176 "	7170 "
1921	8355 "	1199 "	7156 "
1922	8858 "	1216 "	7642 "
1923	8348 "	1220 "	7128 "
1924	9465 "	1274 "	8191 "
1920-24	8674 "	1217 "	7457 "
1925	8278 "	1338 "	6940 "
1926	8283 "	1395 "	6888 "

Exhibit 1111, Transcript 3361-3362,
Report of Special Master pp. 22-23.

The quantities of diversion from the Great Lakes watershed permitted from time to time under the various permits of the Secretaries of War are shown by the following quotations from the various permits as they were modified from time to time:

PERMIT OF JANUARY 17, 1903:

* * * * *

And whereas said Sanitary District of Chicago has applied for permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute during the closed season of navigation, in order to carry off the accumulation of sewage deposit which line the shores of the city;

Now, therefore, this is to certify that in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby gives unto said Sanitary District of Chicago permission to increase the flow through the Chicago River from 250,000 cubic feet per minute to 350,000 cubic feet per minute until the 31st day of March, 1903, after which date it shall be reduced to 250,000 cubic feet per minute, as now authorized, upon the following conditions:

* * * * *

Exhibit 12, Doc. 24, Trans. 303.

Permit of January 17, 1903.

2. That the total diversion of water from Lake Michigan through the Chicago River into the Illinois River shall be no greater than already authorized by past War Department permits:

Exhibit 12, Doc. 28, Trans. 312.

Permit of September 11, 1907.

(d) The amount of water withdrawn from Lake Michigan, through the Chicago and Calumet Rivers together, shall not exceed the amount of 250,000 cubic feet per minute (4,167 cubic feet per second) already authorized to be withdrawn through the Chicago River alone.

Exhibit 12, Doc. 37, Trans. 365.

Permit of June 30, 1910.

And whereas, in the judgment of the Secretary of War, an annual average diversion of more than 8,500 cubic feet per second should not now be permitted;

Now therefore, this is to certify that, upon the recommendation of the Chief of Engineers, the Secretary of War, under the provisions of aforesaid statute, hereby authorized the said Sanitary District of Chicago to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon the following conditions:

Exhibit 12, Doc. 45, Trans. 433.

Permit of March 3, 1925.

The respondent answered, denying or belittleing each allegation, denying that the Calumet River was navigable within the meaning of the term, or that diverting water from Lake Michigan would lower its level, or that the Act of March 3, 1899, was applicable or even a constitutional or valid enactment. At the same time the respondent claimed the project would benefit navigation; that State law required it to carry out the project; that it was the only authorized agency for providing the needed drainage and sewerage, and the proposed method was the only lawful one under state enactment; that it made application to the Secretary of War for a permit only as a mere matter of comity; and that the old Illinois and Michigan canal laws constituted authorization by Congress. This answer was filed March 23, 1908.

Exhibit 1-G, Trans. 410-11.

Report of Major Putnam, U. S.
District Engineer, November, 1923.

(40) Defendant has never recognized the right of the United States in any manner to interfere with the construction, operation or use of its main channel, adjuncts or additions, or the right of the United States to determine or direct how the said main channel and its appurtenances should be operated or use, or the amount of water that should be abstracted from Lake Michigan through its various adjuncts or channels, to carry out the purposes of said Act of May 29, 1889. Application for permits mentioned and described in the bill of complaint and in this answer, were made by two governments, namely, the Government of the State and of the United States. The defendant desired, if possible, to obtain the consent of the Secretary of War for the construction, operation and use of its works, but defendant never has admitted and does not admit, but on the contrary denies the right of the United States to determine the amount of water that should be caused to flow through said main channel or its adjuncts.

Par. 40, Answer, Sanitary District of Chicago in *Sanitary District of Chicago vs. United States of America,* 266 U. S. 405.

114. Diversions for water-supply and sewage purposes have already been discussed and, with the exception of the diversion of the Chicago sanitary district, they have been disposed of. We, therefore, revert to this important permanent diversion at Chicago. The case is so well known and the information in the report so full as to call for little further discussion of its merits. Granting that disposal by dilution was the most practicable plan at the time of its adoption, the fact remains that the Chicago sanitary district has for practically 20 years been on notice that the United States was unwilling to allow the district to divert more water than the limit set in the permit of 1903, namely, 4,167 cubic feet per second. Notwithstanding this, the district has since then greatly expanded its boundaries and enlarged its plans, and from year to year, in the face of the opposition of the United States, has diverted more and more water, until in 1917 the yearly average diversion

was 8,800 cubic feet per second, which is more than twice the lawful amount.

115. The district can no longer fairly plead the absence or the impracticability of other safer methods of handling sewage and of protecting its people from waterborne diseases. Certainly, for the past 20 years, expert opinion has held disposal by dilution to be inferior to other methods of treating sewage, and enlightened public opinion has condemned a policy which, in effect, is the transfer of a nuisance from our own front door to that of our neighbor. Large cities on the Great Lakes cannot safely drink raw lake water, nor should they discharge unscreened and unfiltered sewage either into the lakes or into tributary streams. In 1915, the Chicago Real Estate Board employed three experts, of whom two were of acknowledged eminence in England, and the third a New York expert of well-known authority, to investigate the sewage problem of Chicago and to present their views as to the best way of solving it. Their report entitled "A Report to the Chicago Real Estate Board on the Disposal of the Sewage and the Protection of the Water Supply of Chicago, Illinois," by Messrs. Soper, Watson, and Martin, has been printed, and its conclusions are, therefore, well known to the public in general, and particularly to the people of Chicago whom they advised substantially in accordance with the views above expressed. Chicago is, therefore, debarred from any claim for indulgence as to work done and expenditures incurred in recent years. If, in defiance of the opposition of the Government, and in open disregard of the law, the officials of the Chicago Sanitary District have continued to expend the money of their constituents in the prosecution of unwise and illegal plans, these officials and their constituency are to blame, and they should expect no great indulgence from the general public whose government they have ignored and whose interests they have disregarded.

Exhibit 3, p. 55.

Exhibit 210, Trans. 9246.

Warren Report, Recommendation,
Chief of Engineers.

Office Supreme Court, U. S.
FILED
JAN 3 1928
CHARLES ELMORE CROPLEY
CLERK

In the Supreme Court of the United States

October Term, 1927

No. [redacted] 11 Original.

State of New York,
Complainant,

vs.

State of Illinois and Sanitary District of Chicago,
Defendants.

EXCEPTIONS TO REPORT OF SPECIAL MASTER

ALBERT OTTINGER,
Attorney General, State of New York.

ALBERT J. DANAHER,
Assistant Attorney General.

RANDALL J. LE BOEUF, JR.,
Solicitor and of Counsel.

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, 1927

No. 12 Original

STATE OF NEW YORK,
Complainant,
against
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

The State of New York, complainant in the above entitled original cause Number 12, hereby excepts to certain of the findings of fact, conclusions of law and recommendations for a decree set forth in the report of Honorable Charles E. Hughes, Special Master herein, which findings of fact, conclusions of law and recommendations for a decree so excepted to are as follows:

EXCEPTIONS TO FINDINGS OF FACT

First.—To so much of finding of fact numbered 5, set forth in paragraph (a) at page 18 of the report wherein the Special Master finds as follows:

> "In connection with the construction of this canal, the Des Plaines River was straightened for many miles above Lockport, and its channel was improved from Lockport down through Joliet, so that it would be capa-

> ble of taking the combined floods of the Des Plaines River watershed and the Chicago River watershed, or a total of about 25,000 c.f.s."

for the reason that said finding is immaterial and if it has any materiality in this controversy, it is not a full, fair and complete finding of the facts relative to the improvement of the channel of the Des Plaines River and the Special Master should have concluded the said finding as follows:

> "but such improvements as were made in the channel of the Des Plaines River were made with a view of facilitating and increasing the abstraction of water of the Great Lakes-St. Lawrence waterway—for purposes of sanitation and not for the benefit or in aid of navigation on said River."

Second.—To so much of finding of fact numbered 5 as is contained in paragraph numbered "f" and set forth at page 21 of the Report, for the reason that the cost of the sewer system described therein, as the same appears on the books of the Sanitary District of Chicago, is not competent proof of the reasonable cost of these works, and proof of the fair and reasonable cost not having been offered by the defendants, no finding thereon should have been made.

Third.—To the statement of fact set forth at page 165 of the report herein, which reads as follows:

> "So far as the diverted water is used for the development of power, the use is merely incidental (*supra,* p. 25)."

because if said statement is intended to be or is construed as a finding of fact, it is contrary to all competent evidence herein and not supported by any competent evidence in this case.

Fourth.—To so much of finding of fact numbered 8, set forth in paragraph (u) at page 58 of the report wherein the Special Master finds as follows:

> "The Act of Congress of June 25, 1910 (36 Stat. 659, 660), appropriated $1,000,000 for the construction of a waterway from Lockport, Illinois, to the mouth of the Illinois River, and provided for the appointment by the Secretary of War of a board of five members to report on the feasibility and advisable dimensions of such waterway, and also upon such measures as might be required properly to preserve the levels of the Great Lakes and to compensate, so far as practicable, for the diminished level in these lakes and connecting waters by reason of any diversion of water from Lake Michigan. (The report of this Board, dated August 15, 1913, was transmitted to Congress on February 18, 1914. See Finding 17, *infra*, p: 125.)"

for the reason that if said finding has any materiality in this controversy, it is not a full, fair and complete finding in respect to the matter set forth therein and the Special Master should have also found as follows:

> "The said act of Congress of June 25, 1910 (36 Stat. 659, 660) was repealed at the next ensuing session of the Congress of the United States and no construction work was done

> under and pursuant to the provisions of said act, nor was any part of the appropriation mentioned therein expended for or on account of any construction work.''

Fifth.—To so much of finding of fact numbered 11 wherein, at page 81 of the Report, the Special Master finds as follows:

> ''*Compliance with conditions of permit of March 3, 1925.*—It appears from the evidence that, up to the time of the taking of the testimony herein, the Sanitary District had substantially complied with the conditions of the permit.''

for the reason that the evidence shows the diversion under said permit created an unreasonable interference with navigation contrary to the provisions of said permit, and further shows that the Sanitary District of Chicago did not carry out the program for the installation of water meters provided for by said permit, and, therefore, did not substantially comply with the conditions of the permit.

Sixth.—To so much of finding of fact numbered 16 as is set forth in paragraph (a) at page 120 of the report wherein the Special Master finds as follows:

> ''The Federal project depth has been seven feet; but this could not have been maintained without at least 8,500 c.f.s. from Lake Michigan, which gives, in the lower Illinois, about four feet of the low water depth of seven feet.''

for the reason that said finding is immaterial and is not supported by any competent evidence herein, and is contrary to the competent evidence in this case.

Seventh.—To so much of finding of fact numbered 16, wherein, at page 120 of the Report, referring to the Illinois Waterway, the Special Master finds:

> "There is no adequate water supply for lockage, except by diversion from Lake Michigan. Other plans would involve prohibitive expense,"

for the reason that said finding is contrary to the evidence and is not supported by the evidence.

Eighth.—To so much of finding of fact numbered 16, wherein, at page 120 of the Report, referring to the sources from which water was to be taken to make up 6,000 c.f.s. as shown by the plans for the waterway of 1920, approved by the Chief of Engineers and the Secretary of War, the Special Master finds that said flow of 6,000 c.f.s. was made up of 500 c.f.s. as an actual low water flow, 4,167 c.f.s. from Lake Michigan, and 1,395 c.f.s. as averaging the amount of Chicago's pumpage, for the reason that there is no evidence to support said finding.

Ninth.—To so much of finding of fact numbered 16, wherein, at page 120 of the Report, the Special Master finds, referring to the lower Illinois River, that if there were no diversion at Chicago, a large amount of improvements and several locks and dams would have to be provided, for the reason that there is no evidence to support said finding.

Tenth.—To so much of finding of fact numbered 16, wherein, at page 121, the Special Master quotes from the report of Colonel Judson as follows: "for a 9 foot channel, with an increment of 4,167 second-feet, the cost either with dams retained or removed appears almost prohibitive," for the reason that the finding has no materiality in the controversy, and the fact is that the recommendations made by Colonel Judson were never adopted either by the Board of Engineers for Rivers and Harbors, by the Chief of Engineers or by Congress, and the Special Master should have so found.

Eleventh.—To so much of finding of fact numbered sixteen, wherein, at page 122 of the Report, the Special Master states that he is unable to find that a diversion of less than 1,000 c.f.s. of water is sufficient to supply all the needs of navigation on the Illinois waterway from Lake Michigan to the mouth of the Illinois River, for the reason that the evidence clearly shows that 1,000 c.f.s. of water is sufficient for lockage and navigation purposes on this waterway, and the Special Master should have so found.

Twelfth.—To so much of finding of fact numbered sixteen, wherein, at page 124 of the Report, the Special Master finds that the diversion from Lake Michigan increases to some extent the navigable depth over the bars on the Mississippi River, and that it was permissible for the Secretary of War to reach the conclusion that the diversion from Lake Michigan of 8,500 c.f.s. was, to some extent, an aid to the navigation of the Mississippi River, for the reason that the evidence shows that instead of being an aid to navigation on the Mississippi, the diversion of 8,500 c.f.s. from Lake Michigan is an added menace thereto, and the Special Master should have found that the Secretary of War would not have been justified in reaching the conclusion that the diversion of 8,500 c.f.s. of water from Lake Michigan had any beneficial effect on the navigation of the Mississippi River, and the Special Master should have found that there is nothing in the permit of the Secretary of War which indicates that the Secretary gave any consideration to the effect of this diversion on navigation of the Mississippi River.

Thirteenth.—To so much of finding of fact numbered sixteen, wherein, at page 125 of the Report, the Special Master finds that the Secretary of War on the application and hearing which resulted in the permit of March 3, 1925, had before him the information regarding the effect of the diversion on navigation of the Mississippi River, for the reason that the evidence shows conclusively that no part of the diversion was authorized for the purpose of improving navigation on the Mississippi River, and the evidence, the Report of the Secretary of War, and the permit itself all show clearly that the diversion was authorized for the sole purpose of relieving an assumed sanitary necessity and for the purpose of permitting the City of Chicago to dispose of its sewage through and by means of the so-called Drainage Canal.

Fourteenth.—To all of finding of fact numbered seventeen, for the reason that the construction of compensating works is not within the control of the defendants, but can only be built if and when

Congress so orders and then only by the consent of the Government of Great Britain, and for the further reason that the complainant state of New York is entitled to all the benefits which may be derived from the construction of such so-called compensation works without the diminution of such benefits by the abstraction of water from Lake Michigan by the defendants herein.

EXCEPTIONS TO CONCLUSIONS OF LAW

First.—To the second conclusion of law made and filed by the Special Master herein appearing on page 148 of the report in *haec verba:*

> "My conclusion is that the action of Illinois in diverting water from Lake Michigan through the drainage canal of the Sanitary District was, and is, unlawful unless validly permitted by Congress either directly or through the action of the Secretary of War."

and appearing in the summary of conclusions of the Special Master's Report, page 196, in *haec verba,* to-wit:

> "2. That the State of Illinois and the Sanitary District of Chicago have no authority to make or continue the diversion in question without the consent of the United States."

insofar and to the extent that said conclusion of law implies or holds that the United States might authorize the State of Illinois and the Sanitary District of Chicago, or either of them, to make or continue the diversion in question under the circumstances of this case.

Second.—To all of conclusion of law numbered third as set forth in the Special Master's Report on pages 148 to 171, inclusive, and as summarized on page 196 *in haec verba* as follows:

> "3. That Congress has power to regulate the diversion, that is, to determine whether and to what extent it should be permitted."

for the reason that such a conclusion is contrary to law and the Special Master should have found and concluded that Congress had not been delegated power under the Federal Constitution to authorize this diversion from Lake Michigan, which was to the injury of this complainant riparian state, and to the substantial detriment of its rights and the rights of its citizens in the navigation and use of the Great Lakes-St. Lawrence waterway and which primarily was sought for and, by the Secretary of War, was permitted for the disposal of Chicago's sewage.

Third.—To all of conclusion of law numbered "Fifth" for the reason that it is contrary to law and the Special Master should have found that Congress did not and could not give authority to the Secretary of War to issue said permit for the diversion of water from the Great Lakes-St. Lawrence waterway to the Mississippi waterway, which was for the purpose of relieving sanitary conditions in the City of Chicago.

Fourth.—To all of conclusion of law numbered "Sixth" for the reason that it is contrary to law and the Special Master should have found that the Secretary of War was without authority of law to issue such a permit, and that his act was *ultra vires* and that the permit was void and of no effect.

EXCEPTIONS TO FAILURE OF SPECIAL MASTER TO FIND FACTS AS REQUESTED

First.—To the failure of the Special Master to find in accordance with its proposed finding of fact numbered "12" set forth on page 47 of this complainant state's requests to find and which reads as follows:

> "All of the abstractions of and requests for consent of Secretary of War to abstract the waters of the Great Lakes-St. Lawrence system by the Sanitary District of Chicago have been for the purpose of sewage disposal and power development."

Second.—To the failure of the Special Master to find in accordance with its proposed finding of fact numbered "13" set forth on page 47 of this complainant state's requests to find and which reads as follows:

> "The Congress of the United States has never affirmatively authorized any diversion of water from the Great Lakes-St. Lawrence watershed at Chicago through the Chicago Drainage Canal for any purpose. None of the Secretaries of War of the United States or other Federal executive officers has authorized or directed any diversion of water from the Great Lakes-St. Lawrence watershed to the Mississippi watershed by way of the Chicago Drainage Canal for purposes of navigation. All consents or permits which have been issued or granted by any of the various Secretaries of War of the United States have

> been granted or issued at the request of the Sanitary District of Chicago for sewage disposal purposes. All such permits have been temporary and revocable in character and conditioned that there should be no interference with or injury to navigation. They have been reluctantly granted to meet a case of alleged sanitary necessity with obvious fear that great damage would be done to navigation and other interests."

Third.—To the failure of the Special Master to find in accordance with its proposed finding of fact numbered "17" set forth on page 50 of this complainant state's requests to find and which reads as follows:

> "From April 1, 1903, to March 3, 1925, the Sanitary District of Chicago knowingly violated each and every of the permits of the Secretary of War. (Exhibit 1111, Tr. 3361, 3362.)"

Fourth.—To the failure of the Special Master to find in accordance with its proposed finding of fact numbered "91" set forth on page 93 of this complainant state's requests to find and which reads as follows:

> "The Sanitary District of Chicago has violated the conditions of the Permit of March 3, 1925, by exceeding the limitation placed by that permit upon an instantaneous maximum diversion and by causing and continuing an unreasonable interference with navigation in the Chicago River and in all of the waters of the Great Lakes, their connecting waters and

> their outlet river, from St. Mary's Falls in the St. Mary's River to tidewater in the St. Lawrence River at Quebec. (Exhibit 146.)"

EXCEPTIONS TO THE FAILURE OF THE SPECIAL MASTER TO FIND REQUESTED CONCLUSIONS OF LAW

First.—To the failure of the Special Master to find in accordance with its proposed conclusion of law numbered VII set forth at page 95 of this complainant state's requested findings of fact, conclusions of law and recommendations for a decree, which proposed conclusion reads as follows:

> "VII. That neither the plans for the building nor the construction of the Chicago Drainage Canal was ever recommended by the Chief of Engineers or authorized by the Secretary of War."

Second.--To the failure of the Special Master to find in accordance with its proposed conclusion of law numbered IX set forth at page 95 of this complainant state's requested findings of fact, conclusions of law and recommendations for a decree, which proposed conclusion reads as follows:

> "IX. That the Congress of the United States is without power to authorize the abstraction and transfer of the waters of the Great Lakes-St. Lawrence watershed to or for the benefit of the Mississippi watershed."

Third.—To the failure of the Special Master to find in accordance with its proposed conclusion of law numbered X set forth at page 95 of this complainant state's requested findings of fact, conclusions of law and recommendations for a decree, which proposed conclusion reads as follows:

> "X. That the aforesaid abstraction of water from the Great Lakes-St. Lawrence waterway by the defendants, State of Illinois and the Sanitary District of Chicago, which has lowered the levels of the waters of said waterway, constitutes an unlawful obstruction to and impairment of the navigable capacity thereof."

Fourth.—To the failure of the Special Master to find in accordance with its proposed conclusion of law numbered XI set forth at page 95 of this complainant state's requested findings of fact, conclusions of law and recommendations for a decree, which proposed conclusion reads as follows:

> "XI. That the Permit of the Secretary of War, dated March 3, 1925, is *ultra vires* and void and constitutes no authority for the abstraction of the waters of the Great Lakes-St. Lawrence waterway by the State of Illinois and/or the Sanitary District of Chicago."

Fifth.—To the failure of the Special Master to find in accordance with its proposed conclusion of law numbered XII set forth at page 96 of this complainant state's requested findings of fact, conclusions of law and recommendations for a decree, which proposed conclusion reads as follows:

> "XII. That all of the permits issued by the Secretary of War prior to March 3, 1925,

are *ultra vires* and void and constitute no authority for the abstraction of the waters of the Great Lakes-St. Lawrence waterway by the State of Illinois and/or the Sanitary District of Chicago."

Sixth.—To the failure of the Special Master to find in accordance with its proposed conclusion of law numbered XIII set forth at page 96 of this complainant state's requested findings of fact, conclusions of law and recommendations for a decree, which proposed conclusion reads as follows:

> "XIII. That the Permit of March 3, 1925, does not purport to authorize, nor does it authorize, the abstraction of the waters of the Great Lakes-St. Lawrence waterway, and does not undertake to authorize the invasion or injury of the property and rights of the people of the complainant State of New York or the proprietary or quasi-sovereign rights of said state."

Seventh.—To the failure of the Special Master to find in accordance with its proposed conclusion of law numbered XIV set forth at page 96 of this complainant state's requested findings of fact, conclusions of law and recommendations for a decree, which proposed conclusion reads as follows:

> "XIV. That the permits issued by the Secretary of War prior to March 3, 1925, did not purport to authorize, nor did they authorize, the abstraction of the waters of the Great Lakes-St. Lawrence waterway, nor did they undertake to authorize the invasion or

> injury of the property and rights of the people of the complainant State of New York or the proprietary or quasi-sovereign rights of said state."

Eighth.—To the failure of the Special Master to find in accordance with its proposed conclusion of law numbered XVIII set forth at page 97 of this complainant state's requested findings of fact, conclusions of law and recommendations for a decree, which proposed conclusion reads as follows:

> "XVIII. That neither the Congress of the United States nor the Secretary of War by means of the Permit of March 3, 1925, or any prior Permit has appropriated or attempted to appropriate any of the waters of the Great Lakes-St. Lawrence waterways for navigation purposes in the Des Plaines, Illinois or Lower Mississippi Rivers."

Ninth.—To the failure of the Special Master to find in accordance with its proposed conclusions of law, set forth at page 16 of this complainant state's Supplemental Findings of Fact and Conclusions of Law and recommendations for a decree submitted to the Special Master, as follows:

> "That the Congress of the United States is without power to authorize such abstraction or diversion of the waters of the Great Lakes-St. Lawrence watershed or waterway to the Mississippi watershed or waterway, as will interfere with, impair or obstruct the navigable capacity of the Great Lakes-St. Lawrence waterway."

for the reason that the Special Master, having found that the diversion through the Chicago drainage canal has caused a substantial lowering of the levels of the Great Lakes and their connecting waters and that the said diversion has caused substantial damage to the navigation interests of the State of New York (Report of Special Master, p. 118), should have found that Congress was without power to authorize such a diversion; that Congress had not delegated to the Secretary of War power to issue a permit purporting to authorize such a diversion and that the permit of the Secretary of War of March 3, 1925, was illegal, unauthorized and void.

EXCEPTION TO THE RECOMMENDATIONS FOR A DECREE

The State of New York also excepts to the recommendation of the Special Master that the bill of complaint be dismissed for the reason that on the facts and the law the complainant State of New York is entitled to a decree herein ordering that defendants cease, desist and refrain from abstracting any of the waters of the Great Lakes-St. Lawrence waterway or watershed through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency.

Respectfully submitted,
ALBERT OTTINGER,
Attorney-General, State of New York,

ALBERT J. DANAHER,
Assistant Attorney-General.

Randall J. Le Boeuf, Jr.,
Solicitor and of Counsel.

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JOINT ABSTRACT OF RECORD

IN THE

Supreme Court of the United States

OCTOBER TERM, ~~1927~~ [redacted] 1961

No. ~~7~~, ORIGINAL. 1

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA, COMPLAINANTS,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, DEFENDANTS; STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS, INTERVENING DEFENDANTS.

No. ~~11~~, ORIGINAL. 2

STATE OF MICHIGAN, COMPLAINANT,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

No. ~~12~~, ORIGINAL. 3

STATE OF NEW YORK, COMPLAINANT,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

FILED JANUARY 24, 1928.

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Joint Abstract, in Narrative Form, of Portions of the Record Filed by the Special Master Herein with His Report on November 23, 1927, Embracing Material Not Considered to be Sufficiently Set Forth in Said Special Master's Report, Submitted by Counsel for All Parties, Pursuant to Order of the Court Entered Herein on January 4, 1928.

Colonel Charles Keller, for Complainants.

I reside at Evanston, Illinois. I am a graduate of the United States Military Academy 1890; served in the
1267 Corps of Engineers between the grades of 2nd-Lieu-
1268 tenant and Colonel, serving largely on rivers and harbors, including two years as resident member of Board of Engineers for Rivers and Harbors: member of Special Board of Engineers for a Waterway from Lockport, Illinois to the mouth of the Illinois River, reported in House Document 762, 63rd Congress, 2nd Session; now retired, now assistant vice-president in charge of engineering of the Byllesby Engineering & Management Corporation, Chicago, testified as follows:

1269 With a 9-foot waterway from Lockport, Illinois to Utica, having locks 600 feet long, 110 feet wide, with a maximum lift of 41 feet, a water supply of 1,000 second-feet throughout the year would be more than sufficient to accommodate a traffic of 100,000,000 tons annually. Traffic possibilities on this waterway are large, but it is doubtful if they will ever exceed 100,000,000 tons annually within a measurable period of time.

1272 The great ports are — New York, with a total ton-
1273 nage of imports and exports of 20,000,000 tons; London, with about 22,000,000 tons; Antwerp, with about 20,000,000 tons; Amsterdam, with about 5,000,000 tons; Hamburg ,with about 26,000,000 tons; Rotterdam, with about 17,000,000 tons; Liverpool, with about 20,000,000 tons; Marseilles, with about 5,000,000 tons; and Hongkong, with about 34,400,000 tons.

1274 The number of locks in the waterway does not
1275 affect the lockage water requirements which are governed by the lock of the greatest lift.

1275 My estimate that the amount of water required on the Illinois River is 1,000 c. f. s. relates solely to the amount required for the locks. That figure assumes that there would be locks and dams from Utica to the mouth of the Illinois River, a canalized waterway.

1276-*a* I do not intend my estimate of a thousand c. f. s. to relate in any way to the amount of water that would be required in the Illinois River for navigation in the event that there were no locks and dams in that river.

Ex. 62 The total amount of lockage water used in the American canals at St. Marys Falls between Lake Superior and the lower lakes from 1921 to 1925 varied from 681 to 796 second-feet and for the American and Canadian canals ranged from 788 to 902 second-feet.

Ex. 66, p. 7 The amount of commerce annually passing through the canals at St. Marys Falls from 1921 to 1925 ranged from 48,000,000 tons to over 91,000,000 tons.

General W. H. Bixby, for Complainants.

2102 2105 I was educated at the Massachusetts Institute of Technology, United States Military Academy, Engineers School of Application, French Government School of Highways and Bridges; graduated from West Point 1873, commissioned in the Engineering Corps, U. S. Army, serving from 1873 until 1913. Chief of Engineers, U. S. Army, 1910-13. Retired for age. Advisory Engineer, National Waterways Commission, which studied inland waterway systems of Europe in 1909; district engineer at Chicago, 1904-08. I was recalled into the service during the World War. I served on the Board on the Fourteen Foot Waterway from Grafton to St. Louis, and various other boards. From Utica to Grafton, a distance of about 230 miles, the Illinois River drops only about 33 feet. In the improved river there were eventually four locks of about 8 foot lift each. The river here flows in practically an alluvial plane. The banks and bed are alluvial. The river is a very level, slow-moving stream under ordinary circumstances and continues that way until it almost reaches the Mississippi where it has to go out into the Mississippi through a cut in between high banks, at least on one side. The section of the river from Utica to the mouth is easily dredged and maintained. In the annual report of the Chief of Engineers, 1895, page 2716, Major Marshall states:

> 2109 "The channels dredged in the Illinois River are found to be nearly permanent. Channels dredged twenty years ago are but little deteriorated, and it is surprising to find that there has been no deterioration in the channels created by the Henry and Copperas Creek dams after from 15 to 20 years use. We can then expect the cost of maintenance to be very little."

2113 No addition to the flow of the Illinois River is necessary for a nine foot channel created by locks and dams. The improvement to river navigation with a channel of nine feet under existing circumstances cannot be properly secured until there is a dam in the Missis-
2114 sippi River below the mouth of the Illinois River.
The corps of engineers of the War Department has never recommended a greater depth of improvement for the Illinois River than nine feet.

2116 With a nine foot channel, from 500 to 1,000 feet
2117 per second will furnish all the lockage water that is necessary for about sixty million tons per year from Lockport to Utica. None is needed during the closed season of navigation.

2126 In 1925 the Panama Canal through the summit
2127 level used 992 second-feet of water for a commerce of about 24 million cargo tons, and in 1926, used 989 second-feet of lockage water for a commerce of 26 million tons. Lockage on the Panama Canal goes both ways, from the summit to the two oceans. The amount required for lockage water one way on the Panama Canal is less than 500 second-feet. In the Illinois waterway the lockage only runs one way, from Lockport to Utica, since the summit level is Lake Michigan. There is surplus water in the Panama Canal so that they need not be economical in the use of lockage water.

2111 In my opinion, the proper method of improving the section of the Illinois River from Utica to Grafton for a nine foot channel is by locks and dams all the way through to the Mississippi.

2113 The improvement of the river for a navigation of nine feet under the existing circumstances cannot be properly secured until there is a dam in the Mississippi River below the mouth of the Illinois.

2130 A diversion of 10,000 c. f. s. from Lake Michigan will raise the low water elevation of the Illinois River 5½ ft. at La Salle, 5½ ft. at Peoria, 5½ ft. at Kampsville, and 4½ ft. at Grafton.

The flood of 1922 would have been about 18 inches lower at Peoria and 3 inches lower at Grafton if it had not been for the Sanitary District flow.

2133 It would be quite possible and it would be practicable if there was a diversion of from 8,500 to 10,000 c. s. f. of water from Lake Michigan to improve the Illinois River for a waterway of nine feet without any dams from Utica to Grafton. Such an increment might save considerable money in the lower end of the river, but that amount of increment makes it awkward for navigation at the upper part of the river between Lockport and
2134 Utica. This stretch of the waterway is entirely improved by Locks and dams, but it is in the section of the river which has a steep slope, naturally composed of rapids.

2135 The dams do not make quiet pools with that flow of water.

2136 I am inclined to think it would be feasible and practicable to construct a nine foot waterway without any dam from Utica to the mouth of the Illinois River with a diversion of from 8,500 to 10,000 c. f. s., but I would not vouch for it.

2131 The actual low water flow of the Illinois River is
2132 about 500 c. s. f. in the upper river and 1,500 c. s. f. at its mouth.

2133 In times of flood, dams in the Illinois River would tend to collect silt a certain distance above the dams. Dams act like bars on the river, and always between the bars there are deep pools.

John W. Woermann, for the Defendants.

I am the principal Assistant Civil Engineer in the employ of the office of the United States District Engineer at Chicago.

I was graduated from Washington University in 1890, taking for my degree thesis, "The Lakes to the Gulf Waterway and the Disposal of Chicago Sewage." Ever since that time, I have been employed, almost continuously, by the United States Engineer Corps at St. Louis and Chicago. For over 35 years I have been familiar with conditions, relating to the improvement of the Chicago, Des Plaines, Illinois, Missouri and Mississippi Rivers, the operation of the Illinois and Michigan Canal, and the construction of the Hennepin Canal, the Sanitary and Ship Canal and the Illinois Waterway. In the Summer of 1890 I worked under Captain W. L. Marshall making observations, maps and estimates in connection with the Government "Survey of a Waterway from Lake Michigan to the Illinois River," reported upon in House Document No. 269, 56th Congress, 1st Session (sometimes called the "Marshall Report"), made on March 10, 1890, pursuant to the Rivers and Harbors Act of August 11, 1888, which called for surveys, plans and estimates for a channel improvement for
locks and dams in the beds of the Illinois and Des
4099, Plaines Rivers and for a channel from Lockport
4100, to Lake Michigan not less than 160 feet wide and
2, 6, 8, 9 14 feet deep.

I was assistant to the Division Engineer in the St. Louis office for 12 or 13 years and am now Principal Assistant to the District Engineer at Chicago. Following 1905 I had private practice for three years on construction of a bridge across the Illinois River at Peoria and a hydro-electric plant at the mouth of the Des Plaines River and other miscellaneous work. In 1908, I went to St. Louis and for a

time was engaged in making plans and estimates for a 14-ft. waterway from St. Louis to Cairo, in the employ of the United States under the Board of Examination and Survey of Mississippi River. That survey was authorized by the Act of Congress approved March 2, 1907, and re-
4111 ported on in H. D. 50, 61st Congress, 1st Session. The
4112 same quantity (10,000 c. f. s.) of diversion of water from Lake Michigan was taken into consideration as a basis for that survey.

4114 I was on the upper Missouri River about 6 or 7 months on a survey until the end of 1890. I was on the survey and construction of the Hennepin Canal from January 1, 1891, until July, 1902, nearly 12 years, under the United States Engineer's Office at Chicago. I was employed from the summer of 1902 to the summer of 1905 by a Board of Engineers of which Colonel Ernst was Chairman, in making the surveys, plans and estimates for a 14-foot waterway from Lockport to the mouth of the Illinois River, reported upon in H. D. 263, 59th Congress, 1st Session, 1905, commonly known as the "Ernst Report" with relation to a waterway from Lockport to St. Louis. In 1910, I made estimates for an 8 foot and a 9 foot waterway from Lockport to St. Louis under the so-called "Bixby Board."

4117 I was assisting in the division office of the Western Division at St. Louis from 1909 until April, 1921, at which time I was transferred back to Chicago where I am at the present time. I have been continuously in the employ of the United States since June, 1890, with the exception of three years.

About 1901, after the diversion of water began the old practice of using as a datum or reference plane the low water of 1879 was abandoned and has been continuously abandoned ever since. All work since that time has
4132 been done without reference to that old datum plane.

4124 In the improvement by the United States Government on the Illinois River between La Salle and the mouth from time to time those improvements have been made with reference to the new low-water levels as those new low-water levels have from time to time been affected by the diversion of water from Lake Michigan.

4177 The 7-foot project of the Federal Government adopted in 1880 in the Illinois River was never completed, except in the sense that I indicated that by taking advantage of the increased flow it had been com-
4207 pleted.

Complainants objected to the competency of the foregoing testimony and testimony along the same line, and took an exception to its allowance.

Congress was providing a 7-foot channel as in its
4177 judgment sufficient for navigation on the Illinois
River, and the engineers took such steps as they found necessary as conditions developed to give the 7-foot channel.

4120 Until a few years before the drainage canal (the Sanitary and Ship Canal) was opened, when it seemed a reasonable thing for all concerned to take advantage of the additional water which was expected to come and to use that as the new datum or reference plane, the low water of 1879 had been taken as the datum or reference plane, from which it was attempted to establish the project depth in the Illinois River.

4226 Since 1900 there have not been sufficient appropriations for the improvement of that stretch of the Illinois River to have maintained the project depth of 7 feet without the diversion of water from Lake Michigan at any time during that period. The reference plane or datum represented by low water of 1879 was officially established by the Chief of Engineers upon the recommendation of the District Engineer and the other sub-project reference planes from time to time, as indicated by this correspondence (Exhibit 1145, 1 to 17) have been established officially in the same way.

4113, 264- In the Marshall Report of 1890, the effect of
51-1, p. 27 the diversion upon the Illinois River is stated
in the following language: "The larger discharge, 11,000 cubic feet per second, will raise the present

low water surface under present conditions about 5.5 feet at La Salle or to 9.9 feet above original low water; about 5.5 at La Grange; about 4.5 feet at Kampsville and about 1.5 in the Mississippi at the mouth of the Illinois."

4109 In making the surveys of the 14-foot waterway, re-
4110 ported upon by the Ernst Board in 1905 (H. D. 263-59-1) the maps, plans and estimates for that project were based upon a diversion of 10,000 cubic feet per second from Lake Michigan.

4111 That amount of diversion was reported as the basis of the survey in the 1905 Ernst Report, by the use of the following language: "In preparing this estimate the Board has assumed that the full discharge of 10,000 cubic feet per second contemplated in the plans of the Sanitary District will eventually be permitted by the Secretary of War."

4123 I made the surveys and estimates for the 1911 Bixby Report. In making my surveys and estimates for a 14-foot waterway it was, of course, necessary to use some uniform basis for putting soundings on the maps, and I used for that purpose the low water of 1901 which was the lowest since the opening of the Drainage Canal on January 19, 1900. The flow during the three summer months of 1900 being about 3,000 cubic feet per second, it seemed likely that the river would never be any lower than that, and all of my soundings are referred to that common basis. Following that the United States Engineer Department adopted that low-water line of 1901, which was fully established the entire length of the river in connection with my survey as a basis of the 7-foot project. That was the result which was aimed at to secure 7 feet below that low water of 1901.

4166 For many years the project depth and the project
4167 width for this stretch of the Illinois River between La Salle and the mouth of the Illinois has been a 7-foot depth and a 200-foot width. At no time since the beginning of the diversion from Lake Michigan into this waterway through the Sanitary and Ship Canal down to

the present time, would that project depth and that project width have been available without any diversion from Lake Michigan in the stretch of the Illinois River from La Salle to the mouth of it. Without any diversion the depth would have fallen short of 7 feet at low water at critical points of navigation about 4 feet.

During the low water years from 1900 down to the present time the least amount of diversion of water from Lake Michigan through the Sanitary and Ship Canal that was necessary to have produced an available depth of 7 feet at low water at the critical points of navigation, in that stretch of the Illinois River from La Salle to its mouth was from 8,000 to 9,000 c. f. s.

4118 With conditions as they have existed or did exist in the year 1925 in that stretch of the Illinois River between La Salle and the mouth of the Illinois River the average depth at low water at the critical points of navigation in this stretch of the river, with the diversion of water from Lake Michigan, which then amounted to 8,500 c. s. f. was from 7 to 7½ feet and the minimum available width was about 200 feet.

4120 From my estimates and conclusions and observations as to the conditions as they existed in the year 1925 the effect in that stretch of that river of the 8,500 c. f. s. of diversion of water from Lake Michigan upon the average depth in that stretch at low water at the low critical points of navigation in the year 1925 was to raise it an amount, varying from 4 feet below the Kampsville Dam up to as much as 9 feet at La Salle, except that the water level was not raised that much immediately above the dam. There was no place in that stretch that this diversion did not raise the natural level of the water at critical points of navigation at least 4 feet. The minimum value in feet of this diversion to that stretch of the river is 4 feet.

4228 There was not obtained at low water 7 feet of available depth in the Illinois from La Salle to its mouth before 1925.

4169 During the period from 1901 to the present time by the diversion of 8,500 c. f. per second from Lake

Michigan through the Sanitary and Ship Canal the available depths in the different portions of that stretch of the river between La Salle and the mouth of the Illinois River have been increased about 9 feet at La Salle, 6.5 feet at Peoria, and 4.3 feet below the Kampsville Dam.

4177 If the flow through the Drainage Canal was suddenly shut off the water would drop 6.5 feet lower at Peoria and 4.3 feet at Kampsville, at low water.

4170 The value of 8,500 c. f. per second from Lake Michigan through the Sanitary and Ship Canal in this stretch of the Illinois River between La Salle and the mouth of the Illinois River is from 4 to 9 feet. The minimum value through that stretch during all that period has been at least 4 feet.

4225 Since 1900 the estimates for improvements on the stretch of the Illinois River between La Salle and its mouth, reported to the Chief of Engineers for appropriations on that stretch of the river have been based upon low water conditions in that stretch of the river as affected by the diversion of water from Lake Michigan.

4226 There have not been sufficient appropriations for the improvement of that stretch of the Illinois River at any time since 1900 to have maintained the project depth of 7 feet without the diversion of water from Lake Michigan.

4237 When the Illinois Waterway is completed the locks will be very much larger than those the Federal Government has built along the Illinois River.

4215 The masonry for the lock two and one-half miles below Marseilles has been completed, although the steel gates have not been installed; and the lock at Lockport, at the end of the Chicago Drainage Canal, the masonry and upper gates are about 98 per cent completed, according to the report we made at the beginning of this month.

4216 Work has been started on the lock at Starved Rock. just above Utica, about five or six months ago.

4203-4 The effect of the reversal of the Chicago River has been the creation of a current in that river amounting to a mile or a mile and a half an hour, which has tended to discourage traffic to some extent. I would hardly consider the situation serious, but it unquestionably has an effect. Occasionally it does become serious. If a very large boat, especially at the Clark Street Bridge, which is the only remaining center pier on the river, gets crosswise, it may rub on one side or the other. At rare intervals further down on the south branch, boats will get crosswise and get aground on one end or the other. Such situations occur rarely.

4204 The statement of the Barlow Board that 10,000 cubic feet per second would make additional traffic through that river impracticable applies to the river as it existed before the Sanitary District widened it, deepened it and rebuilt the bridges.

4223 The low water of 1879 included some diversion of water from Lake Michigan about 700 c. s. f. coming from the old Illinois and Michigan Canal. The reference plane indicated by the low water of 1879, used as the datum for a number of years was determined and based upon that amount of diversion from Lake Michigan.

4177–78
4207 As I understand it, Congress was providing a seven foot channel as in its judgment sufficient for navigation on the Illinois River, and the engineers took such steps as they found necessary and as conditions developed to give the seven foot channel. If the flow from the drainage canal were suddenly shut off, the water level would drop nine feet at La Salle, 6-5/10 feet at Peoria, and 4-3/10 feet at Kampsville, providing the engineer corps had done no more work in maintaining and improving the river. This is because the corps of engineers did no more work during this period than was necessary to maintain the seven foot depth with the water that happened to be flowing in the river. In all projects, the river must be dredged and maintained annually or the depth provided by the Government will not exist. The Illinois River is not different in that respect than other rivers. In fact, the lower Illinois

is a much easier river in which to maintain depths by dredging than the majority of rivers in the United States.

The seven foot project adopted in 1880 by the Federal Government was never completed, except in the sense of taking advantage of the increased flow in the river. All projects require constant dredging to maintain. One would not expect any project adopted in 1880 to continue to have the required depth unless there was constant and regular maintenance and dredging for that purpose.

James R. Fuller, for Defendants.

4238 I am a Civil Engineer and an Assistant Engineer
4239 for the United States Engineering Department stationed at Peoria. I entered the government service in 1889 and ever since have been almost continuously employed by that department as clerk, overseer of construction and engineer in charge of survey and improvements on the Illinois River.

4240 When I first observed the Illinois River in 1889, it was very sluggish and shallow, and the available depth in that stretch at low water was from 16 to 18 inches over the worst bars.

4241 At the present time, at low water, the navigable
4242 capacity of that stretch of the Illinois is 7 feet deep and 200 feet wide at low water. When I first began working on that river in 1889 the official reference plane datum used for the improvement of that river was low water of 1879. At that time, the project capacity was a navigable channel 7 feet deep at low water.

4242 Low water of 1879, as a reference plane, was abandoned in my work after the completion of the lock and dam at Kampsville in 1893, when it had become certain that the Chicago Drainage Canal was going to be opened and it had been estimated that the flow from that would raise the low water plane. The dredging operations that were carried on after that were done to that reference plane.
4245 At this point the Special Master made the following statement with reference to this line of testimony:

> "Well, the question is not now whether the reference plane has ever been changed. The question is as to the actual conduct of the engineers, and whether or not the amount of water received by virtue of this diversion at Chicago was not taken into consideration in the actual operations. * * * Why can we not go forward with the idea that the engineers, irrespective now of just what authority they had or what official adoption there was of any reference plane, thought that, because there was a certain amount of water in this waterway, they did not have to ignore it in their operations to get a certain depth?"

4249 I have made observations and calculations to determine the effect of the diversion of water from Lake Michigan through the Sanitary and Ship Canal into the stretch of the Illinois River from La Salle to its mouth.

4249
4250 With conditions as they existed or did exist in the year 1925 in that stretch of the Illinois River the available depth at low water at the critical points of navigation with the diversion of water from Lake Michigan, which then amounted to at least 8,500 cubic feet per second was slightly over 7 feet and the minimum available width was approximately 200 feet.

4250
4251 The available depth in that stretch of the river at the critical points of navigation during the year 1925 if there had been no diversion from Lake Michigan, would have been 3 feet or possibly a little bit more. The minimum amount by which the diversion has raised the low-water plane in that stretch of the Illinois River at the most critical points of navigation, is about four feet. The minimum value of this diversion in that stretch of the river is four feet. At no time since the beginning of the diversion from Lake Michigan into this waterway through the Sanitary and Ship Canal from the year 1900 down to the present time would the project depth of 7 feet at low water have been available in that stretch of that river without any diversion of water from Lake Michigan.

4252 There was no time since the beginning of the diversion when the project width and the project depth would have been maintained without the diversion.

During the low-water years, from 1900 down to the present time, the least amount of diversion of water from Lake Michigan through the Sanitary and Ship Canal that was necessary to have produced an available depth of 7 feet at low water at the critical points of navigation in that stretch of the Illinois River from La Salle to its mouth was about 8,500 cubic feet per second.

During the period from 1901 to the present time a diversion of 8,500 cubic feet per second increased the available depth in the Illinois River at La Salle about 9 feet.

4254 The diversion raised the water in the Illinois River at La Salle in 1901 5.5 feet; in 1910 about 7.5 feet; in 1914 about 8 feet; in 1919 about 9.3 feet and in 1925 about 9.6 or 9.7 feet; at Peoria in 1901 about 2.8 feet; in 1910 about 5.4 feet; in 1914 6 feet; in 1919 6.5 feet; in 1925 about 6.7 or 6.8 feet and below the Kampsville Dam in 1901 2.5 feet; in 1910, 4 feet; in 1914, 3.7 feet; in 1919, 4.3 feet and in 1925 it was practically the same. All of these elevations are not exact, but they are as close as can be approximated. They are within .1 of a foot or .2. Those figures, at the respective points for the respective years in the varying amounts of diversion represent the value of the diversion in feet upon the navigable capacity of that stretch of the Illinois River.

4255 On the 3d of March, 1925, as conditions then existed in ordinary practice it would have taken about five years to have dredged or otherwise improved that stretch of the Illinois River from La Salle to its mouth so as to have made the project depth of 7 feet and the project width of 200 feet available, with a diversion of only 3,000 cubic second feet.

4255
4256 It would take five years from the present time to accomplish the same result with a diversion of only 3,000 cubic second feet. Without any diversion it would take two to two and one-half times as long, or ten or twelve years, anyway.

4256 By diversion from Lake Michigan in my testimony just given I mean the quantity of water that the Sanitary District is turning into the Illinois River at Lockport, measured at Lockport. That is inclusive of water used in the city for sanitary purposes.

4257 My assumption of the length of time it would take to complete the established project on the Illinois River if there were no diversion does not mean that not a drop would come from Lake Michigan because that assumption is based on the original low water plane, when there was a little water coming in out of the old Illinois Michigan Canal, six or seven hundred feet.

4261 The amount of diversion assumed in 1901 was 3,000 second feet, in 1910 about 6,900 c. f. s., in 1914 about 8,400 c. f. s., in 1919 about 8,500 c. f. s. and in 1925 about 8,700 c. f. s.

4262 In testifying as to the amount which I found the Illinois River was raised by the diversion at these critical points I assumed those figures.

The effect at the mouth of the Illinois is a little more than 1.2 feet, with an 8,500 diversion, between that and a foot and a half. The Mississippi affects that, or affected that at the time.

4263 Our official authority for the change in reference plane is the District Engineer. I have knowledge that authority higher up knew what he was doing.

4264 His reports to the Chief of Engineers showed what we were doing, so that they knew the actual conditions.

It would take five years from today to complete the existing project on the Illinois, with a diversion of 3,000 c. f. s.

4264
4265 I estimated that it would take from two to two and one-half times as long if there were no diversion, except the diversion of six to seven hundred feet, which was flowing through the Illinois and Michigan Canal

in 1879 and upon which was based low water of 1879, the old reference datum.

4266 With no diversion I doubt whether, if you increase the plant still further, you could do it in the same length of time, five years.

4270 We were first able to obtain in that stretch of the river the project depth of 7 feet with the diversion as it existed about 1925.

4272
4273 There were never available appropriations and funds sufficient to obtain at any time the project depth and the project width referred to in this stretch of the Illinois River, without at least 8,500 cubic second feet of diversion of water from Lake Michigan. We asked for more funds many times.

Ex. 1145
(1 to 17)
4121

Correspondence Between the District Engineer and Division Engineer and the Chief of Engineers Concerning the Reference Datum for Improvements of the Illinois River.

Ex. 1145-1 On May 4, 1900, the Assistant Engineer at Kampsville wrote to the District Engineer regarding the dredging to be done there that season, as follows:

> "The approved project provided for a channel 7 feet deep at low water and of sufficient width for free navigation.
>
> "This would require a large amount of dredging using the low water of 1879 as a datum. The addition of the water from the drainage Canal of Chicago will probably raise the low water plane materially."
>
> * * * * * * *
>
> "I would recommend that the dredging done this season be done with a view of providing the 7 ft. of water below the new low water plane."

This letter was approved by the District Engineer on May 7, 1900.

Ex.1145-2 On March 25, 1907, the District Engineer at Chicago wrote a letter to the Chief of Engineers, which is in part as follows:

> "1. In compliance with instructions contained in department letter of March 7, 1907 (Ed. 42877) I have the honor to submit the following projects for the expenditure of the appropriations by Act of March 2, 1907, for:
>
> 1. Improving Illinois River, Illinois: continuing improvement and for maintenance, $50,000. * * *
>
> "Major (Now Lieut. Col.) W. L. Marshall adopted 130 feet for the immediate navigable width, but made 200 feet the width to be ultimately obtained, with 7 feet at low water. This depth is still considered sufficient for present needs, but considerable work remains to be done to obtain a uniform width of 200 feet at all points, as well as dredging of bars to maintain 7 ft. navigable depth at low water of 1901."
>
> * * * * * * *
>
> "4. It is therefore recommended that the available balance with the new appropriation be applied to maintaining the plant in efficient condition, repairing the same and rebuilding when necessary, snagging over the whole of the river from its mouth to Copperas Creek, and to such dredging as may be required to provide and maintain a navigable channel at low water of 1901 of 7 ft. depth and 200 feet width, as far as funds will allow. * * *"
>
> * * * * * * *
>
> "6. It is therefore recommended that the appropriation for the Illinois River from Copperas Creek to La Salle be applied to maintaining the plant in efficient condition, repairing and rebuilding the same when necessary, snagging, removing bars, widening out channels, easing curves and crossovers, for the general purpose of securing and maintaining a navi-

> gable depth at low water of 1901 of 7 feet, with a project width of 200 feet, * * *"

This was approved by the Chief of Engineers April 6, 1907.

Ex. 1145-3 Under date of July 20, 1910, the District Engineer at Chicago, in submitting a project for the expenditure of the appropriation, made in the Act of June 25, 1910, for the Illinois River, wrote a letter to the Chief of Engineers at Washington, which is in part as follows:

> "2. The present general project for the Illinois River contemplates the creation and maintenance by appropriate means of a channel of indefinite width, 7 feet deep at low water (of 1879) below Copperas Creek, and of a channel 200 feet wide and 7 feet deep at the low water of 1901 from Copperas Creek to La Salle."
>
> "4. The increased depth has been secured largely by dredging, and continuous dredging is required to maintain that depth."

This was approved by the Chief of Engineers on August 10, 1910.

Ex. 1145-4 Under date of July 21, 1910, J. W. Woermann, Assistant Engineer, wrote to the District Engineer at Chicago as follows:

> "MEMORANDUM.
>
> July 21, 1910.
>
> Major KELLER:
>
> Permit me to refer to the following point, which has probably not been brought to your attention before.
>
> Paragraph 2 of your project for the expenditure of the recent appropriation of $30,000 for 'Improving Illinois River' states that the general project contemplates a channel 7 feet deep *at law water of 1879*, below Copperas Creek. While this statement may

be technically correct and can probably be supported by reference to earlier reports, as a matter of fact it is dead letter. Practically, the present project is to maintain a depth of seven feet with the present low water flow and not that of 1879.

The low water profile of 1879 became a matter of history when the river was canalized and the volume of flow is the only feature that can have any bearing on the present project. The natural low water discharge of the river was about 500 second feet at Utica and about 1,000 second feet at the mouth. To this the Chicago Drainage Canal is now adding about 7,000 second feet (not official, but reliable) although their permit only calls for about 4,300 second feet.

This addition from the Chicago Drainage Canal has raised the low water surface not less than three feet, on an average, so that a channel seven feet deep with the low water flow of 1879 would be at least ten feet deep under conditions as they now exist.

My suggestion is to omit the words 'of 1879' in similar statements in the future. This practice sems to be the more common in other districts, viz., to state the required depth at low water without specifying any particular year.

The river and harbor act of 1910 seems to have gone one step farther in stating that 'the depth of water * * * shall be understood to mean the depth at *mean* low water unless otherwise expressed.' (See p. 42 of 6″ x 9″ edition.)"

1145–5 Under date of July 15, 1912, the District Engineer at Chicago wrote to the Chief of Engineers at Washington a letter which is in part as follows:

"* * * I have the honor to submit the following sub-project for the expenditure of the funds carried in the pending act 'making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes,' in the following item, viz:

> 'Improving Illinois River, Illinois; continuing improvement and for maintenance below Copperas Creek, twenty thousand dollars.'

"The present project for the Illinois River contemplates the creation and maintenance by appropriate means of a channel of indefinite width, 7 feet deep at the low water below Copperas Creek, and of a channel 200 feet wide and 7 feet deep at the low water of 1901 for Copperas Creek to La Salle.

"A channel 7 feet deep has been secured throughout the entire portion of the river under improvement, but the needs of navigation have not demanded dredging to the full project width of 200 feet up to the present time.

"Continuous dredging is required to maintain the project depth which has been secured largely through dredging.

"It is proposed to expend the funds covered in above item in maintaining the navigable channel of 7 feet depth * * *."

Ex. 1145-6 This letter was approved by the Chief of Engineers on July 28, 1912, in a letter (file 7868/19) to the District Engineer stating "The subproject submitted is approved."

Ex. 1145-7 Under date of April 18, 1913, the District Engineer at Chicago wrote a letter to the Chief of Engineers which is in part as follows:

"Subject: Project, Improving Illinois River, Ill.

"Complying with instructions contained in Department letter of March 11, 1913 (E. D. 42877), I submit herewith the following sub-project for expenditure of the funds appropriated in the following item of the River and Harbor Act approved March 4, 1913:

> 'Improving Illinois River, Illinois: Continuing improvement and for maintenance below Copperas Creek, $10,000.'

"The project for improving this river is given in the Annual Report for 1912, pages 1021-1022, and the last sub-project was approved August 28, 1912—E. D. 7868/19."

Ex. 1145-8 On May 25, 1914, the Assistant Engineer at Peoria wrote a letter to the District Engineer at Chicago, which is in part as follows:

> "Subject: Project, Illinois River.
>
> Answering the questions in your letter of the 22nd inst. in the order asked:
>
> 1st. The original project for this river below Copperas Creek Lock, adopted in 1880 was for a 7 feet depth at low water of 1879 of indefinite width to be provided by dredging, with the aid of locks and dams.
>
> The sub-project approved April 6, 1907, for expending money appropriated that year for a channel 7 feet deep at low water of 1901 and 200 feet wide, from Grafton to La Salle, $50,000.00 having been appropriated for Improving Illinois, General Improvement, and $50,000.00 for Improving Illinois River, Copperas Creek to La Salle.
>
> The sub-project approved August 28, 1912 for expending the money appropriated that year provided for a channel 200 feet wide and 7 feet deep at low water, the appropriation being for Improving Illinois River, General Improvement, only.
>
> The project for improving the river by locks and dams and dredging was based on low water of 1879. When Kampsville Dam was finished, progress on the Chicago Drainage Canal had reached a point where it was only a question of a few years until it would be opened, and all dredging done between that time and 1901 was done with a view to providing 7 feet

with the aid of water through this canal. The canal was opened January 17, 1900 and the low water of 1901 was the lowest there has been on this river since, except for the first 15 miles above the mouth of the river.

The year 1910 was very dry and the Upper Mississippi had the lowest water on record between the Mouth of the Missouri and St. Paul. As the fall in this river is very small, the Mississippi affects the lower end of this river very materially. So much so, that although the discharge through the Chicago Drainage Canal in 1910 was twice as great as it was in 1901 the low water of 1910 in this river for the first fifteen miles above Grafton was the lowest on record.

The estimate of 500,000 cu. yds. to complete the project refers to the project approved August 28, 1912 for 7 feet at low water of 1910.

The lowest water between Copperas Creek and Kampsville Lock after Kampsville and La Grange Dams were finished was in 1894. This was also the lowest stage below Kampsville Lock, except for the last 15 miles of the river. Where the stage reached in 1910 is the lowest as noted above. To provide a channel 200 feet wide and 7 feet deep at low water of 1894 from Copperas Creek to Grafton will require 2,500,000 cu. yds. of dredging. To dredge the last fifteen miles of the river to 7 feet at low water of 1910 will require 200,000 cu. yds. additional. It is believed that with proper equipment this dredging can be done at a cost of 12½¢ per cubic yard or a total cost of $327,500.00."

1145–9 On May 26, 1914, the District Engineer at Chicago, wrote a letter to the Assistant Engineer at Peoria, which is in part as follows:

> "As to the low water from which depth should be measured, it seems to me that the low water of 1879 lost its importance when the Drainage Canal water was admitted and that it would be fair now to assume

the low water from which the depth should be calculated as the low water of 1901." * * * "I wish very much that I could get a reasonable and proper statement of this project and of the amount necessary to complete so that I might obtain authority from the Chief of Engineers at this time to embody same in my annual report, and thus get the matter straightened out."

1145–10 On January 29, 1915, the Assistant Engineer at Peoria wrote a letter to the District Engineer at Chicago, which is in part as follows:

"Referring to paragraph 1 of your letter of January 28 will say that hereafter whenever low water is referred to it will mean low water of 1901 unless otherwise stated."

1145–11 On February 5, 1915, the District Engineer at Chicago wrote a letter submitting estimates for dredging to the Assistant Engineer at Peoria, which is in part as follows:

"It is now understood that, until a change is made, our project depths will be referred to low water of 1901, from Grafton to Kampsville Lock, and from Bedford to Copperas Creek Lock; to low water of 1908 from Kampsville Lock to Bedford; and to low water of 1879 when referring to the mitre sills of the two locks."

1145–12 On May 10, 1915, the District Engineer at Chicago wrote a letter to the Chief of Engineers at Washington, which is in part as follows:

"Subject: Sub-project for Improving Illinois River, Ill.

* * * * * * *

"In compliance with instructions contained in department letter of April 2, 1915, (Ed. 42877) the following sub-project is submitted for the expenditure of $50,000 allotted for improving Illinois

River, Illinois, (general improvement) from the $25,000,000 appropriated by Act of March 4, 1915."

"The existing project for improvement of this river provides for dredging and maintaining a depth of seven (7) feet at low water, and the construction of two locks, at Kampsville and La Grange, respectively."

1145–13 On May 18, 1915, the Chief of Engineers at Washington wrote a letter to the District Engineer at Chicago in reply to the above-mentioned letter of May 10, 1915, which is in part as follows:

"The sub-project submitted is approved."

1145–14 On April 20, 1916, the Assistant Engineer at Peoria wrote a letter to the District Engineer at Chicago, which is in part as follows:

"Subject: Estimates for completing Illinois River Project."

* * * * * * *

The following estimate of the amount of dredging required to complete a channel 200 feet wide and 7 feet deep at low water from Grafton to La Salle is submitted.

* * * * * * *

The above estimate is based on the low water of 1901 for 110.3 miles; Six mile Island to Kampsville Lock and Montezuma to Copperas Creek Lock; On the low water of 1908 for 18.5 miles, Kampsville Lock to Montezuma, and on the low water of 1910 for 8 miles, Grafton to Six mile Island.

The above is the lowest water over the reaches described since the opening of the Chicago Drainage Canal in 1900."

Ex. 1145–15 Under date of March 31, 1919, the District Engineer at Chicago wrote a letter to the Chief of Engineers in part as follows:

"Subject: Illinois River, Illinois.

(*a*) In compliance with instructions contained in circular letter dated March 8, 1919, the following *sub-project* is submitted for the expenditure of $10,000 allotted by the Chief of Engineers * * * from the lump sum appropriation of $140,000 by the River and Harbor Act approved March 2, 1919.

(*b*) The existing project for the improvement of the Illinois River is given on pages 1470 and 1471 of the annual report for 1918."

1145–16 On June 18, 1920, the District Engineer at Chicago wrote a letter to the Chief of Engineers at Washington, which is in part as follows:

"Subject: Illinois River.

"In compliance with instructions contained in the department letter of June 10, 1920 (Ed. 42877), the following sub-project is submitted for the expenditure of $25,000 allotted for the Illinois River from the River and Harbor Act approved June 5, 1920.

(*b*) The last printed statement of the existing project is given on page 1595 of the annual report for 1919.

(*c*) The two locks and dams have been completed and the dredging, exclusive of accumulated maintenance, is about 66% completed. The whole project, including locks and dams, is about 94.5% completed. Dredging towards completion of the project should be undertaken at once.

With the present unauthorized flow from Lake Michigan the controlling depth of the entire river from La Salle to the mouth is 6 feet but not for the full project width of 200 feet. On the hypothesis that there will be an increment from Lake Michigan of 4166 c. f. s., there yet remains to be done the dredging of about 1,290,000 cubic yards of material, of which about 640,000 cubic yards is new work and about 650,000 cubic yards is accumulated maintenance.

The increased importance of the Illinois River due to the recent approval of the plans for the construction of the Illinois Waterway by the State of Illinois, makes it imperative that more extensive dredging operations be carried on both for maintenance and for the completion of the project."

Ex. 1145–17 On March 21, 1921, the District Engineer at Chicago wrote a letter to the Chief of Engineers at Washington which is in part as follows:

"Subject: Additional dredging plant for Illinois River.

* * * * * * *

In order to complete the existing 7-foot project, assuming the flow from Lake Michigan through the Chicago Drainage Canal to be approximately that authorized by the Secretary of War and all dams retained, it will be necessary to remove about 1,900,000 cubic yards of material.

* * * * * * *

The existing dredging plant working under the most favorable conditions has a capacity of about 300,000 cubic yards per annum with double crew and would require from 12 to 13 years to complete the existing 7-foot project.

* * * * * * *

In view of the progress being made in the construction of the 'Illinois Waterway' by the State of Illinois it is very probable that a 9-foot project for the Illinois River will be adopted by Congress in the near future.

Should the 8-foot project be adopted it will probably provide for obtaining an 8-foot depth at a low water stage corresponding to a diversion from Lake Michigan of 7,500 cubic feet per second and the removal of the existing dams.

* * * * * * *

Neither the existing 7-foot project nor the suggested 8-foot project can be completed before the completion of the work on the 'Illinois Waterway'."

"NAVIGATION OF ILLINOIS RIVER AND WATERWAY PHYSICAL CHANGES."

Ex. 1, p. 42, Putnam Report, Nov. 1, 1923, "Diversion of Water from Lake Michigan."
3506
3510

"Previous to the opening of the drainage canal the reference plane for channel improvements was the elevation of low water of 1879. This was 439.25 at La Salle and 410.7 at Grafton, Memphis datum. Since 1900 the reference plane has been the elevation of low water of 1901, that being the lowest stage since the opening of the canal."

In House Document 762, 63rd Congress, 2nd Session, the Board of Engineers, in reporting to Congress in the year 1913 on the Illinois River, stated:

"FEASIBILITY OF THE WATERWAY."

H. D. 762-63-2,
p. 4,
Par.3.

"In the valley of the Des Plaines and upper Illinois Rivers, excellent foundations for locks are available; the lower Illinois has a gentle slope, so that any reasonable depth can be obtained by dredging, and the present diversion* of water from Lake Michigan through the Chicago Drainage Canal is more than sufficient for navigation purposes. It is therefore the opinion of the special board that the waterway from Lockport to the mouth of the Illinois River is feasible."

Ex. 18,
H. D. 4-69-1,
p. 175,
Bd. of E.

"Illinois River, LaSalle to the mouth.—The existing Federal project adopted in 1880 provides, in connection with the State project, for a navigable channel 7 feet deep at low water of 1879 from La Salle to the mouth of the river, by the construction of four locks and dams and dredging the bars."

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*— 6945 c. f. s. (Special Master's Report, p. 22.)

Ex. 1360
Doc. 2,-
67-1,
p. 9,
Dist. E.

"Illinois River, LaSalle to the mouth.—The existing Federal project adopted in 1880 provides, in connection with the State project, for a navigable channel 7 feet deep at low water of 1879 from LaSalle to the mouth of the river, by the construction of four locks and dams and dredging the bars."

* * * * * * *

"All dredging since 1914 has been done by the United States dredging plant, and to a depth of 7 feet below low water of 1901, the lowest stage of river since the opening of the Sanitary Canal."

Ex. 18,
H. D. 4-
69-1,
p. 8,
Bd. of E.

"The Illinois River * * * is under improvement by the United States in accordance with a project providing for a channel 7 feet deep at low water of 1879 * * * to be obtained by two Federal locks and dams * * *. There are two other locks and dams * * * operated and maintained by the State of Illinois * * *; these were, however, necessary for navigation up to LaSalle previous to the present large diversion of water from Lake Michigan."

C. of E.,
Rep. 1890,
Pt. 1, P. 261.

"The present project" on the Illinois River "includes the building of two locks * * * with 7 feet of water over the mitre-sills at low water of 1879, and dredging the channel where necessary to obtain 7 feet depth at low water in the pools thus created."

Ex. 207,
C. of E. Rep.,
1893, Pt. I,
p. 362.

"The project" on the Illinois River "includes the construction of two locks * * * with a depth of 7 feet in water over sills at low water of 1879, and dredging the channel where necessary to secure 7 feet depth of water at low water in the pools thus created."

This appears also in Report of Chief of Engineers, U. S. Army,

1894, Part I, p. 334.
1895, Part I, p. 372.
Part IV, P. 2714.
1896, Part I, p. 327.
Part IV, p. 2597.
1897, Part I, p. 416.
1898, Part I, p. 404.
1899, Part I, p. 480.
1900, Part I, p. 505.

Ex. 207,
C. of E. Rep.,
1897, Pt. LV,
p. 2815.

"The présent project" on the Illinois River "includes the construction of two locks * * * with 7 feet depth at low water over sills, and dredging the channel where necessary to secure that depth of water at low water throughout the pools created by the dams."

This also appears in Report of Chief of Engineers, U. S. Army,

1898, Part IV, p. 2436.
1899, Part IV, p. 2841.
1900, Part V, p. 3799.
1901, Part IV, p. 3006.

Ex. 207,
C. of E. Rep.
1901, Pt. 1.

"The project" on the Illinois River "includes the construction of two locks * * * with 7 feet of water over sills at low water of 1879, and dredging the channel where necessary to obtain 7 feet depth at low water was adopted in 1880."

This also appears in Report of Chief of Engineers, U. S. Army

1902, Part I.
1903, Part I.
1904, Part I, p. 541.
1905, Part I, p. 548.
1906, Part I, p. 609.
1907, Part I, p. 635.
1908, Part I, p. 682.
1909, Part I, p. 718.
1910, Part I, p. 796.
1911, Part I, p. 853.
1912, Part I, p. 1012.
1913, Part I, p. 1133.

Ex. 207,
C. of E. Rep.,
1907, Part 1,
p. 636.

"From Copperas Creek to LaSalle. The first appropriation for this section of the River was made March 2, 1907, and the approved project for its expenditure provides for securing the same navigable conditions from Copperas Creek to LaSalle as are planned for the lower river i. e. a channel depth of 7 feet at low water."

This also appears in report of Chief of Engineers, U. S. Army

1908, Part I, p. 682.
1909, Part I, p. 719-20.
1910, Part I, p. 797.
1911, Part I, p. 835.
1912, Part I, p. 1021.
1913, Part I, p. 1133.

Ex. 207,
C. of E. Rep.
1910, Pt. II,
pp. 2164-65.

"Improvement of Illinois River, (a) Below Copperas Creek. The approved project provides for a channel 200 feet wide and 7 feet deep at low water of 1879."

This appears also in Report of Chief of Engineers, U. S. Army,

1911, Part II, pp. 2367-2368.
1912, Part II, p. 2555.
1913, Part II, p. 2817.

Ex. 207,
C. of E. Rep.
1912, Pt. I,
p. 1020.

"Improvement * * * includes the construction of two locks * * * with 7 feet of water over sills at low-water level of 1879, and dredging the channel where necessary to obtain 7 feet depth at low water, was adopted in 1880."

"From Copperas Creek to La Salle— * * * project * * * provides for securing the same navigable conditions from Copperas Creek to La Salle as are planned for the lower river, i. e., a channel depth of 7 feet at low water."

Ex. 207,
C. of E. Rep.
1914, Pt. I,
pp. 1170–72.

"The admission to the Illinois River of Lake Michigan water via the Chicago Drainage Canal has raised the lower water plane; but inasmuch as the quantity of water which may thus be admitted is a matter of present litigation, it is impracticable, as yet, to ascertain what the low water plane will be."

"Each lock is 350 feet long, between sills and 75 feet wide, with 7 feet on the mitre sills at low water of 1879."

"Copperas Creek to La Salle. * * * The state of Illinois * * * has built locks * * * with 7 feet on the mitre sills at low water of 1879."

Ex. 207,
C. of E. Rep.
1915, Pt. I,
p. 1266.

"Illinois River (Note on p. 1266). The admission to the Illinois River of Lake Michigan water via the Chicago Drainage Canal has raised the low water plane, but inasmuch as the quantity of water that may thus be admitted is a matter of present litigation, it is impracticable to ascertain what the future low water plane will be. At present there is admitted nearly 8,000 cubic feet per second as against 4,166 cubic feet per second authorized."

This appears also in the report of Chief Engineers, U. S. Army,

1917, Part I, p. 1423.
1918, Part I, p. 1470.
1919, Part I, p. 1595.
1920, Part I.
1921, Part I, p. 1575.
1922, Part I, p. 1593.

"The existing project * * * contemplates improvement to a 7-foot depth at low water by dredging and by the construction of locks * * * with 7 feet on the mitre sills at low water of 1879."

"Copperas Creek to La Salle. * * * The State of Illinois has built locks, * * * with 7 feet on the mitre sills at low water of 1879."

Ex. 207
C. of E. Rep.
1916, Pt. I,
p. 1367.

"Illinois River * * * below Copperas Creek * * * project * * * contemplates improvement to a depth of 7 feet at low water by dredging and by * * * locks, * * * with 7 feet on the mitre sills at low water of 1879."

This appears also in report of Chief of Engineers, U. S. Army,

1917, Part I, p. 1423.
1918, Part I, p. 1470.
1919, Part I, p. 1595.
1920, Part I.
1921, Part I, p. 1576.

Ex. 207,
C. of E. Rep.
1923, Pt. I,
p. 1451.

"Existing project * * * provides for the improvement * * * by dredging to afford a depth of 7 feet at low water of 1879."

This appears also in report of Chief of Engineers, U. S. Army,

1924, Part I, p. 1448.
1924, Part I, p. 1358.

> "The admission to the Illinois River of Lake Michigan water via the Chicago Drainage Canal has raised the low water plane, but inasmuch as the quantity of water that may thus be admitted is subject to progressive reduction, it is impracticable as yet to ascertain what the future low water plane will be."

Ex. 207,
C. of E. Rep.
1922, Pt. I,
p. 1593.

"Illinois River * * * existing project * * * provides for improvement * * * by a construction of two locks and dams and by dredging to afford a depth of 7 feet at low water of 1879 and * * * from Copperas Creek to La Salle by dredging and other improvements to afford the same depth."

"FEASIBILITY, ILLINOIS WATERWAY."

Ex. 1195-A
Judson letter,
Aug. 11, 1919
to C. of E.
on Ill. Waterway, pp. 9–10.

"In this connection it seems enough to point out that along the line followed by the proposed waterway there already flows a commerce vastly greater than the proposed or any other reasonably designed waterway could accommodate. The lands bordering upon the river-and-canal system of which the Illinois Waterway would be a part are among the richest, agriculturally, in the country.

8

The Illinois River traverses a great coal field. The timber marketed via the Great Lakes is becoming exhausted and increasing amounts of pine are being brought to Chicago from the South. Along the proposed waterway itself are enormous deposits of stone. At Joliet is a great steel plant. At La Salle there are large zinc reduction works and a number of cement mills having a capacity of approximately 4,000,000 barrels yearly. Chicago and the wonderful industrial district at and about Chicago are at one end of the waterway. From Chicago to the seaboard proceeds a vast volume of commerce, including grain and other food products and all kinds of manufactured articles. Some considerable portion of this commerce will be destined to pass through the Panama Canal, and the Illinois Waterway would be a link in a waterway system continuous to and through the Panama Canal."

In 1925, Major General Harry Taylor, Chief of Engineers, appearing before the "Select Committee On Nine-Foot Channel From The Great Lakes To The Gulf, United States Senate," testified relative to the amount of water required for purposes of, and the effect of the diversion upon, navigation along the Illinois River, as follows:

Ex. 209 "Of course, the amount of water depends entirely upon how the improvement shall be made. We could get 8 or 9 feet in the Illinois River with 1,000 second-feet or with 10,000 second-feet diversion but by different methods of improvement and at different costs."

Ex. 209 "With 1,000 second-feet you would have to have locks and with 10,000 second-feet no locks would be required; that is, below Utica."

In 1926 General Taylor appeared before the Committee on Rivers and Harbors, House of Representatives, and testified relative to the amount of water required for purposes of navigation along the Illinois River as follows:

Ex. 209 “It is shown in the table and published in the report that the channel can be obtained with any amount of diversion annually from 1,000 up to 10,000. That answers your question.”

In 1926 General Taylor also appeared before the United States Senate, Commerce Committee, where he testified as follows:

Ex. 209 “There is a certain amount of water used for domestic purposes, approximately 1,200 second-feet, and that would go back into the river and go down the river. With a diversion there at Lockport of only 1,000 second-feet, which is less than the amount they are using at the present time for domestic consumption, the cost would vary. With complete canalization it would be $2,666,000, and with partial canalization, by taking the State dams out, it would be $5,133,000. In other words, with a flow from the lake of only 1,000 second-feet, the cost would be between $2,555,000 and $5,133,000.”

Ex. 209 “Navigation can be provided for with a thousand second-feet.”

After considering this testimony of General Taylor before the “Select Committee On A Nine-Foot Channel From The Great Lakes To The Gulf, United States Senate” the “Select Committee” made its report (Report No. 955, 68th Congress, 2nd Session) which, among other things, states:

Ex. 1099, p. 6 “The portion of the Illinois and Mississippi Rivers proposed to be improved is a natural waterway having a fall of only 30 feet in 230 miles. In fact, except in flood, the Illinois is naturally a more navigable stream than the Ohio. However, what concerns navigation on any river is neither the average nor the flood flow, but the minimum flow available throughout the year. We find available for the waterway proposed here a low, natural dry-weather flow supplemented by an existing diversion of 10,000 cubic feet of water per second

> from Lake Michigan. This quantity of water, we believe, is needed to give the 9-foot depth proposed in the lower Illinois River. Likewise, we believe this amount of water diverted from Lake Michigan increases by about one-third the dry-weather flow of the Mississippi River at St. Louis and provides an increase in the low-water depth of this portion of the river of about 1½ feet without dredging."

In House Document No. 4, 69th Congress, 1st Session, transmitted to the Congress March 29, 1926, the Board of Engineers for Rivers and Harbors with respect to the effect of the diversion from Lake Michigan upon the methods and cost of providing a 9-foot channel in the Illinois River stated:

Ex. 18, p. 10, par. 8, Bd. of E.

> "The estimated cost of navigation improvement, which is the question asked, depends both on the amount of diversion and the method of improvement. For any of the three depths, the river can be improved by one or more of at least four different methods; complete canalization, using five locks and dams; partial canalization, using the four existing locks and dams; partial canalization, using the two existing Federal locks and dams and taking out the two State dams; and open channel improvement. The following table shows, for a channel 9 feet by 200 feet, the costs by these methods, for the five diversions given in the resolution and for additional diversions as well (1,000, 3,000, 5,000 and 6,000 c. f. s.). It is assumed, that by 'diversions' the committee meant 'average annual diversions based upon the year most unfavorable to navigation.' (Par. 7-c, col. 1.) The division engineer concurs in these cost estimates. The board concurs and submits them, as the answer to the first question, as regards the 9-foot depth. Data on 7-foot and 8-foot depths and certain alternative estimates for 9-foot depths appear in the district engineer's report and appendices thereto."

Ex. 18,
p. 11,
par. 8,
Bd. of E.

"ILLINOIS RIVER, ILL.

"Method of Improvement	Instantaneous maximum diversion, Lockport, cubic feet per second	Annual average diversion, Lockport cubic feet per second	Cost, thousands of dollars.[1]		
			First Cost	Maintenance and operation	Annual Charge (maintenance & operation plus 4 per cent first cost)
Complete canalization[2]	1,650	1,000	2,666	226	[2] 332
Partial canalization (State dam out)			5,133	210	415
Complete canalization[2]	3,300	2,000	2,619	216	[2] 321
Partial canalization (State dams out)			5,108	171	375
Open Channel			6,050	105	347
Partial canalization[2] (present dams retained)	4,580	3,000	1,914	191	[2] 268
Partial canalization (State dams out)			3,697	147	295
Open Channel			4,482	97	276
Partial canalization (present dams retained)	6,050	4,167	1,383	180	235
Partial canalization[2] (State dams out)			2,262	133	[2] 224
Open Channel			3,465	89	227
Partial canalization (present dams retained)	7,050	5,000	1,264	178	229
Partial canalization (State dams out)			1,789	130	202
Open Channel[2]			2,365	87	[2] 182
Partial canalization (present dams retained)	8,250	6,000	1,141	168	214
Partial canalization (State dams out)			1,349	126	180
Open Channel[2]			1,925	80	[2] 157
Partial canalization (State dams out)	10,050	7,500	942	122	160
Open Channel[2]			1,540	76	[2] 138
Partial canalization[2] (State dams out)	11,250	8,500	171	114	[2] 121
Open Channel			1,320	70	123
Partial canalization (State dams out)	13,050	10,000	171	105	112
Open channel[2]			990	63	[2] 102

[1] On the assumption that the flow is regulated primarily in the interests of navigation.

[2] Indicates method which, considering, first, maintenance and operation costs, is cheapest, in terms of Federal money expended, for the given diversion."

Ex. 18,
p. 15,
par. 22,
Bd. of E.

"22. Pending further developments and investigations along these lines, the board is unable to give its opinion as to what is the exact amount of diversion which would result in the maximum of benefit to the Nation as a whole, taking all factors into account. The board therefore feels that it would be premature definitely to fix the diversion at this time. As it happens, it is needless from the viewpoint of navigation on the Illinois thus to fix it. The Illinois can be given a 9-foot channel by several methods, as shown above; two of these are of special merit, being applicable for any annual average diversion as low as 2,000 cubic feet per second, and equally applicable for a diversion as high as 10,000 cubic feet per second. The two methods are (1) removal of all dams, and (2) partial canalization by removal of the two State dams and retention of the two Federal dams, together with in each case dredging and supplementary work."

Ex. 18,
p. 3,
par. 3,
C. of E.

"6. The district engineer, as a result of a careful economic study, is of the opinion that the most suitable dimensions are a governing depth of 9 feet and a governing width of 200 feet. The division engineer concurs in this view. The Board of Engineers for Rivers and Harbors also concurs on the basis both of the district engineer's computations and of the general significance of a navigable connection between Lake Michigan and the Mississippi as an important part of the future system of trunk-line waterways in the interior of the country."

p. 4,
Par. 8.

"8. The question of what diversion is necessary to produce a channel 9 feet by 200 feet by any of the several practicable schemes, other than complete canalization, is answered by the table in paragraph 5 above. More complete data on this and other depths appear in the district engineer's report."

p. 4, Par. 11. "11. The district engineer recommends a 9-foot channel 200 feet wide, to be obtained by an annual average diversion of 4,167 cubic feet per second and a maximum instantaneous diversion of 6,050 cubic feet per second, both measured in the drainage canal at Lockport, the channel to be provided by dredging, partial removal of the two State dams, and retention and alteration of the two Federal dams, at an estimated cost of $2.262,000 with $133,000 annually for maintenance. The division engineer submits certain comments on the amount of diversion required for navigation. Taking all factors into consideration, he concurs in the recommendations of the district engineer as to the works to be undertaken, and considers that the diversion at Lockport should not exceed 4,167 cubic feet per second annual average."

Ex. 18, p. 6, Par. 14, C. of E. "14. The board therefore recommends modification of the existing project for the Illinois River to provide a channel with least dimensions of 9 feet in depth and 200 feet in width from the mouth to Utica, by dredging and by the partial removal of the two State dams and by the retention and minor alteration of the two Federal locks and dams, at an estimated cost under present conditions of diversion of $1,350,000 with $126,000 annually for operation and maintenance; provided that the State of Illinois transfer to the United States without cost all rights and titles in the two State-owned dams on the Illinois River; that local interests furnish the United States without cost all necessary areas for the economical disposal of material dredged in creating and maintaining the channel; provided further that no work on the Illinois River shall be carried out according to the project herein outlined, with the existing or any subsequent diversions, until the Secretary of War and the Chief of Engineers shall have received satisfactory assurances that local interests will provide an equal depth for through navigation in the Illinois waterway. The amount of $1,350,000 should be made available in the initial appropriation. With any future reduction in the diversion a re-estimate of the cost of completing or revising and maintaining the project will become necessary. If after the completion of the Illinois waterway several years hence the large commerce expected has developed in such a way that the Federal locks are becoming inadequate for the navigation, consideration should at that time be given to the relative desirability of the partial removal of the dams or the provision of increased lock capacity, as may then appear best.”

p. 7,
Par. 16,
C. of E.

“16. After due consideration of the above-mentioned reports, I concur in the views and recommendations of the board.”

In House Document 762, 63rd Congress, 2nd Session, the Lakes-to-Gulf Waterway Board, after discussing a diversion of 10,000 c. s. f. and its relation to navigable depths stated that,

H. D. 762-
63-2,
pp. 13-14.

“The Board has also shown * * * in its preceding report that such a diversion was not necessary to obtain the 8 or 9 foot navigation recommended from Chicago to the mouth of the Illinois River.”

H. D. 762-
63-2,
p. 12.

“Compensation for the loss of elevation on Lakes Michigan, Huron, and Erie, and their connecting waters, due to an assumed diversion from Lake Michigan of 10,000 second-feet, will by the plan above outlined involve an expenditure of about $475,000, to which should be added an amount for the maintenance of the weirs, estimated at about $15,000 per year, the total cost being much less than the cost of restoration of depths by dredging. It is the opinion of the board that while other plans have been proposed, compensation by fixed contraction works similar in general to those above described affords the cheapest and most satisfactory method of preserving the levels of the Great Lakes.”

p. 11. "To restore the diminished levels in the Lakes by constructing contracting works in their outlets does not however present any serious difficulties."

pp. 12-14. "* * * The board reiterates that a diversion exceeding 1,000 second-feet is not necessary for navigation purposes alone in the Illinois River, and that an added discharge will produce a slight and inadequate effect on the Mississippi River."

"* * * The effect of any diversion upon gauge height will always be small, and at the highest stages practically nothing, but the exact effect at any time or at any stage is impossible to determine, since this effect will be complicated or obscured by various other changes in the regimen of the river."

p. 2. "The influence on the volume of the Mississippi River due to any diversion from Lake Michigan will be an increase approximately equal to the amount of water diverted."

H D. 762-63-2, p. 106 "For purposes of navigation a diversion from Lake Michigan of less than 1,000 second-feet of water is all that will be necessary."

p. 106 "For purposes of sanitation the works of the Sanitary District of Chicago were designed to allow the diversion of 10,000 second-feet and now contemplate a total of 14,000 second-feet, the additional 4,000 second-feet to be obtained by the diversion of water through the Calumet River and a connecting canal following the Sag route."

p. 107 "While it appears to have been assumed that the Sanitary District may be allowed to divert 10,000 second-feet so long as actually necessary for sanitary purposes, the diversion of the waters of the great Lakes from their natural outlets for power development alone is inadmissible, under the recent treaty between the United States and Great Britain."

p. 107 "The claim that more than 1,000 cubic feet per second is required for purposes of navigation cannot be maintained."

p. 107 "The treaty, however, recognizes as proper the use of water for sanitary purposes, and it is the opinion of the Board that only such water should be diverted from Lake Michigan as is indispensable for sanitation, and then only with a provision for proper compensating works in the outlets of the lakes to prevent a lowering of their levels. Water thus diverted may be used incidentally for power purposes, but care must be exercised in authorizing the diversion of water for sanitary purposes, to restrict it to the amount necessary for those purposes alone."

"The work now proposed by the State in connection with the canal of the Chicago Sanitary District contemplates a waterway from Lake Michigan to Utica, which, although departing from the line of the old canal, substitutes a waterway more than sufficient for any probable navigation. This will in effect fulfill the original agreement between the State and General Government for this section and incidentally develop a water power which the State considers a profitable business investment. State or local agencies are better adapted than the General Government for conserving water power for their citizens."

H. D. 762-63-2, p. 8 "It is understood that the Sanitary District of Chicago and the State expect to develop considerable water power on that portion of the waterway between Chicago and Utica. As it is proposed that the navigable channel between these points shall be built without cost to the United States, it is believed that the General Government should relinquish to these local agencies any rights that it may have in the power to be thus developed. It does not appear that there is any question of water power, flood control, or other matter that can be coordinated with that portion of the work to be done by the United States for the improvement of navigation, so as to lessen the cost and compensate the Government for its expenditures made in the interest of navigation."

p. 113 "It is understood that the Sanitary District of Chicago and the State expect to develop considerable water power on that portion of the waterway between Chicago and Utica. As it is proposed that the navigable channel between these points shall be built without cost to the United States, it is believed that the General Government should relinquish to these local agencies any rights that it may have in the power to be thus developed."

p. 7 "The construction of such dam is not necessary for the execution of existing projects for the Illinois and Mississippi Rivers or the projects recommended in the partial report printed in House Document No. 1374, Sixty-first Congress, third session. The special board reports that the work would be enormously expensive and not justified by resulting benefits to commerce and navigation or by the returns from water-power development."

In House Document 1374, 61st Congress, 3rd Session, being report on a waterway from Lockport, Illinois, to the mouth of the Illinois River, the Board of Engineers, after considering a channel 8 or 9 feet deep, with appropriate widths and locks, stated:

H. D. 1374-61-3, p. 7, p. 8. "A waterway of these dimensions would have a capacity exceeding 100,000,000 tons per annum, * * *. Such a waterway will not require a diversion of more than 1,000 second-feet from Lake Michigan and this amount would not injuriously lower lake levels nor cause excessive flooding of lands in the Illinois Valley * * *. "For purposes of navigation a diversion from Lake Michigan of less than 1,000 second-feet of water is all that will be necessary.

Warren Rep. Ex. 182, 19. In reviewing the Warren Report, upon the subject of water diversion from the Great Lakes and the Niagara River, transmitted to Congress December 7, 1920, the Board of Engineers stated with respect to the needs of navigation from the Lakes to the Gulf:

> Warren Rept. P. 19. "The diversion through the Chicago Sanitary Canal averaged 8,800 cubic feet per second in 1917, although some daily averages were 10,000 cubic feet per second or more. Of this diversion 6,800 cubic feet per second is incidentally used in the development of power, as will be explained later."
>
> "Such small navigation as now exists would be amply served by a diversion of 500 cubic feet per second, and twice that amount would be sufficient for the needs of the greatest probable commerce of the so-called Lakes to the Gulf Waterway."
>
> p. 414 "At extreme low water the navigation of the Mississippi suffers from insufficient draft. On the 25-mile stretch, between the mouth of the Illinois River and the mouth of the Missouri, extreme low-water flows as small as 25,000 cubic feet per second have been reported. Under such conditions the addition of the Chicago diversion would be a real assistance to navigation."

On February 28, 1912, W. H. Bixby, the then Chief of Engineers, reported to the Secretary of War on the subject of the diversion of water from Lake Michigan, as follows:

> Ex. 12, Doc. 40, p.1. "For the purposes of navigation alone by canal and canalized river from Lake Michigan to the Mississippi River, on the Illinois River and its headwaters and connecting canals, and to keep the locks and pools full, a diversion from Lake Michigan of less than 1,000 second-feet of water will easily supply any reasonable demands and is all that

will be actually necessary, and any greater diversion is a greater injury than benefit to navigation."

M. G. Barnes, for Defendants.

5603 I am Chief Engineer of the Division of Waterways of the State of Illinois, which position I have held since 1917. My first experience was as surveyor and county engineer in Nebraska. I received the degrees 5604 of B. S. and C. E. from the University of Michigan, where I took a post-graduate course in hydraulics and masonry. Later, that University conferred upon me the degree of Master of Engineering. After leaving the University, I was employed on the design and construction of power locks, power houses, hydroelectric plants and paper mills at Sault Ste. Marie, Michigan, and 5605 Ontario. My next work was on the survey and design of the Black Warrior Canal, after which I was employed by the Board of Engineers on Deep Waterways, in connection with the survey of a deep waterway from the Great Lakes to the Atlantic.

In this employment I made a topographical survey on the St. Lawrence from Lake St. Francis to Lake Champlain and hydraulic surveys of both of these lakes.

5606 I was next engaged for six years, as United States Assistant Engineer and later as Resident Engineer, on the design and construction of the Hennepin Canal, which connects the Illinois and Mississippi Rivers. Following that, I was employed as United States Assistant Engineer in the design and construction of the Moline lock on the Mississippi River. I then became designing engineer in charge of the design of the structures for the Panama Canal. When that work was finished, I was appointed as designing engineer on investigation of the dams and other structures for the New York water supply.

5607 In 1907, I was appointed by the Governor of New York, as a member of the Consulting Board, in charge of design and construction of the New York Barge Canal. On that Board, I was associated with W. A. Breckenridge, chief engineer of the Niagara Falls Power

Company, who later resigned to become managing director and vice-president of the Southern California Edison Company, Commander A. B. Frye, United States Navy, who lived at New York City, Edward A. Bond, ex-State Engineer of the State of New York; Colonel Thomas W. Simons, U. S. A., and Mr. Joseph Ripley, former Assistant Chief Engineer of the Panama Canal. Following that I was engaged for several years in private practice at Albany, N. Y., as Consulting Engineer for the United States and various municipalities, in connection with the design and construction of waterways, harbors and water power plants. In 1917, I retired from private practice to become Chief Engineer of the Division of Waterways of the State of Illinois, to which position I was appointed by Governor Lowden. In that capacity I have designed and directed the construction of the Illinois Waterway and have represented the State of Illinois in the negotiations between the State and the Federal Government with reference to the approval of plans for that project.

5608 "The Illinois Waterway" is the official title given
5612 to that branch of the improvement of the Illinois and
Ex. Des Plaines Rivers reaching from the lower end of
1192 the Sanitary and Ship Canal and connecting with it
at Lockport down the Des Plaines River to its mouth, thence down the Illinois River to Utica, a distance of about 65 miles. Its minimum dimensions are—depth 8 feet in earth and 10 feet in rock, and bottom width 150 feet—locks 600 feet usable length and 110 feet wide, with all structures 14 feet below low water.

5615 It is intended to serve the same purpose as the
5616 old Illinois and Michigan Canal, in a more efficient
way, being larger and deeper and in every way modern. The new improvement parallels the old Canal from Utica to Lockport, where it connects with the Sanitary and Ship Canal.

5609 Before the 1919 Illinois Waterway Act was passed,
negotiations with reference to the location, dimensions, slope and capacity of the channel were carried on between Illinois and the Federal Government. A preliminary

plan and a copy of the proposed bill were prepared and presented informally to the Chief of Engineers for his comment and criticism. After receiving those, the bill was presented to the legislature and enacted. Application was then made to the Chief of Engineers for the formal approval of these plans and he submitted them to the District Engineer for his recommendations.

5613 Ex. 1194 The final plans, which were approved by the Chief of Engineers and the Secretary of War in March, 1920, contain a profile map of the proposed improvements. Upon this is a straight line indicating the position and slope of the water surface in the various pools between the several locks. Above this straight line are figures, which indicate that the amount of flow, upon which these plans are based, is 6,000 cubic second feet.

This is shown by the following entry—"W. S.—6,000 C. F. S. flow." The entry is explained or qualified by an arrow-notation in the following language:

> "The water surfaces shown on this profile are based upon an assumed flow of 4,167 cubic feet per second, already approved, as a diversion from Lake Michigan, plus the normal flow from other sources in various pools."

When these plans were first submitted by Illinois to the United States District Engineer at Chicago the profile map did not contain this "4,167 cubic feet per second" arrow notation.

5613 5614 This 6,000 second-feet flow is neither high water nor low water. If there is only 4,167 cubic feet per second diverted from Lake Michigan, that would mean that the remainder must come from natural sources. However, at low water there is no such amount of water flowing from its natural water shed, hence it must mean that there is more than 4,167 cubic feet per second coming from lake Michigan or some other source. The actual low water at that point from natural sources is something less than 500 cubic feet per second.

5614 In discussing these plans with the Chief Engineer of the Illinois Division of Waterways the United States District Engineer stated that he feared that the approval of the plans as submitted might be construed as an approval of 6,000 cubic second-feet from Lake Michigan, and asked me to have the "4,167 cubic feet per second" arrow notation placed on the map, which I did.

5614 In presenting the plan in its original form the District Engineer recognized that there were more than 6,000 feet of water in the river, and that the State might be justified in making this improvement under existing flows, and that we would receive a greater depth than called for by the Act, if the approval were based on 6,000 c. s. f. of flow in the river. It was also noted that with the flow that then existed something between 8,000 and 9,000 from Lake Michigan, very nearly nine feet in depth would pervail.

7123
7124 With reference to my statement before the Select Committee, the fact that I did not know what the diversion would be was not the only reason that I did not design our power plant. The main reason was that we have no money to design the power plant. I designed the locks on the belief that we would have 10,000 feet of water and on the belief that we would have the water as shown on the plans approved by the Secretary of War.

7124 "Q. Was not the fact that you went ahead with the design for the locks but not for the power plants influenced by the fact that your locks would be perfectly useful with the diversion of 1,000 second-feet or less, whereas your power plants would not have any value unless you had a large abstraction of water from Lake Michigan?

A. No; nothing of the kind at all.

Q. You did not consider that at all?

A. I did not consider what?

Q. Whether your power plant would have any value if the abstraction was not had from Lake Michigan?

A. The question of power plant, as I told you repeatedly, must remain in abeyance until we can secure money and until this matter is finally settled in the courts.

Q. Well, will not the amount of money that you will request should be made available for you depend upon the amount of water?

A. Yes, sir."

6230 The particular location of this improvement was based upon an assumption of a diversion of water from Lake Michigan, because in the lock and dam structures it was necessary to know the amount of water that could be expected, both at low water and high water periods, so as to get the proper discharge capacity at those points. In our dealings, the United States required that the structures should be so located as to develop the greatest amount of power; and to accomplish this it was necessary to
6231 leave plenty of room for the power house structures. In addition to the navigation there was the question of power that was both for the State's interest and to comply with the requirements of the Federal Government. That is, the structures had to be so designed as to make the maximum use of the power available. The preliminary permit provided that the structures should be so located as to permit the development of the greatest amount of power and preceding the preliminary permit, we had endeavored to secure a permit from the Secretary of
6232 War for the structures for the waterway and power development. These requirements which I have mentioned are reflected in the plans for the construction of the waterway as well as in the plans for the proposed power development. The amount of diversion from Lake Michigan relied upon in those plans and negotiations was 10,000 c. s. f.

6774 Exhibit 1194.

When I submitted plans for Exhibit 1194 the War Department, being present approval of plans for the Illinois Waterway, the arrow notation concerning the "6,000 c. s. f. flow" entry, as follows: The water surfaces shown on this profile are based upon an assumed flow of 4,167 cubic feet per second, already approved as a diversion from Lake Michigan, plus the normal from other sources in various pools," was not a misstatement of what my plan was. I did not intend or expect merely to get 4,167 second-feet from the Lake and the balance from local drainage.

Condition "B" of Exhibit 1196, being the first approval of plans for the Illinois Waterway, provided:

> "That it is understood that such approval does not authorize the diversion of water from Lake Michigan through the waterway. It merely expresses the approval of the Federal Government to the plans so far as concerns the public rights of navigation."

6775 The explanation of 6,000 feet of water in the river is this:

There are several power plants above that long reach, and the best use of that power, which the Conservation Commission desires that we shall make, some of the water must be held back, so that full use can be made in the load factor that is obtained. In such conditions there will be not more than 6,000 and in some cases even less than 6,000 feet of water in the river. The Federal Power Commission was not in existence when we started, but, we could not obtain a permit from the War Department until it was known what the Congress was to do in regard to the Federal Power Act. They held us up at that time.

Ex. 1194 The second approval of plans dated March 6, 1920, contained the following condition:

> "That it be understood that such approval does not authorize the diversion of water from Lake Michigan. It merely expresses the approval of the Federal Government to the plans so far as concerns the public right of navigation, and this provision is with-

out prejudice to the use by the State of Illinois of such flow as may be existing at any time in the Illinois and Des Plaines Rivers."

6790 Ex. 1194 At the time the plans of the Illinois Waterway were approved, there was a flow in the Illinois and Des Plaines Rivers from Lake Michigan of between 8,000 and 9,000 feet. The flow was in excess of 6,000 feet, but I did not feel it was safe to design an 8-ft. depth based on that because of the power situation. That matter was taken up at considerable length with the District Engineer at the time and we finally fixed on a low water flow of 6,000 feet of water. Part of it to come from Lake Michigan and the balance of it from the local flow.

6791 I know that the Chief of Engineers considered that we would get more than the 4,167 from Lake Michigan because there was not 2,000 feet of water in the Illinois River at that time at low water stages. He knew that from the records in his office. He knew the low water flow at that time was about or less than 500 and that, therefore, it must come from some other source.

The figures "4167 c. f. s." on the plans were put there at the request of the Chief of Engineers. I had no personal dealings with the Chief of Engineers.

6792 6793 In the negotiations with reference to these plans, the dealings of Illinois were had with the District Engineer. He knew the amount of water there was flowing in the Illinois and Des Plaines Rivers at the time and knew that the permit of the Secretary of War limited the flow from Lake Michigan to 4,167. He asked the Chief Engineer of Illinois to put the arrow notation on the plans so that it would not by any inadvertence or by any other method be construed as a permit for 6,000 c. s. f. of water from Lake Michigan. In his conferences regarding these plans with the Chief Engineer of the State of Illinois the District Engineer stated that there was plenty of water in the river, and that in his opinion we would always have enough water to make that safe to design for an eight-foot channel based on 6,000 c. s. f. The arrow notation on the plans, which were submitted to the Secretary of War and Chief of Engineers as the basis of their action and approval was a fair representation of the facts and one which they might be fairly asked to act upon. I do not think that the legend indicated that all of the water was coming from Lake Michigan.

The District Engineer knew, and had his record before him all the time, and he knew the flow from Lake Michigan. I don't know that the Chief of Engineers knew anything about where the flow of water provided for by my design came from. I do not suppose that he would ever know where it came from from its legend. In any event he took the recommendations of the District Engineer.

7008 7009 The part of the navigable waterway between Lake Michigan and the Mississippi River selected by Illinois for improvement in the construction of the Illinois Waterway was fixed by what the Government had previously taken to develop and control. The Sanitary District at Chicago had carried the navigation improvement down to Lockport. The Federal Government had carried the improvement up to La Salle.

7010 That left a reach of about 72 miles unimproved. The State undertook to develop that portion that had not been taken under control by the Federal Government, or the Sanitary District. In the conferences of Illinois with the United States District Engineer it was agreed that if Illinois would carry the development to or in the vicinity of the Utica bridge, the Government could very fairly extend its project up to that point.

5629, Ex. 1193 When it became evident that the old canal could no longer serve the needs of transportation, the State began casting about for something that would take its place. The State-wide movement for an improved waterway became so insistent that finally a proposal was presented to the people to issue bonds in the sum of twenty million dollars for improving the link between Lockport and Utica, so as to provide a canal of modern dimensions, and, incidentally, so as to develop the surplus power along that reach. That question was submitted to the voters in 1907 and approved by them in 1908.

6231
Ex. 1242 Certain of the conditions of the preliminary permit issued by the Federal Power Commission of Illinois on January 14, 1922, were:

> "That full practicable utilization will be made of the water, storage possibilities, and the head at the site to be developed,"
>
> and that "said project will be in general accord with the most beneficial utilization of water for navigation, water power, and other beneficial uses."

7609 November, 1920, our design for the Starved Rock lock was on the left bank of the river. Subsequent to that date we asked the Chief of Engineers for a modification of the permit permitting us to locate the lock on the opposite side of the river. At that time the negotiations were on, looking to the sale of that power; and in the final design of the lock and dam I was influenced to locate the lock sufficiently away from the stream to give us a power site for the flow that I had expected would be in the river.

7095 When I testified at the hearings before the Committee on Rivers and Harbors of the House of Representatives, 69th Congress, 1st Session, on the subject of the improvement of the Illinois River and the abstraction of water from Lake Michigan, I said that the Engineering Board had stated that open river navigation in the Illinois can be obtained with any flow above 2,000 c. f. s. of
7096 diversion. I was asked by Mr. Chalmers whether with two locks in the Illinois River, 1,000 c. f. s. of diversion would not be sufficient and I answered that it would not be sufficient. Mr. Mooney than asked me whether 1,600 c. f. s. would not be and I answered that it would not be sufficient, but I did say, "If you go on and excavate sufficiently, then you can do it." I so testified before that Committee, but that was for slack-water navigation.

By enormous expense you can do almost anything
7097 in any stream. The Illinois River has a fall of about 35 feet, as I recall it, in its full length. Various

methods of making slack water navigation have been proposed, all the way from six locks to only one lock; and it is a matter of cost and a matter of damage as to which method is the more practical and feasible to use.

You can make a canal and obtain a 9-foot channel in the Illinois River with locks and dams and with a diversion of a thousand second-feet. It is inadequate and inappropriate for the purpose, but a canal can be obtained for a thousand cubic feet per second if enough locks are put in to make complete slack water.

7096 The slackwater navigation in the Illinois River,
7098 with the locks that have been proposed, does not give
as full width and as full a depth as will obtain in the Illinois Waterway. However, it is entirely possible to so locate the locks and so make your excavations as to give as great width as will obtain in the Illinois waterway above.

7046 If you assume that there were some locks remaining in the Illinois River, you could operate from Utica to the mouth, in many years, without water from Lake Michigan. However, Utica is 100 miles from Chicago
and no engineer would recommend the improvement
7047 of the lower Illinois without extending it to Chicago.
If you make slack water navigation, with five or six or seven locks in the reach between St. Louis and Utica, you can secure a fair amount of water ordinarily for lockage purposes.

7114 The low water flow of the Illinois River is 500 feet
7116 per second at LaSalle and about 1,000 second-feet
at the mouth. It is not sufficient to economically develop an adequate channel without intervening locks. The locks could be constructed with this flow and of the same size as those in the Illinois waterway. The locks would have a much lower lift than those in the Illinois waterway and would require a much smaller quantity of lockage water for a given commerce. There is no question but that with ~~this flow~~, the channel could be dredged to a depth of 9 feet, but I seriously question the economy of any such thing.

5644 The amount of diversion of water from Lake Michigan has a bearing upon the cost of construction and upon the navigable capacity of the Illinois Waterway. As the amount of water from Lake Michigan is increased, the cost of excavating and forming the channel decreases. Also the structures must be modified in accordance with the amount of water obtainable from Lake Michigan. Based on a flow of 10,000 cubic feet of water from Lake Michigan, the extra cost for channel only, if the diversion were decreased to 1,000 cubic feet per second, I estimate to be about $1,400,000.

6806-8 The lock at Lockport as designed and without any change would be more than ample to take care of traffic which was limited by the controlling depth of a nine-foot channel without any diversion, as far as the lock is concerned.

6812 The effect of reducing the diversion to 1,000 c. f. s. upon the construction of the Illinois Waterway would not relate merely to the excavation of the channels between the locks. There would be the additional depth it is necessary to go in the location of the locks and the design of the locks, the depth on the bottom of the sills to comply with the State Law.

6813 The locks must be 14 feet under the State law. Leaving aside all legal questions under the State law, a 9-foot waterway could be obtained in the stretch covered by the Illinois Waterway, as shown by Exhibit 1194, with the diversion reduced to 1,000 second-feet without any further change other than possibly additional excavation in the channels between the locks, but that would be in violation of the State Law. I could build a waterway based on the present plan with a thousand c. f. s. diversion so that a boat drawing nine feet could still get
through. I cannot tell you exactly just what differ-
6814 ence it would make in excavation between the Lock-
port Lock and Brandon Road Lock to obtain a 9-foot channel with a reduction of the diversion to 1,000 second feet.

6982 I cannot, from my memory, tell you what is the slope of the section between the foot of the lock and dam at Lockport and the one on Brandon Road, or in any of the pools of the Illinois Waterway, with a flow of 10,000 second-feet. I have prepared no design to show that. The plans, as approved by the Secretary of War, are based upon a flow of 6,000 c. f. s.

6983 The scale on the map is so small that you cannot tell definitely what it is. It would take a detailed map to determine definitely what the slope is.

6984 The depth of the water over the sills of all of the locks in the Illinois Waterway, with a flow of 10,000 second-feet, is at least 14 feet, and undoubtedly more than 14 feet.

5866 I estimate the capacity of the Illinois Waterway at 60,000,000 tons per year. The Engineer Corps has estimated its capacity in excess of that amount.

5855
Ex. 1236
Page 13 Colonel Judson, in a letter to the Chief of Engineers, dated November 24, 1915, stated that along the line followed by the proposed waterway there already flows a commerce vastly greater than the proposed or any other reasonable waterway could accommodate.

Special
Master
5867 "I suppose that there, as in other cases, it may be assumed that if there is a highway of commerce in this country, certainly in relation to such a port and mart as Chicago there will be traffic. How much there will be might be a matter of a good deal of conjecture."

5867 On a maximum use of the channel at its capacity it will require at least 1500 cubic feet per second for lockage purposes at summit level. If the traffic increases so that twin locks are required, additional water will be required, and if and when traffic should increase to the full capacity of the twin locks, double the amount of water would be required at that time.

6991 My estimate of a capacity of 60,000,000 tons for
6992 this waterway is based on a maximum tow of 9,000
or 10,000 tons.

6993 There is about three million cubic feet of water used at each lockage at Lockport on the 41-foot lift. That is the full 10,000 foot flow for a period of five minutes or in other words if the flow was reduced say to one thousand, only one lockage per 50 minutes could be made with the water supply of one thousand cubic feet per second.

6997 One lockage at Lockport, according to my computations, requires about 1/100th of a cubic foot per second per year. A thousand cubic feet per second would permit 28½ lockages per day unless I have made some mistake in my calculations.

6998 With a cargo of 9,000 tons per lockage this would accommodate a commerce of 265,500 tons per day, and with open navigation 365 days a year an annual tonnage of 93,622,500 tons.

If you reduce the number of locks in the Illinois Waterway and increase the fall you do not therefore increase the quantity of water needed for a lockage.

6999 If I had reduced the number of lockages from some other design that does not follow that I reduced the lift at the Lockport locks. That has been fixed by nature, and could only be changed by putting in a flight of locks with a slight saving. If the Lockport lock were a double lock it would not cut the amount of lockage water required in two.

7559 When a vessel passes into the lock from the lower
7560 pool it displaces water equivalent to the cargo, and
7752 as it passes up into the upper pool the amount of
6994 water required is the volume of the lock plus the displacement, forgetting any displacement resulting from the boat itself, inasmuch as the boat must return. In passing down stream the amount of water taken from the summit level is the volume of the lock minus the cargo capacity, hence whatever is added in one direction must be subtracted in the other.

7559 I have estimated that the up-bound traffic will
7560 greatly exceed the down-bound traffic, measured in tons. The proportion of the up-bound traffic to the downstream traffic would be about three to one.

7033 Assuming a tow of such size that it can enter the locks and no interference from other navigation, the average time of a lock through the locks on the Illinois Waterway probably would ~~not exceed~~ 15 minutes. To this must be added the time of slowing up, mooring the boats, and getting them under speed. The delays to the ships or to the fleets on the average would amount ~~to very~~ nearly one hour in such a case.

7035 45 minutes for an average lockage would not be very far from the fact if there are not too many vessels in the way.

5643 In my opinion the sum of twenty million dollars
5644 appropriated for the Illinois Waterway is sufficient to complete that waterway in accordance with the plans and the amount of diversion indicated on the plans.

5646 If the diversion from Lake Michigan is reduced materially below 4,167 cubic second-feet there will not be funds available under the $20,000,000 bond issue to complete the work.

6274 The structures of the Illinois Waterway as now approved and partially constructed, are not practically usable and cannot be used without a diversion of water from Lake Michigan.

As the advisor of this project of the State of Illinois I would not have recommended the construction of this waterway according to those plans if I or the State of Illinois had been led to believe that there would not be a diversion of water from Lake Michigan in excess of one thousand
6276 cubic second-feet. There is a limit below 4,167 at which I would not have recommended the construction of a waterway of the dimensions that we have designed. I do not know that I am competent to say exactly what point that would be, but it would be a point where the amount of water needed for the use of the canal would not

have been adequate to supply its entire use and where the funds available would not be sufficient to complete the structure.

7561 The first work on the Illinois Waterway was commenced in November, 1920. By June, 1922, about 50% of the Marseilles lock, the entire cost of which was $1,254,000, was completed.

5612
5645 The Marseilles lock has been completed, the Starved Rock lock is about 20%, and the Lockport lock is about 99% complete. About $6,000,000 of construction on the Illinois Waterway have been completed or placed under contract.

5886 As is well known, the Mississippi River is unstable in banks and bed and must be protected and regularized in order to keep it within bounds. No such improvements are required on the Illinois River to any great extent. It is, therefore, quite manifest that the best improvement of the Illinois River is with an open channel; that is, without locks. In order to obtain that water must be supplied sufficient to fill the channel. Various studies have been made by me and by others, particularly the Engineer Corps, to show the best possible means of improvement of the river under various assumptions of flow of water in the stream. In its natural condition the Illinois River has a low-water flow at the upper end; that is, at La Salle, of, roughly, 500 cubic feet per second. This increases downstream until at the mouth it will have a flow of approximately 1,000 cubic feet per second. That is not sufficient to economically develop an adequate channel without intervention of locks.

My studies show that at least 5 locks and possibly 6 must be placed in the stream to develop the channel at such low flow, and even with that flow it is quite questionable whether there is at all times sufficient water for canal purposes.

5887,
5888,
5889. There are now constructed and in use in the Illinois River four old locks, two built by the Federal Government and two by the State of Illinois. These with the flow available in the stream now are

capable of producing a channel 7 or 8 feet in depth, and with proper improvement these depths could be increased.

With this flow maintained, that is, the flow of 10,000 cubic feet of water in the Illinois River maintained, all of these locks and dams can be removed and open river transportation afforded similar to that in the Mississippi River from the mouth of the Illinois to the mouth of the Ohio.

If, however, the amount of water must be reduced to that necessary for lockages in the Illinois River, these dams and others must remain and commerce must be injured, stopped, in passing all these structures. Probably the easiest way of estimating the cost of navigation interests caused by such delays is to follow the method of the International Board which recently reported on the improvement of the St. Lawrence Waterway. That Board estimated that a delay in one lock on the St. Clair River would cost navigation, because of delays at one lock, one cent per ton. The difference between that stream and the Illinois River is that in the Great Lakes their vessels run at about twice the speed that the vessels would on the Illinois River and do on the Mississippi River, but the cost of transportation on the Great Lakes is about one-half the cost of transportation on the Mississippi River. Hence the conditions would be relatively the same.

With six locks intervening there would, therefore, be a loss to navigation of six cents per ton, and with a tonnage of 30,000,000 tons, which is entirely possible and probable, this would mean a loss to navigation of $1,800,000 per year; or capitalized at 4 per cent, which is the same capitalization that has been used in other instances in this case and which the Government used in its reports, that represents a capitalized value of $45,000,000.

In addition to this, it will be necessary to construct and maintain the six locks and dams necessary with the reduced flow. The cost of such structures has been estimated at various times by engineer officers and myself at various amounts, but with modern traffic that we are providing for, that the State has provided for in the upper Illinois and that the Federal Government has provided for in the Ohio, it will be necessary to reconstruct all these locks or build twin locks at all places commensurate in size with the standard locks constructed by the State and by the Federal Government.

I assume that these structures and incidental improvements to channels would cost not less than $10,000,000 and probably might exceed $13,000,000. There is also a further item that is measured in dollars and cents as to the adequate channel that would result from this means of capitalization. The channel would be narrower and of less depth in many of the reaches that now have greater depths, and such condition, of course, retards vessels and adds to the cost of transportation, but the amount cannot be easily ascertained and shown in dollars.

5891 My estimate of the value of diversion for navigation in the Illinois River is $55,000,000, generally speaking, as reflected by the difference between slack water navigation and open river navigation on the Illinois River, on the basis of six locks at a cent per ton per lock.

7036 With an average flow of 10,000 second-feet in the Illinois River without locks and dams the current might reach three-fourths of a mile per hour, possibly a little more. The engineer officers have estimated its flow somewhat higher than that.

Ex. 18
House Doc. 4,
69th Congress
First Session
Page 206.
7037

In Exhibit 18 it is stated that 10,000 cubic feet per second annually would produce a current of 1.63 feet per second, which would be about 1.1 miles per hour. A tow of coal coming up from the mouth of the of the Illinois River to La Salle, with a speed of three miles an hour, would take 76 hours to make the trip. If you introduced a current of one mile per hour it would not necessarily reduce the speed of your tow by that much. It would if you were traveling at the maximum speed of your tow. The coal comes from southern Illinois and must be transported for 100 or 200 miles over the Mississippi River where the fall is from three to four times the fall in the Illinois, and the velocity is much in excess of the velocity of the Illinois River. The tow must be equipped with power sufficient to overcome that reach of transit, hence there would be excess power available when you reach the Illinois River.

Ex. 18
Doc. 4,
69th Congr.
First Sess.
Page 208
7039

I understand from page 208 of Exhibit 18 that the engineer attempted to compute a loss of 10 hours in one-way traffic upstream by reason of the current velocity with open channel navigation, but I do not subscribe to that report.

I believe that the corps of engineers in computing a delay to barge traffic in tows by reason of the introduction of current in the Illinois River through a large diversion is in error in this location.

7040 If it were assumed that this figure of the Federal engineers for loss of time for the tow upstream, in case of a current caused by the 10,000 second feet, were accurate it would mean that the time lost by such tow through the current would be a great deal more than it would be from passing through four locks in that stretch, but I think the reasoning is entirely erroneous. My claim of loss of time by reason of the location of from two to four locks in the lower Illinois River is based upon an assumption that there would be no delay caused by the currents in the case of a 10,000 second-feet flow with open channel.

Exhibit 18,
House Doc. 4,
69th Congress,
First Session,
Page 23.

In the report on the Illinois River, Illinois, transmitted to Congress on March 29, 1926, the District Engineer stated:

> "19. In studying the potential traffic on the Illinois River it must be remembered that this stream is a part of a system of water routes converging upon the Mississippi River. The completion of the "Illinois waterway" from Lockport to Utica will join this system to that of the Great Lakes and make Chicago its northern terminal. Since the Mississippi River is now under improvement below the mouth of the Illinois and construction of the "Illinois waterway" is well under way, the Federal section can not be treated by itself in a study

of the economics of the question; it must be considered as integral with the entire system.

"20. The study of prospective commerce indicates that a water traffic of considerable volume will result from the opening of the "Illinois waterway" and the deepening of the connecting channels which make up the through route from Chicago to the Gulf of Mexico; that inland waterway carriers of the most modern types will seek to use this improvement, and that a substantial return on the investment in construction, maintenance, and operating costs will be realized.

"21. Assuming that no change is made in the project depth in the Mississippi River above Cairo and this limits the potential interstate traffic, it is found that the following is a reasonable estimate of the traffic expected to result from the improvements contemplated, most of which will pass through the portion of the Mississippi having a limiting depth of 6 feet:

	Tons per year
7-foot project	4,940,000
8-foot project	5,140,000
9-foot project	5,340,000

"22. This tonnage is composed of ore, sand, gravel, coal, grain, lumber and some general cargo. If the limiting project depths in the Mississippi River are increased to conform to those under consideration for the Illinois River, the potential tonnage is expected to be as follows:

	Tons per year
7-foot project	5,265,000
8-foot project	6,315,000
9-foot project	7,515,000"

THOMAS Q. ASHBURN, FOR DEFENDANTS.

3984 I am, Brig. General, United States Army, and Chairman of the Advisory Board of the Inland Waterways Corporation of the United States and Execu-

tive thereof under the Secretary of War. The corporation was created by Congress to carry out the mandate contained in Section 500 of the Transportation Act to promote, encourage and develop waterways and to foster and preserve in full vigor both rail and water transportation, and to carry out further functions prescribed in Section
3990 201 of the Transportation Act. The Corporation operates the Mississippi-Warrior Service, a fleet of boats, between St. Louis and New Orleans, then through the coastal waters of the south to Mobile and then up the Black Warrior to Birmingsport. On the upper Mississippi it is building a large fleet to operate between St.
3991 Paul and St. Louis. Exhibit 502 shows the volume, routes, origins and destinations, by Congressional Districts, of southbound traffic handled by the barge
3992 line during the calendar year 1925. The map shows that the benefits of the service have been extended to the Eastern and Western Coasts, the south and interior, and practically all of the United States, except the Inter-
3995 mountain States. Transportation is conducted in this manner from these interior points with joint through rates in which the barge line and rail car-
3997 riers participate. These rates are all published by the barge line and concurred in by the railroads.

4015 The loading of barges by the barge line depended upon the stage of the river, which is supposed to have a general depth of 8 feet from St. Louis to Cairo and 9 feet from Cairo to New Orleans, but the barges are loaded to within 6 inches of the bottom, depending upon river stage up to the time that the final depth of 8½ feet is obtained.

Theodore Brent, for Defendants.

4024 I am Traffic Manager of the Inland Waterway Corporation with headquarters in New Orleans.

Note: As the testimony of this witness covers both operating conditions on the Mississippi and traffic and economic matters, we will first briefly state the effect of his testimony as to operating conditions and then as to the other branch thereof.

I have been engaged in occupations connected with transportation for about 25 years, and have held most
4025 every position in the traffic department of railroads and waterway carriers, and was federal or general manager of the Inland Waterway Service on the Mississippi and Warrior Rivers. My appointment as federal manager was in 1920 at the time the project was returned from the Railroad Administration to the War Department. The witness produced and identified photostatic copies of records kept by the barge line in its ordinary business, showing the movement of every tow and barge from October,
4027 1922 to November, 1926. These charts, each one being a month's operation, were introduced as one exhibit, Defendants' Exhibit 505. On the chart, the horizontal portion thereof represents time and the vertical portion represents distance; in the margin at the left are the points along the stream and the mileage distance from New Orleans to St. Louis. A tracing is kept on the chart in accordance with reports, showing the exact movement of each
4028 boat. At the end of each month the chart is photostated and preserved as a permanent record. A straight horizontal line indicates that the boat is stopped, and where this occurs at one of the main ports, obviously the boat has stopped to take on or discharge freight, but where any other straight horizontal line is noted on the chart it indicates grounding, port work, breakage of
4029 machinery, weather conditions, etc., so that each chart contains a history of operations. Referring to the chart for August, 1922, its general appearance is
4030 decidedly different from the one for March. The general saw-tooth effect of the chart indicates what is called "double tripping" indicating that the channels were so narrow from lack of water, that a towboat could only get through with a single barge, and that under difficulties. Under these conditions, the larger part of the tow of six barges would be laid at a point to which the towboat could proceed in usual formation, and from that point on the towboat could proceed with a single barge and dredge her way through with difficulty, lay the barge down at
4031 a convenient point and go back for the others. Referring to the month of September, 1920, a glance at

the chart indicates that the condition has become much
worse: for instance, the towboat St. Louis was stationary at
a point just above Memphis from the 16th of September to
the end of the month, and turning to the chart for October,
you will find that she was still there until the 19th of
October. In that period, all of the power boats of the line
were gradually approaching this point under difficulties,
and the power boats above were drawing into the same
territory. The fact was that there was no channel, and
some of the tows were aground; some simply stationary
because of lack in the channel of sufficient depth to get
through. This condition continued until the middle of November
when it got appreciably better, and with some little
interruption in December, which were finally cleared up by
the end of the year. But from early August until the end
of December, we were in constant difficulty because of low
water in the whole stretch of the river between Memphis
and Cairo, and at intervals between Cairo and St.
4032 Louis. These conditions were recurrent in the fall
periods of almost every year of the eight years that
I have been connected with the line. They have been
4033 conspicuous by their absence in the year 1926, due
to the unprecedented fall rains in the whole Mississippi
watershed. In the year 1923, for a period of three
months, we had serious interruptions. In the year 1924,
in the month of November, we had very serious interruptions.
4033 In 1925, we had a slight interruption.
I kept a record of business results of the barge line
operations for six months periods, and am able to state of
my own knowledge that the conditions indicated by the
charts in these recurrent periods of interruption of traffic
due to low water are reflected in the operating results of
the barge line as shown by the accounts. During the
4036 fall period these interruptions occur, and our traffic
falls to very much lower proportions than normal.
We do not succeed in delivering our freight. Our operating
expenses are increased. We have generally been able
to look for a result of net earnings in the first six months
of each year, and have almost invariably had red figures in
the last six months of each year, except for 1926, in
4039 which we had good water throughout the year. The
average tonnage per freight car of all freight in the

Middle West is about 30 tons, and we can easily propel down
stream in one tow, 15,000 tons, or 500 loaded freight cars.
The barges draw 8 feet. We need a channel of at
4040 least 8 feet 6 inches and should have 9 feet. We
could not handle the quantities of freight handled
with tow boats of less power and different construction.

4050 Assuming and expressing ~~no~~ opinion as to the fact
that if the diversion of water from Lake Michigan
were terminated, the effect on navigable depths in the Mississippi would be to reduce ordinary navigation depths
from 9 feet to approximately 8 feet or less, this reduction
would be very disastrous to the operations of the service
on the river during the months when there is a low normal
flow in the river, because, and the fact is shown by many operations, when the river falls to such narrow depths,
4051 we cannot operate our powerful tow boats without
interruption. The result to the general business is
extremely bad. We also operate between Cairo and St.
Louis where the project depth is 8 feet. This is ob-
4052 tained when there is sufficient run-off to get it, but
we frequently do not have it during the fall months.
The charts show that during these months we are compelled
to operate tow boats other than our 8 foot boats in that
stretch of the river, miscellaneous boats of 5 or 6 foot draft.
These are all of much smaller loads and therefore operating
results are much inferior to those in the stretch below Cairo.
In order to render the public the service we render, I
4053 regard it as essential to continue operations on an
8 foot boat basis. The results from that kind of
operation are secure.

Cross-examination.

4067 Sometimes the depth of the water in the Mississippi between Cairo and St. Louis during the fall of
1922 period was not five feet. We had places where
4068 it was not five feet. They were the places substantially where our boats are shown stranded and
stopped on these charts. There were some crossings
4069 where there was probably less than five feet of water.
In that stretch of the river between Memphis and

Cairo during that period of that year there were twelve different points where we had difficulties, and those crossings in length measured about three and one-half miles, and they varied from sometimes seven to at times five feet of water.

One of our barges loaded to 2,000 tons draws 8 feet
4069 6 inches. I cannot at this date point out the places
4072 on the river and the dates when the depth of the
4073 water in the river was five feet or less in the navigable channel. Those were matters which came to me in the operation of the line at that time. I cannot state how many days in 1922 or for any other year during which I have engaged in these operations when the water in the navigable channel of the Mississippi River between Cairo and St. Louis was less than eight feet. It is my testimony that in a substantial part of the time in recent years, there has been substantially less than eight feet in the navigable channel of the Mississippi between St. Louis and Cairo, and there have been considerable periods of time when there was less than 9 feet between Memphis and
4082 Cairo. There are private barge lines on the river but there are no other common carriers with joint relations with railroads.

6149 As Federal Manager, I had supervision of the navigation on the river. I traveled on the boats and frequently when there was difficulty. One of our tows going down stream as ordinarily operated has six
6153 loaded barges, in a staggered formation, each barge 45 by 230 feet, tied together and to the tow boat by steel lines, so that they may be manipulated as a unit. The tow carries ordinarily about 11,000 tons dead weight of revenue freight. Such a tow would be 135 feet wide
6157 and 600 feet long. Either the channels are so narrow or so shallow that it is impossible to get through without grounding. There are at least 50 crossings between Cairo and Memphis which require almost constant attention in the fall of each year in order to keep them open. In that reach of the river there are only three dredges, and it is a physical impossibility to keep the river in such shape that we can go through without groundings.

The witness identified a report dated December 15, 1922, to Major General Beach, Chief of Engineers, covering the month of November, together with carbon copy of letter of transmittal, Defendants' Exhibit 536. Similar reports for September, Defendants' Exhibit 537; for October, 1922, Defendants' Exhibit 538; and for December, Defendants' Exhibit 539; for August, 1922, Defendants' Exhibit 540. The witness also identified a tabulation of the actual performance of the two boats St. Louis, Natchez and Cordova on the eight days between October 16 and 24th, prepared for him by the General Superintendent of the line about October 25, 1922, and copies of radiograms from the Masters of the two boats Memphis and St. Louis to the General Superintendent at Memphis concerning conditions on October 25. (Defendants' Exhibits 541, 542, and 543.) Defendants' Exhibit 543 is as follows:

> "Patton, Memphis, Tennessee" signed "Boles, 12:42 P. M.
>
> "Eight feet at Point Pleasant. Nine feet at foot of Madrid Bend. Eight feet at Darnalls. Nine and a half at Cherokee. Nine at Stewarts, Nine at Bass. Eight and a half at Fritz. Seven at Sandy Hook. Channels are very narrow not wide enough for two barges. Dredge 'Fort Gage' working at Morrison's when we left New Madrid. Dredge 'Harrod' left Bass this morning at ten and dropped down and tied up at the bank at Hathaway. Understand she will go to work on Sandy Hook. Box dredge still at Hotchkiss. Dredge 'Henry Flad' at Point Pleasant channel about finished."

Exhibit 542 is as follows:

> "Str. St. Louis, October 25, 1922.
>
> "Patton, Memphis, Tenn.
>
> "Dredge 'Fort Gage' at Morrison towhead. Dredge 'Henry Flad' at Toneys. Found eight feet there. Point Pleasant nine feet. Darnall eight and half. Stewart eight. Bass nine. Dredge has been working at Bass left about ten A. M. Island 14 bar

eight and half feet. Sandy Hook seven feet. Dredge 'Harrod' laying at Hathaway. Think she is going work in Sandy Hook crossing. All crossings are one barge channels account of width. Owing to general conditions we consider ourselves lucky to be as far down as we are. On way now for last barge 543 which is heaviest.

Clay 2:30 P. M."

It does not make much difference, however, if the
6170 barges are loaded to eight 6 or 7 feet, because the tow boats draw 8 feet, and of course the barges cannot get through without the tow boat. In my
6177 judgment it is essential to profitable and successful navigation that we should have the full project width of 250 feet by 9 foot depth. With that we can easily manipulate these boats of the present dimensions. Our experience is that transportation on the Mississippi River cannot be successfully conducted in any other way than by the large tows.

4040 In reference to the barge line rates, the Railroad Administration at the inception of the project adopted a theory that the water rates should be 80 per cent of the rail rate, and when we went to secure joint rates with the railroads, they determined that the differential should be fixed by taking 20 per cent of the rail rates applying at the port at which we took the freight to the port at which we discharged it, reducing that to a factor of cents per hundred pounds, and subtracting this factor from the published through all rail rate from point of origin and point of destination in making up a through joint rate. That formula has been used in extending our rates over the entire territory now governed by joint rail and barge, barge and rail and rail-barge and rail rates. The formula is supposed as nearly as possible to approximate in the
4045 through rate the portion of economy in the water portion of the haul. I am able to state that there has never been a common carrier on the river with any appreciable system of joint rates with railroads or which has joined in the publication of through routes and joint rates

with the railway carriers. The railroads did not desire this during the time of earlier water operations, and there was no law requiring the creation of such relations.
4050 At the time our operations began, there were no precedents of that nature to be found.

4056 The introduction of water transportation as far inland as St. Louis has tended to bring cities in that vicinity more nearly in line with the eastern seaboard in doing business with the Pacific Coast. The seaboard from the time the Panama Canal was finished has had the advantage because the rail rates from the East and from Chicago are the same, while the water rates from the East have been very much less. Therefore, industry has to a very marked degree not only transferred its operations but its business from the Chicago District and from the Middle West to the eastern seaboard. With the introduction of our water transportation, we have been able to quite
4057 a considerable extent to equalize those conditions as far as operations go. The average ton mile earnings on the Warrior and on the Mississippi as a whole, slightly exceeded 4 mills per ton mile. We have for the last three seasons handled grain for export from St. Louis and Cairo at a rate of 2 mills per ton mile. The average earnings of the railroads on grain, according to testimony in the Western Rates Case, has been about 8 mills per ton mile. The barge line rates cheapen transportation of grain and have, therefore, been of considerable benefit to the territory of the Middle West which has only one outlet practically today, and that is the Gulf, for export.
4061 The barge line participates in the movement of import and export freight aside from the grain mentioned. We handle a great deal of freight from the
4064 Central West into the Southwest. Through traffic comes from hundreds of points beyond and goes to hundreds of points beyond.

4089 There is a considerable and growing traffic in private barges particularly out of the Ohio River, which is coming down during the months in which navigation is possible to carry it. The principal commodities handled by these barges are steel products. We handle these products as agents for the owners at Memphis and load it into cars and switch it for their account to the trunk line railroads.

This steel originates in the Pittsburgh District.

6240 The witness produced and identified two statements, one showing imports and exports with the exclusion of sugar, and the other showing tonnage handled by months and years, north and southbound, and totals, compiled from the monthly reports of the barge line. He testified this is an analysis of the tonnage moving through New Orleans for export and the import tonnage moving north for the years 1921 to 1925, inclusive, and the first ten months of 1926. The import figures do not include sugar which although an import, was received by us in a refined condition and as a domestic product. Our movement of sugar northbound in 1926 was about 300,000 tons.

(Introduced in evidence as Defendants' Exhibit 546 and 547.)

6254 The base rate which controls the entire exportation from the Mississippi River, is the published proportional on all grain of 18 cents from St. Louis and 15 cents from Cairo to New Orleans. The barge line contemporaneously charges on grain for export from St. Louis 11½ cents and from Cairo 10 cents to New Orleans, under conditions substantially similar to those for rail carriers. The barge rates here named are exactly 2 mills per ton mile for the barge line's respective hauls. These rates apply to grain actually moving day by day and year by year con-
6255 stantly on the Mississippi River. The amount of saving is 6½ cents per 100 pounds or substantially 4 cents per bushel. The map in reference to grain rates described just above is in evidence Defendants' Exhibit 549.

Colonel Robert Isham Randolph, for Defendants

4495 Direct Examination:

As Secretary of the Internal Improvement Commission and Rivers and Lakes Commission of Illinois, I made a

number of inspection trips on the Mississippi; in addition to my practical experience, I made a study of the effect of the increment of water diverted from Lake Michigan upon river stages and channel depths of the Mississippi based upon all available authentic sources of information. I submit a number of exhibits showing these basic data, all official records, the first a hydrograph of the Mississippi River, being an average of observations from 1861 to 1920.
4503 (Defendants' Ex. 507.) This exhibit, a correct copy of an official document prepared by the engineer corps, shows a hydrograph of the extreme low daily stages during the sixty years in question and a similar hydrograph of the high daily stages and a mean hydrograph made up from the averages throughout the sixty years. In addition, the chart shows a discharge curve showing the gauge height at the left of the chart and the volume of discharge figures at the bottom, the curve representing the relation of discharge and river stage at the St. Louis gauge.

The project for the improvement of the Mississippi between the mouth of the Missouri and the mouth of the Ohio calls for an 8 foot depth referred to plus 1 of the St. Louis gauge at present, although in 1906 and prior thereto, the project was referred to plus 4 of the St. Louis gauge.

Referring to Exhibit 507, at mean low water plus 1 of the gauge, the discharge is 40,000 c. f. s., including approximately 10,000 c. f. s. from Lake Michigan and from the discharge curve, a decrease of 10,000 c. f. s. would
4506 lower the stage one foot and a half. At plus 2 of the gauge, the 10,000 increment makes a difference of a
4507 foot; at plus 4 approximately .8 of a foot; at 35 of the gauge, about .3 of a foot. Exhibit 507A is a sim-
4508 ilar discharge curve based on observations from 1900 to 1904, prepared by the government engineers.

The witness similarly introduced Exhibits 508 to 512, inclusive, being similarly prepared discharge curves for Chicot, Arkansas, Columbus, Kentucky, Vicksburg,
4510 Mississippi, Red River Landing and Carrollton, Louisiana. At Columbus, Kentucky, the addition of 10,000 c. f. s. at low water (stage 5 of the gauge) increases the depth one foot and a quarter to one foot and a

4512 half; at Chicot, Arkansas, at low water (plus 8 of the gauge) the increment of 10,000 makes a difference of a foot in depth; at Vicksburg, according to the chart, at low water (7½ of the gauge) the increment of 10,000 has a value of slightly less than a foot; at Red River Landing .7 of a foot and at Carrollton .6 of a foot. These changes
4513 in stage as deduced from the curves are the results shown by observations made by the government engineers.

The witness then produced in evidence Exhibits 513 to 516, inclusive, being hydrographs furnished by the Mississippi River Commission for the years 1922 to 1925, inclusive. The charts are graphs showing in a curve the daily record of gauge heights. It is apparent that these hydrographs taken at various points from St. Louis down
4516 are similar at each point with a slight lag as you go down the river. Similar hydrographs for the river from Cairo to Port Jackson for the same years were
4517 introduced as Defendants' Exhibits 517 to 520, inclusive. The witness then introduced certain charts prepared by him showing two hydrographs, the upper one being simply a copy of the previous hydrograph for the same year for the same stretch of the river. The lower hydrograph was obtained by applying the discharge curve to the stage shown on each day so as to find the stage which would have occurred on that day if the discharge were 10,000 second feet less and therefore, the lower graph represents the daily river stage for the year and location
4519 in question as it would have been without the water from Lake Michigan. The witness then noted at the bottom of each of these charts certain information obtained from the operating charts of the Mississippi-Warrior Barge Line previously introduced as Defendants' Exhibit 505.

Note.—This Exhibit consisted of one chart for each month from March, 1922, to December, 1926, inclusive, showing in a graphic way the operation of each towboat of the Mississippi-Warrior Barge Line, and indicating the progress of the boat up or down the river, and the cause and nature of any delays. The Exhibit was qualified and introduced by the witness, Theodore Brent, and, he testified, was a photostatic copy of business records of the Barge Line kept in the ordinary course of business.

The information furnished by Exhibit 505 was classified and collected and transferred to the charts prepared by the witness under two headings, first, "Held Up By Bad River" and second, "Barge Groundings by Days." The information was so taken from Exhibit 505 as to show the actual number of hours a barge was aground, but the time taken was the time of grounding whether one or more barges was actually aground. I, in preparing the chart, assumed that the fact of grounding indicated a lack of sufficient navigable depth in the channels, the record giving no information as to actual depth at the particular point and time involved.

No assumption was made as to the information under
4528 the "Bad River" heading. On Exhibit 518, it ap-
pears that there were 19½ days of barge groundings
for the year 1922. I assumed the fact of grounding at a particular stage of the River indicated an actual lack of navigable depth at that stage and by applying the stage to the lower hydrograph indicating what the stages would have been without the Lake Michigan increment, I ascertained the additional time during which there would have been the lack of navigable depths if the volume in the river
had been decreased by the amount of the Lake Michi-
4526 gan increment. I made no assumption as to depth
4527 needed to float the barges. The project depth calls
for the maintenance of 8 feet, but the channel shifts
and bars form, and a mere rise of stage does not
4531 necessarily indicate a corresponding rise of depth.

My assumption was that without regard to the depth of the barge, if it was shown by the operation charts, Exhibit 505, to have grounded at a particular stage, at that stage there was insufficient navigable depth in the channel. I further assumed that the hydrograph at St. Louis fairly represented the river stages in the stretch of river from the mouth of the Ohio to the mouth of the Missouri. On the assumptions involved and by applying the discharge curves to the lower hydrograph representing what would

have occurred without the Lake Michigan water, I found that in 1922, while barges actually were grounded for an aggregate of 19½ days, without the Lake Michigan water, this would have been increased to 101 days. In
4534 reaching my conclusion, I gave consideration to the rise and fall of bars in the river, and offered in evidence Defendants' Exhibit 526, being a graph published in House Document No. 50, 61st Congress, First Session, Report of the Board of Examination and Survey of the Mississippi River. The graph was entitled:

> "Curves showing Relations between River Stage to Bar Heights and Depths Limiting Navigation in the Mississippi River between St. Louis and Cairo compiled for the Board of Examination and Survey of Mississippi River from the records of the United States Engineer Office, St. Louis, Missouri, for the years 1896 to 1908. The curve of mean depths shows for each foot of stage the average of the best depths found in the channel crossings of all bars between St. Louis and Cairo, and indicates the relation between mean bar height and stage: the total number of soundings represented by each reference mark
> 4539 being stated opposite thereto."

The curve indicates in general that as the river rises the bars rise with the river so that at gauge 10, for instance, an increase of stage of 1 foot indicates an increase of depth over bars of approximately .7 of a foot. This relation applies at the upper stages on a falling river. The re-
4540 lation does not hold true throughout, and does not apply at all to the lower stages. The curve indicates that at plus one of the gauge, the bar does not rise as the stage increases. Since the time of these observations, 1908, the project for the regulation of the river has been carried further and now in general upon a rising river at the higher stages, there will be an increase of bar height,
4542 but this would not be true for the lower stages. The witness introduced in evidence similar charts for the lower river similarly prepared, but referred to a
4544 different gauge, and the appropriate hydrograph.

Based upon my study of the basic data and experience on the river itself, in my opinion the increment of 10,000 second feet at low water stages of the river increased the navigable depth to the extent that the stage was increased, and further the government project for the improvement of the Ohio would necessarily tend to decrease the flow from the Ohio at low water stages, and consequently
4559 make more important sources of supply elsewhere derived.

4560 "I do not think we are going to try that, and I
Special judge from what the witness says that we would
Master have great difficulty in reaching a conclusion if we did, if the engineers at the War Department are doubtful about the extent of the effect."

Cross-examination:

4794 I am not a graduate of any school of engineering. I have made no field surveys on the Mississippi River. I have made surveys for drainage districts on the Mississippi River involving a study of flood heights and levee heights, but they did not have anything to do
4795 with navigable depths or location of the channel. I have never had any field work as an engineer dealing with navigation on the Mississippi, but I have taken several trips on the river. On my trip as Secretary
4797 of the Internal Improvement Commission I did no
4798 field work. It was just a trip on the river.

4800 My opinions expressed in my direct testimony are based entirely on the various charts, surveys and government reports offered in connection with my
4801 testimony. There is no other information or charts upon which I am relying.

4809 I agree in the main with the description of hydraulics of the Mississippi River found at page 44 of the report of the Special Board of Engineers on the 14-foot waterway.

When asked concerning instances of extreme low water below zero of the gauge at St. Louis shown on the chart, Defendants' Exhibit 507, the witness pointed out that the entire plane of reference for the government project had been lowered since the Chicago diversion from plus 4 of the gauge to plus 1 of the gauge.

4855 The grounding on September 1st, 1922, shown by
4856 the operating diagram of the barge line occurred about 7 A. M. and it lasted until about 8 P. M., and then apparently moved down a little bit and again stuck and continued through the night until about 5 o'clock the next morning. I do not know the cause of the grounding.

4863 From Exhibit 521 I cannot tell how the tow or tug boat that grounded on the bar at a stage of five feet on the St. Louis gauge got off the bar when the stage
4864 in the St. Louis gauge was 4. The tow finally got off the bar when the mean daily stage as shown on this graph was a foot below the point where it originally grounded.

4865 If my relations had exact accord with the fact that there was one foot less water there than when the tow got on it could not have gotten off. I did not present these graphs as showing anything about the depth
4866 of water. According to the graph, the water surface was one foot lower when the tow got off than when it got on. The special master indicated that in view of this he was unable to see the effect of the charts. The
4867 depths would be affected by the dropping of the water surface if the river bed was stable or fixed but the bottom must have dropped out at that time,
4868 as it sometimes does under these bars and rises.

4868 "The net result seems to be that there was one
Special foot less when the tow got off than when it got
Master on."

4894 In response to the Master's questions, the witness replied that in the first place, the relation of river surfaces below St. Louis to the gauge at St. Louis, was a practice approved by the Engineering Corps; as indicated by defendants' Exhibit 526, the curve of depths over bars which related the information there contained throughout the stretch of river from the mouth of the Missouri to the mouth of the Ohio to the St. Louis gauge. On this Exhibit there were two curves, one for mean depths over bars and the other curve of limiting or least depths over bars, the latter showing the depths controlling navigation. The chart itself states, in reference to the latter curve:

> "The average of the line channel depths, one for each through trip between St. Louis and Cairo, found by boats operated by the U. S. Engineering Office, indicates the relation between the controlling depth and the stage, the least depth of each trip being shown as a small dot, and the mean of all trips within a half foot of each foot of stage being shown as a large circle."

As indicated by my chart Exhibit 521, in the year 1922, on September 1, a barge grounded at gauge height plus 5 and as shown by the curve above referred to, the limiting depth at gauge plus 5, is 5.9 feet, and further that for a gauge height of 10, the limiting depth is 8 feet. The chart shows a fixed relation between bar depth and surface elevations and although based upon an accumulation of recorded observations between 1896 and 1908, in the opinion of the witness, the relations so established obtained at the present time.

4900 The assumption that I have made is that on September 1st, when this boat stuck on a bar at gauge height 5, that was the gauge height and the controlling depth at which that barge would have stuck under any conditions, and that with 10,000 second feet less water, skimming a foot off the top of the river at that point, that gauge height would have occurred three days earlier and the barge would have stuck three days earlier.

Now, it got off the same day, and in the interval between when it stuck and when it got off the river fell .4 of a foot. Some work was consumed to get it off. What kind of work was consumed I have a very good idea, but I am not able to state definitely of my own knowledge whether it was dredged off or dredged itself off with the aid of the twin screw propellers. It got off and went down the stream a little ways, as shown on the operating diagram, Exhibit

505, and got on another bar and stuck, and worked its way off and got off that bar at stage 4. Its progress was a succession of getting on and off bars through that difficult stretch of the river.

The assumption that I have made is that the actual grounding, as shown on the operating chart of the barge line, Exhibit 505, show clearly that for the months of September, October, November and December, navigable depths were not obtained in that stretch of the river, and as barges came to those places where the channel depth was not sufficient to float them, with 10,000 feet less water or skimming approximately one foot off the top of the river, the conditions would have been worse and the stage would have been as represented on this line graphically and at the left numerically.

4916 The conclusion is that the addition of 10,000 second feet would produce greater navigable depths at low water stages, and the measure of the increase would diminish as the stage increases. In support of my conclusion I also refer to the Annual Report of the Chief of Engineers for 1926, page 1028, which states:

4924 "The average natural depth available for navigation at low water, mean and bank full stages, are about 4½, 9 and 16 feet respectively, that is the crests of bars rise and fall with stage as 1 to 2½."

J. W. Woermann, for Defendants.

4569 Direct examination:

I have been in the division office at St. Louis for 12 years or more, and in 1915 I prepared the new article on the Mississippi River for the Dodd & Mead International Encyclopedia upon the recommendation of the President of the Mississippi River Commission.

4572 In preparing the 14 foot waterway plans at the request of the Board, I assumed a diversion from Lake Michigan of 10,000 c. f. s. I took one foot as the increase in stage at low water represented by this incre-

ment. The discharge curve at St. Louis published in
4573 the report indicates more than a foot, but I took a foot as a conservative value. From the mouth of the Illinois to the mouth of the Missouri, this increment would increase the low water stage between a foot and a half and two feet, and from the mouth of the Missouri to the mouth of the Ohio about a foot, and also a foot to Columbus, Kentucky, and down to half a foot at Carrollton, Louisiana. The more recent discharge curves indicate a greater effect at the present time; at St. Louis, for instance, it is close to a foot and a half.

Cross-examination:

4577 I state that the Board had accepted my assuming an increase of one foot due to the assumed diversion of 10,000 second feet. At low water the increase in gauge height of one foot would be the increase in navigable depth. The bars do not rise and fall with stage of the river at low water or near zero of the gauge. The St. Louis office endeavored with the plant at hand to maintain eight
4580 feet, but, of course, did not always do it.

The rise of the bars with the rise of stage does not occur at any particular definite point on the gauge, but begins at plus one or two, or more. The curves in
4582 the report indicate that the bars rise approximately .4 as fast as the rise on the gauge. The effect of a
4592 given increment depends as much on depth as it does on slope. I do not agree with the statement con-
4593 tained in Complainants' Exhibit No. 1 on page 47 as follows:

> "It would not be unwise to assume that the average raising of the water surface amounts to about one foot, but due to the hydraulics of the Mississippi River, where the elevation of the tops of the bars fluctuate with the height of the surface of the water, it is doubtful if the actual depths are materially increased. For this reason it is impossible to evaluate the benefit, if there is any."

I would not say it was an error. I would say it was very conservative value.

And when referred to the following statement by Major J. B. Cavanaugh, pages 38 to 40, H. D. 762, 63rd Congress, second session, the Bixby report reading as follows:

> "The effect of any diversion upon gauge height will always be small, and at the highest stages practically nothing, but the exact effect at any time or at any stage is impossible to determine, since this effect will be complicated or obscured by various other changes in the regimen of the river;"

said:

> "I absolutely do not agree with that statement.
> 4606 I was amazed when I read it. Major Cavanaugh when he wrote that was a long way from the Mississippi."

When his attention was directed to the statement on page 39 of the same document in reference to the comparison of certain discharge curves, the witness said that the writer was dealing with ordinary stages of the river; that the rise of bars was an unusual phenomenon and people nat-
4609 urally applied this phenomenon to all stages of the river, at some of which it did not occur. The discharge curve in the Bixby report does not show that the bars rise at lower stages. The curve stops at plus two of the gauge. If continued to zero, it would indicate that the depths on the bars increase faster than the water rises, which is, of course, absurd.

4610 I do not know whether there was any information obtained from actual tests in the river which would have permitted extension of that curve if the Board had seen fit. There were plenty of trips taken to give
4611 soundings for the lower stages to my personal knowledge. I do not know of any official report made by any member of the Corps of Engineers which would support my statement that there were data from which the curve could be deduced for a depth less than shown on the chart.

4612 I did not have any data that has not been in the hands of these various Boards investigating this question with respect to the relation between the heights of bars and the stage of water.

4613 It would be impossible to have any natural channel of eight feet in this river without dredging and other improvement during the low water stages.

4615 It is practical to improve that section of the river by revetment of the banks and regulation, but nothing can take the place of water, and if you develop as great a depth with a smaller volume of water you have a channel of less navigable capacity.

CAPTAIN WILLIAM L. BERRY, FOR DEFENDANTS.

Direct examination:

I am the Manager of Transportation at Paducah, Kentucky, for the Ayer and Lord Tie Company which
4720 operates barges and boats on the Mississippi, Ohio
and Cumberland Rivers. My experience in navigation on the Mississippi River began in 1886. I obtained a license as a pilot in 1910, but was watchman and mate on tow boats prior to that time, at least half of my service being on the Mississippi. Prior to 1900, the barges would be loaded to capacity, from 6 to 8 feet draft up to around the first of August. After that during low water, they would be loaded to 4 and 4½ feet. I noticed a change in the conditions of navigation after the introduction of the Lake Michigan water in 1900. I think we had about a foot to 18 inches more water after the diversion of water from Lake Michigan; a slight improvement immediately, but an increase right along. We generally had an average of
4723 from 5 to 7 feet right along during the fall. Before
1900, there was frequently only 4 feet in the river after August. The barges are loaded in accordance with depths found in the river. I don't know about the bars rising with the river. I know as the river rises we have more water in the river. Of course, when we have high water the Mississippi River is changeable. It has a sandy

bottom and banks, and, of course, when we have high water the current increases and it moves the sand. Sometimes it moves it on either side. Sometimes it moves it straight ahead and flows into deep water. Sometimes it spreads and leaves a bar clear across the river. We could not afford to lay up and wait for the government to make the channel, but were compelled to load according to the actual available depth. I noticed a change when the water was turned in from Lake Michigan in 1900. I was towing ties from White River out of St. Louis, loading the barges to 5 feet and got stuck twice going up, and on the next trip after the introduction of the new water, I went through without touching.

My barges grounded some time in the summer or in
4731 the fall of 1900, I think. It was toward the latter
4732 part of the season. On the next trip taken about
4733 three weeks later my barges went up loaded to the
same depth and did not ground. I think the change in those three weeks was due to the turning in of the Chicago water.

I could not see a great and sudden change, but know
that boats have been loading right along in the last
4736 ten years for about 18 inches more of water. The
government tried to maintain a depth of 8 feet, but did not succeed.

Captain Oscar F. Barrett, for Defendants.

Direct examination:

I am engaged in the river transportation business on the
Ohio and Mississippi residing at Cincinnati. My
5387 experience began in 1882 in heavy freighting on the
Mississippi and Ohio, with headquarters beginning in 1887 at Cairo. I was not always on the vessels during the trips, but practically always during times of low water. Before 1900, low water would begin any time after the middle of July, and with practically no rise above Cairo, until the middle of March or first of April. I would consider myself lucky if before 1900 there would be an average of 5 feet between Cairo and St. Louis, after the first of October and sometimes in September. During the low

water season, I used to tow lighters following the Anchor Line Packets in order to lighten these by removing freight to permit the big steamboats to get through the shallow river. The packet boat after the freight was off, would draw from 4 to 4½ feet, and from six to eight feet with the freight aboard. Before 1900 the channels were
5391 not only shallow but very narrow. Most of the barges before this period were double end barges which required being pulled at the side of the tow boat, and in order to meet this difficulty, square stern barges to be shoved ahead of the tow boats were designed in
5392 1896. Since the water has been turned in in 1900, the tow boats usually take three barges wide and two in length, six barges in all. For a number of years I have not loaded any barges down stream less than 7 feet, and as a rule load 6 to 6½ feet for up stream movement and usually get through without much trouble. The improvement began gradually after 1900. The improvement by the Chicago water was forcibly illustrated to me when I attempted to haul cement to Hannibal, Missouri, above Grafton. Barges were going to St. Louis with 7 feet draft although it was the dry season. They sent their barges to Hannibal, and although they had only loaded them to 3 feet, they couldn't get out. I went up the river to help these barges move, and had no difficulties until I got above Grafton. There was 7 to 8 feet in the channel up to Grafton, and above it dropped down to three or three and one-half feet. That convinced me that the water from the Illinois was the salvation of the Mississippi.

I fixed the time when I noticed the added water from Chicago in the river to two or three years after my
5406 father's death in 1897. I remember that instead of towing one barge at a time, I was frequently able to tow two and even three drawing more water than had been anticipated. I knew the improvement in conditions was caused by the Chicago diversion, because when I went up above the mouth of the Illinois River at Grafton, navigation was not so good. Then instead of 7 or 8 feet it
5408 dropped to 3 or 3½ feet. I think that it was about 1901 or 1902 that the change became definitely fixed

in my mind. The change did not take place within weeks or months, but within a year or two.

CAPTAIN H. W. NEYHE, FOR DEFENDANTS.

Direct examination:

I am the Manager of the Eagle Packet Company, operating boats on the Mississippi and Illinois Rivers.

I first had to do with the navigation on these rivers in 1888. The Eagle Packet Company was organized in
5801 1861. I began to operate on the Illinois in 1893. I am a licensed pilot on both the Mississippi and Illinois; on the Mississippi from Cairo to Grafton. In 1892, we built a large boat for the Illinois River, 240 by 40 feet, drawing about 4 feet, which we figured would carry
5802 a lot of people up the river on excursions to the World's Fair in Chicago. We found we could not operate after the last of July because of low water. That generally describes the conditions obtaining in the Illinois during those years; insufficient water during the
5803 summer and fall months. There was a change in the river occurring to my best recollection during the season of 1900. We never take any soundings now in the Illinois River. Our boats draw about 4 feet light and loaded 5½ to 6 feet. With reference to the stretch of the Mississippi between Grafton and St. Louis, prior to 1900, we had a lot of trouble. One season, I think it was 1898, we were unable to get to Grafton with a boat drawing
5804 3 feet. The difficulty was just north of Alton. We operate north of Grafton on the Mississippi all the way to St. Paul. There has been a change in the condition of the river below Grafton, (the mouth of the Illinois). We never have any trouble there now in using these boats I described as operating on the Illinois. I think this change began in the season of 1900. Before 1900, we operated tow boats from Cairo to St. Louis. We could take from 3,000 to 5,000 tons a trip in a good stage of water, that is, 7½ to 8 feet. We could do that in the early portions of the season, say up to the first of September. After that, with a boat

we could tow about 3,000 tons with, we would gen-
5805 erally come up the river with about 1,000 tons, which
would be unprofitable. This would be at a 4½ foot
draft. We gave up that tow boat business in 1901 because
of the uncertain stages of water. There has been a big
change in the condition of the river since that time, between
Cairo and St. Louis. Since that time, we have oper-
5806 ated packet boats, but I see what is coming up the
river, and I have often remarked that if the present
tow boats have the trouble to contend with we did before
1900, they would not be on the water. With the coming of
the Chicago diversion, I noticed a marked difference
5807 in low water. It gave us a wider channel. I do not
know that we would have an 8 foot draft all the time,
but we have been having good water. I guess after that
between 6 and 7 feet would be very close to what we got.
Ever since I started on the river the Government has been
dredging and building wing dams and dikes along
5808 the river in carrying out the Government improve-
5809 ment which does help in some cases and in other
cases not. In 1898, we were laid out all fall trying
to get to Grafton. Our packet boat then was drawing 30
inches. Prior to 1900, we could only draw about 4 to 4½
feet in the low water season in the middle Mississippi south
of St. Louis. After that date, we would not get 8
5811 feet, but the prevailing draft was at least 7 feet.
There was more water in the river than 4½ feet;
that was the draft of the barges.

MAJOR JOHN C. GOTWALS, FOR DEFENDANTS.

Direct examination:

5453 I am United States District Engineer at St. Louis,
in charge of the Mississippi River between the mouth
of the Missouri and the Ohio since April 30, 1924; graduate
of Pennsylvania State College in Civil Engineering in 1906;
advanced degree of civil engineering from same institution
in 1907. From 1906 to 1913 employed successively by the
Pennsylvania Railroad tunnelling into New York City, by

the State of New York on the barge canal and by the
5454 City of New York on the Catskill Aqueduct. Commissioned second lieutenant in the United States Corps of Engineers as a result of competitive examination in 1912. On duty with troops in Texas, 1912 to 1917. 1917 to 1919 in charge of Searchlight Regiment in France. Engineer Officer of the Alaska Road Commission from 1920 to 1924. Chief Engineer of Alaska Railroad in 1924.

5455 I have the direct duty of improving the Mississippi. For that purpose I have reviewed all of the work that has been done since 1881 as well as its economic
Ex. 1180 value. My studies are incorporated in Exhibit 1180, being Document No. 9, 69th Congress, Second Session, Committee on Rivers and Harbors, House of Representatives, entitled "Mississippi River between the Ohio and St. Louis." My recommendations contained in this report are incorporated in the last Rivers and Harbors Act. This report gives a history of the project showing the initial appropriation in 1824 for the removal of snags and projects for certain specific improvements in 1836 and 1837, and later in 1844. The first general project for the improvement of the river was in 1872. The present project using revetments and permeable dikes was adopted
5486 in 1881, calling for a six-foot channel to the mouth of the Missouri and an eight-foot channel from there to the mouth of the Ohio. The project was modified in
5487 1895 by a provision for dredging in addition to the regularization work to maintain the channel, and in 1902 an increased appropriation for dredging was made, but no advantage was taken of this appropriation. No appropriations after 1905 were devoted to dredging until 1910. Paragraph 30 of the report reads as follows:

> "30. It is to be noted that the above defined low water is the natural minimum flow during the season of navigation, and includes no 'added volume' or diversion of waters from Lake Michigan. An increment of 8,000 cubic feet per second will raise the low-water plane at St. Louis about one foot, and because of rise in river bottom with rise in stage, character-

> istic of the middle Mississippi, will increase the navigable depth about one-half foot."

5506 Paragraphs 58 and 59 of the report read as follows:

> "58. It is not possible to predict exactly the navigable depths which will result after completing works of the nature proposed. Based on the natural velocities obtaining in the present low-water cross sections, reasonable computations indicate that the cross sections formed by the proposed contraction works will give a mean depth of 8 feet at low water and a channel depth of 9 feet over a width of about 500 feet in each of the three-river subdivisions. These computations are based upon the very conservative natural low-water volume for navigation of 40,000 cubic feet per second which includes no diversion whatever from Lake Michigan. (Par. 30.) So low a water has not occurred during navigation seasons of the last 22 years. * * *
>
> "59. It is therefore a fairly conservative conclusion that a channel 9 feet deep at low water and at least 300 feet in width will result in completing the regulating works."
>
> NOTE.—The three-river subdivisions referred to are found in Table 2 of the report which shows a mean depth of 8 feet and the "fairly conservative conclusion" that a 9-foot channel will result, is based 5505 upon the inclusion of the Chicago diversion.

The report also quotes the following extract from Colonel Ernst's report of August 10, 1903:

> "A dredged channel which does not maintain itself is a very precarious foundation for trade. There is probably no place in the world where a dredged channel will have a briefer existence than in the uncontrolled part of the Mississippi River below the Missouri."

Colonel Potter, Chairman of the Mississippi River Commission and Division Engineer, adds the following endorsement to Major Gotwal's report:

> "2. This report is the result of a very thorough study based on many years' experience on the St. Louis engineer office in the regulation of the middle Mississippi, and the conclusions are well worth acceptance and thoughtful application to the problem of its improvement."

The witness also introduced a tabulation showing funds, appropriations and expenditures for regulating works and dredging from 1891 to 1926, inclusive. (Defendants' Exhibit 1184.)

5537 Exhibit 1185 was received in evidence, being a blueprint entitled "Mississippi River and Tributaries and the Great Lakes," which shows the elevations at various points on the Mississippi River and its tributaries above sea level at extreme low water, the distance from the Gulf to Mexico, the range in stage at various locations, the mean fall in feet per mile at extreme low water, and the maximum and minimum discharges of the tributaries entering the Mississippi.

In connection with the testimony of the witnesses
5538 there was received in evidence Exhibit No. 1186, being a table showing the effect of 10,000 c. s. f. diversion from Lake Michigan on the Mississippi River at Grafton, St. Louis, Columbus, Helena, Vicksburg, and New Orleans, prepared by the witness from official reports and documents, discharge and rating curves.

5539 Basing his testimony on Exhibits 1185 and 1186 the witness stated the extreme low water flow at Grafton just below the entrance of the Illinois River is 25,000 second-feet. Since the Illinois and upper Mississippi Rivers are streams with fixed beds a rise in stage probably would be reflected by a rise in navigable
5540 depth. The low water flows at Grafton of 25,000 second-feet and at St. Louis of 40,000 second-feet occur only in extreme mid-winter when navigation is closed by ice. 10,000 or 15,000 second-feet should be added to these figures to get the extreme low water during naviga-

tion season. Below the Missouri the effect of a rise
5541 in stage on navigable depths would be about one-
half the rise in stage. At the low water the navigator goes in the very deepest channel, while during the high stages he avoids the deepest channel to avoid the stiff current.

There is a slight tendency in navigation records to show the bars a little higher at the high stages than is actually the case. I cannot take too seriously the adding up of the previous sounding over the bar and say that rise is exactly 1 to 2½ or 1½ to 2½, but it is something roughly in that neighborhood. You can say below St. Louis that with the rise in stage, due to 10,000 c. s. f., there is some increase in navigable depths.

5542 Low water generally exists from August to the close of the navigation season, which varies from December 10th to January 1st, during which period the average discharge is between 55,000 and 60,000 c. s. f. at St. Louis. A 10,000 c. s. f. diversion from Lake Michigan increases the navigable depths from six inches up to the full amount that the stage is increased by the diversion, depending upon how the river stage has dropped.

5543 The plan of improvement in the middle Mississippi
5544 consists in contracting the existing river into uniform
widths so that the river would cut out the shoals as they form. With these contraction works it is very probable that the shoals will cut out through the entire river, though I am not optimistic enough to expect it to altogether eliminate dredging.

5545 With the completion of these regularizing works the pools will be a little shallower and the bars a little deeper, but I hesitate to predict whether this change would result in increasing the effect of an increment from Lake Michigan on the navigable depths. An increment of 10,000 c. s. f. has no effect, by erosion or otherwise, to create bars or to injure the navigable capacity of the river.

5549 Fourteen feet on the gauge would be the extreme limit at which navigation difficulties occur due to low water. The hydrograph for 60 years shows that low water is not very long duration of the navigation season.

5552 Cross-examination:

The Mississippi River has an unstable bed from the mouth of the Missouri to the Red River, being most unstable nearest the Missouri and gradually stabilizing as one goes downstream. The Mississippi becomes practicallly
5552 stable above the mouth of the Missouri. The gravel bars there shift occasionally, but very little. There are undulations in the bed of the lower Illinois similar to Mississippi bars, but they are quite stable. Annual
5555 dredging is not required in the Illinois. The dredge cuts will last through a period of years. The same situation is true in the Mississippi between Grafton and the mouth of the Missouri.

5557 As the water increases above low water in the Mississippi navigators keep out of the channel over the bars in order to avoid the current. The current in the Mississippi River immediately below St. Louis varies from a mile and a half per hour at extreme low water to seven miles per hour at extreme flood.

5558 A prudent navigator keeps out of the mid-channel all the time. Even a current of a mile an hour increases the difficulty of handling his boats. Coming
5559 upstream he will cross a bar as far from mid-channel as his soundings will permit.

5560 In going downstream and approaching the bar a navigator backs his boat while he is flanking it, and he tries to avoid the swiftest current. This avoidance of the channel accounts for some groundings of barges when there is plenty of water. A good many of the groundings of the Barge Warrior Service occurred at times and places where there was ample water for the barge if the navigator had not gone in the "soft water" to avoid the current or if the navigator had not used poor judgment in picking a place in the river or having a boat with poor equipment, two or three rudders missing, thinking they would get by.

The conditions here described would prevail in barge
5562 navigation anywhere but to a lesser extent.

Even at the low current rate of 1½ miles per hour the navigator would avoid the channel if he felt sure there was no shoal water. Though with extreme low velocities, he is likely to look ahead and say the best chance of keeping in deep water is to keep in the lively current. However, if there is sufficient water over the bar, in the opinion of a navigator, he will avoid a channel current of a mile and a half an hour because it would mean a mile and a half more speed for his boat. There are towboats on the Mississippi with a still water speed of the naked boat of only six miles per hour. A good towboat has a still water speed of eleven miles per hour without a tow. A poor boat would have a
difficult time in a swift current. At extreme low
5564 water the pool depth immediately below St. Louis
is from 12 to 15 feet, at mean stage from 20 to 25 feet, and at high stage from 40 to 50 feet, though these are very wide estimates. Accordingly, the chief problem is to maintain project depths between the pools.

5565 The same situation obtains between the mouth of
the Missouri and the mouth of the Illinois, but here the bars are stable. The records of dredging at points above the mouth of the Illinois show that the dredge cut lasts 10 or 12 years. The project depth of six feet is maintained in this section of the river. Probably six inches additional depth by dredging could be obtained if desired, although that section of the river is not under my jurisdiction. Six inches additional depth below the mouth of the Missouri could be provided by dredging.

5566 The bars appear more rapidly when the river falls
suddenly. They do not cut out as the stage drops. Both government and commercial boats report on the condition of all bars. When a bar forms in the project depth we move a dredge there and make an estimate of how much further the river is going to drop. Our dredges are able to cut 14 feet below the stage at which they are working.

We usually work about 12 feet below that stage.

5567 The river helps very much in cutting through the bars and maintaining the channel. With dredge cuts 40 or 50 feet apart the current will occasionally scour out a full channel. At other times we have to dredge the entire distance.

5569 The formation of bars depends on the rapidity of the fall of the river, how the water comes in and where it comes from. A drop in flow from 80,000 c. s. f. to 70,000 would not of itself be so important as the rapidity of the drop. It is the rate of drop and not the extent which is a factor in maintaining depths over the bars. In the Mississippi River it is not the silt but the rapid changes in the stage which make trouble in maintaining project depths.

5570 No average length of time can be stated during which a dredged channel through a bar remains open. If the location is unwisely chosen the channel may not remain open a great length of time. There are many variations in them. There have been times when a particular bar has been dredged four times in a season, sometimes three or four days intervening between the dredgings. It is the rate of the fluctuation of the river rather than the quantity of water which makes this trouble.

5571 It is my recommendation that improvement of the river below the Missouri should be by contracting the beds rather than placing so much emphasis on dredging.

5575 The present velocity at low water is 1⅔ miles per hour.

5576 Contracting works would increase the velocity very slightly. This increased velocity would be decreased by decrease in the discharge of the river. If 10,000 c. s. f. were taken from the present flow there would still be adequate water for navigation. The river had it for 100 years before the increased flow came in.

Re-direct examination:

5678 A rise in the stage of one foot, roughly correspond-
ing to an increment of 10,000 second-feet, will slightly
increase the slope and velocity. Since partial dredging
will in many cases cause the river to scour out the
5679 channel through the bar, to the extent that the
velocity is increased, the time required to remove
the bar will be shortened.

5680 The most important effect of an increment of six inches is in producing more water and more room in which to manoeuvre a boat. It might be possible to develop mathematically that an increment of 10,000 second-feet would slightly stabilize the flow of the river, but I would not like to do so. It is a principle of river hydraulics that the smaller the range between the high and low water the more stable the stream and its bed. The silt in itself would be nothing if it were not for the variation of stages retarding the current irregularly so as to cause the dropping of the silt.

5681 Regularization of the river by controlling works is more efficient in maintaining navigable depths than dredging.

5683 The menace of the lower river is the flood heights
and not lack of navigable depths. 10,000 second-feet
would add to the flood heights now passing New Orleans,
and some of which enter the lower Atchafalaya. There
have been floods of 2,000,000 second-feet at Columbus con-
verted by crevices to 1,400,000 second-feet past New Or-
leans, and something like three or four hundred thousand
feet down the Atchafalaya. 10,000 second-feet is a
5685 very small contribution to that, but if that contribu-
tion happens to be the slight contribution which
breaks the levees it is just as dangerous as though it were
500,000 second-feet.

Re-cross examination:

5686 The existing Federal project for the Mississippi River adopted January 21, 1927, provides for a channel nine feet deep and three hundred feet wide. This was a modification of an existing project originally adopted in 1881 and changed from time to time thereafter. None of these projects depended on the Chicago diversion which was not considered by me in my report for project just adopted.

5687 The records of flow on the Mississippi River at St. Louis since 1872 show that the only times during the navigation season when the flow in the river got as low as 40,000 second-feet was on October 20, 1889, and December 22, 1904. There is a little doubt about the measurement on December 22, 1904, being in the navigation season, because it is so late. These are the only times since 1872 when the flow of the Mississippi River got as low as 40,000 second-feet during the navigation season.

5688 Adding a permanent or fixed increment to the flow of the river would not change its characteristic of fluctuation to any material extent.

5689 The lowering of the low water plane in the Mississippi River at St. Louis, shown by Exhibit 1201, was caused by artificial improvement of the river. The extent of this lowering is a matter of controversy and study.

GENERAL W. H. BIXBY, FOR COMPLAINANTS.

8065–68 My experience on the Mississippi River includes service as District Engineer in direct charge from St. Louis to Cairo, as Division Engineer having supervision over all of the Mississippi and Missouri Rivers, as President of the Mississippi River Commission and as chairman of two boards of engineers for surveys from Lockport, Illinois, to the Gulf. During the World War I was recalled to active service in the St. Louis District and on the Mississippi River Commission.

8068 The Mississippi River has a shifting, movable, bottom, bed and banks. From St. Paul to St. Louis the river is small with a comparatively hard bottom, wide
8069 and shallow. While the upper Mississippi is not so long, it furnishes more water than the Missouri and

does not carry much sediment, sand or other material. The Missouri has a lesser flow but the higher floods tear up the beds and banks and send the sand rolling along the bottom. With the union of the upper Mississippi and Missouri rivers, the Mississippi assumes peculiar characteristics, in that it is composed of a series of deep pools sepa-
rated every 3 or 4 miles by bars. The average depth
8070 of the Mississippi from St. Louis to Cairo is 18 feet.
From Cairo to Memphis it is 31 feet. From Memphis to Vicksburg it is 37 feet. From Vicksburg to the mouth of the river it is 48 feet. Below the mouth of the Red River the bars are so far below the surface that they rarely interfere with navigation.

8072 Between the mouth of the Missouri and Cairo the natural depth on the bars has been somewhere between 3 and 5 feet. Below Cairo, down to Vicksburg the natural depth is between 4½ and 6½ feet. These bars not only rise and fall, but they travel down stream. The bars wash away on the upstream side and fill up on the downstream side, gradually changing their position. As the bars move down-stream, they gradually diminish in height and fade away. When a bar has moved down-stream to where it has nearly disappeared, another bar begins to form up above and moves down and takes its place. Hence the bottom of the stream is constantly changing, the bars constantly moving and the pools constantly filling up and scouring away.

8074 The navigation season commences in January or February and ends in November or December, when the water is away below the low water of the navigation season. At the low water of the navigation season the flow of the river is 40,000 second-feet. During the closed season
of navigation the flow in the river is very small, so
8075 that everything is quiet on the bottom of the stream.
The previous work of the season has cut channels through all the bars, so that the draft all through December and January is good, usually 8 feet from St. Louis down to Cairo, and 9 feet or more from there down to Vicksburg. This is the condition which exists when navigation resumes

in February. The water then commences to rise gradually
at St. Louis and continues a steady continual rise until
April or May. In May the river is nearly at full stage.
During this time the navigation channel is even better than
it was before because the current is gentle and grad-
8076 ual and not much material is carried to lodge on
the bars. The bars do not rise as fast as the river
stage rises, so that navigation depth may increase until
April, May or even June. During this time the boats have
more water than they need. If an unusual flood should
come with a sharp rise and then drop very suddenly, the
bars might reform, as they do in the fall, and cause trouble,
but that rarely ever happens. Between July and August
the river ordinarily reaches its maximum stage, which aver-
ages about 20 feet on the St. Louis gauge, although it some-
times reaches a gauge height of 30 or 40 feet.

8077 During this time there is more water than is needed for navigation.

8078 During this period of rising water the silt gradually begins to move, filling up the dredge cut through the bars. These bars have been gradually rising but because the water has been rising faster, the navigation depths have continued to improve. By July and August when the river begins to fall the Missouri river has risen to its full force. The Missouri tears away the water soaked banks, as the receding water removes their support, so that
they fall into the stream. Some of this material is
8079 taken up in suspension and some is rolled along the
bottom and emptied into the Mississippi. The vol-
ume of such material that annually rolls out of the
Missouri into the Mississippi is about 400,000.000
8080 cubic yards, mostly during July and August. From
time to time this material is deposited in eddies and
on the bars.

8081 While the river is at full height, flowing with its greatest velocity, all this matter that is in suspension and rolling along the bottom keeps on moving; but as the river begins to fall and lose its velocity, a lot of the material that is suspended settles on the bottom and the rolling material lodges on the nearest bar. When the river falls rapidly, the rapid diminution of the current piles a mass of material on the bars and they apparently rise up from the bottom of the river and come up close to the surface. Then a condition will develop where with 23 feet on the St. Louis gauge there is only an 8 foot draft over some bars down the river. Then the dredges must rush to the bar and cut a new channel. In July and August the government boats that are going up and down the river are always sounding over the bars that have made trouble in former years. Between St. Louis and Cairo there are 40 or 50 places where bars might form. In some years work is required on 13 to 20 of them and there are usually a half dozen of them that make trouble quicker than others.

8083 When the government boats find 10 or 11 feet over a bar where the project is 8 or 9 feet, the dredges go down there and start to work. If the bar still develops, a few cuts are made through the bars about 30 feet apart and 30 feet wide, after which the river will scour away the
8084 intermediate ridges and a good channel is established. In a good many cases those cuts when made through the bars last entirely through the season, especially if the river drops gradually and steadily. However, if the river drops and then rises 2 to 10 feet and then drops again, the trouble will occur again because the rising river has again picked up the material in suspension and rolled the material along the bottom so as to fill in the cut. Under such circumstances it has occasionally been neces-
8086 sary to dredge a bar 3 or 4 times a year. The bars generally form at from 10 to 20 feet between St. Louis and Cairo and at 10 to 15 stage below Columbus and at a little lower stage at Vicksburg. From the mouth of the Red river bars never trouble navigation. An inter-
8087 mediate stage is the best for navigation. But for the formation of the bars low stages would be better.
8088 The channel does not depend upon the volume of the water or the height of the water in the river. The channel depends upon the unequal movement of the water in velocity. Wherever the velocity drops a bar develops causing trouble. The bars form rapidly on a rapidly falling

river, which means that the river goes down 6 inches
8089 or a foot in one day. At the stage of the river when
bars form a drop of a foot means a decrease of 20,000
to 30,000 feet per second in volume. This is the stage when
dredges have to jump in and cut a passageway through the
bars. 10,000 second feet diverted from Lake Michi-
8090 gan has no appreciable effect upon the navigation of
the Mississippi river. It may make a difference of
one-half a day in the time when the dredge starts work;
but after the dredge has once started work that 10,000 sec-
ond feet has no more value. If the river is falling rapidly
the 10,000 second feet might be wiped out in a fraction of
a day. The 10,000 second feet diverted would hardly
8090 make any difference in the time required for the
dredge to cut through ~~the bar~~ because the dredge
working through a falling river, makes a cut a great deal
deeper than the project depth, so that the river will take
hold more rapidly and widen and deepen that cut.
8091 An increment of 10,000 second feet from Lake Michi-
gan would not make the cut through the bars last any
longer. If the river falls slowly and gradually it keeps
the cut dredged beyond the depth that is required for navi-
gation. If on the other hand the river rises and falls again,
the work has to be done over again and there is no gain from
the 10,000 second feet. There is no gain in a constant incre-
ment of 10,000 second feet. With no dredge and no regu-
larization work an increment of 310,000 second feet
8092 would have to be added to the Mississippi river to
8094 insure a 9 foot navigation.

Cross-examination:

8276 My statements as to the natural condition of the
Mississippi are based upon the back records of the
engineer's office at St. Louis and of the Mississippi River
Commission. I had to look over these records to
8279 draw the 1909 Board report. I do not know what
recommendation Gen. Robert E. Lee made. The
Mississippi River Commission was created in 1879, and the
present project of partial regularization or bank protection
and dredging and levees, was adopted in 1881. Dredging

only gives a temporary channel. There have been a
8280 few dikes and some revetment work, meaning anything that will prevent the banks from washing away
8281 into the water. We have always recommended the
8282 regularization of the channel. Major Gotwals simply
increases the amount of partial regularization. His
report contemplates a channel 300 feet wide at all points
and 9 feet deep. In navigation, both depth and width of
channel are important. The 40,000 second feet definition of
low water flow has only been made within the last few
years. Before that it was approximately 35,000 to
8284 40,000, since at least 1909. In 1909 the lowest meas-
8286 ured discharge during navigation was about 35,000
feet measured February 5, 1900. At the present time
during navigation season, the water added from Lake Mich-
igan is not approximately 25% of the low water dis-
8289 charge, because it has been impossible to flow more
than 8,250 feet through the canal. At low water, the
increment of the Mississippi at St. Louis is about 10,000
feet per second, that is the amount of water needed to raise
the stage one foot. The bars usually begin to form at
anywhere between 15 to 23 feet on the gauge. The bars
usually begin to form about 20 feet. I refer to the
8290 chart in Document No. 50, First Congress, First
Session, the report of the 1909 Board, showing the
correlation between bars and water stage for 12 years be-
tween 1896 and 1908, and there were some 30,000 soundings
taken in getting up that chart. The chart shows not only
the location of the soundings with reference to stage, but
also the depth of the controlling bar on each trip, that is,
the least depth on the trip. And these controlling depths
are plotted on a curve. The chart is Plat 2 of House Document 50. There were 29,000 soundings taken when the stage
was below 20, that is between plus 4 and plus 20 on the
gauge at St. Louis, and about 24,000 between 4 and
8292 15. Exhibit 507 shows the mean stage of the Missis-
sippi River at St. Louis and this shows that the river
is over 20 feet on the gauge, an average each year of only
10 days. The chart shows that it commences to go over 20
feet about the 10th of June, is about a half a foot higher

the 15th of June, and drops down to about 20 feet the 22nd of June, and coasts along at 20 feet until the commencement of July. It goes down uniformly as a mean stage until about the 10th of September, when it is 9 feet. Then it goes along very gently and uniformly until about the middle of November when the stage is 8 feet, then faster until the 19th of December when it is down to about 5 feet on the gauge. There is a discharge curve on that exhibit. The curve shown in House Document 60, supra, following page 236, shows an increment between 4 and 5 feet of about 7,000 feet. The addition of 10,000 feet, therefore, with the river at stage 5, would increase the stage a little over a foot, but comparing the two discharge curves, the increment is about the same between 15 feet and 5 feet on the gauge, that is, 7,000 to 10,000 second feet. The effect of 10,000 second feet diversion from Lake Michigan is supposed to be somewhere between one foot and one and four tenths of a foot increase in stage. When the stage of water is 20 feet, there is usually sufficient depth for navigation.

I think the best navigation on the Mississippi is
8300 by all odds at very low water. Due to the rise of
8302 bars at low water, because of the diversion of 10,000
second feet, there is only an increase of half of the
1 foot and a half, that is, seven tenths of a foot so
8303 far as navigable depth is concerned. When the
water is rising, the bars form only half as fast as
the water surface rises. The bars rise about 2 feet for
every 5 feet in water stage as the river goes up. As
8304 the river falls, the bars go down only half the decrease
in stage. The discharge at 17 feet is 220,000
second feet; at 18 feet, it is about 15,000 feet more; at 19
feet it is about 255,000 second feet; at 20 feet, 270,000 second
feet. Assuming that the increment at 20 feet is
8305 20,000, the effect of the 10,000 diversion at Chicago
8307 would be six inches in raising the water surface. You
have a greater depth over the bars at the 20 foot
stage of one-half of the six inches, or three inches, and the
water that comes into the Mississippi from the Illinois
8308 River is not silt-laden water, but is clear. The
object of the reservoirs on the upper Mississippi was

to provide water at low water times to improve navigation.
If the water coming out of the Illinois were about 8,000 feet
and this were taken away from the low water stage with a
40,000 discharge, the discharge would be 32,000 second feet,
and navigable depths might be reduced about a foot. Be-
tween St. Louis and the Ohio, there are about 30 bars of
which about 4 always make trouble. Every year they
8313 have to send a dredge to that particular locality. The
localities are named at page 66 of Document No. 50.
Bars rarely, if ever, form during a rise; they com-
8314 mence to form during the falling of the river. If
there were a rise of 6 inches and then a fall of the
same amount, there would probably not be any formation of
bars to the injury of navigation. You might begin
8316 to look for trouble if the rise and fall were 5 feet.
I cannot see that the addition of the Chicago water
would make it any easier to dredge out the bar. If
8319 the river channel were stabilized we would not need
any more water at all; we would have ample water at
14 feet. You get greater depth by deepening the channel.
By changing the cross sections, the same volume of water
would flow at a greater depth. I never found any
8323 pilots or river men or captains that agreed with me
that the added water did not favorably affect naviga-
tion on the Mississippi. I never found any practical river
man who did not feel that added water would help naviga-
tion. I do not think there has been any appreciable change
in the flow of the river in the last hundred years. I
8330 do not think deforestation had any effect upon the
flow of the Mississippi. The Chicago diversion adds
something to the flow of the Mississippi. I do not think that
flow has any appreciable effect on the handling of boats or
on the depths. At high water stages they have more water
than they want. At medium stages it does not help any-
thing except for perhaps a short time while the dredge is
getting into position. At low water stages, the depths are
already there and they do not need any water. Assuming a
3 foot bar and the instantaneous removal of the Chicago
diversion. I think there would be a difference of from 3 to
6 inches in depth at the 20 foot stage of the river for a

very short time. On a river flowing 200,000 second feet, I do not think engineers can measure the effect any closer. I would regard a change of from three to six inches as insignificant under those circumstances. If the depth over the bar were 8 feet 6 inches and the Chicago diversion were withdrawn, the depth would fall momentarily from 3
8337 to 6 inches at the 20 foot stage.

8341 The silt carrying capacity is dependent upon the velocity of the river and not at all on its volume. The modern dredge cuts 6 feet deep, 32 feet wide and 360 feet forward every hour. In connection with 1909, I examined the previous history of regularization of the
8348 river, and the project beginning with 1881. Since that time, there have been regular appropriations by Congress of certain sums spent by the Engineer Corps annually for this so-called partial regularization of the river, with the exception perhaps of a few years when there
8349 was not a sufficient appropriation and consequently no expenditure. From 1895 to 1909, I am unable to think of any particular year when by reason of expenditures by the Engineer Corps in any way anything was done which produced a marked change in the navigable channel. The river was being improved right along. I remember no year that stands out before 1909. I am familiar with the statement on page 391 of the report of the Chief of the Engineers for 1903 as follows:

> "The result of the expenditure of this amount has
> 8351 been the partial improvement of the entire reach of the river from St. Louis to Cairo. During the past year there was at all times during open navigation a channel depth of 6 feet or more throughout this reach. The river attained a low water stage of 3.5 feet above standard low water."

I do not recollect anything different than that that statement occurred in identical language in the 1903, 1904
8352 and 1905 reports. The following statement occurs at page 413 of the 1904 report:

> "The result of the expenditure of this amount has been the partial improvement of the entire extent

> of the river from St. Louis to Cairo. During the past year there was at all times during open navigation a channel depth of 8 feet or more throughout this section."

Very probably the 2 foot difference in channel might easily be taken care of by the difference in rainfall or run-off on the Mississippi and Missouri Rivers. The 1904 report states:

> "The river reached a low water stage of six-tenths of a foot below standard low water;"

indicating that when there was an 8 foot channel the river reached a stage of 4 feet lower than when there was a six foot channel. It is the fact that every year after 1904 for 10 or 12 years, the same statement as to the 8 foot channel was repeated in the annual report of the Chief of Engineers, and there were all kinds of variations in the low
8355 stages of the river. This would indicate that the variations in low water had nothing to do with the maintenance of the 8 foot channel. A difference in rainfall or run-off would easily explain the change in one year in channel depth of from 6 to 8 feet. It did not occur to me that the additional water from Lake Michigan might have some effect. I should say that the way in which the dredges were handled was more responsible. The 2 foot difference in depth undoubtedly resulted from some cause, but whether it resulted from water flow, dredging, rainfall or run-off, it would be extremely difficult to tell. The one thing that occurred there more than anything else, was that the officer in charge that year was very effective in seeing that his dredges did all the work that the money would pay for. The money expended in 1904 was less than the amount expended in 1903.

Redirect examination:

8358 In reference to the 2 foot change in channel depth, the additional water required would be 30,000 or 40,000 second feet. The reservoirs on the upper Mississippi were only used at St. Paul during the three months of low water season, and they raised the water about 14 inches, and the whole effect disappeared 50 miles below. In regard to the improvement of the Mississippi to obtain the best navigation from Grafton to the mouth, whether by dredging, regularization or other kinds of work or combination, I do not think the cost would be appreciably decreased by the addition of 10,000 feet per second added to the natural flow of the river.

Ex. 1111 3361 The total diversion through the Chicago Drainage Canal in 1903 was 4,971 and in 1904 was 4,793 second feet.

In the Final Report of the Lakes to the Gulf Waterway Board, House Document No. 762, 63rd Congress, 2nd Session, the Board States:

> 8024 Ex. 171 "The influence on the volume of the Mississippi River due to any diversion from Lake Michigan will be an increase approximately equal to the amount of water diverted. The effect upon gauge 8025 Ex. 171 height will be small even at low stages, and at high stages it would scarcely be appreciable and not of any importance.
>
> * * * * * * *
>
> The effect of any diversion upon gauge height will always be small, and at the highest stages practically nothing, but the exact effect at any 8028 Ex. 171 time or at any stage can not be determined, since this effect will be complicated or obscured by various other changes in the regimen of the river."

In said Final Report there were quoted certain statements contained in the report of the Board of Engineers on the Survey of Mississippi River from St. Louis, Mo., to its mouth, published in House Document No. 50, 61st Congress, first session, page 44, as follows:

> 8038 Ex. 171 "Repeated measurements (see graphical plot hereto appended) on the bar crossing of the Mississippi between St. Louis and Cairo show that up to a stage of about 20 feet above low water the

available depth across the new bar is increased on an average only about one-half foot for every foot in the rise of water. (Between Cairo and Red River similar measurements show even less increase in navigable depth per foot of rise of water surface.)

8038 Ex. 171 Due to the permanent character of the diversion, the above ratio of elevations of water surface and river bed would not hold, and any permanent increase in gauge height would be less than that indicated by the standard curve, and would represent a change in the regimen of the river, which would be accompanied by a rise of the river bed practically equal to such increase. In any case, the gain in navigable depth would be insignificant for any permissible diversion."

8047 Ex. 175 The Board of Engineers for Rivers and Harbors, reviewing the Warren Report, on page 98, with respect to the effect of the Chicago diversion, said:

> "The aid which it affords to low water navigation is very small above the mouth of the Missouri River and trifling below that point."

8050 Ex. 177 The Board of Engineers for Rivers and Harbors in House Document No. 4, 69th Congress, 1st Session, being a report of the Illinois River, states the effect of the Chicago diversion on the Mississippi River as follows:

> "It would not be unwise to assume that the average raising of the water surface amounts to about one foot between Grafton and Cairo; but due to the characteristics of the Mississippi River, where the tops of the bars seem to rise with the surface of the water, it is doubtful if the actual depths are materially increased. For this reason it is impracticable to evaluate whatever benefit exists."

Condensation of Certain Extracts Relating to the Physical Characteristics of the Mississippi River Taken from House Document 50, 61st Congress, First Session, Being a Report by a Special Board of Engineers on the Survey of the Mississippi from St. Louis, Missouri, to Its Mouth, and Including a Consideration of the Survey of a Proposed Waterway from Chicago, Illinois, to St. Louis, Missouri.

Ex. 170

7983 Ex. 170 The natural result of a greater volume of water flowing into the Mississippi River at the higher stages is to produce immediately greater channel depths to the advantage of navigation. However, this high water channel rarely coincides with the low 7984 Ex. 170 water channel, and not only does an increase in river stage fail to give an equal increase in the low water channel depth but a return to the lower stages often finds the former low water channel wholly or partly obliterated, and until the scouring effect of the water produces a new low water channel the controlling depth is usually less than it was at an equal stage before the rise.

The new low water channel on the crossings is ordinarily in the same position as before the rise, but often at a considerable distance from its former position. The most injurious effects on the controlling low water depths result from a speedy fall in the river after a considerable rise. The most beneficial effects of scour are produced by a uniform moderate flow of long duration.

7985 Ex. 170 The Mississippi River from St. Louis to the Gulf is a river with a very unstable bed; that is, one of caving banks and shifting bottom. No river in the world equals it in magnitude of its bed disturbances. Caving banks include eroding banks, slumping banks, sinking banks, and sliding or slipping banks, and these classes of banks differ from each other in 7986 Ex. 170 appearance, origin, or both. An eroding bank is one where the whole side of the river bank gradually wears away under the scour of the moving water. Erosion is not dependent on high water but may be expected at any stage of water wherever the river current

approaches the bank at a decided angle with the general
line of bank in straight reaches and with the tangent to the
curve of the bank in bends; but little erosion takes place
where the river current is parallel to the straight bank.
Erosion increases with the current and with the angle of its
approach, and unless an eroding bank is protected any increase
of river stage will usually increase the
7988 erosion. The most serious erosion of banks in
Ex. 170 the Mississippi River is that of the submerged
banks below the low water line. As the erosion
progresses the bank becomes undercut at the water surface
until the upper portions collapse and fall into the
7989 river. During erosion a small part of the soil is
Ex. 170 dissolved by the water and remains permanently
in solution while a large part is taken up as sediment
in suspension, and the balance, the heavier portion,
is rolled along the bed of the river until it gets away from
the full force of the current, when it piles up on the river
bed in the form of a bar. Wherever the current slackens
the heavier sediment is deposited to assist in bar formation
or to build up the river banks on the non-eroding side of
the river. As the river rises the total erosion increases,
such increase being due to the increased area exposed as
well as to the increased current, but since the high waters
are limited in duration, while the low water
7990 erosion continues throughout the year, it is the
Ex. 170 latter which is the most to be feared and which
needs the most attention.

The greatest danger to the regimen of a navigable river,
due to eroding banks, is when such a bank in one bend approaches
another eroding bank on another bend across an
intervening neck of land. In such cases the junction of the
two eroding banks produces a cut-off of the river by which
the end of the intervening neck of land is converted into an
island, whereupon the river adopts the cut-off as a new
channel. The river length is thus shortened considerably
and the river currents are greatly increased. The
7991 injury to the regimen of the Mississippi River
Ex. 170 and to its navigation interests which arises from
a cut-off, is very great.

7992 Ex. 170 The shifting bottom of the Mississippi River attracts attention chiefly by the rise and fall of its river bars. An erosion of the bed or change of depth in deep pools between bars seldom affects navigation directly, but the river bars directly limit the draft of passing boats. The river bars on the Mississippi River below St. Louis are mainly deposits of material coming from eroding banks and augmented by material eroding from the river bed itself. (Page 43.)

The bed of the Mississippi changes constantly and reaches a fairly stable condition only in dry seasons and at the end of a long low water season. During such periods the erosion of the banks is at a minimum, and 7993 Ex. 170 the river bars, although generally high, have usually been cut through at some one place with the channel-way of fair depth.

As the water rises the first action is a slight additional scour in the deep water channel across the bar, but the extra depth so gained is generally balanced by the extra amount of rolling material brought down from the eroding banks upstream. As the river rises still farther, the increased current rolls from the river bed, a great deal of the loose material of the bars levelling them down somewhat and filling up the former deep channel across them. As the river rises still farther to a medium stage it gathers up an enormous amount of material and sediment deposited during the low water stage, and it becomes full of material ready to be deposited in new places at the first slacking of the current. Should the river stop rising and commence to fall, the deposit of material is apt to be so rapid as to force the river currents into new channels and to leave the available depth over the new bars hardly, if at all, greater than was the former depth in the regular channel at extreme low water.

7996 Ex. 170 Should the water continue to rise to the top of the natural banks, the upper portion of the dry bank becomes water soaked and bank erosion becomes very active. As the water recedes from a bank full stage, the upper portions of the water-soaked bank slump into the river as the water recedes. It is at this

stage of the river, while the water is falling and the current beginning to slacken, that the suspended material is deposited most rapidly and the river bars are augmented enormously and are changed in location. As the river continues to fall the total deposit increases, new banks are built up on the sides of the river bed away from the main current, and the bars scour off slowly, if at all, so that at a stage of from 8 to 15 feet above low water the channels over the bars are not much better than they were originally at low water. As the water continues to fall to extreme low water the river currents select a single passage across the newly developed bars and deepen this passage-way down to its former good condition. It is at this stage of the river, with the falling water, that the aid of dredges be-
comes most useful in assisting the river currents
7997 to select a proper bar crossing and to hasten the
Ex. 170 increase in depth. Without the aid of dredges
the prevailing depth over the bars from St. Louis
8018 to Cairo would hardly exceed five feet; probably
not more than four feet; but with the assistance
of dredges an eight-foot depth has been maintained for many years throughout the navigation season, with an occasional interruption of a few hours while the dredge was being moved to a newly formed bar; but such short, temporary delays as a rule not interfering with the use of the river by existing boats.

8020 The limit of river depth available to naviga-
Ex. 170 tion in the Mississippi River below St. Louis is
due to the height of river bars at channel crossings, and the height of such bars is primarily due to material coming from caving banks; that is, from eroding banks that lead to the formation of bars and that destroy the otherwise good general regimen of such river.

6199 Section 12 of the Rivers and Harbors Act of
Ex. 1271 March 4, 1915, repealed the appropriation of
June 25, 1910, (36 Stat. 659, 660, Special Master's Report, page 58) before any part of it had been expended or any work done thereunder.

414 The Illinois Act of May 14, 1903, authorized the Sanitary District to construct all such dams, water wheels and other works in the north upper basin of the Illinois and Michigan Canal as might be necessary or appropriate to develop power from the water passing through its main channel and any auxiliary channels then or thereafter constructed. (Ex. 14, Secs. 5 and 6, Act of Illinois Legislature, approved May 14, 1903.)

In 1903 the Sanitary District of Chicago commenced the construction of a power house and transmission lines at the lower end of the drainage canal, which work was completed in 1907. (Ex. 1-E; T. 317-20)

On May 10, 1907, the Governor of Illinois in a message to the General Assembly with respect to the proposed Illinois Waterway, stated:

Ex. 1351
T. 7511,
7513–14

"In the development of the internal waterways system of the country, the nation at large, and the central and western States in particular, are deeply interested. To further that development, a large number of organizations have been formed in our own and neighboring states to press its claims upon the attention of the various state legislatures and of Congress, for it has become a well-recognized fact that the improvement of the internal waterways of the United States is of vital importance to the growing commercial needs of the country.

Our own State must naturally take a leading part in this program, because Illinois occupies a geographical position of commanding importance in relation to the proposed waterways development, and because no State in the Union will receive larger benefits from such development. The General Assembly of Illinois, furthermore, has by legislative action and appropriation of funds recognized the interest of our State in the whole question.

The national government is now engaged in the construction of the Panama Canal. The commercial relation of our internal waterways to that canal is obvious, and the degree of benefit accruing to the interior states of the country from the opening of the Panama Canal is largely dependent upon the development of our internal waterways system. In this connection, it may be stated that the government of the United States has been balked for generations in any attempt at realizing a national waterway from the lakes to the gulf by the great cost of cutting through the Chicago Divide. That barrier has been removed by the work of the Sanitary District Canal. This district has an area of but six-tenths of one per cent of the State of Illinois and yet it has expended fifty-three and a half millions of dollars in a canal from Chicago to the near vicinity of Joliet, a channel of the largest cross section of any canal yet built. The length of the channel and improved river provided by the Sanitary District of Chicago is thirty-seven miles. That district now asks permission from the General Assembly to extend its channel three miles further. If this permission is granted, an expenditure of about six millons of dollars will be made in carrying out the project, and forty miles of deep waterway will be available for the national government whenever it shall be ready to accept the gift and show its appreciation by carrying the waterway on to the Mississippi.

In addition to this great contribution to the national waterway, the Sanitary District will as soon as it interferes with the water power of the State in Joliet at dam No. 1, pay into the State treasury $75,000 per annum, to be used in maintaining the Illinois and Michigan Canal and the navigability of the Illinois river, thus relieving the State of a pecuniary burden which it has heretofore been compelled to bear.

In my biennial message I called attention in the following language to other phases of the benefits which will result to the State from the development of a deep waterway:

'In connection with this most prominent feature of the commission's work, the report of the commis-

> sion shows many incidental advantages which will accrue to our own State from the construction of the proposed waterway. Among these, is the creation of 120,000 electrical horse power, which can be secured without in any way affecting the use of the waterway as a navigable channel. At the minimum estimate of $25.00 per horse power, this electrical power would afford an annual income of $3,000,000.'"

In 1908 the State of Illinois adopted the following amendment to Separate Section 3 of the Illinois Constitution:

> "Provided further, that the General Assembly may, by suitable legislation, provide for the construction of a deep waterway or canal from the present water power plant of the Sanitary District of Chicago, at or near Lockport, in the township of Lockport, in the County of Will, to a point in the Illinois River at or near Utica, which may be practical for a general plan and scheme of deep waterway along a route which may be deemed most advantageous for such plan of deep waterway; and for the erection, equipment and maintenance of power plants, locks, bridges, dams and appliances sufficient and suitable for the development and utilization of the water power thereof; and authorize the issue, from time to time, of bonds of this State in a total amount not to exceed twenty million dollars, which shall draw interest, payable semi-annually, at a rate not to exceed four per cent per annum, the proceeds whereof may be applied as the General Assembly may provide, in the construction of said waterway and in the erection, equipment and maintenance of said power plants, locks, bridges, dams and appliances.
>
> All power developed from said waterway may be leased in part or in whole, as the General Assembly may by law provide; but in the event of any lease being so executed, the rental specified therein for water power shall be subject to a re-valuation each ten years of the term created, and the income therefrom shall be paid into the Treasury of the State."

The Illinois Waterway Act, adopted June 17, 1919, authorized the Department of Public Works & Buildings of the State of Illinois, to construct power plants along the Illinois Waterway, and lease, sell or otherwise dispose of the electrical current thereby generated, or to lease in whole or part the surplus waters of such waterway for power development, subject to revaluation every ten years. (Ex. 1192, Pars. 7 and 21.)

Rivers and Harbors Act (1927), Ex. 214, Tr. 9255:

> "Illinois River, Illinois: Modification of existing project so as to provide a channel with least dimensions of nine feet in depth and two hundred feet in width from the mouth to Utica: Provided, that the State of Illinois transfers to the United States without cost all rights and titles in the two State-owned dams on the Illinois River; and that local interests furnish the United States without cost all necessary areas for the economical disposal of material dredged in creating and maintaining the channel herein and hereby authorized: Provided further, that nothing in this Act shall be construed as authorizing any diversion of water from Lake Michigan: Provided further, that there is hereby authorized to be appropriated for the project a sum not to exceed $3,500,000."

Col. W. V. Judson, in his report on the Illinois and Mississippi Rivers, from Lockport to Cairo, appearing in House Document 2, 67th Congress, 1st Session, transmitted to Congress on November 21, 1921, states that the lower limit of the Illinois waterway ends about one mile above the Utica wagon bridge, while the Federal improvement of the Illinois River ends one mile below La Salle, Illinois, leaving a stretch of 7.4 miles which has never been under improvement by the United States and which was not included in the Illinois waterway. (Ex. 1360, p. 9.)

With respect to the relation of water power to the Illinois waterway and the Chicago Drainage Canal, including navigation on the Illinois River, Col. Judson states:

> "57. *For a 9-foot channel,* with an increment of 4,167 second-feet, the cost either with dams retained

or removed appears almost prohibitive, and the probability that Congress will limit the increment to 4,167 second-feet is, in my opinion, so remote that this hypothesis may be left out of consideration. With increments of 7,500 or 10,000 second-feet the figures show conclusively the advisability of removing all dams. Inasmuch as the Sanitary District of Chicago and the State of Illinois receive practically all of the benefits that accrue from maintaining the flow of 7,500 second-feet from Lake Michigan, the propriety of the dams being removed at the expense of those interests may well be considered.

58. *Water powers.*—The State of Illinois, at a cost of $20,000,000, is engaged in improving that link in the through waterway which will connect the Great Lakes at Chicago with the Gulf of Mexico via Chicago River (6.3 miles), Chicago Drainage Canal (30 miles), 'Illinois Waterway' (60.5 miles), and the Mississippi River (1,300 miles).

59. The link under improvement by the State of Illinois embraces all of that portion of the waterway (except the lower end of the Chicago Drainage Canal where the Sanitary District of Chicago controls a fall of 36 feet) which will afford any profitable development of water power, the fall under control of the State amounting to about 96 feet. The State expects the returns from water power alone to make its investment profitable. The extent of the water powers controlled by the State and the sanitary District depends of course upon the amount of water which is withdrawn from Lake Michigan through the drainage canal.

60. As to whether the through waterway above described will prove of economic benefit to the Nation sufficient to justify the cost to the Federal Government of the additional improvements which it is called upon to make between Utica on the Illinois and Cairo on the Mississippi, is in my opinion a doubtful question. The State will presumably recover the value of its expenditures from water pow-

ers. The sanitary district can perhaps justify its expenditures in excavating the drainage canal by the resulting conveniences afforded for sewage disposal. The United States will be out of pocket if a through waterway is created which does not prove to be an economical avenue of commerce.

61. In my opinion, however, the creation of an 8-foot channel below Utica is justifiable partly on experimental grounds and partly because all Federal agencies which have dealt with the problem have held out promise to the State of Illinois that the United States would provide reasonable depth (say 8 or 9 feet) below Utica if the State would carry a proper channel down to Utica. The full possibilities for navigation of the drainage canal, the 'Illinois Waterway,' and the Mississippi below Cairo, all at least 8 feet deep, cannot be tried out unless the Illinois (in connection with the Mississippi from Grafton to Cairo) be deepened to 8 feet.

* * * * * * *

65. In my opinion, to most reasonably conform to the probable conditions of the future, an 8-foot project should now be adopted, based on a 7,500 second-feet withdrawal for purposes of estimate and with all dams removed. Then should Congress place the limit of the amount of water to be withdrawn from Lake Michigan at 10,000 second-feet, which I deem probable and, under proper conditions, advisable, that increment would of itself increase the depth to 9 feet. The computations show that with all dams removed, an increment of 10,000 second-feet will increase the depth due to the increment of 7,500 second-feet by about 1.25 feet at Utica, about 1 foot at Peoria and Havana, and slightly less than 1 foot at the mouth."

JOHN W. WOERMANN, FOR DEFENDANTS.

4102 La Salle, Illinois, has been the head of navigation for Federal improvement of the Illinois River, but the Illinois Waterway stops six miles above that—at Utica. It had been presumed that the United States would extend its portion of the improvement up to Utica.

4216 The State of Illinois planned to install power plants into each of the four lower locks of the Illinois waterway. The Sanitary District has a power plant installed at the first lock. In order to have water power in connection with this waterway on a slack-water system, it is necessary to have surplus water over and above what 4217 is needed for lockage. The stretch of waterway from the lakes to the Mississippi River which is under improvement by the State of Illinois includes all available commercial power sites between Lake Michigan and the Mississippi River. Below the southwesterly end of the section proposed to be improved by the State of Illinois there are no further water power sites. The im-
4218 provement by the State of Illinois commences at the first available water power site after leaving Lake Michigan, which is the one now operated by the Sanitary District of Chicago. These water power sites would be quite valuable if there is a large flow of water from Lake Michigan. If the flow of water from Lake Michigan were limited to the quantity needed for lockage purposes, these water power sites would not have any value. In a general way, the value of these water power sites to the State of Illinois depends upon how large a flow of water can be obtained from Lake Michigan.

M. G. BARNES, FOR DEFENDANTS.

Direct examination:

5871 The plans in Exhibit No. 1242 in a general way show the location of the power structures, elevation of the water at each pool, the general size of the structures, and the amount of power that could be developed under different flows in the river. With development on efficiency of 85%, which can be accomplished, the four state dams will develop 72,600 horsepower, with 10,000 feet of flow per second from Lake Michigan. In addition to this, there is 11,500 horse power at the Marseilles dam now claimed by the private interests on the opposite side of the river.

There can be developed at least 34,800 horse power
5872 at the Lockport dam which gives a grand total of
118,900 horse power. This would be divided into three parts: the Sanitary District development of 34,800 horse power at Lockport; the Marseilles development of 11,000 horse power; and the development at other points by the State of Illinois of 72,600 horse power. The latter power could be developed at a cost of about $7,500,000.

5873 Twenty-five dollars per horse power is a very conservative estimate of the rental value of this water power, including the maintenance and operation of the plant by the lessees; in fact, this estimate may be said to be too low. The annual income to the State of Illinois
from its share of this water power would be not less
5874 than $1,815,000. On this basis, capitalized at 4%,
the capital value of this power development to the State of Illinois, after deducting the cost of the development, is $37,875,000.

Cross-examination:

6797 I think that the voters of Illinois, in approving the Constitutional amendment providing for the Illinois waterway, were influenced by the prospect of obtaining a net annual income for the State of Illinois of $3,000,000 by the abstraction of waters from Lake Michigan.

7008 The first power site between Chicago and the Mississippi River is at Lockport where the upper end of the Illinois waterway begins. Proceeding thence downward toward the Mississippi River, the last power site is located at Starved Rock. The Illinois waterway ends at Starved
Rock at about the lower end of the lock. The interest
7009 of the State of Illinois did not terminate at the last
available power site, but extended throughout the entire valley.

The part selected for improvement by the State of Illinois was fixed by what the Government had previously undertaken to develop and control. The Sanitary District had carried the navigation improvement down to Lockport. The Federal Government carried the improvement up to La Salle. That left a stretch of 72 miles unimproved. The State undertook to develop that portion that had not been taken under control by the Federal Government or the Sanitary District. In our conferences with the district engineers, it was agreed if the state would carry the de-
7010 velopment to or in the vicinity of the Utica bridge, the Government could very fairly extend its program up to that point.

When the Illinois waterway was planned, there was no one who had supervision of any improvement between the dam at Lockport and the end of the Federal project at La Salle. The State of Illinois did not undertake the improvement of the whole section down to connect with the Federal project, but only about a mile or a mile and a half beyond the last power site at the Utica bridge. The State did not undertake the improvement of the 7 miles between the Starved Rock lock, dam, and power site and the head of the Federal improvement at La Salle.

7011 It is not strictly true that there must be surplus water over and above that needed for slack water navigation on the waterway from Lockport to and including Starved Rock before there can be any water power because you can have water power in the off navigation season or in the navigation season when there is little traffic. Of course if the water was not used for power, it would not be needed in the closed navigation season, or if there were little or no traffic.

The natural flow of the river is very low and the development of the natural flow of the stream has not been feasible because of its small quantity. With the addition of even enough to provide lockage and with structures built for canal purposes, then it does become feasible to construct power sites for the flow of the river, exclusive of diversion from other streams.

7012 Insofar as water from Lake Michigan is concerned, none of that water would be available for power unless there was a surplus above that actually needed for the operation of the waterway. The more water that could be obtained from Lake Michigan above the amount needed for the operation of the waterway, up to at least 10,000 second-feet, the more power can be produced.

7013 The power site of the Sanitary District at Lockport
7014 has an annual net value of $870,000, with a capitalized
value of 4% of $18,000,000 or $19,000,000. If the diversion at Lockport were limited to the actual lockage water used for navigation, this power site would have no value.

7015 The state power site at Brandon Road would not
have any value if there were no diversion from Lake
7016 Michigan except what was actually used for navigation,
because the flow in the Des Plaines River at that point would not be sufficient to justify the construction of a power plant. Without any diversion and without any canal, this power site would have no value. If there were a canal from Lake Michigan, I think we could put [illegible] a small
power house and we could operate profitably with
7017 the natural flow of the stream, but not if you appropriated
all of the flow of the Des Plaines River to navigation purposes and merely took such extra water from Lake Michigan as was needed.

7018 Some power could be developed at the lower dam
even though the diversion from Lake Michigan were limited to lockage water, because the locks below Lockport have a lower lift and do not require so much water to operate.
In addition, the streams further down have a
7019 greater natural discharge so that the power would
become more available. If the lockage water were pumped, witness does not know what the situation would be. If there is no diversion, there can be no Illinois Waterway. If the diversion is limited to that used for navigation purposes, power down stream is practicable because the locks have a lower lift.

7020 I think that there can be practicable development of the power sites at Brandon Road lock, Dresden Island, Marseilles and Starved Rock without any diversion from Lake Michigan, but I cannot tell how much power would be developed.

7021 The flow of the stream could be developed, which is quite considerable for 8 or 9 months in the year. The low water flow at Starved Rock is about 500 second-feet. The natural low water flow at Brandon Road is nill. All of the water flowing out from the power house indicated in Exhibits 1175 and 1273 is surplus water not needed for navigation at those points. (T. 7008–22.)

Horace P. Ramey, for Defendants.

Direct examination:

3282 Reside at Chicago, Illinois; am civil and hydraulic engineer; assistant chief engineer of the Sanitary District; been such since 1922. Graduate of University of Michigan 1907; specialized in hydraulic engineering; degree of Bachelor of Science in civil engineering; 1917 was given degree of Civil Engineer by University of Michigan;
3283 was instructor in surveying at that institution in 1906. In 1907 entered the employ of the Sanitary District, and have been in its employ ever since.

3284 Have worked on the design, construction and oper-
3285 ation of the various plants and works of the Sanitary District constructed and operated during said period.

Cross-examination:

4338 During 1926 the Sanitary District diverted less water than the quantity it could have diverted and
4339 less than the permit allowance. We took all we could get through the channel, except for a period in the fall from about the middle of September until the latter part of October. But through ten and one-half
4340 months of the year we diverted through the channel
4342 all that we could. The flow of water has not been manipulated primarily for power. The flow has va-

ried in years. The load would vary with the flow. It did not vary with the power demand directly, and if there was variation in the flow that coincided with the power demand, I would not say that was accidental. If the operators in the power house were carrying the bulk of the flow through the power house and the load dropped off like it might between the hours of 12:00 o'clock noon and 1:00 o'clock, they might not open the dam for that one hour to let over the amount of water that was shut out of the power house due to the automatic shutting down of some of the ma-
4343 chinery. So the record for that hour would show a low discharge from the end of the channel. The reason we diverted less during September and October, 1926, was because of very bad floods in the lower Illinois, and under the instructions of Col. Schultz, the District Engineer at Chicago, we cut the flow in the canal down as low as we possibly could, that is, during September and October.

4344 Page 9 of Complainants' Exhibit 145 shows that between 4:00 and 5:00 P. M. on that day, the flow at Lockport jumped from 269,000 cubic minute feet
4346 to 589,000 cubic minute feet and that the power production jumped from 9,900 kilowatts to 21,600 kilowatts. This was the time of day in December when our power demand was the heaviest because of the overlapping of the day and night power loads. Our night loads are very much heavier than the day loads independently of this overlapping.

4347 Page 9 of Exhibit 145 shows that this increase continued throughout the night until about 7:00 the next morning. This manipulation of the flow was to get as much power as possible, but at the same time there was a
4348 flow over the dam.

Exhibit 145 shows that this variation between day and night flow prevailed in each year up to 1925. In that
4349 year the Sanitary District power plant was tied in continuously with the power plants of the Commonwealth Edison Company, and that is the reason that an almost constant flow can now be maintained in the channel. A constant flow could have been maintained before

4350 if there had been no manipulation of the flow for
power purposes.

4352 Exhibit 153, covering power output and flow at
Lockport by half hour averages during each month
of 1916, shows that the hour of the day when this doubling
of the flow started varied with the season of the
4353 year, being dependent upon the time when the street
lighting load of Chicago came on the system. This
particular variation of the flow was for the purpose of
generating power, and was carried on continuously up to
1925, when the continuous connection was made with the
Commonwealth Edison Company. But in that year there
was passed through the power house only 85% of the total
flow through the channel.

The electrical engineer in the plant at Lockport regulated the flow for the purpose of operating the plant as a power house.

Redirect examination:

4405 To change the flow, for instance, throughout the
channel from 5,000 second feet to 9,000 second feet,
would take more than sixteen hours, probably around
twenty-four hours. The half hourly readings at Lockport,
the lower end of the channel, merely represents a discharge
there at the instant at which the reading is taken. In order
to determine what the flow is throughout the channel, it is
necessary to have the average of the discharge at the end
of the channel for a long period of hours. In all the
4406 years the power house has been in operation, there
has been considerably more water flowing through
the channel than flowed through the power house; that is,
spilling over the dam at the site of the power house. The
only time that the flow has exceeded at the end of the
4407 channel 9,700 or 9,800 second feet, has been in times
of flood when we wanted to get the level of the canal
at Lockport dropped down so that it could discharge the
flood waters, and since the date of the permit the monthly
average has never exceeded the permit allowance, and at
no time prior to that has the monthly average flow exceeded
the dilution ratio of 20,000 cubic feet per minute for each

100,000 of the population. The so-called manipulation of
flow mentioned on cross-examination means merely that at
times there is a storing of water in the fore bay at the end
of the channel, and the surplus thus stored is then run off
in two or three hours after the night load comes on. So
the change of flow mentioned in cross-examination at Lockport
never lasted long enough to become established clear
back into the Chicago River. And I doubt if such
4408 changes have any or very much effect on the flow
throughout the channel in any way, and would not
affect the average daily flow, and the so-called manipulation
of flow if it did have any effect, would only tend to reduce
the average daily. The so-called manipulation of flow
would have no effect upon the use of the water for
4410 navigation in the Des Plaines and Illinois Rivers below.
The so-called manipulation of flow above mentioned
would have no effect upon the use of the water for
dilution or oxidization of the sewage. So the only purpose
of manipulating the flow was to conserve the energy, as I
understand it.

4480 Further Cross-examination:

The drawing off of the surplus water in the early evening
hours is taking off water from the storage at the
lower end of the channel. In years past the drawing
4481 off started in the evening hours, and continued
so long as the city's street lighting load is on the line.
As it takes from sixteen to twenty-four hours to establish
the change of flow in the Chicago River, the flow in that
river by reason of the carrying of the night lighting load
would be changed slightly, but it would not be altogether
changed. There would perhaps be a substantial increase,
4482 and the increase would continue for some
hours after the heavy discharge at Lockport was shut
4483 off. No effect of the change would be felt in the Chicago
River for four hours, when a slight change
would be observed, until at the end of twenty-four hours you
would probably have 80% of the change in the Chicago
River. At the upper end of the Chicago River at the end
of fourteen hours the change would not be substan-

4484 tial. It might increase the flow in the Chicago River at the end of fourteen hours by approximately 50%. The maximum effect would be felt in the morning when the controling gates were raised at Lockport and would continue for three or four hours from that time. I do not think the change in the flow at Lockport to take care of the night load ever caused considerable trouble in navi-
4485 gating the Chicago River, and I do not think the current would have been increased to an amount greater than one and a quarter miles an hour as fixed by the Government permit of 1901. The change would not reflect back in the Chicago River for hours. The change in flow
4487 at Lockport would have some effect upon the current in the Chicago River. The storage water at the southern end of the channel hinders to some extent the drawing off of storm waters from the Chicago area,
4488 and from that standpoint it is better to have the canal lower at Lockport.

GEORGE M. WISNER, FOR DEFENDANTS.

3666 Direct examination:

Resides at Chicago, Illinois, consulting engineer for the Sanitary District, civil engineer connected with the
3669 Sanitary District since July, 1892, in capacities ranging from rod man to chief engineer and later consulting engineer; degree of Bachelor of Science in Civil Engineering from the University of Michigan.

3756 Cross-examination:

The power plant of the Sanitary District was built under my direction. Practically all of the power was sold excepting only what the District used. The District made a profit in the beginning on the commercial load but
3757 no profit on the municipal load, in fact, I think it lost money. It cost about $26.40 per horse power to generate the power, which was sold for $55.00 per horse power, making a profit of about $29.00 per horse power.

In 1870 the State of Illinois adopted a new constitution which provided in Separate Section 3, that the General

Assembly should "never loan the credit of the State, or make appropriations from the Treasury thereof, in aid of railroads or canals." This provision of the Constitution was, however, amended in 1908 as above set forth.

The Illinois Legislature by resolution of 1881, provided for the installation of pumps at Bridgeport, the northern terminus of the Illinois and Michigan Canal, with a capacity of at least 1,000 cubic feet per second, for the purpose of drawing more water from Lake Michigan through the Illinois and Michigan Canal. This resolution is in part as follows (Def. Ex. 1057, Rec. 2617):

> "Whereas, The State of Illinois, in General Assembly, did on the sixteenth day of February, 1865, grant and authorize the City of Chicago in the State of Illinois, to deepen the Illinois and Michigan canal for the purpose of, and with the intent to better the system of sewerage of the said City of Chicago by permitting a free flow of water from Lake Michigan through the Chicago River and said canal to the Des Plaines and Illinois Rivers; and the City of Chicago did perfect said improvement in conformity with said permission; and,
>
> Whereas, the great fire in the said City of Chicago on the eighth and ninth days of October, A. D. 1871, did so greatly damage the assessable property of a very large number of its citizens and taxpayers, and the people of the State of Illinois did, by its General Assembly, refund to the said City of Chicago the amount of the cost of deepening the Illinois and Michigan Canal, said sum refunded being in gross two million nine hundred and fifty-five thousand three hundred and forty dollars; and,
>
> Whereas, The deepening of the canal as aforesaid has proved to be totally inadequate for the purposes intended, and the large amount of sewage of the City of Chicago, being far greater than the capacity of the canal and the water now passing through it to deodorize and render innocuous; and,

Whereas, the foulness of the water annually causes the death of millions of fish in the Des Plaines and Illinois Rivers, that float to the shores and decay; and,

Whereas, Said sewage, in an entirely undecomposed and putrid mass, is carried by the current of the canal into the Des Plaines River, and thence into the Illinois River, and in its foulest condition is thus transported to and below the City of Peoria, in said State, rendering the air at all points along its passage so impure and foul as to be exceedingly offensive and taking with it germs of disease of all kinds prevalent in the City of Chicago, and thus spreading them broadcast through the entire Des Plaines and Illinois River valleys, causing thereby much illness as well as poisoning of the blood, and debilitating the systems of 200,000 people; and,

Whereas, Careful investigation leads our people to fear that an epidemic may spread over said section of the State of Illinois from the causes above stated; and

Whereas, in addition to the above distress, there has been a great loss of property, business industries, and to the communities in said region, by reason of the causes herein mentioned; and,

Whereas, Prior to the deepening of said Illinois and Michigan Canal, the water necessary for all purposes of navigating said canal and propelling of machinery was obtained from the Des Plaines River and the Calumet feeder, through Lane's Lake; and,

Whereas, The bed of the Des Plaines River, at the summit and thence westward along the line of and adjacent to the canal is, at a low stage of water, eight (8) feet above the surface level of the canal, and will average a supply of water sufficient for all canal and power purposes during the seasons of navigation; and,

Whereas, The supplying of the canal from these sources will so dilute and weaken the sewage of the

City of Chicago, as to greatly relieve it of its foulness and stench to the great delight, relief and health of the people near to and bordering upon the line of the canal, the Des Plaines and Illinois Rivers; therefore, be it

Resolved, By the Senate, the House of Representatives * * * if said city shall proceed without delay to cause a flow into the canal from the Chicago River sufficient to dilute and purify the waters and thus remedy the evils complained of, said flow to be not less than 60,000 cubic feet per minute, including the ordinary flow into the canal from the Chicago River, or so much thereof as in their judgment said canal can carry, and if this shall be accomplished by the first day of September, 1881, the commissioners shall accept it in lieu of obtaining a supply of water from the other sources named: Provided, further, that said commissioners are hereby directed to take care of 60,000 cubic feet per minute above contemplated, if so furnished by the City of Chicago."

210–214 In 1887 the Legislature of Illinois adopted two
Ex. 6 joint resolutions with reference to the Chicago
sewage and drainage system, reciting the plan of
Chicago to transfer its sewage into the Des Plaines and
Illinois Rivers and expressing the opinion that such a plan
was dangerous to the people of the Illinois Valley
214–219 by reason of sewage pollution and by reason of
Exs. 7 disastrous overflows, and providing for the ap-
& 8 pointment of a committee to investigate and re-
port.

Later the Joint Resolution of the General Assembly of Illinois of May 28, 1889, and the Sanitary District Act of May 29, 1889, were passed as shown in the Master's Report. (P. 14-16.)

In 1923 Major Rufus Putnam made a report on Diversion of Water from Lake Michigan, summarizing the work of the Sanitary District in the Chicago River and its branches, as follows:

Rec. P. 33–35 Ex. 1 "That the sanitary district had recognized the difficulty of flowing enough water through the Chicago River was evidenced some years before the Secretary of War had indicated his disapproval of producing obstructive currents. On April 21, 1891, the trustees proposed a resolution providing that they 'forthwith enter upon, use, widen, deepen, and improve the Chicago River from its mouth at Lake Michigan * * * so as to make the same a proper and sufficient supply channel * * *'.

A start was made on this work in 1897 for certain improvements between Harrison and Quincy Streets and a permit for this short piece of work was issued by the Secretary of War on November 16, 1897. However, it was not until April 26, 1900, that the sanitary district made application to the Secretary of War for a permit to widen, deepen, and straighten the whole of South Branch of the Chicago River so as to provide the discharge capacity desired without introducing obstructive currents. A permit was issued by the Secretary of War on July 11, 1900 (Appendix 14), allowing the sanitary district to proceed with this work covering that section of the river between Twelfth Street and Ashland Avenue.

On January 17, 1902, a permit was issued for the rest of the work on the South Branch from Twelfth Street to Lake Street (Appendix 15). Work under these permits was under way for a period of years. Efforts were directed toward obtaining a channel of a minimum width of 200 feet with a depth of 26 feet for the middle 100 feet, shoaling to 16 feet at the dock faces. Up to December 31, 1917, a total of over $12,000,000 was expended by the sanitary district for right of way, dredging, and construction of bridges. At the present time the desired channel improvements have been finished throughout the entire stretch from Lake Street to Robey Street. There are a few bridges yet to be replaced.

It can not be said that all of the results expected from improving the channel have been obtained. Through this portion of the channel the discharge is fairly constant, averaging in the neighborhood of 8,000 cubic feet per second. The effect of withdrawing maximum amounts at the power house at Lockport is equalized by the storage capacity of the channel between Lockport and Lake Michigan, so that the variations which occur near the source of supply result largely from fluctuations in the level of the lake. Deliberate efforts on the part of the Sanitary District of Chicago to establish and maintain a uniform flow of 10,000 cubic feet per second through the Chicago River have been unsuccessful. While these attempts were experimental, they indicate that the stream is still too crooked and narrow to permit that volume of discharge under ordinary conditions of head.

The east and west arms of the South Fork of the South Branch were dredged in 1913 by the sanitary district for the stockyard interests to 20 feet in the former arm and to 18 feet in the latter as far as Ashland Avenue, and to 13.5 feet above that street. The portion above Ashland Avenue has since been filled. This deepening was for the purpose of providing an adequate discharge channel for the sewage from Packingtown.

The sanitary district straightened the channel of the North Branch for 2 miles northward from Belmont Avenue, providing 12 feet depth and 90 feet width to the north side of Lawrence Avenue. In 1917 they dredged to Roscoe Street from Belmont Avenue to a depth of 15 feet for a width of 20 feet in mid-channel; also a turning basin along the west dock north of Roscoe Street, about 500 feet long, 50 feet wide, and 15 feet deep. These improvements facilitated the discharge of water through the North Branch by way of the North Shore Channel."

Statement of Chief of Engineers, General A. McKenzie, at p. 10 of H. D. 263, 59th Congress, first session, as follows:

"Although the primary object of the Chicago
6212 Drainage Canal was the discharge of Chicago sew-

> age, its function as a channel for navigation was kept in view from the beginning."

231-232 On June 24, 1896, the United States District
Ex. 12 Engineer at Chicago, in his report recommend-
Doc. 2 ing the granting of the application to enlarge the
capacity of the Chicago River for drainage purposes upon the conditions subsequently embodied in the permit of July 3, 1896, stated:

> "As far as the work itself is concerned there can be no objection to it, as in every case the navigable channel of Chicago River will be improved, and at this stage I am unable to do otherwise than to recommend the granting of the authority sought.
>
> The question that must come up later for the action of the War Department, towit, whether the improved channel of Chicago River will be sufficient to carry 300,000 cubic feet of water per minute without lessening or destroying the navigability of Chicago River, or whether the City of Chicago will be allowed by the United States and Great Britain to take any water at all from the Great Lakes, with the inevitable result of lowering their levels, is not now under investigation, and is one that will not probably be settled or decided by executive officers. It is, or may rather be considered an international question."

234-235
Ex. 12 The Chief of Engineers concurred in the fore-
Doc. 3 going recommendation of the District Engineer.

The permit of the Secretary of War dated November
16, 1897, for the construction of by-passes and
237-239 docks, was conditioned that it should not be in-
Ex. 12 terpreted as approval of the plans of the Sanitary
Doc. 5 District of Chicago to introduce a current into the
Chicago River.

On April 24, 1899, the United States District
243-248 Engineer at Chicago, pursuant to direction, made
Ex. 12 a report upon the application of the Sanitary Dis-
Doc. 7 trict of Chicago to open the Drainage Canal and
reverse the Chicago River, of which the material parts are as follows:

"It is a strange fact that this city has expended, or will expend, over $30,000,000 with the intention of diverting an apparently unlimited amount of water from the Great Lakes to the Mississippi drainage area for sanitary purposes without finding out whether such diversion would be allowed by the great interests of the United States and the Colonies of Great Britain along the chain of Great Lakes in the navigation of the rivers and harbors of the Great Lakes. Now they ask the authority of an executive officer of the United States to open a channel that will to some unknown extent lower the levels of all the Great Lakes below Lake Superior and of their outlets, introduce a current also unknown and not to be ascertained otherwise than by actual experiment, in Chicago River, the most important navigable river of its length on the Globe, but which is already obstructed by bridges, masses of masonry and bends, and of difficult navigation at best.

The possible effects of this diversion are not known, further than that to some unknown degree they will be injurious. Whether the amount of this injury will be so small as to be accepted by the interests affected in view of the manifest advantages to and apparent necessities of their neighbors, cannot be determined by other than the interests themselves.

It is clear to me that I am not competent to make a recommendation as to what should ultimately and definitely be done.

The matter of what effect the opening of this channel would have on the levels of the Great Lakes has been heretofore submitted to a Board of Engineers. That Board reported that the Great Lakes would be lowered, but that there was not sufficient data to determine the exact effects of the proposed discharge, and recommended extended investigations, which it is believed are being carried on now by the Deep Waterways Commission, or Board. They have not reported. In my opinion the abstraction of from 300,000 to 600,000 cubic feet per minute will permanently lower Michigan, Huron and Erie from 3 to 8 inches; not more than 8 nor less than 3 inches, corresponding to an extreme reduction of from 160 to 466 tons in carrying capacity of the large vessels of the Lakes, and that it will take from three to four years for this full effect to be attained. But the State law is unlimited in its requirements. 20,000 cubic feet per minute must be taken from Lake Michigan for each 100,000 population of the district; already nearly 400,000 c. ft. must be taken, and at the same ratio of increase for a few decades, in a very short time there must be taken 1,000,000 c. ft. per minute under this indefinite law. The amount should be limited and the injurious effect stopped somewhere.

The mean current to be introduced in Chicago River upon the opening of the canal is estimated by the engineers of the Drainage Board at one and one-fourth miles per hour or 110 ft. per minute. This is simply an assumption that with such velocity in an unobstructed river, the amount of 300,000 cubic feet per minute can be discharged through Chicago River —but I have seen this River so jammed with vessels, drawing all the water that is in it, that by leaping from deck to deck I could cross the river. What the velocity would be in such conditions with Lake Michigan on one side and a great fall on the other side of such vessels, no one knows. But it is a simple mathematical problem to determine the effect on steel-plate vessels of from 2,000 to 4,000 tons mass drifting upon or striking stone piers with a velocity of near two feet a second. They will go to the bottom.

* * * * * * *

Individually I have to say that I am in entire sympathy with this people in their effort to purify their water supply. I have lost my only son from typhoid fever, produced, I believe, from drinking water polluted by defective drainage at Chicago, which this channel will correct. In every proper way I have aided the officers of the Drainage district. I would like further to aid them, but I believe this question to be entirely out of my sphere, and too great and important for me even to venture an opinion or make a recommendation about. I yet may venture to suggest that the entire subject be referred to Congress for final solution, and that a conditional permit or authority be granted to the authorities of the Chicago Sanitary District by the War Department, awaiting action by Congress, to open their channel, and under the following conditions:

* * * * * * *

'With 300,000 cubic feet per minute discharge it will take one year to lower the level of Lake Michigan and Huron one-tenth of a foot, and several years to reach the maximum permanent effect of this discharge, which will not probably much exceed three inches, so that the main injury to navigation, if any, that can be expected before action by Congress, will be in Chicago River, and that can be at once abated.'

I believe their channel will be entirely under control and that if the discharge be injurious it can be at once and at any time shut off, and it is evident that the War Department should reserve the right to control the current and discharge through the controlling works at this channel."

249-250 Ex. 12 Doc. 8 The Chief of Engineers concurred in the foregoing opinion and recommendations of the District Engineer.

255-257 Ex. 12 Doc. 10 On June 14, 1901, the Chicago River Improvement Association protested against the diversion of water from Lake Michigan through Chicago River and the Chicago Drainage Canal because of the interference with navigation occasioned by the swift current introduced into the Chicago River.

257-263 Ex. 12 Doc. 11 Pursuant to direction, the Federal District Engineer at Chicago reported upon the protest of the Chicago River Improvement Association to the Chief of Engineers, recommending the issuance of an order to the Board of Trustees of the Sanitary District of Chicago to regulate the discharge so that the flow through the Chicago River should not produce dangerous currents without specifying any arbitrary limit because of the difficulty of determining the quantity which could be abstracted without injuring navigation in the Chicago River, and suggesting that a larger quantity might be permitted during the closed season of navigation.

In this report the District Engineer stated:

> "The Sanitary Trustees themselves recognize the dangers to navigation from increased discharge under the present conditions, for a special Commission has been created to formulate plans for the enlargement of the Chicago River, and preliminary estimates for several projects have been prepared involving very large expenditures, and probably additional legislation. * * * Early action is desirable as navigation will open within a few days."

264-267 Ex. 12 On April 4, 1901, in reviewing the foregoing report of the District Engineer, the Chief of Engineers recommended the issuance of an order restricting the flow to 200,000 cubic feet per minute for the protection of navigation and property interests along the Chicago River and its South Branch.

268-270 Ex. 12 Doc. 13 Under date of July 15, 1901, the Sanitary District of Chicago made application for permission to flow 300,000 cubic feet of water per minute between the hours of 4:00 P. M. and 12:00 o'clock midnight, on the ground that such an increased flow during the hours in question would not injure navigation as the effect upon the currents in the Chicago River would be confined to a period extending from about 12:00 o'clock midnight to 6:00 A. M. of the following day, during which there was no navigation.

270-272 Ex. 12 Doc. 14 On July 16, 1901, the District Engineer at Chicago reported on the foregoing application, advising that the requested change would only affect the current in the Chicago River between 12 o'clock midnight and 6:00 A. M., during which time there was practically no navigation in the river, that the Sanitary District would give navigation interests notice of such increased night flow by publication, if granted, and recommended that the increase be granted for the preservation of health in the Sanitary District and in the Illinois River Valley, subject to revocation in case the increase was found dangerous to navigation.

274-275 On July 25, 1901, the Chief of Engineers con-
Ex. 12 curred in the foregoing report of the District
Doc. 15 Engineer.

On October 16, 1901, the Sanitary District of Chicago ?
applied for permission to increase the diversion,
275-278 on the ground that improvements in the Chicago
Ex. 12 River would permit a flow as great as 300,000 cu-
Doc. 16 bic feet per minute without injury to navigation
but limiting the request to 250,000 cubic feet per minute until the close of navigation, in order to give the greatest consideration to the navigation interests.

279-285 On November 5, 1901, Col. Ernst, the Division
Ex. 12 Engineer of the Northwest Division, pursuant to
Doc. 17 directions, reported to the Chief of Engineers
upon this application, and among other things stated that the question was solely one of the requirements of water for sanitation purposes, that only one-ninth of the necessary work for the improvement of the Chicago River to permit the desired flow of the Sanitary District had been completed; that complaints had been loud and repeated of the damage to navigation interests by reason of the discharge through the Chicago River; that no increase should be granted in excess of the necessities shown for sanitary purposes, and that a permit should be issued regulating the discharge so as not to exceed 250,000 cubic feet per minute throughout the 24 hours of the day, conditioned upon the Sanitary District being responsible for all damages inflicted upon navigation interests, and that any furthere increase should await its necessity for sanitary purposes. This report further stated:

"The enlargement of the Chicago River has been begun by the Sanitary District under a systematic plan and able management. It has made good progress, as shown by the list of improvements, but it is very far from complete. * * * There are three tunnels under the river which are among the worst obstructions of all. No steps for the removal have been taken. * * * A large amount of widening has to be done. The project contemplates an expenditure of about $9,024,000. * * * Roughly speaking, then, the improvement is about 1/9th completed.

* * * * * * *

It is, in my judgment, quite too late to discuss the question of shutting off the flow entirely and turning the sewage of Chicago back into the lake. The grave necessity which impelled the people to undertake work upon which they have expended over $35,000,000, has increased rather than diminished with the advance of time. In the face of that necessity a temporary, or even a permanent, injury to the navigation interest becomes of secondary importance. If, as I believe, the Drainage Canal must be accepted as an accomplished fact, the question is narrowed down to the one, how much flow is required to make it harmless to the people below.

* * * * * * *

It is, of course, possible to so enlarge the Chicago River that any reasonable amount of water can be passed through it without unduly obstructing navigation. A very important enlargement has been begun and further enlargements can be made in the future if needed. These works are costly and slow, and the use of the Canal cannot await their completion."

287-288 Ex. 12 Doc. 18 The Chief of Engineers concurred in the foregoing recommendation of the Division Engineer upon the condition that the permission should be subject to modification if dangerous to navigation.

In 1902 Colonel O. H. Ernst, United States Engineer at Chicago, made a report, appearing in Report of the Chief of Engineers for 1902, App. K. K. p. 2097:

> "Since the flow of the Chicago River has been reversed through the South Branch by the discharge into the sanitary canal, the slope has also been reversed from the lake upstream and the depth correspondingly reduced. This loss in navigable depth will be more than restored in the main stream and in the South Branch by the excavations of the sanitary district, which, in order to facilitate the flow of the large volume of water required for the dilution of the sewage discharged into the drainage canal, has undertaken to enlarge these portions of the Chicago River to a width of 200 feet and central depth of 26 feet. These dimensions have no relation to the draft of vessels using the river, and if maintained as they should be for drainage purposes will furnish a navigable depth in excess of the requirements. The south fork of the South Branch and the North Fork, however, do not share in these benefits. In the South Fork particularly the dimensions of channel obtained by the operations of the Government were seriously impaired by the change of slope. The sanitary district has undertaken to restore these dimensions, and will no doubt do so, though it has been prevented from fully accomplishing the work by some difficult rock excavation. But it has not undertaken as yet to maintain them."

296–298 Ex. 12 Doc. 21 Shortly prior to January 17, 1903, the Sanitary District applied to the Secretary of War for permission to increase the discharge through the Chicago River and Drainage Canal to 350,000 cubic feet per minute, on the ground that the navigation season being then closed, navigation interests would not be injured by such increase.

301 Ex. 12 Doc. 23 The District Engineer recommended the granting of the foregoing application during the closed season of navigation, until March 31, when it should be reduced to 250,000 cubic feet per minute. The Chief of Engineers concurred in this recommendation.

330–333 Ex. 12 Doc. 31 On January 16, 1907, the Chief of Engineers made a report upon the first application of the Sanitary District to construct the Calumet-Sag Channel, of which the material portions read as follows:

* * * * * * *

> "The essence of section 10 is contained in the first clause, and its obvious purpose is to prevent the erection of any structures, the execution of any work, or the doing of any act, that would tend to obstruct, injure, diminish, or destroy the navigable capacity of any of the navigable waters of the United States, without the explicit assent of Congress.
>
> To better accomplish this purpose, the section makes it unlawful to commence the construction of any structure, or in any manner to alter or modify the course, location, condition *of* capacity of any navigable water, unless such work has been previously approved or authorized by the Chief of Engineers and the Secretary of War. The effect of this latter is to necessitate the submission of every project of this kind to the Chief of Engineers and the Secretary of War for their consideration, and to impose upon them the duty of determining whether such project will or will not obstruct navigation or injure the navigable capacity of public waterways. The powers delegated to these officials are merely conservative, and intended to facilitate the execution of work that, in their judgment, would be an aid to commerce, Congress having expressly reserved to

itself the power to authorize impediments and to determine to what extent the interests of commerce and navigation may be sacrificed or yielded in favor of other interests.

The above interpretation of the provisions of section 10 of the act of March 3, 1899, has been uniformly held by the Department, and it would seem that in considering the application of the Sanitary District of Chicago the first question to be determined should be as to the effect of the project upon the navigable waterways involved.

If, in the opinion of the Deartment, the project is one which fairly and directly tends to obstruct, that is (using the language of the Supreme Court), interfere with or diminish, the navigable capacity of any public stream or waterway, the Department has no power to grant the application, and the applicant should be remitted to Congress.

The project involves the abstraction and diversion of water from Lake Michigan, and while it is impracticable to state with exactness the effect of this diversion, it is impossible to escape the conclusion that it will cause a lowering of lake levels to a considerable extent, and that this will fairly and directly tend to diminish the navigable capacity not only of the lakes themselves, but of their connecting waters, and of the vast and growing commerce contiguous to these waters.

In view of the foregoing, no executive officer can authorize the execution of the proposed work, and the action of the Department on the application should be limited to advising the applicant that the project is one that requires the sanction of Congress."

345–347 On January 10, 1910, the Sanitary District
Ex. 12 again applied for a permit to construct the Calu-
Doc. 33 met-Sag Channel on revised plans, reverse the
Calumet River and divert a total of 10,000 c. s. f.
through all its diversion channels.

On March 1st, 1910, the Chief of Engineers reported to the Secretary of War upon the foregoing application, pointing out that the most important question involved was the diversion of water from Lake Michigan; that the Chief of Engineers, in 1907, had declined to recommend favorable action on a similar application because of the probable injurious effect upon the levels of the Great Lakes and because any project contemplating the permanent and continuous abstraction of water from Lake Michigan
353–357 should have the special sanction of Congress be-
Ex. 12 fore being approved by the War Department, and
Doc. 35 further stating as follows:

> "The project now submitted contemplates a further diversion which, inclusive of the aforesaid withdrawal through the main channel, is not to exceed 10,000 cubic feet per second. While this amount of water might possibly be withdrawn from Lake Michigan by the Sanitary District, through its various channels, without injury to navigation in Chicago and Calumet rivers and without lowering the levels of Lakes Huron and Michigan more than 6 inches, nevertheless, in view of the results of even a slight reduction in the levels of these lakes, I believe that the question is one that merits the attention and consideration of Congress, and that until Congress has indicated a policy, either special or general, with respect to it, the War Department will not be justified in granting any permission or in approving any project which contemplates the permanent and continuous abstraction of water from Lake Michigan. I am therefore constrained to adhere to the views of my predecessor, and to recommend that so much of the project as covers the diversion, be not given favorable consideration, until sanctioned by Congress. As that body is now in session, a favorable opportunity is presented to obtain its action."

367-369 On February 5, 1912, the Sanitary District ap-
Ex. 12 plied for permission to increase the diversion to
Doc. 38 10,000 c. s. f. pending the investigation of methods
and devising of plans for the treatment of sewage,

with the view of requiring less water for its safe dilution in the future.

383-389 On February 28, 1912, the Chief of Engineers
Ex. 12 reported to the Secretary of War upon the fore-
Doc. 40 going application, as summarized in report of
the Special Master on pages 61 and 62; and further stated:

> "From the above it is evident that it is of the greatest importance to the United States that the diversion of water from Lake Michigan into the Illinois River should be limited to merely such amount as is actually indispensable to sanitation."

371-382
Ex. 12 On March 11, 1912, the District Engineer at
Doc. 39 Chicago, pursuant to verbal instructions of the
Secretary of War, reported upon the foregoing application, as summarized by the Special Master on page 62 of his report; and further stated:

> "The jurisdiction of the Secretary of War over the navigable waters of the United States is derived from special and general legislation. The general legislation is found in the River and Harbor act approved March 3, 1899, which defines the duties of the Secretary of War and determines the extent of his jurisdiction. It may be inferred that the jurisdiction of the Secretary of War is limited to the items named in that act. Under that act he may order the removal of bridges obstructing navigation, remove wrecks interfering with navigation, establish harbor lines when essential to the preservation and protection of harbors, authorize the creation of obstructions and the alteration of navigable channels in the navigable waters of the United States. Under the river and harbor act of August 18, 1894, it is the duty of the Secretary of War to prescribe rules and regulations for the use, administration and navigation of any and all canals and similar works of navigation that are now or may hereafter be owned and operated by the United States. He is also authorized

to prescribe regulations covering the speed and movement of vessels and the opening of draw bridges. The acts of May 9, 1900, and March 3, 1905, further increase the jurisdiction of the Secretary of War over navigable waters. Section 10 of the act of March 3, 1899, may perhaps be interpreted to confer upon the Secretary of War the necessary authority to grant the application of the Sanitary District, although if it be shown that the granting of the application will create an obstruction 'not affirmatively authorized by Congress' the Secretary has no authority in the case.

It would appear that the War Department entertained a doubt as to its authority from the language used in the two permits issued under date of July 11, 1900 (E. D. 35041/17 and 18), granting permission to the Sanitary District of Chicago to change, alter and improve the Chicago river. Condition 1 of both of these permits states:

> That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action and that this permit shall be subject to such action as may be taken by Congress.

* * * * * * *

The right of the State of Illinois to use water from Lake Michigan for purposes of navigation in its Illinois and Michigan Canal, connecting Lake Michigan and the Illinois River, has not been questioned, but the quantity used is practically nothing. Whether the diversion of water for navigation purposes in the Illinois and Michigan waterway in sufficiently large quantities to injure navigation on the Great Lakes would be legal or proper remains to be determined.'

390-409 Ex. 12 On January 8, 1913, the Secretary of War rendered an opinion denying the foregoing appli-

Doc. 41 cation. In addition to the portions of such opinion set forth on pages 62-66 of the report of the Special Master, the Secretary stated:

* * * * * * *

Rec. P. 390-409 Ex. 12 Doc. 41 "The Sanitary District of Chicago applies to the War Department for permission to increase the amount of water it is authorized to withdraw from Lake Michigan from 4,167 cubic feet per second, the amount now authorized, to 10,000 cubic feet per second.

The Chicago Drainage Canal was opened in January, 1900. It reverses the flow of the Chicago River, which formerly emptied into Lake Michigan, and as a result a portion of the waters of that lake, instead of following their former course through Lakes Huron, Erie and Ontario into the St. Lawrence, are now carried across the watershed into the Illinois River, and through that to the Mississippi and the Gulf of Mexico. The canal thus serves as a system of drainage for the City of Chicago, carrying the sewage of that city southward to the Mississippi, and thus protects the water supply of that city, which is taken from Lake Michigan.

Permission to divert water from Lake Michigan was first granted by my predecessor, Secretary Alger, on May 8, 1899. He permitted a flowage of 5,000 cubic feet per second, but his permit contained the following conditions:

* * * * * * *

On March 14, 1907, an application made for permission to divert an additional 4,000 cubic feet per second for the purpose of reversing the current of the Calumet River and flowing that river also through the canal to drain the southern portion of Chicago was denied by Secretary Taft in an opinion in which he referred once more to the desirability of submitting 'this question of capital and national importance to the Congress of the United States.'

"It is clear that even under the conditions heretofore manifested on these applications, the proposition to divert the waters of Lake Michigan into another watershed has not been entertained without hesitation and careful restriction by my predecessors. The propriety of obtaining congressional sanction for the project has been pointed out from the beginning; and the form in which the permit has been granted, even for the moderate amount of diversion permitted, has been so phrased as to indicate that the permission was predicated upon the absence of any substantial injury to commerce.

The Sanitary canal has never received the direct sanction of Congress. It was built solely under the authority of the State of Illinois, as given in its 1889 general act for creating sanitary districts. And although pursuant to the suggestion of my predecessors the question of the propriety of its diversion of water from Lake Michigan was presented urgently in the reports of the Chief of Engineers for the years 1899 and 1900 as transmitted to Congress, no action upon the question has ever been taken by that body. In the argument before me it was urged that the present canal represented the growth and development of a national policy expressed in two acts of Congress, 1822 and 1827, which authorized the construction of a canal 'to connect the Illinois River with Lake Michigan,' thus connecting the two watersheds. (Acts of Mar. 30, 1822 and Mar. 2, 1827.) But these statutes authorized a canal for the purpose of navigation and not sanitation. (*Missouri* vs. *Illinois,* 200 U. S. 526.) The Illinois and Michigan Canal, actually constructed under their authority, derived its water for navigation purposes from the Calumet, Des Plaines and Chicago Rivers, and not from the Lakes. And although in the latter part of its existence it was used to a very slight extent to help purify the waters of the Chicago River and thus sanitate the City of Chicago, such a purpose could not have been dreamed of at the time its construction was authorized by Congress, 90 years ago. I cannot see that its authorization and construction offer the slightest congressional sanction for the great canal now under discussion, which was not even contemplated until much more than half a century later. Even at the time when the present canal was constructed and opened it is very evident that its ultimate possible effect upon the navigation of the Great Lakes was not clearly realized by those interested in that navigation. The evidence before me indicates that the withdrawal of water from Lake Michigan at Chicago would require about five years to produce its full effect upon the levels of the Great Lakes (see report of International Waterways Commission on Chicago Drainage Canal, p. 7) and that this effect would be still further obscured by periodic oscillations in the lake levels. These facts may easily explain any inaction on the part of the Nation and their representatives to this withdrawal of water and make it clear that any argument of implied acquiescence must be scrutinized with unusual care.

In this respect the situation is now very different. The present application was opposed by representatives of 23 cities and 6 states interested in harbors and commerce upon the Great Lakes, notably the cities of Duluth, Milwaukee, Toledo, Cleveland and Buffalo. It was opposed by representatives of the navigation interests engaged on the Chicago River as well as on the Great Lakes; and by the official representatives of the Canadian Government as well as private Canadian interests engaged in the navigation of the Lakes and the St. Lawrence River, including representatives of the cities of Kingston and Montreal.

A very careful consideration of the voluminous evidence and statements submitted, as well as a consideration of the reports of other commissions and boards of engineers who have investigated the subject, leaves no doubt in my mind that the withdrawal of 10,000 cubic feet per second would substantially interfere with the navigable capacity of the Great

Lakes and their connecting rivers. The Chief of Engineers, whose statutory authority in passing upon this application is concurrent with and independent of my own, and whose opinion upon such a question of scientific conclusion must be given especial weight, so states in his recommendation. His conclusions are corroborated by the authority of other boards of investigation, notably the report of the International Waterways Commission of January 4, 1907.

Careful observations and calculations conducted under the offices of the United States Lake Survey and reported through the Chief of Engineers, covering observations for the last 46 years, indicate that a withdrawal of 10,000 cubic feet per second would reduce levels at various places as follows:

	Inches.
Lakes Huron and Michigan	6 9
Lake St. Clair	6 3
Lake Erie	5 4
Lake Ontario	4 5
St. Lawrence River and Rapide Plat	4 8 Plus

The foregoing effects would be produced at mean lake levels; the lowering effects would be much greater at low-water periods—the precise time when any additional shortage would be most keenly felt. This reduction would create substantial injury in all of the American harbors of the Great Lakes and in the St. Marys, St. Clair and Detroit Rivers. It would produce equal injury in Canadian harbors on the Great Lakes, and a still greater injury on the lower St. Lawrence, the Canadian officials claiming a probable lowering effect of 12 inches at Montreal at low water.

The United States has improved about 106 harbors and rivers on the Great Lakes affected by this diversion and has spent on such improvement over ninety millions of dollars. The Canadian Government has improved over 50 harbors on Georgian Bay and Lakes Huron, St. Clair, Erie and Ontario.

By treaty, American vessels are accorded equal rights of navigation with Canadian vessels in all these waters, including the St. Lawrence River. The reduction of the water in these harbors and channels would diminish to just that extent the amounts of these improvements, and would nullify to just that extent the effects of the moneys which have been appropriated for that purpose by the respective Governments. Connecting various portions of these waterways are the two canals at the Sault Ste. Marie, the Welland Canal, and a number of canals on the St. Lawrence River. The available depth of water over one or all sills of each of these canals would be affected, and in some cases reconstruction might even be made necessary.

The enormous lake traffic which uses these harbors and these rivers is increasing with great rapidity, both in gross volume and in the size and average draft of the vessels employed therein. The Chief of Engineers reports that to lower the water surface 6 inches would reduce the permissible load of one of the large modern vessels by from 300 to 550 tons, with a consequent loss of from $3,600 to $7,500 in freights for such vessel per season. The International Waterways Commission reported that it would be a conservative estimate which would make the loss to the navigation interests resulting from a reduction of 6 inches in the depth of water as $1,500,000 per annum, or a sum which, capitalized at 4 per cent, would amount to a loss of $37,500,000 (see third progress report of International Waterways Commission of Dec. 1, 1907, p. 24). The lowest careful estimate of injury to American vessels alone is reported by the Chief of Engineers at $1,000,000 per year.

The argument was made before me that, owing to the well-known fact that the levels of the lake vary, owing to winds and change of barometric pressure, by amounts even greater than the reduction which would be caused by this canal, therefore the proposed reduction is of no consequence. This argument is well disposed of in the report of the International Waterways Commission of January 4, 1907, on page 8 as follows:

> 'It is evident that the average level of the lake may be lowered considerably without the change becoming immediately apparent, and that fact has been used as an argument to prove that the lowering caused by the Chicago Drainage Canal is of no consequence to those interested in navigation. Since they cannot see it they will not know it and will not feel it. The argument is fallacious. It is true that they cannot see it immediately, but they will soon feel it and will know it through the most costly means of acquiring knowledge—the injury to their material interests. The oscillations will remain the same as before, but low water will fall lower and high water will rise less high. The average draft of vessels must be diminished by the amount that the average level is lowered unless the depth be restored by remedial works.'

* * * * * * *

* * * I do not for one moment minimize the importance of preserving the health of the great City of Chicago; but when a method of doing this is proposed which will materially injure a most important class of the commerce of the nation and which will also seriously affect the interests of a foreign power, it should not be done without the deliberate consideration and authority of the representatives of the entire nation. The growth of Chicago is phenomenal and its representatives are quite unwilling to put any final limit to the demand which may be made upon the waters of Lake Michigan for its sanitation under the system now in use. I have before me the report of 1911 of the president of the sanitary district in which he says:

> 'I am of the opinion that the presumption that our water supply is to be limited to 10,000 cubic feet per second, or 600,000 cubic feet per minute,. is gratuitous and mischievous and should not be voiced by the officials of this district. I believe that we should have the volume requisite to our needs as they appear and are justified.'

* * * * * * *

In my view of the proper exercise of my discretion in this matter the foregoing considerations are sufficient for a decision of this case. Having reached the conclusion that the proposed diversion of the waters of Lake Michigan would substantially injure the interests of navigation on the Great Lakes which it is my legal duty to protect, it would clearly follow that the present application should be denied.

* * * * * * *

It remains only to consider certain special arguments that have been pressed upon me. It has been urged that the levels of the lakes, even if lowered, could be restored by compensating works. To a certain extent that is true. But the very nature of this consideration offers another illustration of the importance of having the whole question passed upon by Congress. Such compensating works can only be constructed by the authority of Congress and at very considerable cost. It is not a matter which is in the hands of the Secretary of War. Permission to divert water which will at one and the same time nullify the effect of past appropriations and make necessary similar expenditures in the future, should be granted only with the express consent of the body in whose hands the making of such appropriations and the authorization of such works rest.

Furthermore, in most cases such compensating works could only be constructed with the joint consent of our neighbor Canada. The United States Government alone would be unable, even if it were willing to spend its own funds, to compensate for the damage done through the lowering of these levels, unless Canada were willing to join in constructing the portion of such works which would necessarily stand upon Canadian soil.

The question therefore becomes not merely national but international, and this leads me to the consideration of the arguments which were urged by both sides in reference to the treaty with Great Britain in respect to Canada of January 11, 1909. A careful consideration of that treaty fails to indicate to me that it is in any way controlling upon the question now before me. It gives to the citizens of both countries certain mutual rights of navigation in the waters of the Great Lakes and their connecting rivers; but beyond that the question of the right of this diversion at Chicago seems to me to have been carefully excluded. The applicants for the permit have urged upon me that article 8 of the treaty gives a preference to the uses of water of the lakes for domestic and sanitary purposes over the uses of such water for navigation. Article 8, however, applies only to future cases brought before the International Joint Commission; and furthermore I am clarly of the opinion that the domestic and sanitary purposes referred to in that article were intended to be the 'ordinary' uses of such waters for domestic and sanitary purposes referred to in article 3. It would be quite contrary to our own national policy to give such a preference to an extraordinary sanitary use of such a character as to create a substantial injury to navigation. The matter has been before our own Supreme Court in the case of *the United States* vs. *The Rio Grande Dam & Irrigation Co.* (174 U. S. 690). In that case the Supreme Court held that a company which proposed to take the water of the Rio Grande river for the purpose, among others, 'of supplying water to cities and towns for domestic and municipal purposes' could be prevented from so doing when the result would be a substantial injury to the navigability of the Rio Grande river farther down. In its opinion the court said:

> 'The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact. In the course of the argument, this suggestion was made, and it seems to us not unworthy of note, as illustrating this thought. The Hudson river runs within the limits of the State of New York. It is a navigable stream and a part of the navigable waters of the United States, so far at least as from Albany southward. One of the streams which flows into it and contributes to the volume of its waters is the Croton river, a non-navigable stream. Its waters are taken by the State of New York for domestic uses in the City of New York. Unquestionably the State of New York has a right to appropriate its waters, and the United States may not question such appropriation, unless thereby the navigability of the Hudson be disturbed. On the other hand, if the State of New York should, even at a place above the limits of navigability, by appropriation for any domestic purposes, diminish the volume of waters, which, flowing into the Hudson, make it a navigable stream, to such an extent as to destroy its navigability, undoubtedly the jurisdiction of the National Government would arise and its power to restrain such appropriation be unquestioned; and within the purview of this section (act of Sept. 19, 1890, ch. 907) it would become the right of the Attorney General to institute proceedings to restrain such appropriation.'

The treaty, however, contains provisions in its article 10 by which 'any question or matters of difference arising between the high contracting parties involving the rights, obligations, or interests of the United States or of the Dominion of Canada, either in relation to each other or to their respective inhabitants, may be referred for decision' to an international joint commission established by the said Treaty. The hearing before me brought forth the fact that the Government of Canada regards the proposal contained in this application as one which affects the material interests of that country. The establishment by formal treaty between the two countries of a tribunal with jurisdiction to decide just such questions seems to me to afford an additional reason against the assumption of jurisdiction to decide the question by an administrative officer of one of those countries."

In the Warren Report, the Board of Engineers for Rivers and Harbors report states:

Ex. 3 P. 55 "114. Diversions for water-supply and sewage purposes have already been discussed and, with the exception of the diversion of the Chicago sanitary district, they have been disposed of. We, therefore, revert to this important permanent diversion at Chicago. The case is so well known and the information in the report so full as to call for little further discussion of its merits. Granting that disposal by dilution was the most practicable plan at the time of its adoption, the fact remains that the Chicago sanitary district has for practically 20 years been on notice that the United States was unwilling to allow the district to divert more water than the limit set in the permit of 1903, namely, 4167 cubic feet per second. Notwithstanding this, the district has since then greatly expanded its boundaries and enlarged its plans, and from year to year, in the face of the opposition of the United States, has diverted more and more water, until in 1917 the yearly average diversion was 8,800 cubic feet per second, which is more than twice the lawful amount.

115. The district can no longer fairly plead the absence or the impracticability of other safer methods of handling sewage and of protecting its people from water-borne diseases. Certainly, for the past 20 years, expert opinion has held disposal by dilution to be inferior to other methods of treating sewage, and enlightened public opinion has condemned a policy which, in effect, is the transfer of a nuisance from our own front door to that of our neighbor. Large cities on the Great Lakes cannot safely drink raw lake water, nor should they discharge unscreened and unfiltered sewage either into the lakes or into tributary streams. In 1915, the Chicago Real Estate Board employed three experts, of whom two were of acknowledged eminence in England, and the third a New York expert of well-known authority, to investigate the sewage problem of Chicago and to present their views as to the best way of solving it. Their report entitled 'A Report to the Chicago Real Estate Board on the Disposal of the Sewage and the Protection of the Water Supply of Chicago, Illinois', by Messrs. Soper, Watson and Martin, has been printed, and its conclusions are, therefore, well known to the public in general, and particularly to the people of Chicago whom they advised substantially in accordance with the views above expressed. Chicago is, therefore, debarred from any claim for indulgence as to work done and expenditures incurred in recent years. If, in defiance of the opposition of the Government, and in open disregard of the law, the officials of the Chicago Sanitary District have continued to expend the money of their constituents in the prosecution of unwise and illegal plans, these officials and their constituency are to blame, and they should expect no great indulgence from the general public whose government they have ignored and whose interests they have disregarded.

116. Quite recently, at the end of many years of delay, a decision in the suit of the United States to

restrain the sanitary district from the diversion of more water than was authorized in its permit of 1903, has been made public. As was expected, the judge has felt constrained to uphold the authority of the United States, but it is not believed that any injunction has issued against the district. Also, recently, the district, as noticed earlier in this report, has admitted the damage done to navigation by the diversion at Chicago, and is understood to be prepared to install and pay for remedial works, contingent upon the grant by the United States of authority permanently to divert 10,000 cubic feet per second. The views of the division engineer as to this matter are summarized in paragraph 183 (2) of his report. We agree with him except that we believe that the diversion should be limited to 6,800 cubic feet per second, and that, as the use of the water for developing power is more or less an incident to its use for dilution, we regard as inadvisable the tax that he proposes, though we concede that such a tax would be equitable. It would, however, be difficult to assess correctly and it might prove onerous. Apparently, the public interest would be sufficiently satisfied were assurance given that all the power derived from this diverted water, a possible 70,000 to 80,000 horse-power, would be conserved and administered for the benefit of the people of Illinois, and therefore not alienated to any individual or corporation operating solely for private profit. His recommendations that the diversion shall be supervised by the United States at the expense of the sanitary district, and that provision be made at the earliest moment for the installation of a method of sewage disposal other than by dilution, are excellent, and we concur in them. We believe, further, that the Chicago water supply should receive such treatment as will render it at all times safe. The diversion above recommended would permit 2,000 cubic feet per second to be taken by way of the Calumet River, 4,800 cubic feet per second by the Chicago River, and allow the operation of all power-generating machinery now installed at Lockport, Ill. It would also afford the statutory dilution of 3⅓ cubic feet per second per 1,000 of population for a total of 2,100,000 people."

417-18 Ex. 12 Doc. 42 The application of the Sanitary District of Chicago, dated January 31, 1925, upon which the permit of March 3, 1925, was subsequently issued, stated:

> "The Sanitary District of Chicago hereby applies for permission to divert an annual average of ten thousand cubic second feet of water from Lake Michigan through the channels of the Sanitary District of Chicago, for the purpose of preserving the lives and health of all of its people, and of the millions of others in constant, daily contact with them.
>
> We have prepared a brief statement of facts in support of this application, which we present herewith for your consideration, all of which is respectfully submitted."

Part of said application was Exhibit 1156, entitled: "Statement of Facts in support of the application of the Sanitary District of Chicago for permission to withdraw, through its channels, from Lake Michigan an annual average of 10,000 cubic second feet of water." 4414-

4419 Exhibit 1156 recited that the Sanitary District was organized in 1889 as a municipal corporation having no legal connection with or control over the City of Chicago or any of the other forty-nine cities and villages within its boundaries; that the Sanitary District was authorized to construct and maintain drainage canals, outlet sewers, sewage pumping stations and appurtenances; that at the time the Sanitary District was organized to divert drainage and sewage within its boundaries from Lake Michigan to the Des Plaines River, the only practicable method by which sewage could be disposed of, was by dilution, which method was used at that time by all large cities in the United States, and in 1924 it was the method used by eighty-eight per cent of all the cities of the United States having a population of 100,000 or more; that the statute under which the Sanitary District was organized required a dilution ratio of three and one-third cubic feet per second for each one thousand of population; that the said ratio is necessary to prevent nuisance; that in 1889 the population of the Sanitary District was 1,140,000; that the population and trade waste equivalent by 1945 is estimated to be 6,785,000; that the population and trade waste equivalent of the Sanitary District at the time of the application, was 4,864,000; that 10,000 cubic second feet of water diversion from Lake Michigan is necessary for the purpose of eliminating offensive conditions in the Illinois River, as well as for the purpose of keeping the Chicago River reversed at all times, so that at no time even during storm periods would it empty its sewage into Lake Michigan; that the dry weather run-off of the Chicago River drainage area was approximately 1,200 cubic feet per second; that the maximum flood run-off for the same area was approximately 10,000 cubic feet per second; that the run-off from the drainage area of the Chicago River exceeds 4,167 second feet seven to eight times per year, 5,000 c. f. s. from five to six times per year, 7,500 c. f. s. from three to four times per year, 9,500 c. f. s. about one time per year; that if the flow of 4,167 feet per second were maintained through the Chicago River from Lake Michigan the sewage would flow into Lake Michigan about seven times per year, and a similar condition would exist but not so frequently for the other flows above mentioned; that a heavy storm may concentrate the run-off in the Chicago River in approximately six hours, discharging 10,000 cubic feet per second; that it takes more than twelve hours to effect any appreciable increase in the flow through the Chicago River by manipulation of the control gates at Lockport; that since 1892 the Sanitary District has expended in the construction of its Sanitary and Ship Canal, widening, deepening and improving the Chicago River, construction of bridges and other channels and appurtenances, approximately $130,000,000; that the operation of the Sanitary District's canal has materially affected the death rate from typhoid fever and has generally improved the health conditions of Chicago; that the Sanitary District had during the period beginning with the year 1908, carried on extensive experimental work in artificial sewage treatment, and had expended on such artificial sewage treatment works up to the end of the year 1924, approximately $30,000,000; that the Sanitary District had laid out a program to artificially treat sewage by the installation of works which would require the expenditure by 1945 of the sum of approximately $95,000,000; that this program by 1945 contemplated eight-five per cent or complete treatment for a population of 1,917,000, ninety-four per cent treatment for equivalent population of 1,725,000, thirty-three and one-third per cent treatment for a population of 3,140,000, which would be equal to one hundred per cent treatment for a population of 4,300,000; that cost of carrying out this program would be about $95,000,000.

The said Defendants' Exhibit 1156 further set forth the then financial resources of the Sanitary District, its bonding power, taxing power, income from other sources and the moneys required to be expended for its various corporate purposes, and that:

> "In October, 1924, the Sanitary District engaged twenty-eight consulting sanitary and hydraulic engineers from all parts of the United States, leaders in their profession and of outstanding experience and reputation, to make an exhaustively complete study of the sanitary situation in this community.
>
> This Engineering Board of Review, after upwards of four months of intensive study, has just completed its labors and presented a report with findings and recommendations, in two printed volumes, copies of which are submitted herewith.
>
> The report of this board was unanimous and its recommendations cover the subjects which must necessarily be considered by the War Department in arriving at a proper solution of the questions now under consideration, and it is respectfully urged

that this report, with findings and conclusions, be
4420 given careful consideration."

Exhibit 1120 submitted to the said Secretary of War as part of the said application for the permit of March 3, 1925, is entitled "Recommendations including Brief Statement of Findings and Conclusions of the Engineering Board of Review of The Sanitary District of Chicago on the Lake Lowering Controversy and a Program of Remedial Measures, Chicago, Illinois, December 20, 1924".
3555 The said Defendants' Exhibit 1120 stated in its introduction the following:

> "1. The Chicago Drainage Canal was authorized by the Illinois Legislature in 1889, and opened in 1900. It reversed the flow of the Chicago River, diverting Chicago's sewage from Lake Michigan; improved the City's only source of water supply; ended severe water-borne epidemics; provided one of the chief links in a waterway from the Great Lakes to the Gulf, a project long promoted by the National and State Governments; led to a remarkable development of bathing beaches, and incidentally supplied power for public needs.
>
> 2. Dilution was the best method then in use for large-scale sewage disposal, and the Canal was a vital factor in Chicago's phenomenal growth.
>
> 3. The City's growth already has exceeded the limits considered when the Canal was built, and the Chicago Sanitary District, after scientific research, has planned and has under construction extensive plants for the treatment of sewage by recently developed methods, at a rate to provide additions for approximately 300,000 persons each year. This program should be continued. Its cost can be reduced by the elimination of water waste, but in any event will involve an increase in tax rates. However, a large diversion of lake water will still be required to produce satisfactory conditions.

4. The Chicago diversion has lowered the Great Lakes about 5 inches, while diversions elsewhere, improvements of outlet channels, and climatic conditions, have caused a lowering of 2 to 3 feet. Reduced lake levels have damaged navigation and harbor works.

5. Lake fluctuations can be largely eliminated, and the lakes held near the highest desirable levels, by works constructed near their outlets. Such works are necessary regardless of the Chicago diversion, and their cost will be but slightly affected by it. They will protect all interests involved, increase low water flow, greatly improve navigation and harbor conditions, allow more efficient use of water for power, and make possible the restoration and protection of the scenic beauty of Niagara Falls.

6. Diversion of water at Chicago is necessary for sewage disposal; it prevents gross pollution of the lake; it improves navigation in the waterways from the Great Lakes down the Illinois and Mississippi Valleys; and it makes available hydro-electric energy in a region where needed. With lake and river regulatoin it will confer these benefits without damage to navigation in the Great Lakes and connecting waters; without affecting navigation conditions in the St. Lawrence River; and for years without reduction of power at Niagara along the St. Lawrence River."

* * * * * * *

It was recommended by said Engineering Board of Review in said Exhibit 1120, that the Sanitary District carry out a program for artificial treatment of sewage, such as was mentioned in said Exhibit 1156; that the City of Chicago be requested to reduce water consumption by the installation of meters; that the Sanitary District cooperate with all authorities interested in forwarding the Lakes-to-the-Gulf waterway, including the dredging of the little Calumet River; that the Sanitary District offer to contribute its proper share of the cost of lake regulating works; that the District apply to Federal authorities for permission to divert from Lake Michigan an annual average of 10,000 feet of water per second.

Among the findings and conclusions of the said Engineering Board of Review (Exhibit 1120, Tr. 3561), were the following:

> "20. The Main Drainage Canal draws water from Lake Michigan by reversing the flow of the Chicago River and discharges it into the Des Plaines-Illinois River for the purpose of diluting Chicago's sewage and diverting it from the lake. In addition to this use, the water will also play an important part in the operation of the 9-foot waterway now under construction from the Great Lakes to the Gulf of Mexico.
>
> 21. The maximum capacity of the Main Drainage Canal was determined largely by the necessity that it should carry at least 10,000 cubic feet per second, to prevent the flood flow resulting from occasional heavy rainfalls over the Chicago River drainage area from flushing sewage and accumulated sewage deposits into the lake.
>
> 22. The Illinois Legislature made mandatory that the sewage entering Chicago River should be diluted with at least 3⅓ cubic feet of water per second per 1,000 population. The channel was therefore intended to serve a population of not more than 3,000,000.
>
> * * * * * * *
>
> 27. The plan for sanitary improvements authorized in 1889 and executed at a capital cost to date of approximately $100,000,000 was not only sound but the best that could have been devised. It has been a success. The typhoid fever death rate has been reduced from a maximum of 174 per 100,000 inhabitants in 1891 to less than 2 per 100,000 in 1917; since

then it has remained consistently below 2, with an average of less than 1.2 per 100,000 inhabitants.

* * * * * * *

35. To abandon the Main Drainage Canal and again discharge the sewage into Lake Michigan, even though the most effective means be provided for purification of the sewage and the water supply, would be a serious backward step in sanitation. Failure to take reasonable and proper advantage of natural and artificial conditions would not be justified.

* * * * * * *

38. To maintain the Des Plaines-Illinois River in a satisfactory condition will require a substantial flow of lake water, even after all the sewage shall have been treated by the most effective practicable means now available.

39. While a diversion of 10,000 cubic feet per second, and at times more, is necessary for sanitary purposes during the warmer portion of the year, the amount may be diminished at other times without seriously reducing the dilution efficiency of the Canal. Authorization of the full amount is necesary, however, to reduce the danger of the reversal of Chicago River during heavy rainfalls, and to provide for contingencies.

* * * * * * *

45. The extensive and growing use of the lake front of Chicago by bathers has directly resulted from the diversion of sewage from the lake, and is of great benefit to the public.

48. Accepting the conclusion that the diversion of lake water at Chicago has contributed to the present low stages of the lakes, the Sanitary District made an offer to the United States to pay the cost

of remedial works to compensate for the lowering caused by its diversion, these works to be designed by the United States Army Engineers, and to be built under their direction.

49. The Great Lakes rise and fall 3 to 5½ feet during long periods. The present low stages are due partly to natural variations in rainfall, evaporation, and ice conditions; and partly to diversions through the Chicago Drainage Canal, the Welland Canal, the Black Rock Canal, and the improved Erie Canal, and for water power at Niagara; to storage of water in Lake Superior; and to the enlargement of the channels of the St. Clair and Detroit Rivers for navigation purposes.

50. With a diversion of 10,000 cubic feet per second at Chicago, and without regulation of the outflow from Lake Huron and Erie, the United States Army Engineers report that such a diversion would ultimately lower Lakes Michigan and Huron 5½ inches. This Board accepts this figure.

51. The outflow from the Great Lakes can be controlled at moderate cost by works of simple character. By these works, the lakes can be held at as high stages as prevailed in the period from 1883 to 1887, regardless of the amount of water diverted from the lakes and connecting rivers.

52. There is a distinction between 'compensation works,' such as submerged weirs, by which lake levels may be raised, and 'regulating works' by which both the level and the discharge can be so controlled that the surplus of water in cycles of large yield can be conserved in storage for increase of outflow in years or seasons of scant water supply.

53. Regulating works are neither experimental nor are their effects problematical. This is well illustrated by the works at the outlet of Lake Superior, which have successfully raised and controlled the level of that lake for the past eight years.

54. A reduction of the diversion at Chicago to 4,167 cubic feet per second would raise the lake levels only 3 inches; whereas proper regulating works would raise these levels ten or more times as much, even with an annual average diversion of 10,000 cubic feet per second at Chicago.

* * * * * * *

58. The water diverted from Lake Michigan, formerly wasted through the control works at the outlet of the Main Drainage Canal at Lockport, is now utilized to develop hydro-electric power, and the surplus power not required for the works of the Sanitary District is sold to the City of Chicago and other cities in the District for municipal lighting and pumping, and to industries.

60. By reason of the demand for power and its higher market value, a cubic foot of lake water is now worth as much for power production in Illinois as at Niagara, even were the full available head between Lakes Erie and Ontario utilized. There is no present economic loss to the country at large by using lake water for power in Illinois instead of at Niagara.

61. Furthermore, under present treaty restrictions, the water diverted at Chicago does not now and will not prevent the development of all the water power which it is possible to develop at Niagara by diversions now allowed by treaty.

62. On the Upper Illinois River the natural low water flow is approximately 500 cubic feet per second. Any additional water diverted by the Drainage Canal from Lake Michigan would meet a future demand for condensing water in steam power plants located near the coal mines of the Illinois Valley, and would thereby facilitate the production of power by such plants.

* * * * * * *

66. There are no treaty restrictions as to the use of the St. Lawrence water for power, but less than 10 per cent of the available power is utilized. There will be no economic loss of power on either the Niagara or St. Lawrence River by reason of the diversion of water from Lake Michigan until 95 per cent of the available power at each location has been developed.

67. The diversion of 10,000 cubic feet per second of water at Chicago, with regulating works proposed, would in no way interfere with the establishment of a deep waterway from the Great Lakes to the ocean by any one of the several routes that have been proposed. For the deep water route down the St. Lawrence, regulating works will be required, which can be operated in the same manner as those proposed for the Great Lakes, and would eliminate the effect of any diversion at Chicago.

* * * * * * *

68. For more than 100 years both the United States and the State of Illinois have proceeded on a policy of improving the navigation facilities of the country by connecting the Great Lakes through Chicago with the Gulf of Mexico. Construction work is now in progress on a modernization of this waterway.

69. The State of Illinois is spending $20,000,000 in building the most expensive section of a 9-foot barge waterway. The United States already maintains 6 to 8-foot navigation over the remaining distance to the Gulf, and has outlined a 9-foot project.

70. An average annual diversion of 10,000 cubic feet per second at Chicago would reduce the cost of completing and operating the 9-foot waterway from the lakes to the Gulf of Mexico, would improve navigation conditions down to and below Memphis, and would dispense with four of the nine locks which

would be required with a diversion of 1,000 or 2,000 cubic feet per second. This would make feasible a 9-foot channel without locks from the Gulf of Mexico to within 100 miles of Chicago.

* * * * * * *

72. The improved Illinois waterway will adequately connect the Mississippi Valley with the Great Lakes. Such a connection will encourage navigation, and will give the Middle West and Gulf States a better opportunity to share in the benefits to be derived from ample and desirable facilities for water-borne commerce between the Gulf and the Lakes. Such a waterway is of international importance, and with the completion of the improvements in the Illinois River is a possibility within three or four years."

* * * * * * *

Exhibit 1157 (Tr. 4415) entitled "Report of Engineering Board of Review of the Sanitary District of Chicago on the Lake Lowering Controversy and a Program of Remedial Measures—Part II—The Technical Bases for the Recommendations of the Board of Review," submitted as part of said application for permit, is as indicated by its title, a more detailed description of the various projects mentioned in Exhibit 1120, the Engineering Board of Review's first report, and describes in greater detail the effect of the diversion upon the levels of the waters of the Great Lakes and their connecting channels and remedial works that may be installed, including also the benefits of the diversion to the waterway from the Great Lakes to the Gulf of Mexico.

Exhibits 1120, 1156 and 1157 were each admitted in evidence over the objection of the complainants on the ground that they and each of them had been submitted to the Secretary of War.

Pursuant to the request of the Secretary of War, the attorney general of the United States on February 13, 1925, rendered an opinion to the effect that the Secretary of War on the recommendations of the chief of engineers, had the power to issue a permit fixing the diversion from Lake Michigan by the Sanitary District of Chicago at an amount greater than the 4,167 cubic seconds feet theretofore authorized by the Secretary of War. (Ex. 1205, Tr. 5701.)

On March 2, 1925, the District Engineer at Chicago made a report upon the foregoing application, in which he stated:

"U. S. Engineering Office, Chicago, Ill.,
March 2, 1925.

To the Chief of Engineers, Washington, D. C.

1. This is an application from the Sanitary District of Chicago, a municipality created under the laws of the State of Illinois, to divert 10,000 cubic feet per second of water from Lake Michigan, for the purpose of keeping the sewage of that locality from contaminating its water supply and for reducing the sewage by dilution.

2. This question of the diversion of water from Lake Michigan has been so thoroughly investigated by the Department and discussed at such great length in various reports that it is not believed advisable to enter into any description or historical review before presenting the recommendations which are to follow. Detailed information of this character may be found in the report entitled 'Diversion of Water from Lake Michigan,' which was submitted by this office on November 1, 1923.

3. This application is prompted by the action of the United States Supreme Court on January 5, 1925, by which it sustained the position taken by the local United States Court, requiring adherence to the limitations placed by the Secretary of War on the amount of the diversion. The local authorities are faced with the alternative of a reduction in the amount of diversion to 4,167 cubic feet per second

by March 5, 1925, or relief from Congress or the War Department.

4. In the issuance of a permit, the exact meaning of the word 'diversion' should be understood. In the recommendations which follow, by diversion is meant the amount of water which is actually withdrawn from Lake Michigan by the Sanitary District of Chicago through its main drainage canal and auxiliary channels, and is not inclusive of the amount flowing in the channels which come from the sewers of the locality. In other words, 'diversion' is taken to be the gross flow at Lockport, less the amount of water used by the City of Chicago for domestic purposes.

5. It is recommended that a permit be issued to the Sanitary District of Chicago, covering a period of five years, to divert from Lake Michigan through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second; the instantaneous maximum not to exceed 11,000 cubic feet per second. This permit should be made conditional upon the following:

(1) The Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.

(2) The Sanitary District shall pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes system, if and when constructed, and post a guarantee in the way of a bond or certified check in the amount of $1,000,000 as an evidence of its good faith in this matter.

(3) The Sanitary District shall submit for the approval of the Chief of Engineers and the Secre-

tary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929.

(4) The execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the U. S. District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.

(5) If, within six months after the issuance of this permit, the city of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of ten per cent per annum thereafter, this permit may be revoked without notice.

(6) The average diversion from Lake Michigan during 1924 by the Sanitary District has been approximately 8,500 cubic feet per second. This diversion, combined with the discharge from the sewers of the locality, produces a total flow at Lockport of about 9,700 cubic feet per second. This so closely approximates the flow necessary to safeguard against reversals of the river into the Lake in times of storm (10,000 cubic feet per second) that a permit for diversion of 8,500 cubic feet per second will suffice in this regard. * * * No obligation appears to rest with the Department to prevent any increase in pollution of the Illinois and Des Plaines Rivers; the maintenance of status quo as regards amount of diversion will place the burden of relieving the lower river situation upon the Sanitary District. Until the controlling works (Condition 3) are completed, ample protection against the dangers of a reversal of the river is provided by the

authority to divert an instantaneous maximum of 11,000 cubic feet per second.

(7) Condition (1) as proposed provides for the execution of a sewage treatment program which will relieve the load on the Drainage Canal by the equivalent of a population of 1,200,000. * * * Compliance with this condition will make possible a reduction in amount of diversion to 7,250 cubic feet per second, or lower, by the end of 1929. This condition looks to a reduction to 4,167 cubic feet per second by 1935.

* * * * * * *

12. Condition (3) is considered necessary to permit an ultimate reduction of the diversion to 4,167 cubic feet per second. Controlling works of some sort will be required to keep the Chicago River from discharging into Lake Michigan in times of flood, and at least two types have been suggested which are believed to be practical.

13. The provision with reference to metering of the water service of the City of Chicago is included for three reasons:

(a) There will be a substantial saving in the cost of construction and operation of sewage treatment plants due to the decreased amount of sewage to be treated.

(b) There will be a substantial reduction in the amount of lake water used for domestic purposes.

(c) It will be possible for the city of Chicago to finance a filtration system for its water supply when its water consumption is reduced to a reasonable amount. When the water supply is filtered, the dangers incident to an occasional reversal of the Chicago River will be entirely eliminated.

14. A shorter time limit for the permit is not recommended as results produced by the end of

1927, for instance, will not permit a reduction in the amount of the diversion, which it is believed should be required in any renewal, no matter when it is made. Furthermore, sufficient performance can not be prescribed for a shorter period to insure completion of a larger program looking to a reduction in diversion to 4,167 cubic feet per second by 1935."

The following is all that appears in the transcript of record concerning the offer in evidence of and the ruling of the Master upon Exhibit 1158.

4447 "Mr. Adcock: I ask to have marked for identification the document which I hold in my hand entitled 'Diversion of Water by the Chicago Drainage Canal, Hearing before the Secretary of War, Washington, February 21st, 1925, Pechin and Dismukes, Shorthand Reporters, Washington, D. C.'

(The document referred to was thereupon marked Defendants' Exhibit for Identification No. 1158.)

The title that I just read appears on the cover. This purports to be a stenographic transcript or a copy of a stenographic transcript of the proceedings before the Secretary of War held on the date mentioned, and I understand that the court reporter who took the proceedings and transcribed them was selected by the Honorable John W. Weeks, or his office, to take the proceedings. I have no other copy.

The Special Master: Do you propose to offer that in evidence?

4448 Mr. Adcock: I wish to offer it in evidence for the purpose only of showing what took place before the Secretary of War, and with no notion that the other side should be bound by anything that our representatives said, although we are to be bound by what our representatives said, nor do we wish to be responsible for the truth of the statements made by parties to that proceeding.

4448 The Special Master: I cannot conceive that you can make evidence of a lot of statements made before the Secretary of War at a hearing of that description. You may show that the Secretary of War had a public hearing. The Secretary of War acted on the recommendation of the Chief of Engineers. He was acting on the application made by the Sanitary District. I have allowed you to put in all the facts, the application itself, and what formed a part of it, which invited the official action of the Secretary of War.

The Secretary of War, in his discretion, although I am not aware that the statute required it, seemed to have held a public hearing at which, I suppose, in accordance with the statement of counsel, a good many people attended and a good many statements were made. In view of the many official reports that are in evidence, and in view of the amount of testi-
4449 mony we have had about everything pertinent to that transaction, I do not see any necessity and, from the strict standpoint of competency, I do not see the propriety of introducing a lot of statements made at such a hearing. If there is any particular matter there which can be regarded as an official statement of fact by the Sanitary District, in addition to the statement in the former papers, you may point it out to me and I will consider it. You may also have the matter marked for identification, and if at any time there should be disagreement by the court with my ruling you can point out what has been excluded, but I shall not receive it. This is subject, of course, to your pointing out something which the Sanitary District presented officially on that hearing, as supplemental to what they presented in the papers, that I should be inclined to think might be pertinent.

Mr. Adcock: Perhaps I should have mentioned to your Honor the fact that this public hearing was held on February 20th and 21st 1925, and that there were present beside the Secretary of War the Chief of Engineers, Major Putnam, I believe, and General John A. Hull, Judge Advocate General. I also wish to point out that the date of the recommendation of the Chief of Engineers was March 2nd or March 3rd 1925, which was after this hearing.

4450 The Special Master: We have his report, and it shows what he considered. I should think it would be extremely dangerous to make evidence out of any statement that might be made in a hearing of that sort. I know I would not consider such a statement, unless competently proved.

Mr. Adcock: I limited my offer only for the purpose of showing what took place.

The Special Master: And only what took place without the statement given when that took place does not seem to me to be a very definite offer.

Mr. Adcock: The entire transcript would go in, but simply for the purpose of showing what was said and done.

The Special Master: Simply for the purpose of having it in. I do not think it is competent. But to repeat, I do not debar you from showing what is essentially a part of this official application of the Sanitary District. I assume we have that in the papers that were submitted.

* * * * * * * *

4453 Mr. Lynde: May I say a word, your Honor, in connection with this exhibit for identification No. 1158? This transcript will disclose—and, of course, in making this statement I am not trying to get anything into the record, but I am merely describing the situation—that there was a representative there on behalf of the commercial interests of Chicago,
4454 and I desire to call the court's attention in connection with the offer that the logical position, very briefly stated, in reference to the value of the Chicago water for navigation on the Illinois River and the Mississippi was presented for the information of the Secretary of that hearing; and in addition to the statement made for the record as I presented

it at that time, I can produce also a written statement which was filed with the Secretary. It seemed to me pertinent in connection with the offer to call attention to the fact that these elements which the Mississippi Valley States are here to present were called to the Secretary's attention in connection with this permit.

The Special Master: Is there any question but what all the various matters which have been presented here on both sides of this proposed action were the subject of a public hearing before the Secretary of War

Mr. Adcock: That was one reason that I desired to present that transcript; to show that practically every argument that has been presented by the complainants was presented to the Secretary of War and by representatives of these various states and that there was no question of whether the Secretary of War had jurisdiction or not. It was assumed that he had jurisdiction and they were all presented there.

4455 The Special Master: Of course, Mr. Adcock, that sort of a presentation cannot add to his actual authority. If he did not have authority it would make no difference. On the other hand, if he did have authority and exercised it, that exercise draws to it presumptions of a very large degree of knowledge and information with regard to all questions which possibly could be considered. That is the presumption we have with regard to all legislative and executive acts, that they are performed, perhaps not with omniscience, but with honest purpose and an understanding of all the revelant facts. That is one thing. It is quite different to have a lot of particular statements introduced as facts themselves.

Mr. Adcock: I am not offering them for that purpose. They show that at the time the Secretary was very ill he held this painstaking hearing for two days and at which he heard practically everybody.

Mr. Lynde: May it be understood, your Honor, that the Mississippi Valley States join in this offer

for the purpose merely of showing that these con-
4456 tentions were presented for your consideration?

The Special Master: Certainly. I have no objection at all to receiving the evidence, and I understand that is virtually submitted without any contest; that there was a public hearing, and that you and your clients appeared at that hearing.

Mr. Lynde: No; pardon me. I misrepresented the situation if I stated that. I appeared at that time on behalf of the commercial interests of Chicago. I do not want a misstatement of facts in the record.

The Special Master: I shall assume on what has been said here that all the various parties in interest were heard before the Secretary of War; and I may add that I do not think it makes much difference whether they were or not, so far as any actual conclusion upon his authority and construction of his action that he finally took are concerned. It simply shows his desire to be fair in the matter and not to act in ignorance of what people complained about."

Condensation of Excerpt of Defendants' Exhibit 1158 (Transcript 4455-4456).

This exhibit is a transcript of the proceedings of a public hearing before the Secretary of War at the time of the application by the Sanitary District of Chicago for the permit of March 3rd, 1925. The excerpt printed is a portion of the statements made at that hearing to the Secretary of War by Mr. Lynde on behalf of the Chicago Association of Commerce condensed as follows:

> "We believe the water through that Canal is of great assistance for use in navigation in the Illinois River and almost a necessity for any proper development of navigation on the Mississippi River between Grafton and Cairo. * * * One of the Government Engineer Reports in 1907, contains statements as to the low water flow of the Mississippi at St. Louis, and the curve there shows that the

low water at St. Louis was 33,000 second feet. The actual diversion of Lake Michigan at that time was between 7,000 and 8,000 cubic feet per second, included, of course, in that 33,000 second feet at St. Louis. It has always been our understanding that in navigation on the Mississippi where the desired depth is difficult to maintain under present conditions, the subtraction of a material amount of water is certainly not going to increase the facilities for navigation. * * * The Secretary is concerned with this matter from a broad national standpoint. The Congress of the United States in Section 500 of the Transportation Act laid down a declaration of policy in favor of the development of water transportation. Congress has gone further than that. It has put the Mississippi-Warrior Barge Line on a permanent basis. The Secretary is the agent of Congress in those particulars. * * * The water going out of Lake Michigan is of great assistance to the development of this full waterway route from the Gulf to the Lakes. Congress by the expenditure of public funds, to which the Mississippi Valley has contributed, created the Panama Canal. This has upset the equality of transportation conditions in this country. A full development of waterways in the interior portion of the country will tend to equalize the inequality produced by the Panama Canal route. Industries located in the Atlantic seaboard have available a route for transportation to the Pacific coast. A cheaper method of transportation. Industries in the interior have to depend on rail transportation and are at a great disadvantage. If they are given this water transportation down the rivers, they are more or less equalized. * * * The transportation on a waterway, of course, is dependent upon the depth of the water. The present depth in the Mississippi and Ohio is a 9 foot project, and we want that same depth maintained.''

The report entitled ''Diversion of Water from Lake Michigan,'' dated November 1, 1923, filed with Secretary of War April 18, 1924, referred to in the above quotations from Doc. 43 (Comp. Ex. 12), is Exhibit 1 for identification. This report among other things described the early navigation on the Chicago River and the outer harbor or entrance thereto, the improvements from time to time made for navigation purposes on the Chicago River and branches, the amounts of diversion from time to time by the Sanitary District and the works installed and operated by it, including also the deepening and widening by the Sanitary District of the south branch and west fork of the south branch of the Chicago River, 200 feet in width at all points, and 26 feet in depth throughout.

3519 The report further stated:

> "As far as the navigation of the Chicago River and the Drainage Canal is concerned, if the flow at Lockport were entirely throttled and the power house gates closed so as to permit no diversion from Lake Michigan, conditions would be decidedly improved. The current which now averages 1½ miles per hour, and in some bridge draws is as high as 4, would be practically eliminated, making navigation considerably simpler, especially for the larger vessels whose passage through a narrow bridge draw is apt to increase the current materially.
>
> The Illinois Waterway is only about 15% completed, and at the present rate of progress will not be ready for use for some time to come. The question of flow is entirely unaffected by any immediate needs of this waterway. The amount of flow to be expected when the enterprise is finished has a definite bearing on the plans of the structure, but as Part IV deals with immediate needs, a study of the amount of water necessary for the operation of the waterway some 10 years from now will be left for later consideration.
>
> The low-water widths of the Mississippi River immediately below the mouth of the Illinois are between 1,500 and 2,000 feet; at bank-full stages the widths are between 2,500 and 4,500 feet

Under present conditions the estimated extreme low-water flow is about 30,000 cubic feet per second including that diverted from Lake Michigan. (See H. Doc. No. 22, 67th Cong., 1st Sess.)

The diversion of 8,000 second-feet from the Lake constitutes slightly over one-fourth of the low-water flow in the Mississippi River. An inspection of the discharge curve of the river at St. Louis indicates that an increment of 8,000 cubic feet per second produces an increased depth of 1.4 feet (Plate VIII). No other discharge curves are available for that portion of the river between Grafton and Cairo.

It would not be unwise to assume that the average raising of the water surface amounts to about 1 foot, but due to the hydraulics of the Mississippi River, where the elevation of the tops of the bars fluctuates with the height of the surface of the water, it is doubtful if the actual depths are materially increased. For this reason it is impossible to evaluate the benefit if there is any.

* * * * * * *

On the improved portions of the Illinois River depths have been materially benefited by the introduction of Lake Michigan water. The present project contemplates the completion of a 200-foot channel 7 feet deep based on a diversion of 4,167 cubic feet per second. If the project were completed the flow could be reduced to 4,167 cubic feet per second and cause no injury to navigation. It is estimated that about 1,700,000 cubic yards of material would have to be dredged to complete the project. This would require from three to four years' time with a 15-inch suction dredge such as is contemplated for the river. With the expenditure of about $973,000, inclusive, of funds available, the project will be completed by 1928. A reduction in diversion to 4,167 cubic feet per second could not be made without detriment to navigation before that time."

Complainants objected to evidence relating to the alleged effect of the increment from Lake Michigan upon the depth of the Mississippi River, on the ground that intervening States, none of them, had any legal interest in any artificial enrichment of the Mississippi River, if there be any, from any diversion from Lake Michigan.

441-443 Ex. 17 In reply to a communication from the Government at Canada, through the British Embassy, the Secretary of State, under date of November 24, 1925, advised the British Embassador as follows:

> "Referring further to your Embassy's note No. 813 of September 15, 1925, bringing to my attention certain remarks and inquiries of the Canadian Government in regard to the diversion of water from Lake Michigan by the Sanitary District of Chicago, I take pleasure in submitting the following statements:
>
> The Sanitary District of Chicago to which the permit of March 3, 1925, was issued by the Secretary of War, is a municipal corporation separate and distinct from the City of Chicago. The operations of the Sanitary District are conducted under direct authority of the legislature of the State of Illinois without reference to the operations of the municipal government of the City of Chicago. Diversion of water for domestic consumption in the City of Chicago being purely a function of the municipal government of the city, it is considered that the authority granted the Sanitary District could not be made to apply to or include this other diversion as well. The case before the Secretary of War for action involved the granting of a permit for diversion of water for sanitary purposes only, and the instrument of authority was worded accordingly.
>
> On the other hand, it seemed to the Secretary of War that the diversion of water for domestic consumption by the City of Chicago was larger than it should be, and that the amount wasted was not a negligible portion of the gross diversion. He also considered that this excessive diversion for domes-

tic purposes made the cost of sewage treatment, plant construction and operation unnecessarily high and consequently added to the length of the construction period and the difficulties of financing. For these reasons the Secretary of War took cognizance of the diversion for which the City of Chicago is responsible, in a restrictive way, rather than by permissive means, and included a condition in the permit making the instrument voidable in case the City of Chicago fails to take specified steps looking to a curtailment in the amount of water diverted for domestic purposes.

In the judgment of the Secretary of War the average diversion which should be authorized for sanitary purposes under the conditions known to exist should be not less than 8,500 cubic feet per second. The safety of the lives and health of citizens of the locality cannot be disregarded, and until the conditions of the permit of March 3, 1925, have been complied with no substantial reduction in the amount of diversion could be made without endangering health if not life.

The expression 'measured at the intakes' used to designate the places where the total actual flow should not exceed that specified in the permit, is hypothetical as it is impracticable to measure the diversion at the numerous intakes with accuracy. For this reason, the practical enforcement of the limitation placed upon the diversion will be carried out at Lockport. Measurements taken there will determine the gross diversion, sanitary and domestic, and, as accurate information is available in regard to the amount of water pumped by the City of Chicago for domestic purposes, the sanitary diversion may be computed by subtracting the domestic diversion from the gross flow at Lockport.

• • • • • • •

The Canadian Government is correct in concluding that no immediate reduction in diversions has been provided, but its conclusion that no definite reduction is assured and that the effect of the permits will actually be to authorize a greater diversion than is now being made cannot be confirmed. The gross flow at Lockport will not exceed an average of 9,700 cubic feet per second, and by the time the permit of March 3, 1925, has expired the gross flow may be reduced to 8,000 cubic feet per second and probably to 6,700 cubic feet per second. The sewage treatment program of the Sanitary District has been arranged, so as to make it possible to effect a reduction to a gross flow of 4,167 cubic feet per second by the year 1935 or before."

The Joint Board of Engineers appointed by the governments of the United States and Canada on the St. Lawrence Waterway in their report dated November 16, 1926, stated:

> "Question 6 (d):
>
> Without considering compensation by the present relative diversions of water from the Niagara River and from Lake Erie and without prejudice to a future consideration thereof, what works, if any, could be constructed to recover on the St. Lawrence River the amounts of power determined under Section 6 (c), and what would be the cost of such works?
>
> 244. Answer—The board finds that after the St. Lawrence River has been fully developed for power production, no works can be constructed which would recover on the St. Lawrence the power lost by the diversion of water from the watershed." (Ex. 147, p. 44, 6 (d))"

Evidence with respect to compensating works in the Great Lakes was admitted over objection of complainants. (T. 3390-3182; 3902-04; 5702)

Portion of Complainants' Exhibit 146 is as follows:

2067 "Sanitary District of Chicago
Maximum or Peak Flow and K. W. Output
1920 to 1926 Inclusive.

* * * * * * *

Items 4 and 5.			K. W.	Total C. F. S.
1925	Nov. 16	5 P. M.	25,000	13,415
1926	Sept. 23	4:30 P. M.	17,600	12,765

Minimum Flow on Days of Maximum Flow
1920-1926.

* * * * * * *

1925	Nov. 16	8 A. M.	10,300	5,615
1926	Sept. 23	2:30 A. M.	12,100	6,700

Based on record of flow at Lockport, Ill.''

The amount shown above for maximum and minimum flow includes the water diverted from Lake Michigan, as well as the domestic sewage or pumpage by the City of Chicago, amounting to 1,338 cubic second feet for the year 1925 and 1,395 cubic second feet for the year 1926. (Master's Report, p. 23)

HORACE P. RAMEY, FOR DEFENDANTS.

4385 Cross-examination:

I do not think the flow through the channel has ever exceeded the figure authorized by the permit since March 3, 1925, the date of the permit. Nor has the instantaneous maximum ever exceeded that amount. Referring to November 16, 1925, and to the figure of 13,415 cubic second feet, I do not think that the flow was ever that
4386 amount through the channel. What you are referring to is probably the record of a discharge from the end of the channel. I know that that much flow has not passed through the channel. It is true that the flow is measured at Lockport, but the discharge from the end of the channel is not the same for any given half hour that the flow through the channel might be, and as I recall the wording the permit is ''instantaneous flow through the channel''.

On redirect examination on this subject, Mr. Ramey testified (Tr. 4405-09; see infra p. 123).

Document 4, 69th Cong., 1st Sess., Committee on Rivers and Harbors, submitted to the Committee by the Chief of Engineers on March 29, 1926, (Ex. 18) states at p. 17:

> "26. Due to low lake levels, however, it is physically impracticable with existing works to withdraw more than about 8,250 cubic feet per second at Lockport. The city is withdrawing all that it can, this being within the terms of the permit, so that the figure of 8,250 cubic feet per second represents the instantaneous maximum that can be withdrawn at the moment, and also approximates the annual average that is being withdrawn."

741-43 COL. EDWARD M. MARKHAM, FOR COMPLAINANTS.

Graduate of the United States Military Academy, serving in the Engineer Corps from February 15, 1899, to date; on River and Harbor work in Florida, surveying on coal deposits in Philippine Islands, as Assistant Engineering Commissioner of District of Columbia, four years on the Improvement and Control of the Mississippi River and as Federal Engineer in charge of the Detroit District from 1919 to 1925. Author of House Document 270, 69th Congress, 1st Session.

746 From my study of the ton mile rates by land and water I estimate the annual saving from the use of water transportation on Lake Superior traffic to be
747 $120,000,000 per year and the annual saving for the whole lake trade at over $150,000,000 per year.

Ex. 144 November 29, 1926, the United States Shipping Board issued the following statement on the Great Lakes Commerce:

> "The magnitude of water-borne traffic on the Great Lakes is shown in statements prepared by the Bureau of Research, United States Shipping Board, in co-operation with the Board of Engineers for Rivers and Harbors, War Department, indicating that more than 210,300,000 cargo tons of freight were handled through Great Lakes ports in 1925, an

increase of 31,000,0000 tons, 11.8% over the total of the preceding year. Nearly 44% of the total water-borne commerce of the United States was conducted on the waters of the Great Lakes. The 197,500,000 tons of coastwise commerce of Great Lakes exceeded the total coastwise trade of ocean ports by more than 30,000,000 cargo tons, and the 12,800,000 tons of foreign commerce passing through Great Lakes ports constituted 13.8% of the total foreign commerce of the United States in 1925.

In the relative standing of all United States ports by volume of cargo tonnage handled, Duluth-Superior, with a total of 45,600,000 tons, ranks second to New York. Fifteen other Great Lakes ports handled more than 5,000,000 tons of freight each. The total cargo tonnage passing through these sixteen ports exceeded 172,900,000 tons and included 82.4% of the coastwise traffic as well as 78.3% of the United States foreign trade conducted on the Great Lakes in 1925."

Ex. 1134.
3647. This exhibit is a transcript of a portion of the oral argument before the Supreme Court of the United States on the motions to dismiss in this case, as follows:

"Mr. Justice Sutherland (interposing): Is the city of Chicago or the Sanitary District doing anything now that they are not permitted to do by the order of the Secretary of War?

Mr. Baker: So far as I know, they are not, sir.

Mr. Justice Sutherland: So that really your attack is on that permit?

Mr. Baker: In part, yes, sir; and I say 'in part' only because what we contend is that the Secretary of War has never made a regulation that had anything to do with navigation.

Mr. Justice Sutherland: But whatever they are doing is done by virtue of his permit?

Mr. Baker: Yes, sir.

Mr. Justice Sutherland: And they are not going beyond that?

Mr. Baker: I think that is so, and I think they are living up to the conditions that the Secretary of War imposed under that permit.

Mr. Justice Sutherland: And what you are really asking this Court to do is to review the order of the Secretary of War?

Mr. Baker: I suppose that is so."

Note.—The "Mr. Baker" above referred to is Mr. Newton D. Baker, a Special Attorney General for the State of Ohio. This exhibit was not admitted as against the complainants, Michigan and New York.

Respectfully submitted,

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ORIGINAL NOS. 6, 10 & 11,

Supreme Court, U. S.
FILED
FEB 10 1928
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

October Term, 1927

No. 11. ORIGINAL

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, vs. State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7, Original.
State of Michigan, Complainant, vs. State of Illinois and Sanitary District of Chicago, Defendants.	No. 11, Original.
State of New York, Complainant, vs. State of Illinois and Sanitary District of Chicago, Defendants.	No. 12, Original.

BRIEF FOR THE STATE OF MICHIGAN, COMPLAINANT, IN SUPPORT OF EXCEPTIONS TO REPORT OF SPECIAL MASTER

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IN THE

Supreme Court of the United States

October Term, 1927

No. 11. ORIGINAL

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.

No. 7, Original.

State of Michigan, Complainant,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

No. 11, Original.

State of New York, Complainant,

vs.

State of Illinois and Sanitary District of Chicago, Defendants.

No. 12, Original.

BRIEF FOR STATE OF MICHIGAN

IN SUPPORT OF EXCEPTIONS TO REPORT OF SPECIAL MASTER

REFERENCE TO REPORT OF SPECIAL MASTER

This case is an original action brought under the equity jurisdiction of the Supreme Court of the United States, and therefore reference cannot be made to any opinion from a lower court. Reference, however, is respectfully made to the Report of the Special Master to whom this case was referred. This Report was filed November 23, 1927, with the Clerk of this Court, and reference is made thereto for the findings of fact and conclusions of law referred to.

JURISDICTION OF THIS COURT

Inasmuch as the Special Master has found (Report of Special Master, pages 140-146) that this Court has jurisdiction in the instant case, and has held that this action presents a justiciable controversy (to which Defendants have not excepted), it is deemed unnecessary to set forth at greater length than by citation the authorities relied upon to sustain the jurisdiction of this court and that a justiciable controversy is presented.

Cohens v. Virginia, 6 Wheat. 263;
Missouri v. Illinois, 180 U. S. 208, also 200 U. S. 496;

Louisiana v. Texas, 176 U. S. 1;
Hans v. Louisiana, 134 U. S. 1;
Kansas v. Colorado, 185 U. S. 125;
New York v. New Jersey, 256 U. S. 296;
Wyoming v. Colorado, 259 U. S. 419;
North Dakota v. Minnesota, 263 U. S. 365;
Pennsylvania v. W. Virginia, 262 U. S. 553;
Georgia v. Tennessee Copper Co., 206 U. S. 237.

EXCEPTIONS TO REPORT OF SPECIAL MASTER RELIED ON

Statement of errors assigned is also dispensed with herein because the case was not heard in a lower court. However, attention is called to the "Exceptions to the Report of the Special Master" filed by Complainant, January 3, 1928, with the Clerk of this Court, in No. 11, Original, October Term, 1927, which exceptions are now severally relied upon and urged.

STATEMENT OF THE PLEADINGS

(It is deemed necessary to set forth a summary of the pleadings and statement of facts, so that Complainant's position may be made clear.)

This is an action brought under the original equity jurisdiction of the Supreme Court of the United States by the State of Michigan, complainant, to enjoin the State of Illinois and the Sanitary District of Chicago, defendants, from abstracting the waters of Lake Michigan, to the damage of complainant. The Bill was filed in this Court by the State of Michigan, complainant, on March 8, 1926, alleging that the diversion at Chicago had caused a lowering of the levels of Lakes Michigan, Huron, St. Clair, Erie and Ontario, and of the waterways connecting these lakes, and of the St. Lawrence River above tidewater, not less than six inches below the levels that would otherwise exist, to the serious injury of complainant, as a sovereign state, as *parens patriae*, and as proprietary owner of land littoral to the Great Lakes and their connecting waters; that the acts of defendants in abstracting and diverting water from Lake Michigan had never been authorized by complainant or by Congress, and were in violation of the legal rights of complainant and her people, to the free and unobstructed use of Lake Michigan and the other Great Lakes, connecting waterways, and the ports and harbors thereof, within the borders of the State of Michigan, for the purposes of navigation, trade, and commerce, free from any interference with the navigable capacity of such waters, by any agency of complainant, or the United States Government, and also, the right to the free and unobstructed navigation of Lakes Michigan, Huron, St. Clair, Erie and Ontario, and the navigable waters between these lakes, and from them into the Mississippi River and the Atlantic Ocean, both under the common law and the Ordinance of 1787 for the Government of the Northwest Territory; also that the acts of defendants were in violation of the provisions of the Act of Congress of March 3, 1899, and particularly of section 10 of that act; and also, that the defendant Sanitary District of Chicago had not complied with the conditions of the permit of the Secretary of War of March 3, 1925.

The defendants filed their Answer June 1, 1926, setting forth their claims as to the nature and history of the sanitary canal and the diversion of water from Lake Michigan, and its claimed purposes, and asserted authority for the diversion, under acts of the legislature of Illinois and of Congress and permits of the Secretary of War, claimed to be authorized by Congress in the regulation of interstate commerce; also alleging full compliance with the conditions of the permit of the Secretary of War of March 3, 1925.

The defendant, Sanitary District of Chicago, also alleged that Lakes Michigan, Huron, St. Clair, Erie and Ontario, and the connecting waterways, were not lowered more than four and three-fourths inches, by reason of the Chicago diversion, while the defendant State of Illinois claimed that the mean level of the Lakes and connecting waterways were not lowered to any greater extent than that which would exist in the absence of the Chicago diversion. Other defenses were set forth by the defendants, but disposed of by the Special Master and do not need consideration.

On June 7, 1926, by order of reference, the cause was referred by this Court to the Special Master, and the State of Michigan, complainant, was permitted, upon its election (which was exercised) to participate in the taking of testimony and in the hearing before the Special

Master, in like manner and with like effect as if the action had been consolidated by the Court's order with similar actions begun by the States of Wisconsin, Minnesota, Ohio, Pennsylvania, and New York, complainants, against these same defendants, and in which actions the States of Missouri, Tennessee, Kentucky, Arkansas, Mississippi and Louisiana appeared as Intervening Defendants.

The Special Master filed his Report herein on November 23, 1927, and on January 3, 1928, this complainant, the State of Michigan, filed its Exceptions to the Report of the Special Master.

STATEMENT OF FACTS

1. THE GREAT LAKES-ST. LAWRENCE WATERWAY.

The Great Lakes-St. Lawrence Waterway is a great natural system of navigation and highway of commerce, consisting of Lakes Superior, Michigan, Huron, St. Clair, Erie and Ontario, and the St. Marys, St. Clair, Detroit, Niagara and St. Lawrence Rivers. (M. R. 107.) This system of waterways was navigable in a state of nature and its navigable capacity has been improved by agencies of the local, State, Federal and Canadian Governments. (M. R. 107, 49.) It has a shore line from the west end of Lake Superior to the international boundary line on the St. Lawrence River of 8,117 miles, of which 4,345 miles are within the United States. (M. R. 107.) Of this shore line, 2,391 miles lie within the State of Michigan, 55 miles within the State of Pennsylvania,

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(For convenience the abbreviation M. R. will be used for page citations from the Master's Report.)

719 miles within the State of New York, 673 miles within the State of Wisconsin, 186 miles within the State of Minnesota, 261 miles within the State of Ohio, and only 60 miles within the defendant state of Illinois.

The total drainage area of the Great Lakes-St. Lawrence in land and water surface is 298,080 square miles. The total land area of the Great Lakes-St. Lawrence system drainage basin is 202,910 square miles, of which only 715 square miles lie within the defendant State of Illinois, while there are 95,170 square miles of water surface area in this system, of which only 1,674 square miles are within the State of Illinois. (M. R. 107.) In a state of nature the mean annual contribution of the State of Illinois to the net water supply of this waterway was 503 c.f.s.*, (M. R. 23), and the Chicago River flowed into Lake Michigan and contributed to the water supply of the Great Lakes-St. Lawrence as would also the Little and Grand Calumet Rivers. (M. R. 10, 23.) Under natural conditions all of the waters of the Great Lakes-St. Lawrence system discharged eastward through the St. Lawrence River into the Atlantic Ocean. (M. R. 10, 107.)

2. COMMERCE, NAVIGATION, AND OTHER INTERESTS OF MICHIGAN AND HER PEOPLE IN THE GREAT LAKES-ST. LAWRENCE WATERWAY.

Around the Great Lakes there has been built up in the State of Michigan, as well as other states, a great industrial and commercial civilization, involving investments of hundreds of millions of dollars, and the employment of millions of people. This came about largely because navigation of a practical nature could be carried on with vessels of a sufficiently deep draft to make water transportation economical. Millions of people have settled on the Great Lakes and commerce and industry are dependent for their prosperity and future development upon the availability of this great waterway to the limit of its natural capacity, and particularly is this true of the State of Michigan which is nearly surrounded by this waterway system. (M. R. 106-118.)

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*(For convenience the abbreviation c.f.s. will be used for cubic feet per second.)

The Great Lakes and their connecting channels form a natural highway for water transportation of over 95,000 square miles, extending from Duluth on Lake Superior, to Montreal on the St. Lawrence. (M. R. 107.) There are approximately 400 harbors on the Great Lakes and connecting channels, of which about 100 have been improved by the Federal Government at enormous public expense, (M. R. 49, 107), such improvements mainly consisting in excavations and maintenance of channels from deep water to harbor entrances. In many cases local harbors, located inside of the Federal channels, have been improved and maintained at local expense, these harbors being necessary for practical navigation. Loading, unloading and other terminal facilities have been constructed in these ports on a large scale and at great local expense. The State of Michigan has a large number of these improved ports and inner harbors. (M. R. 107.)

There are about 300 unimproved harbors which have navigable capacity, which are used by pleasure and fishing boats and small craft in the landings, bays, inlets and river mouths, a large number of which are within the State of Michigan. (M. R. 107.)

Transportation on the Great Lakes by American ports during the year 1923, amounted to 125,517,551 tons, valued at $1,383,903,309. Among the ports engaged in handling this business were a large number of the ports of the State of Michigan. (M. R. 108.)

The territory which is tributary to the Great Lakes is the most important grain producing district in the world, and includes not only American grain, but nearly all of the Canadian grain. During the ten year period ending with 1923, the states in this territory produced 71.8 per cent of the wheat, 87.7 per cent of the oats, 66.8 per cent of the corn, 73.1 per cent of the barley, and 82.3 per cent of the rye of the United States. An enormous volume of grain is shipped eastward over the Great Lakes to domestic and foreign ports. Over 350,000,000 bushels arrived at four Great Lakes ports in 1923, from western and northwestern states. A large amount of Canadian grain is also shipped through American ports. Over 409,849,000 bushels of grain were shipped on the Great Lakes during 1923 alone. (M. R. 108-9.)

Another important commodity shipped on the Great Lakes is iron and copper ore; nearly half of the total lake traffic in 1923 consisting of ore shipments. During that year six iron ore ranges in the Lake Superior region shipped 80 per cent of the total ore moving from American mines. This ore was shipped from five ports, two of which are located in the upper peninsula of the State of Michigan. The bulk of this ore was received at fourteen ports on Lake Michigan and Lake Erie, and smaller amounts at other ports. In 1923 the port of Duluth shipped nearly 38,000,000 long tons of ore alone, and the ports of Michigan rank high in the quantity of iron ore transported on the Great Lakes. (M. R. 109.)

Large quantities of coal are shipped upon the Great Lakes from Ohio, Pennsylvania, Virginia, West Virginia, Tennessee and Kentucky, to markets in the northwestern states and the provinces of Canada. This shipment of coal from mines to ports of loading on Lake

Erie and Lake Ontario, during 1923, amounted to 34,293,373 tons, consisting of both bituminous and anthracite coal. Of this coal shipped from lower Lake ports, a vast quantity was shipped to ports upon all of the lakes and connecting waters, including those of the State of Michigan. Large amounts of coal shipped by lake transportation were consumed at upper lake ports, including those of the State of Michigan. This movement of coal amounted to about 8,621,337 tons in 1923. (M. R. 110.)

In addition to iron ore, grain and coal which are the bulk commodities of importance carried on the Great Lakes, other commodities including stone, sand, gravel, lumber and petroleum are most important in the amount of tonnage, and comprised about 12 per cent of the lake traffic in 1923. With the exception of about 700,000 tons, the stone shipped on the Great Lakes in 1923, originated in the State of Michigan, three ports alone shipping 9,021,000 tons of stone. (M. R. 111.)

The traffic in forest products, on the Great Lakes in 1923, amounted to 378,674 tons. Petroleum products moving on the Great Lakes to various ports, including Detroit and other Michigan ports, where they are stored in tanks for local distribution, amounted in 1923 to 1,577,518 tons. The movements of sand and gravel, being of a local nature and the hauls being generally short, are not all recorded, but in 1923 the receipts by American ports on the Great Lakes amounted to 3,771,160 tons. Package freight moved on the Great Lakes in 1923 amounted to 3,000,000 tons. The car ferry traffic of the Great Lakes has grown to such proportions that special types of carriers have been developed. This particular transportation depends largely upon improvements at lake harbors permitting car ferries to make rail-to-ferry connections. (M. R. 112.)

During the year 1923 alone, the Great Lakes commerce constituted 44 per cent of the total water-borne commerce of the United States, there being 71,466,902,000 ton-miles of water-haul of the principal bulk commodities of water-borne traffic on the Great Lakes. (M. R. 112.) All of this commerce is directly dependent to a large degree, upon the water levels of this waterway system for its continuance. (M. R. 113.)

The United States Shipping Board, in a statement issued November 29, 1926, summarized its view of the magnitude of water-borne traffic on the Great Lakes and its appraisal in comparison with ocean commerce, illustrating the enormous trade that is handled on the Great Lakes. It was said: (J. R. 185, 186)*

> "The magnitude of water-borne traffic on the Great Lakes is shown in statements prepared by the Bureau of Research, United States Shipping Board, in co-operation with the Board of Engineers for Rivers and Harbors, War Department, indicating that more than 210,300,000 cargo tons of freight were handled through Great Lakes ports in 1925, an increase of 31,000,000 tons, 11.8% over the total of the preceding year. Nearly 44% of the total water-borne commerce of the United States was conducted on the waters of the Great Lakes. The 197,500,000 tons of coastwise trade of ocean ports by more than 30,000,000 cargo tons, and the 12,000,000 tons of foreign commerce passing through Great Lakes ports constituted 13.8% of the total foreign commerce of the United States in 1925.
>
> "In the relative standing of all United States ports by volume of cargo tonnage handled, Duluth-Superior, with a total of 45,600,000 tons, ranks second to New York. Fifteen other Great Lakes ports handled more than 5,000,000 tons of freight each. The total cargo tonnage passing through these sixteen ports exceeded 172,900,000 tons and included 82.4% of the

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*(For convenience the abbreviation J. R. will be used for page citations from the Joint Abstract of Record.)

coastwise traffic as well as 78.3% of the United States foreign trade conducted on the Great Lakes in 1925."

In addition to its ports and harbors, and this commerce, the State of Michigan has a shore line of 2,391 miles including a large number of islands, on Lakes Superior, Michigan, Huron, St. Clair and Erie, and their connecting waters, which is the site of a great summer resort industry, and the location of thousands of summer homes and cottages of the people of the State. (M. R. 105, 117.) Small towns have been built up, devoted to and dependent upon the summer resort industry for their existence. There are excellent bathing beaches, fishing and hunting grounds, including marshes and attractive features for birds and other wild-life, all peculiarly suited to navigation of small craft. Likewise the State of Michigan has 26 public parks located on the shores of the Great Lakes with 21 miles of shore line for the pleasure and recreation of its people; also the State of Michigan has built docks at Mackinaw City and St. Ignace and has established a ferry service across the Straits of Mackinac as a part of its highway system. All of these major interests of complainant and its people are dependent to a great degree upon the levels of the Great Lakes-St. Lawrence system. (M. R. 105, 117.)

3. THE CHICAGO SANITARY CANAL.

The drainage basins of the Great Lakes-St. Lawrence and the Mississippi River system are separated by a continental divide which passes about ten miles to the west of the southwestern end of Lake Michigan, and in its natural state was from ten to eleven feet above the level of Lake Michigan. (M. R. 10.) Between this divide and the Lake lies the basin of the Chicago River, with its two branches, both near the shore of the Lake, the North Branch flowing in a southerly direction, and the South Branch flowing northerly. (M. R. 10.) These branches unite about one mile from the Lake to form the main channel of the River, which formerly flowed into Lake Michigan, carrying with it the waters of its drainage basin. (M. R. 10.) The Little and Grand Calumet Rivers, rising in Indiana, flowing westerly into Illinois, curve to the north and east, and in their natural condition flowed into Lake Michigan, carrying the waters of their drainage basins. (M. R. 10, 11.)

The city of Chicago lies on a low prairie between Lake Michigan and the Des Plaines River, which river is on the other side of the continental divide. This river rises in southern Wisconsin, flows southerly, parallel to the lake shore, until it reaches a point about due west of the mouth of the Chicago river, and then turns southwest, joining the waters of the Kankakee River to form the Illinois River, which flows into the Mississippi. (M. R. 10, 11.) Between the Des Plaines and South Branch of the Chicago River there was a swampy tract, known as Mud Lake, through which in times of freshet, the waters of the Des Plaines River poured over the divide into the Chicago basin and found their way into Lake Michigan. (M. R. 10-11.)

By Act of March 30, 1822, Congress authorized Illinois to survey and mark through public lands of the United States the route of a canal connecting the Illinois River with Lake Michigan, and by Act of March 2, 1827, to proceed with the construction of that canal which was begun in 1836 and completed in 1848. (M. R. 11.) That canal crossed the continental divide between the Chicago and Des Plaines Rivers on a summit level eight feet above the lake, paralleled the Des Plaines and Upper Illinois Rivers to La Salle, Illinois, where it entered the Illinois

River. The summit of the canal was supplied with water by pumping out of the Chicago river—only enough water being pumped originally to meet the needs of navigation —a depth of four feet. (M. R. 11, 12.) The Chicago River has always been the main receptacle of the sewage of the City of Chicago. (M. R. 12.) It was found that pumping to supply the Illinois-Michigan canal perceptibly cleaned the waters of the South Branch of the Chicago River. (M. R. 12.) In 1865 the Legislature of Illinois, recognizing that the Chicago River was sluggish and that steps should be taken to purify the river from the sewage of the rapidly growing city of Chicago, together with the waste of industrial plants which had become very offensive, authorized a deeper canal and an arrangement was made to deepen that canal and introduce water by gravity flow through the Chicago River from the lake into the canal, so as to accomplish that purpose. (M. R. 12.) After considerable effort with only a fair degree of success, and after trying several expedients to afford sufficient dilution to flush the sewage down that canal, it was recognized that some other expedient must be resorted to. (M. R. 13.) The reversal of the rivers was not accomplished and the mean flow was less than 300 c. f. s. (M. R. 13.) In 1881 the Legislature of Illinois adopted a resolution reciting the gross pollution of the Illinois River by the sewage of Chicago and the consequent injuries to fish life and the inhabitants of the Illinois Valley and requiring the City of Chicago to pump not less than 1000 c. f. s. of water from the Chicago River into the canal for the purpose of relieving the pollution of the Illinois River, and further reserving the right to require the City of Chicago in future years, to take care of its sewage through other channels. (M. R. 13.) But this was not effective, and in 1886, after numerous complaints, a Drainage and Water Supply Commission was created to study and report upon the question of this disposal of the sewage. (M. R. 14.) This Commission considered three methods of sewage disposal and recommended as most economical the discharge into the Des Plaines River through an artificial channel to be cut across the continental divide, thus providing a canal that would furnish ample dilution. (M. R. 14.)

Accordingly, the Legislature of Illinois, by Act of May 29, 1889, authorized the creation of Sanitary Districts to provide for drainage, with power to condemn property to construct channels for a sanitary canal, and other powers, requiring that any channel constructed be of sufficient capacity to produce a continuous flow of water of at least 200 cubic feet per minute for each one thousand population, which was later amended so as to provide a channel which should discharge not less than 20,000 cubic feet per minute for each one hundred thousand inhabitants, "and shall thereafter maintain the flow of such quantity of water." (M. R. 14-17.)

Under this Act of 1889, the Sanitary District of Chicago was organized in 1890, its district comprising an area of 185 square miles, and by later acts approximately 438 square miles, extending from the Illinois state line on the south and east to the northern border of Cook County on the north, with about 34 miles of frontage on Lake Michigan, and embracing the so-called metropolitan area of Chicago, made up of 54 suburbs including cities, towns and villages. (M. R. 17, 18.)

In 1892 the Sanitary District of Chicago began construction of the Sanitary Canal, an artificial channel extending from the west fork of the South Branch of the Chicago River, near Robey Street (in the City of Chicago and about six miles from Lake Michigan) to the Des Plaines River at Lockport, a distance of about 28 miles. It was dug thirteen miles through earth to Willow Springs

24.4 feet deep and from 250 to 300 feet wide. It was blasted out of solid rock from Willow Springs to Lockport, with a width of 161 feet and a depth of 24.4 feet. Controlling works were constructed at Lockport, with seven sluice gates each 30 feet wide and a movable dam 160 feet long. By the opening of these gates or the lowering of the dam the amount of water flowing in the main channel could be regulated at all times. (M. R. 18.) On June 16, 1896, work on the channel of the Sanitary Canal proceeded to the point where the Sanitary District asked authority to widen and deepen the Chicago River. The United States District Engineer recommended the granting of the permit upon condition that it should not be interpreted as approval of the plans of the Sanitary District to introduce a current into the Chicago River and upon the ground that an abstraction of water from the lakes was not involved in the application then under consideration. (M. R. 34, 35.) These conditions were included in the permit of the Secretary of War, July 3, 1896. Later the Sanitary District made application to open the main channel of the Sanitary Canal to reverse the flow of the Chicago River and cause it to flow away from Lake Michigan to the west. On April 24, 1899, the United States District Engineer at Chicago, in reporting on the proposal, deplored the situation that had been created by the Sanitary District going ahead with large expenditures without any assurance that authority would be granted, and recommended that a conditional permit be granted awaiting the action of Congress providing an obstructive current was not introduced into the Chicago River, and the Secretary of War issued a permit with such conditions May 8, 1899, stating emphatically that this permit was but temporary and that the final action of Congress would control. (M. R. 38.)

The canal was opened January 17, 1900. (M. R. 18.) Since that date the flow of the Chicago River has been reversed and instead of flowing into Lake Michigan with the waters of its drainage basin, it has been made to flow away from Lake Michigan into the Sanitary Canal and from thence into the Mississippi River system, not only diverting its own drainage contribution but carrying along with it the abstraction from Lake Michigan. (M. R. 19.)

On April 9, 1901, the Secretary of War directed the Sanitary District to regulate the discharge through the Chicago River into the drainage canal, so that the maximum flow should not exceed 200,000 cubic feet per minute. (M. R. 41.) On July 15, 1901, the Sanitary District made application for permission to flow 300,000 cubic feet per minute between four p. m. and twelve o'clock at midnight, for the purpose of sewage disposal, on the ground that such an increased flow during the period in question would not injure navigation, as the effect upon the current would be confined to the period extending from twelve o'clock at midnight to six a. m. on the following day. (M. R. 42.) On October 16, 1901, the Sanitary District applied for permission to flow 300,000 cubic feet per minute, but limited the request to authorization of 250,000 cubic feet per minute, until the close of navigation, so as not to injure navigation interests, and on December 5, 1901, a formal permit was issued regulating the flow to 250,000 cubic feet per minute. (M. R. 42.) Just prior to January 17, 1903, the Sanitary District applied to the Secretary of War for permission to increase the discharge through the Chicago River and drainage canal to 350,000 cubic feet per minute during the closed season of navigation, in the interests of the health of the people of Chicago, on the ground that navigation would not be injured by such a flow because of the closed season. (M. R. 43.) The District Engineer recommended the grant of the application during the closed season of navigation until March 31, when it was to be reduced to 250,000 cubic feet per minute again, whereupon the Secretary of War's permit of January 17, 1903, contained these terms. (M. R. 43.)

This canal as originally constructed and opened ended in a non-navigable tail-race. (M. R. 19.) There was no lock at the southwestern end, but authority was given by Illinois Act of May 14, 1903, extending the corporate limits of the Sanitary District of Chicago so as to permit it to construct a channel across the Illinois and Michigan canal, and to construct dams, waterwheels and other works to develop water power from the water passing through its main and auxiliary channels. (M. R. 19.) This work was accomplished and the main channel was extended to the proposed power house ready for operation in 1907. (M. R. 19.) In 1908 by constitutional amendment of Illinois, authority was provided to construct the canal from Lockport to Utica, and for the installation of power plants and necessary appliances to develop water power under regulations to be authorized by the Legislature of Illinois. (M. R. 19, 20.) Water power has accordingly been developed from 1908 to the present. Since 1908 hydro-electric power has been generated by the Sanitary District at the easterly terminus of the main channel, although the actual output at the power house has been much less than the theoretical capacity, due to the present inefficiency of the installation. The total quantity of electrical power which has been generated by the Sanitary District at Lockport since 1907 is 1,957,509,931 K.W.H.* or 299,408 horse power. (M. R. 24-26.) During the period 1920 to 1924 the average yearly production of power was 122,343,360 K. W., or about 18,721 horse power. A large amount of power thus generated has been used in the work of the Sanitary District and also for street and park lighting in the city of Chicago and other municipalities within the District. A considerable portion of the power developed has been sold to commercial consumers at a price of about $55.00 per horse power, thus giving an asset worth at least $1,029,655.00 per year. (M. R. 24-26.)

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*(For convenience the abbreviation K.W.H. is used for Kilowatt-Hours.)

November 28, 1906, the Sanitary District submitted a proposed permit to the Secretary of War to authorize the construction of a channel from the Calumet River through a depression known as the "Sag", to connect with the main drainage canal for the purpose of diverting the water of the Little Calumet River, and reversing its flow, under ordinary conditions, for sanitary purposes. Both the Chief of Engineers and the Secretary of War rejected this request March 14, 1907, (M. R. 48, 49) but a permit was granted for the construction of the so-called North Shore Canal from Lake Michigan at Wilmette to the North Branch of the Chicago River, September 11, 1907, providing that no greater amount was diverted from Lake Michigan. (M. R. 51.) The Sanitary District, however, ignoring the Federal Government entirely, proceeded with the construction of the Calumet-Sag channel, and the United States Government brought an action in 1908 in the Federal Circuit Court for the Northern District of Illinois, Eastern Division, to prevent the construction of a canal whereby further diversion could be brought about. (M. R. 52.) This suit, after considerable delay, (from 1908 to 1913), was joined with another suit brought by the Federal Government in 1913 to restrain diversion of water from Lake Michigan above the maximum permitted by the Secretary of War. (M. R. 72.) This suit finally reached this Court in June, 1923, and was terminated January 5th, 1925, in a decree upholding the

Government's contention, but in the meantime the Sanitary District had proceeded with the construction of the Calumet-Sag channel and from that time on diverted its water into the channel of the Sanitary Canal without any new permit, and in the meantime had been exceeding its permit by double the amount mentioned in the only permit under which it could claim. (R. 22, 23, 59, 72.)

January 10, 1910, the Sanitary District formally applied for permission to construct a channel from the Little Calumet River to the main channel of the Sanitary Canal. (M. R. 59.) On March 1, 1910, the Chief of Engineers reported to the Secretary of War, recommending that no increase in diversion should be authorized, and on June 30, 1910, the Acting Secretary of War authorized the construction of the Calumet-Sag channel upon certain conditions, including the submission of this question to Congress, a prohibition against obstructions to navigation, and a condition that the total amount of abstraction should not exceed the maximum already permitted by the Secretary of War (4167 c.f.s), and also that this permit should not be used in the suit begun by the Federal Government against the Sanitary District. (M. R. 59.) On February 5, 1912, the Sanitary District of Chicago applied for permission to withdraw 10,000 c.f.s. from Lake Michigan through the Chicago and Calumet Rivers, for the purpose of sewage disposal by dilution. (M. R. 61.) Under date of February 28, 1912, the Chief of Engineers reported to the Secretary of War that the application should be denied, advising that 1,000 c.f.s. of water from Lake Michigan was sufficient for navigation purposes alone, and that the installation of modern methods of sewage treatment would obviate the necessity for a large diversion of water, and that such diversion would seriously affect lake levels and the water power development capacity of the Niagara and St. Lawrence Rivers. (M. R.

61, 62.) On January 8, 1913, the Secretary of War rendered an exhaustive opinion denying the application of the Sanitary District setting forth in detail why 1,000 c.f.s. of water from Lake Michigan was sufficient for all purposes, calling attention to the lowering of lake levels as a serious menace to navigation, also calling attention to International Relationship with Canada, and stating that Chicago had not attempted to solve its sewage disposal problem in the proper manner, stating as his conclusion that the proposed diversion would interfere substantially with the navigable capacity of the navigable waters of the Great Lakes and their connecting rivers. (M. R. 62-66), (J. R. 145-158.)

Following this determination and denial of the application of the Sanitary District, the Attorney General of the United States, on October 6, 1913, filed another bill in equity in the same federal court, to enjoin the Sanitary District from diverting more than 4,167 c.f.s. from Lake Michigan, which was joined with the earlier action, and which resulted in a decree ten years later, June 18, 1923, in the Government's favor. (M. R. 72.) The Sanitary District appealed to the Supreme Court of the United States, which upheld the contentions of the Government on January 5, 1925, and entered a decree restraining these defendants from abstracting or diverting more than 4,167 c.f.s. of water from Lake Michigan (Sanitary District vs. United States, 266 U S. 405.)

On January 13, 1925, the Sanitary District applied to the Secretary of War for permission to divert 10,000 c.f.s. from Lake Michigan for the stated purposes of eliminating offensive conditions along the Illinois River, to keep the Chicago River reversed at all times so that during storm periods it would not pour sewage into Lake Michigan and also to protect the health conditions of Chicago. (M. R. 73.) The District Engineer at Chicago recommended a conditional, temporary permit for the purpose of compelling the Sanitary District to construct sewage disposal works within a reasonable time, so as to permit a reduction in the quantity of water diverted. (R. 75, 76.) On March 3, 1925, the Secretary of War issued a permit to the Sanitary District of Chicago purporting to authorize the diversion of 8,500 c.f.s. from Lake Michigan upon certain conditions including a prohibition against unreasonable interference with navigation, requiring a program for the treatment of sewage, posting a bond for its share of the cost of regulating works, and requiring the metering of water for the domestic use of the city of Chicago. The permit was revocable at will and was to expire December 31, 1929. (M. R. 79-80.) In forwarding a copy of the permit to the Sanitary District of Chicago, the Secretary of War advised the Sanitary District that it was the policy of the War Department to hold the taking of an excessive amount of water for sanitation at Chicago as affecting navigation on the Great Lakes adversely and that the diversion of water from Lake Michigan should be reduced to reasonable limits with utmost despatch. (M. R. 80.) Under this permit the Sanitary District claims authority to divert and abstract these waters from Lake Michigan. (M. R. 81.)

Following the granting of this permit and on May 7, 1925, the Government of Canada began diplomatic correspondence concerning the amount of the Chicago diversion and when it would be stopped or cut down. (M. R. 83-85.) Three specific questions were propounded which were answered by the Secretary of State of the United States, June 15, 1925, stating the terms of the permit and that the flow at Lockport amounted to 9,700 c.f.s. (M. R. 85.)

The sewer system of Chicago is a combined system carrying both storm water and sewage, originally draining principally into the Chicago River and its branches. (M. R. 20.) Two large intercepting sewage systems on the south side and on the north side of Chicago were so constructed as to flush the sewage into the main drainage canal by water abstracted from the Lake. There was also constructed what was known as the North Shore Channel, starting from Lake Michigan at Wilmette, and connecting with the North Branch of the Chicago River, which carried the sewage from the north shore sewage system, by reason of the flushing of water pumped into it from Lake Michigan. (M. R. 21.) The same process carried the sewage from the Calumet intercepting sewage system into the Calumet-Sag Canal. (M. R. 21.) Thus all of the sewage of the Sanitary District was flushed into and through the main channel by means of this abstraction of water from Lake Michigan. (M. R. 21.) In order to accomplish this result, large quantities of water were abstracted from Lake Michigan and passed through the drainage canal, in addition to the quantity of water pumped from the Lake by the city of Chicago for its domestic water supply, and then passed into the drainage canal. (M. R. 20, 21, 81.) The mean annual quantities of water abstracted from Lake Michigan and passed through the drainage canal constitute an increasing diversion, amounting to at least an average of 8,674 c.f.s. between 1920 and 1924. (M. R. 22, 23.) This amount of water does not include the added diversion of 503 c.f.s., being the flow the Chicago basin under natural conditions would have contributed to the supply of the Great Lakes-St. Lawrence system, but which was diverted also. (M. R. 23.)

The flow of all of the water abstracted and diverted from Lake Michigan passes through the drainage canal into the Mississippi watershed, and becomes permanently lost to the Great Lakes-St. Lawrence Waterway System. (M. R. 23.)

4. EFFECT OF THIS ABSTRACTION OF WATER FROM LAKE MICHIGAN UPON THE LEVELS AND NAVIGABLE CAPACITY OF THE GREAT LAKES-ST. LAWRENCE SYSTEM.

The Special Master found the facts to be in substantial accordance with the claims of complainant,—that this abstraction of water from Lake Michigan by defendants had caused a lowering of the levels of the Great Lakes, so that Lakes Michigan and Huron and their connecting waters were lowered at least six inches, and that Lakes St. Clair, Erie and Ontario were lowered approximately five inches. (M. R. 104.) The Special Master rejected defendants' claims (M. R. 104), basing his findings upon testimony which included the report of the International Waterways Commission of the United States and Canada, January 4, 1907 (M. R. 95), the report of the Board of Engineers for Rivers and Harbors, August 24, 1920 (M. R. 67), the report of the Joint Board of Engineers, United States and Canada, November 16, 1926 (M. R. 96), the testimony of Colonel Pillsbury, United States Army Engineer in charge of the United States Lake Survey, and the records of that Survey (M. R. 99-102). The special Master found as follows (M. R. 104, 105):

> "I find that the full effect of a diversion of 8,500 c.f.s. of water from Lake Michigan at Chicago through the drainage canal of the Sanitary District would be to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; the levels of Lakes Erie and Ontario, approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they

have the same mean levels as the above-mentioned lakes, to the same extent, respectively. * * *

"I find that the diversion which has taken place through the Chicago drainage canal has been substantially equivalent to a diversion of about 8,500 c.f.s. for a period of time sufficient to cause, and has caused, the lowering of the mean levels of the lakes and the connecting waterways practically to the extent above stated.

"I find, further, that an increase of the diversion at Chicago above 8,500 c.f.s. would cause an additional lowering of the levels of the lakes and their connecting waterways in proportion to the amounts above stated. Thus a diversion of an additional 1,500 c.f. s. or a total diversion of 10,000 c.f.s. would cause an additional lowering in Lakes Michigan and Huron of about one inch, and in Lakes Erie and Ontario a little less than one inch, with a corresponding additional lowering in the connecting waterways having the same levels as the lakes respectively.

"I also find that if the diversion at Chicago were ended, assuming that other diversions remained the same, the mean levels of the lakes and rivers affected by the Chicago diversion would be raised in the course of several years (about five years in the case of Lakes Michigan and Huron and about one year in the case of Lakes Erie and Ontario) to the same extent as they had been lowered, respectively, by that diversion."

5. EFFECT OF THIS ABSTRACTION OF WATERS UPON COMMERCE, NAVIGATION AND OTHER INTERESTS OF THE STATE OF MICHIGAN AND ITS PEOPLE.

The State of Michigan, with 2,391 miles of shore line, has 16,653 square miles of Lake Superior, 12,922 square miles of Lake Michigan, 9,925 square miles of Lake Huron, and 460 square miles of Lakes St. Clair and Erie within its boundaries. (M. R. 106.) Hence the interest of the State of Michigan, and its people is manifest in the Lake levels and connecting waters of the Great Lakes-St.

Lawrence System throughout, and particularly in that portion which lies within its boundaries. By reason of its ports and commerce, the State of Michigan and its people are vitally concerned in the effect on navigation and commercial interests caused by lowering the Great Lakes due to the Chicago abstraction. (M. R. 112.)

The amount of permissible draft of vessels carrying the greater portion of the freight traffic between Lake Superior and Lake Erie has been increasingly important. (M. R. 113.) There are *critical points* in navigating the St. Marys and St. Clair Rivers, Lake St. Clair, and the Detroit River and other connecting waterways, and vessels must of necessity be loaded to available depths at such points. A lowering of the levels of the lakes increases the hazards and dangers of navigation, contributes to groundings and strandings, and actually prohibits the loading of vessels to anywhere near their capacity, because of the necessity to navigate these *critical points* in the connecting waters between these lakes. (M. R. 115.) It is manifest that although Lake Superior is not affected by the Chicago diversion, yet all commerce leaving or arriving at Lake Superior ports, must contemplate the lower lake levels of the other lakes and their connecting waters because of the critical points which must be navigated, and accordingly, commerce upon that lake is as much affected, and perhaps more so, because of its present character, i. e., grain, iron ore and other commodities that have their point of origin in the Lake Superior region. (M. R. 114.) The rest of the Great Lakes, being lowered approximately six inches or more, must constantly recognize the permissible draft of all vessels, because of these critical points. (M. R. 113, 114.)

Transportation upon the lakes has been done upon the basis that channel depths and widths would be suitable for at least a twenty-foot draft. (M. R. 114.) Since 1906 all freighters have been constructed upon a draft theory of twenty-three to twenty-four feet, with commensurate length and beam. A third lock was authorized in 1906 for St. Marys Falls, 80 by 1,350 feet, with sills set at a depth of 24.5 feet, thus providing at that time for future ship drafts, consistent with the adopted sill depths. A fourth lock of the same dimensions was authorized and constructed. But as a practical matter, a twenty-foot draft, through the complete navigation season, has rarely been provided for, at least since the Chicago diversion. (M. R. 113, 114.) The percentage of the season, when less than twenty-foot drafts were employed, was as follows: 1921, forty-five per cent; 1922, eighty-five per cent; 1923, eighty-two per cent; 1924, one hundred per cent. The effect of a reduction of six inches of draft as measured in the adverse consequences upon lake shipping due to the receded levels of the lakes below St. Marys Falls, is illustrated by the 1923 Lake Superior trade. The year's business was done on the following drafts: From May 1 to 31, 19 feet; May 31 to July 19, 19 feet, 6 inches; July 10 to August 28, 20 feet; August 28 to December 18, 19 feet, 6 inches. The report of Colonel E. M. Markham, United States District Engineer, at Detroit (May 19, 1925) stated: (M. R. 114)

> "Consideration of individual loaded boats and of their respective dimensions show that, if water had been available for an additional six inches of draft, the fleet could have handled for the year 3,346,000 tons more than was actually transported, or to put the matter in another light, the season's business could have been done with the elimination from service of about 30 freighters of the 2,000-3,000 ton class. It should be emphasized that the reference is to Lake Superior trade alone. It is estimated that the lost tonnage of the total through business of the Lakes for 1923, incident to a 6-inch deficiency of draft, ex-

> ceeded 4,000,000 tons. The average water-haul rate for the year was 88 cents per ton.
>
> "For the year just closed" (1924) "shipping was done on a draft throughout of 19 feet, with occasional exceptions up to 19 feet 6 inches. The year's 'tonnage loss' applicable to the total lake trade, reckoned from a base draft of 20 feet, was probably in excess of seven millions. For the season of 1925, shipping has opened at a draft of 18 feet 6 inches, with the unlikelihood that the best water of the year will permit a safe draft in excess of 19 feet.
>
> "From the above outline of lake commerce, and of the number, dimensions and capacity of the lake freighters doing its bulk business, two facts become evident: First, that the existing fleet could carry seasonally, on drafts for which designed, something like twenty-five to thirty million tons in excess of the cargo possible of transport by the same boats over the channel depths now available; second, that the loss of inches in channel depth due to receding levels or otherwise is a matter of large import with respect to shipping efficiency and to the transportation charges of the bulk commodities concerned."

With the loss of every inch of draft below twenty feet, the modern, lake, bulk freighter suffers a loss of from 90 to 100 tons in cargo capacity. It will gain a corresponding amount for every inch of draft in excess of 20 feet. (M. R. 115.) The Special Master has found as follows: (M. R. 116)

> "The defendants point to other diversions and artificial changes in the Great Lakes and connecting channels, which have contributed to this total lowering of levels. It is evident, however, that during a period in which the level of the Great Lakes is being lowered, an additional lowering, even of six inches, would be even more serious in its consequence than if it occurred at a time when other causes did not operate to lower the levels of the lakes or operated to raise them.
>
> "These are not actions for damages, and it is not necessary to attempt to estimate with precision the

> extent of the damage caused by a lowering of six inches in lake levels. The defendants have introduced evidence for the purpose of showing that the claims of damage have been exaggerated, but after considering the testimony and critical analyses presented by the defendants, I am satisfied that the evidence requires the finding that the lowering of lake levels of approximately six inches has had a substantial and injurious effect upon the carrying capacity of vessels, and has deprived navigation and commercial interests of the facilities which otherwise they would have enjoyed in commerce on the Great Lakes."

In addition to the damage to commerce and navigation, the State of Michigan and its people have suffered great damage to their ports and inner harbors (M. R. 49-107) and to fishing and hunting grounds, beaches and summer resorts, public parks, and the state ferry between Mackinaw City and St. Ignace across the Straits of Mackinac. (M. R. 117.)

Ports and inner harbors which have been constructed at vast expense by the federal and local governments, and have been maintained at continuous cost for upkeep and dredging have been directly affected, because the levels of the ports and inner harbors, being identical or directly dependent upon the levels of the lakes, have themselves, been lowered. (M. R. 49-107.) This has caused the water in these ports to become too shallow to serve for practical commercial purposes, and these ports and inner harbors must either be deepened, excavated and dredged (which because of the nature of some of the harbors, is a practical impossibility), or they must become useless for commercial purposes in serving lake traffic, because unable to afford the depth required for navigation on a practical basis. (M. R. 107.)

In his report of February 23, 1907, the Chief of Engineers said: (M. R. 49)

> "3. In my opinion, this abstraction will undoubtedly lower the levels of all the waters of the Great Lakes, except those of Lake Superior, and thus diminish the navigable capacity and depth of the various channels and harbors which have been deepened and improved under authority of Congress.
>
> "4. Leaving out Lake Superior, there are more than 100 works of river and harbor improvement on the Great Lakes and their connecting waters, for which appropriations aggregating more than 80 millions of dollars have been made. The application of this vast sum has resulted in securing and maintaining specified depths and widths of channel, which Congress has decided to be required for the accommodation of the traffic using these waters."
>
> "5. To diminish these depths, even to a slight extent, would not only prove a serious injury to the traffic, but would practically undo the work which has been accomplished by Congressional direction and necessitate the expenditure of further large sums of money for restoration."

The improved ports and inner harbors of Michigan have thus suffered serious impairment. Also a large number of unimproved harbors, which have navigable capacity and which are used by pleasure and fishing boats and small craft, have been directly affected. (M. R. 105, 117.)

The State of Michigan and its people, because of the nature of the water, land and climate, have large fishing and hunting areas along its lake borders, which are directly affected by the lowering of the lake levels. Fishing and hunting grounds have been rendered less desirable and in some cases have been altogether taken away by the lowering of lake levels, and the people, whose right it has been from time immemorial to fish and hunt upon the public waters within the State of Michigan, have been prevented from exercising this ancient right, not only to commercial damage in large amounts, but in their private rights and enjoyment in this respect. (M. R. 117.)

Beaches at summer resorts have been rendered unavailable or practically inconvenient to the point of rendering them almost useless, because of this Chicago diversion. Shallow beaches being a requirement for summer resorts, quickly reflect a lowering of lake levels of even a small amount. The effect of a lowering of six inches upon beaches at summer resorts is to cause the water to recede from the meander line (ordinary beach line) a distance in some cases of upwards of a quarter to a half mile. The effect of this lowering has been to render practically valueless a large amount of summer resort and beach property in which the State of Michigan and its people have invested enormous sums of money, not only in private homes, cottages and residences, but in commercial property used in connection with these beaches. (M. R. 117.) The State of Michigan has twenty-six public parks littoral to the Great Lakes which are directly affected in their availability and convenience for use by the people for park purposes, by reason of the lowering of lake levels. (M. R. 117.) The State of Michigan also operates ferries for the service of the general public as a part of its highway system, across the Straits of Mackinac, and because these waters constitute a *critical point* in the connecting waters between Lakes Michigan and Huron, and constitute a part of the shoal areas, these ferries are impaired in usefulness. The car ferries operated across Lake Michigan are also impaired in usefulness by the lowering of the waters of Lake Michigan. (M. R. 112.)

Thus the State of Michigan and her people have suffered tremendous damage, not only to their commerce and navigation upon the Great Lakes, amounting to millions of dollars, but also to their ports and inner harbors, beaches, summer resorts, public parks, fishing and hunting grounds, and ferry system, which constitute a substantial, far-reaching and serious damage to the rights of the State of Michigan as sovereign, and proprietary owner and as *parens patriae* of its people. (M. R. 117.)

The Special Master, in his finding of fact, says: (M. R. 117, 118)

> "But there is sufficient evidence to require the finding that a lowering of six inches has been a substantial contribution to the injury caused by the total reduction, in connection with fishing and hunting grounds, the availability and conveniences of beaches at summer resorts, and public parks." * * *
>
> "My conclusion on this branch of the case is that, while the damage proved to have been sustained by the complainants has been due to the combination of causes which have brought about the total lowering of the levels of the lakes and connecting waters, the contribution made by the diversion of the water of Lake Michigan through the Chicago drainage canal must be regarded as substantial, although the proportion of the damage caused by the reduction of approximately six inches is not susceptible of exact computation.
>
> "I therefore find that the complainants have established that the diversion through the Chicago drainage canal has caused substantial damage to their navigation, commercial and other interests as above stated."

ARGUMENTS ON THE FACTS.

The Defendants have not excepted to the Report of the Special Master, but this should not be interpreted as demonstrating in the slightest degree that the Special Master upheld defendants' claims *on the facts. On the contrary, the Special Master has found with complainant on all of the major issues of fact considered in this case.*

The following issues of fact have been clearly decided in complainant's favor, and in complete accord with the claims of the State of Michigan;—

1. That the effect of this Chicago diversion has been to lower the levels of the Great Lakes and their connecting waters six inches. (M. R. 104, 105.)
2. That this has caused substantial damage to commerce and navigation upon the whole of the Great Lakes-St. Lawrence Waterway System. (M. R. 116.)
3. That this diversion has caused extensive damage to numerous improved ports and inner harbors. (M. R. 107, 116.)
4. That this abstraction has impaired and damaged the numerous beaches and summer resorts of the State of Michigan. (M. R. 117.)
5. That this abstraction has impaired and damaged the numerous fishing and hunting grounds, including the public parks of the State of Michigan. (M. R. 117.)

These findings of fact which are most vital to the determination of this case have all been found in favor of complainant. However, there are a few findings which are not in entire accord with the clear weight of testimony, and an omission to find some facts which should follow the findings that have been made.

I. THE CHICAGO SANITARY CANAL IS AN ARTIFICIALLY CONSTRUCTED CHANNEL, WHICH IS NOT NOW AND NEVER HAS BEEN A NAVIGATION PROJECT, BUT ALWAYS HAS BEEN IN REALITY A SANITATION AND POWER ENTERPRISE FOR THE BENEFIT OF THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

(Exceptions No. 1, 5, 7, 8, 11 and 15 relate to this subject.)

The Special Master indicated this result but did not make a definite finding of fact to this effect.

a. *Defendants themselves have always dealt with the Chicago Sanitary Canal as a sanitation project.*

The Sanitary District of Chicago and the State of Illinois were likewise defendants in the case of Sanitary District v. United States, 266 U. S. 405, 69 L. Ed. 352. Their position in that case was that the sanitary canal was a sanitation and power project. Prior to that time there had never been any serious claim on their part that it was anything else. After this court, in that case, decided that the defendant had no right to abstract, divert, and appropriate the waters of the Great Lakes-St. Lawrence Waterway System for local sanitation and power purposes, defendants then claimed they were public benefactors, establishing a system of navigation, and thereupon the sanitary canal became a *navigation* enterprise instead of a *sanitation* and *power* project.

The Sanitary District of Chicago was created by an Act of Illinois, in 1889, entitled: "An Act to create sanitary districts, etc." In People v. Nelson, 133 Ill. 565, 27 N. E. Rep. 217, it was said:

> "A sanitary district is a municipal corporation organized to secure, preserve and promote the public health."

In Chicago v. Green, 238 Ill. 258, 87 N. W. 417, the court said:

> "The purpose of the Act of 1899 was to furnish a common outlet for the sewage of the incorporated municipalities within the limits of the district."

In Beidler v. Sanitary District, 211 Ill. 628, 637, the Illinois Supreme Court in October, 1904, said:

> "Here the waters were taken and their general levels reduced for the purpose of making navigable an artificial channel, and not for the purpose of facilitating the navigation of the south branch of the Chicago River or any stream or body of water naturally emptying into it or any stream or lake into which it naturally empties.
>
> "Again, it is evident, from an examination of the act for the creation of sanitary districts, that the primary and principal purpose of their creation under the statute is to provide for the preservation of the public health by improving the facilities for the final disposition of sewage and by supplying pure water. The fact that a navigable waterway may be created is a mere incident, and not one of the purposes for which a sanitary district is created."

The Sanitary Canal was opened in January, 1900. The Constitution of Illinois of 1870, independent section 3, and the statutes in pursuance thereof (Starn & Curtis Statutes, 1896, p. 206) forbade the loaning of its credit or making appropriations in aid of canals, and the necessary effect of this was upheld in Burke v. Snively, 208 Ill. 328; 70 N. E. 327.

It is evident that the State of Illinois could act only through the medium of the Sanitary District in building and operating a sanitary canal solely as a sanitation project and not as a canal for the purpose of navigation. Hence, from the very outset the State of Illinois, through its courts, definitely determined that this was a project for sanitation and not navigation.

That this is the fact is also borne out by the requests of the Sanitary District to the War Deparement for permission to divert water from the Chicago River to aid in the disposition of the sewage of Chicago, and to prevent that sewage entering Lake Michigan and polluting the water supply of Chicago.

Illustrating this attitude on the part of the Sanitary District is its application following the action of the Secretary of War of April 9, 1901, in reducing the flow through the Chicago River of not to exceed 200,000 cubic feet per minute, in applying for a permit in this language: (M. R. 42)

> "that the water in the main drainage channel has become greatly polluted and very offensive both to sight and smell, and is working such hardship upon the valley communities as to evoke frequent protest from various cities and municipalities along the Des Plaines and Illinois Valleys."

Further illustrating this attitude on the part of the Sanitary District, is its application of February 5, 1912, to the Secretary of War, setting forth the "needs of Chicago" as a basis for asking permission to withdraw water from Lake Michigan through the Chicago and Calumet Rivers. (M. R. 61.)

After the decision of the case of Sanitary District v. United States, *supra,* wherein it was decreed that the defendants be enjoined from diverting more than 4,167 c.f.s. from Lake Michigan, these defendants applied to the Secretary of War for an increase in the amount of authorized abstraction from Lake Michigan, alleging as the main purpose for such added diversion the elimination of offensive conditions along the Illinois River, to keep the Chicago River reversed at all times, so that even during storm periods it would not pour sewage into Lake Michigan, and further alleging that the authorized diversion would not accomplish this purpose, and without mention of navigation, thus clearly indicating that the water was needed solely for sanitation. (M. R. 73-74.)

b. *The War Department has dealt with the Sanitary Canal as a sanitation project.*

The War Department has dealt with the Sanitary Canal as a sanitation project from the beginning. The first permit from the Secretary of War, under date of July 3, 1896, recited: (M. R. 34)

> "I have the honor to acknowledge the receipt of your letter of the 16th ultimo requesting permission to make certain changes in the capacity of the channel of the Chicago River, *for drainage purposes,* at points indicated on the map, etc. * * *
>
> "2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce a current into Chicago River. This latter proposition must hereafter be submitted for consideration.
>
> "3. That it will not cover obstructions to navigation, by reason of this work while in progress, or when completed."

In the permit of May 8, 1899, from the Secretary of War, there were recited as conditions that the questions would be submitted to Congress, and: (M. R. 39)

> "2. That if, at any time, it becomes apparent that the current created by *such drainage works* in the South and main branches of the Chicago River be unreasonably obstructive to navigation or injurious to property, the Secretary of War reserved the right to close said discharge, etc."

On April 9, 1901, the Secretary of War "*heeding the protests of commercial and navigation interests,* directed the Sanitary District to regulate the discharge so that the maximum flow through the Chicago River and its South Branch should not exceed 20,000 cubic feet per minute," (M. R. 41), and on July 23, 1921, amended the former order so as to permit an increase in flow between four p. m. and twelve o'clock midnight, daily. (M. R. 42.) On December 5, 1901, the Secretary of War authorized a flow of 250,000 cubic feet per minute during the entire day with former *conditions against interfering with navigation.* (M. R. 42.) On January 17, 1903, another permit was granted allowing a diversion of 350,000 cubic feet per minute, until March 31, 1903, during the closed season of navigation, "in order to carry off the accumulations of sewage deposits lining the shores of the city," with the provision that, after said date, the flow should be reduced to 250,000 cubic feet per minute as required by the permit of December 5, 1901. (M. R. 43.)

From this dealing with the abstraction of waters from Lake Michigan it is evident beyond argument that the Secretary of War, in *"heeding the protests of commercial and navigation interests"* was cutting down the abstraction to *save navigation.* In permitting an increase between four p. m. and midnight he showed a desire to aid sanitation at a time when it would protect navigation by letting the water flush the sewage at a time when it would do the *least harm* to navigation. In permitting an increased flow *during the closed season of navigation,* he demonstrated the impairment that such flow must cause during the *open season of navigation.* Could anything be plainer from the very beginning than that this was a *sanitary project* and was in fact *detrimental to navigation?*

When the Calumet-Sag channel project was brought before the War Department on the application of the Sanitary District to obtain 4000 c.f.s. additional abstraction, the Chief of Engineers reported under date of February 23, 1907, (M. R. 49):

> "3. In my opinion, this abstraction will undoubtedly lower the levels of all the waters of the Great

> Lakes, except those of Lake Superior, and thus diminish the navigable capacity and depth of the various channels and harbors which have been deepened and improved under authority of Congress.
>
> "4. Leaving out Lake Superior, there are more than 100 works of river and harbor improvement on the Great Lakes and their connecting waters, for which appropriations aggregating more than 80 millions of dollars have been made. The application of this vast sum has resulted in securing and maintaining specified depths and widths of channel, which Congress has decided to be required for the accommodation of the traffic using these waters.
>
> "5. To diminish these depths, even to a slight extent, would not only prove a serious injury to the traffic, but would practically undo the work which has been accomplished by Congressional direction and necessitate the expenditure of further large sums of money for restoration."

Later, in granting a permit for the Calumet-Sag channel on June 30, 1910, the Acting Secretary of War, stated among the conditions of his permit: (M. R. 59.)

> "(b) That if at any time it becomes apparent that the current created by such drainage work in the Calumet as well as Chicago Rivers be unreasonably obstructive to navigation, or injurious to property, the Secretary of War reserves the right to close the discharge through said channels or rivers, or to modify it to such an extent as may be demanded by navigation and property interests along said rivers."

What could be plainer than that the Secretary of War was at all times fearful of the harmful effect upon navigation? Instead of this diversion being a navigation project, the prospective injury to navigation caused more constant concern than perhaps any other peace time problem considered by the War Department.

The Chief of Engineers considering the application for a permit (M. R. 61) advised on February 28, 1912, that a diversion of less than 1000 c.f.s. from Lake Michigan would supply any reasonable demands of navigation from Lake Michigan to the Mississippi River, and that any greater diversion was a greater injury than benefit to navigation; that the dumping of sewage into the rivers was becoming more objectionable and it was expected that the provisions made elsewhere against sewage contamination would be followed in Illinois, after which there would be no reason for continuing the diversion of large quantities of Lake Michigan water, except for local benefit, as such diversion would no longer be necessary for sanitation and was not required for navigation between Lake Michigan and the Mississippi, (M. R. 61) and that from the standpoint of conservation of water power, diversion from Lake Michigan into the Illinois River was an economic loss. And on the same subject the Secretary of War, on January 8, 1913, rendered an elaborate opinion, in which he said: (M. R. 63.)

> "On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. There is involved in this case no issue of conflicting claims of navigation." (M. R. 63.)

And later on in his opinion, he further says:

> "Having reached the conclusion that the proposed diversion of the water of Lake Michigan would *substantially injure the interests of navigation on the Great Lakes*, which it is my legal duty to protect, it would clearly follow that the present application should be denied."

On February 2, 1922, a subsequent Secretary of War, in a communication to Congress concerning a pending bill, thus stated the policy of the Department: (M. R. 71.)

> "It is clear that, under the conditions of affairs created by the Chicago Sanitary District, the diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago. * * * It is my view that the quantity authorized should be limited to the lowest possible *for sanitation,* after the sewage has been purified to the utmost extent practicable before it is discharged into the sanitary canal."

The Secretary of War in granting the permit of March 3, 1925, purported to give permission to take an amount of water not to exceed an annual average of 8,500 c.f.s. upon conditions that clearly contemplated treatment of Chicago sewage under the supervision of the United States District Engineer at Chicago, only mentioning navigation to the extent of prohibiting defendants from further interfering with navigation by such diversion. (M. R. 78, 79.) In his letter of transmittal the Secretary of War, under date of March 3, 1925, said:

> "This Department has always held and continues to hold, that the taking of an excess amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost despatch." (M. R. 80.)

From the foregoing statements and the policy established by the War Department respecting this abstraction at Chicago, it seems conclusive that this project is solely *for sanitation* and the only relation it can possibly bear to the question of navigation is to *"affect navigation adversely."*

II. THE GREATEST AMOUNT OF WATER REQUIRED TO BE ABSTRACTED FROM LAKE MICHIGAN FOR THE NEED OF NAVIGATION FROM LAKE MICHIGAN TO THE MOUTH OF THE ILLINOIS RIVER WOULD BE 1000 C.F.S.

(Exceptions No. 11 relates to this subject.)

In Sanitary District vs. United States, 266 U. S. 405, 431, this Court said:

> "It seems that a less amount than now passes through the canal (4167 c.f.s.) would suffice for the connection which the United States has wished to establish and maintain."

Yet the Special Master said: (M. R. 122.)

> "The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than 1,000 c.f.s. of water is sufficient to supply all the needs of navigation. I am unable to so find."

The Special Master bases his reason for this statement upon the possibilities attending the Act of January 21, 1927. (M. R. 85, 122.) But in this very act (44 Stat. Pt. 2, 1010, 1013) and quoted at another place by the Special Master (M. R. 85), it was provided:

> "Provided, further, That nothing in this Act shall be construed as authorizing any diversion of water from Lake Michigan."

In fact, the Special Master makes use of this very clause (M. R. 189, 190) to foreclose Complainant's argument as to the construction Congress desired to place upon the Act of March 3, 1899, when he said:

> "I do not think that it can be said that the proviso in the act approved at the last session of Congress (January 21, 1927, 44 Stat., Pt. 2, 1010, 1013) with respect to a modification of the existing project on the Illinois River, that 'nothing in this act shall be construed as authorizing any diversion of water from Lake Michigan' affects the question as to the construction of the Act of 1899 or limits the power of the Secretary of War thereunder. This proviso was inserted in the act while the present suit was pending and *it appears to have been intended to leave the contentions of both parties to this controversy unaffected by the provision which was enacted as to the improvement of the Illinois River.*"

It would appear that this reason would apply with equal force to prevent the Special Master from using this same Act of January 21, 1927, to argue the facts respecting the sufficiency of a flow of 1000 c.f.s. for all purposes of navigation from Lake Michigan to the mouth of the Illinois River.

But considering the effect of the Act of Jan. 21, 1927, Congress provided:

> "Illinois River, Illinois: Modification of existing project so as to provide a channel with least dimensions of nine feet in depth and two hundred feet in width from the mouth to Utica; * * * " (M. R. 85.)

This was the very type of canal reported upon by the Government Engineers.

> The amount of water necessary for navigation upon the Des Plaines—Illinois Waterway was reported upon by the Special Board on the Waterways under the Chairmanship of General W. H. Bixby,

Chief of Engineers under date of Jan. 23, 1911 as follows:

> "*The Board considers a bottom width of 160 feet in canal and 200 feet in the open river above the mouth of the Illinois River sufficient for a channel of eight or nine feet available depth.* For safety and ease of navigation the channel should be extended to 11 feet in rock cuts and canals, and the locks should be given 11 feet depth, 80 feet width, and 600 feet useful length. With these lock dimensions three barges carrying about 9,000 tons of freight may be locked through with their tow-boat. A waterway of these dimensions would have a capacity exceeding 100,000,000 tons per annum and would accommodate barge tows carrying about nine times the ordinary train-load of this vicinity. In addition the vessels using it would be capable of navigating the Ohio and Lower Mississippi Rivers. *Such waterway will not require a diversion of more than 1,000 second feet from Lake Michigan,* this amount would not injuriously lower lake levels nor cause excessive flooding of land in the Illinois Valley." (J. R. 44)

> "*(J. R. 45) For purposes of navigation a diversion from Lake Michigan of less than 1,000 second feet of water is all that will be necessary." "* * * The claim that more than 1,000 cubic feet per second is required for purposes of navigation cannot be maintained.*"

If there is any one idea that runs through the different reports of the Chief of Engineers and House and Senate Documents, as well as the Secretary of War's findings, from time to time, it is the unanimity with which it has been found that 1,000 c.f.s is all that could ever be needed for navigation purposes in this water way.

The Chief of Engineers advised the Secretary of War, February 28, 1912, that:

> A diversion of less than 1,000 c.f.s. from Lake Michigan would supply any reasonable demands for

> navigation from Lake Michigan to the Mississippi, and any greater diversion was a greater injury than benefit to navigation. (M. R. 61.)

and also:

> that on the assumption that the waterway to the Mississippi River should in the future provide for the passage of boats of over 20-foot draft, or any other greater draft useful in the Great Lakes, such navigation could be maintained with a diversion from Lake Michigan of less than one-fifth of that at present in progress, (4167 c.f.s.) and less than one-fourteenth of that then desired by the State authorities. (M. R. 62.)

The Secretary of War, in his opinion of January 8, 1913, said:

> "The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a *deep* waterway from the Great Lakes to the Mississippi over the route of the sanitary canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over 1,000 feet per second, or less than a quarter of the amount already being used for sanitary purposes in the canal. This estimate is confirmed by the report of the special board of engineers on the deep waterway from Lockport, Ill., to the mouth of the Illinois River, dated January 23, 1911. It is also confirmed by the practical experience of the great Manchester Ship Canal in England. From the standpoint of navigation alone in such a waterway too great a diversion of water would be a distinct injury rather than a benefit. It would increase the velocity of the current and increase the danger of overflow and damage to adjacent lands." (M. R. 63.)

Again, in the final report of the special board on the waterway from Lockport to the mouth of the Illinois River (House Document 762, 63rd Congress, 2d Session, p. 14) dated December 16, 1913, it is said:

> "* * * The Board reiterates that a diversion exceeding 1,000 second feet is not necessary for navigation purposes alone in the Illinois River, and that an added discharge will produce a slight and inadequate effect on the Mississippi River." (J. R. 42.)
>
> "For purposes of navigation a diversion from Lake Michigan of less than 1,000 second feet of water is all that will be necessary." (J. R. 42.)

III. THIS DIVERSION IS NOT FOR NAVIGATION UPON A LAKE MICHIGAN-TO-MISSISSIPPI WATER COURSE, BECAUSE ABSTRACTIONS IN EXCESS OF 1,000 C.F.S. HAVE AFFECTED NAVIGATION IN THE CHICAGO RIVER ADVERSELY.

(Exceptions Nos. 1, 5, 7, and 11 relate to this subject.)

Since January 17, 1900, when the flow of the Chicago River was reversed, a current has been introduced into that river (M. R. 38), which has made it increasingly impossible for large boats to navigate, until now there is no practical navigation by large lake boats upon the Chicago River. To keep the Chicago River reversed at all times so that the sewage would be discharged into the Sanitary Canal and not into Lake Michigan, it has been necessary to take increasingly large amounts of water to accomplish *this purpose,* and that is what has created the current in that stream. This current has virtually driven all commerce from the River.

The very first permit granted by the Secretary of War on July 3, 1896, provided:

> " * * * 2. That this authority shall not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce *a current into the Chicago River.* This latter proposition must be hereafter submitted for consideration. * * * " (M. R. 35.)

Other permits contained the same conditions, including the permit of May 8, 1899, (the first permit purporting to authorize the reversal of the Chicago River):

> " * * * 3. That the Sanitary District of Chicago must assume all responsibility for damage to property and navigation interests by reason of *the introduction of a current in Chicago River.*" (M. R. 39.)

While the application for the permits of 1900 (which contained the same conditions) were under consideration by the Secretary of War, the Lake Carriers Association requested (May 16, 1900) action by the Secretary of War modifying the amount of discharge through the drainage canal, *in order to avoid excessive current in the Chicago River.* (M. R. 41.)

On April 9, 1901, the Secretary of War, heeding the protests of commercial and navigation interests, directed the Sanitary District to regulate the discharge so that the maximum flow through the Chicago River and its South Branch should not exceed 200,000 cubic feet per minute. (M. R. 41.) And this was followed on July 15, 1901, by another request from the Sanitary District for an increased flow because the water of the main drainage canal "has become greatly polluted and very offensive both to sight and smell, and is causing such hardships upon the valley communities as to evoke frequent protests from various cities and municipalities along the Des Plaines and Illinois Valleys". Whereupon the Secretary of War made an order on July 23, 1901, amending the former flow to permit an increase between four P. M. and twelve o'clock midnight "subject to revocation in case the increase was found to be *dangerous to navigation*". (M. R. 42.)

Again in the permit of December 5, 1901, the Secretary of War, in allowing a diversion of 250,000 cubic feet per minute, under conditions including:

> " * * * 3. That said Sanitary District of Chicago shall be responsible for all the *damage inflicted upon navigation interests* by reason of the increase in flow herein authorized." (M. R. 42.)

In the report of the Board of Engineers to Congress on December 18, 1905, it was stated:

> " * * * The capacity of that stream (Chicago River) at present, is such that not more than about 4,200 c.f.s. can pass without creating velocities which will unreasonably obstruct navigation. * * * " (M. R. 44.)

In the permit of June 30, 1910, the Secretary of War provided as a condition:

> " * * * (c) That the Sanitary District of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in the Calumet as well as Chicago River. * * * ". (M. R. 60.)

In the report of the Chief of Engineers, February 28, 1912, upon the application of the Sanitary District for an increase at that time, it was stated:

> "that the current existing in the river was injurious to navigation, as shown by collisions between vessels and bridges and the difficulty of stemming the current." (M. R. 62.)

The case of Corrigan v. Sanitary District of Chicago, 125 Fed. 611, and 137 Fed. 851, illustrates the effect of this current in adversely affecting navigation upon the Chicago River as early as 1903, before the volume and increment of flow were increased to the present force and velocity. All of these conditions and statements by the War Department and its officers illustrate beyond question that this diversion is not for the purpose of benefiting navigation in the least, but has been purposely limited because it affected navigation in the Chicago River as well as the Great Lakes adversely.

IV. ANY POSSIBLE BENEFICIAL EFFECT UPON THE NAVIGATION OF THE MISSISSIPPI RIVER CAUSED BY THIS ABSTRACTION AT CHICAGO WAS NOT CONSIDERED NOR CONTEMPLATED BY THE SECRETARY OF WAR IN GRANTING THE PERMIT OF MARCH 3, 1925; THIS REASON SHOULD NOT BE EMPLOYED TO JUSTIFY THE PERMIT.

(Exceptions Nos. 13 and 22 relate to this subject.)

In Sanitary District vs. United States, 266 U. S. 405, 431, this Court said:

> "It is doubtful, at least, whether the Secretary was authorized to consider the remote interests of the Mississippi States or the Sanitary needs of Chicago."

Yet the Special Master says: (M. R. 124.)

> "My conclusion is that the diversion from Lake Michigan through the drainage canal increases to some extent during low water the navigable depths over bars on the Mississippi River, but that the extent of this increase is not the subject of sufficiently

> accurate determination to warrant a finding. Upon all the facts, it was permissible for the Secretary of War to reach the conclusion that the diversion from Lake Michigan of 8,500 c.f.s. was to some extent, an aid to the navigation of the Mississippi River in time of low water."

And again: (M. R. 125.)

> "It is not controverted that the Secretary of War had these considerations before him, on the application and hearing which resulted in the permit of March 3, 1925."

It is our position that this was not controverted because neither in the application by defendant, nor in the recommendation of the Chief of Engineers, the permit of the Secretary of War himself, nor in his letter of transmittal forwarding the permit of March 3, 1925, nor in fact is there an indication that such a consideration was either weighed by the Secretary of War or considered of the slightest moment in granting the permit.

The application of the Sanitary District of Chicago, January 31, 1925, was couched in this language:

> "The Sanitary District of Chicago hereby applies for permission to divert an annual average of 10,000 c.f.s. of water from Lake Michigan through the channel of the Sanitary District of Chicago for the purpose of preserving the lives and health of all of its people, and of the millions of others in constant daily contact with them." (J. R. 158.)

This not only demonstrates the purpose of the diversion, but covers every consideration deemed necessary to be shown to the Secretary of War upon the application. In the report of the Chief of Engineers which followed, there was not a single mention of any benefit to be derived by such diversion upon the Mississippi River. (M. R. 75, 76.) The Permit of March 3, 1925, from the Secretary of War, contained no indication of that claim, (M. R. 77-80) and the letter of transmittal (M. R. 80) not only contained no indication that the Mississippi River was a motivating consideration to any degree, but plainly stated that the permit was granted as a matter of supposed necessity for the disposal of the sewage of Chicago. Hence if it was not controverted that the Secretary of War had these considerations before him, it was because there was no proof of it and hence it was not necessary to establish that the Secretary of War did not consider any such claims in arriving at his finding.

But even if such consideration had been before the Secretary of War at the time of the hearing upon the application, it is evident from the testimony in the case and from even the language of the Special Master himself, that there is no evidence to support a finding that this diversion would materially increase navigable depths over bars on the Mississippi River. The testimony of General W. H. Bixby, United States Engineer, (M. R. 123) clearly answers the question as to the effect on the navigable capacity of the Mississippi River of a 10,000 c.f.s. diversion from Lake Michigan, by finding that it has no appreciable effect but might make a difference of a half a day in the time when the dredge starts work on the bars of that river and could have no effect whatsoever after the dredging has once started. As the stage of the Mississippi River rises, the bars also rise, and as these bars furnish the critical points in the periods of *low water*, there is no addition by reason of the Lake Michigan increment to the available depths for navigation over the bars. And at *high water* or flood stage (such as occurred in 1927) the only function of water from Lake Michigan would be to swell the flood by its added volume when it would be liable to cause untold damage to the lower

Illinois and Mississippi River states. "The Government reports state that the effect of the diversion of 10,000 c.f.s. at Chicago is to raise the mean stage of the Mississippi River one foot at St. Louis." (M. R. 122.) This flood of 1927 upon the Illinois and Mississippi Rivers illustrates how at *high water* stage these river valleys and their people are adversely affected by this diversion, which swells the flood-tide considerably at a time when human life and property are at stake.

How then—*at either low water* (when the bars interfere and form critical points) or at *high water* (when flood conditions demand *outlets* instead of *inflow*)—can it be claimed that the diversion of this water can be based *at all* upon *benefit* to *navigation upon the Mississippi River?*

V. THE FEASIBILITY OF REMEDIAL OR REGULATORY WORKS TO OFFSET THIS ABSTRACTION IS NOT AN ISSUE, AND IS NOT DETERMINATIVE OF COMPLAINANT'S RIGHTS; THIS SHOULD NOT HAVE BEEN CONSIDERED AS A BASIS FOR CONCLUSIONS BY THE SPECIAL MASTER.

(Exception No. 12 relates to this subject.)

The Special Master, as a part of his findings of fact concluded that remedial works were feasible to offset the effect of the Chicago Diversion. (M. R. 125-131.)

But the question is *not* how the damaging effect of the Chicago diversion can be *offset*, but whether there is an *obstruction to navigable capacity, and if so, whether there is any power and authority to continue it.*

While the Master specifically finds all the injuries to the commerce and property rights of the people of the lake states, apparently he thinks that after their property is destroyed, Congress is under some obligation to remedy the damage by remedial works to offset the effect of this diversion. He sets forth the report of an "Engineering Board of Review" of 28 engineers in September, 1924, (M. R. 134, 135) which the State of Illinois and the Sanitary District employed for the purpose of finding some way to excuse their unlawful acts.

However, inasmuch as the feasibility of remedial works to offset the effect of the Chicago diversion has been found by the Special Master, there are certain definite considerations involved in the establishment of such regulating works.

1. *The construction of such works is solely under the control of Congress and not under the control of the defendants nor of complainant, and when or if Congress will ever act on this matter is not known nor determined.*

> Gibbons v. Odgen, 9 Wheat 190;
> Cooley v. Port Wardens, 12 How. 299;
> Pennsylvania v. Wheeling Bridge Co. 13 How. 518.

2. *The construction of such works is dependent on joint action and consent of Great Britain and the United States Government, and when or if the two governments will ever act and consent to the construction of such works is not known.*

Under the terms of the Canadian Boundary Waters Treaty of January 11, 1909, (M. R. 52) the construction of such works as the Special Master proposes cannot be undertaken without the approval of the International Joint Commission.

Article 4 of the Treaty reads as follows:

"The High Contracting Parties agree that, except in case provided for by special agreement between them, they will not permit the construction or maintenance on their respective sides of the boundary of any remedial or protective works or any dams or other obstructions in waters flowing from boundary waters or in waters at a lower level than the boundary in rivers flowing across the boundary, the effect of which is to raise the natural level of waters on the other side of the boundary unless the construction or maintenance thereof is approved by the aforesaid International Joint Commission."

Article 8 of the Treaty reads as follows:

"This International Joint Commission shall have jurisdiction over and shall pass upon all cases involving the use or obstruction or diversion of the waters with respect to which under Articles 3 and 4 of this Treaty the approval of this Commission is required.

* * *

"The Commission in its discretion may make its approval in any case conditional upon the construction of remedial or protective works to compensate so far as possible for the particular use or diversion proposed, and in such cases may require that suitable and adequate provision, approved by the Commission, be made for the protection and indemnity against injury of any interests on either side of the boundary.

"In cases involving the elevation of the natural level of waters on either side of the line as a result of the construction or maintenance on the other side of remedial or protective works or dams or other obstructions in boundary waters flowing therefrom or in waters below the boundary in rivers flowing across the boundary, the Commission shall require, as a condition of its approval thereof, that suitable and adequate provision, approved by it, be made for the protection and indemnity of all interests on the other side of the line which may be injured thereby."

> "The majority of the Commissioners shall have power to render a decision. In case the Commission is evenly divided upon any question or matter presented to it for decision, separate reports shall be made by the Commissioners on each side to their own Government. The High Contracting Parties shall thereupon endeavor to agree upon an adjustment of the question or matter of difference, and if an agreement is reached between them, it shall be reduced to writing in the form of a Protocol, and shall be communicated to the Commissioners, who shall take such further proceedings as may be necessary to carry out such agreement."

3. Complainant is not required to construct regulating works for the purpose of mitigating damages caused by an illegal abstraction of water constituting a public nuisance done and created by defendants.

The effect of the Special Master's conclusion is to indicate that Complainant's rights should not be enforced against defendants, but must either abide favorable action by Congress and the Canadian government, or provide such regulating works at its own expense if the lake levels are to be preserved. Inasmuch as complainant can neither construct the works itself nor compel their construction by Congress and the Canadian Government, it certainly should not be denied relief against defendants on the ground that remedial works should be established which complainant is powerless to accomplish.

4. While some of the damages caused by this illegal abstraction from Lake Michigan might be mitigated by remedial works, some damages, such as those to water power and other rights, could never be compensated.

The Secretary of War in 1922, upon being consulted by the Committee on Rivers and Harbors, advised against the passage of a bill to permit the diversion of 10,000 c.f.s., and in his recommendation contained in a letter of February 2, 1922, said: (M. R. 72)

> "* * * In view of the substantial and widespread damage done to many activities throughout the United States by the diversion, *damage which can be but partly compensated by the construction of the works proposed in the bill,* the diversion should not be continued beyond the time when its necessity ceases to exist."

In the report of the Joint Board of Engineers, United States and Canada, of the St. Lawrence Waterway, November 16, 1926, (M. R. 129) in answer to question 6(D) as to what works, if any, could be constructed to recover on the St. Lawrence River the amount of power lost by the diversion and what would be the cost of such works, replied: (J. R. 183)

> "244. Answer—The Board finds that if the St. Lawrence River has been fully developed for power production, *no works can be constructed which would recover on the St. Lawrence the power lost by the diversion of water from the watershed.*"

5. *Even the establishment of remedial works would not justify an abstraction by Defendants from Lake Michigan.*

The Complainant is entitled to the full benefit which might be obtained from the construction of compensating works by the Government without any mitigation or diminution by abstraction of water from Lake Michigan by defendants. The St. Lawrence River is navigable for ocean vessels as far as Montreal. When this great waterway is developed from the Lakes to the Atlantic Ocean so that ocean vessels may travel upon these great inland waterways to and from the Atlantic Ocean and drop anchor in the improved ports of the State of Michigan, and other States, Complainant has the right as against defendants to have *all of the water* naturally belonging to this watershed *without abstraction* at Chicago, for the development and improvement of Great Lakes-St. Lawrence waterway to the Ocean.

VI. DEFENDANTS HAVE NOT COMPLIED WITH THE CONDITIONS OF THE PERMIT OF MARCH 3, 1925.

(Exceptions No. 2, 6 and 9 relate to this subject)

The Special Master says (M. R. 81):

> "It appears from the evidence that, *up to the time of the taking of the testimony herein*, the Sanitary District had *substantially complied* with the conditions of the permit."

The permit included the following conditions:

"1. That there shall be no unreasonable interference with navigation by the work herein authorized. * * *

3. That no attempt shall be made by the permitee or the owner to forbid the full and free use by the public of any navigable water of the United States. * * *

8. That if, within six months after the issuance of this permit, the city of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average rate of one hundred per cent per annum thereafter, this permit may be revoked without notice. * * *

10. That this permit is revocable at the will of the Secretary of War and is subject to such action as may be taken by Congress."

1. Defendants have unreasonably interfered with navigation upon the Great Lakes and their connecting waters in violation of condition No. 1 of the permit of March 3, 1925.

The evidence conclusively establishes that the diversion of water from Lake Michigan has caused and continues to cause a lowering of levels and available depth of all the waters of the Great Lakes from St. Mary's Falls to tide water on the St. Lawrence River of approximately six inches, and particularly a lowering of at least six inches upon Lakes Huron and Michigan, which are dealt with as one reservoir of equal water level for all purposes in various reports by the War Department. The Special Master has found:

> (M. R. 104) "I find that the full effect of a diversion of 8,500 c.f.s. of water from Lake Michigan at Chicago through the drainage canal of the Sanitary District would be to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; the levels of Lakes Erie and Ontario approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the above mentioned lakes, to the same extent respectively."
>
> (M. R. 105) "I find that the diversion which has taken place through the Chicago drainage canal has been substantially equivalent to a diversion of about 8,500 c.f.s. for a period of time sufficient to cause, and has caused, the lowering of the mean levels of the lakes and the connecting water ways practically to the extent above stated.
>
> (M. R. 116) "I am satisfied that the evidence requires a finding that the lowering of the lake levels of approximately six inches *has had a substantial and injurious effect* upon the carrying capacity of vessels, and *has deprived navigation* and commercial

interests of the facilities which otherwise they would have enjoyed in commerce on the Great Lakes.

Thus the Special Master has found a substantial interference with navigation. If this does not constitute an "unreasonable interference with navigation" it is difficult to conceive how much more would be necessary to create such an interference as would constitute a violation of this condition of the permit. It is respectfully submitted that the first condition of this permit is an *express limitation* upon the authority which can be claimed under it, and that the permit cannot be asserted as authority for any act in violation of an express condition. Moreover, the condition qualifies the permit and determines its meaning to be substantially this: that defendants may divert water up to the maximum mentioned in the permit *provided* it does not constitute an obstruction to navigable capacity. When an obstruction to navigable capacity occurs this condition of the permit acts not only as an expression of limitation from the Secretary of War, but is an expression of the statutory limitation beyond which no authority exists without the affirmative act of Congress. This permit, *if valid* pursuant to statutory authority, must stand on the same basis as a statute of the United States. A violation of the provisions of the statute prohibiting obstructions to navigable capacity, would be actionable to prevent obstructions, even though the maximum diversion mentioned in the permit had not been reached.

Hence the first condition of the permit prohibiting "unreasonable interference with navigation," has been violated. It cannot be said in fact or in law that there has been a *substantial* compliance with the permit of March 3, 1925, in view of this violation of the first condition, incorporated in and made a part of that permit.

2. *Defendants have exceeded the instantaneous maximum mentioned in the permit of March 3, 1925.*

In the report of the District Engineer on application of the Sanitary District for the permit of March 3, 1925, a "diversion" was defined:

> (J. R. 170) "In other words, 'diversion' is taken to be the gross flow at Lockport, less the amount of water used by the City of Chicago for domestic purposes".

In the diplomatic correspondence between the Secretary of State of the United States and the Government of Canada, through the British Embassy, it was said: (J. R. 182)

> "The expression 'measured at the intakes', used to designate the places where the total actual flow should not exceed that specified in the permit, is hypothetical as it is impracticable to measure the diversion at the numerous intakes with accuracy. For this reason, the practical enforcement of the limitation placed upon the diversion will be carried out at Lockport. Measurements taken there will determine the gross diversion, sanitary and domestic, and, as accurate information is available in regard to the amount of water pumped by the City of Chicago for domestic purposes, the sanitary diversion may be computed by subtracting the domestic diversion from the gross flow at Lockport.
>
> "The term 'diversion' as used in the permit is construed to include the discharge of the Chicago and Calumet Rivers. In view of the methods employed in computing the amount of the diversion the discharge of these streams will be included within the

> 8,500 cubic feet per second, authorized by the permit of March 3, 1925."

It appears that this maximum diversion claimed to be authorized under the permit was exceeded on at least two occasions as follows: (J. R. 184)

November 16, 1925, 5 p. m.	13,415 c.f.s.
September 23, 1925, 4:30 p. m.	12,765 c.f.s.

Inasmuch as both of these tests occurred at a time when the peak-load of water-power development was occurring in the late afternoon, this fact also is significant in determining one of the purposes of this diversion. But upon at least these two occasions when tests were made the instantaneous maximum *has been exceeded.*

3. Defendants have not complied with metering requirements of the permit of March 3, 1925.

Condition number 8 of the permit provides for a program of metering of the water service of the City of Chicago. This clearly contemplates a *reduction* in the amount of water abstracted from Lake Michigan for domestic use by Chicago, which is not returned but used for additional dilution of sewage into and through the Sanitary Canal.

Since the closing of the taking of testimony in this case before the Special Master, it has become a matter of common knowledge through the public press, and otherwise, that the City of Chicago has wilfully and consciously abandoned and repudiated the program for water metering according to the requirements of condition number 8 of the permit, and has wilfully abandoned and terminated the reading of meters theretofore installed under the provisions of this permit, and is not attempting to comply with either the program submitted by defendants to the War Department or the letter or spirit of condition 8 of the permit. Inasmuch as this has occurred since the taking of the testimony, it is of course a matter which the Special Master did not contemplate, for he said:

> "It appears from the evidence that, *up to the time of the taking of the testimony,* etc."

but it is a matter which we believe should be brought to the attention of this Court for such further consideration as warranted, and for reference by proof, or otherwise, as this Court may see fit.

Hence defendants are claiming to divert these waters from Lake Michigan under a permit which they themselves have violated. The effect of violation of these three conditions of the permit jointly and severally should render it void.

VII. THIS ABSTRACTION FROM LAKE MICHIGAN IS ALSO FOR WATER POWER DEVELOPMENT.

(Exceptions Nos. 1, 5, 11, 16, 18 and 21 relate to this subject)

On May 14, 1903, the State of Illinois passed an act relating to the development of water power by the Sanitary District which was the recognition of a powerful motive for the abstraction of the largest possible quantity of water from the Great Lakes. (J. R. 113.) From that time on the City of Chicago was not only interested in sewage disposal but became jointly interested with the State of Illinois in the development of water power and the revenues to be derived therefrom.

Thereupon the State of Illinois decided to reverse its former policy stated in the constitution of Illinois of 1870, forbidding the appropriation of money or the loaning of credit in the aid of canals. But it will be noticed that this reversal of policy was limited to a single waterway in the State of Illinois and to that portion from which valuable water power could be developed if a large quantity of water were abstracted from Lake Michigan. In suggesting the reversal of the old policy, the Governor of that State pointed out in a message to the Legislature that by undertaking this work the State would derive a net annual income of $3,000,000 a year from electric power developed from the abstracted waters of Lake Michigan. (J. R. 115.)

Accordingly in 1908 the people of Illinois amended their Constitution so as to provide for the construction of what is called the Illinois Waterway, and the appropriation of the resultant water power development to the State of Illinois. (J. R. 115.) The Chief Engineer of the Illinois Waterway stated that in adopting this amendment the voters of Illinois were influenced by the prospect of obtaining a net annual income of $3,000,000 by the abstraction of water from Lake Michigan. (J. R. 120.)

June 17, 1919, the Legislature of Illinois passed the Illinois Waterway act providing for the appropriation of the water power from Lockport to Utica. (J. R. 116.) But the State of Illinois did not elect to improve this whole section of waterways so as to provide a connection between the Sanitary District Canal and the head of the federal improvement at LaSalle, Illinois. Instead, the section selected extended from Lockport to a point just beyond the last available power site, a little above Utica and left an unimproved stretch of about seven miles from that point to the head of the said improvement, which would *prevent any through navigation.* (J .R. 116, 119, 121.) The Illinois Waterway commenced at the first available power site southwestward from Lake Michigan and ended at the last available power site and includes all available commercial power sites between Lake Michigan and the Mississippi River. (J. R. 117, 119.)

The United States Assistant Engineer stated that these power sites would be valuable if there were a large flow of water from Lake Michigan, but if the flow were limited to the quantity needed for lockage purposes, these power sites would not have any value. The measure of their value is the amount of water that can be taken from Lake Michigan. (J. R. 119.) The Chief Engineer of the Illinois Waterway stated that the power sites at Lockport and at Brandon Road would have no value if there were no diversion from Lake Michigan, except that amount actually used for navigation. (J. R. 122.)

The history of the manipulation of the amount abstracted from Lake Michigan also reflects the purpose of power development. The Assistant Chief Engineer for the Sanitary District stated that the records for a typical December day show that between four and five o'clock in the afternoon the flow at Lockport jumped from 269,000 cubic feet per minute to 589,000 cubic feet per minute, and the power produced from 9,900 k.w. to 21,600 kw. (J. R. 124.) At that particular time of day in December the day and night power load over-lapped. (J. R. 124.) This doubling of the flow in the late afternoon of each day varied with the season of the year, being dependent upon the time when the street lighting load came on in Chicago.

(J. R. 125.) This manipulation of flow for power purposes continued from 1908 until 1925 when the power plant of the Sanitary District was cross-connected with the Commonwealth Edison Company, on an exchange of power basis, and since that time a uniform flow has been maintained. (M. R. 26) (J. R. 124, 125.) The Secretary of War in his opinion of January 8, 1913, (M. R. 65) said:

> "It is manifest that so long as the City is permitted to increase the amount of water which it may take from the lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage. *This is particularly true in view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport.*"

The Chief Engineer of the Illinois waterway stated that with the desired 10,000 c.f.s. abstraction from Lake Michigan, 34,800 horse power can be developed at Lockport, 72,600 horse power at the four state dams, and 11,500 horse power at the Marseilles dam, where private interests claim some right against the State. (J. R. 120.) That the four state dams would produce a net annual income of not less than $1,815,000 with a capitalized value at 4 per cent, of $37,875,000. (J. R. 120.) On the same basis the power site at Marseilles would produce an additional net annual income of $277,500 upon a capitalized value of over $7,000,000. (J. R. 120.) Including the income from the Lockport power site this would mean a net annual profit from the abstraction of the water of Lake Michigan to the State of Illinois for water power purposes alone of over $3,000,000. If the quantity of water were restricted to the needs of navigation these power sites would have no value, the profits would disappear, and the city of Chicago and other cities in the metropolitan district would have to pay for their street lighting and other power uses. Can it be questioned that the attempt to obtain and retain this huge income from the abstraction of the waters of Lake Michigan is a powerful factor in defendant's demand for a large abstraction of water?

SUMMARY OF ARGUMENT ON THE LAW

I.

CONGRESS DOES NOT HAVE POWER TO AUTHORIZE AN ABSTRACTION OF WATER FOR AN UNCONSTITUTIONAL PURPOSE; THE DIVERSION OF THESE WATERS IS CLEARLY FOR SANITARY AND WATER POWER PURPOSES AND NOT FOR NAVIGATION; THE ATTEMPT TO EXERCISE POWER FOR THESE PURPOSES IS THEREFORE VOID.

1. The Constitutional limitation upon the power of Congress.

Article 1, Section 8, Clause 3, Federal Constitution.

Congress has only those powers which were delegated or granted by the people and expressly set forth in the Constitution.

Martin v. Hunter, 1 Wheat. 304;
United States v. Harris, 106 U. S. 629.

Congress may not legislate to affect navigation adversely.

Grand Trunk Western Railway v. South Bend, 227 U. S. 544;
United States v. River Rouge Improvement Co. 269 U. S. 411;
Farnham on Waters, Vol. 1., page 60.

The Power of Congress over "commerce" does not contemplate its exercise for the purpose of sanitation, water power, irrigation or other non-navigation purpose.

Farnham on Waters, Vol. I., pages 59 and 60;
Port of Seattle v. Oregon & Washington Ry. Co. 255 U. S. 56.
United States v. Rio Grande, 174 U. S. 690;
Kansas v. Colorado, 206 U. S. 46;
United States v. River Rouge Improvement Co. 269 U. S. 411;
New Jersey v. Sargent, 269 U. S. 328;
Woodruff v. North Bloomfield Co. 18 Fed. 753;
Withers v. Buckley, 20 How. 84;
Mobile v. Kimball, 102 U. S. 698;
Depew v. Wabash, 5 Ind. 8;
Barney v. Keokuk, 94 U. S. 324;
Burlington Gas Light Co. v. Burlington, etc., Ry. Co. 165 U. S. 370;
Muhlker v. New York & Harlem Ry. Co., 197 U. S. 544;
Sauer v. City of New York, 206 U. S. 536.

2. *The diversion of these waters is for sanitary and water power purposes and not for the purpose of navigation or commerce so as to bring it within the power of Congress.*

Sanitary District v. United States, 266 U. S. 405;
Missouri v. Illinois, 180 U. S. 208, and also 200 U. S. 496.
Beidler v. Sanitary District, 211 Ill. 628;
Chicago v. Green, 238 Ill. 258;
Mortell v. Clark, 272 Ill. 201;
Sanitary District v. Chicago Packing Co. 241 Ill. Appl. 288.

Cases cited by Special Master distinguishable.

Miller v. Mayor, 109 U. S. 385;
New York v. New Jersey, 256 U. S. 296.

II.

THE DEFENDANTS HAVE CREATED AND ARE MAINTAINING AN OBSTRUCTION TO THE NAVIGABLE CAPACITY OF THE GREAT LAKES AND THEIR CONNECTING WATERS WITHOUT AUTHORITY FROM CONGRESS.

A. THIS ABSTRACTION CONSTITUTES AN OBSTRUCTION TO THE NAVIGABLE CAPACITY OF THE GREAT LAKES AND THE CHICAGO RIVER, BOTH IN FACT AND IN LAW.

Master's Report, pages 104-118

Inasmuch as this diversion creates an obstruction in fact it constitutes an obstruction in law to navigable capacity.

Sanitary District v. United States, 266 U. S. 405;
United States v. Rio Grande, 174 U. S. 690;
Economy Light and Power Co. v. United States, 256 U. S. 113;
United States v. Chandler-Dunbar Water Power Co. 229 U. S. 54;
Hubbard v. Fort, 188 Fed. 987.

B. CONGRESS HAS NOT ACTED TO "AFFIRMATIVELY AUTHORIZE" SUCH OBSTRUCTIONS, UNLESS SECTION 10 OF THE ACT OF MARCH 3, 1899, CAN BE SO INTERPRETED.

Report of Special Master, 173;
Sanitary District v. United States, 266 U. S. 405.

Statutes purporting to affirmatively authorize obstructions to navigation should be strictly construed.

Newport & Cincinnati Bridge Co. v. United States; 105 U. S. 470.
Fairbank v. United States, 181 U. S. 283.

C. UNDER SECTION 10 OF THE ACT OF MARCH 3, 1899, AN AFFIRMATIVE ACT OF CONGRESS WAS NECESSARY TO AUTHORIZE THE CREATION OF AN OBSTRUCTION TO NAVIGABLE CAPACITY; THIS SECTION DOES NOT AUTHORIZE THE SECRETARY OF WAR TO GRANT A PERMIT FOR THE ABSTRACTION OF THESE WATERS FROM THE GREAT LAKES.

Section 10 of the Act of March 3, 1899 (Chap. 425, Section 10, 30 Stat. at L. 1121-1151);
Sanitary District v. United States, 266 U. S. 405.

1. *Section 10 of the Act of March 3, 1899, should receive a construction which gives effect to its plain and unmistakable prohibition against obstructions to navigable capacity.*

Sanitary District v. United States, 266 U. S. 405.

A statute should receive a construction which gives effect to its unmistakable terms.

United States v. Goldenberg, 168 U. S. 95;
United States v. Lexington Mill Co. 232 U. S. 399;
Lake County v. Rollins, 130 U. S. 662;
Hamilton v. Rathbone, 175 U. S. 414;
Caminetti v. United States, 252 U. S. 485;
United States v. Wiltberger, 5 Wheat. 76;
American Railway Co. v. Birch, 224 U. S. 547;
United States v. Detroit First National Bank, 234 U. S. 245;
Adams Express Co. v. Kentucky, 238 U. S. 190.

The general construction of Section 10 is to prohibit the creation of obstructions and to necessitate regulations even though not amounting to an obstruction.

Hubbard v. Fort, 188 Fed. 987.

2. *Reference to the history of Section 10 of the Act of March 3, 1899, shows the plain intention of Congress to increase its prohibition against obstruc-*

tions to navigable capacity, so as to forbid such obstructions in any navigable waters of the United States, except by affirmative act of Congress.

Sanitary District v. United States, 266 U. S. 405;
United States v. Rio Grande, 174 U. S. 690;
United States v. Chandler Dunbar Co. 229 U. S. 53;
Lake Shore Railway Co. v. Ohio, 165 U. S. 365;
United States v. Bellingham Bay Boom Co. 176 U. S. 211.
Act of September 19, 1890 (Chap. 907, Sections 7 and 10, 26 Stat. at L. 426-454).

Instead of releasing its control Congress advanced its control over obstructions in all navigable waters.

Sanitary District v. United States, 266 U. S. 405;
United States v. Rio Grande, 174 U. S. 690;
United States v. Chandler-Dunbar Co., 229 U. S. 53;
Economy Light & Power Co. v. United States, 256 U. S. 113.

When Congress asserts its power to regulate commerce its authority is supreme in State waters.

United States v. Rio Grande, 174 U. S. 690;
Cummings v. Chicago, 188 U. S. 410;
Escanaba Transportation Co. v. Chicago, 107 U. S. 678;
Simpson v. Shepard, 230 U. S. 350.

3. *By the language "obstruction to navigable capacity" in section 10, Congress intended to prohibit this kind of an abstraction of water.*

United States v. Rio Grande Dam & Irr. Co. 174 U. S. 690;
Economy Light & Power Co. v. United States, 256 U. S. 113;
United States v. Chandler-Dunbar Water Co. 229 U. S. 54;
Sanitary District v. United States, 266 U. S. 405;
Hubbard v. Fort, 188 Fed. 987;

Anything which tends to destroy the navigable capacity of one of the navigable waters of the United States is within the terms of the prohibition.

United States v. Rio Grande Dam & Irr. Co. 174 U. S. 690.

4. *By the use of the language "affirmatively authorized" Congress contemplated retention of control over obstructions to navigable capacity and not a delegation of power to the Secretary of War; a positive prohibition is not an affirmative authorization.*

Hubbard v. Fort, 188 Fed. 987.

5. *Under section 10 an affirmative act of Congress is necessary as a condition precedent to the existence of any power in the Secretary of War to authorize obstructions to navigable capacity.*

Hubbard v. Fort, 188 Fed. 987;
Pennsylvania v. Wheeling Bridge Co. 13 How. 518;
West Chicago Street Ry. Co. v. Illinois, 201 U. S. 506;
Cobb v. Lincoln Park Comm. 202 Ill. 427;
Wilson v. Hudson County Water Co. 76 N. J. Eq. 543.

6. *Obstructions to navigable capacity of interstate waters without authority from Congress have always been unlawful; when an obstruction to navigation exists in fact in inter-state waters, congress alone may authorize its continuance but only by an affirmative act.*

Pennsylvania v. Wheeling Bridge Co. 13 How. 518;
Bridge Company v. United States, 105 U. S. 470;
Miller v. Mayor of New York, 109 U. S. 385;
Gibbons v. Ogden, 9 Wheat. 190;
Sault Ste. Marie v. International Transit Co. 234 U. S. 333;
Cooley v. Port Wardens, 12 How. 299.

Where Congress has not authorized an obstruction to navigable capacity in interstate waters this court has assumed jurisdiction to enjoin.

Pennsylvania v. Wheeling Bridge Co. 13 How. 518; 18 How. 421;
Economy Light & Power Co. v. United States, 256 U. S. 113.

7. *It would be an unconstitutional application of section 10 of the Act of March 3, 1899, to construe this section as delegating authority to the Secretary of War to permit diversion of these waters from Lake Michigan for purposes of sanitation or to "affect navigation adversely".*

Port of Seattle v. Oregon & Wash. Ry. Co. 255 U. S. 56;
Kansas v. Colorado, 206 U. S. 46;
United States v. River Rouge Imp. Co. 269 U. S. 411;
Sanitary District v. United States, 266 U. S. 405.

8. *The language of section 10 of the Act of March 3, 1899, is not susceptible of construction by reference to the so-called rules in aid of construction used by the Special Master.*

a. *The rule of ambiguity is not applicable here.*

Report of the Special Master, p. 184;
Sanitary District v. United States, 266 U. S. 405.

When the language of the statute is plain and unambiguous the statute must be given its plain meaning.

United States v. Wiltberger, 5 Wheat 76;
United States v. Detroit First National Bank, 234 U. S. 245;
Adams Express Company v. Kentucky, 238 U. S. 190;
United States v. Fisher, 2 Cranch 358;
Merrit v. Welch, 104 U. S. 694;
United States v. Dickson, 15 Pet. 141;
Amy v. Watertown, 130 U. S. 320;
United States v. Rider, 163 U. S. 132.

b. The rule of construction based upon the practice of the War Department in administering section 10 is not applicable because the practice of that Department has not been uniform, but has been constantly in doubt from the beginning, even to the extent exercised.

United States v. Healey, 160 U. S. 136;
Wisconsin Central v. United States, 164 U. S. 205;
United States v. Johnson, 173 U. S. 378;
Houghton v. Payne, 194 U. S. 88;
United States v. Graham, 110 U. S. 219;
United States v. Finnel, 185 U. S. 236;
Edwards' Lessee v. Darby, 12 Wheat. 206;
United States v. Temple, 105 U. S. 97;
Swift Co. v. United States, 105 U. S. 691;
Ruggles v. Illinois, 108 U. S. 526.

c. The decision of this court in Sanitary District v. United States does not construe or interpret section 10 as delegating power to the Secretary of War to affirmatively authorize an obstruction to the navigable capacity of the Great Lakes.

Report of Special Master, p. 189;
Sanitary District v. United States, 266 U. S. 405.

d. The fact that Congress did not act to disapprove the Secretary of War's permit of March 3, 1925, does not constitute an "affirmative act of Congress" nor a delegation of power by implication; legislative power cannot be implied so as to be exercised by another department of government.

Report of Special Master, p. 186, 187;
Kilbourn v. Thompson, 103 U. S. 168;

When express ratification is asked and refused no power can be implied nor inferred.

Barden v. Northern Pacific, 154 U. S. 288;
Durosseau v. United States, 6 Cranch, 307;
Eyster v. Centennial Board of Finance, 94 U. S. 500.

Implied power from non-action of Congress is limited to a withdrawal of public lands or similar concerns in pursuance of a policy declared by Congress or in cases where grants of Congress were in conflict.

> United States v. Midwest Oil Co. 236 U. S. 459; (dissenting opinion).

e. Affirmative authorization cannot be implied from section 10 by supplying and reading into that section the word "unreasonable" so as to modify the express prohibition against obstructions to navigable capacity.

> Report of Special Master, p. 190;
> Fairbank v. United States, 181 U. S. 283;
> Section 18 of the Act of March 3, 1899 (30 State, at Lar. 1121, 1153, Chap. 425, Sec. 18).

It is a general principle of interpretation that the mention of one thing implies the exclusion of another.

> United States v. Arredando, 6 Pet. 691;
> Sturgis v. Draper, 12 Wall. 19;
> Arthur v. Cunning, 91 U. S. 362;
> Walla Walla v. Walla Walla Water Company, 172 U. S. 1.

To depart from the meaning expressed in section 10 would be to legislate and not to interpret.

> United States v. Detroit First National Bank, 234 U. S. 245;
> United States v. Goldenburg, 168 U. S. 97;
> United States v. Lexington Mill Co. 232 U. S. 399.

f. Section 10 of the Act of March 3, 1899, is not in and of itself an affirmative act of Congress delegating authority to the Secretary of War in cases under the second and third clauses of that section. This statute operates prospectively.

> Report of Special Master, p. 182;
> United States v. Wishka Boom Co. 136 Fed. 42.

There is always a presumption that statutes are intended to operate prospectively only.

> Reynolds v. M'Arthur, 2 Pet. 417;
> Twenty Percent cases, 20 Wall. 179;
> Cameron v. United States, 231 U. S. 710;
> United States Fidelity, etc. v. United States, 209 U. S. 306.

g. The Maine Water Company case is distinguishable.

> Maine Water Co. vs. Knickerbocker Steam Towage Company, 99 Me. 473;
> Hubbard v. Fort, 188 Fed. 987;
> Sanitary District v. United States, 266 U. S. 405;

h. Section 10 should not receive a construction delegating discretionary power to the Secretary of War to authorize obstructions to navigable capacity, because such power necessarily includes the power of eminent domain which cannot be delegated unless it affirmatively appears from action by Congress.

> Monongahela Navigation Co. v. U. S. 148 U. S. 312;
> Southern Pacific Co. v. Olympian Dredging Co. 260 U. S. 205;
> Scranton v. Wheeler, 179 U. S. 141;
> United States v. Lynah, 188 U. S. 445;
> United States v. Cress, 243 U. S. 316;
> 2 Suth. on Stat. Const. 2d ed. 1940;
> 20 Corpus Juris 533;
> United States v. Gettysburg Electric Co. 166 U. S. 668;
> Newport & Cincinnati Bridge Co. v. United States, 105 U. S. 470;
> Fairbank v. United States, 181 U. S. 283;
> Western Union v. Atlanta, 227 Fed. 465;
> Western Union v. Penn. Rd. Co. 195 U. S. 540;
> United States v. Rauers, 70 Fed. 748;
> Washington Water Power Co. v. Waters, 186 Fed. 572;
> Miocene Ditch Co. v. Lyng, 138 Fed. 544.

9. *The ordinance of 1787 prohibits interference with the navigable capacity of the Great Lakes; Congress did not intend section 10 to modify or repeal the prohibition of this compact.*

Ordinance of 1787 (1 Stat. at L. 51, 52; United States Rev. Stat. 1878 ed. pp. 13, 16)
Pennsylvania v. Wheeling Bridge Co. 13 How. 518;
Economy Light and Power Co. v. United States, 256 U. S. 113;

Repeals by implication are not favored and will not be indulged in if there is any other reasonable construction.

Lewis v. United States, 244 U. S. 134;
Washington v. Miller, 235 U. S. 422;
Ex parte Webb, 255 U. S. 663.

One act cannot be allowed to defeat another if by fair construction both can stand together.

Washington v. Miller, 235 U. S. 422.

An intention to repeal salutary provisions in an earlier statute cannot be implied.

Fussell v. Gregg, 133 U. S. 550.

Where two statutes are inconsistent the presumption is that the special act is intended to remain in force as an exception to the general act.

Rodgers v. United States, 185 U. S. 83;
Washington v. Miller, 235 U. S. 422;
In Re Louisville Underwriters, 134 U. S. 488.

10. *To construe section 10 as giving the Secretary of War full authority to authorize this diversion without an affirmative act of Congress is not justified in light of international relationship with Canada, including treaties and kindred acts of Congress.*

Article II, Section 2, Clause 2, Federal Constitution;

Article VI, Section 2, Federal Constitution;
United States v. Rio Grande Dam & Irr. Co. 174 U. S. 690;
Kansas v. Colorado, 206 U. S. 46;
Sanitary District v. United States, 266 U. S. 405;
United States v. Chandler-Dunbar Water Co. 229 U. S. 54.

a. Canada has a right to its portion of international waterways.

Vattel Law of Nations, Introd. par. 18;
In Re The Antelope, 10 Wheat. 66;
In Re The Schooner Exchange v. M'Fadden, 7 Cranch, 116;
Kansas City Southern v. Kaw Valley Drainage Dist. 233 U. S. 75.

b. The Canadian Boundary Waters Treaty of 1909 did not contemplate authorization to make abstractions affecting international waters.

Canadian Boundary Waters Treaty of Jan 11th, 1909;
Article II, Section 2, Clause 2, Federal Constitution;
Sanitary District v. United States, 266 U. S. 405.

c. The Treaty of 1909 bears the same construction as should be given to section 10.

The Canadian Boundary Waters Treaty of 1909;
Section 10 of the Act of March 3, 1899.

d. The Niagara Falls Act does not contemplate extensive delegated powers to the Secretary of War.

Niagara Falls Act of June 29, 1906.

e. A general consideration of American-Canadian relationships does not justify such a construction of section 10 as to authorize obstructions in international waters.

Lord v. Steamship Co. 102 U. S. 541;

Henderson v. Mayor of New York, 92 U. S. 259;
United States v. Chandler-Dunbar Water Co. 229 U. S. 53.

11. To construe section 10 as delegating power to the Secretary of War to grant express authority for obstructions to navigable capacity would render that section void, because such a construction would amount to an unconstitutional delegation of legislative power.

a. Congress, having established the rule of law prohibiting obstructions, authorization to defendants would amount to a change in the general rule and not a fact-finding determination.

St. Louis Merchants Bridge Co. v. United States, 188 Fed. 191;

Power to regulate commerce cannot be delegated.

Hautenberg v. Hennick, 129 U. S. 148;
Robbins v. Shelby Co. 120 U. S. 489;
Asher v. Texas, 128 U. S. 129;
Dent v. United States, 71 Pac. Rep. 920;
United States v. Blasingame, 116 Fed. 654.

The so-called bridge cases are distinguishable.

Union Bridge Co. v. United States, 204 U. S. 364.

b. Any construction of section 10 conferring legislative power would be void.

United States v. Chandler-Dunbar Co. 229 U. S. 53;
Southern Pacific v. Olympian Co. 260 U. S. 205;
Monongahela Bridge Co. v. United States, 216 U. S. 177;
Philadelphia Co. v. Stimson, 223 U. S. 605;
Scranton v. Wheeler, 179 U. S. 141;
West Chicago Street Ry. Co. v. Chicago, 201 U. S. 506.

12. *The permit of March 3, 1925, from the Secretary of War does not justify the abstraction of these waters from Lake Michigan by defendants as against the State of Michigan.*

a. This permit is but an expression of assent.

Cummings v. Chicago, 188 U. S. 410;
Montgomery v. Portland, 190 U. S. 89.

b. Being but a revocable license this permit cannot justify the invasion of property rights.

Sanitary District v. United States, 266 U. S. 405;
Corrigan Transportation Co. v. Sanitary Dist. 125 Fed. 611;
Baltimore & Potomac v. Baptist Church, 108 U. S. 317;
Hubbard v. Fort, 188 Fed. 987;
Wilson v. Hudson Co. Water Co. 76 N. J. Eq. 543;
Cobb v. Comm. of Lincoln Park, 202 Ill. 427;
Attorney General ex rel Becker v. Bay Boom Co. 172 Wis. 363;
International Bridge Co. v. New York, 254 U. S. 126;
In Re Crawford County L. & D. Dist. 182 Wis. 404;
Commonwealth v. Pennsylvania Ry. 72 Penn. Super. Ct. 353.

III.

THE DIVERSION AND ABSTRACTION OF WATERS FROM LAKE MICHIGAN BY DEFENDANTS CONSTITUTES A TAKING OF COMPLAINANTS PROPERTY WITHOUT JUST COMPENSATION, IN VIOLATION OF THE 5TH AND 14TH AMENDMENTS OF THE FEDERAL CONSTITUTION.

1. *The exercise of power by Congress over navigation is subject to the limitation of the 5th amendment.*

Gibbons v. Ogden, 9 Wheat. 1, 196;

Cooley v. Port Wardens, 12 How. 310;
Councilmen v. Hitchcock, 142 U. S. 547;
Interstate Commerce Comm. v. Brimstone, 154 U. S. 447;
Dooley Case, 188 U. S. 321;
O'Neil v. Vermont, 144 U. S. 323;
Potapsco Guano Company v. N. Carolina, 171 U. S. 345.

The constitutional limitation upon the exercise of the power of Congress over navigation requires *just compensation.*

Monongahela Navigation Co. v. United States, 148 U. S. 312;
Scranton v. Wheeler, 179 U. S. 141;
United States v. Lynah, 188 U. S. 445;
United States v. Cress, 243 U. S. 316.

2. *The State of Michigan has a quasi sovereign right over the land and water of the Great Lakes and their connecting rivers within its boundaries, and also as sovereign is the parens patriae.*

a. By treaty of peace Great Britain surrendered all rights to land and water within the United States.

Johnson v. McIntosh, 8 Wheat. 543;
Manchester v. Commonwealth of Mass. 139 U. S. 266;
Martin v. Waddell, 16 Pet. 367;
Shively v. Bowlby, 152 U. S. 1;
Wheeler v. Smith, 9 How. 55.

b. Upon admission into the Union Michigan succeeded to all these rights.

1. All states are admitted upon an equal footing.

a. By settled principle.

1 Nichols on Eminent Domain, par. 7;
Pollard v. Hagan, 44 U. S. 212;
Munn v. Illinois, 94 U. S. 113;

Shively v. Bowlby, 152 U. S. 1;
Hardin v. Shedd, 190 U. S. 508;
Kansas v. Colorado, 206 U. S. 46;
Port of Seattle v. Oregon & Wash. Ry. Co. 255 U. S. 56;

b. By the ordinance of 1787.

Section 2 of the Act of Congress approved June 15, 1836 (admitting the State of Michigan into the Union).

5. *Sovereign states own all of the land and waters within their boundaries as against any other state.*

Davis International Law, Par. 13;
15 Ruling Case Law, p. 100.
Taylor International Law, Chap. III, p. 263;
1 Halleck, International Law, Chap. VI., Par. 13;
Hall, International Law, 5th ed., Chap. 11, p. 100;
Glenn, International Law, Par. 34, p. 45;
Wheaton, International Law, Chap. IV., p. 217;
1 Hyde, International Law, p. 272;
Wilson, International Law, p. 78;
1 Oppenheim, International Law, 3d Ed. Par. 172;
Vattel, Law of Nations, Book II, Chap. VII;
Am. & Eng. Ency. of Law, 2nd Ed. 1133;
1 Cooley, Constitutional Limitations, 8th Ed. p. 4;
Church v. Hubbart, 2 Cranch, 187, 234; 2 L. Ed. 249, 264;
United States v. Smiley, et al, 27 Fed. Cases 1132, Case No. 16317;
In the Paquete Habana, 175 U. S. 679; 44 L. Ed. 321;
Mayor of New York v. Miln, 11 Pet. 102, 139; 9 L. Ed. 648;
Hudson County Water Co. v. McCarter, 209 U. S. 349; 52 L. Ed. 828;
33 Corpus Juris, 404;
Georgia v. Tenn. Copper Co. 206 U. S. 230; 51 L. Ed. 1038;
No. Dakota v. Minnesota, 263 U. S. 342; 68 L. Ed. 365.

4. *The State of Michigan has proprietary rights as a riparian owner in the land and waters within its boundaries.*

a. The State of Michigan has the authority to determine for itself such rules of property as it shall deem expedient with respect to waters within its boundaries, both navigable and non-navigable, and the ownership of the lands forming their beds and banks.

Hardin v. Jordan, 140 U. S. 384;
Shively v. Bowlby, 152 U. S. 1;
Scott v. Lattig, 227 U. S. 229;
Archer v. Greenville Sand & Gravel Co., 233, U. S. 60;
Port of Seattle v. Oregon & Wash. Ry. Co. 225 U. S. 56;
United States v. Holt State Bank, 270 U. S. 49;
Appleby v. New York, 271 U. S. 365;
Barney v. Keokuk 94 U. S. 324;
United States v. Cress, 243 U. S. 316.

b. The State of Michigan has established the rule that the State is the proprietary owner of the waters of the Great Lakes within its boundaries and of the lands forming their beds and banks.

1. *In Michigan the title to riparian property outside the meander line on the Great Lakes is held in trust by the State for the use of its citizens.*

Ainsworth v. Munoskong Hunting and Fishing Club, 159 Mich. 61;
State v. Venice of America Land Co. 160 Mich. 680;
Kavanaugh v. Rabior, 222 Mich. 68;
Kavanaugh v. Baird, 241 U. S. 240 (Decided January 3, 1928).

2. *The State of Michigan has a right of dockage upon the Great Lakes and connecting waters, as riparian owner and also as representative of its people.*

Transport Company v. Parkersburg, 107 U. S. 707;

Dutton v. Strong, 66 U. S. 23;
Yates v. Milwaukee, 10 Wall. 497;
Rice v. Ruddiman, 10 Mich. 125;
Richardson v. Prentiss, 48 Mich. 88;
Lincoln v. Davis, 53 Mich. 375;
Blodgett & Davis Lumber Co. v. Peters, 87 Mich. 498;
People v. Silberwood, 110 Mich. 103;
Commissioner of Highways v. Ludwick, 154 Mich. 32;
Walker v. Shepardson, 4 Wis. 486;
Delaplaine v. C. & N. W. Ry. Co., 42 Wis. 214;
Madison v. Mayers, 97 Wis. 399;
Miller v. Mendenhall, 43 Minn. 95;
Mobile Drydock v. Mobile, 146 Ala. 198;
Ladies Seamen' Friends Society v. Halstead, 59 Conn. 144;
Norfolk City v. Cook, 27 Gratt. 430;
Alexandria & F. R. Co. v. Faunce, 31 Gratt. 761;
Buffalo v. Delaware L. & W. R. Co. 39 N. Y. Supp. 4;
Saunders v. New York Central & H. RR. Co., 54 N. Y. Supp. 364;
Deering v. Proprietors of Long Wharf, 25 Maine 51;
Mather v. Chapman, 40 Conn. 382;
Commonwealth v. Pierce, 2 Dane Abr. 696;
Clement v. Burns, 43 New Hampshire, 618;
Hill v. Gough, 23 N. J. 624;
New Jersey Zinc Co. v. Morris Canal, 44 N. J. Eq. 398.

3. *A different rule prevails in the State of Michigan as to the rights of riparian proprietors upon navigable rivers.*

Lorman v. Benson, 8 Mich. 18;
Rice v. Ruddiman, 10 Mich. 128;
Ryan v. Brown, 18 Mich. 186;
Watson v. Peters, 26 Mich. 508;
Bay City Gas Light Co. v. Industrial Works, 28 Mich. 182;
Maxwell v. Bay City Bridge Co. 41 Mich. 46;
Pere Marquette Boom Co. v. Adams, 44 Mich 403;

Richardson v. Prentiss, 48 Mich. 88;
Backus v. Detroit, 49 Mich. 110;
Fletcher v. Thunder Bay Co. 51 Mich. 277;
Webber v. P. M. Boom Co. 62 Mich. 636;
Butler v. Railroad Co. 85 Mich. 255;
Grand Rapids Ice & Coal Co. v. South Grand Rapids Ice & Coal Co. 102 Mich. 227;
People v. Silberwood, 110 Mich. 106;
Scanton v. Wheeler, 113 Mich. 565;
Goff v. Gougle, 118 Mich. 307;
Brown v. Parker, 127 Mich. 392;
Kemp v. Stradley, 134 Mich. 676;
People v. Grand Rapids Power Co. 164 Mich. 121;
Nedtweg v. Wallace, 237 Mich. 14;
Collins v. Gearhart, 237 Mich. 38;
Kavanaugh v. Baird, 241 Mich. 240.

5. *These rights as quasi-sovereign, parens patriae and as a proprietory owner are property rights of the State of Michigan and its people in the land and waters within its boundaries upon the Great Lakes and their connecting waters.*

a. Property in its legal conception.

Buchanan v. Warley, 245 U. S. 71;
Rice v. Ruddiman, 10 Mich. 145;
Grand Rapids Boom Co. v. Jarvis, 30 Mich. 308;
Hall v. Ionia, 38 Mich. 403;
Eaton v. Boston, Concord & Montreal RR. Co. 51 New Hampshire, 504;
1 Lewis Eminent Domain, 3d Ed. par. 63;
12 Corpus Juris, 945;
Old Colony & Fall River Ry. Co. v. County of Plymouth, 14 Gray 155;
Fisher v. Bountiful City, 21 Utah, 29;
City of St. Louis v. Hill, 116 Mo. 527;
City of Denver v. Bayer, 7 Col. 113;
Chicago & Western Indiana RR. v. Englewood Connecting RR. Co. 115 Ill. 375;
Bailey v. People, 190 Ill. 28.

b. The State of Michigan as sovereign, as the parens patriae and also in its proprietary capacity has definite property rights in the waters of Lake Michigan, its beds and banks.

1. *The State of Michigan is entitled to have all the waters coming naturally to it, yielding only if at all to the demand of public, commercial necessity as asserted by appropriate Congressional action.*

Gardner v. Newburgh, 2 Johnson's Chancery, 165;
Kansas v. Colorado, 206 U. S. 46;
Hudson County Water Co. v. McCarter, 209 U. S. 349;
United States v. Rio Grande, 174 U. S. 690;
Missouri v. Illinois, 180 U. S. 208;
United States v. Chandler-Dunbar Water Co. 229 U. S. 54;
Hoge v. Eaton, 135 Fed. 411, 414;
Holyoke Water Power Co. v. Connecticut River Company, 20 Fed. 71;
Pine v. New York, 112 Fed. 98;
United States v. River Rouge Improvement Co. 269 U. S. 411;
Gould on Waters, 2d ed. 396;
Rigney v. Tacoma Electric Light & Water Co. 9 Wash. 576;
Crawford County v. Hathaway, 67 Neb. 325, 340; 93 N. W. 788;
Ohio & Mississippi Ry. Co. v. Thillman, 143 Ill. 127;
Wyoming v. Colorado, 259 U. S. 419, 466.
Farnham on Waters (1904) Vol. I, pages 29, 59;
Tetherington v. Donk Bros. 232 Ill. 522;
Thomas v. Coal Co. 199 Ill. App. 50, 58;
Hyatt v. Albro, 121 Mich. 638;
Embrey v. Owen, 6 Exchn. 353;
3 Kent Comm. 439;
1 Wiel Water Rights, 1911, 3d Ed. Sec. 282, 285, 711.

6. *This diversion of water by the State of Illinois and the Sanitary District of Chicago amounts to a taking of the property of the State of Michigan.*

a. Taking in its legal conception.

The general rule is that any injury to rights or property which, if caused by a private person without authority of statute would give the plaintiff a cause of action against such person, constitutes a taking of property, entitling one to compensation, notwithstanding the statute which legalizes the damaging work.

Delaplaine v. Chicago & N. W. R. R. Co., 42 Wis. 214;
1 Mills on Eminent Domain, Par. 183;
Trinity Sabine R. Co. v. Meadows, 73 Texas, 32, 3 L. R. A. 565;
Gould on Waters, (2d Ed.) p. 497;
Peel v. The City of Atlanta, 85 Ga. 138; 8 L. R. A. 787;
1 Lewis Eminent Domain, 3rd. Ed. Par. 65;
1 Nichols on Eminent Domain, Par. 28;
Avery v. Fox, 2 Fed. Cases, Case No. 674;
Central Trust Co. of New York v. Hennen, 90 Fed. Rep. 593;
James v. Campbell, 104 U. S. 359; 26 L. Ed. 786;
Johnson v. United States, 4 Court of Claims, 250;
Eaton v. Boston, Concord & Montreal Rd. Co., 51 N. H. 504; 12 Am. Rep. 147;
Cooley's Constitutional Limitations, 8th Ed. 1158;
Foster v. The Stafford National Bank, 57 Vt. 128;
City of Mansfield v. Balliett, 65 Ohio St. 451; 58 L. R. A. 628;
Broadwell v. The City of Kansas, 75 Miss. 213.
People ex rel. The Manhattan Savings Institution of the City of New York v. Norton P. Otis, et al., 90 N. Y. 48;
McCord v. High, 24 Iowa, 336;
Memphis & Charleston Railroad Co. v. Birmingham, Sheffield & Tennessee River R. Co., 96 Ala. 571; 18 L. R. A. 166;
City of Schnectady v. Furman, 145 N. Y. 482;
Gaylord v. The Sanitary District of Chicago, 204 Ill. 576; 63 L. R. A. 582; 98 Am. St. Rep. 235;
City of Clinton v. Franklin, 119 Ky. 143;
Oregon Short Line Railroad Company v. Jones et al., 29 Utah, 147;

Leffman v. Long Island Ry. Co., 93 N. Y. Supp. 647;

Knowles v. New Sweden Irrigation Dist. 16 Idaho 217;

School Town of Andrews v. Heiney, 178 Ind. 1.

b. It is not necessary that the property be absolutely and physically taken from the possession of the complaining party, and the complaining party ejected from possession and use.

1. *If water is dammed up or set back upon or over land so as to destroy its essential use, it constitutes a taking of property.*

Pumpelly v. Green Bay & Mississippi Canal Co., 13 Wall. 166; 20 L. Ed. 557;

United States v. Lynah, 188 U. S. 445; 47 L. Ed. 539;

United States v. Cress, 243 U. S. 316; 61 L. Ed. 746;

King v. United States, 59 Fed. Rep. 9;

Williams et al. v. United States, 104 Fed. Rep. 50;

Morris v. The United States, 30 Ct. of Claims, 162,

Jackson et al. v. The United States. 31 Ct. of Claims, 318;

Stevens v. The Proprietors of the Middlesex Canal, 12 Mass. 466;

Evansville & Crawfordsville Rd. Co. v. Dick, 9 Ind. 433;

Kemper and wife v. City of Louisville, 77 Ky. 87;

Conniff v. The City & County of San Francisco, 67 Calif. 49;

Nevins v. City of Peoria, 41 Ill. 502;

Beidler et al. v. The Sanitary District of Chicago, 211 Ill. 628;

Doty v. Village of Johnson, 84 Vermont 15;

Ft. Worth Improvement District No. 1 v. City of Ft. Worth, 106 Tex. 148; 158 S. W. 164; 48 L. R. A. (N. S.) 994.

2. *If a riparian owner is deprived of the use and ordinary flow of water in its natural and normal height by artificial lowering of levels so as to convert what was water area into land area, it constitutes a taking of property.*

Cohen v. United States, 162 Fed. Rep. 364;
United States v. Alexander et al., 148 U. S. 190;
Stein v. Burden, 24 Ala. 130, 60 Am. Dec. 453;
Meyers v. City of St. Louis, 8 Missouri Appeals, 266;
City of Emporia v. Soden, 25 Kansas 588; 37 Am. Dec. 265;
Mayor and City Council of Baltimore v. Warren Manfg. Co. et al., 59 Maryland 96;
Smith v. Rochester, 92 N. Y. 463; 44 Am. Rep. 393;
Proprietors of Mills and others v. Braintree Water Supply Co., 149 Mass. 478;
Fernald v. Knox Woolen Co., 82 Maine 48, 7 L. R. A. 459;
Kimberly & Clark Co. v. Hewitt and others, 75 Wis. 371;
Kimberly & Clark Co. v. Hewitt, et al., 79 Wis. 334;
Cedar Lake Hotel Company v. City of Fall River, 154 Mass. 305;
Rigney v. Tacoma Light & Water Company, 9 Wash. 576;
Waller v. State of New York and Skaneateles Paper Co. v. State of New York, 144 N. Y. 579;
Valparaiso City Water Co. v. Dickover, 17 Ind. App. Ct. Rep. 233;
Priewe v. Wisconsin State Land & Improvement Co., 93 Wis. 534, 33 L. R A. 645;
Smith v. Youmans, 95 Wis. 103; 70 N. W. 1115;
Gehlen Brothers v. Knorr, 101 Iowa 700; 36 L R. A. 798;
Neal v. City of Rochester, 156 N. Y. 213;
Baxter v. Gilbert, 125 Calif. 580;
Hyatt v. Albro, 121 Mich. 638;
Sanborn v. People's Ice Co , 82 Minn. 43, 83 Am. St. Rep. 401, 84 N. W. 641, 51 L. R A. 829;

Strobel v. Kerr Salt Co, 164 N. Y. 303, 79 Am. St. Rep. 643; 51 L. R. A. 687;
New Whatcom v. Fairhaven Land Co., 24 Wash. 493; 54 L. R. A. 190;
Draper v. Brown, 115 Wis. 361, 91 N. W 1001;
People v. Hulbert, 131 Mich. 156;
Wender v. Spokane County, 27 Wash. 121;
Webster v. Harris, 111 Tenn 668, 59 L. R. A. 324.

7. *This diversion of water from Lake Michigan is not governed by the authorities cited by the Special Master; this diversion is not an "incidental damage" nor is it damnum absque injuria.*

a. In each of the cases cited by the Special Master the work was for a constitutional purpose. It was authorized by an Act of Congress and it was done by or for the Federal Government.

The following cases are distinguishable:

S. Carolina v. Georgia, 93 U. S. 4;
Gibson v. United States, 166 U. S 269;
Scranton v. Wheeler, 179 U. S. 141;
C. B. & Q. v. Illinois, 200 U S. 561;
W. Chicago Street Ry. Co. v. Illinois, 201 U. S 506;
Union Bridge Co. v. United States, 204 U. S. 364;
Philadelphia Co v. Stimson, 223 U. S. 605;
Chandler-Dunbar Water Co. v. United States, 229 U. S. 53;
Jackson v. United States, 230 U. S. 1;
Greenleaf-Johnson v. Garrison, 237 U. S. 251;
Willink v. United States, 240 U. S. 572;
Horstman Company v. United States, 257 U. S. 138;
United States v. River Rouge Improvement Co., 269 U. S. 411.

These cases are also distinguished by United States v. Cress, 243 U. S. 316.

b. In each of these cases cited by the Special Master the work caused an "incidental damage."

Sanguinetti v. United States, 264 U. S. 146; is distinguishable

United States v. Rio Grande Dam & Irrigation Company, 174 U. S. 690;
Hubbard v. Fort, 188 Fed. 987.

ARGUMENT ON THE LAW

The Special Master, having determined the facts in substantial accord with complainant, it is our position that the defendants are not clothed with constitutional and Congressional authority to abstract the water of Lake Michigan to the substantial damage and destruction of the property of the State of Michigan and its people.

Issues of Law.

The Special Master has found:

1. That this suit is one over which this court has jurisdiction and that it presents a justiciable controversy. (MR144-146.)
2. That an act of Congress is necessary to justify this abstraction and diversion. (MR146-148.)
3. That Congress has not acted to permit this diversion, unless the Rivers and Harbors Appropriation Act of March 3, 1899, gives such authority (which the Special Master concludes was given). (MR171-175.)

The Special Master's position with respect to complainant's claims for relief in equity raises the following issues:

1. Whether Congress *can act* to authorize an abstraction of these waters for a purpose which is unconstitutional.

2. Whether Congress *has acted* to permit this abstraction of water.
3. Whether Congress *could act* under these circumstances to permit the taking of property from complainant *without just compensation*.

Thus the issues of law are vital, far-reaching, and go to the very fundamentals. These questions involve the law upon matters of importance to the Federal and State Governments as well as the future existence of the Great Lakes-St. Lawrence waterway system. We have taken respectful exception to the Special Master's conclusions of law because we believe these issues should be decided in favor of complainant in order to be brought in harmony with:

1. The Federal Constitution.
2. The *"unmistakable"* construction of Section 10 of the Act of March 3, 1899.
3. The Property Rights of Complainant and its people.

I.

CONGRESS DOES NOT HAVE POWER TO AUTHORIZE AN ABSTRACTION OF WATER FOR AN UNCONSTITUTIONAL PURPOSE; THE DIVERSION OF THESE WATERS IS CLEARLY FOR SANITARY AND WATER-POWER PURPOSES AND NOT FOR NAVIGATION; THE ATTEMPT TO EXERCISE POWER FOR THESE PURPOSES IS THEREFORE VOID.

(Exceptions No. 26, 27, 28, 29 and 35 relate to this subject.)

By Article I, Section 8, Clause 3, United States Constitution, it is provided:

> "The Congress shall have power to regulate commerce * * with foreign nations and among the several states * * *."

1. *The Constitutional limitation upon the power of Congress under the commerce clause.*

In approaching the power of Congress to regulate commerce among the several states, we do not overlook the long settled principle stated in Gibbons v. Ogden (9 Wheat. 1. 196), that the power of Congress to regulate commerce among the states is complete in itself, may be exercised to its utmost extent, and has no limitations other than are prescribed in the Constitution.

But it is also equally fundamental that Congress has only those powers which were delegated or granted by the people and expressly set forth in the Constitution.

> "The Government, then, of the United States, can claim no powers which are not granted to it by the Constitution, and the powers actually granted, must be such as are expressly given, or given by necessary implication."

Martin v. Hunter, 1 Wheat, 304, 326.

> "The Government of the United States is one of delegated, limited and enumerated power."

United States v. Harris, 106 U. S. 629, 635, 27 L. Ed. 290, 292.

Congress may not legislate to affect navigation adversely or to destroy navigation.

> "The power to regulate implies the existence and not the destruction of the thing to be controlled."

Gd. Trunk Western Ry. v. So. Bend, 227 U. S. 544, 555.

"And while Congress, in the exercise of this power, may adopt, in its judgment, any means having some positive relation to the control of navigation and not otherwise inconsistent with the Constitution, it may not arbitrarily destroy or impair the rights of riparian owners by legislation which has no real or substantial relation to the control of navigation or appropriateness to that end."

United States v. River Rouge Imp. Co. 269 U. S. 411, 419.

"The authority is given to Congress for the purpose of aiding, and not destroying, navigation and commerce; so that, although authority over the stream is absolute in execution of the trust imposed in it, whatever obstructions it authorizes must be for the purpose of improving the navigation of the stream, or of facilitating commerce." * *

"One purpose of the grant to Congress of the power over commerce was, undoubtedly, to preserve the waterways for the common use of the citizens of the United States."

Farnham on Waters, Vol. I, page 60.

The power of Congress over "commerce" justifies its exercise to regulate *navigation,* but this power does not contemplate the exercise of a control over navigable waters for the purpose of *sanitation, water-power, irrigation* or other kindred uses, to which water may be put, under the guise of regulating navigation. Nor could Congress legislate to permit waters to be taken for the sole purposes of sanitation, water-power or irrigation, and not for navigation, and so as to affect navigation adversely. Under the authority to regulate navigation, Congress could not donate navigable capacity for purposes other than those contemplated within its constitutional power. The power of Congress over navigation does not justify its exercise for every purpose, solely because the subject of its general control is water, and has navigable capacity. Congress is limited to the *exercise of power over water for the purpose of navigation.*

Therefore, whenever Congress attempts to exercise power over navigable waters for the purpose of sanitation, its attempt is not in pursuance of Article I, section 8, Clause 3, of the constitution, and is void.

> Farnham on Waters, Vol. I, page 59, 60;
> Port of Seattle v. Oregon & Wash Ry. Co. 255 U. S. 56;
> United States v. Rio Grande Dam & Irr. Co., 174 U. S. 690;
> Kansas v. Colorado, 206 U. S. 46;
> United States v. River Rouge Imp. Co., 269 U. S. 411; 70 L. Ed. 339;
> N. Jersey v. Sargent, 269 U. S. 328;
> Barney v. Keokuk, 94 U. S. 324;
> Burlington Gas Light Co. v. Burlington, etc. Rwy. Co., 165 U. S. 370;
> Muhlker v. N. Y. & Harlem Ry. Co., 197 U. S. 544;
> Sauer v. City of New York, 206 U. S. 536;
> Woodruff v. North Bloomfield Gravel & Mine Co., 18 Fed. 753;
> Withers v. Buckley, 20 How. 84, 15 L. Ed. 816;
> Mobile v. Kimball, 102 U. S. 698; 26 L. Ed. 238;
> Depew v. Wabash & E. Canal, 5 Ind. 8.

In Port of Seattle v. Oregon and Washington Railway Co., 255 U. S. 56, it was said:

> "First. The right of the United States in the navigable waters within the several states is limited to the control thereof for purposes of navigation."

In Woodruff v. North Bloomfield Gravel & Mining Co., 18 Fed. 753, it is said:

> "Congress is authorized to *'regulate'* but not to *destroy* 'commerce among the states.' It may, undoubtedly, in its wisdom, obstruct, or, perhaps, destroy navigation, to a limited extent, at particular points, for the purpose of its general advantage and improvement on a larger general scale, such, for example, as by authorizing the building of a railroad or post-road bridge across a navigable

> stream; but it cannot destroy, or authorize the destruction, entire or partial, of the whole system of navigable waters of a state for purposes wholly foreign to commerce or post-roads, or to their regulation."

In United States v. River Rouge Improvement Co., 269 U. S. 411, 70 L. Ed. 339; it was likewise said:

> "The right of the United States in the navigable waters within the several states, is, however, 'limited to the control thereof for the purposes of navigation.'"

In United States v. Rio Grande Dam and Irrigation Company, 174 U. S. 690, 708, 710, the Government brought action to enjoin a private corporation from impounding and diverting the waters of the Rio Grande at a point in the territory of New Mexico where the river was not navigable. The government planted its case upon the theory that this diversion would cause an interference with the navigable capacity of the river in its lower reaches, where it would have navigable capacity. This court held that the government had the right to enjoin the impounding or diversion of waters which would substantially interfere with the navigable capacity of the lower reaches of the Rio Grande River. But it will be noticed in that case particularly that this court was accurate and precise in *limiting* the effect of that decision to the power of Congress to *protect navigable capacity.* The authority of the government to go beyond the point where navigation was affected was impliedly denied by the preciseness with which this court limited the effect of that decision to the control of water *to the extent* of control for navigation.

In State of New Jersey v. Sargent, 269 U. S. 328, 337, this court was again somewhat called upon to state the power of Congress to regulate navigable waters. It will be noticed that in that case likewise the exactness of language which was used to express this power:

> "Rightly to appraise the bill one should have in mind the doctrine heretofore firmly settled that the power to regulate interstate and foreign commerce, which the constitution vests in Congress, includes the power of control, *for the purposes of such commerce* all navigable waters which are accessible to it and within the United States, whether within or without the limits of a State, and to that end to adopt *all appropriate measures to free such water from obstructions to navigation and to preserve and even enlarge their navigable capacity."* * * *

In Kansas v. Colorado, 206 U. S. 46, the State of Kansas brought an action under the original equity jurisdiction of this court to restrain Colorado and certain corporations organized under this law from diverting the water of the Arkansas River for the irrigation of lands in Colorado. In that case the waters were not diverted from their own watershed, but their diversion was claimed to diminish the navigability of the river. The Federal government petitioned to intervene, and upon this phase of the case, in denying that petition, this Court again restated fundamental principles: that the Government of the United States is one of enumerated powers; that it has no inherent powers of sovereignty; that the enumeration of powers granted is to be found in the constitution of the United States, and in that alone; that the manifest purpose of the tenth amendment to the Constitution is to put beyond dispute the purpose that all powers not granted are reserved to the people. With this as its major premise the Court held that while Congress has general legislative jurisdiction in the *territories* and may control the flow of water in their streams, it has no power to control a like flow within the limits of the *State, except to preserve or improve the navigability of the stream.* The effect of that decision is to recognize the constitutional limitation upon the power of Congress, prohibiting any action by it relative to navigable waters, except to *protect, preserve and improve* their navigable capacity and not otherwise. Problems of irrigation, sanitation and the like cannot be solved under the guise of navigation.

In Barney v. Keokuk, 94 U. S. 324, 342, it was held that the local government could not authorize permanent obstructions (such as a depot building) upon the streets of a city. The Court said in disposing of the claim that the city had a right to permit this sort of action:

> "It (the depot building) was a total obstruction of the passage; and that, as we have said, cannot be created or allowed. It is subversive of and totally repugnant to the dedication of the street as well as to the rights of the people."

Thus the rule is laid down in that case by this Court that public authorities could not authorize an obstruction in a public highway for any other purpose than that of the protection, preservation and improvement of the public highway. This same doctrine with respect to highways of travel has been followed in Burlington Gas Light Company v. Burlington Railway company, 165 U. S. 370; Muhlker v. New York and Harlam Railroad Company, 197 U. S. 544; Sauer v. City of New York, 206 U. S. 536. Surely the same rule employed by this court with respect to highways upon land would have a high degree of importance in determining its attitude upon navigable highways of commerce.

The interest of the Federal Government in navigable waters is for the purpose of preserving these natural highways. The reason this power was given to the Federal Government by the States by grant in the constitution was to prevent just such a situation as here involved,—where one state desires to take another state's property, impair and destroy navigability and to consider only the rights of its own limited portion of our national population. To prevent this interstate competition for the elements of these highways of commerce, the people wisely left their control with the Federal Government *to protect and preserve them* from the onslaught of any selfishness based upon local consideration and not a national desire for the preservation and protection of the status quo of navigable waters.

2. *The diversion of these waters is for sanitary and water-power purposes and not for the purpose of navigation or commerce so as to bring it within the power of Congress.*

7.

That the diversion of this water is for sanitary purposes nobody can possibly doubt. There may be a possibility that Congress may some day in the future see fit to adopt this channel for the purposes of navigation by rendering it physically capable of being navigated for its entire length, but at present there is no navigable connection between the sanitary canal and the Illinois waterway, so that at present at least, any diversion can be justified only upon the grounds of sanitation.

In Sanitary District v. United States, 266 U. S. 405, these same defendants relied upon the right of the state to divert these waters under its *police power* (for sewage disposal, sanitation, and water-supply purification), as against the right of the Federal Government to prohibit obstructions to navigation. But this court said (266 U. S. 405, 426):

> "The *main ground* is the authority of the United States to remove obstructions to interstate and foreign commerce. There is no question that this power is superior to that of the States to provide for the *welfare or necessities of their inhabitants.*"

Sewage disposal and water-supply was their defense to that action,—in fact it was their *main ground.*

Indeed, prior to the instant case, defendants did not rely upon the argument of navigation. It was admittedly a sanitary canal for the purpose of sewage disposal on the part of the Sanitary District of Chicago, and for water-power development accruing to the State of Illinois, by which the City of Chicago and other municipalities received electric power at cost. But when it became necessary to establish a justification for this diversion, then the theory of navigation was seized upon by defendants to justify this appropriation which could not otherwise be made.

In the report of the Special Master, it is said:

> "There is no doubt that the diversion is primarily for the purposes of sanitation. Whatever may be said as to the service of the diverted water in relation to a waterway to the Mississippi, or as to the possible benefit of its contribution to the navigation of that river at low water stages, it remains true that the disposition of Chicago's sewage has been the dominant factor in the promotion, maintenance and development of the enterprise by the State of Illinois and the Sanitary District. The purpose of utilizing the flow through the drainage canal to develop power is also undoubtedly present, although subordinated to the exigency of sanitation. So far as the diverted water is used for the development of power, the use is merely incidental." (M. R. 165.)

This court, in Sanitary District v. United States, 266 U. S. 405, 424, 69 L. Ed. 362, said in describing the canal that it was used:

> "Primarily as a means to dispose of the sewage of the city of Chicago."

And again at p. 431, said:

> "It is doubtful, at least, whether the Secretary of War was authorized to consider the remote interests of the Mississippi states *or the sanitary needs of Chicago.*"

In Missouri v. Illinois, 200 U. S. 496, 526; 50 L. Ed. 512, 581, although this court could not, under the facts there presented, grant an injunction to the State of Missouri to enjoin these same defendants from polluting the water supply of St. Louis, Missouri, it was accepted and recognized that the purpose of this diversion from Lake Michigan was for sanitation or sewage disposal. At that time these defendants had not advanced the claim, nor was it suggested that the purpose of this diversion was in any way to facilitate navigation.

Indeed the courts of Illinois have spoken upon this subject as to the purpose of the diversion and there has been a series of cases passing upon this question. They have uniformly held that the purpose of this canal whereby the diversion was accomplished was to flush the sewage from Chicago and the Sanitary District.

In Beidler v. Sanitary District of Chicago, 211 Ill. 628, the Supreme Court of Illinois stated the purpose of this very abstraction as follows:

> "Again, it is evident from an examination of the act for the creation of sanitary districts, that the primary and principal purpose of their creation under the statute is to provide for the preservation of the public health by improving the facilities for the final disposition of sewage, and by supplying pure water. The fact that a navigable waterway may be created is a mere incident, and not one of the purposes for which a sanitary district is created."

Again in Chicago v. Green, 238 Ill. 258, 264 (Feb., 1909), the Illinois Supreme Court said:

> "A consideration of the various provisions of the Sanitary District act of 1899, leads, it seems, irresistibly to the conclusion that this act was passed to furnish a common outlet for the sewage of the incorporated municipalities within the limits of the district, * * *." "* * * (p. 267). The law was enacted for the purpose of constructing a main channel or outlet for all the sewers and drains of the various municipalities."

Again in Mortell v. Clark, 272 Ill. 201, 207 (Feb., 1916), the Illinois Supreme Court said:

> "The fact that a navigable waterway, however, will be created by the digging of the main channel of the sanitary district, is a mere incident and not one of the purposes for which the sanitary district was created."

Again in Sanitary District v. Chicago Packing Co. 241 Ill. App. 288. 297, (June, 1926), the Appellate court said:

> "The primary purpose of the legislature in authorizing the creation of sanitary districts and in the construction of the sanitary channel and other adjuncts by the Sanitary District of Chicago was the disposal of sewage."

In fact, such cases as Corrigan Transportation Co. v. Sanitary District of Chicago, 125 Fed. 611, 137 Fed. 851, demonstrate that navigation was adversly affected to the point where action was begun against the Sanitary district by shipping interests, which could not operate **successfully upon the** Chicago River because of the increased current and obstacles presented by the increase, due to the diversion of these waters from Lake Michigan for sanitary purposes.

Not only have the Supreme Court of the United States and the highest courts of Illinois stated the purposes of this canal and the diversion of water from Lake Michigan, but also the Secretary of War and the Chief of Engineers have likewise very definitely spoken about the purpose of this diversion of water.

On February 28, 1912, the Chief of Engineers, in passing upon the application of the Sanitary District for a permit, advised that the diversion of such waters was not necessary for the demands of navigation, and on January 8, 1913, the Secretary of War said:

> "On the other hand, the demand for the diversion of this water at Chicago is *based solely upon the needs of*

> *that city for sanitation.* There is involved in this case, no conflicting claims of navigation." (MR63.)

And in the conclusion he said:

> "After a careful consideration of all the facts presented, I have reached the following conclusions:
>
> First. That the diversion of ten thousand cubic feet per second from Lake Michigan as applied for in this petition, *would substantially interfere with the navigable capacity of the navigable water in the Great Lakes and their connecting rivers.*
>
> Second. That that being so, it would not be appropriate for me, without express Congressional sanction, to permit such a diversion, however greatly demanded by the local interest of the Sanitary District of Chicago." (MR66.)

And even in the permit granted by the Secretary of War March 3, 1925, that official constantly deals with the problem of sewage disposal, and in the letter of transmittal accompanying this permit, says: (MR80.)

> "This Department has always held and continues to hold, that the taking of an excessive amount of water for sanitation at Chicago, *does affect navigation on the Great Lakes adversely.* And that this diversion of water from Lake Michigan should be reduced to reasonable limits with *utmost despatch.*"

Could anything be plainer from the findings of fact herein than that navigation has been discouraged upon the Chicago River to the point where there is no navigation at the present time, by shipping interests? In the face of all these considerations how can it be doubted that this abstraction of water from Lake Michigan is for sanitary and water-power purposes?

The Special Master says: (MR 165.)

> "In determining the constitutional authority of Congress, the purpose of the diversion is not to be considered without regard to its effect. * * When navigation is affected the power of Congress comes into play."

But if the purpose is not to be considered without the effect, likewise it is true that the *effect* is not to be considered without the *purpose,* for the effect to a large degree determines the purpose. To divorce the *purpose* from a consideration of the constitutional power of Congress to deal with navigation would result in giving power over navigable water for *any* purpose, simply because it is navigable water or affects navigable water.

The Special Master says that because the diversion *affects* navigation Congress immediately becomes invested with discretionary power to deal with the whole subject, and may thereupon permit the diversion under such power. But this reasoning disregards entirely the purpose and *extent* for which the power of Congress is called into play. To follow this reasoning it would be necessary to hold that where navigation was adversely affected, Congress may act to permit water to be further diverted for the purpose of sanitation, irrigation, or some other non-constitutional purpose, simply because navigation has been adversely affected. In short, it would mean that where the power of Congress was called into play to protect navigation, it became enlarged for the purpose of benefiting sanitation. Thus the power of Congress under the commerce clause could be enlarged to accomplish other purposes, not contemplated in the commerce clause, for the sole reason that Congress could act to protect navigation.

It is our position that in a determination of the *constitutional authority* of Congress, if the purpose be one which is beyond the scope of its power, Congress is limited to the correction of the *effect upon navigation.* In fact, its power to prohibit a diversion presupposes that such action is for the purpose of navigation. If this were not so, Congress could enlarge upon its power under the commerce clause to include a dealing with water for every purpose, simply because navigation is affected and thus Congress could itself furnish the premise to give itself power to act, where otherwise it could not do so.

The Special Master cites as authority for his conclusion the case of Miller v. Mayor, 109 U. S. 385, where it was held that because the Brooklyn bridge affected a navigable waterway Congress had control. But the *control* of Congress was *limited to the bridge.* Because the bridge affected navigation, Congress did not have nor exercise power to go further and deal with sanitation, irrigation or any other project than the bridge, simply because its power over the commerce clause came into play for the protection of navigation.

The Special Master also cites the case of New York v. New Jersey, 256 U. S. 296, in which this court held that the Attorney General of the United States had authority to retire from the case upon terms stated in a stipulation approved by the Secretary of War, who afterwards embodied them in the construction permit issued to the sewage commissioner. But New Jersey was prevented from polluting the harbor of New York, and whatever powers were exercised were to prevent pollution of the harbor for the *purpose* of *regulating navigation.* The government did not propose nor carry out any scheme of diversion of the water of the New York harbor or other water for the purpose of sewage disposal, nor did the government deal with navigable water of the New York harbor, except for the purpose of preventing pollution which might be considered an obstruction to navigation. In that case, likewise, because the purity of the water of New York harbor affected navigation, Congress did not have power to go further and deal with sanitation, irrigation or any other project than the prevention of pollution itself, simply because its power over the commerce clause came into play. The power to *protect navigation by stopping pollution* does not give added power to destroy or impair navigable capacity simply because the power to protect navigable capacity has *to that extent* been called into play.

There is no precedent where Congress or any official has been permitted to deal with navigable water for any other purpose than that of navigation. Only for that purpose and to that extent may Congress deal with a diversion of water. Whether the project affecting navigation embraces some other object not within the commerce clause or not, no case can be pointed to where federal authority has been exercised under the commerce clause for any other *purpose* than that of *navigation.*

Congress would not have power under the commerce clause to construct this artificial channel and divert water from Lake Michigan to flush Chicago's sewage so as to substantially interefere with the navigable capacity of the Great Lakes.

It is our position that Congress, not having power to do these acts, could not authorize an abstraction of water for the purpose of sanitation or water power development, or other non-constitutional purpose, and could not furnish authority to the defendants. Hence any attempt to exercise power for these purposes is void.

II.

THE DEFENDANTS HAVE CREATED AND ARE MAINTAINING AN OBSTRUCTION TO THE NAVIGABLE CAPACITY OF THE GREAT LAKES AND THEIR CONNECTING WATERS WITHOUT AUTHORITY FROM CONGRESS.

(Exceptions Nos. 30, 36 and 37 relate to this subject.)

The Issue

It is the complainant's position that this abstraction constitutes an obstruction to the navigable capacity of the Great

Lakes. To justify such an obstruction the constitutional authority of Congress must necessarily be given.

The constitutional authority of Congress over navigation, (admitted to exist), has never been exercised in this instance, so as to give defendants the right to abstract these waters, and thereby create this obstruction to navigation upon the Great Lakes-St. Lawrence waterway system. *Admitting the power of Congress* to act in the premises, so as to lawfully permit the diversion of this water of the Great Lakes for some great national purpose, still, *until Congress does act plainly and unequivocably, no such vast and enormous an exercise of power can be implied without some foundation.* In short the State of Michigan, *admitting the power of Congress* to deal with problems of navigation, *denies* that there has been *any constitutional and lawful exercise of that power by Congress in this instance.*

A. *This abstraction constitutes an obstruction to the navigable capacity of the Great Lakes and the Chicago River, both in fact and in law.*

The creation of a large navigable river flowing away from Lake Michigan, and carrying into the Mississippi basin an amount of water equal in increment of flow to about one-third that of the St. Clair river, and equal in volume of flow to the three largest tributary rivers of Lake Michigan, whereby the levels of the Great Lakes have been lowered at least six inches as a direct result, shows beyond peradventure that this diversion of water is *not hypothetical or imaginary, but is a real, practical, serious and menacing obstruction to the navigable capacity of the Great Lakes.*

Perhaps the clearest finding of fact by the Special Master in this whole case was:

> "I am satisfied that the evidence requires the finding that the lowering of lake levels of approximately six inches has had a substantial and injurious effect upon the carrying capacity of vessels, and has deprived naviga-

> tion and commercial interests of facilities which otherwise they would have enjoyed in commerce on the Great Lakes." (MR116.)

Commerce and navigation have been substantially affected by reason of the lowering of the lake levels. This has imperiled and directly threatened navigation to such an extent that millions of tons of shipping have been cut off by the reduced margin of safety at critical points in connecting waters between the Great Lakes; millions of dollars have been lost by this unjustified limitation upon water-borne shipments; fishing and hunting grounds, beaches, summer resorts, public parks and all riparian property, including harbors and ports, with millions of dollars invested in their establishment and maintenance by the Federal Government, as well as State and local governments, and private citizens have been rendered practically useless and valueless by this extraordinary obstruction to commerce and navigation, that is without precedent in the annals of history.

Attention is respectfully called to the report of the Special Master which sustains the complaining states, without reservation upon this point, at page 104:

> "I find that the full effect of a diversion of 8,500 c. f. s. of water from Lake Michigan at Chicago through the drainage canal of the Sanitary District would be to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; etc."

At page 105—

> "I find that the diversion which has taken place through the Chicago drainage canal has been substantially equivalent to a diversion of about 8,500 c. f. s. for a period of time sufficient to cause, and has caused, the lowering of the mean levels of the lakes and the connecting waterways practically to the extent above stated."

At page 116—

> "While there are quite definitely established routes or lanes for vessels plying between the various ports on the Great Lakes, vessels deviate from such courses in bad weather, both because of the difficulty of maintaining the course with precision under such conditions, and because of the necessity of seeking protection under weather shores. At such times, when the vessel is of necessity off the regular steamer track, a lowering of the level of the lakes increases the hazards and dangers of navigation, contributing to groundings or strandings.
>
> "The defendants point to other diversions and artificial changes in the Great Lakes and connecting channels, which have contributed to this total lowering of levels. It is evident, however, that during a period in which the level of the Great Lakes is being lowered, an additional lowering, even of six sinches, would be even more serious in its consequence than if it occurred at a time when other causes did not operate to lower the levels of the lakes or operated to raise them."

At page 117—

> "But there is sufficient evidence to require the finding that a lowering of six inches has been a substantial contribution to the injury caused by the total reduction in connection with fishing and hunting grounds, the availability and conveniences of beaches at summer resorts, and public parks."

At page 118—

> "I therefore find that the complainants have established that the diversion through the Chicago drainage canal has caused substantial damage to their navigation, commercial and other interests as above stated."

In addition to the condition of the Great Lakes, at a result of this diversion, the creation of an increased and dangerous current in the Chicago River must certainly be considered an injury to navigation. The Secretary of War has indicated his view that a current of a mile and a quarter an hour is all that is considered safe with navigation on the river. (MR 38.)

It may be concluded from these and other facts supporting the finding of the Special Master that the Sanitary District of Chicago, in diverting this water from Lake Michigan, has created "an obstruction to the navigable capacity of navigable waters of the United States,"

a. By lowering the levels of the Great Lakes, their connecting waters, and the St. Lawrence River;

b. By introducing into the Chicago River an unduly rapid current dangerous to navigation.

It may also be concluded that inasmuch as this diversion creates "an obstruction to the navigable capacity of the navigable waters of the United States" it constitutes an obstruction in law to navigable capacity.

Sanitary District of Chicago v. United States, 266 U. S. 405; 69 L. Ed. 364;
United States v. Rio Grande Dam & Irr. Co., 174 U. S. 690;
Economy Light & Power Company v. United States, 256 U. S. 113;
United States v. Chandler-Dunbar Water Power Co., 229 U. S. 5‸,
Hubbard v. Fort, 188 Fed. 987.

In Sanitary District of Chicago v. United States, 266 U. S. 405, 429, it was said:

> "As now applied it concerns a change in the condition of the lakes and the Chicago River, admitted to be navigable, and, if that be necessary, an obstruction to their navigable capacity without regard to remote questions of policy."

In United States v. Rio Grande Dam & Irrigation Company, 174 U. S. 690, 708, an obstruction to navigation was defined as:

> "Anything, wherever done or however done, within the limits of the jurisdiction of the United States which tends to destroy the navigable capacity of one of the navigable waters of the United States."

In Economy Light and Power Company v. United States, 256 U. S. 113, it was held that the Des Plaines River, although not navigable in fact, was not to be obstructed by a dam, so that it could not become navigable if Congress later decided to improve that stream.

In United States v. Chandler-Dunbar Water Power Company, 229 U. S. 54, 67, this court said:

> "The same fall in the water level of the lower lakes will perceptibly affect access to their ports. This was a matter of international consideration, for Canada, as well as the United States, was interested in the control and regulation of lake water levels."

In Hubbard v. Fort, 188 Federal 987, 996, the court said:

> "What is navigable capacity? Does it not mean the capability of being navigated over any part of the waters when in their normal condition?"

From the foregoing authorities it would appear that the Chicago diversion constitutes not only an obstruction in fact but an obstruction in law to the navigable capacity of the Great Lakes, and that this has been definitely established, not only by relation to definitions of the court, but by holdings of this court in which this diversion was involved.

B. CONGRESS HAS NOT ACTED TO "AFFIRMATIVELY AUTHORIZE" SUCH OBSTRUCTION, UNLESS SECTION 10 OF THE ACT OF MARCH 3, 1899, CAN BE SO INTERPRETED.

It cannot be doubted that defendants would have no right to abstract the waters of Lake Michigan to such an extent as to cause an obstruction to their navigable capacity, without some authority from Congress. In the absence of some legislation by Congress, giving defendants this right to divert the water from Lake Michigan, it is clear that an injunction would lie, to restrain the substantial damage found by the Special Master to exist.

Sanitary District v. United States, 266 U. S. 405.

If Congress has acted at all to give this authority (which we deny) it must be by the Act of March 3, 1899 (Ch. 425, Stat. at L.) because it is conceded by the Special Master:

> "I am unable to find that Congress, apart from the authority conferred upon the Secretary of War by Section 10, of the Act of March 3, 1899, and his action thereunder * * * has authorized the diversion in question. The Acts of 1822 and 1827 relating to the Illinois and Michigan canal were considered in Sanitary District v. United States, 266 U. S. 405, 427, 428, and were found to contain nothing with regard to the amount of water to be withdrawn from the lake." (M. R. 173.)

Hence Congress has not acted to affirmatively authorize such obstruction unless section 10 of the Act of March 3, 1899, can be so interpreted. We must therefore turn to this Act to see whether Congress has acted at all to give to the State of Illinois and the Sanitary District of Chicago the right to take from Lake Michigan, a river of water that constantly drains the reservoir of an ancient highway of navigation, so that commerce is being steadily discouraged and the property interests of millions of people adversely affected.

As to the general construction of such statutes, this court, in Newport and Cincinnati Bridge Co. v. United States, 105 U. S. 470, said:

> "Congress, which alone exercises the legislative power of the Government, is the constitutional protector of

> foreign and interstate commerce. Its supervision of this subject is continuing in its nature, and all grants of special privileges, affecting so important a branch of governmental power, ought certainly to be strictly construed."

In Fairbanks v. United States, 181 U. S. 283, 288, it was said:

> "It would be a strange rule of construction that language granting powers is to be liberally construed and that language of restriction is to be narrowly and technically construed."

C. UNDER SECTION 10 OF THE ACT OF MARCH 3, 1899, AN AFFIRMATIVE ACT OF CONGRESS WAS NECESSARY TO AUTHORIZE THE CREATION OF AN OBSTRUCTION TO NAVIGABLE CAPACITY; THIS SECTION DOES NOT AUTHORIZE THE SECRETARY OF WAR TO GRANT A PERMIT FOR THE ABSTRACTION OF THESE WATERS FROM THE GREAT LAKES.

Section 10 of the Act of March 3, 1899 (being Chapter 425, Section 10, 30 Stat. at L. 1121, 1151, Comp. Stat. Sec. 9910, 9 Fed. State. Anno. 2d edition, page 53) provides:

> "Sec. 10. *The creation of any obstruction not affirmatively authorized by Congress,* to the navigable capacity of any of the waters of the United States ***is hereby prohibited;*** and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal,

> lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

The language of this section is plain.

> "It is a broad expression of policy in unmistakable terms. * * *"
>
> Sanitary District v. United States, 266 U. S. 405, 429.

Instead of following the plain and positive language of this section, the effect of the Special Master's fifth conclusion of law is to hold that the words "*affirmatively authorized by Congress* mean "*affirmatively authorized by the Secretary of War,*" and that an act of Congress is *not* necessary to authorize the creation of an obstruction to the navigable capacity of a navigable water of the United States.

To reach this startling conclusion, the Special Master necessarily had to find that power has been affirmatively delegated to the Secretary of War to authorize obstructions—a permit from the Secretary of War being all that is necessary to legalize an obstruction to navigation, following a recommendation by the Chief of Engineers. To reach such a conclusion, the Special Master also had to find that in the absence of an affirmative act of Congress, it may be considered that *power may be implied* to give the Secretary of War this authority, *because Congress has not affirmatively acted to the contrary.*

With these conclusions we take respectful but firm exception. How can section 10 of the Act of March 3, 1899, be capable of such construction as to avoid the positive and unqualified language:

> *"That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States, is hereby prohibited;"*
> * * ?

1. SECTION 10 OF ACT OF MARCH 3, 1899, SHOULD RECEIVE A CONSTRUCTION WHICH GIVES EFFECT TO ITS PLAIN AND UNMISTAKABLE PROHIBITION AGAINST OBSTRUCTIONS TO NAVIGABLE CAPACITY.

Inasmuch as this court has said in Sanitary District v. United States, 266 U. S. 405, 429:

> "It (Act of March 3, 1899) is a broad expression of policy *in unmistakable terms.* * *"

it would appear that the action in question should receive a construction which gives effect to its *"unmistakable terms."*

> United States v. Goldenberg, 168 U. S. 95; 42 L. Ed. 394;
> United States v. Lexington Mill Co., 232 U. S. 399;
> Lake County v. Rollins, 130 U. S. 662;
> Hamilton v. Rathbone, 175 U. S. 414;
> Caminetti v. United States, 242 U. S. 485;
> United States v. Wiltberger, 5 Wheat 76, 5 L. Ed. 523;
> American Railway Co. v. Birch, 224 U. S. 547, 56 L. Ed. 879;
> United States v. Detroit First National Bank, 234 U. S. 245; 58 L. Ed. 1298;
> Adams Express Co. v. Kentucky, 238 U. S. 190, 59 L. Ed. 1267.

In United States v. Lexington Mill Company, 232 U. S. 399, 409, this court said:

> "If this purpose has been effected by plain unambiguous language and the act is within the power of Congress, the only duty of the courts is to give it effect according to its terms. This principle has been frequently recognized in this court."

In Lake County v. Rollins, 130 U. S. 662, 670, this court said:

> "Where a law is expressed in plain and unambiguous terms, whether those terms are general or limited, the legislature should be intended to mean what they have plainly expressed, and consequently no room is left for construction."

In view of these authorities we submit that section 10, being plain and unmistakable, its provisions can be read to mean only the following:

(a) The creation of any obstruction to the navigable capacity of a navigable water of the United States must be affirmatively authorized by Congress—*that there must be an act of Congress, general or specific, authorizing the obstruction.*

(b) A modification of the course, location, condition or capacity of any navigable waters of the United States, even though *not* amounting to an obstruction, must, to be lawful, be recommended by the Chief of Engineers and authorized by the Secretary of War.

The interpretation we have placed upon this statute was given expression in Hubbard v. Fort, 188 Fed. 987, wherein the Circuit Court in the District of New Jersey, had before it the construction of section 10 of the Act of March 3, 1899, and the precise question involved was the right to obstruct a navigable water used in interstate commerce. The court said:

> "So far as applicable to the present question, such section may be summarized thus: First, the creation of any obstruction to the navigable capacity of any waters of the United States is prohibited unless affirmatively authorized by Congress; second, it shall not be lawful to build any structure in a navigable river or water of the United States, except on plans recommended by the chief of engineers and authorized by the Secretary of War; and, third, it shall not be lawful to excavate or fill the channel of any navigable water of the United States unless such work is recommended by said Secretary of War prior to beginning the same."

Section 10 contains *three express prohibitions.* To construe these three express prohibitions, to arrive at one *affirmative authorization* is to adopt a principle of construction never before expressed by this court. It has never been held that a positive prohibition is an affirmative authorization. The effect of a principle of this kind would be to throw the whole matter of legislation into the field of judicial uncertainty, and *to say that Congress meant to authorize what it had expressly prohibited* would produce an effect as monstrous as could be imagined in the whole field of legislative construction. It is plain that Congress knew how to use words to express its intent. To say that *by the use of a negative, Congress meant an affirmative* is startling to say the least.

In United States v. Lexington Mill Company, 232 U. S. 399, 410, this court, in dealing with just such a claim, said:

> "In other words, the first and familiar consideration is that, *if Congress had intended to enact the statute in that form, it would have done so by choice of apt words to express that intent.*"

2. REFERENCE TO THE HISTORY OF SECTION 10 OF THE ACT OF MARCH 3, 1899, SHOWS THE PLAIN INTENTION OF CONGRESS TO INCREASE ITS PROHIBITION AGAINST OBSTRUCTIONS TO NAVIGABLE CAPACITY, SO AS TO FORBID SUCH OBSTRUCTIONS IN ANY NAVIGABLE WATERS OF THE UNITED STATES EXCEPT BY AFFIRMATIVE ACT OF CONGRESS.

United States vs. Rio Grande Co. 174 U. S. 690;
United States vs. Chandler-Dunbar Co. 229 U. S. 53;
Lake Shore Ry. Co. vs. Ohio 165 U. S. 365;
United States vs. Bellingham Bay Boom Co. 176 U. S. 211;
Sanitary District vs. United States 266 U. S. 405.

In Sanitary District v. United States, 266 U. S. 405, 429, this court said:

> "If (the Act of March 3, 1899) is a broad expression of policy in unmistakable terms, *advancing* upon an earlier act of September 19, 1890, Chap. 907, Sec. 10, 26 Stat. at L. 426, 454, Comp. Stat. Sec. 9910a, which forbade obstructions to navigable capacity 'not affirmatively authorized by law' and which had been held satisfied with regard to a boom across a river by authority from a state."

The Act of September 19, 1890, Chap. 907, Secs. 7 and 10, 26 Stat. at L. 426, 454, Comp. Stat. Sec. 9910a, provided in part as follows:

> "Section 7. It shall not be lawful hereafter * * * to excavate or fill or in any manner alter or modify the course, location, condition or capacity of the channel of said navigable waters of the United States, unless approved and authorized by the Secretary of War.
>
> "Section 10. That the creation of any obstruction not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction, is hereby prohibited. * * *"

Following the enactment of the statute this court in the case of United States v. Bellingham Bay Boom Company, 176 U. S. 211 (Submitted January 18, 1899) held that the words "affirmatively authorized by law" in section 10 of the Act of 1890 included a case where an obstruction was affirmatively authorized *by a state* law where the navigable water was wholly within that state. This case came on for hearing upon an appeal from a decree of the United States Circuit Court of Appeals for the Ninth Circuit, affirming the judgment of the Circuit Court, dismissing a bill filed by the United States for an injunction against a log boom as an obstruction to navigation. The State of Washington had passed an act which purported to affirmatively authorize log booms under certain circumstances. This court held that an act by the State came within the expression "affirmatively authorized by law" and the effect of this decision was reflected in the immediate enactment of section 10 of the Act of March 3, 1899, changing the expression of the earlier act and *advancing* the power of Congress into this field by using the expression "affirmatively authorized by Congress."

Instead of releasing its control, or delegating any greater control over navigable waters to the Secretary of War, or remaining dormant in a field where the State could act in the absence of Federal legislation, Congress deliberately chose to include more positive and unmistakable language than it used in the provisions of the act of September 19, 1890, thus specifically showing its intent to assert its paramount control over all navigable waters of the United States and keep within the power of Congress alone, absolute and complete control, without delegation to administrative officials and without permission to State Governments to authorize obstructions to navigation.

> Sanitary District vs. United States, 266 U. S. 405;
> United States vs. Rio Grande Co., 174 U. S. 690;
> Lake Shore Ry. Co. vs. Ohio, 165 U. S. 365;
> United States vs. Chandler-Dunbar Co., 229 U. S. 53;
> Economy Light & Power Co. vs. United States, 256 U. S. 113.

The requirement of Section 10 of the Act of March 3, 1899, for "affirmative authorization by Congress" is much more sweeping and broad than that of the previous statute. Under the act of September 19, 1890, a State could authorize, with the consent of the Secretary of War, made upon recommendations of the Chief of Engineers, obstructions to navigation in the navigable waters of the United States, such as wharves, piers, harbors and dock lines, light houses and the like, *within the State*. But by the Act of 1899, Congress reached out and took into its own hands the control of the entire subject of navigation in the navigable waters of the United States, including intrastate, interstate, and international waterways and thenceforth and thereafter it was contemplated that no obstructions could be made nor continued, *except upon the affirmative action of the Congress of the United States.* Thereafter, Congressional authorization was necessary. This was to be indicated through an Act of Congress, providing specific authorization for the obstruction or by express appropriation of money to be expended for the particular work under the supervision of the Secretary of War and Chief of Engineers.

The Act of March 3, 1899, manifests a clear conception of the fundamental constitutional principle that Congress having once entered the field of regulation of interstate and international navigation, thereafter the State and municipal authorities became powerless to act in the absence of an affirmative act of Congress.

> "It was an exercise by Congress of the powers, oftentimes declared by this Court to belong to it of national control over navigable streams."
>
> United States vs. Rio Grande Dam & Irrig. Co., (174 U. S. 690, 708.)

This position is supported by the opinion of Mr. Justice Hughes, in the case of Simpson v. Shepard, 230 U. S. 350, 57 L. Ed. 1511. In that case the court said substantially that the general principles governing the exercise of State authority when interstate commerce is affected, are well established. That the power of Congress to regulate commerce among the several states is supreme and plenary. It is complete in itself and will be exercised to its utmost extent, and acknowledges no limitations other than are prescribed in our constitution. The grant of power in the constitution of its own force, without action by Congress, established the essential immunity of interstate commerce from direct control of the states with respect to those subjects embraced within the grant, which are of such a nature as to demand that, if regulated at all, their regulation should be prescribed by a single authority. It has been repeatedly declared by this court that as to those subjects which require a general system or uniformity of regulation, the power of Congress is exclusive. In other matters, admitting of diversity of treatment according to the special requirements of local conditions, the States may act within their respective jurisdictions until Congress sees fit to act,

> Cummings vs. Chicago, 188 U. S. 410;
> Escanaba Transportation Company vs Chicago, 107 U. S. 678.

but when Congress does act, the exercise of its authority overrides all conflicting state legislation. In this case, under the Act of the State of Illinois of 1889, the Sanitary District of Chicago, appropriated money and entered upon the construction and completion of the sanitary channel and the introduction of water so as to constitute it a canal. By 1899 it became apparent that this obstruction might affect the navigable capacity of the navigable waters of the United States in case it was put into operation. Already a Secretary of War, on July 3, 1896, had expressed as one of the conditions of a permit of that date "that it will not cover obstructions to navigation by reason of this work while in progress, or when completed."

On April 24, 1899, the United States District Engineer at Chicago, pursuant to direction, made a report upon the application of the Sanitary District of Chicago to open the drainage canal and reverse the Chicago River, of which the material parts are as follows:

> "It is a strange fact that this city has expended or will expend, over $30,000,000 with the intention of diverting an apparently unlimited amount of water from the Great Lakes to the Mississippi drainage area for sanitary purposes without finding out whether such diversion would

> be allowed by the great interests of the United States and the Colonies of Great Britain along the chain of Great Lakes in the navigation of the rivers and harbors of the Great Lakes. Now they ask the authority of an executive officer of the United States to open a channel that will to some unknown extent lower the levels of all the Great Lakes below Lake Superior and of their outlets, introduce a current also unknown and not to be ascertained otherwise than by actual experiment, in Chicago River, the most important navigable river of its length on the Globe, but which is already obstructed by bridges, masses of masonry and bends, and of difficult navigation at best.
>
> "The possible effects of this diversion are not known, further than that to some unknown degree they will be injurious. Whether the amount of this injury will be so small as to be accepted by the interests affected in view of the manifest advantages to and apparent necessities of their neighbors, cannot be determined by other than the interests themselves." (J. R. 134.)

These facts contained in the statement of the District Engineer were undoubtedly in the possession of the War Department at that time and were considered by Congress in its action of 1899.

Congress may have had this precise situation in mind when it amended the statute and provided that thereafter there could be no obstructions to the navigable capacity of navigable waters of the United States without an affirmative act of Congress. Knowing that the defendants contemplated a diversion of water which might constitute an obstruction to navigation, and with knowledge that the Act of Illinois provided an "affirmative authorization by law," and learning through the case of United States v. Bellingham Bay Boom Company, 176 U. S. 211, that the act of Illinois satisfied this requirement, Congress saw fit to take charge of the whole field of regulation itself and to advance upon the former language, so that there could be no doubt of its meaning, and thereafter required affirmative authorization by Congress itself. Surely the history of previous and contemporaneous events gives a construction to section 10 which supports its unmistakable language. In this connection, too, it is significant that the original Act of September 19, 1890, followed closely the Illinois Act of 1889, which indicated the intention of defendants and preceded the beginning of any work upon the sanitary canal, (begun in 1892), and it is more significant that just one year previous to January 17, 1900, when the first actual reversal of the Chicago River and abstraction of water from Lake Michigan occurred Congress again saw fit to act upon the subject of obstructions to navigation, and this time to strengthen and advance its language which had recently theretofore been construed as leaving some portion of control within the State. In the light of these enactments and their contemporaneous history, can there be any reasonable doubt or question as to the intention of Congress in construing the Act of March 3, 1899?

3. BY THE LANGUAGE "OBSTRUCTION TO NAVIGABLE CAPACITY" IN SECTION 10, CONGRESS INTENDED TO PROHIBIT THIS KIND OF AN ABSTRACTION OF WATER.

United States v. Rio Grande Dam & Irr. Co., 174 U. S. 690;
Economy Light & Power Co. v. United States, 256 U. S. 113;
United States v. Chandler-Dunbar Water Co., 229 U. S. 54;
Hubbard v. Fort, 188 Fed. 987;
Sanitary Dist. of Chicago v. United States, 266 U. S. 405.

The language,—"Any obstruction * * * to the navigable capacity of any of the waters of the United States", is not only clear and explicit, but it has been passed upon by this Court in such a manner as to leave no doubt as to its meaning. In United States vs. Rio

Grande Dam and Irrigation Company, 174 U. S. 690, 708, this Court said, with reference to section 10,—

> "It is not a prohibition of any obstruction to the *navigation*, but an obstruction to the *navigable capacity.*"

In that case the Irrigation Company was proceeding to construct a dam across the Rio Grande River, and to appropriate the waters of that stream for the purposes of irrigation. The Rio Grande River was not navigable at that point, but became a navigable river at a point considerably lower down in its course. Under the issues raised by the pleadings, the facts were assumed to be that most of the flow of the river had already been appropriated by other parties, and the defendant proposed to take the balance. This, according to the averment of the defendant, "would be very largely only so acquired from the excess storm and flood waters now unappropriated, useless and going to waste".

This Court said: (page 708)

> "It is urged that the true construction of this act limits its applicability to obstructions in the navigable portion of a navigable stream, and that as it appears that although the Rio Grande may be navigable for a certain distance above its mouth, it is not navigable in the Territory of New Mexico, this statute has no applicability. The language is general, and must be given full scope. *It is not a prohibition of any obstruction to the navigation, but any obstruction to the navigable capacity, and anything, wherever done or however done, within the limits of the jurisdiction of the United States which tends to destroy the navigable capacity of one of the navigable waters of the United States, is within the terms of the prohibition.* Evidently Congress, perceiving that the time had come when the growing interests of commerce required that the navigable waters of the United States should be subjected to the direct

> control of the National Government, and that nothing should be done by any State tending to destroy that navigability without the explicit assent of the National Government, enacted the statute in question. And it would be to improperly ignore the scope of this language to limit it to the acts done within the very limits of navigation of a navigable stream."

It will be noticed that this court used this language "*anything wherever or however done, within the limits of the jurisdiction of the United States which tends to destroy the navigable capacity of one of the navigable waters of the United States, is within the terms of the prohibition.*" These words "anything wherever done or however done" seem broad enough to cover that kind of obstruction which substantially interferes with commerce, causes ships to be less heavily loaded so that they may navigate the critical points; cuts off the water from fishing and hunting grounds, beaches, summer resorts, public parks and harbors and ports of the State of Michigan and other states.

If this Court has seen fit to apply this language to that portion of the Rio Grande River, above its navigable depths, how much more do the Great Lakes and their connecting waters, deserve the protection and preservation of their navigable capacity? These waters are the greatest center of inland, commercial navigation in the world, affecting millions of people and their property rights; and the condition of commerce and navigation is affected directly by the amount of diversion of water from Lake Michigan. How much more does the term "navigable capacity" refer to these waters than those dealt with by the Court in the case of United States vs. Rio Grande Dam and Irrigation Company, *supra?*

That case was remanded by this Court, directing,—

> "An inquiry into the question whether the intended acts of the defendants * * * will sub-

> stantially diminish the navigability of that stream within the limits of present navigability, and if so, to enter a decree restraining those acts to the extent that they will so diminish."

The finding of the Special Master in this case amply supports this requirement by finding: (M. R. 118.)

> "I therefore find that the complainants have established that the diversion through the Chicago drainage canal has caused substantial damage to their navigation, commercial and other interests as above stated."

From this finding,—that there is substantial damage to navigation, commerce and other interests,—it follows that there is a substantial obstruction to navigable capacity.

In Economy Light and Power Company vs. United States, 256 U. S. 113, the United States sought by injunction to restrain the Power Company from constructing a dam in the Des Plaines River. The District Court found that there was no evidence of actual navigation within the memory of living man, and that there would be no present interference with navigation by the building of the proposed dam. The Circuit Court of Appeals did not disturb this finding, but both courts found that in its natural state the river was navigable in fact. Upon this state of facts this Court found:

> "We concur in the opinion of the Circuit Court of Appeals that a river having actual navigable capacity in its natural state and capable of carrying commerce among the states, is within the power of Congress to preserve for purposes of future transportation, even though it be not at present used for such commerce, and be incapable of such use according to present methods, either by reason of changed conditions or because of artificial obstructions."

If this Court saw fit in a case of that kind to protect the navigable capacity of a stream which was actually non-navigable at that time, how much more necessary would it seem to be to preserve the navigable waters of the Great Lakes, when obstructions to its commerce and navigation are shown to exist by the lowering of the levels at least six inches, whereby these great, inland waterways are jeopardized and their commerce and navigation imperiled! How much more should these navigable waters of the Great Lakes have the protection of this Court to assure their preservation for future transportation than the Des Plaines River, which was protected in Economy Light and Power Company vs. United States, supra!

The question is not how much money damage is present nor even whether the obstruction to navigable capacity is slight or substantial (although both of these elements are present to a large degree in this case), but the real question is whether there is any *obstruction to navigable capacity.*

In United States vs. Chandler-Dunbar Water Power Company, 229 U. S. 54, 66, 67, where the Government acted to preserve the Great Lakes, this Court said:

> "That outflow (from Lake Superior) has great influence both upon the water level of Lake Superior and also upon the level of the great system of lakes below, which receive that outflow. A difference of a foot in the level of Lake Superior may influence adversely access to the harbors on that lake. The same fall in the water level of the lower lakes will perceptibly affect access to their ports. This was a matter of international consideration, for Canada, as well as the United States, was interested in the control and regulation of the lake water levels."

In Hubbard vs. Fort, 188 Fed. 987, 996, the Court said:

> "What is navigable capacity? Does it not mean the capability of being navigated over any part of the waters when in their normal condition? And how can it be said that the structures or the works subsequently referred to in this section may not amount to an obstruction to such navigable capacity? It is to be noted that 'excavate or fill' is associated with 'alter or modify the course, location, condition or capacity of any' navigable water, all of which may be so performed as to become serious obstructions to navigation. That such obstructions may be but slight, and that some will be of only temporary duration would not make them any less obstructions, and within the prohibition. Any less comprehensive interpretation of the first part of section ten would do violence to its language and, as already said, be meaningless."

It was also said in Sanitary District of Chicago vs. United States, 266 U. S. 405, 429; 69 L. Ed. 364:

> "As now applied it concerns a change in the condition of the lakes and the Chicago river, admitted to be navigable, and, if that be necessary, *an obstruction to their navigable capacity* (U. S. vs. Rio Grande Dam & Irr. Co., 174 U. S. 690, 43 L. Ed. 1136, 19 Sup. Ct. Rep. 770) without regard to remote questions of policy."

4. BY THE USE OF THE LANGUAGE "AFFIRMATIVELY AUTHORIZED" CONGRESS CONTEMPLATED RETENTION OF CONTROL OVER OBSTRUCTIONS TO NAVIGABLE CAPACITY AND NOT A DELEGATION OF POWER TO THE SECRETARY OF WAR; A POSITIVE PROHIBITION IS NOT *AN AFFIRMATIVE* AUTHORIZATION.

As to the meaning of the term "affirmatively authorized" there can be no doubt. There must be Federal authority and that must be an *Act of Congress.* As this term is used in section 10 of the Act of March 3, 1899, there is no doubt as to its meaning and intent,—*in case of an obstruction to navigable capacity there must be an Act of Congress.*

In Hubbard vs. Fort, 188 Fed. 987, 996, the Court said:

> "What is affirmative authorization? Affirmative is the antithesis of negative. The use of the word 'affirmatively' with 'authorized' would be difficult to understand except for the use of the word 'authorize' in the latter part of this section where the building of certain structures and the performing of certain works are forbidden without the authority of the Secretary of War. As pointed out by V. C. Walker in the New Jersey case, this section 'does not provide that it shall be lawful for the Secretary of War to authorize the excavation of land in the channel of any navigable water of the United States, but only that it shall not be lawful to do the work without the authorization of the Secretary and before beginning the work.' In view of the context, the word 'affirmatively' was legislatively used to distinguish the two kinds of authority referred to, and to make it plain that the initial authorization to create an obstruction was not to rest on implied, but express—affirmative—congressional authority."

As to the use of the word "authorize" with reference to the Secretary of War's act in the third clause of this section, the court, in Hubbard v. Fort, *supra,* said:

> "The use of the word 'authorize' instead of 'approve' does not change the Secretary of War's act from permissory to plenary. Two of the definitions of the word 'authorize' are to approve of; to formally sanction. Cent. Dict. & Cyc. What does the Secretary of War authorize? Not the building of the structures mentioned in the second part of this section, but the plans to which such construction is to conform. And what does he authorize as to excavating, filling, altering, etc., of the channel of navigable waters, but the commencement, the character,

and the manner of doing such work? * * * The Secretary of War's authorization is supervisory, and relates to the character and performance of the work, and not the directing or authorizing it to be done in the first instance. * * * Among the changes effected by the act of 1899 was to require the affirmative authorization by Congress to create any obstruction to the navigable waters of the United States, except that bridges, dams, dikes, and causeways in or across waters the navigable portions of which lie wholly within the limits of a single state were permitted if authorized by state legislation and the location and plans of such structure were approved by the chief of engineers and of the Secretary of War. Perhaps without the change from 'authorized by law' to 'authorized by Congress' no obstruction to the navigable capacity of interstate waters without affirmative congressional enactment would have been lawful, but a present reading of the law in the light of the history of its enactment clearly evinces to my mind a legislative purpose to require affirmative action on the part of Congress before such a crossing of interstate streams as contemplated by complainants in this suit shall be permitted, and that only when such congressional action shall have been taken can the powers delegated to the Secretary of War be put into operation."

5. UNDER SECTION 10 AN AFFIRMATIVE ACT OF CONGRESS IS NECESSARY AS A CONDITION PRECEDENT TO THE EXISTENCE OF ANY POWER IN THE SECRETARY OF WAR TO AUTHORIZE OBSTRUCTIONS TO NAVIGABLE CAPACITY.

Hubbard v. Fort, 188 Fed. 987;
Penn. v. Wheeling Bridge Co., 13 How. 518; 14 L. Ed. 249;
West Chicago Street Railway Co. v. Illinois, 201 U. S. 506, 527; 50 L. Ed. 845, 854;
Cobb v. Lincoln Park, 202 Ill. 427;
Wilson v. Hudson County Water Co., 76 N. J. Eq. 543.

In Hubbard v. Fort, *supra,* it was said:

> "Among the changes effected by the Act of 1899 was to require the affirmative authorization of Congress to create any obstruction to navigable waters of the United States, except that bridges, dams, dikes, and causeways in or across waters the navigable portions of which lie wholly within the limits of a single state were permitted if authorized by state legislation and the location and plans of such structures were approved by the chief of engineers and of the Secretary of War. Perhaps without the change from 'authorized by law' to 'authorized by Congress' no obstruction to the navigable capacity of interstate waters without affirmative congressional enactment would have been lawful, but a present reading of the law in the light of the history of its enactment clearly evinces to my mind a legislative purpose to require affirmative action on the part of Congress before such a crossing of interstate streams as contemplated by complainants in this suit shall be permitted, and that only when such congressional action shall have been taken can the powers delegated to the Secretary of War be put into operation.

In Wilson v. Hudson County Water Company, *supra,* it was said:

> "The only intention discoverable is, as already said, the authorization of such a work if it may be lawfully done, and the intention is to authorize it to be done only in such way as to prevent its being any obstruction to navigation. Congress may some day be induced to enact a law under the commerce clause of the federal constitution which will make a grant of power such as is contended for by the Water Company in this case, but up to the present time, it has not done so, and the Water Company, without a grant of power, is seeking to prosecute an unlawful work —a work not unlawful in and of itself, but unlawful so far as it appropriates the land and invades the rights of the State of New Jersey, and this by ob-

taining a mere license from a supervisory power,—a license to do the thing desired, efficacious only if and when lawful authority to prosecute the work shall have been obtained.

"In this connection it may be observed that the tenth section of the River and Harbor act does not provide that it shall be lawful for the Secretary of War to authorize the excavation of land in the channel of any navigable waters of the United States, but only that it shall not be lawful to do the work without the authorization of the Secretary, had before beginning the work. The section as worded clearly contemplates that the consent of the Secretary shall merely be permissive of the doing of work for which authority already exists."

In Cobb v. Lincoln Park Commissioners, 202 Ill. 427, 63 L. R. A. 264, 95 Am. St. Rep. 258, the court said:

> "We are of the opinion that the act prohibiting the erection of wharves without the consent of the Secretary of War is a mere regulation for the benefit of commerce and navigation, and that the license or permission of the Secretary of War is only a finding and declaration of such officer that such proposed structure would not interfere with or be detrimental to navigation, and not that it is equivalent to a positive declaration by the authority of Congress that the licensee may build the wharf or other structure without first obtaining the consent of the owner of the submerged land on which it is his purpose to build. Appellant not having, by the law of this State, the right to construct a wharf over his neighbor's submerged lands without his neighbor's consent, could not acquire that right, without his neighbor's consent, by obtaining a license from the Secretary of War."

Section 10 of the Act of March 3, 1899, definitely and positively prohibits "*obstructions to navigable capacity.*" It does not prohibit those works which are *in the aid of navigation.* But those works which are a benefit to navigable capacity are prohibited by section 10 *unless* they comply with administrative requirements to be fixed by the Secretary of War, so that they will not themselves become obstructions to navigation. Thus the *prohibition against obstructions to navigable capacity is absolute* while the *prohibition against other works* specifically mentioned *is conditioned* upon the following:

First: That the work shall not become an obstruction.

Second: That the work shall receive the approval of the Secretary of War.

The kind of work contemplated in the last two clauses of section 10 is that which does not obstruct navigation *per se,* but which may be constructed only under administrative direction, upon recommendation of the Chief of Engineers and approval of the Secretary of War. But if in such work there is involved an obstruction to navigable capacity, the affirmative authorization of Congress is just as positively required as though these clauses did not exist. The function of these two clauses in addition to the first clause of section 10 is to prohibit certain work, even though beneficial to navigation, unless recommended by the Chief of Engineers and authorized by the Secretary of War. Instead of being an exception or limitation upon the first section, these two clauses constitute additional prohibitions in all cases where the work is not in fact an obstruction to navigation but a benefit to navigable capacity. These requirements are necessarily imposed for the further limitation of beneficial work affecting navigation.

It is obvious that any of this work contemplated in the second and third clauses, may be carried on in a place or in a manner which will not obstruct the navigable capacity of water but may, in fact, improve navigation, providing the directions of the Secretary of War are followed. But this does not operate to remove the positive prohibition in the first clause against any obstruction to navigation without an affirmative authorization by Congress, but rather accentuates the reason for the requirement that any work which is not an obstruction to navigation must have the authorization of the Secretary of War prescribing such administrative details as are necessary to insure its not becoming an obstruction.

It will be noticed that the language of the whole section is prohibitive in character, and that the second and third clauses are joined by the conjunction "and", meaning "in addition". (Century Dictionary.) The term "or" is not used in connection with these clauses, and the power over the construction of certain works which are obstructions to navigation, is *not alternative.* From this we gather the intent of Congress that its control over obstructions to navigation is supreme, and that in addition to this sweeping prohibition, Congress desired to further limit even those works which might appear to be beneficial to navigation by imposing the duty upon the Secretary of War to restrict even such works so that they might not become obstructions.

If section 10 stopped at the end of the first clause, the prohibition against obstructions without affirmative authorization by Congress would give implied permission to construct any work which was not an obstruction to navigable capacity. Perceiving this, Congress proposed in the second and third clauses to provide the manner of approval of those works which were not obstructions to navigation *per se,* but might become so if unregulated and therefore needed administrative supervision to prevent their becoming obstructions in fact

In short, the second and third clauses of section 10 of the Act of March 3, 1899, were in aid of the first clause, and in addition thereto, so that those cases which were not obstructions to navigable capacity *per se,* would not become so in fact. Instead of being a limitation upon the power of Congress it is an expression declaring the power of Congress. Instead of being an affirmative act of Congress delegating authority to the Secretary of War, over obstructions generally, this section prohibits any and every obstruction to navigable capacity *except upon express authority from Congress,* and then proceeds to prohibit all other works except upon approval of their administrative details by the Secretary of War.

6. OBSTRUCTIONS TO NAVIGABLE CAPACITY OF INTERSTATE WATERS WITHOUT AUTHORITY FROM CONGRESS HAVE ALWAYS BEEN UNLAWFUL; WHEN AN OBSTRUCTION TO NAVIGATION EXISTS IN FACT IN INTERSTATE WATERS CONGRESS ALONE MAY AUTHORIZE ITS CONTINUANCE BUT ONLY BY AN AFFIRMATIVE ACT.

Pennsylvania v. Wheeling Bridge Co., 13 How. 518;
Bridge Company v. United States, 105 U. S. 470;
Miller v. Mayor of New York, 109 U. S. 385;
Gibbons v. Ogden, 9 Wheat. 190;
Sault Ste. Marie v. International Transit Company, 234 U. S. 333;
Cooley v. Port Wardens, 12 How. 299, 319, 13 L. Ed. 996, 1004.

Before either the Act of September 19, 1890, or the Act of March 3, 1899, the rule had been established by numerous cases that obstructions to the navigable capacity of *interstate waters* were unlawful without authority from Congress. The Acts of 1890 and 1899 reached out and advanced the power of Congress to *all* navigable waters of the United States, but the rule remained as before with respect to interstate waters, and these acts became declaratory of Congress' admitted control.

In Pennsylvania v. Wheeling Bridge Company, 13 How. 518, 625; 18 How. 421, this court held that when an obstruction to navigation exists in fact Congress may still authorize its continuance, but must do so by some affirmative act declaring its qualified intent to authorize such obstructions.

In the Wheeling Bridge case, this court had already declared that the bridge in question was an obstruction in fact to navigation, and had enjoined it as such. When an affirmative act of Congress was thereafter passed, declaring the bridge not to be an obstruction to navigation, it was held that Congress had this power, but only by an affirmative act. The decision of this court governed the case until Congress acted affirmatively. Hence an obstruction in fact would have remained an obstruction in law in the absence of an affirmative act of Congress. From this we extract the principle that in the absence of an affirmative act of Congress, this court has jurisdiction to declare and enjoin an obstruction to navigable capacity of interstate waters, where there is a *substantial obstruction to navigation in fact* and when Congress has not acted affirmatively in the premises.

In Economy Light & Power Co. v. United States (256 U. S. 113, 117, 123) it was held that in the absence of action by Congress authorizing an obstruction to navigation this court had power to enjoin its continuance.

The power exercised by Congress in the Wheeling Bridge case to declare a bridge not to be an obstruction to navigable capacity is precisely what is needed to authorize an obstruction under section 10 of the Act of 1899. The control of Congress over navigable capacity in interstate waters was not lessened by its subsequent legislation positively and unmistakably forbidding the creation of any obstruction in any of the navigable waters of the United States without its own action. Congress' assertion of its paramount power over intrastate waters did not lessen its previously exercised and oft-declared power over interstate waters. Instead of diminishing or delegating this power, Congress restated and declared that it remained one of its own powers which should not be infringed, unless "affirmatively authorized." From its action in the Wheeling Bridge case, Congress showed that it recognized the meaning of the term "affirmatively authorized" and that it was to be construed as an affirmative act of Congress. Both before and after the acts of 1890 and 1899 Congress had and exercised exclusive power to authorize obstructions to navigable capacity in interstate waters, without delegating any authority to the Secretary of War. The Acts of 1890 and 1899 were declaratory of Congress' intention to *retain control and advance its power to all navigable waters.* No stronger retention of power could be expressed than the expressions of Congress to deal with obstructions *alone,* without reservation, limitation or delegation.

7. IT WOULD BE AN UNCONSTITUTIONAL APPLICATION OF SECTION 10 OF THE ACT OF MARCH 3, 1899, TO CONSTRUE THIS SECTION AS DELEGATING AUTHORITY TO THE SECRETARY OF WAR TO PERMIT DIVERSION OF THESE WATERS FROM LAKE MICHIGAN FOR PURPOSES OF SANITATION, OR TO "AFFECT NAVIGATION ADVERSELY."

Port of Seattle v. Oregon & Wash. Ry. Co., 255 U. S. 56;
Kansas v. Colorado, 206 U. S. 46;
United States v. River Rouge Imp. Co., 269 U. S. 411;
Sanitary Dist. v. United States (266 U. S. 405).

The constitutional power of Congress over commerce and navigation is the measure of the limitation upon its delegation of power to the Secretary of War. Congress itself is limited in the exercise of power to regulate *navigation,* and no other purpose can be served under the guise of navigation.

In Sanitary District v. United States, 266 U. S. 405, 431, this court said:

> "It is doubtful, at least, whether the Secretary (of War) was authorized to consider * * * * the sanitary needs of Chicago."

Whether or not Congress would have the power to legislate, regulate, control and improve sanitary conditions, there can be no claim in this instance that by the Act of March 3, 1899, Congress even attempted to delegate to the Secretary of War any power to authorize an obstruction to navigation for the purposes of sanitation, or to "affect navigation adversely."

Independent, therefore, of whether the Secretary of War had power delegated to him by section 10 to authorize obstructions to navigation (which we strenuously deny), still the Secretary of War would not have authority to permit or authorize obstructions to navigation *for the purpose of sanitation.*

Hence, if section 10 of the Act of March 3, 1899, be so construed as to delegate to the Secretary of War the power to authorize an obstruction to navigation, yet if in the exercise of this claimed right, he attempts to permit an obstruction to navigation for the purpose of sanitation and not navigation, his act would be void. Such an application of section 10 would give the Secretary of War delegated power to authorize an obstruction for sanitary purposes. This would be an unconstitutional application, and therefore void.

(a) *The Secretary of War used his delegated power (if any) to authorize this obstruction for sanitary purposes and not for navigation, which is an unconstitutional application of section 10, and therefore void.*

In the report of the Special Master, (pages 75-81), there are contained, the report of the Chief of Engineers, the permit of March 3, 1925, and the letter of transmittal by the Secretary of War.

In the report of the Chief of Engineers it was said by him: (M. R. 75, 76)

"3. The first condition recommended by the district engineer provides for the adoption and execution of a program of construction of modern sewage disposal plants at such a rate as to provide before the end of five years for treatment of the sewage of a human population of 1,200,000. * * *

4. The program of construction recommended is limited to five years, as it is not possible to predict what advances may be made in the science of sewage disposal during the next five years. It is entirely within the realms of possibility that, during that period, such advance may be made as to warrant the Department's insisting on an even more rapid rate of progress thereafter, should a renewal of this permit be sought. A shorter period for the permit is not believed advisable, as it would be difficult to prescribe sufficient progress in the way of construction of sewage treatment plants and require a substantial reduction in the diversion upon the renewal of the permit.

5. It is estimated that the construction of sewage treatment plants for a population of 1,200,000 will permit a reduction in the necessary diversion from Lake Michigan of about 1,250 cubic feet per second. * * *

6. It is, of course, highly desirable that the excessive diversion of water from Lake Michigan be reduced to reasonable limits with the utmost despatch. For humanitarian reasons, it is impracticable to make the desired reduction instantaneously, and it is believed that the procedure proposed by the district engineer is the most reasonable and just to all concerned that can be adopted."

From the foregoing it is to be seen that the basis of the Secretary of War's permit upon the recommendation of the Chief of Engineers was in contemplation of "sewage" and "sewage treatment plants," and the effect of the diversion upon sewage disposal. That was the sole consideration of the Chief of Engineers. Deep concern is shown in his report for the result of continuing water diversion upon the lake levels of the Great Lakes and upon commerce and navigation. With great reluctance the Chief of Engineers deals with the "necessity" of diverting these waters for sewage disposal purposes and finally concludes that *"for humanitarian reasons"* it was impracticable to make the *"desired reduction"* instantaneously. In short, the report of the Chief of Engineers gives no authority in law for a finding upon which the Secretary of War could apply the provisions of section 10. The report of the Chief of Engineers treated solely with *sewage* and *sewage disposal* as the purposes of the diversion; (which is the truth of the matter),—and any construction of section 10 of the act of Congress of March 3, 1899 held to delegate power to authorize obstructions to navigation, does not bear a constitutional application when exercised for the purpose of relieving a problem of sewage disposal.

Following the report of the Chief of Engineers, the Secretary of War, after a hearing, granted the permit of March 3, 1925, under which defendants are claiming to operate. In his permit the Secretary of War said (M. R. 79-80):

> "4. That the Sanitary District of Chicago shall carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100 per cent) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit.
>
> * * *
>
> 7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan shall be under the supervision of the U. S. District Engineer at Chicago, etc.
>
> * * *
>
> 9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice."

In his letter of transmittal the Secretary of War under date of March 3, 1925, said:

> "This Department has always held and continues to hold that the taking of an excessive amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost despatch. I appreciate that the desired reduction cannot be made instantaneously, but with the view of making a substantial reduction by the time this permit expires, the conditions require, among other things, the artificial treatment of the sewage of a large population, the construction of controlling works to prevent the discharge of the Chicago River into the lake and the metering of the water service of the city of Chicago. * * *
>
> While it is not in my province to dictate, I sincerely urge * * * that arrangements be made with the packers and the Corn Products interests to treat their waste before discharging it into the sewers. * * *"
> (M. R. 80.)

From the foregoing permit and letter of transmittal it is painfully apparent that what the Secretary of War was attempting to do was to take care of a *necessitous* circumstance in his opinion, and upon the grounds of *expediency* to declare his assent *reluctantly* to the abstraction of this water. It will be noticed particularly, that the only consideration was sanitation when he said "this department has always held and continues to hold that the taking of an excessive amount of water for sanitation at Chicago *does affect navigation on the Great Lakes adversely,* and that diversion of waters from Lake Michigan should be "reduced to reasonable limits" with utmost despatch," and so there may be no doubt as to the purpose of the permit and the sole consideration prompting it, it will be noticed that the Secretary of War used the words himself *"the taking of an excessive amount of water for sanitation at Chicago."* If words have their ordinary meaning, how can it be reasoned by the defendants that when the Secretary of War granted a permit to take this water *"for sanitation,"* that this was "for navigation" and that authority was derived by a constitutional application of section 10 of the Act of March 3, 1899, which (if at all), delegated authority over obstructions to navigation for the purpose of *navigation* and *not sanitation.*

The situation is clear in the light of contemporaneous events. The Supreme Court of the United States had held in Sanitary District of Chicago v. United States, 266 U. S. 405, (decided January 5, 1925), that the Sanitary District of Chicago was diverting a large amount of water from Lake Michigan unlawfully. Something had to be done by the sanitary district or its sewage disposal plan would suddenly end. A hearing upon a petition was promptly accorded and to provide *"a way out,"* the Secretary of War reluctantly but with utmost regard for the expediency of the sewage disposal problem, attempted to exercise an authority delegated (if at all) for the purpose of navigation in a case where navigation was *"adversely affected,"* and in which *sanitation* or *sewage disposal* was the sole consideration,—and admittedly so.

8. THE LANGUAGE OF SECTION 10 OF THE ACT OF MARCH 3, 1899, IS NOT SUSCEPTIBLE OF CONSTRUCTION BY REFERENCE TO THE SO-CALLED RULES IN AID OF CONSTRUCTION USED BY THE SPECIAL MASTER.

(a) *The Rule of ambiguity is not applicable here.*

In his report (p. 184) the Special Master says:

> "Where an act of Congress is ambiguous, long continued and uniform practice of the executive department charged with the duty of administering it is 'persuasively determinative of its construction'."

This *assumes* that the language of the section is *"ambiguous."* But this Court in the case of Sanitary District v. U. S. 266 U. S. 405, 429 said:

> "It is a broad expression of policy *in unmistakable terms,* advancing upon an earlier Act of Sept. 19, 1890. * * *."

If there be any ambiguity in section 10 it certainly cannot exist in the first clause which clearly provides:

> "That the creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of any of the waters of the United States is hereby prohibited."

Surely this language of section 10 is not susceptible to "administrative" construction because there is *no ambiguity* in such language. It is a general sweeping prohibition. This court has held

> When the language of the statute is plain and unambiguous and conveys a clear and definite meaning, there is no occasion for resorting to the rules of statutory interpretation and construction; the statute must be given its plain and obvious meaning.
>
> United States vs. Wiltberger, 5 Wheat. 76;
> United States vs. Detroit First National Bank, 234 U. S. 245;
> Adams Express Co. vs. Kentucky, 238 U. S. 190;
> United States vs. Fisher, 2 Cranch 358;
> Merritt vs. Welch, 104 U. S. 694;
> United States vs. Dickson, 15 Pet. 141;
> Amy vs. Watertown, 130 U. S. 320;
> United States vs Rider, 163 U. S. 132.

b. The rule of construction based upon the practice of the War Department in administering section 10 is not applicable because the practice of that Department has not been uniform but has been constantly in doubt from the beginning, even to the extent exercised.

United States v. Healey, 160 U. S. 136;
Wisconsin Central R. R. v. United States, 164 U. S. 205;
United States v. Johnson, 173 U. S. 378;
Houghton v. Payne, 194 U. S. 88;
United States v. Graham, 110 U. S. 219;
United States v. Finnel, 185 U. S. 236;
Edwards' Lessee v. Darby, 12 Wheat. 206;
United States v. Temple, 105 U. S. 97;
Swift Company v. United States, 105 U. S. 691;
Ruggles v. Illinois, 108 U. S. 526.

From the very first permit, the Secretary of War has consistently refrained from expressly authorizing obstructions to navigation. Each permit has expressly prohibited obstructions to navigation, and in nearly all, the Secretary of War has expressed his belief that the matter is one for Congress and his intention to submit the matter to Congress. In some cases he has actually refused to grant a permit because of long standing doubt as to the Department's authority to go further. Each permit has been reluctant in its terms, and has not contemplated the authorization of any obstructions to navigation. In no permit is there any language wherein the Secretary of War authorizes obstructions to navigation or expressly allows defendants to do so.

Briefly tracing the permits issued by the Secretary of War, we find the following:

In the first permit, May 8, 1899, the Secretary of War provided: (M. R. 39.)

> "1. That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago *to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress.*"

This language certainly does not sustain any administrative construction of this action to mean that the Secretary of War believed his power existed independent of Congress, but indicates that the authority was doubted from the very first and was never expressly attempted to be exercised. This is not a case of a Federal Department providing rules and regulations for the government of its departmental matters under ambiguous terms of a Federal statute. In such a case custom of the department, long continued by successive officers, would prevail. On the other hand, this is a case wherein, from the very beginning, the department either recognized its lack of power and refused to act in the field prohibited by Congress, or if action occurred at all, acted to the extent of its authorized power, and prohibited by conditions in the permit any obstructions to navigable capacity.

In Houghton v. Payne, 194 U. S. 88, 100, this Court said:

> "It is well established that it is only where the language of the statute is ambiguous and susceptible of two reasonable interpretations that weight is given to the doctrine of contemporaneous construction. * * *
>
> "A custom of the department, however long continued by successive officers, must yield to the positive language of the statute."

Thus the custom of the War Department is material only if the language of the statute (section 10) is ambiguous. Assuming, therefore, an ambiguity, yet this court has said in United States v. Healey, 160 U. S. 136, 145:

> "But as the practice of the Department has not been uniform, we deem it our duty to determine the

> true interpretation of the Act of 1877 without referring to the practice in the Department."

We respectfully submit that the most that can be claimed by defendants for the practice of the War Department by way of implied authority is that *its practice has not been uniform* and that some times permits have been granted with conditions against obstructions to navigation, and other times permits have been refused altogether.

In the permit of July 11, 1900, the same conditions were imposed as in the permit of May 8, 1899. (M. R. 40.) In the permits of April 9, 1901, and July 23, 1901, the previous permit was amended as to quantity and time, but with like condition. (M. R. 41.) The permit of December 5, 1901, was in substantial accord with the previous permits, (M. R. 42) as was that of January 17, 1903. (M. R. 43.) On March 13, 1907, the War Department denied a permit because of certain reasons, among which is the following in the Report of the Chief of Engineers: (M. R. 49.)

> "3. In my opinion, this abstraction will undoubtedly lower the levels of all the waters of the Great Lakes, except those of Lake Superior, and thus diminish the navigable capacity and depth of the various channels and harbors which have been deepened and improved under authority of Congress.
>
> * * *
>
> "5. * * * Any project that tends, in a measure, to annul or reverse the orders of Congress, as expressed in the various river and harbor acts appropriating funds for improving the harbors and channels connecting with the Great Lakes, should meet the disfavor of the Department, unless it has been sanctioned by that body. * * *"

And the Secretary of War concluded, March 14, 1907:

> "* * * It may be fortunate that circumstances now require submission of this question of capital and national import to the Congress of the United States." (M. R. 51.)

In the permit of June 30, 1910, the Acting Secretary of War said: (M. R. 59)

> "(a) That it be distinctly understood that it is the intention of the Secretary of War to submit the questions connected with the work of the Sanitary District of Chicago to Congress for consideration and final action, and that this permit shall be subject to such action as may be taken by Congress."

In the refusal to grant a permit by the Secretary of War January 8, 1913, it was said: (M. R. 63)

> "The discretion given to the Secretary of War under Sections 9 and 10 of the Act of 1899 is very broad, but I have very grave doubts as to whether it was intended to authorize him to grant a permit which would inflict a substantial injury upon commerce in order to benefit sanitation. The entire purpose and scope of that legislation was to make him the guardian of the commercial interests of the Nation represented in their waterways. * * *
>
> "They are broad questions of international policy. They are quite different in character, for example, from the question of fixing the proper location of a pierhead line or the height or width of a drawbridge over a navigable stream—fair samples of the class of questions which come to the Secretary of War for decision under the above mentioned Act of 1899. While the researches and opinions of experts in the respective fields are necessary and useful as an assistance towards reaching a fair and proper policy, the *final determination of that policy should belong,* not to an administrative officer, but rather to those bodies to whom we are accustomed to entrust the making of our laws and treaties."

In the report of the Chief of Engineers of March 3, 1925, it will be noticed how reluctant and hesitant he approaches the problem and finally places it upon "humanitarian reasons", all the time dealing with the cutting down of the diversion to eliminate the obstruction, which is reflected in every syllable of the permit granted by the Secretary of War. (M. R. 75-77.)

Surveying these permits, one and all, they express the undeniable conclusion that the Secretaries of War, respectively, did not believe their power extended to permit an obstruction to navigation. To say that the construction of this statute by the War Department is "persuasively determinative" that there was delegated power over obstructions is hardly in keeping with these expressions by the War Department. We respectfully submit that the construction of section 10 is not determined by the departmental construction which indicates, if at all, that the power of the Secretary of War was *constantly in doubt from the beginning,*—and rightly so!

c. THE DECISION OF THIS COURT IN SANITARY DISTRICT V. UNITED STATES DOES NOT CONSTRUE OR INTERPRET SECTION 10 AS DELEGATING POWER TO THE SECRETARY OF WAR TO AFFIRMATIVELY AUTHORIZE AN OBSTRUCTION TO THE NAVIGABLE CAPACITY OF THE GREAT LAKES.

In his Report, the Special Master (M. R. 189) says:

> "Finally, the authority of the Secretary of War under Section 10 of the Act of 1899, is deemed to have been involved, and to have been passed upon by this Court, in Sanitary District v. United States, 266 U. S. 405, where the Court said in reference to Section 10 (id. p. 429):

> " 'There is neither reason nor opportunity for a construction that would not cover the present case. As now applied it concerns a change in the condition of the Lakes and the Chicago River, admitted to be navigable, and, if that be necessary, an obstruction to their navigable capacity, United States v. Rio Grande Dam & Irr. Co. 174 U. S. 690, without regard to remote questions of policy. It is applied prospectively to the water henceforth to be withdrawn. This withdrawal is prohibited by Congress, except so far as it may be authorized by the Secretary of War.' "

In Sanitary District v. United States, the Government was attempting to prohibit the abstraction of a greater quantity of water than 4,167 c.f.s. The purpose of that suit was to settle the question whether the Sanitary District could exceed the maximum of 4,167 c.f.s. without *any* authority from the Federal Government, but upon their claim of right under the police power of the State. This court held that their rights under the *police power of the State* were *inferior* to the superior rights of the Federal Government, and that in the absence of any Federal authority these defendants could not exceed 4,167 c.f.s. The use made of section 10 in that case was confined to its *first clause.* The second and third clauses and the extent of power under them was not discussed because not involved. It is respectfully urged that this Court is not committed to any construction of the second and third clauses of section 10 by anything said of any principle involved in that case.

On the other hand the Government, through the Attorney General and Solicitor General, urged (Sanitary District v. United States, 266 U. S. 405, 419) that the construction to be placed upon section 10 of the Act of 1899 was:

> *"An Act of Congress is necessary to authorize the creation of an obstruction to the navigable capacity*

> *of a navigable water of the United States;* for a modification of the condition or use, of such navigable water *not amounting to an obstruction*, the recommendation of the Chief of Engineers and the authorization of the Secretary of War are necessary. Hubbard v. Fort, 188 Fed. 987; West Chicago R. R. Co. v. Chicago, 201 U. S. 506; Distinguishing Maine Water Company v. Knickerbocker Company, 99 Me. 473."

Inasmuch as the Government took this position, and this Court held with the Government, how can it be said that this Court construed section 10 in any different light? In that case the first clause was held to prohibit obstructions. How then can it be claimed that the second and third clauses were either construed, or if so, to delegate any authority to change the rule announced by congress in the first clause? Rather it would appear that the Government was sustained when taking the same position that complainant now urges.

The Maine Water Company case (used by the Special Master as his sole authority for construction of section 10) was distinguished by the Government. Hence the case of Sanitary District v. United States, *supra*, would appear to be an authority for Complainant's construction of this section, and particularly in view of this court's language at page 429:

> "It (Act of March 3, 1899) is a broad expression of policy in unmistakable terms, advancing upon an earlier act of September 19, 1890, etc."

Since the holding of this court in that case defendants have abstracted more than twice the amount there involved, (now abstracting at least 8,500 c.f.s.) What may have appeared to the Secretary of War as being a diversion not constituting an obstruction to navigable capacity (4,167 c.f.s.) surely cannot justify the taking of more than twice as much water, which now, without question, substantially obstructs navigation upon the whole of the Great Lakes-St. Lawrence Waterway System. A diversion not amounting to an obstruction might be regulated by the Secretary of War, but when it becomes an obstruction to navigable capacity, his power to authorize ceases and the power of Congress becomes exclusive. Hence Sanitary District vs. United States, *supra,* cannot be cited to sustain an "affirmative authorization" which has never been given by Congress.

d. THE FACT THAT CONGRESS DID NOT ACT TO DISAPPROVE THE SECRETARY OF WAR'S PERMIT OF MARCH 3, 1925, DOES NOT CONSTITUTE AN "AFFIRMATIVE ACT OF CONGRESS" NOR A DELEGATION OF POWER BY IMPLICATION; LEGISLATIVE POWER CANNOT BE IMPLIED SO AS TO BE EXERCISED BY ANOTHER DEPARTMENT OF GOVERNMENT.

In his report the Special Master Says: (M. R. 186, 187)

> "While, as I have said, Congress did not directly authorize the diversion, it was fully conversant with what had been done by the Sanitary District and with what had been permitted by the Secretary of War purporting to act under the general authority conferred by Congress in Section 10 of the Act of March 3, 1899, and it may be regarded as significant that Congress, having complete control, all the permits of the Secretary of War being subject to its action, did not at any time adopt measures either to prevent the diversion or to manifest disapproval of the construction which the Secretary of War had placed upon the statute."

This so-called aid to construction assumes first that Congress was aware that the diversion amounted to an obstruction to navigable capacity, and that it desired the obstruction to continue. That Congress was "conversant with what had been done" is fully as consonant with *disapproval* as with *approval*, because by Section 10 of the Act of March 3, 1899, Congress had exerted itself to the limit to *prohibit all obstructions to navigable capacity.* It could do no more. The enforcement of this prohibition remained with the executive department and the *courts* and not with Congress. The fact that Congress did not act affirmatively cannot be interpreted as giving "affirmative" authority to do that which it had sweepingly prohibited in the beginning. The *express prohibition* of any right to authorize obstructions *does not give that right by implication.*

We are not unmindful of the rule established in some cases, such as United States v. Midwest Oil Company, 236 U. S. 459, in which it was held that long continued practice to withdraw public lands operated as a grant of implied power. But it will be noticed that in no case is any rule established that where Congress has prohibited certain action by an executive department, authority to do the act is implied from an express prohibition. And also in such cases, as was ably pointed out in the dissenting opinion in United States v. Midwest Oil Company; *supra,* the decisions upholding the withdrawal of public land were in pursuance of a policy declared by Congress, or in cases where grants of Congress were in conflict. Also it will be noticed that these decisions were for the preservation of rights of the government and not in derogation thereof.

The Constitution of the United States contains no prohibitive clause against the exercise of powers by one department of the government belonging to another, and yet it is held that the powers confided to one of the departments cannot be exercised by any other. Kilbourn v. Thompson, 103 U. S. 168, 26 L. Ed. 377.

Nor when express ratification is asked and refused, can any power by implication be fairly inferred.

Barden v. No. Pacific R. Co. 154 U. S. 288, 317; 38 L. Ed. 992, 998;
Durousseau v. United States, 6 Cranch. 307, 318; 3 L. Ed. 232, 235;
Eyster v. Centennial Bd. of Finance, 94 U. S. 500, 503; 24 L. Ed. 188, 189.

From this we extract the principle that the grant of authority to the legislative department of the government ought not to be amplified by judicial decision. Congress should not be held to have delegated a power to the war department by implication, simply because it did not act at all after its express prohibition in the act of March 3, 1899.

e. AFFIRMATIVE AUTHORIZATION CANNOT BE IMPLIED FROM SECTION 10 OF THE ACT OF MARCH 3, 1899, BY SUPPLYING AND READING INTO THAT SECTION THE WORD "UNREASONABLE" SO AS TO MODIFY THE EXPRESS PROHIBITION AGAINST OBSTRUCTIONS TO NAVIGABLE CAPACITY.

The Special Master says: (M. R. 190)

> "The true intent of the Act of Congress was that *unreasonable* obstructions to navigation, and navigable capacity, were prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an *unreasonable* obstruction."

From the foregoing language the Special Master endeavors not only to read out of section 10 the term *"affirmatively authorized by Congress"* and substitute in its place *"affirmatively authorized by the Secretary of War,"* but also to read into the section the word *"unreasonable"* with reference to obstructions to navigation.

Had Congress intended to say "reasonable" or "unreasonable" it surely could have done so and if Congress had intended any such result the sweeping prohibition of section 10 would certainly not have been used. The section declares the *sole power over obstructions* rests with *Congress,* and whether they are *reasonable* or *unreasonable* is a matter for *Congress' determination* and is not delegated to the Secretary of War.

Indeed the Special Master has adopted a rather narrow construction of section ten to effect the grant of a power by reading into it the word "unreasonable", when that section consists of *language of restriction.* Upon this subject this Court in Fairbank vs. United States, 181 U. S. 283, 288, aptly said:

> "It would be a strange rule of construction that language granting powers is to be liberally construed and that language of restriction is to be narrowly and technically construed."

In section 18 of the same act of March 3, 1899 (30 Stat. at L. 1121, 1153, Ch. 425, U. S. Comp. Stat. p. 3545) Congress used the term "unreasonable obstructions" in connection with the determination of the Secretary of War, respecting the bringing of criminal actions in cases of bridges, making it the duty of the Secretary of War to insist on certain proceedings whenever he,—

> "Shall have good reason to believe that any railroad or other bridge now constructed, or which may hereafter be constructed, over any of the navigable

> waterways of the United States, is an *unreasonable* obstruction to the free navigation of such water * * *''

The insertion of the word ''*unreasonable*'' was of course consciously done and directed the Secretary of War to consider certain conflicting interests of commerce respecting the use of the river and the use of the bridge as related to each other. The fact that the word ''*unreasonable*'' was specifically employed in the case of the bridges and consciously *used by Congress in section 18 of the same Act*, strengthens the construction urged by complainants that it is *not* to be read into section 10 when it is *not* there.

It is a general principle of interpretation that the mention of one thing implies the exclusion of another. (Expressio unius est exclusio alterius.)

> United States v. Arredondo, 6 Pet. 691;
> Sturges v. Draper, 12 Wall. 19;
> Arthur v. Cunning, 91 U. S. 362;
> Walla Walla v. Walla Walla Water Co. 172 U. S. 1.

It would amount to judicial legislation to read into this section something which is not there and which was not intended by Congress.

Courts have no legislative powers and cannot read into a statute something that is not within the manifest intention of the legislature as gathered from the statute itself; to depart from the meaning expressed by the legislature is to alter the statute, to legislate and not to interpret.

> United States v. Detroit First National Bank, 234 U. S. 245; 58 L. Ed. 1298;
> United States v. Goldenberg, 168 U. S. 97; 42 L. Ed. 394;
> United States v. Lexington Mill Co. 232 U. S. 399.

In adopting section 10 Congress had the same opportunity to use the word "unreasonable" that it had in section 18 of the same act. Its use in section 18 implies that the failure to use such term in section 10 was a desire on the part of Congress not to delegate any authority to the Secretary of War or anyone else, including State Governments, to determine the reasonableness or unreasonableness of obstructions to navigation, but to retain that power in Congress.

(f) *Section 10 of the Act of March 3, 1899, is not in and of itself an affirmative act of Congress delegating authority to the Secretary of War in cases under the second and third clauses of that section; this statute operates prospectively.*

The Special Master, in his report (M. R. 182) says:

> "In the cases described in the second and third clauses of Section 10, Congress has given its affirmative authorization provided the requirements as to the recommendation of the Chief of Engineers and the authorization of the Secretary of War are met."

This argument assumes that the requirement of the first clause of section 10:

> "that the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States, is hereby prohibited"

being followed by two clauses giving limited authority to the Secretary of War is an "affirmative act of Congress," as respects everything mentioned in these clauses.

We respectively contend that no such construction can be placed upon the sweeping prohibition of the first clause of section 10. Congress contemplated an *act of Congress.* Its language is prospective. It did not contemplate that the *very act prohibiting obstructions to navigation should constitute an "affirmative act of Congress"* to permit them. A positive prohibition is not an affirmative authorization. The language of Congress in section 10 is prospective. The word *"creation"* suggests any *future* creation, as contrasted with "maintenance" used in the previous Act of Sept. 19, 1890, and which was held in United States vs. Wishkah Boom Co. 136 Fed. 42, 45, not to be repealed because not inconsistent with the prohibition against "creation" in the later act.

Even though the legislature may have the power to enact retrospective laws, a construction which gives to a statute a retroactive operation is not favored. There is always a *presumption* that statutes are intended to operate *prospectively only.*

> Reynolds vs. M'Arthur, 2 Pet. 417;
> Twenty Per Cent Cases, 20 Wall. 179;
> Cameron vs. United States, 231 U. S. 710;
> United States Fidelity, etc. v. United States, 209 U. S. 306.

If Congress intended to delegate discretionary authority to the Secretary of War in all of the cases mentioned in the second and third clauses of section ten then his authority would be without limit in the field of obstructions to navigable capacity and there would be no good reason for enacting the first clause. About the only works not mentioned in these clauses are bridges which were included in a separate section which *did* give fact-determining discretion to the Secretary of War in cases of bridges.

Is it not more consonant with the intention of Congress that section 10 was *prospective* entirely? This

Court in Sanitary District vs. United States, 266 U. S. 405, 429, said:

> "* * * It (section 10) is applied *prospectively* to the water henceforth to be withdrawn."

In like manner is it not more in harmony with the intent of Congress to say:

> It (section 10) is applied prospectively to the prohibition of all obstructions unless Congress in the future may authorize them?

(g) *The Maine Water Company Case is distinguishable.*

The Special Master cites the case of Maine Water Co. vs. Knickerbocker Steam Towage Co. 99 Me. 473, in support of his conclusion. Reference to that case discloses that the Supreme Court of Maine utterly failed to consider that in the Act of September 19, 1890, the effect of the combined provisions of sections 7 and 10 gave the same results that the Maine court thought could not have been intended in the Act of March 3, 1899. The structures covered by Section 7 of the early act could be authorized by the Secretary of War *if they did not constitute obstructions.* If, on the other hand, they did constitute obstructions, they were forbidden by section 10 unless "affirmatively authorized by law". The conclusion of the Maine court wholly disregards the word *affirmatively"* and renders it meaningless, useless and without purpose. The result of the Maine holding is to substitute the word "impliedly" for "affirmatively" and to substitute the terms "affirmatively authorized by the Secretary of War" in place of "affirmatively authorized by Congress", in the first clause of section 10.

The Special Master endeavors to support his conclusion by the following reasoning: (M. R. 181, 182)

> "If the section were construed to require a special authorization by Congress whenever in any aspect it might be considered that there was an obstruction to navigable capacity, none of the undertakings specifically provided for in the second and third clauses of Section 10 could safely be undertaken without a special authorization of Congress, as in the absence of that, it would always be a judicial question whether there was an obstruction to navigable capacity, and if there were, the action of the Chief of Engineers and the Secretary of War would be without authority. Unless Congress had acted specifically, every such question would be thrown into the courts and the administrative authority of the Secretary of War which has been regarded as practically essential in the classes of cases described in the second and third clauses of Section 10 would be paralyzed."

The answer to this rests in the numerous acts passed by Congress since March 3, 1899, specifically acting upon questions involving obstructions to navigation in isolated ports, harbors and rivers throughout the length and breadth of its jurisdiction. If Congress intended in 1899 to delegate to the Secretary of War its broad power over obstructions to navigation, why would Congress go on after that time, continually authorizing certain obstructions by affirmative acts, in numerous cases, and why was it necessary in all of these acts for Congress to expressly use such terms as "the Secretary of War is hereby authorized and empowered"; "The Secretary of War shall have power and he is hereby authorized and directed"; "the Secretary of War is hereby authorized in his discretion", etc., in cases involving obstructions to navigation which are infinitesimal in comparison with the enormous obstruction here involved!

At the present time with Congress in session the attention of this Court is respectfully directed to the hundreds of bills now pending to provide affirmative authorization by Congress for the construction of bridges over rivers, rivulets and streams throughout the length and breadth of the nation, and authorizing the Secretary of War to approve the construction of countless works which come under the second and third clauses of section 10, as well as sections 11 and 18 of the Act of March 3, 1899.

In particular the court is asked to take judicial notice of the following pending bills before the 70th Session of Congress, which are typical of the hundreds of similar measures acted upon by each session of Congress.

H. R. 6512—Bridge across Little Calumet River near Wentworth Avenue, Chicago.

H. R. 6513—Bridge across Little Calumet River near Ashland Avenue, Chicago.

H. R. 6514—Bridge across Little Calumet River near Indiana Avenue, Chicago.

H. R. 8740—Bridge across Little Calumet River, Chicago.

S. 2811—Bridge across Little Calumet River, Chicago.

S. 2812—Bridge across Little Calumet River, Chicago.

S. 2813—Bridge across Little Calumet River, Chicago.

For these apparently inconsequential "obstructions to navigable capacity" and upon one of the "tributaries" of the Chicago Sanitary Canal, the affirmative authority of Congress is being sought. Evidently it is not too inconsequential for Congress to deal with these small regulatory measures, but the Maine Water Company case would lead us to the conclusion that it is too much to require Congress to deal with a measure involving changes in the levels of the Great Lakes and their connecting water ways, constituting a substantial obstruction to the navigable capacity of 400 harbors, at least 100 of which have been improved at an expense of more than eighty million dollars to the Federal Government, damaging commerce and navigation at least three million dollars per year, affecting fishing and hunting grounds, beaches at summer resorts, public parks, wharves, docks, and all riparian property of the State of Michigan and sister states bordering upon the Great Lakes, and directly affecting an industrial and commercial civilization that has grown up largely dependent upon these water ways for its continuance. It seems incredible that any view could be adopted to the effect that Congress intended to empower the Secretary of War, to authorize within his discretion obstructions to the navigable capacity of the Great Lakes which might cause all of this damage and in addition affect international relations with Canada on the other side of this great international waterway, and yet did not intend to give discretionary authority to the Secretary of War to affirmatively authorize the construction of bridges over streams, dredging harbors, dumping refuse, and other countless matters of relatively small importance.

As to the action of previous sessions of Congress reference is made particularly to such acts as, section 11 of the Act of March 3, 1899:

> "where it is made manifest to the Secretary of War that the establishment of harbor lines is essential to the preservation and protection of harbors, *he may, and is hereby, authorized* to cause such lands to be established beyond which no piers, wharves, bulkheads, or other works shall be extended, or deposits made, except under regulations as may be prescribed from time to time by him: Provided, etc."

Section 13 of the Act of March 3, 1899:

"* * * And provided, further, that *the Secretary of War, whenever in the judgment of the Chief of Engineers,* anchorage and navigation will not be injured thereby, *may permit* the deposit of any material above mentioned in navigable waters, within the limits to be defined and under conditions to be prescribed by him. * * *"

Section 14 of the Act of March 3, 1899:

"* * * Provided, that *the Secretary of War may, on a recommendation of the Chief of Engineers, grant permission* for the temporary occupation or use of any of the aforementioned public works, *when in his judgment* such occupation or use will not be injurious to the public interests".

Section 18 of the Act of March 3, 1899:

"That *whenever the Secretary of War shall have good reason to believe* that any railroad or other bridge now constructed, or which may hereafter be constructed, over any of the navigable water ways of the United States, *is an unreasonable obstruction* to the free navigation of such country, on account of insufficient height, etc., it shall be the duty of the said Secretary, first giving the parties reasonable opportunity to be heard * * * to notify the United States District Attorney or the District in which such bridge is situated, to the end that the criminal proceeding hereafter mentioned may be taken."

Section 5 of the Act of August 26, 1912:

"*The Secretary of War is hereby authorized in his discretion,* to modify and extend harbor lines in front of the City of Chicago in such a manner as to permit, park extension work, which may be desired by the municipal authorities, including the changing and widening of the southern entrance to the Chicago Harbor."

We pause long enough to suggest that if an affirmative act of Congress was deemed necessary to authorize the Secretary of War to have this power with reference to the *Chicago Harbor,* how much greater were the necessities for an affirmative act of Congress with respect to the creation of an obstruction to *four hundred other harbors upon the Great Lakes,* and the taking of such an enormous quantity of water that a substantial obstruction to navigation was caused throughout this great chain of water ways? If Congress deemed it necessary in 1912 to give authority to the Secretary of War upon this comparatively insignificant matter, how can it be said that Congress had already affirmatively given much broader powers by the Act of 1899 and had so intended without further affirmative action?

Section 14 of the Act of March 26, 1908:

> "*The Secretary of War is hereby authorized* to fix and establish pierhead and bulkhead lines, either or both, in the harbor of San Pedro."

Act of July 27, 1916:

> "*The Secretary of War is hereby authorized and directed* to fix and establish pierhead and bulkhead lines, either or both, in New Port Harbor, California, etc."

Section 4, Act of March 3, 1905:

> "*The Secretary of War is hereby authorized and empowered* to prescribe regulations to govern the transportation and dumping into any navigable water, or waters adjacent thereto, of dredgings, earth, garbage, and other refuse materials of every kind or description, whenever in his judgment such regulations are required in the interests of navigation."

We call the court's attention to the fact that Congress considered it necessary in 1905, to act affirmatively to authorize even such possible obstructions to navigation as the dumping of refuse. How much more is needed to show that section 10 of the Act of March 3, 1899, was not intended nor construed by congress itself as authorizing obstructions to navigation by any delegated power claimed to reside in the Secretary of War?

Section 2 of the Act of May 9, 1900:

> "*The Secretary of War shall have power, and he is hereby authorized and directed*, within the shortest practicable time after the passage hereof, to prescribe rules and regulations, which he may at any time modify to cover and regulate the floating of loose timber and logs, etc."

Section 5, Act of March 3, 1909:

> "That the Secretary of War, be, and is hereby, authorized to make such rules and regulations for the navigation of the south and southwest passes of the Mississippi River, as to him shall seem necessary or expedient for the purpose of preventing any obstructions to the channels through said south and southwest passes and any injury to the works therein constructed, etc."

Section 1, Act of March 4, 1913:

> "Improving New York harbor, New York. * * * And the Secretary of War is hereby authorized to make such rules and regulations for the navigation of Ambrose Channel, etc."

Section 1, Chapter 436, Act of June 25, 1910:

> "The consent of Congress is hereby given to the city of New York in the State of New York, to ob-

> struct navigation of any river or other water way which does not form a connecting link between other navigable waters of the United States, etc. Provided, however, that any such obstruction shall be unlawful unless the location and plans for the proposed work, or works, before the commencement thereof, shall have been filed with and approved by the Secretary of War and Chief of Engineers."

This act of June 25, 1910, illustrates that Congress at that time, not deeming that the act of March 3, 1899 delegated authority over obstructions to navigation, saw fit to pass an affirmative act to permit these obstructions to navigation. The regulatory details were to be administered by the Secretary of War. *This act is the kind of act intended by Congress to precede the creation of any obstruction to navigation.* In ~~this~~ act we find illustrated the intention of Congress as to the true construction of section 10 of the Act of March 3, 1899.

None of these works of construction can be done without cost. The money to defray them must be appropriated by Congress, and would constitute express authorization to do the work. This was undoubtedly the manner contemplated by Congress when it expressly prohibited obstructions being created without its affirmative authorization. These acts illustrate even better than the language of section 10 the construction which Congress placed upon its own act.

H. SECTION 10 SHOULD NOT RECEIVE A CONSTRUCTION DELEGATING DISCRETIONARY POWER TO THE SECRETARY OF WAR TO AUTHORIZE OBSTRUCTIONS TO NAVIGABLE CAPACITY BECAUSE SUCH POWER NECESSARILY INCLUDES THE POWER OF EMINENT DOMAIN WHICH CANNOT BE DELEGATED UNLESS IT AFFIRMATIVELY APPEARS FROM ACTION BY CONGRESS.

The Special Master says (M. R. 191):

> "And when the Secretary of War acts under the authority conferred by Congress, *his determination as to what is or is not an unreasonable obstruction to navigation or navigable capacity in the circumstances of the particular case has the same effect and is as immune from judicial review as if Congress had acted directly.*"

This construction would clothe the Secretary of War with power to authorize obstructions to navigable capacity *within his discretion.* Being "*immune from judicial review*" it would necessarily be *conclusive* in its effect.

1. *Discretionary power to authorize obstructions to navigable capacity necessarily includes the power of eminent domain.*

Discretionary power over obstructions would necessarily include the power of eminent domain because in the exercise of discretion the Secretary of War would be empowered to authorize a class of obstructions which would involve the taking of private property for public use for the purpose of navigation.

> Monongahela Navigation Co. v. United States, 148 U. S. 312; 37 L. Ed. 463;
> Southern Pacific Co. v. Olympian Dredging Co., 260 U. S. 205, 210;
> Scranton v. Wheeler, 179 U. S. 141; 45 L. Ed. 126;
> United States v. Lynah, 188 U. S. 445; 45 L. Ed. 539;
> United States v. Cress, 243 U. S. 316, 61 L. Ed. 746.

Whatever may be the opinion of this Court with respect to the effect of the Chicago diversion upon the property rights of complainant and its people in this case, as to whether the power of eminent domain has been exercised or whether the damage is *damnum absque injuria,* nevertheless the power of the Secretary of War, if discretionary, would include in other cases the whole power of Congress to deal with obstructions, which necessarily includes the power of eminent domain whenever it is required to be exercised.

The determination in a given case whether the obstruction is *damnum absque injuria* or amounts to a "taking" of private property for which compensation must be made, is for the Courts. But the determination to do the act which amounts to the exercise of the power of eminent domain would (if discretionary) be one for the Secretary of War.

2. *The delegation of the power of eminent domain must plainly appear.*

> "The right to take private property in any form without the consent of the owner is a high prerogative of sovereignty, which no individual or corporation can exercise without an express grant. The power may be delegated but the delegation must plainly appear."
>
> 2 Sutherland on Stat. Const. 2d ed. 1940.

> "Inasmuch as the right of eminent domain is one which lies dormant in the State until legislative action is had, pointing out the occasion, mode, conditions and agencies for its exercise, the right to exercise the power must be conferred by statute, either in express words or by necessary implication.
>
> The power should not be gathered from doubtful inferences but should be unmistakably expressed."
>
> 20 Corpus Juris 533, 534.

United States v. Gettysburg Elect. R. Co. 160 U. S. 668; 40 L. Ed. 576;
Newport & Cinn. Bridge Co. v. U. S. 105 U. S. 470;
Fairbanks v. U. S. 181 U. S. 283;
Western Union Telegraph Co. v. Atlanta R. Co. 227 Fed. 465;
Western Union Telegraph Co. v. Penn. R. Co. 195 U. S. 540, 549; 49 L. Ed. 312, 332;
United States v. Rauers 70 Fed. 748;
Washington Water Power Co. v. Waters, 186 Fed. 572;
Miocene Ditch Co. v. Lyng, 138 Fed. 544.

3. *No such plain legislation to delegate the power of eminent domain appears in section 10 giving the Secretary of War power to authorize obstructions.*

Besides the plain and *unmistakable prohibition* in section 10 against creating any obstructions without affirmative authority from Congress it is clear that the War Department itself never believed it had the broad discretionary power of Congress, including the power of eminent domain. This feeling was expressed by the Secretary of War (M. R. 64) when on January 8, 1913, he said among other things:

> "The weighing of the sanitation and possibly the health of one locality over against the commerce of the rest of the Nation, and the consideration of our relations and obligations to Canada in respect to a great international waterway, *are not matters of mere technical or scientific deduction. They are quite different in character, for example, from the question of fixing the proper location of a pierhead line or the height or width of a drawbridge over a navigable stream—fair samples of the class of questions which come to the Secretary of War for decision under the above-mentioned Act of 1899.* While the researches and opinions of experts in the respective fields are necessary and useful as an assistance towards reaching a fair and proper policy, the final determination of that policy should belong, not to an administrative officer, but rather to those bodies to whom we are accustomed to entrust the making of our laws and treaties."

9. THE ORDINANCE OF 1787 PROHIBITS INTERFERENCE WITH THE NAVIGABLE CAPACITY OF THE GREAT LAKES; CONGRESS DID NOT INTEND SECTION 10 OF THE ACT OF MARCH 3, 1899 TO MODIFY OR REPEAL THE PROHIBITION OF THIS COMPACT.

Article 4 of the Ordinance of 1787 (1 Stat. at L. 51 and 52; U. S. Rev. Stat. 1878, Ed. pp. 13, 16) provides as follows:

> "The navigable waters leading into the Mississippi and St. Lawrence, and the carrying places between the same, shall be common highways, and forever free, as well to the inhabitants of the said territory as to the citizens of the United States, and those of any other states that may be admitted into the confederacy, etc."

In Pennsylvania v. Wheeling Bridge Company, 13 How. 518, 566, this court said:

> "This compact, by the sanction of Congress, has become a law of the Union. What further legislation can be desired for judicial action?"

In Economy Light & Power Company v. United States, 256 U. S. 113, 120, it was said:

> "But, so far as it established public rights of highway in navigable waters, capable of bearing commerce from State to State, it did not regulate internal affairs alone, and was no more capable of repeal by one of the States than any other regulation of interstate commerce enacted by the Congress; being analogous in this respect to legislation enacted under the exclusive power of Congress to regulate commerce with the Indian tribes."

From these cases it is clear that the ordinance of 1787 applies to the navigable waters of the Great Lakes and has always been in force. The Ordinance of 1787 has been reiterated in later acts of Congress, accepted by the States of Illinois, Ohio, Wisconsin and Michigan, in their constitutions, and was in force at the time of the passage of both the Acts of September 19, 1890 and the Act of March 3, 1899, and is the law of the land.

In view of the ordinance of 1787 can it be said that Congress intended by section 10 to delegate power to the Secretary of War to repeal or modify this ancient compact, without an affirmative act of Congress expressing such an intention? Section 10 must be construed with reference to the ordinance of 1787 when applied to the Great Lakes, and any construction of this section which negatives the guarantee of that compact must be clear in its repeal. Whatever this section may mean with respect to *other* navigable waters of the United States, it still remains true that Congress never intended a construction of the Act of March 3, 1899 which would permit obstructions to the navigable capacity of *these particular waters of the Great Lakes*, guaranteed to be kept free and navigable to the fullest extent by the Ordinance of 1787. To construe Section 10 as delegating power over *obstructions to the navigable capacity of the Great Lakes and their connecting waters* would be to derive a *power by implication* to annul or repeal an express act of Congress still in force and effect.

If Section 10 be so construed to repeal or modify this guaranty of the Ordinance of 1787, then in addition to its being a power delegated by implication, it constitutes a repeal by implication of the Ordinance of 1787.

Repeals by implication are not favored and will not be indulged in if there is any other reasonable construction.

Lewis v. United States, 244 U. S. 134;
Washington v. Miller, 235 U. S. 422;
Ex Parte Webb, 255 U. S. 663.

Nor can one act be allowed to defeat another if, by a fair and reasonable construction, the two can be made to stand together.

Washington v. Miller, 235 U. S. 422.

It would be most unreasonable to suppose that a legislative body intended, by doubtful inference, to repeal salutary provisions in a very early statute which, in numerous enactments it has cautiously preserved.

Fussell v. Gregg, 133 U. S. 550.

Even though two statutes are inconsistent the presumption is that the special act is intended to remain in force as an exception to the general act.

> Rodgers v. United States, 185 U. S. 83;
> Washington v. Miller, 235 U. S. 442;
> In Re Louisville Underwriters, 134 U. S. 488.

Section 10 should not receive a construction repealing or changing the guarantee of the Ordinance of 1787, at least so far as it applies to the Great Lakes and their connecting waters.

10. TO CONSTRUE SECTION 10 OF THE ACT OF MARCH 3, 1899, AS GIVING THE SECRETARY OF WAR FULL AUTHORITY TO AUTHORIZE THIS DIVERSION WITHOUT AN AFFIRMATIVE ACT OF CONGRESS, IS NOT JUSTIFIED IN LIGHT OF INTERNATIONAL RELATIONS WITH CANADA, INCLUDING TREATIES AND KINDRED ACTS OF CONGRESS.

The power of Congress over commerce includes the power:

> "To regulate commerce with foreign nations. * *"

By Article II, Sec. (2) Clause 2, of the Federal Constitution, it is provided that:

> "He (the president) shall have Power, by and with the Advice and Consent of the Senate, to make treaties. * *"

By Article VI, Sec. (2), of the Federal Constitution, it is provided:

> "* * All treaties made or which shall be made, under the authority of the United States, shall be the Supreme Law of the Land; * * *".

Regardless, for the moment, of the construction of section 10 that may be urged, concerning an obstruction to navigation affecting two sister states in inter-state waters, can it be that by section 10, Congress intended to include the delegation of even broader powers, i.e., power to authorize the creation and mantenance of obstructions to navigation in *international waters* which affect a *foreign nation,—without an affirmative act of Congress?*

The power of Congress extends to the exclusive control of interstate and *a fortiori* to international waterways.

> United States vs. Rio Grande Dam & Irrig. Co. 174 U. S. 690;
> Kansas v. Colorado 206 U. S. 46;
> Sanitary District v. United States 266 U. S. 405;
> United States v. Chandler-Dunbar Water Co. 229 U. S. 54.

If Section 10 be so construed as to give to the Secretary of War these rights which anciently reposed in Congress and the President, it means that acts which involve international waterways and "commerce with foreign nations" and require the action of Congress, acts which involve treaty-making power, which should be counseled by the Senate, and acts which may lead to international complications and even to war itself—may be accomplished by the Secretary of War without an affirmative act of Congress. If this construction were to be urged with regard to any other *foreign nation,* than our friendly neighbor Canada, the effect might be even more significant. How can it be said that Congress ever intended to affirmatively authorize the Secretary of War to have power through section 10 to accomplish this result? *Certainly it cannot be found in section 10 itself, nor in any of the treaties with the Dominion Government, nor in any of the acts of Congress dealing with this question.*

(a) *Canada as a sovereign nation has a right to its portion of the international water ways, including the Great Lakes* *and St. Lawrence River, without restriction, except by treaty.*

In Vattell Law of Nations, introd. par. 18, it is said:

> "A small republic is no less a sovereign state than the most powerful kingdom."

In Re The Antelope, 10 Wheat. 66, 122, Justice Marshall said:

> "No principle of general law is more universally acknowledged than the perfect equality of nations."

In Re The Schooner Exchange v. M'Fadden, et al., 7 Cranch 116, 3 L. Ed. 114, 116 Justice Marshall again said:

> "This perfect equality and absolute independence of sovereignty * * *"
>
> "The jurisdiction of a nation within its own territory is necessarily exclusive and absolute. It is susceptible of no limitations not imposed by itself. Any restriction upon it, deriving validity from an external source, would imply diminution of its sovereignty to the extent of the restriction, and an investment of that sovereignty to the same extent in that power which could impose such restriction."

As a necessary corollary of international sovereignty, one nation would have no right to perform an act or to permit it to be done by its own political subdivisions or its nationals without its express or clearly implied consent or approval, the direct, natural and necessary result of which is to infringe upon, injure, impair or destroy the rights of property of another equal, independent, sovereign nation, or the rights of property of another equal independent sovereign nation, or the rights of property of its nationals, or of those under its jurisdiction and control. Such an injury to the rights of another sovereign nation, if persisted in, constitutes a proper ground for diplomatic interposition and protest and may constitute a just cause for war.

In matters where the national importance is imminent and direct even where Congress is silent the States may not act.

> Kansas City So. Ry. Co. v. Kaw Valley Drainage Dist. 233 U. S. 75.

(b) The Canadian Boundary Waters Treaty of 1909 did not contemplate authorization to take these international waters nor the delegation of authority to the Secretary of War to permit such diversion.

It has been intimated that this treaty did not contemplate the waters of Lake Michigan. But it was found by the Special Master (M. R. 87, 89, 101) that the levels of Lakes Michigan and Huron were the same, that the diversion affected them equally, and for all practical purposes they were one reservoir.

The Canadian Boundary Waters Treaty of January 11, 1909, provided in part as follows:

> Art. 1. "* * * It is further agreed that so long as this treaty shall remain in force, this same right of navigation shall extend to the waters of Lake Michigan, and to all canals, connecting boundary waters, and now existing or which may hereafter be constructed on either side of the line. * * *"

> Art. 2. "* * * It is understood, however, that neither of the High Contracting Parties intends by the foregoing provision, to surrender any right which it may have, to object to any interference with or diversions of water on the other side of the boundary, the effect of which would be productive of material injury to the navigation interests on its own side of the boundary."

> Art. 3. "It is agreed that in addition to the uses, obstructions, and diversions, heretofore permitted or hereafter provided for by special agreement by the Parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United

> States or the Dominion of Canada within their respective jurisdictions and with the approval, as hereinafter provided, of a joint commission, to be known as the International Joint Commission. * * *"

It will be noticed from the foregoing Article 2 that Canada *did not surrender any right to object to any interference, which would be productive of material injury to the navigation interests on its own side of the boundary.* Can it be successfully argued in view of this international expression that Congress intended to delegate authority to the Secretary of War to create an obstruction to navigation on the Great Lakes that would extend to our international neighbor, Canada,—and this without an affirmative act of Congress? If so, this is going far beyond the delegation of regulation-making power to the Secretary of War and places within his hands treaty making powers, which repose in the president of the United States by and with the advice and consent of the Senate, (Art. II, Sec. 2, Clause 2, Federal Constitution) because the power to modify a treaty presupposes the power to make one. Surely no such broad power was ever intended by Congress in enacting section 10 of the Act of March 3, 1899. And surely no such extensive power was recognized by the Federal Government in this treaty of 1909.

Under the Boundary Waters Treaty of 1909, it was no more possible to divert waters with immunity from Lake Michigan than for Canada to divert waters from the Georgian Bay so as to *affect* boundary waters. If Lake Michigan is not treated as a *boundary water,* but as an arm or bay connecting with a boundary water, what difference does this overnice distinction make when a boundary water (Lake Huron) is affected? This Court in Sanitary District vs. United States, 266 U. S. 405, 425, thought this treaty applied to diversions *which affect boundary waters* when it said:

> "It (the Government) has a standing in this suit not only to remove obstruction to interstate and foreign com-

> merce, the main ground, which we will deal with last, *but also to carry out treaty obligations to a foreign power bordering upon some of the Lakes concerned,* and, it may be, also on the footing of an ultimate sovereign interest in the Lakes. * * * *With regard to the second ground, the Treaty of January 11, 1909, with Great Britain, expressly provides against uses 'affecting the natural flow of boundary waters' without authority of the United States or the Dominion of Canada within their respective jurisdictions and the approval of the International Joint Commission agreed upon therein.*"

(c) *The Treaty of 1909 bears the same construction as should be given by the Courts to section 10 of the Act of March 3, 1899.*

Article 3, provides that the respective governments were not intended to be limited in their right to construct breakwaters, improve harbors, and other governmental works,

> "for the benefit of commerce and navigation, provided that such works are wholly on its own side of the line and do not materially affect the level or flow of the boundary waters on the other."

By the treaty certain works *for the benefit of commerce and navigation,* and the use of water in its *ordinary use* are not changed or interfered with, but the use of water so as *to materially affect the level or flow of boundary waters is* especially denied.

The Special Master says: (M. R. 189)

> "* * * the treaty contains nothing which can be regarded as effecting a repeal of the Act of March 3, 1899, or as operating to deprive the Secretary of War of the authority it conferred in relation to the diversion here in question."

The question is not whether the treaty *repeals* the act of March 3, 1899, but whether section 10 of the Act of March 3, 1899 can be construed as delegating power to the Secretary of War to permit obstructions to navigable capacity in the *Great Lakes in view of the treaty of January 11, 1909, with Canada.*

It will be noticed that by that treaty, works which were beneficial to navigation—such as the construction of breakwaters, improvement of harbors, and the like (included in clauses two and three of section 10) were permitted upon regulation. Either Government retained power to regulate through its administrative officers; but those acts which constituted *a change in the level or flow of the boundary waters,* which constituted an obstruction to navigation (included in clause one of sec. 10) were expressly reserved and denied by the treaty. In other words, the Canadian Boundary Water Treaty of 1909 *bears the same construction that is here urged with respect to section 10 by complainant.* The treaty and section 10 both provided that obstructions to navigation, such as the lowering of levels of the Great Lakes, should require further *affirmative* dealing on the part of the Governments themselves, and only those matters "for the benefit of commerce and navigation" rested within regulatory and administrative control. Thus the power of Canada over "the level or flow" of its portion of the Great Lakes was reserved, and was intended to be dealt with by further international agreement, should this be desired. *Congress was expected to deal with problems concerning the "level and flow" of the Great Lakes.* In view of this international situation, how can the previous act of March 3, 1899 be construed as delegating full power to the Secretary of War to affect "the level or flow" of the Great Lakes, and thus authorize obstructions, which was a subject expressly reserved to the treaty or law-making power of the respective governments?

(d) *The Act of Congress, Niagara Falls Act, June 29, 1906, does not contemplate a construction of section 10, giving extensive delegated power to the Secretary of War.*

The Special Master says: (M. R. 188)

> "I find nothing in the Niagara Falls Act which can be deemed to indicate disapprobation by Congress of the construction by the Secretary of War of his authority under the Act of 1899; whatever inference may be drawn from the act seems to me to be to the contrary."

The Niagara Falls Act of June 29, 1906, provided in part:

> "Provided, That this prohibition shall not be interpreted as forbidding the diversion of the waters of the Great Lakes or of Niagara River for sanitary or domestic purposes, or for navigation, the amount of which may be fixed from time to time by the Congress of the United States or by the Secretary of War of the United States *under its direction.*" (M. R. 46, 47.)

If the previous act of March 3, 1899, bore the construction by Congress that the Secretary of War was invested with full power, to authorize diversion from the Great Lakes and St. Lawrence waterways, then why, it may be asked, did Congress deal with this same subject at all in 1906, or if it decided to act, then why did it deem it necessary to grant power to the Secretary of War to act "under its direction" if a still broader power already had been delegated to him by its act of 1899? In all other diversions the Secretary of War, by such a construction of section 10, would have extensive unlimited, discretionary authority, yet here Congress thought it was necessary to pass an affirmative act for the purpose of delegating much more *limited authority.* Surely the Act of 1906 does not show that Congress ever recognized a delegation of such broad power to the Secretary of War by the earlier act of March 3, 1899, as to authorize obstructions to navigation on the Great Lakes.

(e) *A general consideration of American-Canadian relationships does not justify the conclusion that Congress intended such a construction of section 10 as to include this particular diversion and obstruction in international waters.*

Ford vs. Steamship Co. 102 U. S. 541;
Henderson vs. Mayor of New York, 92 U. S. 259.

In United States v. Chandler-Dunbar Co., 229 U. S. 53, 67, this court said:

> "This was a matter of international consideration, for Canada, as well as the United States, was interested in the control and regulation of the Lake water levels."

This controversy involves international waters between Canada and our country, and is of a legislative nature, necessitating legislative determination as to the position of the United States, respecting the Great Lakes. This is not a controversy between sister cities on an intrastate stream, or even between sister states on an interstate waterway, but a controversy between *two separate nations* on an *international frontier of waterways.* Whatever may be thought about the Secretary of War's power under section 10 with respect to intrastate or interstate waterways, *here is a power which Congress never contemplated should be delegated to an administrative officer.*

Most certainly Congress did not *expressly* delegate any such international action under section 10, and *if it be urged by implication,* we point to the fact that this is no trifling power as applied to the facts of this particular case. The Federal constitution contemplates legislative action in matters of international relations. The regulation of commerce with foreign nations is reposed in Congress. The magnitude as well as the nature of the questions involved demand legislative decision, based upon action by representatives from the whole United States. International, war-fraught questions are peculiarly legislative in character. Deliberative and legislative action of a *national* and *international* scope are involved.

To say that this power is to be delegated to an *appointive, administrative officer* by an *ordinary rivers and harbors act* which as a matter of fact expressly reserves to the affirmative action of Congress authorization over obstructions to navigation, is to deny the meaning of the language of the act itself and to place in the hands of this officer, a power not only to permit the Great Lakes to be drained into the Mississippi Valley, but to legislate upon matters of vital and lasting importance respecting two great nations. What can there possibly be in the Act of 1899 that imports a necessity for such broad powers to be delegated to the Secretary of War, in any case, but particularly in a case respecting international relationship with Canada? In fact this very kind of case illustrates *the reason for the express prohibition employed by Congress in prohibiting "the creation of any obstruction not affirmatively authorized by Congress."*

On June 24, 1896, the United States District Engineer at Chicago, in his report (which language was embodied in a later permit) stated:

> "The question that must come up later for the action of the War Department, to-wit, whether the improved channel of Chicago River will be sufficient to carry 300,000 cubic feet of water per minute without lessening or destroying the navigability of Chicago River, or whether the City of Chicago will be allowed by the United States and Great Britain to take any water at all from the Great Lakes, with the inevitable result of lowering their levels, is not now under investigation, and is one that will not probably be settled or decided by executive officers. It is, or may rather be considered an international question." (J. R. 133.)

Can it be possible that Congress intended to delegate its power so that an administrative officer, alone, could disrupt peaceful relations on a three thousand mile frontier upon which not a soldier stands guard? Can it be argued that Congress intended, without a word of debate indicating any such intention, without reason, logic or necessity, justifying such course, to delegate such a power? Certainly a general consideration of the relationship of Canada and the United States does not justify such a strained construction of section 10, as this, when applied to the facts of this particular diversion.

(II) TO CONSTRUE SECTION 10 OF THE ACT OF MARCH 3, 1899, AS DELEGATING POWER TO THE SECRETARY OF WAR TO GRANT EXPRESS AUTHORITY FOR OBSTRUCTIONS TO NAVIGABLE CAPACITY WOULD RENDER THAT SECTION VOID, BECAUSE SUCH A CONSTRUCTION WOULD AMOUNT TO AN UNCONSTITUTIONAL DELEGATION OF LEGISLATIVE POWER.

By the first clause of Section 10 Congress laid down the *legislative rule* prohibiting the creation of any obstructions to navigable capacity.

By the third clause of section 10, it was provided:

> "And it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, * * * lake * * *, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War, prior to beginning the same."

a. *Congress, having established the rule of law prohibiting obstructions to navigable capacity, power could be delegated to the Secretary of War to determine facts* but *not to change the general rule.*

Congress established the general rule and the Secretary of War's act was limited to a fact-finding determination in pursuance of this rule. He can neither expand nor contract the law. On this question his judgment cannot be substituted for that of the people's representatives. Hence any construction of the third clause which attempts to give the Secretary of War the power to authorize and permit obstructions to navigation, would necessarily give power to change the express rule of law laid down by Congress, and thereby would involve an unconstitutional delegation of law-making power.

In such an event, his power would not be confined to the determination of a fact, but would extend to override and change that which Congress had expressly prohibited, i. e. obstructions to **navigable capacity.**

In St. Louis Merchants Bridge Company v. United States, 188 Fed. Rep. 191, 195, the court said:

> "A legislative body may delegate the power to find some fact or situation on which the operation of a law is conditioned, or to make and enforce regulations for the execution of a statute according to its terms."
>
> "But it cannot delegate its legislative power, its power to exercise the indispensable discretion to make, to add to, to take from, or to modify the law. 'The true distinction,' said Judge Ranney for the Supreme Court of Ohio, in Cincinnati, Wilmington and Zanesville Railroad Co. v. Commissioners, 1 Ohio St. 77, 88, in a declaration which has been repeatedly approved by the Supreme Court, 'is between the delegation of power to make the law, which necessarily involves a discretion as to what it shall be, and conferring authority or discretion as to its execution, to be exercised under and in pursuance of the law. The first cannot be done. To the latter no valid objection can be made.'"

Power to regulate commerce cannot be delegated.

Houtenbergh v. Hennick, 129 U. S. 148;
Robbins v. Shelby Co. 120 U. S. 489;
Asher v. Texas, 128 U. S. 129;
Dent v. United States, 71 Pac. Rep. 920;
U. S. v. Blasingame, 116 Fed. Rep. 654.

Any construction of clause 3 which extends the power of the Secretary of War *beyond the prohibition of obstructions to navigation,* and attempts to give him power to authorize obstructions to navigation, would be an attempt to give him the power to make the law with respect to such obstructions, and not only to determine what amounts to an obstruction in a given case, but to decide whether to prohibit such an obstruction. Such power must of necessity, involve a delegation of law-making power to change the general rule laid down by Congress in the first clause of section 10, and is a violation of the express rule prohibiting obstructions.

This was never contemplated by Article I, Section 1, of the Federal Constitution, which provides:

> "All legislative powers herein granted shall be vested in a Congress of the United States."

The delegation of power by the people to the Federal Government to regulate commerce conferred upon *Congress* plenary power over navigation, including obstructions to navigable capacity. Re-delegation of legislative power by Congress would be void. Congress alone can legislate, and when Congress declares by specific enactment that there shall be no obstructions to navigable capacity, the Secretary of War may receive power to determine the facts as to what constitutes an obstruction in a given case, but cannot go further and *authorize* and make lawful *that which has been declared by Congress to be unlawful.*

We are not unmindful of the cases cited by the Special Master (M. R. 190-191), upholding the power of Congress to make a delegation of fact determination. But in each case referred to, Congress expressly provided the *general rule* and left the determination of facts to the Secretary of War or other officer, with power to enforce the provisions of the law. *Congress* provided the *general rule of law* and the executive or administrative *officer determined* the *facts.*

In the case of Union Bridge Company v. United States, 204 U. S. 364, and the other so-called bridge cases cited by the Special Master (M. R. 190-191), the general rule of law was laid down by Congress, in Section 18 of this same act (March 3, 1899) prohibiting bridges which obstructed navigable capacity, and left with the Secretary of War power to determine in a given case what constituted an obstruction, and to enforce their removal. But this court did not hold that by virtue of his fact-determining power, the Secretary of War could change the rule of law, and determine that obstructive bridges could be authorized, and that he could issue a permit for that purpose. Similarly, in the other cases cited where Congress approved the general rule that articles below a certain standard or of a certain nature should be prohibited, and left the fact-determining power to the Secretary of War, or other officer, to determine what articles came within this classification. The court did not say that the administrative officer had power to change the rule and permit such articles to be excluded within his judgment. His sole power in all of these cases was limited to the finding of the facts and the enforcement of the prohibition under the general rule of law that was laid down by Congress. The officer was the mere agent of the law-making department, to ascertain and declare the event or article upon which its expressed will was to take effect.

But here is a different question entirely from that which was decided in the so-called bridge cases and the other cited cases. *Here the general rule of Congress is expressly stated in the first clause of section 10, prohibiting obstructions to navigable capacity.* The broadest construction possible for the third clause is that the Secretary of War shall be the fact-determining administrative officer to decide what shall come within the prohibition of Congress. To construe this clause so as to give the Secretary of War power to change the rule of law that Congress has adopted, and to affirmatively authorize an obstruction to navigable capacity by granting a permit therefor, would be to give that officer law-making power to change the general rule of Congress, and permit obstructions to navigable capacity,—and this in the same section of the statute which prohibits any obstruction to navigable capacity without an affirmative act of Congress. That power necessarily involves legislative determination. It must of necessity require a rule of law to change a rule of law, and especially a rule of law which is in violation of the express law laid down by Congress. That being the case, such a construction of section 10 would involve an unconstitutional delegation of legislative power.

b. Any construction of Section 10 which attempts to confer upon the Secretary of War power to affirmatively authorize obstructions to navigable capacity, would involve a legislative power and thus prove to be an unconstitutional delegation.

Delegation of fact-determining power to prohibit obstructions to navigable capacity does not confer upon the Secretary of War power to give affirmative authority to create obstructions to navigable capacity, whereby property rights of the complainant and others may be invaded and damage inflicted. If any power exists to do this, Congress, legislating on a national basis, is the body which must act to affirmatively authorize obstructions to navigable capacity, and particularly in view of the considerations involved in lowering of levels of the Great Lakes. Accordingly, if the Act of March 3, 1899, be construed to confer upon the Secretary of War this power, it is tantamount to conferring upon that administrative, appointive officer the power to "regulate commerce with foreign nations and among the several states" which has been exclusively delegated by the people to Congress.

It is the theory of our government that all power ultimately resides in the people; that governments derive their just powers from the consent of the governed; that the Constitution of the United States outlined the framework of the national government; that this Constitution was framed by representatives of the people and at least submitted to the people for adoption. The power then which all public officers of the national government exercise, is power delegated to them by the people, through the Constitution. The legislative power delegated to the Congress of the United States by the Constitution is power derived from the people themselves. There is no direct declaration in the Constitution of the United States of a division of powers, but the Constitution does provide:

a. That all legislative power herein granted shall be vested in the Congress of the United States which shall consist of a Senate and a House of Representatives;

b. All executive power is vested in the President of the United States; and

c. All judicial power is vested in the Supreme Court of the United States and such other courts as Congress may from time to time establish.

Congress, by Article I, Section 8, clause 3, of the Constitution, had granted to it the power to regulate commerce, and this power carried with it the power to regulate navigation. The precise question involved is whether, under Section 10 of the Rivers and Harbors Act of March 3, 1899, the Secretary of War has the power delegated to him to lower the level of the Great Lakes by diverting the water therefrom, and this involves the question whether the power exercised by the Secretary of War in its purposes, objects, and results, is a power to regulate commerce or a mere executive power to carry into effect the law framed by Congress.

The lowering of the level of the Great Lakes is an accomplished fact. It occurred by reason of the exercise of the power by the Secretary of War to permit the diversion of the water from the Great Lakes. The lowering of the level of the waters of the Great Lakes is an invasion of the sovereign rights of an adjacent friendly government and might become a just cause for war. It is a violation of the international obligations of the United States with a foreign friendly government consummated by a treaty entered into between the respective sovereignties, and the violation of such international obligation would be a just cause for war.

The lowering of the level of the waters of the Great Lakes constitutes an obstruction to navigation and that navigation is navigation used and essential to be used in foreign and interstate commerce, the power to regulate which is vested in the Congress of the United States. The power to lower the level of the waters of the Great Lakes or to authorize their lowering, to violate the international obligations of the United States and to interfere with and obstruct intrastate, interstate and foreign commerce is a power necessarily *legislative* in character. It has to do with the policy of the United States government toward commerce and foreign nations. It is the determination of a matter of national policy which requires consideration and deliberation. The power, being legislative in character, is such a power as is held in trust by the Congress of the United States for the benefit of all of the people. These powers of government, held in trust by the Congress of the United States under the constitution, cannot be abdicated. The Congress of the United States cannot delegate its legislative power without destroying the very foundation of constitutional government. If it may do so, then the proposition is reduced substantially to this,—that the people, in their sovereign capacity, who have delegated the legislative power of the government of the United States to Congress and fixed and prescribed the body which should exercise that power, may be thwarted, and Congress which is the trustee of that power, may abdicate its trust, delegate its power, and defeat the will of the people themselves.

The power which has been exercised in this case necessarily involves the exercise of *legislative* power, the consideration and determination of matters of *public policy*, and is of such a nature as may not be delegated by the Congress of the United States to the Secretary of War.

> United States vs. Chandler-Dunbar Co. 229 U. S. 53;
> Southern Pacific Co. vs. Olympian Co. 260 U. S. 205;
> Monongahela Bridge Co. vs. United States, 216 U. S. 177;
> Philadelphia Co. vs. Stimson, 223 U. S. 605;
> Scranton vs. Wheeler, 179 U. S. 141;
> West Chicago Street R. R. Co. vs. Chicago 201 U. S. 506.

(12) THE PERMIT OF MARCH 3, 1925, FROM THE SECRETARY OF WAR, DOES NOT JUSTIFY THE ABSTRACTION OF THESE WATERS FROM LAKE MICHIGAN BY DEFENDANTS, AS AGAINST THE STATE OF MICHIGAN.

(a) This permit is but an expression of assent.

This permit does not affirmatively appropriate the water of the Great Lakes to the Chicago drainage canal, as against the State of Michigan, complainant. It will be observed that this abstraction does not involve the taking of these waters *for the Federal Government,* nor for any of its purposes,—but by a sister state and for one of its municipal creatures. At most the permit is a mere waiver by the Federal government (if any waiver could be made by the Secretary of War) of any objection on the government's part to the diversion of such an amount of water as would not constitute an obstruction to navigation.

A construction of the permit in view of section 10 of the Act of March 3, 1899, shows that it is limited to giving federal "consent". Its purpose is to express "prospectively" the *limit beyond which an abstraction of water cannot be made,* instead of authorizing an obstruction to navigation. The permit is an expression of *limitation,* rather than *a grant of power.*

The first condition of the permit provides:

> "That there shall be no unreasonable interference with navigation by the work herein authorized."

From this it is evident that the Secretary of War did not intend nor contemplate the authorization of any abstraction which would be an obstruction to the navigable capacity of the waters of the Great Lakes. The permit must be construed as authorizing the diversion of only so much of the waters as would not obstruct their navigable capacity. In short, it meant simply this,—providing you do not obstruct navigable capacity, you shall not exceed the maximum of the permit.

The permit also contains the following note:

> "NOTE:—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See Cummings v. Chicago, 188 U. S. 410.)

From the language of the note to the permit it will be observed that the administrative construction placed upon this permit by the Secretary of War, is:

> "It merely expresses the assent of the federal government so far as concerns the public rights of navigation",

beyond that it cannot and does not go. The principal decided in Cummings v. Chicago, 188 U. S. 410, and Montgomery v. Portland (190 U. S. 89) was that the authority of a state to prohibit the erection without its permission, of a structure in a navigable river wholly within its limits, was not superseded by the provisions of the Act of Congress of March 3, 1899. In that case the court said:

> "Whether Congress may, against or without the expressed will of a State, give affirmative authority to private parties to erect structures in such waters, it is not necessary in this case to decide. It is only necessary to say that the act of 1899 does not manifest the position of Congress to go to that extent under the power to regulate foreign and interstate commerce, and thereby to supersede the original authority of the States."

Cummings v. Chicago, 188 U. S. 410.

As a corollary to that principle, applied in the instant case, where the "structure" is one that is *not* wholly within one state, but consists in a diversion of water, which, directly affects another adjoining state, the authority of such adjoining state is a prerequisite to a *taking* of its property in its water and was not intended to be superseded by the Act of March 3, 1899. The reason supporting the rule necessitating "state assent" in the one case equally supports it in the other. Why should there be any difference in the application of this principle in a case of interstate waters, from its application in a case of intrastate waters? To say that there is a difference is to say that a state may do with impugnity as against another state the same act which would be unlawful where its own rights were involved. In short, the term "state assents" means "assent by the State directly concerned in the *effect* of the particular work."

(b) *Being but a revocable license this permit cannot justify the invasion of property rights.*

Even assuming its validity under section 10 of the Act of March 3, 1899, this permit is a revocable license.

> "After this statute was passed the Secretary of War granted various permits, which are relied on by the appellant, although in their nature they all were revocable licenses."

Sanitary District v. United States, 266 U. S. 405, 429.

> "The Secretary of War could neither create nor wipe out a legal cause of action."

Corrigan Transportation Co. vs. Sanitary District, (125 Fed. 611.)

A revocable license cannot be construed as a donation of property rights. The federal government may have foreclosed itself to object, but it is no defense to an action for invasion of complainant's right, as a quasi sovereign, *parens patriae,* and proprietary owner of bed and banks of the Great Lakes, its parks and other property, to say that the State of Michigan's property rights have been taken or damaged because the federal government has waived its right to object. Such a permit gives no authority to inflict damage upon complainant, nor to do the act described in the permit in such a way as to invade the property rights of complainant.

In Baltimore and Potamac v. Baptist Church, 108 U. S. 317, 227 L. Ed. 379, it is said:

> "It needs no citation of authorities in support of the proposition that the grant of powers by the legislature to do certain things does not carry with it any immunity for private injuries which may result directly from the exercise of those powers and privileges."

In support of the same principle see:

Hubbard v. Fort, 188 Fed. 987;
Wilson v. Hudson County Water Co., 76 N. J. Eq. 543;
Cobb v. Comm. of Lincoln Park, 202 Ill. 427;

Attorney General ex rel Becker v. Bay Boom Co., 172 Wis. 363, 376;
International Bridge Co. v. New York, 254 U. S. 126, 132;
In Re Crawford County L. & D. Dist., 182 Wis. 404, 412;
Commonwealth v. Penn. Railroad Co., 72 Penn. Super. Ct. 353.

III.

THE DIVERSION AND ABSTRACTION OF WATER FROM LAKE MICHIGAN BY DEFENDANTS CONSTITUTES A TAKING OF COMPLAINANT'S PROPERTY WITHOUT JUST COMPENSATION IN VIOLATION OF THE FIFTH AND FOURTEENTH AMENDMENTS OF THE FEDERAL CONSTITUTION.

(Exceptions Nos. 21, 23, 24, 25, 27, 28, 29, 31, 35, 37, 38 and 39 relate to this subject.)

1. *The exercise of power by Congress over navigation is subject to the limitation of the fifth amendment.*

The power of Congress to regulate commerce among the several states and with foreign nations must be exercised by it in strict subordination to the Constitution of the United States, which is the measure of the power which Congress has had delegated to it by the people of the United States.

Gibbons v. Odgen, 9 Wheat. 196;
Cooley v. Port Wardens, 12 How. 310;
Councilman v. Hitchcock, 142 U. S. 547;
Interstate Commerce Comm. v. Brimstone, 154 U. S. 447;
United States v. Joint Traffic Association, 171 U. S. 503;
Dooley Case, 188 U. S. 321;
O'Neil v. Vermont, 144 U. S. 323;
Potapsco Guano Co. v. No. Carolina, 171 U. S. 345.

The constitutional limitation upon the exercise of the power of Congress over *navigation* requires just compensation.

> Monongahela Navigation Co. v. United States, 148 U. S. 312, 37 L. Ed. 463;
> Scranton v. Wheeler, 179 U. S. 141, 45 L. Ed. 126;
> United States v. Lynah, 188 U. S. 445, 47 L. Ed. 539;
> United States v. Cress, 243 U. S. 316, 61 L. Ed. 746.

In Monongahela Navigation Company v. United States, 148 U. S. 312, 336, 37 L. Ed. 463, 471, it is said:

> "But like the other powers granted to Congress by the Constitution, the power to regulate commerce is subject to all the limitations imposed by such instrument, and among them is that of the 5th amendment, we have heretofore quoted. Congress has supreme control over the regulation of commerce, but if in exercising that supreme control, it deems it necessary to take private property, then it must proceed subject to the limitations imposed by this 5th amendment, and can take only on payment of just compensation."

In Scranton v. Wheeler, 179 U. S. 141, 153, 45 L. Ed. 126, 133, it is said:

> "Undoubtedly compensation must be made or secured to the owner when that which is done is to be regarded as a taking of private property for public use within the meaning of the 5th Amendment of the Constitution; and of course in its exercise of the power to regulate commerce Congress may not override the provision that just compensation must be made when private property is taken for public use."

In United States v. Lynah, 188 U. S. 445: 47 L. Ed. 539, it is said:

> "It is contended that what was done by the government was done in improving the navigability of a navigable river, that it is given by the constitution full control over

> such improvements, and that if in doing any work therefor injury results to riparian proprietors or others, it is an injury which is purely consequential, and for which the government is not liable. But if any one proposition can be considered as settled by the decisions of this court it is that, although in the discharge of its duties the government may appropriate property, it cannot do so without being liable to the obligation cast by the 5th Amendment of paying just compensation."

In United States v. Cress, 243 U. S. 316, 61 L. Ed. 746, it is said:

> "As the court said, speaking by Mr. Justice Brewer, in United States v. Lynah, 188 U. S. 445, 470, 47 L. Ed. 539, 548, 23 Sup. Ct. Rep. 349: 'Where the government by the construction of a dam or other public works so flood lands belonging to an individual as to substantially destroy their value, there is a taking within the scope of the 5th Amendment. While the government does not directly proceed to appropriate the title, yet it takes away the use and value; when that is done it is of little consequence in whom the fee may be vested.'"

2. *The State of Michigan has a quasi-sovereign right over the land and water of the Great Lakes and their connecting rivers within its boundaries, and as a sovereign is the parens patriae.*

(A) *By treaty of peace Great Britain surrendered all rights to land and water within the United States.*

Upon the ratification and promulgation of the definitive treaty of peace between Great Britain and the United States in 1783, Great Britain surrendered to the United States all of her sovereign, proprietary and territorial rights in and to all of the land and water within the recognized external territorial boundaries of the United States, and all of those rights at once vested in the people of the several states in whom sovereignty resided.

Johnson v. McIntosh, 8 Wheat. 543, 584;
Manchester v. Commonwealth of Mass., 139 U. S. 266;
Martin v. Waddell, 16 Pet. 367;
Shively v. Bowlby, 152 U. S. 1;
Wheeler v. Smith, 9 How. 55, 78.

It was said by Chief Justice Marshall in Johnson v. McIntosh, 8 Wheaton 543, 584; 5 L. Ed. 681, 691:

> "By the treaty which concluded the war of the revolution, Great Britain relinquished all claim, not only to the government, but to the 'proprietary and territorial rights of the States,' whose boundaries were fixed in the second article. By this treaty, the powers of government, and the right to soil, which had previously been in Great Britain, passed definitively to these states. * * * * It has never been doubted, that either the United States, or the several states, had a clear title to all the lands within the boundary lines described in the treaty, subject only to the Indian right of occupancy, and that the exclusive power to extinguish that right was vested in that government which might constitutionally exercise it."

In Manchester v. Commonweath of Mass. 139 U. S. 266; 35 L. Ed. 159, it is said:

> "By the definitive Treaty of Peace of September 3, 1783, between the United States and Great Britain (8 Stat. 81), His Britannic Majesty acknowledged the United States of which Massachusetts Bay was one, to be free, sovereign and independent states, and declared that he treated with them as such, and, for himself, his heirs and successors, relinquished all claims to the government, proprietary and territorial rights of the same and every part thereof. * * *"

In Martin v. Waddell, 16 Peters, 367; 10 L. Ed. 997, the Court by Chief Justice Taney said:

> "When the Revolution took place the people of each state became themselves sovereign; and in that character

> hold the absolute right to all their navigable waters and the soils under them for their own common use, subject only to the rights since surrendered by the Constitution to the general government."

In Shively v. Bowlby, 152 U. S. 1; 38 L. Ed. 331, it is said:

> "And upon the American Revolution all the rights of the Crown and of Parliament vested in the several states, subject to the rights surrendered to the national government by the Constitution of the United States."

In Wheeler v. Smith, 9 Howard 55, 78; 13 L. Ed. 44, 54, it is said:

> "When this country achieved its independence, the prerogatives of the crown devolved upon the people of the States. And this power ~~still~~ remains with them, except so far as they have delegated a portion of it to the federal government. The sovereign will is made known to us by legislative enactment. And to this we must look in our judicial action, instead of the prerogatives of the crown. The State, as a sovereign, is the *parens patriae.*"

(B) *Upon admission into the Union, Michigan succeeded to all of these rights.*

After the ratification and promulgation of the provisional and definitive treaties of peace by which Great Britain surrendered her proprietary, territorial and governmental rights and powers to the several states, and prior to the adoption of the constitution of the United States, the several interested states ceded to the Congress of the United States their respective rights and claimed rights to the territory now embraced within the external territorial boundaries of the State of Michigan; and the Congress of the United States, after such cession of territory to it by the several states interested therein, adopted the Ordinance of 1787 for the government of the territory northwest of the Ohio River, providing however, that certain states might be created out of said territory, and when such states so created had sufficient population that they might be admitted into the union upon an equal footing with the original states in all respects whatever.

(1) *All States are admitted upon an equal footing.*

(a) *By Settled Principle.*

In 1 Nichols on Eminent Domain, Par. 7, it is said:

> "When the people of the American colonies became independent of Great Britain, each colony became a sovereign state, and by the mere fact of sovereignty assumed absolute control over the persons and property within its jurisdiction. To each state passed all the powers of king and parliament, to be exercised as the people of the state saw fit. The states which were created later had the same powers except as they were limited by the United States Constitution. The territories derive their powers from the enabling acts of congress, and under general grants of governmental power may exercise the customary features of sovereignty such as eminent domain, but the new states on being admitted to the union came in with all the sovereign powers of the old ones.
>
> Each one of the United States, by the mere fact of its being sovereign, has therefore complete and unqualified control over the persons and property within its jurisdiction, deducting only the powers granted to the United States and the powers it is forbidden to exercise by the constitution of the United States."

In Pollard v. Hagan, 44 U. S. 212: 11 L. Ed. 565, it is said:

> "When Alabama was admitted into the Union, on an equal footing with the original states, she succeeded to all the rights of sovereignty, jurisdiction, and eminent domain which Georgia possessed at the date of the cession, except so far as this right was diminished by the public lands remaining in the possession and under the control of the United States, for the temporary purposes provided

> for in the deed of cession, and the legislative acts connected with it. Nothing remained to the United States, according to the terms in the agreement, but the public lands. * * * Alabama is therefore entitled to the sovereignty and jurisdiction over all the territory within her limits, subject to the common law, to the same extent that Georgia possessed it before she ceded it to the United States. To maintain any other doctrine is to deny that Alabama has been admitted into the Union on an equal footing with the original States, the constitution, laws, and compact, to the contrary notwithstanding. * * * Then to Alabama belong the navigable waters, and soils under them, in controversy in this case, subject to the rights surrendered by the Constitution to the United States."

In Shively v. Bowlby, 152 U. S. 1: 38 L. Ed. 331, it is said:

> "The new states admitted into the Union since the adoption of the constitution have the same rights as the original states in the tide waters, and in the lands below the high water mark, within their respective jurisdictions."

In Kansas v. Colorado, 206 U. S. 46, 95, the court said:

> "But when the States of Kansas and Colorado were admitted into the Union they were admitted with the full powers of local sovereignty which belonged to other states."

In Port of Seattle v. Oregon & Wash, R. R. Co. 255, U. S. 56; 65 L. Ed. 500, suit was brought to quiet title of the State of Washington in tide lands. The court said:

> "The right of the United States in the navigable waters within the several states is limited to the control thereof for purposes of navigation. Subject to that right Washington became, upon its organization as a state, the owner of the navigable waters within its boundaries and of the land under the same. Weber v. State Harbor Comrs., 18 Wall 57, 21 L. Ed. 798. By paragraph 1 of

article 17 of its Constitution the state asserted its ownership in the bed and shore 'up to and including the line of ordinary high tide in waters where the tide ebbs and flows.' The extent of the state's ownership of the land is more accurately defined by the decisions of the highest court, as being the land below high water mark, or meander line, whichever of these lines is the lower. The character of the state's ownership in the land and in the waters is the full proprietary right."

To the same effect see:

> Munn vs. Illinois, 94 U. S. 113, 124;
> Hardin vs. Shedd, 190 U. S. 508, 519.

(b) *By the Ordinance of 1787,*

Article V of the Ordinance of 1787 for the government of the territory of the United States northwest of the Ohio River, provides:

> "There shall be formed in the said territory not less than three, nor more than five states; * * * * * * * * * *
> And whenever any of the said states shall have sixty thousand free inhabitants therein, such state shall be admitted, by its delegates, into the congress of the United States, on an equal footing with the original states in all respects whatever; and shall be at liberty to form a permanent Constitution and state government: Provided, the Constitution and government so to be formed shall be republican, and in conformity to the principles contained in these articles; and, so far as it can be consistent with the general interests of the confederacy, such admission shall be allowed at an earlier period, and when there may be a less number of free inhabitants in the state than sixty thousand."

Section 2 of the Act of Congress approved June 15th, 1836, entitled "An act to establish the northern boundary line of the state of Ohio, and to provide for the admission of the state of Michigan into the Union, upon the conditions therein expressed," provides among other things:

> "And be it further enacted, That the Constitution and state government which the people of Michigan have formed for themselves be, and the same is hereby accepted, ratified and confirmed, and that the said state of Michigan shall be and is hereby declared to be one of the United States of America, and is hereby admitted into the Union upon an equal footing with the original states, in all rerpects whatever."

From the foregoing authorities it is clear that equality of the several states in the American Union is a fundamental principle of American Constitutional law, without which the union as it now exists could not long endure. Equality has as its basis the principle always recognized and freely declared that each of the several states, upon its admission into the union, became, was and continues to be the equal of every other state.

The State of Michigan, therefore, has all of the rights and powers of a national, independent sovereign state, over all of the land and water area within its external territorial confines.

3. *Sovereign states own all of the land and water within their boundaries as against any other state.*

Every sovereign, independent state under the settled principles of international law, to which the United States is committed, and has always avowed adherence, owns and controls, as against all other independent sovereign states, all of the real and personal property within the confines of its external territorial boundaries, even though such property is not held by public ownership, but in private ownership, and is directly controlled by private individuals as distinguished from public corporations. This is the right of eminent domain of the state.

Davis International Law, Par. 13.
15 Ruling Case Law, p. 109.
Taylor International Law, Chapt. III, p. 263.
1 Halleck International Law, Chapt. VI, Par. 13.
Hall, International Law, 5th ed., Chapt. 11, p. 100.
Glenn, International Law, Par. 34, p. 45.
Wheaton, International Law, Chapt. IV, p. 217.
1 Hyde, International Law, p. 272.
Wilson, International Law, p. 78.
1 Oppenheim International Law, 3d Ed. Par. 172.
Vattel, Law of Nations, Book II, Chap. VII.
16 Am. & Eng. Ency. of Law, 2nd Ed. 1133.
1 Cooley, Constitutional Limitations, 8th Ed. p. 4.
Church v. Hubbart, 2 Cranch 187, 234: 2 L. Ed. 249, 264.
United States v. Smiley, et al., 27 Fed. 1132; Case No. 16317.
In the Paquete Habana 175 U. S. 679; 44 L. Ed. 321.
Mayor of New York vs. Miln, 11 Pet. 102, 139; 9 L. Ed. 648.
Hudson County Water Co. vs. McCarter, 209 U. S. 349; 52 L. Ed. 828.
33 Corpus Juris 404.
Georgia v. Tenn. Copper Co. (206 U. S. 230); 51 L. Ed. 1038.
North Dakota vs. Minnesota (263 U. S. 342); 68 L. Ed. 365.

In Taylor, International Law, Chapt. III, p. 263, it is said:

> "A state as a corporate person may possess property, movable and immovable, either within its own limits or beyond them. The territorial property of a state consists of all the land and water within its geographical boundaries including all rivers, lakes, bays, gulfs and straits lying wholly within them. As incidents to such territorial possessions must be added a state's jurisdiction over its marginal waters when its territory abuts upon the sea, and the right of its people to navigate such rivers as form boundaries between two or more states, or such as rising within one state traverse the territories of others on their way to the sea. The legal title to such territorial property may rest either upon (1) prescriptions, (2) conquest, (3) occupation, (4) accretion, or (5) cession."

In Hall, International Law, 5th Ed., Chapter II, p. 100, it is said:

> "The territorial property of a state consists in the territory occupied by the state community and subjected to its sovereignty, and it comprises the whole area, whether of land or water, included within definite boundaries ascertained by occupation, prescription, or treaty, together with such inhabited or uninhabited lands as are considered to have become attendant on the ascertained territory through occupation or accretion, and, when such area abuts upon the sea, together with a certain margin of water."

In Halleck's International Law, Chapter VI, Par. 13 it is said:

> "National territory consists of water as well as land. The maritime territory of every State extends to the ports, harbors, bays, mouths of rivers, and adjacent parts of the sea enclosed by headlands belonging to the same State. Within these limits, its rights of property and territorial jurisdiction are absolute, and exclude those of every other State."

In Church v. Hubbart, 2 Cranch 187, 234; 2 L. Ed. 249, 264, it is said,—

> "The authority of a nation within its own territory is absolute and exclusive."

In United States v. Smiley et al., 27 Fed. Cases, p. 1132, Case No. 16317, Mr. Justice Field said,—

> "Wheaton, in his treatise on International Law, after observing that 'the maritime territory of every state extends to the ports, harbors, bays, and mouths of rivers and adjacent parts of the sea enclosed by headlands, belonging to the same state' says, 'The general usage of nations superadds to this extent of territorial jurisdiction a distance of a marine league, or as far as a cannon-shot will

> **reach from the shore, along all the coasts of the state. Within these limits its rights of property and territorial jurisdiction are absolute, and exclude those of every other nation.'"**

In The Paquete Habana, 175 U. S. 679; 44 L. ed. 321, it is said,—

> "International law is part of our law, and must be ascertained and administered by the courts of justice of appropriate jurisdiction as often as questions of right depending upon it are duly presented for their determination. For this purpose, where there is no treaty and no controlling executive or legislative act or judicial decision, resort must be had to the customs and usages of civilized nations, and, as evidence of these, to the works of jurists and commentators who by years of labor, research, and experience have made themselves peculiarly well acquainted with the subjects of which they treat. Such works are resorted to by judicial tribunals, not for the speculations of their authors concerning what the law ought to be, but for trustworthy evidence of what the law really is. *Hilton v. Guyot,* 159 U. S. 113, 163, 164, 214, 215, 40 L. ed. 95, 108, 125, 126, 16 Sup. Ct. Rep. 139."

In Georgia v. Tenn. Copper Co., 206 U. S. 230; 51 L. Ed. 1038, it is said:

> "The State has an interest independent of and behind the title of its citizens, in all the earth and air within its domain."

The settled principles of international law are a part of the law of the land, and the State of Michigan not only has the right, but it is its duty to invoke its binding force for the protection of its rights and the rights of its people from invasion, injury and destruction by the State of Illinois and the Sanitary District of Chicago.

Glenn's International Law, par. 34, p. 45;
Wheaton's International Law, Chap. IV, p. 217;
1 Hyde International Law, 272;
Wilson International Law, 78;
1 Oppenheim International Law, 3rd Ed. par. 172;
Vattel Law of Nations, Book 2, Chapter 7;
16 Am. and Eng. Encyc. of Law, 2nd Ed. 1133;
1 Cooley's Const. Lim. 8th Ed. p. 4;
Mayor of N. Y. vs. Miln, 11 Pet. 102;
Hudson County Water Co. vs. McCarter, 209 U. S. 349;
33 Corpus Juris, 404.

4. *The State of Michigan has proprietary rights as a riparian owner in the land and waters within its boundaries.*

Independent of the settled principles of international law, the terms of the treaty outstanding in force between the United States and Great Britain, and the doctrine of equality between the states in the American union, which lies at the foundation of our system of constitutional government, there exist certain proprietary rights on the part of the State of Michigan in the land and waters within its boundaries.

A. *The State of Michigan has the authority to determine for itself such rules of property as it shall deem expedient with respect to waters within its boundaries, both navigable and non-navigable, and the ownership of the lands forming their beds and banks.*

The question whether such ownership is in the State or in some private riparian proprietor is one of local law in each state.

Hardin v. Jordan, 140 U. S. 384;
Shively v. Bowlby, 152 U. S. 1;

Scott v. Lattig, 227 U. S. 229;
Archer v. Greenville Sand & Gravel Co. 233 U. S. 60;
Port of Seattle v. Oregon & Washington R. Co. 225 U. S. 56;
United States v. Holt State Bank, 270 U. S. 49;
Appleby v. New York, 271 U. S. 365;
Barney v. Keokuk, 94 U. S. 324;
United States v. Cress, 243 U. S. 316, 319.

In Shively v. Bowlby, 152 U. S. 1: 38 L. Ed. 331, suit was brought to quiet the title to submerged lands in the city of Astoria, Oregon. The court said,—

> "The common law of England upon this subject, at the time of the emigration of our ancestors, is the law of this country, except so far as it has been modified by the charters, constitutions, statutes or usages of the several colonies and states, or by the Constitution and laws of the United States."

In Scott v. Lattig et al., 227 U. S. 229: 57 L. Ed. 490, suit was brought to quiet title to an island in the Snake River in Idaho. The court said,—

> "It was settled long ago by this court, upon a consideration of the relative rights and powers of the Federal and state governments under the Constitution, that lands underlying navigable waters within the several states belong to the respective states in virtue of their sovereignty, and may be used and disposed of as they may direct, subject always to the rights of the public in such waters and to the paramount power of Congress to control their navigation so far as may be necessary for the regulation of commerce among the states and with foreign nations, and that each new state, upon its admission to the Union, becomes endowed with the same rights and powers in this regard as the older ones."

In United States v. Holt State Bank, 270 U. S. 49: 70 L. Ed. 465, suit was brought to quiet title to certain real estate and enjoin the assertion of an adverse claim. The controversy arose over whether a shallow lake constituted navigable water or was swamp land. The court said,—

> "It is settled law in this country that lands underlying navigable waters within a state belong to the state in its sovereign capacity and may be used and disposed of as it may elect, subject to the paramount power of Congress to control such waters for the purposes of navigation in commerce among the states and with foreign nations, and subject to the qualification that where the United States, after acquiring the territory and before the creation of the state, has granted rights in such lands by way of performing international obligations, or affecting the use or improvement of the lands for the purposes of commerce among the states and with foreign nations, or carrying out other public purposes appropriate to the objects for which the territory was held, such rights are not cut off by the subsequent creation of the state, but remain unimpaired, and the rights which otherwise would pass to the state in virtue of its admission into the Union are restricted or qualified accordingly. Barney v. Keokuk, 94 U. S. 324, 338, 24 L. Ed. 224, 228; Shively v. Bowlby, 152 U. S. 1, 47, 48, 57, 58, 38 L. Ed. 331, 348, 349, 352, 14 Sup. Ct. Rep. 548; Scott v. Lattig, 227 U. S. 229, 242, 57 L. Ed. 490, 496, 44 L. R. A. (N. S.) 107, 33 Sup. Ct. Rep. 242; Seattle v. Oregon & W. R. Co., 255 U. S. 56, 63, 65 L. Ed. 500, 506, 41 Sup. Ct. Rep. 237; Brewer-Elliott Oil & Gas Co. v. United States, 260 U. S. 77, 83-85, 67 L. Ed. 140, 144, 145, 43 Sup. Ct. Rep. 60. But, as was pointed out in Shively v. Bowlby, 152 U. S. 49, 57, 58, 38 L. Ed. 349, 352, 14 Sup. Ct. Rep. 548, the United States early adopted and constantly has adhered to the policy of regarding lands under navigable waters in acquired territory, while under its sole dominion, as held for the ultimate benefit of future states, and so has refrained from making any disposal thereof, save in exceptional instances when impelled to particular disposals by some international duty or public exi-

gency. It follows from this that disposals by the United States during the territorial period are not lightly to be inferred, and should not be regarded as intended unless the intention was definitely declared or otherwise made very plain."

B. *The State of Michigan has established the rule that the state is the proprietary owner of the waters of the Great Lakes within its boundaries and of the lands forming their beds and banks.*

The State of Michigan, in the exercise of its sovereign power to determine the ownership of the waters of the Great Lakes, their beds and banks, has established the rule that the title belongs to the State of Michigan outside the meander lines, and that the lands laid bare by a recession of the waters of the Great Lakes do not belong to the riparian proprietors upon such lakes, but belong to the State of Michigan.

Accordingly the State of Michigan has been determined the owner in its sovereign capacity, of all submerged lands beneath the waters of the Great Lakes (not ceded to private ownership) in trust for the public; also the banks of the Great Lakes outside of the meander lines which mark their low water mark; also twenty-six public parks bordering upon the waters of the Great Lakes in addition to Mackinac Park; (a public park ceded to the State of Michigan by the United States government); also the wharves, piers, docks and landing places at St. Ignace and Mackinaw City used in connection with its state owned and operated ferries which ply across the straits of Mackinaw between St. Ignace and Mackinaw City, as a part of its highway system and transportation; also the land laid bare by the recession of the rivers connecting the Great Lakes belonging to the riparian owners; also the right, usufructuary in character, but firmly established and universally recognized by law,—to have the waters of the Great Lakes, and of the connecting water-ways between the same, maintained in the natural and normal level, subject only to the reasonable use thereof by other proprietors.

1. *In Michigan the title to riparian property outside the meander line on the Great Lakes is held in trust by the State for the use of its citizens.*

Ainsworth v. Munoskong Hunting & Fishing Club, 159 Mich. 61.
State v. Venice of America Land Co., 160 Mich. 680.
Kavanaugh v. Rabior, 222 Mich. 68.
Kavanaugh v. Baird, 241 Mich. 240 (decided Jan. 3, 1928).

In Ainsworth v. Munoskong Hunting & Fishing Club, 159 Mich. 61, plaintiffs filed a bill to restrain defendant from interfering with their right to hunt on Munoskong Bay. The court held that this bay was a part of Lake Huron rather than of the Sault Ste. Marie river. The court said,—

> "It is the established law of this State that riparian owners along the *Great Lakes own only to the meander line,* and that title outside this meander line, subject to the rights of navigation, is held in trust by the State for the use of its citizens. Among these is the common right to fish and [illegible]. *La Plaisance Bay Harbor Co. v. City of Monroe,* Walk. Ch. (Mich.) 155; *People v. Silberwood,* 110 Mich. 106 (67 N. W. 1087, 32 L. R. A. 694); *People v. Warner,* 116 Mich. 228 (74 N. W. 705); *State v. Shooting Club,* 127 Mich. 580 (87 N. W. 117); *Lincoln v. Davis,* 53 Mich. 375 (19 N. W. 103, 51 Am. Rep. 116). In these cases, and others cited therein, the subject has been fully discussed, and further discussion here would be unprofitable."

In State v. Venice of America Land Co., 160 Mich. 680, the state successfully maintained a bill to enjoin defendants from taking possession of, platting and selling certain lands. It is said, —

> "The condition of this territory when the State was admitted into the Union is the condition which must control. That the State of Michigan holds these lands in trust for the use and benefit of its people—if we are correct in our conclusion—cannot be doubted. The State holds the title in trust for the people for the purposes of navigation, fishing, etc. It holds the title *in its sovereign capacity*. *People v. Silberwood,* 110 Mich. 103 (67 N. W. 1087, 32 L. R. A. 694; *State v. Fishing & Shooting Club,* 127 Mich. 580 (87 N. W. 117).
>
> "An exhaustive discussion of the nature of the State's title to the land beneath the waters of the Great Lakes, and of the question whether any part of such territory can be acquired, as against the State, by adverse possession, will be found in the minority opinion of Justice Hooker in the last above case. It there clearly appears from an abundance of authority that title to submerged lands in the Great Lakes held by the State cannot be divested by adverse possession; it being held in trust for the public, according to the original cession from Virginia and the ordinance of 1787. The late case of *Illinois Steel Co. v. Bilot,* 109 Wis. 418 (84 N. W. 855, 85 N. W. 402, 83 Am. St. Rep. 905), supports this view. *Olds v. Commissioner of State Land Office,* 150 Mich. 134 (112 N. W. 952); *Ainsworth v. Hunting & Fishing Club,* 159 Mich. 61 (123 N. W. 802)."

In Kavanaugh v. Rabior, 222 Mich. 68, 71, it is said,—

> "While it is generally held that the title to lands under rivers and inland lakes belongs to the riparian proprietors, a different rule has been made with reference to the Great Lakes. The Great Lakes have been classed with tide waters, and the same rules applied. *People v. Silberwood,* 110 Mich. 103 (32 L.

R. A. 694); *Ainsworth v. Hunting & Fishing Club,* 159 Mich. 61.

"In the last case cited it was said:

" 'It is the established law of this State that riparian owners along the Great Lakes own only to the meander line, and that title, outside this meander line, subject to the rights of navigation, is held in trust by the State for the use of its citizens.' (citing authorities.)

"The Wisconsin court has reached the same conclusion. Diedrich v. Railway Co., 42 Wis. 248 (24 Am. Rep. 399).

"In *Illinois Cent. R. Co. v. Illinois,* 146 U. S. 387 (13 Sup. Ct. 110), will be found a very learned and exhaustive opinion on this question by Mr. Justice Field, and he therein reaches the conclusion that the states bordering on the Great Lakes own the title of the land in trust which is covered by their waters."

In Kavanaugh vs. Baird, 241 Mich. 240, 245, (decided Jan. 3, 1928), it was said:

> "This court, irrespective of what other courts have held, and irrespective of what text writers have said, is committed to the trust doctrine as applied to lake bottom lands in the Great Lakes."

2. *The State of Michigan has a right of dockage upon the Great Lakes and connecting waters as riparian owner and also as representative of its people.*

The State, in its proprietary capacity, is the owner of the parks bordering upon the Great Lakes, without reservation, and also the owner of the docks erected to aid the operation of its ferries running between Mackinaw City and St. Ignace. In its governmental capacity the State is a representative of all riparian proprietors bordering upon the Great Lakes, and the connecting waterways between the same. The State has a right of dockage upon the navigable waters of the Great Lakes, incident to its riparian ownership, and in its governmental capacity is representative of all riparian owners having such right of dockage.

Transport Co. v. Parkersburg, 107 U. S. 707;
Dutton v. Strong, 66 U. S. 23;
Yates v. Milwaukee, 10 Wall. 497;
Kavanaugh v. Baird, 241 Mich. 240;
Rice v. Ruddiman, 10 Mich. 125;
Richardson v. Prentiss, 48 Mich. 88;
Lincoln v. Davis, 53 Mich. 375;
Blodgett & Davis Lumber Co. v. Peters & Morrison, 87 Mich. 498;
People v. Silberwood, 110 Mich. 103;
Commissioner of Highways v. Ludwick, 151 Mich. 498;
Stuart v. Greanyea, 154 Mich. 132;
Walker v. Shepardson, 4 Wis. 486;
Delaplaine v. Chicago and Northwestern Railway Company, 42 Wis. 214; 24 A. R. 386;
Madison v. Mayers, 97 Wis, 399; 73 N. W. 43, 40 L. R. A. 637;
Miller v. Mendenhall, 43 Minn. 95; 44 N. W. 1141, 8 L. R. A. 89, 19 Am. St. Rep. 219;
Mobile Dry Dock Co. v. Mobile, 146 Ala. 198;
Ladies' Seaman's Friends Society v. Halstead, 58 Conn. 144;
Norfolk City v. Cooke, 27 Gratt. 430;
Alexandria & F. R. Co. v. Faunce, 31 Gratt. 761;
Buffalo v. Delaware, L. & W. R. Co., 39 N. Y. Supp. 4;
Saunders v. N. Y. C. & H. R. R. Co., 54 N. Y. Supp. 364;
Deering v. Proprietors of Long Wharf, 25 Me. 51;
Mather v. Chapman, 40 Conn. 382;
Com. v. Pierce, 2 Dane, Abr. 696;
Clement v. Burns, 43 N. H. 618;
Bell v. Gough, 23 N. J. 624;
N. J. Zinc & I. Co. v. Morris Canal & Bkg. Co., 44 N. J. Eq. 398.

In Transport Co. v. Parkersburg, 107 U. S. 707, it is said:

> "Wharves, levees and landing places are essential to commerce by water, no less than a navigable channel and a clear river."

In Dutton v. Strong, 66 U. S. 35, it is said:

> "Piers or landing places, and even wharves, may be private or they may be, in their nature, public; although the property may be in an individual owner; the owner may have the right to the exclusive enjoyment of the structure and to exclude all other persons from its use. * * * "

In Yates v. Milwaukee, 10 Wall. 497, it is said:

> "But whether the title of the owner of such a lot extends beyond the dry land or not, he is certainly entitled to the rights of a riparian proprietor whose land is bounded by a navigable stream; and among those rights are accesses to the navigable part of the river from the front of his lot, the right to make a landing, wharf or pier, for his own use or for the use of the public, subject to such general rules and regulations as the legislature may see proper to impose for the protection of the rights of the public, whatever those may be."

In Kavanaugh vs. Baird, 241 Mich. 240, 253, it was said:

> "Upon the Great Lakes the right of the riparian owner to erect docks, to wharf out to navigability, is not only valuable to the riparian owner but an absolutely necessary aid to navigation. Without wharves and docks built by riparian owners commerce on the Great Lakes would come to an end."

3. *A different rule prevails in the state of Michigan as to the rights of riparian proprietors upon the navigable rivers.*

Every riparian proprietor upon a navigable river in the state of Michigan, as an incident to his riparian ownership, owns to the middle line or thread of the stream, in the absence of express reservation. This rule applies to the St. Mary's River, the St. Clair River, the Detroit River and the River Rouge.

Lorman v. Benson, 8 Mich. 18;
Rice v. Ruddiman, 10 Mich. 128;
Ryan v. Brown, 18 Mich. 196;
Watson v. Peters, 26 Mich. 508;
Richardson v. Prentiss, 48 Mich. 88;
Bay City Gas Light Co. v. Industrial Works, 28 Mich. 182;
Maxwell v. Bay City Bridge Co., 41 Mich. 466;
Pere Marquette Boom Co. v. Adams, 44 Mich. 403;
Backus v. Detroit, 49 Mich. 110;
Fletcher v. Thunder Bay River Boom Co., 51 Mich. 277;
Webber v. Pere Marquette Boom Co., 62 Mich. 636;
Butler v. Railroad Co., 85 Mich. 255;
Grand Rapids Ice and Coal Co. v. South Grand Rapids Ice & Coal Co., 102 Mich. 227;
People v. Silberwood, 110 Mich. 106;
Scranton v. Wheeler, 113 Mich. 565;
Goff v. Gougle, 118 Mich. 307;
Brown v. Parker, 127 Mich. 392;
Kemp v. Stradley, 134 Mich. 676;
Fuller v. Bilz, 161 Mich. 589;
People v. Grand Rapids Power Co., 164 Mich. 121;
Nedtweg v. Wallace, 237 Mich. 14;
Collins v. Gearhart, 237 Mich. 38;
U. S. v. Chandler-Dunbar Water Power Co., 209 U. S. 444: 52 L. Ed. 880;
G. R. & I. R. R. Co. v. Butler, 159 U. S. 87: 40 L. Ed. 85;
Scranton v. Wheeler, 179 U. S. 133: 45 L. Ed. 133.

5. *These rights as quasi sovereign and as a proprietary owner are property rights of the State of Michigan in the land and waters within its boundaries upon the Great Lakes and their connecting waters.*

a. *Property in its legal conception.*

The idea of property is difficult to define. It was imbedded in the jurisprudence of imperial Rome. Grotius and Puffendorf, writing in the days of colonial expansion and international disputes over distant lands, sought to base the idea on agreement or compact. Blackstone criticises the views of Grotius, Puffendorf, Barbeyrac, Titius and Locke, and insists that the basis of property is occupancy. Blackstone's views have been criticised by Sir Henry Maine, Chief Baron Pollock and others. Herbert Spencer and Lorimer thought property was naturally created by the economic necessity of individual existence. Hegel conceived that it resulted from projecting the individual will over external objects. Von Ihring says, "Property is but the periphery of my person extended to things," and Kohler says, "the totality of a person's proprietary powers constitutes his property."

At the time of the separation of the American colonies from Great Britain the case of *Entick v. Carrington,* 19 Howell's State Trials, 1030, 1066, had been decided. In that case, Lord Chief Justice Camden, speaking for the court, said,—

> "The great end, for which men entered into society, was to secure their property. That right is preserved sacred and incommunicable in all instances, where it has not been taken away or abridged by some public law for the good of the whole. The cases where this right of property is set aside by positive law, are various. Distresses, executions,

> forfeitures, taxes, etc., are all of this description; wherein every man by common consent gives up that right, for the sake of justice and the general good. By the laws of England, every invasion of private property, be it ever so minute, is a trespass."

This may be regarded as an accurate statement of the common law when the colonies severed themselves from the mother country.

Madison, in the tenth Federalist, spoke of "The diversity in the faculties of men, from which the rights of property originate," and he added, "From the protection of different and unequal faculties of acquiring property, the possession of different degrees and kinds of property immediately results."

Individual domination over land was not regarded as important, say Pollock and Maitland, in the early history of English law. Possession, not ownership, was the leading conception.

Gouverneur Morris, in the constitutional convention, said that life and liberty were said to be of more value than property. "An accurate view of the matter would nevertheless prove that property was the main object of society."

John Rutledge expressed the view that property was the principal object of society. Rufus King supported the same doctrine. Charles C. Pinckney spoke of this as "a government instituted for the protection of property." Pierce Butler called it, "A government instituted principally for the protection of property"; and, he "contended vigorously that property was the only just measure of representation." James Wilson did not agree "that property was the sole and primary object of government and society." So important was property regarded, at the time, that the fifth amendment to the federal constitution provides that no one shall be deprived of property without due process of law and just compensation.

The legal conception of property has been considered and defined in many cases.

> Grand Rapids Booming Co. v. Jarvis, 30 Mich. 308;
> 1 Lewis Eminent Domain, 3rd Ed. Par. 63;
> City of St. Louis v. Hill, 116 Missouri, 527;
> Bailey v. People, 190 Ill. 28;
> Chicago and Western Indiana R. R. Co. v. Englewood Connecting Railroad Co., 115 Ill. 375;
> City of Denver v. Bayer, 7 Colo. 113;
> 12 Corpus Juris, 945;
> Buchanan v. Warley, 245 U. S. 71: 62 L. Ed. 149;
> Eaton v. Boston, Concord & Montreal Railroad Company, 51 N. H. 504: 12 Am. Rep. 147;
> Fisher v. Bountiful City, 21 Utah 29;
> Old Colony & Fall River Railway Co. v. County of Plymouth, 14 Gray 155, 161;
> Rice v. Ruddiman, 10 Mich. 145.

In Buchanan v. Warley, 245 U. S. 71: 62 L. Ed. 149, it is said,—

> "Property is more than the mere thing which a person owns. It is elementary that it includes the right to acquire, use, and dispose of it. The Constitution protects these essential attributes of property. Holden v. Hardy, 169 U. S. 366, 391; 42 L. Ed. 780, 790. * * * Property consists of the free use, enjoyment, and disposal of a person's acquisitions without control or diminution save by the law of the land."

In Grand Rapids Booming Co. v. Jarvis, 30 Mich. 308, 319, 320, the court said,—

> "Of what does property practically consist, but of the incidents which the law has recognized as attached to the title, or right of property? Is not

> the idea of property in, or title to lands, apart from, and stripped of all its incidents, a purely metaphysical abstraction, as immaterial and useless to the owner as 'the stuff that dreams are made of?' Is it not a much less injury to him, if it can injure him at all, to deprive him of this abstraction, than of the incidents of property, which alone render ~~it~~ practicably valuable to him? And among the incidents of property in land, or anything else, is not the right to enjoy its beneficial use, and so far to control it as to exclude others from that use, the most beneficial, the one most real and practicable idea of property, of which it is a much greater wrong to deprive a man, than of the mere abstract idea of property without incidents? This use, or the right to control it with reference to its use, constitutes, in fact, all that is beneficial in ownership, except the right to dispose of it; and this latter right or incident would be rendered barren and worthless, stripped of the right to the use. Property does not consist merely of the right to the ultimate particles of matter of which it may be composed,—of which we know nothing,—but of those properties of matter which can be rendered manifest to our senses, and made to contribute to our wants or our enjoyments."

In Hall v. Ionia, 38 Mich. 493, it is said:

> "The ownership of it (use of water) cannot be confined to a right in the nature of a license, and it is as well recognized a title or interest of a real nature as land itself."

In 1 Lewis Eminent Domain, 3rd Ed. Par. 63, it is said,—

> "Property may be defined as certain rights in things which pertain to persons, and which are granted and sanctioned by law. These rights are the right of user, the right of exclusion and the right of disposition."

In City of St. Louis v. Hill, 116 Missouri 527, it is said,—

> "Property then, in a determinate object, is composed of certain constituent elements, to-wit, the unrestricted right of use, enjoyment and disposal of that object."

In Bailey v. People, 190 Ill. 28, it is said,—

> "The term 'property' includes every interest which one may have in anything and everything that is the object of ownership by man, together with the right to freely possess, use, enjoy and dispose of the same."

In Chicago and Western Indiana Railroad Company v. Englewood Connecting Railroad Co., 115 Ill. 375, it is said,—

> "Property itself in a legal sense is nothing more than the exclusive right of possessing, enjoying and disposing of a thing which of course includes the use of a thing."

In City of Denver v. Bayer, 7 Colorado, 113, it is said,—

> "Property * * * is not alone the chattel or the land itself, but the right to freely possess, *use* and alienate the same."

In 12 Corpus Juris, p. 945, it is said,—

> "The right of private property secured by guaranties in the federal and state constitutions, includes the right to acquire, possess, protect, enjoy, and dispose of such property."

In Eaton v. Boston, Concord & Montreal Railroad Company, 51 N. H. 504: it is said,—

"The term 'property,' although in common parlance frequently applied to a tract of land or a chattel, in its legal signification 'means only the rights of the owner in relation to it.' 'It denotes a right * * * * over a determinate thing.' 'Property is the right of any person to possess, use, enjoy, and dispose of a thing.' Seldon J., in *Wynehamer* v. *The People,* 13 N. Y. 378, p. 433; 1 Blackstone Com. 138; 2 Austin on Jurisprudence, 3d ed., 817, 819. If property in land consists in certain essential rights, and a physical interference with the land substantially subverts one of those rights, such interference 'takes,' *pro tanto,* the owner's 'property,' The right of indefinite user (or of using indefinitely) is an essential quality or attribute of absolute property, without which absolute property can have no legal existence. 'Use is the real side of property.' This right of user necessarily includes the right and power of excluding others from using the land. See 2 Austin on Jurisprudence, 3d ed., 836; Wells, J., in Walker v. O. C. W. R. R., 103 Mass. 10, p. 14. From the very nature of these rights of user and of exclusion, it is evident that they cannot be materially abridged without, *ipso facto,* taking the owner's 'property.' If the right of indefinite user is an essential element of absolute property or complete ownership, whatever physical interference annuls this right takes 'property,'—although the owner may still have left to him valuable rights (in the article) of a more limited and circumscribed nature. He has not the same property that he formerly had. Then, he had an unlimited right; now, he has only a limited right. His absolute ownership has been reduced to a qualified ownership.

"If, on the other hand, the land itself be regarded as 'property,' the practical result is the same. The purpose of this constitutional prohibition cannot be ignored in its interpretation. The framers of the constitution intended to protect rights which are worth protecting; not mere empty titles, or barren insignia of ownership, which are of no substantial value. If the land, 'in its corporeal substance and entity,' is 'property,' still, all that makes this property of any value is the aggregation of rights or qualities which the law annexes as incidents to the ownership of it. The constitutional prohibition must have been intended to protect all the essential elements of owner-

> ship which make 'property' valuable. Among these elements is, fundamentally, the right of user, including, of course, the corresponding right of excluding others from the use. See Comstock, J., in *Wynehamer* v. *The People*, 13 N. Y. 378, p. 396.

In Fisher v. Bountiful City, 21 Utah 29, it is said,—

> "The right to own property carries with it the right to exercise dominion and control over it. When the dominion, control, and management of one's property is taken away from him, the right to private property is violated. To take away the dominion and control over property is to take the property itself, for the absolute right to property includes the right of dominion, control, and the management thereof."

In Old Colony & Fall River Railway Co. v. County of Plymouth, 14 Gray 155 to 161, Justice Shaw said,—

> "The word 'property' in the tenth article of the bill of rights, which provides that whenever the public exigencies require that the property of an individual should be appropriated to public uses, he shall receive compensation therefor, should have such a liberal construction as to include every valuable interest which can be enjoyed as property and recognized as such."

B. *The State of Michigan as a sovereign, as parens patriae and in its proprietary capacity, has definite property rights in the waters of Lake Michigan, its bed and banks.*

The State of Michigan in its proprietary capacity as the owner of all of the land outside of the meander lines along the Great Lakes and between such meander lines and its external territorial boundaries, whether submerged or not; as the owner of the land laid bare by a recession of the waters of the Great Lakes outside the meander lines and within its territorial boundaries; as the owner of its various public parks bordering upon the Great Lakes and the connecting waterways between the same; as the owner and proprietor of the wharves, docks, piers and landing places used by it in connection with its operation of the ferries across the Straits of Mackinac between the cities of St. Ignace and Mackinaw City; as the owner of the proprietary right to all of the water within its domain, and in its governmental capacity as the sovereign proprietor of all of the public domain within the territorial boundaries of the state; as the representative of all of the various persons who own property bordering upon the Great Lakes and the connecting waterways between the same within the State of Michigan and subject to its jurisdiction and entitled to its protection, *has a right to have the water of the Great Lakes and the connecting waterways between the same maintained at its natural and normal level. This is a right inseparably annexed to the soil and which passes with it as a part and parcel of the land, subject only to the paramount right of congress to utilize and improve such waters for the purposes of navigation.* This right is a right of property as sacred as the right to the soil over which the water flows,—a right of which no one may be disseized but by lawful judgment of his peers or by due process of law, *and upon just compensation.*

(1) The State of Michigan is entitled to have all the water coming naturally to it, yielding only if at all to the demand of public commercial necessity as asserted by appropriate Congressional action.

Gardner v. Newburgh, 2 Johnson's Chancery, 165;
Kansas v. Colorado, 206 U. S. 46;
Hudson County Water Co. v. McCarter, 209 U. S. 349;
United States v. Rio Grande, 174 U. S. 690;
Missouri v. Illinois, 180 U. S. 208;
United States vs. Chandler-Dunbar Water Co., 229 U. S. 54;
Hoge v. Eaton, 135 Fed. 411, 414;
Holyoke Water Power Co. v. Connecticut River Company, 20 Fed. 71;
Pine v. New York, 112 Fed. 98;

United States v. River Rouge Improvement Co. 269 U. S. 411;
Gould on Waters, 2d ed., 396;
Rigney v. Tacoma Electric Light & Water Co. 9 Wash. 576;
Crawford County v. Hathaway, 67 Neb. 325, 340; 93 N. W. 788;
Ohio & Mississippi Ry. Co. v. Thillman, 143 Ill. 127;
Wyoming v. Colorado, 259 U. S. 419, 466;
Kansas v. Colorado, (206 U. S. 46, 51, 94); (51 L. Ed. 956, 973);
Farnham on Waters (1904), Vol. I, Page 29, 59;
Tetherington v. Donk Bros., 232 Ill. 522;
Thomas v. Coal Co. (199 Ill. App. 50, 58);
Hyatt v. Albro, 121 Mich. 638;
Embrey v. Owen, 6 Exch. 353;
3 Kent Comm. 439;
I. Wiel Water Rights, 1911, 3rd Ed. sec. 283, 285, 711.

In Gardner v. Newburgh, 2 Johnson's Chancery, 165, Chancellor Kent said:

> "A right to a stream of water is as sacred as a right to the soil under which it flows. It is a part of the freehold, of which no man can be disseized, but by lawful judgment of his peers, or by due process of law."

In United States v. Rio Grande Dam and Irrig. Co., 174 U. S. 690, 702, this court said:

> "The unquestioned rule of the common law was that every riparian owner was entitled to the continued natural flow of the stream. It is enough, without other citations or quotations to quote the language of Chancellor Kent, 3 Kent Comm. Sec. 439—'Every proprietor of lands on the banks of a river has naturally an equal right to the use of the waters which flow in the stream adjacent to his lands as it was wont to run (*currere solebat*) without dimunition or alteration. No proprietor has a right to use the water to the prejudice of other proprietors above or below him, unless he has a prior right to divert it, or a title to some exclusive enjoyment. He has no property in the water itself, but a simple usufruct while it passes along. *Aqua*

> *currit et debet currere solebat,* is the language of the law. Though he may use the water while it runs over his land as an incident to the land, he cannot unreasonably detain it or give it another direction, and he must return it to its ordinary channel when it leaves his estate.' "

In Hudson County Water Company v. McCarter, 209 U. S. 349, it was said:

> "We are of the opinion further, that the constitutional power of the State to insist that its natural advantages shall remain unimpaired by its citizens is not dependent on any nice estimate of the extent of present use or speculation as to future needs. * * * It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one a reason for its will."

In Gould on Waters 2d ed. 396, it is said:

> "The right to the use of waters in its natural flow is not a mere easement and appurtenance but is inseparably annexed to the soil itself."

In Rigney v. Tacoma Electric Light and Water Company, 9 Wash. 576, the court said:

> "The right to the use of waters flowing over land is identified with the realty. It is a real and corporeal hereditament, and this right is a substantial one and may be the subject of sale or lease like the land itself."

In Crawford County v. Hathaway, 67 Neb. 325, 340, 93 N. W. 788, it is said:

> "The riparian proprietor, say all the books and the authorities, has a right to the flow of the water of the natural stream passing through or by his land; such right being inseparably annexed to the soil, and passing with it, not as an easement or appurtenance, but as a part of the land. This property right can be regarded only as a

> corporeal hereditament belonging to and incident to the soil, the same as though it were stones thereon, or grass or trees springing from the earth. Gould, Waters, section 204 and authorities there cited. The riparian right to the use of the water flowing in a natural watercourse is a property right, which should be regarded as such, and to protect which the owner may resort to any or all instrumentalities which may be employed for the protection of private property rights generally. *Gould v. Boston Duck Co.* 13 Gray (Mass.), 422; *Ashley v. Pease,* 18 Pick, (Mass.) 268; *Blanchard v. Baker* 8 Me. 253, 23 Am. Dec. 504; *Keeney & Wood Mfg. Co.,* 39 Conn. 576, 582; *Beissel v. Sholl,* 4 Dall. (U. S.), 211, 1 L. ed., 804."
>
> "The property in water belonging to a riparian proprietor and his right to the reasonable use thereof, as we have seen, is a part and parcel of the land, inseparably annexed to the soil, and is property within the meaning of that word, of which the owner cannot be divested save and except by some lawful method, which would apply alike to all species of real property and appurtenances belonging thereto."

In Ohio & Mississippi Ry. Co. v. Thillman, 143 Ill. 127, the railway company placed an embankment across the water course. As a result of the embankment the natural flow of water was impeded and set back, flooding the lands of the riparian proprietor. The court said:

> "It is stated by all the authorities that it is the right of each proprietor of land upon a natural water course to insist that the water shall continue to run as it has been accustomed to do, and to insist that no one shall obstruct or change its course injuriously to him, without being liable in damages."

In Wyoming v. Colorado, 259 U. S. 419, 466, this court said:

> "The contention of Colorado that she as a state may divert and use, as she may choose, the waters flowing within her boundaries in this interstate stream, regardless of any prejudice that this may work to others having rights in the stream below her boundary, cannot be main-

> tained. The river throughout its course in both states is but a single stream, wherein each state has an interest which should be respected by the other. A like contention was set up by Colorado in her answer in *Kansas v. Colorado* and was adjudged untenable. Further consideration satisfies us that the ruling was right. It has support in other cases, of which *Rickey Land & Cattle Co. v. Miller & Lux*, 218 U. S. 258, 31 Sup. Ct. 11, 54 L. Ed. 1032; *Bean v. Morris*, 221 U. S. 485, 31 Sup. Ct. 703, 55 L. Ed. 821; *Missouri v. Illinois*, 180 U. S. 208, 21 Sup. Ct. 331, 45 L. Ed. 497; and 200 U. S. 496, 26 Sup. Ct. 268, 50 L. Ed. 572, and *Georgia v. Tennessee Copper Co.*, 206 U. S. 230, 27 Sup. Ct. 618, 51 L. Ed. 1038, 11 Ann. Cas. 488, are examples."

From the foregoing authorities the rule is well settled that the right to the flow of water is a part of the land and as such is a proprietary right. If the lower riparian owner may claim as against the upper riparian owner the right to a continued uninterrupted flow of the stream passing his lands, why may not the lower state enforce as against the upper the same right as one of its citizens could enforce against a citizen of another state? A riparian owner could claim only the right to use the water, whereas the State has a right to the full proprietary ownership of these waters. This Court has definitely settled the proposition that an upper riparian state upon an interstate stream or water course may not divert, appropriate, or use the water from that stream within its border to the injury of a lower riparian state, and that has been held without regard to any prejudice which may be worked to the right of the lower state and its citizens.

6. THIS DIVERSION OF WATER BY THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, AMOUNTS TO A TAKING OF THE PROPERTY OF THE STATE OF MICHIGAN.

(A) Taking in its legal conception.

The general rule is that any injury to rights or property which, if caused by a private person without authority of statute would give the plaintiff a cause of action against such person, constitutes a taking of property, entitling one to compensation, notwithstanding the statute which legalizes the damaging work.

Delapiaine v. Chicago & N. W. R. R. Co., 42 Wis. 214.
1 Mills on Eminent Domain, Par. 183.
Trinity Sabine R. Co. v. Meadows, 73 Texas 32, 3 L. R. A. 565.
Gould on Waters, (2d Ed.), p. 497.
Peel v. The City of Atlanta, 85 Ga. 138, 8 L. R. A. 787.
1 Lewis Eminent Domain, 3rd Ed. Par. 65.
1 Nichols on Eminent Domain, Par. 28.
Avery v. Fox, 2 Fed. Cases, Case No. 674.
Central Trust Co. of New York v. Hennen, 90 Fed. Rep. 593.
James v. Campbell, 104 U. S. 358; 26 L. ed. 786.
Johnson v. United States, 4 Court of Claims, 250.
Eaton v. Boston, Concord & Montreal Railroad Co., 51 N. H. 504; 12 Am. Rep. 147.
Cooley's Constitutional Limitations 8th Ed. 1158.
Foster v. The Stafford National Bank, 57 Vt. 128.
City of Mansfield v. Balliett, 65 Ohio St. 451; 58 L. R. A. 628.
Broadwell v. The City of Kansas, 75 Missouri 213.
People ex rel. The Manhattan Savings Institution of the City of New York v. Norton P. Otis, et al., 90 N. Y. 48.
McCord v. High, 24 Iowa 336.
Memphis & Charleston Railroad Co. v. Birmingham, Sheffield & Tennessee River R. Co., 96 Ala. 571: 18 L. R. A. 166
City of Schenectady v. Furman, 145 N. Y. 482.
Gaylord v. The Sanitary District of Chicago, 204 Ill. 576: 63 L. R. A. 582: 98 Am. St. Rep. 235.
City of Clinton v. Franklin, 119 Ky. 143: 83 S. W. 142.
Oregon Short Line Railroad Company v. Jones, et al., 29 Utah 147.
Leffmann v. Long Island Ry. Co. 93 New York Supp. 647.

Knowles v. New Sweden Irrigation District, 16 Idaho, 217.

School Town of Andrews v. Heirey, 178 Ind. 1.

In the case of Delaplaine v. C. & N. R. R. Co., 42 Wis. 214, the court, commenting on the case of Duke of Buccleuch v. Metropolitan Board of Public Works, L. R. 5 H. L. 418, which arose under the English Land Clauses Consolidation Act, which gave damages for lands "injuriously affected," said:

> "The test applied to determine the proper meaning of the words, 'injuriously affected' as giving a right to compensation was whether the act done in carrying out the works in question was an act which would have given a right of action if the works had not been authorized by act of Parliament, * * In other words, if the act affecting the land had been done by an individual, he would be liable for the damages."

In Mills on Eminent Domain, paragraph 183, it is said:

> "If land is injured and in consequence of an act which would have been the subject of an action at common law but for the statute, compensation may be required and awarded."

In Trinity Sabine R. Co. v. Meadows, 73 Texas 32, 3 L. R. A. 565, it is said that:

> "If a railway company * * in constructing its road did an act injurious to an adjacent neighboring proprietor for which if done by the original owner he would have been responsible at common law, the company should be liable to compensate the proprietor so injured."

So in Gould on Waters, (2d Ed.) page 497, it is said:

> "A land owner who should sustain injuries from the construction of works authorized by statute is not entitled to compensation, unless the injury is such as to give a right of action had the works not been authorized."

And in Peel v. The City of Atlanta, 85 Ga. 138, 8 L. R. A. 787, the court in passing upon a constitutional provision similar to ours said:

> "The test is, would the injury, if caused by a private person without authority of statute, give the plaintiff a cause of action against such person? If so, then he is entitled to compensation notwithstanding the statute which legalizes the damaging work."

In 1 Lewis Eminent Domain, 3rd Ed. Par. 65, it is said:

> "If, for damage caused to my land by certain acts of my neighbor done upon his own land for his own use, I may have compensation, and if, for the same damage caused by the same acts done upon the same land by the public or its agents for public use I can have no compensation, it is plain that the right upon which the former action was founded has been taken from me, that so much has been subtracted from my property in the land. Every such taking we hold to be within the constitutional prohibition requiring compensation to be made. In any given case, therefore, where the land of an individual has been damaged or diminished in value by the construction or operation of works for public use, whether he is entitled to compensation or not will depend upon whether the damage or deterioration is due to an interference with any right appurtenant to the land or parcel of his property in it. If this question can be answered in the affirmative, there is a right to compensation; otherwise, not."

In 1 Nichols on Eminent Domain, Par. 28, it is said:

> "There is one limitation upon the power of eminent domain which depends upon no express constitutional provision. The powers of a sovereign state, however vast in their character and searching in their extent, are inherently limited to subjects within the jurisdiction of the state, and any attempt to exercise governmental powers in another state is necessarily void. A state therefore cannot take or authorize the taking of property or rights in property situated in another state, and, conversely, each

state holds all the property within its limits free from the eminent domain of any other state and cannot be compelled to surrender such property to another state in any way."

In Eaton v. Boston, Concord & Montreal Railroad Company 51 N. H. 504; 12 Am. Rep. 147, 151, it is said:

> "To constitute a 'taking of property,' it seems to have sometimes been held necessary that there should be 'an exclusive appropriation,' 'a total assumption of possession,' 'a complete ouster,' an absolute or total conversion of the entire property, 'a taking of the property altogether.' These views seem to us to be founded on a misconception of the meaning of the term 'property,' as used in the various State constitutions.
>
> * * * * * * * * * *
>
> "From the very nature of these rights of user and of exclusion, it is evident that they cannot be materially abridged without, *ipso facto,* taking the owner's 'property.' If the right of indefinite user is an essential element of absolute property or complete ownership, whatever physical interference annuls this right takes 'property'—although the owner may still have left to him valuable rights (in the article) of a more limited and circumscribed nature. He has not the same property that he formerly had. Then, he had an unlimited right; now, he has only a limited right. His absolute ownership has been reduced to a qualified ownership. Restricting A's unlimited right of using one hundred acres of land to a limited right of using the same land, may work a far greater injury to A than to take from him the title in fee simple to one acre, leaving him the unrestricted right of using the remaining ninety-nine acres. Nobody doubts that the latter transaction would constitute a 'taking of property.' Why not the former? * * * * * * * *
> Among these elements is fundamentally, the right of user, including, of course, the corresponding right of excluding others from the use. See Comstock, J., in *Wynehamer* v. *The People,* 13 N. Y. 378, 396. A physical interference with the land, which substantially abridges this right, takes the owner's 'property' to just so great an extent as he is thereby deprived of his right. 'To deprive one of the use of his land is depriving him of his land';

> for, as Lord Coke said, 'What is the land but the profits thereof?' Sutherland, J., in *People* v. *Kerr,* 37 Barb. 257, 399; Co. Litt. 4 b. The private injury is thereby as completely effected as if the land itself were 'physically taken away.' "

In Cooley's Constitutional Limitations 8th Edition 1158, it is said:

> "Any injury to the property of an individual which deprives the owner of the ordinary use of it, is equivalent to a taking, and entitles him to compensation. * * * So a partial destruction or diminution of value of property by an act of the government which directly and not merely incidentally affects it, is to that extent an appropriation. And any regulation which deprives any person of the profitable use of his property constitutes a taking, and entitles him to compensation, unless the invasion of rights is so slight as to permit the regulation to be justified under the police power."

In Avery v. Fox, 2 Fed. Cases, Case No. 674, (1868) a bill was filed for an injunction against the defendants to restrain them from constructing a new channel from White Lake into Lake Michigan. In disposing of the case the court said:

> "This right of private persons to the use of water as it flows by or through their lands, in any manner not inconsistent with the public easement, is as sacred as is the right of a person to his land, his house, or his personal property. The public, however, have the right to use such streams as are navigable as highways, and the owner of a bed of a stream has no rights in the water thereof which will permit him to use it to the injury of the public. He cannot so far divert the water to his private use as to render navigation impossible or difficult, nor can he place obstructions in the stream in a manner to produce such results. His right and the right of the public to the use of the water of such streams are to remain unimpaired as far as possible, but the right of the public for purposes of navigation is paramount, and there can be no use of the water by a riparian proprietor inconsistent with the public easement. * * *"

In Central Trust Co. of New York v. Hennen, 90 Fed. Rep. 593 (1898) decided by the Circuit Court of Appeals, Sixth Circuit (Justices Taft, Lurton and Clark sitting) involved the question of the taking of a private right of way or easement taken without compensation by a railway company. Compensation was afterward referred to the state court and the claim for such compensation presented as a preferential claim against the assets arising from the sale of the railway company on mortgage foreclosure. In disposing of the case the court, through Mr. Justice Clark said:

> "Assuming that this right of way or easement was vested in the petitioner as claimed, we concur with the learned circuit judge in the opinion that a direct, permanent injury to, or the destruction of, such right of ingress and egress, would, to the extent of the damage actually sustained, be the taking of private property for public use. Pumpelly v. Green Bay Co. 13 Wall. 166. And the damages sustained by reason of such a taking would constitute a preferential claim on the proceeds arising from the sale of property, entitled to priority of satisfaction as against the bonds secured by the mortgage. Such a claim in this respect could not be, and in the adjudications has not been, distinguished from the ordinary claim to compensation for property taken or condemned for a right of way, or for the purchase price of a right of way conveyed directly to a railroad company, or any part of such purchase price. Whether land for a right of way is acquired by a railroad company by contract, condemnation, or unlawful taking, the owner is equally entitled to just compensation, and the manner of taking or acquisition does not change the nature or priority of the compensation justly due."

(B) *It is not necessary that the property be absolutely and physically taken from the possession of the complaining party, and the complaining party ejected from possession and use.*

(1) *If water is dammed up or set back upon or over land so as to destroy its essential use, it constitutes a taking of property.*

In order that the acts of defendants constitute a taking of property within the meaning of the use of the word "taking" in the fifth and fourteenth amendments to the constitution of the United States, it is not necessary that the property be absolutely and physically taken from the possession of the complaining party and the complaining party ejected from possession and use. If water is dammed up or set back upon and over land of the complaining party so as to destroy its essential use, that constitutes a taking of property, because it takes from the complaining party the usual and ordinary use of the property, and the usual and ordinary use of property is its principal valuable attribute.

✓ When the land of any one is so interfered with, injured, destroyed or damaged by its overflow by water that the owner thereof is deprived of the usual and ordinary use of the same; when the land area is converted into a water area; such overflow, injury or damage, constitutes a taking of property within the meaning of the fifth and fourteenth amendments of the constitution of the United States. To put water upon land so as to destroy its usual and ordinary use constitutes a taking of property.

Pumpelly v. Green Bay and Mississippi Canal Co., 13 Wall. 166: 20 L. Ed. 557;
United States v. Lynah, 188 U. S. 445, 47 L. Ed. 539;
United States v. Cress, 243 U. S. 316: 61 L. Ed. 746;
King v. United States, 59 Fed. Rep. 9;
Williams et al. v. United States, 104 Fed. Rep. 50;
Morris v. The United States, 30 Ct. of Claims, 162;
Jackson et al. v. The United States, 31 Ct. of Claims, 318;
Stevens v. The Proprietors of the Middlesex Canal, 12 Mass. 466;
Evansville and Crawfordsville Railroad Company v. Dick, 9 Ind. 433;
Kemper and wife v. City of Louisville, 77 Ky. 87;
Conniff v. The City and County of San Francisco, 67 Calif. 49;
Nevins v. City of Peoria, 41 Ill. 502;

Beidler, et al. v. The Sanitary District of Chicago, 211 Ill. 628;
Doty v. Village of Johnson, 84 Vermont 15;
Ft. Worth Improvement District No. 1 v. City of Ft. Worth, 106 Tex. 148; 158 S. W. 164: 48 L. R. A. (N. S.) 994.

In Pumpelly v. Green Bay and Mississippi Canal Company, 13 Wall. 166: 20 L. Ed. 557 (1872) an action of trespass on the case was brought by plaintiff in error charging the defendant with overflowing 640 acres of plaintiff's land by means of a dam erected across the Fox River, an outlet of Lake Winnebago, Wisconsin, by which the waters of the lake were raised so high as to overflow the plaintiff's land. The case reached the Supreme Court of the United States, and in disposing of it, it is said,—

> "It would be a very curious and unsatisfactory result, if in construing a provision of constitutional law, always understood to have been adopted for protection and security to the rights of the individual as against the government, and which has received the commendation of jurists, statesmen and commentators as placing the just principles of the common law on that subject beyond the power of ordinary legislation to change or control them, it should be held that if the government refrains from the absolute conversion of real property to the uses of the public it can destroy its value entirely, can inflict irreparable and permanent injury to any extent can, in effect, subject it to total destruction without making any compensation, because, in the narrowest sense of that word, it is not taken for the public use. Such a construction would pervert the constitutional provision into a restriction upon the rights of the citizen, as those rights stood at the common law, instead of the government, and make it an authority for invasion of private right under the pretext of the public good, which had no warrant in the laws or practices of our ancestors.
>
> "In the case of *Sinnickson* v. *Johnson*, 2 Harr. (N. J.) 129, the defendant had been authorized by an Act of the

Legislature to shorten the navigation of Salem Creek by cutting a canal, and by building a dam across the stream. The canal was well built, but the dam caused the water to overflow the plaintiff's land, for which he brought suit. Although the State of New Jersey then had no such provision in her constitution as the one cited from Wisconsin, the Supreme Court held the statute to be no protection to the action for damages. Dayton, J., said 'that this power to take private property reaches back of all constitutional provisions; and it seems to have been a settled principle of universal law that the right to compensation is an incident to the exercise of that power; that the one is inseparably connected with the other; and they may be said to exist, not as separate and distinct principles, but as parts of one and the same principle.' For this proposition he cites numerous authorities, but the case is mainly valuable here as showing that overflowing land by backing the water on it was considered as 'taking' it within the meaning of the principle.

"In the case of *Gardner* v. *Newburgh,* 2 Johns. Ch., 162, *Chancellor* Kent granted an injunction to prevent the trustees of Newburgh from diverting the water of a certain stream flowing over plaintiff's land from its usual course, because the Act of the Legislature which authorized it, had made no provision for compensating the plaintiff for the injury thus done to his land. And he did this though there was no provision in the Constitution of New York such as we have mentioned, and though he recognized that the water was taken for a public use. After citing several continental jurists on this right of eminent domain, he says that while they admit that private property may be taken for public uses when public necessity or utility requires, they all lay it down as a clear principle of natural equity that the individual whose property is thus sacrificed must be idemnified. And he adds that the principles and practice of the English Government are equally explicit on this point. It will be seen in this case that it was the diversion of the water from the plaintiff's land, which was considered as taking private property for public use, but which, under the argument of the defendants' counsel, would, like overflowing the land, be called only a consequential injury.

"If these be correct statements of the limitations upon the exercise of the right of eminent domain, as the doctrine was understood before it had the benefit of constitutional sanction, by the construction now sought to be placed upon the Constitution it would become an instrument of oppression rather than protection to individual rights.

"But there are numerous authorities to sustain the doctrine that a serious interruption to the common and necessary use of property may be, in the language of Mr. Angell, in his work on water-courses, equivalent to the taking of it, and that under the constitutional provisions it is not necessary that the land should be absolutely taken. Ang. Wat., sec. 465 *a; Hooker* v. *N. Haven and Northampton Co.,* 14 Conn. 146; *Rowe* v. *Granite Bridge Co.,* 21 Pick., 344; *Canal Appraisers* v. *People,* 17 Wend., 604; *Lackland* v. *North Mo. R. R. Co.,* 31 Mo., 180; *Stevens* v. *Prop. of Middlesex Can.,* 12 Mass. 466. And perhaps no state court has given more frequent utterance to the doctrine that overflowing land by backing water on it from dams built below is within the constitutional provision, than that of Wisconsin. In numerous cases of this kind under the Mill and Mill-dam Act of that State this question has arisen, and the right of the mill-owner to flow back the water has been repeatedly placed on the ground that it was a taking of private property for public use. It is true that the court has often expressed its doubt whether the use under that Act was a public one, within the meaning of the Constitution, but it has never been doubted in any of those cases that it was such a taking as required compensation under the Constitution. *Pratt* v. *Brown,* 3 Wis. 613; *Walker* v. *Shepardson,* 4 Wis. 511; *Fisher* v. *Horicon Iron Co.,* 10 Wis., 353; *Newell* v. *Smith,* 15 Wis., 104; *Goodall* v. *Milwaukee,* 5 Wis., 39; *Weeks* v. *Milwaukee,* 10 Wis., 242. As it is the Constitution of that State that we are called on to construe, these decisions of her Supreme Court, that overflowing land by means of a dam across a stream is taking private property, within the meaning of that instrument, are of special weight if not conclusive on us."

In United States v. Lynah, 188 U. S. 445, 47 L. Ed. 539, suit was brought to recover damages for flooding land in the construction of an improvement to navigation of the Savannah river. It is said:

> "It is clear from these findings that what was a valuable rice plantation has been permanently flooded, wholly destroyed in value, and turned into an irreclaimable bog; and this as the necessary result of the work which the government has undertaken. Does this amount to a taking? The case of Pumpelly v. Green Bay & M. Canal Co., 13 Wall. 166, 20 L. Ed. 557, answers this question in the affirmative. And on the argument it was conceded by the learned counsel for the government (and properly conceded in view of the findings) that so far as respects the mere matter of overflow and injury there was no substantial distinction between the two cases. In that case the Green Bay Company, as authorized by statute, constructed a dam across Fox river, by means of which the land of Pumpelly was overflowed and rendered practically useless to him. There, as here, no proceedings had been taken to formally condemn the land. Referring to this it was said (p. 177, L. Ed. p. 560):
>
> "'The argument of the defendant is that there is no *taking* of the land within the meaning of the constitutional provision, and that the damage is a consequential result of such use of a navigable stream as the government had a right to for the improvement of its navigation.
>
> "'It would be a very curious and unsatisfactory result, if in construing a provision of constitutional law, always understood to have been adopted for protection and security to the rights of the individual as against the government, and which has received the commendation of jurists, statesmen, and commentators as placing the just principles of the common law on that subject beyond the power of ordinary legislation to change or control them, it shall be held that if the government refrains from the absolute conversion of real property to the uses of the public, it can destroy its value entirely, can inflict irreparable and permanent injury to any extent; can, in effect, subject it to total destruction without making any compensation, because, in the narrowest sense of that word, it is not taken for the public use. Such a construction would pervert the constitutional provision into a restriction upon the rights of the citizen, as those rights stood at the common law, instead of the government, and make it an authority for

invasion of private right under the pretext of the public good, which had no warrant in the laws or practices of our ancestors.' * * *

"It is clear from these authorities that where the government by the construction of a dam or other public works so floods lands belonging to an individual as to substantially destroy their value there is a taking within the scope of the 5th amendment. While the government does not directly proceed to appropriate the title, yet it takes away the use and value; when that is done it is of little consequence in whom the fee may be vested. Of course, it results from this that the proceeding must be regarded as an actual appropriation of the land, including the possession, the right of possession, and the fee; and when the amount awarded as compensation is paid, the title, the fee, with whatever rights may attach thereto—in this case those at least which belong to a riparian proprietor—pass to the government and it becomes henceforth the full owner.

"Passing to the third question, it is contended that what was done by the government was done in improving the navigability of a navigable river, that it is given by the Constitution full control over such improvements, and that if in doing any work therefor injury results to riparian proprietors or others, it is an injury which is purely consequential, and for which the government is not liable. But if any one proposition can be considered as settled by the decisions of this court it is that, although in the discharge of its duties the government may appropriate property, it cannot do so without being liable to the obligation cast by the 5th amendment of paying just compensation.

"In *Monongahela Nav. Co. v. United States*, 148 U. S. 312, 336, 37 L. Ed. 463, 471, 13 Sup. Ct. Rep. 622, 630, it was said:

" 'But like the other powers granted to Congress by the Constitution, the power to regulate commerce is subject to all the limitations imposed by such instrument, and among them is that of the 5th amendment we have heretofore quoted. Congress has supreme control over the regulation of commerce, but if in exercising that supreme control it deems it necessary to take private property, then it must proceed subject to the limitations imposed by this 5th amendment, and can take only on payment of just compensation.'

> "In that case Congress had passed an act for condemning what was known as 'the upper lock and dam of the Monongahela Navigation Company,' and provided 'that in estimating the sum to be paid by the United States, the franchise of said corporation to collect tolls should not be considered or estimated,' but we held that this proviso was beyond the power of Congress; that it could not appropriate the property of the navigation company without paying its full value, and that a part of that value consisted in the franchise to take tolls. So in the recent case of *Scranton v. Wheeler,* 179 U. S. 141, 153, 45 L. Ed. 126, 133, 21 Sup. Ct. Rep. 48, 53, we repeated the proposition in these words:
>
> "'Undoubtedly compensation must be made or secured to the owner when that which is done is to be regarded as a taking of private property for public use within the meaning of the 5th amendment of the Constitution, and, of course, in its exercise of the power to regulate commerce, Congress may not override the provision that just compensation must be made when private property is taken for public use.'"

In United States v. Cress, 243 U. S. 316; 61 L. Ed. 746, it is said:

> "In Kentucky, and in other states that have rejected the common-law test of tidal flow and adopted the test of navigability in fact, while recognizing private ownership of the beds of navigable streams, numerous cases have arisen where it has been necessary to draw the line between public and private right in waters alleged to be navigable; and by an unbroken current of authorities it has become well established that the test of navigability in fact is to be applied to the stream in its natural condition, not as artificially raised by dams or similar structures; that the public right is to be measured by the capacity of the stream for valuable public use in its natural condition; that riparian owners have a right to the enjoyment of the natural flow without burden or hindrance imposed by artificial means, and no public easement beyond the natural one can arise without grant or dedication save by condemnation, with appropriate compensation for the private right. Cases exemplifying these propositions are

cited in a marginal note. We have found no case to the contrary."

* * * * * * *

"Pumpelly v. Green Bay & M. Canal Co. 13 Wall. 166, 20 L. ed. 557, involved the right to compensation for land overflowed with backwater from a dam erected and maintained in the Fox river, under authority of the state of Wisconsin, for the improvement of navigation. (A permissible exercise of state power, in the absence of action by Congress, although it was an interstate navigable water. Willson v. Black Bird Creek Marsh Co. 2 Pet. 245, 251. 7 L. ed. 412, 414; Gilman v. Philadelphia, 3 Wall. 713, 18 L. ed. 96). The raising of the river above its natural stage, by means of an artificial structure, was the *gravamen* of the complaint. It was argued that the state might, in the interest of the public, 'erect such works as may be deemed expedient for the purpose of improving the navigation and increasing usefulness of a navigable river, without rendering itself liable to individuals owning land bordering on such river, for injuries to their lands resulting from their overflow by reason of such improvements.' This court overruled the contention, and held there was a taking without compensation, contrary to the applicable provision of the Constitution of Wisconsin.

"In United States v. Lynah, 188 U. S. 445, 47 L. ed. 539, 23 Sup. Ct. Rep. 349, the same principle was applied in the case of an operation by the government of the United States. For the improvement of the navigation of the Savannah river certain dams and other obstructions were placed and maintained in its bed, with the result of raising the water above its natural height and backing it up against plaintiff's embankment upon the river and interfering with the drainage of their plantation. This was held (pp. 465, 471) to be a taking of private property, requiring compensation under the 5th Amendment, notwithstanding the work was done by the government in improving the navigation of a navigable river. The raising of the water above its natural level was held to be an invasion of the private property thereby flowed.

"In several other cases the limitation of the public right to the natural state of the stream has been recognized. Packer v. Bird, 137 U. S. 661, 667, 34 L. ed. 819, 820, 11 Sup. Ct. Rep. 210; United States v. Rio Grande Dam & Irrig. Co. 174 U. S. 690, 698, 43 L. ed. 1136, 1139, 19 Sup.

Ct. Rep. 770; Leovy v. United States, 177 U. S. 621, 631, 44 L. ed. 914, 918, 20 Sup. Ct. Rep. 797.

"It follows from what we have said that the servitude of privately-owned lands forming the banks and bed of a stream to the interests of navigation is a natural servitude, confined to such streams as, in their ordinary and natural condition, are navigable in fact, and confined to the natural condition of the stream.

"And, assuming that riparian owners upon non-navigable tributaries of navigable streams are subject to such inconveniences as may arise from the exercise of the common right of navigation, this in like manner must be limited to the natural right. The findings make it clear that the dams in question, constructed by the government in the Cumberland and Kentucky rivers, respectively, are for raising the level of those streams along certain stretches by means of backwater, so as to render them, to the extent of the raising, artificial canals instead of natural waterways. In the language of engineering, the government has 'canalized' the rivers. We intimate no doubt of the power of the United States to carry out this kind of improvement. Nor do we doubt that, upon the completion of the improvements, these rivers: the Cumberland, because it is an avenue of communication between two states; the Kentucky and also the Cumberland, because, in connection with the Ohio and Mississippi rivers, they furnish highways of commerce among many states (Gilman v. Philadelphia, 3 Wall. 713, 725, 18 L. ed. 96, 99; The Daniel Ball, 10 Wall. 557, 563, 19 L. ed, 999, 1001; South Carolina v. Georgia, 93 U. S. 4, 10, 23 L. ed. 782, 783),—remained navigable waters of the United States for all purposes of Federal jurisdiction and regulation, notwithstanding the artificial character of the improvements (Ex parte Boyer, 109 U. S. 629, 632, 27 L. ed. 1056, 1057, 3 Sup. Ct. Rep. 434; The Robert W. Parsons (Perry v. Haines) 191 U. S. 17, 28, 48 L. ed. 73, 78, 24 Sup. Ct. Rep. 8.)

"But the authority to make such improvements is only a branch of the power to regulate interstate and foreign commerce, and, as already stated, this power like others, must be exercised, when private property is taken, in subordination to the 5th Amendment. Monongahela Nav. Co. v. United States, 148 U. S. 312, 336, 37 L. ed. 463, 471, 13 Sup. Ct. Rep. 622; United States v. Lynah, 188 U. S. 445,

> 465, 471, 47 L. ed. 539, 546, 549, 23 Sup. Ct. Rep. 349. And we deem it clear that so much of the properties of the respective defendants in error as was unaffected by the flow of the rivers or their tributaries prior to the construction of the locks and dams in question was private property, and not subject to be overflowed, without compensation, in the raising of the level of the rivers by means of artificial dams."

In King v. United States, 59 Fed. Rep. 9 (1893) an action was brought under the provisions of the act of congress of March 3, 1887, Chapter 359, Par. 1, 2, etc. to recover damages caused by raising the level of the water of the Savannah river and overflowing the plaintiff's plantation. In disposing of the case the court said,—

> "The government has not gone into actual occupancy of this land. But by reason of this public work, occasioned by the public work fulfilling its purpose, the water in the Savannah river has been raised at plaintiff's land, has been backed on it so that the drainage has been destroyed, the water kept on the land, and forced up into it, making it finally wholly unfit for cultivation. This is a taking of the land for public purposes, for which compensation must be provided. Pumpelly v. Green Bay Co., 13 Wall. 181."

In Williams et al. v. United States, 104 Fed. Rep. 50 (1900) proceedings were had under an act of congress to establish a claim against the United States growing out of the raising of the water of the Savanah river under the exercise of the power of congress to regulate commerce and to improve navigation. In disposing of the case the court said,—

> "The facts found show that by reason of the obstructions so placed in the Savannah river and the dumping of mud and sand therein, the water of the river has been directly backed up and against the banks of this plantation, and forced on the land; the superinduced addition of water actually invading it,

> destroying its drainage, and through seepage and percolation raising the level of the water within the plantation to the level of the water in the river, and, in addition thereto, holding back and retaining in, over, and upon said plantation the freshets, the water from which was retained upon the same; by all of which the plantation has been rendered absolutely valueless. All of which is the result of the government improvements and works, and without which its purposes could not be carried out and effected. This is a 'taking,' within the meaning of the fifth amendment.
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> "The plantation of the plaintiffs being actually invaded by the superinduced addition of the water directly caused by the government dams, obstructions, and works backing up the water of the river, and raising the water level at and upon and in the rice plantation, and holding back and retaining upon the same the freshets, and making the same absolutely unfit for the cultivation of rice or any other known article, and plaintiffs having been compelled thereby to abandon their plantation, and being practically ousted of possession, and this being a permanent and continued condition, and the plantation being thereby rendered irreclaimable and become of no value, renders the action of the government a taking of land for public purposes, within the meaning of the fifth amendment to the constitution, for which compensation is due to the plaintiffs."

In Morris v. The United States, 30 Court of Claims, 162 (1895) proceedings were brought to secure compensation from defendant for the value of land appropriated and used by the government in the improvement of the Muskingum River, in the state of Ohio. In disposing of this case the court said,—

> "Whatever may have been thought of the jurisdiction of this court in its early history, in cases where private property has been taken in the exercise of the right of eminent domain, it is now well settled by many decisions of the Supreme and this

> court that upon the taking, as incident to the exercise of the power of eminent domain, there arises an implied contract, upon which a suit may be brought and successfully maintained in this court. The cases are so numerous settling the law in favor of the right to recovery that it is unnecessary to cite them."

In Jackson et al. v. The United States, 31 Court of Claims, 318 (1896), suit was brought to recover for land overflowed, washed away and for practical purposes destroyed by reason of the defendant's levees on the Mississippi River. The allegations of the petition were substantially identical with the declaration in *Pumpelly* v. *Green Bay*. In disposing of the case the court said,—

> "In the present case the facts are also presented by the pleadings. The petition, which is confessed by demurrer, alleges that in the year 1883 the officers of the United States, in pursuance of the act of Congress creating the Mississippi River Commission, projected a system of public works for the purpose of so confining the waters of the river between lines of embankments or levees as to give increased elevation and velocity and force to the current, and have thus caused an increased and abnormal elevation in the waters of the river at the high water or flood stage. The petition also alleges that the effect of these public works is to,—'*Cause the plantation of petitioners, and others so situated, to be flooded annually by the waters of the river, and to destroy the crops growing and grown thereon, and to drown the live stock, and to undermine and wash away the buildings, fences, and other improvements, and to fill up the drains and ditches, and to wash off the soil, and to cover the lands with sand and gravel, and to render them unfit for cultivation, and to entirely destroy their value.*'
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> * * * *
>
> "The material difference between this case and that of *Pumpelly* v. *Green Bay Company* is, that here

> the overflow of the water was not continuous. But the essential fact is averred that the annual overflow of the claimant's lands in consequence of the Government's works is such as 'to render them unfit for cultivation and to entirely destroy their value.' In that essential this case is stronger than the other, for Mr. Justice Miller says that the facts averred are such as to show that the dam and consequent overflow 'worked an *almost* complete destruction of the value of the land.'
>
> "It is true that here the claimant is free to go upon his land during the non-agricultural portions of the year; that is to say, after the spring and summer floods have passed away. But so was the plaintiff, in the other case, free to go upon his land while it was overflowed and do what he could with it. It is not an absolute taking of land which constitutes a taking of private property for public use. Mr. Justice Miller, quoting Angell on Water Courses and stating apparently the conclusion of the court, says that 'there are numerous authorities to sustain the doctrine that a serious interruption to the common and necessary use of property may be equivalent to the taking of it, and that under the constitutional provision it is not necessary that the land should be absolutely taken.' "

In Beidler et al. v. The Sanitary District of Chicago, 211 Ill. 628 (1904) action of trespass on the case was brought by plaintiffs against the Sanitary District of Chicago to recover the amount expended by plaintiffs in deepening or lowering the canals, and in repairing certain docks fronting on said canals, and the south branch of the Chicago River, and for permanent injury to their lots. In disposing of the case the court said,—

> "Section 13 of article 2 of the constitution of the State provides: 'Private property shall not be taken or damaged for public use without just compensation,' and the question is here presented whether

the damages sustained by appellants are within this language of the constitution.

"Section 19 of the act for the creation of sanitary districts provides: 'Every sanitary district shall be liable for all damages to real estate within or without such district which shall be overflowed or otherwise damaged by reason of the construction, enlargement or use of any channel, ditch, drain, outlet or other improvement under the provisions of this act.'

"In the case of *City of Kewanee* v. *Otley,* 204 Ill. 402, we held, (p. 417) referring to *Gardner* v. *Newburgh,* 2 Johns. Ch. 161, and *Simons* v. *Patterson,* 48 L. R. A. 717: 'It is the right of every owner of land over which a stream of water flows, to have it flow in its natural state and with its quality unaffected. The right to a stream of water is as sacred as a right to the soil over which it flows. It is a part of the freehold, of which the owner cannot be disseized except by due process of law, and the pollution of a stream constitutes the taking of property, which may not be done without compensation.'

* * * *

"In the case at bar, however, there was nothing in the condition or character of the property of the plaintiffs which rendered it either necessary or desirable that it should be taken or damaged in the exercise of the police power. It is evident that lowering the level of the water obstructed ingress to and egress from the lots in question, and following the reasoning of this court in *City of Chicago* v. *Jackson,* 196 Ill. 496, we hold that such obstruction is a damage to private property for public use, within the meaning of section 13 of article 2 of the constitution of this State, for which compensation may be recovered from the sanitary district, under and by virtue of section 19 of the act authorizing the creation of the district."

2. *If a riparian owner is deprived of the use and ordinary flow of water in its natural and normal height by artificial lowering of levels, so as to convert what was water area into land area, it constitutes a taking of property.*

Cohen v. United States, 162 Fed. Rep. 364;
United States v. Alexander et al., 148 U. S. 180: 37 L. Ed. 415;
Stein v. Burden, 24 Ala. 130, 60 Am. Dec. 453;
Meyers v. City of St. Louis, 8 Mo. Appeals 266;
City of Emporia v. Soden, 25 Kansas 588: 37 Am. Dec. 265;
Mayor and City Council of Baltimore v. Warren Manufacturing Co. et al., 59 Maryland 96;
Smith v. Rochester, 92 N. Y. 463, 44 Am. Rep. 393;
Proprietors of Mills and others v. Braintree Water Supply Company, 149 Mass. 478;
Fernald v. Knox Woolen Company, 82 Maine 48, 7 L. R. A. 459;
Kimberly & Clark Co. v. Hewitt and others, 75 Wis. 371;
Kimberly & Clark Co. v. Hewitt et al., 79 Wis. 334;
Cedar Lake Hotel Company v. Cedar Lake Hydraulic Co., 79 Wis. 297, 48 N. W. 371;
Watuppa Reservoir Company v. City of Fall River, 154 Mass. 305;
Rigney v. Tacoma Light & Water Company, 9 Wash. 576, 26 L. R. A. 427;
Waller v. State of New York, and Skaneateles Paper Company v. State of New York, 144 N. Y. 579;
Valparaiso City Water Company v. Dickover, 17 Ind. Appellate Ct. Repts. 233;
Priewe v. Wisconsin State Land and Improvement Co., 93 Wis. 534, 33 L. R. A. 645;
Smith v. Youmans, 96 Wis. 103: 70 N. Y. 1115;
Gehlen Brothers v. Knorr, 101 Iowa 700: 36 L. R. A. 798;
Neal v. City of Rochester, 156 N. Y. 213;
Baxter v. Gilbert, 125 Calif. 580;
Hyatt v. Albro, 121 Mich. 638;

Sanborn v. People's Ice Co., 82 Minn. 43, 83 Am. St. Rep. 401, 84 N. W. 641, 51 L. R. A. 829;
Strobel v. Kerr Salt Co., 164 N. Y. 303, 79 Am. St. Rep. 643; 51 L. R. A. 687;
New Whatcom v. Fairhaven Land Company, 24 Wash. 493; 54 L. R. A. 190;
Draper v. Brown, 115 Wis. 361, 91 N. W. 1001;
People v. Hulbert, 131 Mich. 156;
Wendel v. Spokane County, 27 Wash. 121;
Webster v. Harris, 111 Tenn. 668, 59 L. R. A. 324.

Cohen v. United States, 162 Fed. Rep. 364, (1908), was an action to recover compensation for the diversion of a water course. The court held that the *diversion* of the water of a non-navigable stream by the United States, so as to deprive a landowner of its natural flow adjacent to and upon his premises, for the purpose of improving the navigation of other navigable waters, is a 'taking of property' of such landowner, within the meaning of the fifth amendment to the Constitution, which entitles him to just compensation therefor. The court in its opinion said,—

> "The government has diverted the waters of Sausal creek at the point where it enters the subsidiary canal, and in effect has taken and appropriated the stream below that point, and the petitioner has been deprived of its flow adjacent to and upon her premises. This is a taking, within the constitutional provision."

In United States v. Alexander et al., 148 U. S. 180: 37 L. Ed. 415 (1893) appeal was taken by the United States to the Supreme Court from a judgment of the Court of Claims awarding damages for draining and destroying a well by the construction of a tunnel, under the Act of Congress of 1882, and it was held:

> Under the Act of Congress of July 15, 1882, to increase the water supply of the city of Washington, those whose lands or property rights were directly injured by the construction of the work proposed to be done are entitled to damages for such injury, as well as those injured by the taking of their lands.

In Stein v. Burden, 24 Ala. 130, 60 Am. Dec. 453, (1854) Burden brought suit against Stein to recover damages for the diversion of the water of a creek from plaintiff's mill. The court said,—

> "If the legislature should authorize a public improvement by means of a canal, and the construction of the work would destroy or impair the value of private property, without affording the means of indemnification, the owner of the property destroyed or injured would have his action at law against those who caused the damage. Stevens v. Proprietors of Middlesex Canal, 12 Mass. 466. In the present case, there is nothing in the statute from which the intention of the legislature to give the use of the water can legitimately be inferred; and the care with which they have guarded the rights of others, in requiring the consent of the owners of the land through which the canal passed to be given, and providing compensation for the injury which they might sustain, is, at least, persuasive to show that the legislature intended to grant no right which might be detrimental to others. The right to the use of the water intended to be used by the company, under certain conditions and limitations, belonged to the owners of the land through which it run. It is this right which is frequently the most valuable portion of the freehold, and is, in some senses, as much identified with it, as the soil of which it is composed."

In Meyers v. City of St. Louis, 8 Missouri Appeals 266 (1880) plaintiff was the owner of a mill upon the banks of the Mississippi River to which logs were brought by utilizing a navigable stream. The defendants erected a dike twenty feet broad and seven hundred feet long in such a way as to cause the formation of a deposit of mud six feet deep and one hundred feet wide along the plaintiff's frontage, and thus depriving him of the usual and ordinary use of the river. In disposing of the case the court said,—

> "'Whether the title of the owner of such a lot extends beyond the dry land or not, he is certainly entitled to the rights of a riparian proprietor whose land is bounded by a navigable stream; and, among those rights, one is access to the navigable part of the river from the front of his lot—the right to make a landing, wharf, or pier, subject to such general rules and regulations as the Legislature may see fit to impose for the protection of the rights of the public, whatever these may be.' This is the language of Judge Miller in *Yates* v. *Milwaukee*, 10 *Wall.* 504. * * *
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> "Undoubtedly, at common law, both in England and America, and under the common law and civil law doctrines as modified after the system of surveys established after the acquisition of the North-West Territory, every person owning on the banks of the Mississippi has a right that it should flow *ubi currere solebat*. *Bealey* v. *Shaw*, 6 East 208; *Delaplaine* v. *Railroad Co.* 42 Wis. 214; *Yates* v. *Milwaukee*, 10 Wall. 497; *Tyler* v. *Wilkinson*, 4 Mason, 397; *Tinicum Fishing Co.* v. *Carter*, 61 Pa. St. 21; 1 Dill. on Mun. Corp. sects. 70-72; *O'Fallon* v. *Daggett*, 4 Mo. 345. The right to have the river flow by his land as it flowed by nature, and the right of access to the river at this point, were rights of plaintiff as riparian owner, additional to his right as one of the general public to use the river as a highway. His rights to access were exclusive, subject to the general easement in the public to use the river for purposes of navigation, and to make a temporary landing there when the exigencies of the case might require it.

"And this right was the property of the plaintiff. 'It is a right,' says the Supreme Court of the United States, in *Yates* v. *Milwaukee* (*supra*), 'of which, when once vested, the owner can only be deprived in accordance with established law; and, if necessary that it be taken for the public good, upon just compensation.' 'Such riparian rights,' says Judge McLean in *Bowman* v. *Wathen*, 2 McLean, 376, 'frequently constitute the chief value of river property, and to deprive an owner of them without compensation is to despoil him of a most valuable property.'

"That the destruction of the riparian right of plaintiff was such a taking of private property as to come within the limitation on the exercise of the right of eminent domain contained in the State Constitution is clear, we think, both on reason and authority. On this point we may refer to most of the cases cited above, and also to *Pumpelly* v. *Green Bay Company,* 13 Wall. 166; *Eaton* v. *Boston, etc., Railroad Company,* 51 N. H. 504 (where the leading cases on the question as to what constitutes a taking of property, within the meaning of the constitutional limitation, are most exhaustively considered and carefully classified), and *Commissioners* v. *Kempshall,* 26 Wend. 404.

"It is urged that it is the settled doctrine in this State that a municipal corporation, in the absence of negligence, is not answerable in a civil action for consequential damages arising from the execution of a public work which it is authorized by the State to engage in. * * * * But the building of a dike into the Mississippi, by which its stream is diverted from a lot which derives its value from its water-front, cannot be assimilated to these cases of remote and consequential damage; and if, as we have seen, riparian rights are property, it cannot be said that this is not a taking of property."

In City of Emporia v. Soden, 25 Kansas 588; 37 Am. Dec. 265 (1881) the plaintiff brought suit against the city of Emporia alleging that he was the owner of real estate lying on both sides of the Cottonwood River, upon which he had erected and maintained a flouring mill; that the city, without leave, license, warrant or authority of law, had erected and maintained upon the river above plaintiff's mills, a system of waterworks and was diverting the water of the river to the city of Emporia for the usual and ordinary waterworks purposes. The opinion of the court was by Justice Brewer, afterward of the Supreme Court of the United States. In disposing of the case the court said,—

> "A second matter of defense is this: While the undiminished flow of the stream is conceded to be the right of every riparian owner, yet this right has always been limited to this extent, that each riparian owner may, without subjecting himself to liability to any lower riparian owner, use of the water whatever is needed for his own domestic purposes and the watering of his stock. The city is a riparian owner, and, whether it uses little or much, it is simply taking for domestic purposes. Each individual citizen of Emporia may buy land on the banks of the river and then take for domestic uses whatever amount of water he needs. What the individual separately may do, the city, representing all the individuals, has done. Does the manner in which the result was accomplished make any difference in the right?
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> "This argument is plausible, but not sound. A city cannot be considered a riparian owner within the scope of the exception named. The amount of water which an individual living on the banks of a stream will use for domestic purposes, is comparatively trifling. Such use may be tolerated upon the principle *de minimis non curat lex*. It is a use which must always be anticipated, and may reasonably be considered as one of the benefits of the ownership of the banks of a natural stream. Every one proposing to utilize the power of running water should reasonably expect that the stream is chargeable with such a slight burden. It is only a fair equalization of rights. But the taking of water for the supply of a populous and growing city, stands upon an entirely different basis. No man can foresee this; and if it were tolerated, no one would dare to expend money in utilizing this power for

> fear of its being soon taken from him without compensation, and with total loss to his investment. The city, as a corporation, may own land on the banks, and thus in one sense be a riparian owner. But this does not make each citizen a riparian owner. And the corporation is not taking the water for its own domestic purposes; it is not an individual; it has no natural wants; it is not taking for its own use, but to supply a multitude of individuals; it takes to sell."

In Smith v. Rochester, 92 N. Y. 463, 44 Am. Rep. 393 (1883) plaintiffs, owners and lessees of mills situated on the banks of Honeoye creek, brought suit to restrain the city from diverting the waters of Hemlock Lake, in Livingston County New York, with a supeficial area of approximately 1,828 acres. The court exhaustively discussed the character of the lake and creek, and the rights of riparian proprietors thereon. In disposing of the case the court said,—

> "The exercise by a ruler of the right of eminent domain is always subject to the obligation of making compensation for the property taken. *(Gould* v. *Hudson River R. R., supra.)* Due regard for the distinctions existing between a public right and a public use, and also those between a sovereign and a proprietary right is essential to a just consideration of the rights of parties in navigable watercourses. While a sovereign may convey its proprietary rights, it cannot alienate its control over navigable waters without abdicating its sovereignty. (*Martin* v. *Waddell,* 16 Peters, 367.) A neglect to observe these distinctions has been the cause of much error in treating of these rights.
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> "In *Comm'rs.* v. *Kempshall,* Senator Verplank says: 'I cannot assent to the position that the conceded common-law authority of the State over such rivers, for the purposes of navigation, comprehends the right to divert the waters to other purposes of artificial navigation, wholly distinct from that of the river itself.' He then proceeds to state rules in apt and pertinent language, which we consider decisive of this case in its various aspects. 'The proprietor of the bed and bank of the stream has himself

> no absolute property in the waters, but strictly a usufructuary interest appurtenant to his freehold. He can use the waters for his own benefit; but he may not divert them to the injury of his neighbors, or lessen their quantity, or detain them unreasonably. If such be the strict limitation of the proprietary right, can it be that the State, as the trustee of a special public servitude has a much less restricted right, and can divert or detain the waters for other uses? By its sovereign right of eminent domain, it undoubtedly may do so,' * * * 'but all these exercises of sovereign authority are alike "the taking of private property for public use," which the Constitution pronounces may not be done "without just compensation."' * * * We are, therefore, of the opinion not only that the State had no right to grant to the city of Rochester the use of the waters of Hemlock lake, to the detriment of the riparian owners upon the banks of the stream formed by its outlet, but that their rights were recognized and provided for by the act under which the defendant assumes to justify its acts."

In Fernald v. Kno. Woolen Company, 82 Maine 48, 7 L. R. A. 459 (1889) plaintiffs, the owners of lands fronting upon certain ponds, and also the owner of an island in one of these containing fifteen acres, brought suit to restrain the lowering of the level of these ponds by defendants. The court said:

> "We think the injunction prayed for must be granted. We do not think the owners of mills on a stream, flowing from a great natural pond or lake, have a right to lower the outlet and draw down the water in the pond or lake below its natural low-water line.
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> "Such a right is inconsistent with the existence of the pond as a pond. If exercised to its fullest extent it would destroy the pond. All the water might be drawn out and its bed left dry, a mere stream of running water only remaining. And if exercised, to any extent, the necessary effect must be to widen the shores and deprive the adjoining land owners of their natural water frontage; for it is the settled law of this state that lands, bounded on a great pond or lake, extend only to the natural low-water line, and that all beyond is owned by the state. And this natural water frontage may be as valuable to the land

> owner as the right to draw water is to the mill-owner? But whether of equal value or not, it is of equal validity in law, and entitled to equal protection.
>
> "This precise question was recently considered in Massachusetts, and the court held that the water of a great pond could not be lawfully drawn down below its natural low-water line; that such a use of the water would be unreasonable; that great ponds belong to the public; that to draw down the water below its natural level is inconsistent with the common right to the use of the pond as a pond; that for such an abstraction of the water an information or an indictment would undoubtedly lie for the public wrong; and that an adjoining land owner thereby deprived of his natural water frontage could obtain redress by injunction. *Potter* v. *Howe*, 141 Mass. 357.
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> "As great ponds and lakes are public property, the state may undoubtedly control and regulate their use as it thinks proper. But in the absence of legislative authority, no individual or corporation can lawfully draw down the water of a great natural pond or lake below its natural low-water line."

In Kimberly & Clark Co. v. Hewitt, et al., 75 Wis. 371 (1890) plaintiff alleged its ownership of a water power on Fox river together with a dam; that defendants owned lands above plaintiff's dam across which a canal might be constructed to divert the water from the river which would otherwise reach the plaintiff's mill pond. The complaint was that the defendants threaten to and will, unless restrained by the judgment of the court, build a canal across their land and divert the waters of the river to the injury of plaintiff who alleged that it desired to use the power generated by all of the water of the river. Plaintiff demurred to the bill of complaint upon the general theory that an interlocutory injunction ought not to be issued until plaintiffs were actually injured. The court, in disposing of this case said:

> "It is admitted that it is not necessary for a party to delay bringing a suit until after a nuisance is actually perpetrated, where the facts show an ability and a pur-

> pose to proceed at once in the unlawful undertaking. This concession is a sufficient ground for sustaining the complaint; for it is alleged that the defendants threaten to divert the water, claim they have both the right and the ability to do it, and will, unless restrained. Within the authorities, the facts present a case for the exercise of equitable jurisdiction to prevent the threatened injury (*Attorney General* v. *Forbes,* 2 Mylne & C. 123; *Webb* v. *Portland Mfg. Co.* 3 Sum. 189; Angell on Watercourses, ch. X, subd. 11), the province of the injunction being to prevent future mischief; and where the right to do the wrong is insisted upon, the court will interfere and protect the plaintiff. It follows from these views that the order of the circuit court overruling the demurrer must be affirmed."

Subsequently this same case came before the Supreme Court of Wisconsin in Kimberly & Clark Co. v. Hewitt, et al., [illegible] Wis. 334, and in disposing of the case the court said:

> "The rule is elementary that, unless affected by license, grant, prescription, or public right, or the like, every proprietor of land on the bank of a stream of water, whether navigable or not, has the right to the use of the water as it is wont to run, without material alteration or diminution; and no riparian owner has the right to use the water of the stream to the prejudice of other riparian owners above or below him, by throwing it back on the former or subtracting it from the latter.' Lawson v. Mowry, 52 Wis. 219, and cases cited in the opinion by Mr. Justice Cassoday; Ang. Water-courses (7th ed.) Chp. 4, p. 98, note 2; Burrill, Law Dict. tit. 'Ut Currere Solebat.' "

In Cedar Lake Hotel Company v. Cedar Lake Hydraulic Co. 79 Wis. 297, 48 N. W. 371, (1891) plaintiff the owner of a hotel and several acres of ground on the shores of Big Cedar Lake used as a summer resort, brought suit against the defendant to restrain it from lowering the waters of the lake below their natural low water mark to the injury of complainants, and to plaintiff's bill of complaint the defendant demurred. Disposing of the case the court said:

> "It is idle and frivolous to contend that the plaintiff has no such right or interest in the shore of the lake opposite said hotel property as to justify the interposition of the court or claim damages for so causing the lake to recede from its contiguity with it."

In Rigney v. Tacoma Light & Water Company, 9 Wash. 576, 26 L. R. A. 427 (1894) respondent instituted suit against the Tacoma Light & Water Company to restrain it from diverting the waters of Spanaway creek and of Upper Clover creek from their natural channels or polluting the same, and to compel it to remove the dams, flumes, ditches and filters placed therein and to restore the waters to their natural bed or channel. It is said:

> "Not even a riparian owner has a right to divert a stream permanently from its natural course, and thus deprive others of their rights therein. Such an act, in itself, is wholly unlawful. *Crook v. Hewitt,* 4 Wash. 749 (31 Pac. 28). And the purpose for which the water diverted may be used makes no difference as to the force and effect of this rule. Accordingly it is said by Kerr that a diversion of water from a stream for the purpose of supplying a neighboring town with water is not a lawful user of the water. Kerr, Injunctions (2d ed.), p. 229."

* * * *

> "The legal rights of riparian proprietors upon natural water courses are well settled and generally understood. Every such proprietor is entitled, in the absence of grant, license, or prescription, limiting his right, to have the stream which passes over or adjacent to his lands flow as it is wont by nature, affected only in quantity or quality by the consequences of a reasonable use thereof by other proprietors. See *Crook v. Hewitt, supra,* and *Lux v. Haggin,* 69 Cal. 255 (10 Pac. 674).
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> "The right of the riparian proprietor to the flow of the water is inseparably annexed to the soil, and passes with it, not as a mere easement or appurtenance, but as part and parcel of it. Use does not create, and disuse cannot destroy or suspend, it. *Johnson v. Jordan,* 2 Metc. (Mass.) 239; *Lux v. Haggin, supra.* The riparian proprie-

> tor has no property in the water itself, but a simple usufruct while it passes along. 1 Wood, Nuisances (3d ed.), p. 471. The right to the use of water flowing over land is identified with the realty, and is a real and corporeal hereditament. *Cary v. Daniels,* 5 Metc. (Mass.) 238. And this right is a substantial one, and may be the subject of sale or lease like the land itself. 1 Wood, Nuisances (2d ed.), p. 412."

In Valparaiso City Water Company v. Dickover, 17 Ind. Appellate Ct. Repts. 233 (1896) appellee brought suit for and recovered damages against appellant for an alleged wrongful diversion of the waters of Flint Lake, Porter County, Indiana. Plaintiff was a riparian proprietor thereon and the city of Valparaiso authorized the construction and maintenance of a system of waterworks to supply the city and its inhabitants with water to be obtained from Flint Lake. The waterworks system was constructed and placed in operation and the appellant commenced to pump water from the lake to supply the city with water. Plaintiff purchased the land with full knowledge that the water was being diverted from the lake for water works purposes. In disposing of the case the court said,—

> "A riparian proprietor has not the right to divert the stream permanently from its natural course, and thus deprive others of their rights therein; and the purpose for which the water diverted may be used (as, to supply a neighboring town with water) makes no difference as to the force and effect of this rule."

In Priewe v. Wisconsin State Land and Improvement Co., 93 Wis. 534, 33 L. R. A. 645 (1896) suit was brought for an injunction to restrain the lowering of the level of Muskego Lake in Waukesha county, Wisconsin, to the injury of the riparian proprietors. In disposing of the case the court said,—

"In this state it has been repeatedly held that the riparian proprietor upon navigable lakes and ponds takes the land only to the water's edge, but that, as such proprietor, he has the exclusive right of access to and from the lake in front of his land and of building piers and wharves there in aid of navigation, not interfering with the public easement; that such private rights grow out of his title to the land, and have a pecuniary value, and their destruction or material abridgment is generally an injury, entitling him to redress. * * *

"Certainly, one such riparian owner, without leigslative authority, has no legal right to draw the water from such lake, to the injury of other such riparian proprietors thereon. *Sampson* v. *Hoddinott,* 87 Eng. C. L. 590; *Wilts & Burks Canal Nav.* v. *Swindon Water Works Co.* 9 Ch. App. 451; *S. C.* L. R. 7 H. L. 697; *Miner* v. *Gilmour,* 12 Moore, P. C. 156; *North Shore Co.* v. *Pion,* 14 App. Cas. 621; *Miller* v. *Miller,* 9 Pa. St. 74; *Lawson* v. *Mowry,* 52 Wis. 219; *Kimberly & Clark Co.* v. *Hewitt,* 79 Wis. 334. Assuming that the state had plenary power over the lake in question and the land beneath its waters, when exercised in aid of commerce or any other legitimate public purpose, yet we are constrained to hold that it had no power to arbitrarily take away or destroy such rights of the plaintiff, as such riparian owner, without his consent, and without compensation, and without due process of law, and for the sole purpose of benefiting some other riparian owner, or for any other mere private purpose. *Arimond* v. *Green Bay & M. Canal Co.* 31 Wis. 316; *S. C.* 35 Wis. 41; *Barden* v. *Portage,* 79 Wis. 126; *Cedar Lake Hotel Co.* v. *Cedar Creek Hydraulic Co.* 79 Wis. 297; *Wis. Water Co.* v. *Winans,* 85 Wis. 39; In re *Theresa Drainage Dist.* 90 Wis. 301; *Grand Rapids* v. *Powers,* 89 Mich 94."

The court expressly approved its previous holding in Cedar Lake Hotel Company v. Cedar Lake Hydraulic Co., 79 Wis. 297.

In Gehlen Brothers v. Knorr, 101 Iowa 700; 36 L. R. A. 798 (1897) suit was brought by plaintiffs to restrain defendants from erecting a dam across Floyd River, which would interrupt the natural flow of water in the river to plaintiffs' detriment. Plaintiffs owned and operated a grist mill, operated by water power derived from the river and established its right to the flow. Defendants constructed a dam for the purpose of creating a pond from which to harvest ice. In disposing of the case the court said,—

> "Broadly stated, the general rule is that the owner of the land through which a stream of water runs, has a right to have it flow over his land in the natural channel, undiminished in quantity, and unimpaired in quality, except insofar as diminution or contamination is inseparable from a reasonable use of such water."

In Baxter v. Gilbert, 125 Calif. 580 (1899) suit was brought to test the rights of plaintiffs and defendants to the waters of Little Pine and Pinyon creeks, and the waters of certain lakes situated higher up in the mountains and forming in a great measure, the source of supply of Little Pine creek. The court said,—

> "It necessarily follows that it was not the overflow of the creek that appellants sought to appropriate, but a certain amount of water in these two aforesaid described lakes. If such appropriation of waters does not interfere with the usual and ordinary quantity of water flowing down the creek, the right of appellants to appropriate is undoubted; but otherwise, if there be an interference with the quantity of water flowing down the stream. If the tapping of these lakes by appellants reduces the amount of water to which plaintiffs are entitled, or shortens the period of time in which they might otherwise secure water from the creek, then the acts of appellants clearly are a trespass upon plaintiff's rights—exactly the same kind of trespass as though the creek was tapped and that amount of water directly taken therefrom without any molestation of the lakes."

In Hyatt v. Albro, 121 Mich. 638 (1899) complainants, the owners of a mill on the outlet of Tupper Lake and Mud Lake filed a bill to restrain the defendant from diverting the natural channels of the Shiawassee river above such lakes so as to interfere with the usual and ordinary flow of the water to complainants' mill. In disposing of the case the court said,—

> "The complainants have the right to have the water flow naturally, without being accelerated or impeded, except to the extent that the concurrent rights of the upper riparian proprietors may effect such results. In so far as the proper use of the stream above results in inconvenience, or impedes the use of the stream by complainants, it is *damnum absque injuria*. Has the upper riparian owner the right to reclaim a portion of this lake by so accelerating the flow of the stream as to lower the water in the lake, thereby narrowing the area so as to reclaim overflowed lands? This accumulation of water from the overflow of the banks of the lake, fed by the Shiawassee river above, cannot be called surface water. *West* v. *Taylor*, 16 Or. 165; *Schaefer* v. *Marthaler*, 34 Minn. 487 (57 Am. Rep. 73); *Macomber* v. *Godfrey*, 108 Mass. 219 (11 Am. Rep. 349); Gould, Waters, Par. 264; *Stock* v. *Township of Jefferson*, 114 Mich. 357 (38 L. R. A. 355). The right to drain surface water is clear. Gould, Waters, Par. 265. But the right to drain any portion of the waters of these lakes above, which constitute the source of supply to the complainants' water-power, would unquestionably be a wrong against complainants if the water were diverted from the stream. Is it any the less an interference with the complainants' property rights if the water be precipitated in an artificial manner by means of a deepened channel through the stream itself? We think not. On the contrary, this increasing of the flow, it is alleged with much force, would work an additional injury by imperiling complainants' dam. The circuit judge was of the opinion that the flow of water would not be diminished by the deepening of the river. We think it clear, however, that by the deepening of the channel the water will be carried off more rapidly than it now is. Indeed, if it is not expected that this will be the result of the improvement, we are at a loss to understand why it was undertaken."

In Sanborn v. People's Ice Co., 82 Minn., 43, 83 Am. St. Rep. 401, 84 N. W. 641, 51 L. R. A. 829 (1900), complainant a riparian proprietor upon White Bear lake had erected thereon certain improvements, the principal value of which consisted in their use in connection with the waters of the lake. White Bear lake was contiguous to St. Paul, Minneapolis and Stillwater and was used as a resort. The defendant corporation cut and removed many thousand tons of ice from the lake for commercial purposes, and the action was brought to restrain the defendants from cutting and removing any further ice. In disposing of the case the court said,—

> "If there is a remedy for an injury caused by the artificial raising of the water above the natural line, thus flooding a meadow, there is also a remedy to prevent exposure of an unsightly and unhealthy marsh by artificially drawing off the water below the natural level. It is immaterial for what purpose the shore land is used, if it be a lawful use. There is no distinction in this respect between a farm and a summer residence. Employment of contiguous land for the purpose of pleasure, recreation, and health, constitutes such a use of adjacent bodies of public water as to command a remedy for an interference with its natural condition."

In Strobel v. Kerr Salt Co., 164 N. Y. 303, 79 Am. St. Rep. 643; 51 L. R. A. 687, (1900) suit was brought by plaintiffs, owners of various mills on Oatka Creek, against the defendant, a salt manufacturer above the mills, to restrain him from diverting or polluting the waters of the creek. In disposing of the case the court said,—

> "A riparian owner is entitled to a reasonable use of the water flowing by his premises in a natural stream as an incident to his ownership of the soil, and to have it transmitted to him without sensible alteration in quality or unreasonable diminution in quantity. While he does not own the running water, he has the right to a reasonable use of it as it passes by his land. As all other owners upon the same stream have the same right, the right of no one is absolute, but is qualified by the right of the others to have the stream substantially preserved in its

> natural size, flow and purity, and to protection against material diversion or pollution. This is the common right of all, which must not be interfered with by any. The use by each must, therefore, be consistent with the rights of the others, and the maxim of *sic utere tuo* observed by all. The rule of the ancient common-law is still in force: *aqua currit et debet currere, ut currere solebat.* Consumption by watering cattle, temporary detention by dams in order to run machinery, irrigation when not out of proportion to the size of the stream, and some other familiar uses, although in fact a diversion of the water involving some loss, are not regarded as an unlawful diversion, but are allowed as a necessary incident to the use in order to effect the highest average benefit to all the riparian owners."

In Draper v. Brown, 115 Wis. 361, 91 N. W. 1001 (1902) a bill was filed by plaintiffs against defendants who were mill owners at the outlet of Fowler lake, to restrain them from drawing off the water, thereby lowering the level of the lake four feet. To this bill of complaint the defendants demurred on the ground that the complaint did not state a cause of action and for other reasons. This demurrer was overruled and the case went to the Supreme Court. The court said,—

> "We then have the one primary right of the plaintiffs to have the water of Fowler Lake remain at its accustomed level. We have the corresponding duty of the defendants not to interfere with such right. We have also a wrongful violation of the plaintiffs' right by the defendants, Brown and Peacock, in unnecessarily drawing off the water, and the concurrent acts of the other defendants in withholding the natural and accustomed flow of water into the lake. Thus we find a single, complete cause of action, in which all of the defendants are interested, although acting independently and without concert."

In Wendel v. Spokane County, 27 Wash. 121 (1902), plaintiff brought suit to recover damages from defendant for draining a lake in the construction of a highway. In disposing of the case the court said,—

> "It might as well be said that if the roadbed was covered with boulders, they could be rolled off by order of the county onto adjoining lands, or that the county could sluice mud or water from the roadbed onto adjoining lands or even lands at a distance, and shift the liability to the individuals who did the work. * * *
>
> "It is insisted that there is no allegation of carelessness or negligence in the complaint. No such allegation is necessary. If the allegations of the complaint are true, it is the taking of private property for public use without compensation, and falls within the prohibition of the constitution (art. 1, Par. 16) so often construed by this court. And it makes no difference whether it was done negligently or carefully. The taking is what the constitution prohibits. *Brown* v. *Seattle,* 5 Wash. 35 (31 Pac. 313, 32 Pac. 214, 18 L. R. A. 161); *State ex rel. Smith* v. *Superior Court of King County,* 26 Wash. 278 (66 Pac. 385)."

In Webster v. Harris, 111 Tenn. 668, 59 L. R. A. 324 (1902), was involved a title to ownership and navigability of Reelfoot Lake. Harris, assuming to be the owner of the soil under the waters of the lake, began the construction of a canal for the purpose of draining the lake into the Mississippi River. Thereupon complainants, the owners of lands, hotels, clubhouses, fish docks and other property situated along the shore of the lake, filed a bill to restrain the defendant from so doing. The court said,—

> "We entirely concur with the conclusions reached by Judge Swiggart on this branch of the case, which are thus expressed in his learned opinion, viz: 'It must therefore follow, from the rules laid down in these authorities, and in others on the subject of the rights of riparian owners on rivers and lakes and other waters, whether navigable or non-navigable in any sense, that no one, whether he is only a stranger, or is himself a riparian owner on the same body of water, has any right to impair or destroy the interest and the use of such riparian owner to such water. In the language of Washburn (Easements, 316):

> "The right to enjoy this flow of water without disturbance or interruption by any other proprietor is one *jure naturae* and is an incident of property in the land, not an appurtenance to it, like the right he has to enjoy the soil itself in its natural state, unaffected by the tortuous acts of a neighboring landowner. It is an indispensable incident to the ownership of land, made by an inflexible rule of law an absolute and fixed right." The flow of water cannot be diverted, and turned into a different channel. It cannot be lowered by drainage or other artificial means from its natural level or height. It cannot be raised or increased in volume or level by damming or other means. It cannot be polluted or corrupted, and made less fit for use, wrongfully and unnecessarily. The riparian owner cannot be deprived of any of the many uses he has the right to make of the water, or injuriously affected in that respect.'"

7. THIS DIVERSION OF WATERS FROM LAKE MICHIGAN IS NOT GOVERNED BY THE AUTHORITIES CITED BY THE SPECIAL MASTER; THIS DIVERSION IS NOT AN "INCIDENTAL DAMAGE" NOR IS IT *DAMNUM ABSQUE INJURIA*.

The Special Master attempts to dispose of the property rights of the State of Michigan and other States bordering upon the Great Lakes by saying: (M. R. 151)

> "The causing of *incidental damage* through the exercise of the *constitutional authority of Congress* does not constitute a taking of property for public use. * * * It is a case of *damnum absque injuria.* * * * The decisions which have been cited, and the principle they apply, seem to me to dispose of the contention that, in this instance, *if it be assumed that the diversion has been authorized under action of Congress, otherwise competent,* the property of complainant States has been taken in violation of the Fifth Amendment. *Where, pursuant to governmental authorization otherwise valid,* there is an obstruction of water from navigable lakes and rivers and a consequent lowering of levels by enlarging or opening outlets, the *incidental damage* to riparian owners

affords no ground for asserting the constitutional invalidity of that action."

Before entering upon a discussion of these cases it will be noticed that in his conclusions the Special Master assumes,—

1. The Constitutional authority of Congress. (That the work is for a constitutional purpose.)

2. An affirmative act of Congress. (That there was an exercise of the power of Congress.)

3. That the work was by or for the Federal government.

4. That the work caused an "incidental damage."

But indulgence in these presumptions destroys any proper application of these cases to the instant case. A review of the cases discloses that they present entirely distinguishable facts, and are based upon affirmative acts of Congress. The assumptions relied upon by the Special Master do not exist with respect to the diversion of these waters from Lake Michigan.

(a) *In each of the cases cited by the Special Master the work was for a constitutional purpose; it was authorized by an act of Congress; and it was done by or for the Federal government.*

A review of the cited authorities (M. R. 151) discloses that in all of them the work considered was for the benefit of navigation or some other constitutional purpose. No question was raised in any case as to the constitutional authority of Congress to authorize the particular work, except in South Carolina v. Georgia, 93 U. S. 4, which will be dealt with hereunder. In each case there was some affirmative act of Congress authorizing the particular work and in each case there was some improvement or benefit by or for the Federal government to a navigable channel.

1. South Carolina v. Georgia, 93 U. S. 4.
Purpose—Improving channel for navigation.

Authority—Appropriation act of Congress for specific work.
Work—By and for government in use of river.

In discussing the improvement of the southern channel at the expense of the northern by increasing the flow of water through the former, thus increasing its depth and navigability, the court said:

> "The action of defendants is not, therefore, the destruction of the navigation of the river. True, it is obstructing the waterway of one of its channels and compelling navigation to use the other channel, but it is a means employed to render navigation of the river more convenient; a mode of improvement not uncommon. *The two channels are not two rivers,* and closing one for the improvement of the other is in no just or legal sense destroying or impeding the navigation."

From the foregoing it is clear that a different rule would have been adopted had there been two distinct rivers or waterways instead of one, which divided in passing an island. The language used by this court did not apply to two navigable waterways, one of which was destroyed for the benefit of another (even though for a constitutional purpose). In the instant case two distinct waterways are involved, namely: the Great Lakes-St. Lawrence system, and the Chicago-Illinois River system (if it may be called a waterway for navigation at all). It is not a case of improving one part of a river at the expense of the other, but of destroying a substantial portion of the navigable capacity of the one for the effecting of an unconstitutional purpose (sanitation) in the other.

2. Gibson v. United States, 166 U. S. 269.
   Purpose—Improving navigable channel (dike).
   Authority—Appropriation by Congress for work.
   Work—By and for government in use of river.

3. Scranton v. Wheeler, 179 U. S. 141.
   Purpose—Improving utility for navigation (pier).
   Authority—Appropriation act of Congress for specific work.
   Work—Pier—used by and for Federal Government in use of channel.

4. C. B. & Q. v. Illinois, 200 U. S. 561.
   Purpose—Enlarging and deepening water-course (drainage).
   Authority—Specific act of Illinois Legislature authorizing work.
   Work—By and for State and municipal subdivision.

5. West Chicago Street Railway v. Illinois, 201 U. S. 506.
   Purpose—Deepening navigable channel.
   Authority—Special act of Congress for specific work.
   Work—By and for Federal Government in use of river.

6. Union Bridge Company v. United States, 204 U. S. 364.
   Purpose—Improving navigable capacity—for larger vessels.
   Authority—Section 18 of the Act of March 3, 1899.
   Work—By and for Federal Government in use of river.

7. Philadelphia Company v. Stimson, 223 U. S. 605.
   Purpose—Improvement of navigation (harbor lines).
   Authority—Section 11 of the Act of March 3, 1899.
   Work—By and for Federal Government in use of river.

8. Chandler-Dunbar Water Company v. United States, 229 U. S. 53.
   Purpose—Deepening and clearing of St. Mary's River.
   Authority—Special Act of Congress, March 3, 1909.
   Work—By and for Federal Government.

9. Jackson v. United States, 230 U. S. 1.
   Purpose—Improvement of channel (dike).
   Authority—Specific act of Congress for work on Mississippi River.

Work—By and for Federal Government in use of river.

10. Greenleaf-Johnson v. Garrison, 237 U. S. 251.
Purpose—Improvement of channel (harbor lines).
Authority—Section 11, Act of March 3, 1899.
Work—By and for Federal Government in improvement of channel.

11. Willink v. United States, 240 U. S. 572.
Purpose—Improvement of navigable channel (harbor lines).
Authority—Section 11, Act of March 3, 1899.
Work—By and for Federal Government in use of channel.

12. Horstmann Company v. United States, 257 U. S. 138.
Purpose—Irrigation project.
Authority—Special Act of Congress for specific work.
Work—By Government for improvement of channel.

13. United States v. River Rouge, 269 U. S. 411.
Purpose—Improvement of navigable channel (eminent domain).
Authority—Act of Congress, Rivers and Harbors appropriation for specific work.
Work—By and for Federal Government in improvement of channel.

From the foregoing it appears that in each case there was an *affirmative act of Congress* reposing authority in the Secretary of War to do the particular work in question, either by specific act outlining the work itself, such as occurred in Chandler-Dunbar Water Company v. United States, *supra*, or by appropriations for the particular work such as occurred in Scranton v. Wheeler, *supra*, or by Sections 11 and 18 of the Act of March 3, 1899, affirmatively reposing discretionary authority in the Secretary of War to determine whether or not a bridge was in fact an obstruction to navigation. In each case there was an affirmative act of Congress delegating authority to the Secretary of War to do the particular work which was done, whereby the alleged damage occurred.

In each of the foregoing cases another singular circumstance is worthy of mention. It was *admitted* that the work was an improvement, betterment, or advancement *for navigation,* and even in South Carolina v. Georgia, *supra,* it was frankly admitted that *navigation* in the southern channel would be improved to the point where that channel would be navigable for large boats which could not previously have used either one of the two branches because both divided the available navigable capacity of the river, and it was conceded that the result of the particular work engaged in by the Secretary of War was *beneficial as a matter of fact to navigation.* In the instant case, on the contrary, we search the record in vain to find any claim that *navigation* is improved in either the Great Lakes or in the Chicago-Illinois waterway. Hence each of these cases contains the unqualified major premise that the purpose was *for the improvement of navigation* in every respect.

In further contrast it is remarkable that in each of these cases the Federal Government undertook the work itself by or for *its own system* of river or harbor improvement. In none did it undertake to give authority to a *non-federal agency for a non-federally adopted waterway.* In the instant case, on the other hand, without any affirmative adoption of the artificial channel of the Chicago Sanitary Canal by Congress or by the Federal Government, and without any participation in the enterprise, except by inspection from time to time, a river has been diverted and reversed and large amounts of water abstracted from Lake Michigan for a strictly private or *non-federal enterprise.*

In United States v. Cress, 243 U. S. 316; 61 L. Ed. 746, many of these cases were reviewed. In that case, the court having held that the riparian proprietor had the right to have the water flow past his premises without burden or hindrance imposed by artificial means, and having held that if the government of the United States raised the water so as to overflow the lands of such riparian proprietor, it constituted a taking within the meaning of the fifth amendment to the constitution of the United States, entitling such riparian proprietor to compensation; and having cited with approval the case of United States v. Lynah, 188 U. S. 445; 47 L. Ed. 539, proceeded to discriminate all of the cases cited and relied upon by the defendant which had been decided prior to the decision in United States v. Cress. In that case it is said:

> "These cases have no proper relation to cases such as Gibson v. United States, 166 U. S. 269, 41 L. Ed. 996, 17 Sup. Ct. Rep. 578, where no water was thrown back on claimant's land, and the damage was confined to an interference with the access thence to the navigable portion of the river; Scranton v. Wheeler, 179 U. S. 141, 153, 45 L. Ed. 126, 133, 21 Sup. Ct. Rep. 48, which likewise had to do with the interruption of access from riparian land to a navigable channel; Bedford v. United States, 192 U. S. 217, 225, 48 L. Ed. 414, 417, 24 Sup. Ct. Rep. 238, where the damage to claimant's land resulted from operations conducted by the government 6 miles farther up the river; Jackson v. United States, 230 U. S. 1, 23, 57 L. Ed. 1363, 1374, 33 Sup. Ct. Rep. 1011, where owners of lands on the east bank of the Mississippi claimed compensation as for a taking of their property by reason of the effect of levees built on the west bank opposite their lands as a part of a system of levees designed to prevent crevasses, retain the water in the river and thus improve the navigation. In each of these, there was no direct invasion of the lands of the claimants, the damages were altogether con-

sequential, and the right to compensation was denied on that ground."

b. *In each of these cases cited by the Special Master the work caused an "incidental damage."*

A review of the cited authorities (M. R. 151) discloses that in all of them the work caused an "incidental damage." It is not necessary to review each one at length because they group themselves into definite divisions for consideration.

1. Cases involving harbor lines, piers and dikes which interfere with access to navigable channel by riparian or upland owner.

This class of cases involves an "incidental damage" because it is a casual, subordinate or minor result following a federal improvement. The main consideration is the benefit to navigation and if in the course of the principal work and as an incident thereof, *inconvenience* arises, it is an "incidental damage."

2. Cases involving removal of bridges, culverts and subways for the deepening and clearance of channels.

In this class of cases the private interests were bridging over or tunneling under a water course doing so knowing that the work was subject to the paramount right of the federal government to change or alter such obstructions.

3. The class of cases involving deepening, widening, narrowing and clearing a navigable channel.

In this class of cases the riparian owner is directly benefited by the Federally adopted improvement and any indirect inconvenience attendant upon such direct improvement is "incidental."

4. The class of cases represented by Horstmann Co. v. United States, 257 U. S. 138, respecting percolating waters.

In this class of cases percolating waters do not flow in fixed channels but are treated as part of the land and if a riparian proprietor is injured by being deprived of percolating waters or by being subjected to an increased flow, he has no right of action to recover damages because "there was no reason to believe that the construction of the government's works would cause the injury."

5. The class of cases where there has been a temporary overflow or diversion.

In the case of Sanguinetti v. United States, 264 U. S. 146, 149, it was said it must appear that there has been "an actual permanent invasion of the land, amounting to an appropriation of, and not merely an injury to the property." (M. R. 150, 151). But it will be noticed as the court pointed out in that case that mere injuries to property might not constitute a taking, but if the taking or overflow of the premises was a direct, natural and necessary result of the structure, and the land was so overflowed as to constitute an actual permanent invasion of the land amounting to an appropriation of it, or some part of it, then and in such case it constituted a taking of the property. In that case it was not shown that the overflow was a direct or necessary result of the structure complained of. It was not shown that there was any permanent impairment of value. It was not shown that it was an ousting of complainant from possession or a change in the character of the property or a permanent invasion of the land. In the instant case, on the contrary, there has been a direct, natural and necessary result. Six inches of all the surface of Lake Michigan have been definitely, actually and *permanently diverted,* abstracted and removed, amounting to an appropriation of that much of the navigable capacity of all of the ports and harbors and connecting waters, and amounting to a taking of that portion from fishing and hunting grounds, beaches at summer resorts, public parks, and other property rights of complainant and her people. This is not a *temporary* diversion of water. It has been *permanently* lost to the Great Lakes-St. Lawrence watershed (M. R. 23).

Where the agency through which a trespass is committed is permanent in character and such as to necessarily presuppose a continuance or repetition of the wrong, the injured party has the option of treating the damage as permanent, and as such to be recovered in a single action or through recourse to successive actions.—II. Farnham on Waters, Sec. 589.

This is not an action for damages but for an injunction to restrain the continuance of an unlawful abstraction and diversion of water, and where there has been a permanent abstraction of six inches of the water's surface of the Great Lakes and their connecting waters, which has been permanently taken by defendants, and where that taking continues and is proposed to be continued indefinitely, it constitutes a permanent taking for all purposes of the rule announced in the Sanguinetti case.

CONCLUSION.

The issues of this case are far reaching and vitally affect the interests of the whole nation. They are of a magnitude not easily exaggerated. More than one-half of the population and wealth of our nation are represented and directly concerned in the outcome of this case. Great industrial and commercial centers, directly affected by the diversion of these waters from Lake Michigan, are interested in these questions. The rights ~~of property of the~~ Lake States and their people depend upon the decision of the principles involved.

Outstanding above every other consideration is the maintenance of the *status quo* of the greatest inland water-way in the world. Whether this Great Lakes-St. Lawrence system shall be continued substantially as nature provided, for navigation and commerce, and so as to provide an opportunity for further development and improvement, whereby ocean traffic may be accommodated to and from the Atlantic Ocean, and other vast considerations, are involved in the protection and preservation of its *status quo*. If defendants can lower the levels of the Great Lakes system six inches, then they can lower these levels six feet so far as the question of principle is concerned. The one has already been determined by the Special Master to be a substantial interference with navigation, and the other would simply enlarge upon the amount of damage. In either event if defendants may substantially lower the levels of the Great Lakes, then the Dominion of Canada may enlarge the Welland Canal and lower the water of Lake Erie to the point where it would constitute a river instead of a lake. Likewise Canada could divert the water of the Great Lakes from Georgian Bay so as to affect the navigable capacity of all of the lakes and connecting waters; New York might open a waterway across that State to the New York Harbor; Ohio might divert water from Lake Erie across the State of Ohio into the Ohio River; and likewise each city on the Great Lakes might do what Chicago has done, and each State and the Government of Canada, acting independently, might vie with each other for the water of the Great Lakes, for their own particular purposes, until it might become a free-for-all contest for these waters.

It was the intention of the constitution and the laws made in pursuance thereof that these waterways should be preserved forever for the benefit of all of the people of all of the states and foreign governments who have occasion to use these waters for navigation, or in any other lawful manner. This unbridled desire by defendants, if held lawful, may lead to a multiplicity of diversions and excesses for private and local enterprises under the guise of navigation or some other claimed constitutional purpose which will soon take the entire navigable capacity of the Great Lakes and ruin this ancient highway of commerce.

The State of Michigan has no objection to the sanitary disposal of the sewage of Chicago, but it does object to defendants doing so at the expense of property rights of Michigan and her people, under the guise of improving navigation, which is a hollow sham used by defendants to cover up their real purpose of sewage disposal and water-power exploitation. The State of Michigan can have no objection to the ultimate consummation of plans for a waterway from Chicago to the Gulf of Mexico, but it objects to any masquerading of purpose by defendants until such a system of waterways is definitely, positively and affirmatively authorized, approved and adopted by the Congress of the United States, in which event considerations of national scope may be deliberated before any attempt is made to abstract the vital necessities of navigable capacity from the Great Lakes-St. Lawrence system, and donate them to a scheme of doubtful practicability. The State of Michigan does object, as it has a right to object, to the wilful, wanton and unconscionable taking of its property without just compensation for the purposes of carrying out either sewage disposal or water-power projects, and especially in the absence of any affirmative act of Congress. Michigan contends that under the constitution and laws of the United States it is entitled to the natural and normal flow of the waters of the Great Lakes and their connecting waterways and that this constitutes a property right; that any invasion of this right, to become authorized, must have some affirmative act of Congress definitely establishing such a far reaching policy of obstruction, and that nothing except an act of Congress can authorize the taking of these waters; and even assuming an Act of Congress authorizing the taking, the property so taken must be so compensated as to effect a constitutional diversion of the waters of Lake Michigan.

If there is to be a balancing of equities in arriving at a decision of the issues in this case, there certainly can be no fair comparison between the position of Chicago and that of complainant and her people.

Chicago has not played fair with either the Federal Government or the lake states in this abstraction of water. From the very beginning Chicago has demonstrated an utter disregard for the rights of sister states, as well as the Federal Government. As early as April 24, 1899, the United States District Engineer at Chicago said: (J. R. 133)

> "It is a strange fact that this city has expended or will expend over $30,000,000 with the intention of diverting an apparently unlimited amount of water from the Great Lakes to the Mississippi drainage area for sanitary purposes without finding out whether such diversion would be allowed by the great interests of the United States and the colonies of Great Britain along the chain of great lakes in the navigation of the rivers and harbors of the Great Lakes."

Defendants went into this matter with intention to abstract water from the Great Lakes without regard for the rights of others or the use being made of these vast waterways for navigation and commerce. Later, in 1908, when the abstraction had proceeded to the point where the Federal Government denied an application for an increase, the United States suffered the indignity of having its authority flouted and defied by Chicago. Accordingly, a bill of complaint was filed in the Federal Court at Chicago in 1908, to enjoin and limit the diversion within some bounds. Undeterred by the Government's action defendants continued to take increasing quantities of water from Lake Michigan for their own purposes. From 1908 until 1925 when this Court enjoined an unlawful diversion the War Department for fifteen years patiently abided Chicago's wilful abstraction. Defendants had the benefit of all that delay, making full use of their opportunity, with disastrous effects upon complainant's rights. At that time lack of a permit from the War Department did not bother defendants. In fact it never seems to have meant much to the defendants except as a defense in this case. Following the decision of this court in Sanitary District v. United States, 266 U. S. 405, on January 5, 1925, Chicago immediately changed front. Instead of defiance, it began urging its self-created exigency, claiming that pestilential conditions would result if the amount of its unlawful diversion were not legalized by permit. But had Chicago caused sewage disposal plants to be built years ago when other cities began, instead of using the waters of Lake Michigan as a cheap solution for its sanitary problem, it would not have necessitated an unwilling and reluctant permission from the Secretary of War to save the situation for "humanitarian reasons."

The plight of Chicago is not one, however, for defendants to address to the Secretary of War, nor even to this Court. The problem is one for Congress, (to the extent of its power) and is one for the demonstrated ingenuity of Chicago.

To establish an equity defendants have urged their expenditures.

> "The construction cost of these works, as it appears on the books of the Sanitary District of Chicago, to December 31, 1926, amounted to $83,689,636.42, and, with the addition of administration, legal, clerical and incidental expenses, and interest on bonds for construction, to $109,021,613.21." (M. R. 21.)

As to this situation this Court remarked in Sanitary District v. United States, 266 U. S. 405, 431:

> "The investment of property in the canal and the accompanying works took the risk that Congress might render it valueless by the exercise of paramount powers. It took the risk without even taking the precaution of making it as sure as possible what Congress might do."

But contrast with this claim of Chicago the millions of dollars of wealth represented by the states, ports, harbors, inner harbors, industrial enterprises, summer resort beaches, and countless other financial investments of the people residing upon the Great Lakes, directly or indirectly dependent upon the continuance of this great waterway system at its normal, natural level.

If exigency is to govern as is to be inferred from this language—

> "In considering the validity of the permit of March 3, 1925, the exigency as it then existed, must be considered." (M. R. 192.)

the "exigency" contemplated was an exigency in sanitation or sewage disposal. It was no exigency requiring water for *navigation* on the Chicago River or sanitary canal. Contrast this with the exigency which was created upon the Great Lakes and their connecting waters, which involved the property rights of millions of people and their ability to navigate the *critical points* in the connecting waters as well as countless harbors and inner harbors, beaches and other places where a definite *exigency in navigation* actually occurred. Hence the question is reduced to whether an exigency in sewage disposal is of more importance than an exigency in navigation, in considering constitutional purposes.

Balancing the equities of commerce and navigation on the Chicago River, Sanitary Canal and Illinois River, with that upon the Great Lakes and their connecting waters, we find: "the present commerce on the Illinois River is small. It appears that in 1925 the total commerce both ways was 96,080 tons, in the same year the total freight traffic over the Chicago drainage canal was 688,295 tons, 97 per cent of which consisted of stone, largely removed from the spoil banks along the canal." (M. R. 119.) On the other hand the commerce and navigation of the Great Lakes at the same time amounted to over 210,000,000 tons annually, and when the saving and cost of transportation by water from cost of transportation by land is over $150,000,000 annually it means that this amount computed at the rate of five per cent represents a saving on a capital investment of more than $3,000,000,000.

It would appear that none of the equities favor the defendants in their attempt to accomplish an unconstitutional object, and in taking the property of the people of the Great Lake states, without Congressional authority and without just compensation.

The issues of this case are principally questions of law to be decided by reference to the Federal Constitution and an act of Congress. Complainant contends that Congress is limited by the Constitutional restriction to a dealing with diversions for the protection, preservation and improvement of navigation; that this limitation restricts Congress and *a fortiori* the Secretary of War from authorizing obstructions in navigable waters for the purposes of sewage disposal and water power development. But even assuming Congress has power to deal with diversion of these waters, we contend it has not exercised that power by any affirmative act. Section 10 of the Act of March 3, 1899, instead of giving affirmative authorization, is a positive prohibition of power to authorize any obstructions to navigable capacity without an affirmative act of Congress. Instead of a grant of power to the Secretary of War to authorize obstructions, it constitutes an express limitation upon his right to act. The constitutional authority of both Congress and the Secretary of War is subject to the limitation of the 5th amendment prohibiting the taking of complainant's property and that of her people, without due process and just compensation. Any invasion of that right by Congress or the Secretary of War is an invasion of the property right guaranteed to complainant and her people by the Constitution.

Defendants claim the right to abstract these waters under a permit from the Secretary of War which depends entirely for its validity upon the power of that officer to authorize the creation of an obstruction to navigation in the Great Lakes. Certainly no act of Congress can be pointed to expressly giving this power to the Secretary of War, but it is claimed that section 10 of the Act of March 3, 1899, *intends* the delegation of such a power. It is admitted that this is the only act that can even be claimed to have that effect. *But section 10 expresses a prohibition against the creation of any obstruction to navigable capacity as strongly as language can be used to accomplish that object.* Congress could not express any more plainly and unmistakably its desire to assert and retain exclusive control over obstructions to navigable capacity than to say that:

> "The creation of *any* obstruction not affirmatively authorized by Congress to the navigable capacity of any of the waters of the United States is hereby prohibited."

If language means anything at all in following the legislative direction, this statute expresses as plain a prohibition as a legislative body could express. It did not deal with weasel words such as "disapprove." Its expression was couched in no uncertain terms when it said *"is hereby prohibited." This section was an express prohibition to every State and municipal government, public and private corporation, individual and officer, everywhere and under every circumstance. Con-*

gress intended that it alone should deal with abstructions to navigation before they were to be authorized.

Defendants have argued that the second and third clauses qualify the meaning of the first clause so as to give to the Secretary of War this power to authorize obstructions, but the second and third clauses contain additional express prohibitions and not a single affirmative authorization. In fact the whole section deals with express prohibitions,—three in number. *To say that three express prohibitions furnish an express or implied grant of power would be to adopt a rule of construction which has never before been laid down by this Court.* It would amount to holding that Congress meant an affirmative when it used three negatives, and *that where Congress said that all obstructions were prohibited it meant that all obstructions were not prohibited, but that some were prohibited and some were authorized.*

To derive a grant of power of this vast nature, which affects the lives and property of millions of people, influences the future prosperity of great commonwealths, and opens up a controversy involving international relationships with a foreign government, there should at least be a clear foundation in the language of Congress. But here, without other than three express prohibitions, it is attempted to derive a power which is "as broad as the power of Congress itself." Is this Court ready to use this sort of construction for a statute which is a limitation and restriction upon obstructions to navigation and does not contemplate any grant of power except by the affirmative authorization of Congress? If this statute were construed to derive a power by grant from Congress to the Secretary of War, it would constitute the greatest power which the War Department has received with relation to peacetime projects, and would transfer from Congress to the Secretary of War legislative powers over all navigable waters.

Defendants seek to save the city of Chicago from expenditure for sewage disposal. Abatement of this abstraction would compel Chicago to take care of its own sewage at its own expense. But this would have the disadvantage of being expensive and the water power income would also cease, so Chicago is determined to go ahead and continue its wilful and unconscionable diversion of the waters of the Great Lakes-St. Lawrence Waterway System, for its own selfish and limited purposes. All hope that Chicago will voluntarily treat its sewage, forego its water-power profits and stop this enormous abstraction have long since vanished. Complainant and other lake states have been forced to act, just as the Federal Government was forced to preserve what had not already been taken by Chicago. Defendants have not dealt fairly. Their conduct has been inequitable and unconstitutional. We respectfully ask that this Court enjoin defendants from diverting and abstracting these waters in accordance with the prayer of the Bill of Complainant.

Respectfully submitted,

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Complainant.

Dated Lansing, Mich., Feb. 7th, 1928.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11.

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In the Supreme Court of the United States

OCTOBER TERM, A. D. 1927.
No. 7 ORIGINAL,
HEARD WITH NOS. 11 AND 12 ORIGINAL.

STATE OF WISCONSIN, STATE OF OHIO,
STATE OF PENNSYLVANIA and STATE OF
MINNESOTA,
Complainants,

vs.

STATE OF ILLINOIS AND SANITARY
DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF TENNESSEE,
STATE OF KENTUCKY, STATE OF ARKANSAS,
STATE OF MISSISSIPPI AND STATE OF LOUISIANA,
Intervening Defendants.

BRIEF FOR COMPLAINANTS IN NO. 7 ORIGINAL.

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52 A

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STATE OF MISSISSIPPI AND STATE OF LOUISIANA,
Intervening Defendants.

BRIEF FOR COMPLAINANTS IN NO. 7 ORIGINAL.

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In the Supreme Court of the United States

OCTOBER TERM, A. D. 1927.
No. 7 ORIGINAL,
HEARD WITH NOS. 11 AND 12 ORIGINAL.

STATE OF WISCONSIN, STATE OF OHIO,
STATE OF PENNSYLVANIA and STATE OF
MINNESOTA,
Complainants,

VS.

STATE OF ILLINOIS AND SANITARY
DISTRICT OF CHICAGO,
Defendants,
STATE OF MISSOURI, STATE OF TENNESSEE,
STATE OF KENTUCKY, STATE OF ARKANSAS,
STATE OF MISSISSIPPI AND STATE OF LOUISIANA,
Intervening Defendants.

BRIEF FOR COMPLAINANTS IN NO. 7 ORIGINAL.

This original action was begun by the State of Wisconsin in 1922 against the State of Illinois and the Sanitary District of Chicago. In October 1925, leave was granted by the court to file an amended complaint joining the States of Minnesota, Ohio and Pennsylvania as complainants. On January 4, 1926, the defendant, State of Illinois, filed its motion to dismiss and the Sanitary District of Chicago filed its answer and motion to dismiss. On January 25, 1926, the so-called River States, being the States of Missouri, Tennessee, Kentucky and Louisiana, filed a motion to be admitted as intervening defendants and to dismiss the bill of complaint. On November 1, 1926, the states of Arkansas and Mississippi filed motions to be admitted as intervening defendants and to adopt the answer heretofore filed. As the record indicates, Original Action No. 11 was begun by the State of Michigan, Complainant, vs. the State of Illinois and the Sanitary District of Chicago, Defendants, on the 8th day of March 1926, and Original Action No. 12 by the State of New York, Complainant, vs. the State of Illinois and the Sanitary District of Chicago, Defendants, on October 22, 1926. Similar motions to dismiss were addressed to these bills. The motions to dismiss were argued and overruled.

By its order in No. 7 Original, this Court on the 7th day of June 1926, referred the cause to Charles Evans Hughes, Esquire, as Special Master, with directions and authority to take the evidence and to report the same to the Court with his findings of fact, conclusions of law, and recommendations for a decree—all subject to an examination, consideration, approval, modification or other disposal by the Court.

In the order of June 7, 1926, the court authorized the parties in No. 11 Original, being the State of Michigan vs. State of Illinois, and Sanitary District of Chicago, if they so elected, to participate in the taking of evidence and in the hearing before the Special Master, in like manner and in like effect as if that suit had been consolidated. By later order, on November 23, the court authorized the parties in No. 12 Original, being the State of New York vs. the State of Illinois and the Sanitary District of Chicago, likewise to participate.

The parties in Nos. 11 and 12 Original did elect to participate in the hearings and between November 8, 1926, and June 3, 1927, extensive hearings were had before the Special Master in accordance with the orders of the court, and the report of the Special Master was duly filed. Whereupon, pursuant to orders of the court, exceptions were filed to the report of the Special Master and this brief is filed to sustain the exceptions filed by the complainants, the States of Wisconsin, Minnesota, Ohio and Pennsylvania in No. 7 Original. This brief deals first with the facts and second with the law of the case.

STATEMENT OF AND ARGUMENT ON THE FACTS.

I.

THE NATURAL CONDITIONS WHICH OBTAINED IN THE GREAT LAKES-ST. LAWRENCE WATERSHED.

1. The Natural Waterway.

The Great Lakes-St. Lawrence system is a natural waterway, consisting of Lake Superior, St. Marys River, Lake Michigan, Lake Huron, St. Clair River, Lake St. Clair, Detroit River, Lake Erie, Niagara River, Lake Ontario and the St. Lawrence River. It constitutes one of the principal topographical features of the complainant States. It was navigable in a state of nature, and its navigable capacity has been improved by local, Federal and Canadian agencies. Under natural conditions all of the waters of the Great Lakes-St. Lawrence system discharged Eastward through the St. Lawrence River into the Atlantic Ocean.

2. Total Shoreline and Drainage Area of Lake System; Portion Lying in Illinois; Natural Contribution of Illinois to Net Water Supply.

This waterway has a shore-line of 8300 miles, of which only about 60 miles lie within the State of Illinois, *Master's Report 107. Exhibit 78.*

The total land area of the Great Lakes-St. Lawrence drainage basin is 202,910 square miles, of which only 715 square miles lie within the defendant State of Illinois. *Master's Report 86. Exhibits 79, 80.*

Under natural conditions the mean annual contribution of the State of Illinois to the net water supply of this system was 503 cubic feet per second. *Master's Report 23.*

3. Natural Flow of Rivers Affected by the Diversion.

In a state of nature the Chicago River, the Little Calumet River and the Grand Calumet River flowed into Lake Michigan and contributed to the water supply of the Great Lakes-St. Lawrence system. *Master's Report 10-11.*

The Des Plaines River lay on the Westward side of the continental divide at Chicago. However, under natural conditions part of the flood waters of the Des Plaines River spilled over the continental divide near Chicago and constituted a part of the water supply of the Great Lakes-St. Lawrence system. *Master's Report 11.*

II.

THE CHANGES PRODUCED BY THE SANITARY DISTRICT OF CHICAGO IN THE NET WATER SUPPLY AND FLOW OF THE RIVERS AND LAKES OF THE GREAT LAKES-ST. LAWRENCE SYSTEM.

1. The Effect of the Construction of the Main Channel.

During the period from 1892 to 1900 the Sanitary District, acting as an agency of the State of Illinois, cut through the continental divide between the Mississippi River watershed, and the Great Lakes-St. Lawrence watershed at Chicago by constructing an artificial channel from the Chicago River to the Des Plaines River for the purpose of carrying the sewage of Chicago across the divide into the Des Plaines and Illinois Rivers. On January 17, 1900, the Sanitary District turned the waters of the Chicago River and Lake Michigan into this artificial channel, since which date the Chicago River has been continually reversed by the acts of the Sanitary District, so that its waters no longer flow into Lake Michigan, but, together with a substantial portion of the waters of Lake Michigan, have flowed Westward into the Mississippi River. *Master's Report 18-19.*

2. Interference with Flow of the Des Plaines River.

Subsequent to the opening of the drainage canal the Sanitary District constructed works which prevented the flood waters of the Des Plaines from overflowing into the Great Lakes-St. Lawrence basin and thus deprived that basin of its water supply. *Master's Report 23-24.*

3. Effect of the Construction of the Calumet-Sag Channel.

Between the years 1911 and 1923 the Sanitary District of Chicago constructed a second artificial channel from the Little Calumet River to the main drainage canal near Sag. This channel was opened in 1923 and since that time the Little Calumet River has been reversed under normal conditions so that its waters no longer flow into Lake Michigan, but, together with a portion of the waters of Lake Michigan, flow Westward into the Mississippi River. *Master's Report 21.*

4. Extent of the Abstraction.

Subsequent to January 17, 1900, the quantity of water which was being abstracted from the Great Lakes-St. Lawrence watershed, and caused to flow Westward into the Mississippi River through the aforesaid artificial channel, constantly increased until it reached a mean annual maximum of 9465 cubic feet per second in 1924, and thence fell to an average of approximately 8250 cubic feet per second for 1925 and 1926. *Master's Report 22-23.* The lesser flow in 1925 and 1926 was occasioned by the fact that lake levels had fallen so low that the Sanitary District found it physically impossible to draw a greater quantity of water through its existing channels in their then condition through those years. *Joint Abstract 123, 185.* The Sanitary District is now dredging the Little Calumet River to increase its discharge capacity and obviate this difficulty. The foregoing total flow of water through the drainage canal has passed into the Mississippi watershed and has been permanently lost to the Great Lakes-St. Lawrence system. *Master's Report 23.*

5. Extent of the Right of Abstraction Asserted by the Sanitary District.

The Sanitary District of Chicago, by reason of an alleged Permit or consent of the Secretary of War, bearing date March 3, 1925, now asserts the right to abstract from the Great Lakes-St. Lawrence watershed an annual average of 8500 cubic feet per second of water, plus the domestic pumpage of the City of Chicago, which, under the conditions obtaining in 1926, constitutes an assertion of right to abstract a mean annual average of 9900 cubic feet per second of water from the Great Lakes-St. Lawrence watershed. *Master's Report 23, 85, 95. Joint Abstract 12*[illegible] *170, 182.*

Since the domestic pumpage of Chicago shows a steady and rapid increase, there is no definite limitation of this claim of right to abstract these waters. *Master's Report 23.* An effort is sometimes made by the defendants to differentiate between the domestic pumpage of Chicago and the diversion of the Sanitary District. The City of Chicago does not divert any water from the Great Lakes. But for the acts of the Sanitary District the domestic pumpage would return to the watershed from which it is taken in the customary and usual way where water is taken for domestic purposes. It is only necessary to state that if the controlling works of the Sanitary District were closed, none of the domestic pumpage of Chicago would be diverted. The constant increase in Illinois' demand for the abstraction of these waters is further shown by the fact that the area of the Sanitary District was increased from 185 square miles to 438 square miles during the period from 1890 to date. *Master's Report 17-18.*

6. Comparison of Annual Contribution of Illinois to Net Water Supply, with Extent of Abstraction.

The State of Illinois, acting through the Sanitary District of Chicago, is not only withholding its entire natural contribution to the water supply of the Great Lakes-St. Lawrence system, but has abstracted and is now abstracting therefrom approximately seventeen times the quantity of water which it would contribute under natural conditions to the net water supply of this waterway. It is asserting the right to divert approximately twenty times the annual contribution of the State of Illinois to such net water supply.

The State of Illinois is an upper riparian state. It requires no argument to show that the State of Illinois, acting through the Sanitary District of Chicago, is not only withholding the whole of its annual contribution, but is appropriating and abstracting water which was contributed by and originated in other states littoral to the Great Lakes, and which was drawn into the boundaries of the State of Illinois from the lower riparian states by the acts of which complaint is made.

III.

THE DAMAGES SUFFERED BY COMPLAINANT STATES BY REASON OF THE CHANGE FROM NATURAL CONDITIONS OF THE GREAT LAKES-ST. LAWRENCE WATERSHED PRODUCED BY THE ACTS OF THE SANITARY DISTRICT OF CHICAGO.

The damages which have been caused and are being caused by the abstraction of the waters of the Great Lakes-St. Lawrence watershed by the Sanitary District of Chicago are large, widespread and varied, as might well be anticipated from an act which, without regard to or for the rights of the seven other States of the union and the foreign nation littoral to this waterway, undertook in a substantial degree to upset the balance of nature in a waterway with over 8300 miles of shoreline and a drainage basin of approximately 300,000 square miles. *Master's Report 86, 107.* Since this suit is not for the recovery of money damages, it has not been necessary to prove with precision the extent or pecuniary measure of the damages suffered, but merely to point out their nature and serious character, although in some cases their extent has been shown.

The Special Master has found that the complainant States and their people have sustained substantial damages by reason of the diversion through the Chicago Drainage Canal. *Master's Report 105-118.* It is our purpose here to point out the widespread character and varied nature of these damages. The damages to the complainant States and their peoples, which have been caused and are being caused by the Chicago abstraction fall into three general classes: 1st, the direct damages to navigation; 2nd, the damage to riparian property of a non-navigational character; and 3rd, the damages to the proprietary and quasi-sovereign rights of the complainant States.

1.

Direct Damage to Navigation and Navigation Interests.

The report of the Special Master establishes that the diversion has caused a lowering of six inches in Lakes Michigan and Huron, and five inches in Lakes Erie and Ontario, which lowering affects to the same extent the connecting and outlet rivers and all inner harbors, bays, inlets and river mouths along the respective shore lines of these waters. *Master's Report 104.* This artificial lowering has increased the hazards and dangers of navigation and contributed to groundings and strandings, which damages are even more serious when natural conditions produce low lake levels. *Master's Report 116.*

This artificial lowering affects both interstate and intrastate commerce over these waters. It decreases the carrying capacity of the large lake vessels which carry 95% of the freight, by from 540 to 600 tons per cargo. *H. D. 270, 69th Cong. 1st Sess. p. 24, table 7, cited Master's Report 113, Master's Report 114, 115.* At the average freight rate found by Colonel Markham it decreases the revenue of a boat $528 per cargo. *Master's Report 114.* This must be reflected in transportation costs to the people of the complainant States. This loss is more serious because it is the last part of the cargo, the surplus over running expenses and fixed charges, which gives the profit. Thus the obstruction of the navigable capacity of all of these waters casts a tremendous burden upon both interstate and intrastate commerce thereon. The extent of this burden may be appreciated by illustration. The average loaded freight car in the United States carries 30 tons. If Illinois were to pass an enforcible law requiring every freight train operating in the complainant States, for the purpose of transporting the products of their mines, fields and factories, to carry at its back twenty empty freight cars, and require each of the additional freight trains, which would have to be placed in operation to make up for this economic loss, to likewise carry twenty empty freight cars, the effect thus produced upon land transportation in the complainant States would be the same as the effect which has been produced on the lakeborne commerce of the complainant States by the obstruction of the navigable capacity of those waters through the extraterritorial operation of the laws of Illinois.

There are 400 harbors on the Great Lakes, of which 100 have been improved by the Federal Government. *Master's Report 107.* However, the Federal improvements consist only of a channel from deep water in the lake to the harbor entrance. *Master's Report 107.* The inner harbors, which are the real harbors, and indispensable to practical navigation, have been provided and maintained at local, private and municipal expense. *Master's Report 107.* However, the depth of water in these private and municipal inner harbors is directly dependent upon the level of the respective lakes and their connecting waters. *Master's Report 107.* As an illustration Milwaukee and Cleveland have each spent over $4,000,000 on their inner harbors. The extent of private expenditure is immense but not definitely ascertainable. This artificial lowering of the lakes has obstructed the navigable capacity of these channels and harbors, both improved and unimproved, so as to seriously damage their value and utility. Where harbors were somewhat shallow in any event, their usefulness has been practically destroyed.

The enormous extent of this direct damage to navigation interests in the complainant States can be judged from the fact that the lake commerce in 1925 exceeded 210,000,000 cargo tons and constituted 44% of the total waterborne commerce, both foreign and domestic, of the United States. *Joint Abstract 185-186.*

Since practically all of the commerce of Lake Superior ports is to and from the lower lakes, the value and utility of these ports are equally affected and damaged by this artificial lowering. *Master's Report 108-110.* This impairment of navigable capacity directly damages the great shipping interests of these states by substantially lessening the value and utility of vessels carrying 95% of the freight. *Master's Report 114, 116.* In fact, it affects all vessels, because the smaller vessels usually ply between ports of restricted draft where the larger vessels cannot enter.

In addition to the effect on the general lake trade, this artificial lowering very seriously damages, interferes with and obstructs the navigable capacity and use of small unimproved harbors, landings, bays, inlets, river mouths and shallow sheltered waters, which are used by pleasure boats, fishing boats and other small craft, and which are of great value for such purposes.

Directly from this damage to navigation flows great and incalculable damage to the economic welfare and the economic structure of these states. On the one hand the lake borne coal constitutes 70% of the commercial, industrial and domestic fuel supply of Minnesota, and 60% of the commercial, industrial and domestic fuel supply of Wisconsin. *Exhibit 102, p. 19. Master's Report 110.* On the other hand, lake transportation enables the coal-mining industries of Pennsylvania and Ohio to market large quantities of their output in those states and in other states of the Northwest. *Master's Report 110.* Their market area is directly circumscribed by the cost of transportation. This obstruction of the navigable capacity of these waters by the Sanitary District has placed a substantial burden upon the prosperity and welfare of these industries and the large number of people who are producers or consumers of this coal.

Likewise, Minnesota, Wisconsin and Michigan produce 85% of the iron ore mined in the United States, of which 97% is marketed by water over the Great Lakes in the great steel centers on and near the lower lakes of which the larger part is used in the steel industries of Ohio, Pennsylvania and New York. *Exhibit 102, p. 15 Master's Report 109-110.* Thus the iron miners of Minnesota, Wisconsin and Michigan depend upon this waterway to market their ore, while the steel mills of Ohio, Pennsylvania and New York depend upon this economical transportation of raw material for their very existence. This artificial obstruction of the navigable capacity of this waterway burdens and injures all the people engaged in iron mining in the upper states and also those engaged in the steel industries in the lower states.

The same situation exists with reference to the marketing of grain and dairy products of Wisconsin and Minnesota, and the use of these products as a source of food supply by the people in the great centers of population in Ohio, Pennsylvania and New York. *Exhibit 102, p. 21, 22. Master's Report 108-109.* The situation is well summarized in the official report entitled "Transportation on the Great Lakes," described at page 106 of the Special Master's Report, which states, at p. 419:

> "They (the Great Lakes) permit the grain of the Western prairies and the Canadian provinces to reach Eastern mills and ports of export at substantial savings, compared with all-rail routes. They have brought into economic juxtaposition the ores of Minnesota and Wisconsin with the steel mills of the Lake Michigan, Lake Erie and Pittsburgh districts, and they have enabled the Northwest to secure at very great savings the fuel required for the maintenance of its commerce, industry, and domestic life."

2.

Property Damage of a Non-Navigational Character.

The direct damage to property other than navigation interests is immense. The artificial lowering of lake levels, produced by this abstraction, has caused great damage from decay and loss of support to the millions of dollars worth of docks, wharves and piers in harbors and landings along the shorelines of the complainant States on these waters. *Master's Report 117-118.* Thus the International Joint Board of Engineers found that the artificial lowering had caused a damage of $1,800,000.00 to dock walls alone in Montreal harbor where the lowering is less than on the lakes. *Master's Report 131, 98.*

It has substantially damaged the riparian property along the hundreds of miles of shoreline of the complainant States. The large investments in commercial summer resorts, private summer cottages and homes in the greatest summer resort region of Wisconsin, covering many miles of shoreline, have been seriously damaged and depreciated by this artificial lowering and recession of the waters. This causes a continuing injury to the welfare and prosperity of the people of the state dependent upon the summer resort business for a livelihood. Extensive damage has been caused to fishing grounds, spawning beds, hunting grounds and open marshes which were the natural habitat of valuable and extensive wild life. *Master's Report 117.*

The lowering of the water table adjacent to the lake has caused and continues to cause serious damage to millions of dollars worth of buildings in the retail and wholesale sections of Milwaukee by causing pile foundations on which these buildings rest to decay and give away. *Master's Report 117-118.* This condition exists not merely along the waterfront, but for 4 or 5 blocks back from the lake and the shores of the three diverging rivers which form the harbor at Milwaukee.

The artificial lowering of the water has likewise substantially damaged all the industrial and domestic private and municipal water supplies along the lakes. The artificial lowering of lake levels obviously affects the capacity and useful life of all private and municipal pumping plants, and in many cases constitutes the critical element requiring reconstruction at great expense. It obviously increases the cost of pumping.

3.

Damage to the Proprietary and Quasi-Sovereign Rights of the Complainant States.

The third class of damage is to the proprietary and quasi-sovereign rights of the complainant States. The States have suffered damage to their parks and fish hatcheries located on the lake shores and as consumers of lakeborne coal for public buildings and institutions. *Master's Report 117.*

The State of Illinois has appropriated a substantial portion of the public waters which belonged to said States in their sovereign capacities and has laid bare a portion of the submerged lands beneath said waters which belonged to said States in their quasi-sovereign capacities. The State of Illinois has appropriated the property of complainant States and through extra-territorial legislation has appropriated and confiscated the property of the citizens of complainant States against the will of those sovereignties from whom alone such property rights flow without compensation, and thus has invaded the territorial and quasi-sovereign rights of said States.

4.

The Continuing Character of the Damages Inflicted.

The foregoing damages and injuries are continuing and annually recurring damages and injuries which will continue so long as the Chicago abstraction is not abated.

The question now presented is whether such injuries can be inflicted upon the complainant States and their peoples against their will and without compensation.

IV.

THE SANITARY DISTRICT THREATENS TO CAUSE A SUBSTANTIAL INCREASE IN THE DAMAGES SUFFERED BY COMPLAINANT STATES AND THEIR PEOPLE.

Under the terms of the Permit of March 3, 1925, the Sanitary District of Chicago asserts the right to abstract 8500 cubic feet per second of water, plus the domestic pumpage of the City of Chicago. *Master's Report 95. Joint Abstract 170.* This will permit an increase of the abstraction of over 1500 cubic feet per second and such increase will cause additional lowering in the lake levels of about one inch. *Master's Report 105.*

The assertion of this right threatens a further substantial increase in the extent of the various kinds and types of damage to the complainant States in their various capacities and the peoples of those States, in addition to the damage which has already been and is being inflicted.

V.

THE INSTANT DIVERSION AND THE DEMAND THEREFOR HAS BEEN AND IS SOLELY FOR SANITARY AND POWER PURPOSES.

1.

Sanitation is the Sole Purpose of the Diversion Outside of the Power Desires of Illinois and the Sanitary District.

An examination of the origin of this diversion, coupled with all of the requests to increase the flow from time to time, together with the recommendations thereon of the members of the Corps of Engineers and the reluctant consents given from time to time by the various Secretaries of War, conclusively establishes that the diversion was created on the one hand by the Sanitary District of Chicago, solely for sewage disposal although coupled with a powerful underlying motive since 1907 to increase the flow for water power purposes, and permitted on the part of the various Secretaries of War solely to meet a case of alleged sanitary necessity with obvious reluctance because of the definite knowledge that such diversion was seriously injurious to navigation.

In 1870 Illinois adopted a constitution which forbade the State to loan its credit or make appropriations in aid of canals. *Joint Abstract 127-128.*

It was while this was the declared policy of the State, laid down in its fundamental law, that the legislation authorizing the construction of the drainage canal was passed, the main channel constructed and the abstraction commenced. The attitude of the State was further disclosed by the joint resolutions passed in 1881 and 1887, which betrayed only the fear of the rest of the State for the health and prosperity of the people of the Illinois Valley, if the Chicago plan to dump its sewage into the

Illinois Valley were carried out. *Joint Abstract 128-130.* There is no suggestion of navigation in the resolutions of 1887, which provide for the appointment of the committee to make the investigation from which the Sanitary District Act eventually evolved. It will be argued that the Resolution of May 28, 1899, which was a memorial to Congress, and which was adopted practically simultaneously with the Sanitary District Act, established a navigation interest. *Master's Report 16, 17.* However, the third paragraph of this memorial lets the cat out of the bag. The United States is requested to pay for the construction of a proposed channel from Chicago to Lake Joliet, to dispose of Chicago's sewage which could have no relation to navigation along that stretch. The plan there stated provided for a velocity of flow of three miles an hour and a depth of 22 feet, connecting with a project of seven feet in the Illinois and a project of six feet in the Mississippi River. Of course some excuse had to be offered for this bold effort to shoulder the cost of Chicago's sanitation project onto the Federal Government.

Something is attempted to be made of the fact that the Sanitary District of Chicago made certain improvements in the Chicago River in the North Branch, and in the South Branch, including the forks thereof. The improvements in the main Chicago River were solely to facilitate the abstraction of these waters, as appears from the Resolution adopted by the Board of Trustees, April 21, 1891. *Joint Abstract 131.* The application to the Secretary of War, dated June 16, 1896, stated that it was necessary to do this work in the Chicago River "to make available the artificial channel." *Master's Report 34.*

Likewise, the deepening of the South Branch and the East and West arms of the South Branch were to facilitate the abstraction of water and the discharge of sewage. In fact, a portion thereof was subsequently filled in by the Sanitary District, which could hardly be said to be in the interests of navigation. *Joint Abstract 132.*

The improvements in the North Branch were to facilitate the discharge of water through the North Shore channel. *Joint Abstract 132.*

In many cases, the dimensions had no relations to the draft of vessels using the river while the change in slope depreciated the value and utility of Federal improvements. *Joint Abstract 140.*

There is no single item of work performed in the Chicago River or its branches which was not solely for the purposes of facilitating the discharge of water and the use of the Chicago River as an open sewer. Of course, this conclusion would follow as a matter of course by reason of the fact that the powers of the Sanitary District, under the law of its creation, were limited to sanitary and drainage purposes.

The deepening of the main channel of the Chicago River to 21 feet by the Federal Government had no relation to this diversion. *Master's Report 58, 186.* The main channel is only one mile long. *Master's Report 10.* Analogous to the situation in many lake cities the main channel of the Chicago River constituted the harbor of the City of Chicago until its usefulness was destroyed by the currents introduced by the Sanitary District. The deepening of this harbor was part of the general plan of Government improvements on the Great Lakes where the channels and main harbors were deepened in an attempt to provide for 21 foot navigation. *Master's Report 113.*

A consideration of the reasons assigned by the Sanitary District in its requests for authority to abstract, the recommendations of the various District Engineers and Chiefs of Engineers thereon, together with the action of the various Secretaries of War on such applications conclusively establishes that the diversion has been sought and permissively authorized, if at all, solely as a sanitary measure in derogation of the rights of navigation. In addition to the various applications and Permits of the Sanitary District, which are set forth in the report of the Special Master, there has been set forth for the convenience of the Court the pertinent parts of all other applications, recommendations of District Engineers and Chiefs of Engineers and the action of the various Secretaries of War, from June 24, 1896, to March 3, 1925, in the Joint Abstract, pages 133-155 and 169-173. These applications, recommendations of the Federal Engineers thereon, and actions of the Secretaries of War may be searched in vain for a suggestion that this diversion was ever sought or permitted in the interests of navigation or was other than a detriment to navigation. Thus the early permits for the performance of work in the Chicago River were given on the condition that they should not constitute an approval of the plans of the Sanitary District of Chicago to introduce a current in that river with misgivings expressed in the various reports as to the authority of the War Department to authorize such an injury to navigation. *Permit July 3, 1896. Master's Report 34-35.*

Every application for diversion and recommendation thereon discloses an injury to navigation from the diversion, with no suggestion of benefit. We invite the attention of the Court to the recommendation of the District Engineer, April 24, 1899. *Joint Abstract 133-136.* In reporting upon the protest of the "Chicago River Improvement Association," with reference to the injury to navigation produced by the diversion, the Engineer suggests that a larger diversion might be permitted during the closed season of navigation, but recommends early action on the protest with a view to cutting down the diversion "as navigation will open within a few days." Surely this was a peculiar recommendation if the diversion were in aid of navigation. *Joint Abstract 136-137.*

On July 15, 1901, the Sanitary District applied for permission to increase the flow between the hours of 4 P. M. and 12 o'clock midnight, on the grounds that the increase would only affect the currents between 12 o'clock midnight and 6 A. M., during which time there was no navigation. *Joint Abstract 137.* On July 16, 1901, the District Engineer recommended this increase on the ground that there was practically no navigation during those hours and that the Sanitary District would give warning by publication of the increase during these hours as a protection to navigation. *Joint Abstract 137-138.*

In the application of October 16, 1901, the Sanitary District suggested that the improvements in the Chicago River would then permit a diversion of 300,000 c. m. f., without injury to navigation, but limited its request to 250,000 c. m. f. until the close of navigation in order to give the greatest consideration to navigation interests. *Joint Abstract 138.* On November 5, 1901, the Division Engineer reported that this diversion was solely for sanitary purposes; that complaints of injury to navigation therefrom had been loud and repeated and that the diversion should not exceed 250,000 c. m. f., and that a Permit for that flow should be conditioned that the Sanitary District should be responsible for all damages inflicted on navigation interests. *Joint Abstract 138-139.*

Shortly prior to January 17, 1903 the Sanitary District sought permission to increase the diversion to 350,000 c. m. f. during the closed season of navigation, on the ground that during this period navigation interests would not be injured by such increase. *Joint Abstract 140-141.* The District Engineer recommended the increase during the closed season of navigation, but recommended that it should be reduced to 250,000 c. m. f. on March 31, when navigation opened. *Joint Abstract 141.* Can it be contended in the face of this record that such diversions were had in the interests of navigation?

On January 16, 1907 the Chief of Engineers made a report upon the first application of the Sanitary District to construct the Calumet-Sag Channel, in which he states the great injury to navigation interests from this diversion, and that it had been uniformly held by his Department that no executive officer could authorize this diversion. *Joint Abstract 141-142.* On March 1, 1910 the then Chief of Engineers reaffirmed the view of his predecessor, denying the power of the Department to authorize such an obstruction and injury to navigation as this diversion. This construction of the power of the Department was further amplified in a report of the District Engineer, March 11, 1912, on the application of February 5, 1912, for permission to increase the diversion to 10,000 c. s. f., pending investigation of methods, devices or plans for the treatment of sewage. *Joint Abstract 143, 144-145.* The situation is excellently stated in the opinion of Secretary Stimson, rendered January 8, 1913, of which the portions not set forth in the report of the Special Master appear on pages 145 to 155 of the Joint Abstract.

Under date of November 9, 1920 the Chief of Engineers, in transmitting the Warren Report to the Secretary of War, stated:

> "* * * I concur, except so far as relates to the diversion to be permitted to be made by the Chicago Sanitary District. In respect to this, the trustees of the district have already been advised that the Chief of Engineers would not recommend to Congress any

> diversion greater than 250,000 cubic feet per minute, the limit set in the permit of the Secretary of War dated January 17, 1903, until the district had worked out and presented a suitable and comprehensive plan for treating its sewage so as to render it inoffensive and innocuous, and at the same time reduce to a minimum the quantity of water necessary for its dilution and transportation."

Surely such reduction would not be desired of a diversion for the benefit of navigation. The application of the Sanitary District, dated January 31, 1925, pursuant to which the present Permit was issued, stated that the diversion was desired, "for the purpose of preserving the lives and health of all of its people and the millions of others in constant daily contact with them". *Joint Abstract 158.* On March 2, 1925 the District Engineer at Chicago made his report upon the foregoing application. The pertinent portions of this report are set forth on pages 169-173 of the Joint Abstract. The purpose of the recommendations is stated to be to secure the greatest possible reduction of the diversion in the shortest time consistent with the alleged sanitary necessity, and this recommendation and report may be searched in vain for any suggestion that the diversion provided in the Permit of March 3, 1925, was in any degree for the benefit of navigation. The position of the Chief of Engineers with respect to the diversion, sought in the foregoing application, is stated in paragraph 6 of his report, as follows:

> "It is, of course, highly desirable that the excessive diversion of water from Lake Michigan be reduced to reasonable limits with the utmost despatch. For *humanitarian reasons,* it is impracticable to make the desired reduction instantaneously, and it is believed that the procedure proposed by the district engineer is the most reasonable and just to all concerned that can be adopted." *Master's Report 76.*

There was then issued the Permit of March 3, 1925, which looked not to the preservation of this diversion as an aid to navigation but to its reduction at the earliest possible time, to the least possible amount, for the purpose of minimizing the admitted damage occasioned to navigation thereby. The Permit is set forth on pages 77-80 of the Master's Report.

In the letter of transmittal appearing on page 80 of the Master's Report, the Secretary of War stated the position of the Department as follows:

> "This department has always held and continues to hold that the taking of an excessive amount of water for sanitation at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost despatch." *Master's Report 80.*

Previous thereto, and on February 2, 1922, the same Secretary of War in transmitting his recommendations concerning a pending bill relating to the Chicago diversion, stated:

> "It is my view that the quantity authorized should be limited to the lowest possible for sanitation, after the sewage has been purified to the utmost extent practicable before it is discharged into the sanitary canal." *Master's Report 71-72.*

From 1908 to 1925 the United States government prosecuted a suit to reduce the diversion. How can it be seriously contended that this diversion has been and is for any purpose other than to provide for the sanitation of Chicago?

In diplomatic correspondence with the government of Great Britain, under date of November 24, 1925, the Secretary of State, with reference to the Permit of March 3, 1925, solemnly assured the Canadian government,

> "* * * that the case before the Secretary of War for action involved the granting of a permit for diversion of water for sanitary purposes only, and that the instrument of authority was worded accordingly." *Joint Abstract 181.*

Is it contended that the purposes of the diversion is one thing in solemn diplomatic correspondence with a friendly nation and another thing in a controversy between sister States of the Union?

2.

Water Power Profits Have Become a Dominant Motive on the Part of Illinois and the Sanitary District.

With the passage of the Illinois Act of May 14, 1903 relating to the development of waterpower by the Sanitary District, a new and powerful motive for the Sanitary District to abstract the largest possible quantity of water from the Great Lakes entered the picture. *Master's Report 19. Joint Abstract 113.* At that time the Sanitary District embarked upon the production of electric power from its abstraction; and with the completion of the power house, commenced the manipulation of the flow for purposes of power development. *Master's Report 19, 24, 26.* The method and extent of the manipulation and abstraction for power is best shown by illustration. The Assistant Chief Engineer for the Sanitary District admits that the records for a typical December day show that between four and five o'clock in the afternoon, the flow at Lockport jumped from 269,000 c. m. f. to 589,000 c. m. f. and the power production from 9,900 kilowatts to 21,600 kilowatts. *Joint Abstract 124.* This manipulation of flow was occasioned by the fact that at that particular time of day in December the day and night power loads overlapped. Independently of the overlapping, the night power load was very much greater than the day power load. *Joint Abstract 124.*

This doubling of the flow in the late afternoon of each day varied with the season of the year, being dependent upon the time when the street lighting load came on in Chicago. *Joint Abstract 125.*

If the Sanitary District found a flow of 269,000 c. m. f. sufficient throughout the day, when the power demand was less and the sewage load greater, why was a flow of 589,000 c. m. f. required during the night when the sewage load was less but the power load greater, if power development was not a controlling factor with the Sanitary District?

This manipulation of flow for power purposes continued until 1925, when the power plant of the Sanitary District was cross-connected with the steam plants of the Commonwealth Edison Company, on an exchange of power basis. Since that time, both the water flow and the power production have been uniform. The Assistant Chief Engineer of the Sanitary District admits a uniform flow could have been maintained as easily before 1925 as since, if the flow had not been manipulated for power production. *Joint Abstract 124-125.*

If the low flow maintained in the daytime was sufficient for sewage disposal, then the more than doubled flow at night must have been for power.

On re-direct examination, the Assistant Chief Engineer attempted to minimize this manipulation for power by stating that it was merely a process of storing water in the lower end of the canal in the daytime and drawing it off at night. The witness finally admitted, when forced to answer the question by the Special Master, that such doubling of the flow during the night affected the current in the Chicago River by over 50% of the increase, by 7:00 o'clock the next morning, which increased current continued for three or four hours after closing the controlling gates at Lockport to accumulate the storage which had been drawn off during the preceding night. *Joint Abstract 126-127.* While this witness said he did not think such increase in the current of the Chicago River interfered with navigation it is obvious that it necessarily injured navigation.

The witness admitted that the storage of water in the lower end of the canal during the daytime for use for power purposes at night hindered the drawing off of storm water from the Chicago area in the event of floods, and that it was better to have the canal lower at Lockport. *Joint Abstract 127.*

One of the stock pleas of the Sanitary District for an abstraction of 10,000 c. s. f. has been and still is, that such a flow is necessary when the sewage is untreated to keep the Chicago River reversed in time of storm and that the flow must be continuous because it is impossible with the control at Lockport to increase the flow in sufficient time to prevent the reversals of the river in time of storm, if a smaller flow were maintained at Lockport at other times. Of course a change of place of control to a point nearer the lake would obviate this alleged difficulty. However, in any event, the sincerity of this plea is shown by the fact that the Sanitary District from 1908 to 1925 reduced the flow at Lockport to about 4167 c. s. f. through the day (in fact, at times much lower), and stored water for power purposes in the lower end of the canal which was then withdrawn at night. Apparently the matter of the reversal of the Chicago River in time of storm can be prevented satisfactorily with a flow much less than half of that claimed necessary throughout the long summer days, if it is necessary to do so in order to store water for the production of power.

Part of the power produced by the Sanitary District has been sold to commercial users and part has been used by the Sanitary District and allied municipal corporations of Illinois. The consulting engineer and former chief engineer of the Sanitary District states that the profit to the Sanitary District on power sold was about $29.00 per horsepower. *Joint Abstract 127.*

The argument is always made by the defendants that because the balance of this power is used by the Sanitary District and the allied municipal corporations of Illinois, there is no profit from such power. Such an argument does not seem to deserve an answer. Whether the power is sold to commercial users or consumed by the Sanitary District, the profit is the same. In the case of the power used by the district it is the difference between the cost of power to the district and what it would have to pay in the open market. The Chief Engineer of Illinois states that the power site of the Sanitary District has a net annual value of $870,000, with a capitalized value, at 4%, of eighteen or nineteen million dollars, and that if the diversion at Lockport were limited to the lockage water used for navigation, this power site would have no value. *Joint Abstract 122.*

The effect of the power motive on the demands of the Sanitary District for water was noted in the opinion of Secretary Stimson in 1913, when he said:

> "It is manifest that so long as the city is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage. This is particularly true in view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport." *Master's Report 65.*

With the adoption of a program, by the Sanitary District, of power development from the abstraction of the waters of Lake Michigan, the State of Illinois became interested. It suddenly decided to reverse its policy engrafted upon its fundamental law of 1870, forbidding the appropriation of money or the loaning of credit in the aid of canals. But this revision of policy was limited to a single waterway in the State and to that portion of such waterway from which valuable waterpower could be developed if a large quantity of water were abstracted from Lake Michigan. In suggesting the desirability of revising the old policy with respect to a particular section of a single waterway, the governor of the State pointed out in a message to the legislature that by undertaking this work the State would derive a net annual income of $3,000,000 a year from electric power, developed from the abstracted waters of Lake Michigan. *Joint Abstract 115.*

In 1908 the people of Illinois amended their constitution so as to provide for the construction of what is known as the Illinois waterway, and the appropriation of the waterpower thereof to the State. *Joint Abstract 115.* The Chief Engineer of the Illinois waterway stated that in adopting this amendment the voters of Illinois were influenced by the prospect of obtaining a net annual income of $3,000,000 by the abstraction of the waters of Lake Michigan. *Joint Abstract 120.*

Subsequently, the legislature of Illinois passed the Illinois Waterway Act of June 17, 1919, providing for the appropriation of the waterpower from Lockport to Utica. *Joint Abstract 116.* At the time when Illinois adopted the so-called Illinois Waterway Project and up to the passage of the River and Harbor Act of 1927, no agency, either state or federal, had made any improvements or had charge of the section from Lockport to La Salle. *Joint Abstract 116.* However, Illinois did not elect to improve this whole section so as to provide a connection between the Sanitary District canal and the head of the federal improvement at La Salle, Illinois. Instead, the section selected extended from Lockport down to a point just beyond the last available power site at Starved Rock, which is a little above Utica, and left an unimproved stretch of about seven miles from that point to the head of the federal improvement which would prevent any through navigation. *Report of Col. W. B. Judson, Joint Abstract 116. Woermann, Joint Abstract 119. Barnes, Joint Abstract 121.*

The Illinois waterway commenced at the first available power site southwestward from Lake Michigan and ended at the last available power site as one proceeds towards the Mississippi River. It includes all the available commercial power sites between Lake Michigan and the Mississippi River. *Joint Abstract 117, 119.*

United States Assistant Engineer, Woermann, a witness for the defense, testified that these power sites on the Illinois waterway would, in his opinion, be very valuable if there is a large flow of water from Lake Michigan, but if the flow from Lake Michigan were limited to the quantity needed for lockage purposes, these power sites would not have any value. The measure of their value is the amount of water that can be obtained from Lake Michigan. *Joint Abstract, (Woermann) 119.*

The Chief Engineer of the Illinois Waterway admits that the power sites at Lockport and at Brandon Road would not have any value if there were no diversion from Lake Michigan, except what was actually used for navigation. *Joint Abstract 122.* While he attempted to quibble with respect to the other power sites on the Illinois River, on the theory that there might be some power development even if the diversion were limited to the needs of navigation, since the Lockport lock has the highest lift and the lower locks would not need so much lockage water and the difference could be used for power, it is obvious that none of these power sites have any practical value unless a large quantity of water above the needs of navigation on the Illinois waterway can be obtained from Lake Michigan. *Joint Abstract 121-123.*

The evidence of the Chief Engineer of the Illinois Waterway shows that with the desired 10,000 c. s. f. abstraction from Lake Michigan, 34,800 horsepower can be developed at Lockport, 72,600 horsepower at the four state dams, and 11,500 horsepower at the Marseilles dam, where private interests claim some rights against the State. *Joint Abstract 120.* He states that on a very conservative estimate, the four state dams would produce a net annual income—under contracts whereby the lessees pay for the maintenance and operation of the plants—of not less than $1,815,000, with a capitalized value at 4% of $37,875,000, after deducting cost of the development. *Joint Abstract 120.* On the same basis, the power site at Marseilles, which appears to be in dispute between the State and private interests, would produce an additional net annual income of $287,500, with a capitalized value of over $7,000,000. *Joint Abstract 120.*

Including the income from the Lockport power site, this means a net annual profit from the abstraction of the waters of Lake Michigan to the State of Illinois and its agencies, of approximately $3,000,000. Any power company would be delighted to build the Illinois Waterway on such a basis. If the quantity of water diverted were restricted to the needs of navigation, these power sites would have no value and the profits would disappear. Can it be questioned that the attempt to obtain this huge income from the abstraction of the waters of Lake Michigan is a powerful and controlling factor in the demands of Illinois for a large abstraction of water?

The exaggerated claims of Illinois for water must be examined in the light of the power motive. It is extremely significant that it only amended its constitution to undertake or permit a single waterway improvement which commenced at the first available power site and ended at the last available power site and which left a stretch of seven miles unimproved between the lower end of the state project and the head of navigation on the federal project. Doubtless it would have been extended farther if there had been another power site.

VI.

ANY CLAIM OF A NAVIGATION PURPOSE FOR THE INSTANT DIVERSION FAILS.

1.

The Chicago diversion is injurious to navigation on the Drainage Canal and the Chicago River.

Since the Drainage Canal is on the same level as Lake Michigan, it is obvious that the only effect of cutting off the diversion would be to remove the current from the Drainage Canal, which would be a distinct advantage to navigation thereon. In this respect the District Engineer of Chicago, in his report entitled: "Diversion of Water from Lake Michigan", dated November 1923, stated:

> "So far as the navigation of the Chicago River and the Drainage Canal is concerned, if the flow at Lockport were throttled and the power house gates closed so as to permit no diversion from Lake Michigan, conditions would be decidedly improved." *Joint Abstract 179.*

2.

Past and present diversions have not been, and are not now, in aid of navigation on the Illinois Waterway; and if and when the Illinois waterway is ever completed any diversion in excess of 1,000 second feet will not be for the benefit of navigation on that waterway.

The Illinois waterway is nowhere near completion, and of course there is not now, and never has been in the past, any navigation thereon. Obviously past and present diversions cannot be for the benefit of navigation in any degree on the Illinois waterway. However, if and when that waterway may be completed, no diversion in excess of 1,000 second feet will be for the benefit of navigation thereon.

The Illinois waterway extends from Lockport, Illinois, to a certain wagon bridge about one and one-half miles above Utica. *Joint Abstract 116, 119.* It is conceded by everyone that the only feasible method of navigation over this stretch is on a slack-water system by means of locks and dams. Hence any water in addition to the amount necessary to provide lockage water is of no value to navigation on this waterway. If the water for lockage purposes is to be diverted from Lake Michigan the only question then is as to the quantity necessary to provide lockage water thereon.

The Chief Engineer of the Illinois waterway estimates the maximum capacity of this waterway at 60,000,000 tons per annum, although Federal Engineers have estimated the capacity to be somewhat larger. *Joint Abstract 57.* Colonel Keller, a retired army engineer, states that with locks of the size designed and being built in the Illinois waterway, a water supply of 1,000 second feet throughout the year, would be more than sufficient to accommodate a traffic of 100,000,000 tons annually. *Joint Abstract 3.* General W.

H. Bixby, retired Chief of Engineers, states that a water supply of 500 to 1,000 second feet will be more than ample to supply this waterway when it is completed, and that a large diversion would produce dangerous currents. *Joint Abstract 5, 6.*

The only other testimony with reference to the lockage requirements of the Illinois waterway is that of M. G. Barnes, Chief Engineer of the Illinois waterway, who testified on direct examination, that if and when this waterway should be used to its maximum capacity it would require 1500 c. s. f. for lockage purposes. *Joint Abstract 57.* However, on cross examination, he admitted that a water supply of 1,000 c. s. f. would permit 28½ lockages per day, and with open navigation throughout the year, would accommodate a commerce of over 93,000,000 tons per annum. *Joint Abstract 58.* He further testified that the time required for a lockage would be approximately one hour. *Joint Abstract 59.* If, as shown by his testimony, a water supply of 1,000 c. s. f. will permit 28½ lockages per day and it takes one hour to complete a single lockage, it is very difficult to understand his estimate that it would require 1500 c. s. f. to supply lockage for a maximum use of the canal. In the report of the Illinois River, (Illinois,) transmitted to Congress March 29, 1926, the District Engineer estimated the potential traffic along this route, if and when there should be a through 9-foot channel from Lake Michigan to the Lower Mississippi, at 7,515,000 tons per year. *Joint Abstract 64.* On this basis, even if Mr. Barnes had been correct in his estimate of the lockage water required for use on this waterway at its maximum capacity, the potential lockage requirements would have been less than 188 c. s. f.

Every official document which has spoken upon the subject of the requirements for lockage water upon such a waterway, has stated that 1,000 second feet would be more than ample. *Joint Abstract 40-44.*

The Special Master stated in his Report that a reduction in the diversion materially below 4167 c. s. f. would necessitate radical changes in the design and location of the locks on the Illinois waterway. *Master's Report 119. Complainant's Exception VIII.* While we believe the question immaterial, this conclusion is contrary to the evidence.

On this point the Chief Engineer of the Illinois waterway testified on direct examination that a reduction of the diversion to 1,000 c. s. f. would require a change in the design and construction of the locks. This statement, however, was based solely upon a legal quibble that the Illinois statute directed the locks to be 14 feet; and on cross examination the Chief Engineer of the Illinois waterway admitted that a reduction in the diversion to 1,000 second feet would not require any change in the plans or construction of the locks in the Illinois waterway to provide for a 9-foot waterway; that the only change that would be required would be a possible additional excavation in the channels or pools between the locks, because of the reduced slope in the pools, and that he could build a waterway based on the present plan with a 1,000 c. s. f. diversion which would accommodate boats drawing 9 feet. *Joint Abstract 56.* He estimated the increased cost of dredging the pools between the locks at $1,400,000.00, which is doubtless excessive. *Joint Abstract 56.*

Hence it is clear that no change in the design or construction of the Illinois locks or waterway would be required by the reduction of the diversion to 1,000 c. s. f. The Federal project on the Illinois River, up to the River and Harbor Act of 1927, provided for 7 feet. The project initiated in 1927 provides for 9 feet, which is the greatest depth ever recommended for the Illinois River. *Joint Abstract 5. Master's Report 85.* This makes a connection with the channel of 6 feet from the mouth of the Illinois to St. Louis. The futility of contending that any change is required in the locks of the Illinois waterway is obvious.

The approval of plans for the Illinois waterway was conditioned that it "did not authorize diversion of water from Lake Michigan through the waterway." *Joint Abstract 51.* The plan appears to have been based on a flow of 6,000 c. s. f., of which 4167 was derived from the amount provided in the then existing permit to the Sanitary District and the balance from local flow. It is now stated, (although we think it wholly immaterial), that the balance was made up of 1395 c. s. f., being the domestic pumpage of Chicago, and 500 c. s. f., being the low water flow of the natural waterway along the so-called Illinois waterway. This seems very peculiar, in view of the fact that the plans for the Illinois waterway were submitted by the Chief Engineer of the Illinois waterway in 1919, whereas the figure 1395 c. s. f. is taken from the domestic pumpage of Chicago for 1926, and the same Chief Engineer has testified that the low water flow of the Des Plaines River is nil, instead of 500 c. s. f. *Master's Report 23. Joint Abstract 123.*

3.

The instant diversion is not in the interests of navigation on the Illinois River.

The Illinois River, from Utica to its mouth, flows through an alluvial plane for a distance of 233 miles, with a total fall of about 33 feet. *Joint Abstract 4.* It is easily dredged and channels obtained by dredging are relatively permanent. *Joint Abstract 4-5.*

The view that a diversion of 1,000 second feet is more than ample for any navigation requirements on the Illinois

River has been repeatedly stated in the various reports of the Boards of Engineers of the Federal Government who have reviewed that question. *Joint Abstract 40-44.* In the last report on Illinois River, transmitted to Congress, March 29, 1926, it is shown that if a diversion is utilized for navigation purposes, as distinguished from sewage disposal purposes, a 9-foot navigable channel can be obtained with a mean annual diversion of 1,000 second feet, either with or without locks. There are now, and have been for many years last past, 4 locks in the lower Illinois River. In the opinion of former Chief of Engineers, Bixby, the proper method of improving this section of the Illinois River for a 9-foot channel is by locks and dams, and no addition to the natural flow is required for that purpose. *Joint Abstract 5-6.* The latest expression of the War Department on this subject is the testimony of General Taylor before the Committee on Rivers and Harbors and the Commerce Committee of the United States Senate in 1926, wherein he states that 1,000 second feet diversion will provide for a 9-foot channel in the Illinois River. *Joint Abstract 35, 36.*

The only dissenting note is the testimony of Mr. Barnes, Chief Engineer of the Illinois waterway. Barnes, however, admits that with locks and dams a 9-foot channel could be provided in many years from Utica to the mouth of the Illinois without any water from Lake Michigan, and that there is no question but that with a diversion of 1,000 second feet locks equal in size to those proposed for the Illinois waterway could be operated, and a 9-foot channel equivalent in size and width to the channel of the proposed Illinois waterway could be obtained, although he questioned the economy of such a proceeding. *Joint Abstract 55.* His contention that additional locks and dams would be required is shown to be wholly unfounded by the latest report of the Government Engineers on the Illinois River, where the plans, even with a diversion of 1,000 second feet provide for the removal of two or more of the four locks and dams already in the river. *Joint Abstract 37-38.* In this section of the Illinois River Barnes admits that according to the computations of the Government Engineers, who have studied the question, the current which would be produced by a 10,000 c. s. f. diversion with an open channel, would cause a great deal more loss in time to tows using the river than would be occasioned by four locks, although Barnes, of course, does not agree with them. *Joint Abstract 63.* Hence it is clear that a diversion of 1,000 second feet will provide for navigation with a 9-foot channel in the Illinois River. *Complainants' Exception XII. Master's Report 122.*

However, these questions with respect to the Illinois River are wholly immaterial. The State of Illinois has not been entrusted with the regulation of interstate commerce or of the navigable waters of the United States. The United States has not provided any diversion for navigation purposes on, or for the improvement of, the Illinois River. If and when the United States does undertake to appropriate any waters of the Great Lakes to navigation purposes on the Illinois River, it will be time enough to consider its rights and powers and the reasonableness of their exercise.

This observation is not only based upon sound law, but is supported by the most cogent, practical considerations. If the United States has the power to divert water from the Great Lakes to improve navigation on the Illinois River, and if the Congress should ever decide to exercise that power, it would do so not only as one clothed with the authority of the Federal government, but also restrained and guided by the responsibilities of the Federal government, not only on the Illinois River, but to the great section of the nation bordering upon the Great Lakes system, which would sustain serious damage from any unreasonable appropriation of the waters of the lakes. It would not exercise that power either for the purposes of local sanitation and water-power or blinded by the local profits to be obtained by a large diversion without regard to the immensely greater damage flowing therefrom in the great Section of the Nation bordering on the Great Lakes. However, to permit one of the States of the union to divert such waters, with immense profits to itself from the use of the water for sanitation and power, (which profits are in direct proportion to the extent of the abstraction), without any responsibility to the great sections of the country injured thereby, is to place the other sections of the United States at the mercy of the selfish considerations of local interests. There can be no doubt but that if the Federal government has the power, and were to exercise the power, to divert water from the Great Lakes to improve navigation on the Illinois River, the quantity thus diverted for navigation purposes would be so small that there would be no complaint on the part of the Lake States or the Dominion of Canada. No diversion would be required during the closed season of navigation in winter. Low water is of short duration during the navigation season, and no diversion would be required at other times in any event.

This brings us to a consideration of several matters which we deem immaterial, but which it seems necessary to discuss, because they were urged before the Special Master and were covered in his report.

The Special Master quoted a statement from an early report of Colonel Judson to the effect that "with a diversion of less than 4167 c. s. f. the cost of a channel in the Illinois River, with or without dams, seemed almost prohibitive" and further stated that without diversion from Lake Michigan, new locks and dams would have to be provided. *Complainants' Exceptions V, XI. Master's Report 120, 121.* The plans in the latest Government report on the improvement of the Illinois River not only do not provide for additional locks and dams with a diversion of 1,000 second feet, but on the contrary provide for the removal of two of the existing locks and dams. *Joint Abstract 37-38.* An examination of the Judson report will disclose that what the author had in mind was not the large cost of the improvement, as an abstract figure, but the doubtful economic advantage of the improvement when Illinois and the Sanitary District had appropriated all of the valuable waterpower. *Joint Abstract 117-118, paragraph 60.*

The Master found that the Federal project in the Illinois River *could* not have been maintained without a diversion of 8500 c. s. f., and that the old reference plane for Federal improvements on the Illinois River, based on the low water of 1879, had been from time to time *officially* changed to conform to existing low water as affected by the Chicago diversion. *Complainants' Exceptions VI and X. Master's Report 71, 120.* These questions will be discussed together because they are so intimately related.

The finding that the project depth in the Illinois River *could* not have been maintained with a diversion of less than 8500 c. s. f. is obviously based upon misapprehension of the testimony of witnesses Woermann and Fuller. These witnesses testified that under conditions as they actually existed, and considering the limited amount of work that was done in the Illinois River during this period, the project depth *would* not have been available without a diversion of 8500 c. s. f., and in fact testified that it was not available with that diversion until 1925. *Joint Abstract 15, 12.* These witnesses freely admitted that the project depth *could* have been obtained without this diversion; that the original project of 1880 for the Illinois River was never completed; that of course no project would be expected to have its required depth without completion, or in the event of completion, to maintain its required depth without constant maintenance; and that the Illinois River was probably the easiest river in the United States in which to obtain and maintain depths by dredging. *Joint Abstract 13-14; 17-18.*

The testimony of these witnesses with respect to dredging operations on the Illinois River related only to the current expenditure of the annual appropriations for maintaining and continuing the improvements on the Illinois River, and had no relation to any change of reference plane. These annual programs for expenditure of current appropriations were merely sub-projects. See pages 41-42, *infra.* Assistant Civilian Engineers cannot change official reference planes of Federal projects. In fact, they admitted that the situation was merely that the Federal project had never been completed. *Joint Abstract 14.* Their testimony on such a question would be incompetent. However, either that these Assistant Engineers misunderstood the situation, or that (as complainants believe,) the Special Master misconstrued their testimony—if it formed any part of the basis of his finding with reference to the alleged change of the reference plane on the Illinois River,—is conclusively established by the fact that Colonel Schultz, the present Federal District Engineer at Chicago and the superior officer of the witnesses, Woermann and Fuller, testified that the present project on the Illinois River is based on the low water of 1879. *Trans. 588.*

The official reference or datum plane for Federal improvements has no direct relation to the water level in the channel under improvement. It is an imaginary plane, based either upon the elevation above sea level, or some other mark or plane which has been definitely located. It is the plane from which project depths are measured in work done by the Federal government to obtain and maintain a navigable channel. All work is done with reference to this imaginary plane, regardless of whether the actual water level be above or below such plane. Thus the reference plane for improvements on Lake Michigan has been 579.6 feet above sea level. Federal improvements have been obtained and maintained at the project depth below that reference plane, regardless of the fact that in recent years Lake Michigan has been from a foot to a foot and a half below such reference plane. Hence where a Federal project has been completed it will have greater or less depth than the project depth, depending upon whether the current water level is above or below the Federal reference plane. The project for the Illinois River was adopted in 1880 with a reference plane of the low water of 1879, based upon a survey of that year. This continues to be the official reference plane for improvements on the Illinois River unless or until it is officially changed by competent authority.

The defense then introduced a series of letters between Assistant Civilian Engineers Fuller and Woermann and the District Engineer at Chicago, and some letters from the District Engineer at Chicago to the Chief of Engineers with reference to operations on the Illinois River. It is needless to point out that official reference planes cannot be changed by correspondence among subordinate Engineers in an engineering district. With reference to the letters from the District Engineer to the Chief of Engineers the argument of the defendants proceeds upon a misapprehension of their nature. These letters are set out in the Joint Abstract pages 18 to 28. To understand their significance, if any, it is necessary to consider the difference between a project and a sub-project. It is the constant practice of Congress to adopt projects for the improvement of various waterways which are not immediately accomplished, both because of the unwillingness of Congress to provide the entire cost in a single year, and because of the physical impossibility of completing the whole of the work in a single year, if funds were available. Consequently Congress adopts a project and provides an appropriation less than sufficient to complete it. The District Engineer recommends how the funds thus provided may best be spent, and on the approval of the Chief of Engineers, such recommendation becomes a sub-project for the expenditure of the current appropriation under the Rivers and Harbors Act. Many of these letters from the Assistant Engineers to the District Engineer merely submit estimates for dredging for the information of the District Engineer in allocating the current appropriation available. An examination of all of the letters, which are from the District Engineer at Chicago to the Chief of Engineers, shows that they are merely sub-projects for the expenditure of a current appropriation under the Rivers and Harbors Act, which was for continuing the improvement on the Illinois River. *Joint Abstract 18-28.* Some of these letters stated that the existing project was set forth in the Annual Report of the Chief of Engineers. *Joint Abstract 23, 27.* In the Joint Abstract, pages 30-34, a condensation of the statements of the Illinois River project contained in the Annual Reports of the Chief of Engineers from 1890 to 1924, inclusive, and the statement of the project contained in the last report on the Illinois River transmitted to Congress March 29, 1926, are set forth. These all show that this project has been at all times based upon the low water of 1879. To show that this is not the result of overlooking the Chicago diversion, the Chief of Engineers appended a note to his statement of the project stating in the earlier years that the Chicago diversion had raised the low water plane, but inasmuch as the quantity of water to be admitted was a matter of present litigation, it was impractical to ascertain what the low water plane would be, and in later years a note to the effect that inasmuch as the Chicago diversion was the subject of progressive reduction, it was impractical for the Board to ascertain what the future low water plane would be. *Joint Abstract 32, 34.* To these considerations should be added the testimony of the present District Engineer at Chicago page 40, *ante.*

These facts render it self-evident that the reference plane for improvements on the Illinois River was not changed officially or otherwise, following the admission of water from Lake Michigan through the Chicago Drainage Canal in 1900.

The Special Master found that under the Act of June 25, 1910 Congress appropriated $1,000,000 for the construction of a waterway from Lockport, Illinois, to the mouth of the Illinois River. *Master's Report 58 Complainants' Exception IV.* If this Act had any materiality, such materiality was removed by the fact that the appropriation could not be expended unless and until a project was submitted to and approved by Congress and that such appropriation was subsequently repealed by the Act of March 4, 1915 without any part thereof having been expended, or any work done thereon. *Joint Abstract 112.*

4.

The instant diversion has no relation and is of no value to navigation on the Mississippi River.

All evidence in relation to the Mississippi River was admitted over complainants' objection that none of the defendant states had any legal interest in the artificial enrichment of the Mississippi River, if any there was, by reason of the abstraction of the waters of the Great Lakes.

Joint Abstract 181. The whole question of the alleged effect of the diversion on navigable depths in the Mississippi River is immaterial in this case. None of the Federal projects since 1881 for the improvement of the Mississippi was ever based upon an increment from the Great Lakes, and the recently adopted project is not so based. *Gotwals, Joint Abstract, 96, 97.* It is obvious that neither the Permit of March 3, 1925, nor any other Permit issued by the Secretary of War, was ever issued in any degree whatever for the purpose of aiding or benefiting navigation on the Mississippi River or for any other purpose than assisting the Sanitary District of Chicago in the disposal of the sewage of that District. *Complainants' Exception XIV. Master's Report 125.* In Section V, pages 16 to 24, *infra,* complainants have shown that in none of the recommendations or reports of the Government Engineers on applications of the Sanitary District for permission to divert water from Lake Michigan, and in none of the decisions or permits or expressions of policy by the various Secretaries of War thereon was it ever suggested that said diversion was for the purpose of aiding, or was in fact, any aid to navigation on the Mississippi River. On the contrary, the question was solely one of a demand for a diversion for sewage disposal purposes which was uniformly deemed to be injurious to navigation. The conditions in the Permit of March 3, 1925, as amplified by the accompanying correspondence of the War Department and Department of State, and recommendations of the Federal Engineers provided, not for the continuance of this diversion in aid of navigation anywhere, but for its early reduction to the greatest possible extent to remove the damage to navigation created thereby.

However, since the Special Master in his report has stated that there was some benefit to navigation at low water in the Mississippi River by reason of the diversion, although he was unable to evaluate it, and that it was permissible for the Secretary of War to conclude that the diversion was to some extent an aid to navigation in low water, it is necessary to discuss the pertinent evidence. *Master's Report 124. Complainants' Exception XIII.*

Complainants submit that the overwhelming preponderance of the evidence establishes that a diversion of 8500 c. s. f. from the Great Lakes is of no value to navigation on the Mississippi River. General Bixby brought to a consideration of this problem the benefit of over forty years of study and experience as a highly-trained technical expert on river and harbor work, with peculiarly intimate and valuable knowledge of the unusual characteristics of the Mississippi River, obtained by actual work thereon in the capacities of District Engineer in Charge of Operations, Chairman of Special Boards for Surveys thereon, President of the Mississippi River Commission, and general supervision as Chief of Engineers of the United States Army. In the light of his experience and qualifications his testimony is entitled to unusual weight. *Joint Abstract 4, 97.*

The peculiar hydraulics of the Mississippi River arise from the fact that it is a series of deep pools separated by bars which rise and fall with the stage of the river. *Bixby, Joint Abstract 98.* The natural depths over these bars were from three to five feet; and the navigation problem is to maintain a channel through the bars. A consideration of the relation between the rise and fall of the bars and the fluctuations in flow and velocity of the River readily demonstrates that a constant increment of 8500 c. s. f. is of no value to the Mississippi.

During the closed season of navigation the channels obtained the previous year remain good because the low flow and velocity at that time does not carry silt in suspension, or roll material along the bottom; so that the project depths obtain in the navigation channels when navigation opens. As the navigation season opens in February, the river commences a gradual rise which continues until May or June. The corresponding increase in current is gradual and gentle so that not much material is carried in suspension or rolled along the bottom and lodged on the bars. Consequently the water rises faster than the bars, and greater depths than can be used obtain, although the silt is beginning to move and gradually fill in the cuts through the bars. *Joint Abstract 98-99.* During July and August both the Mississippi and Missouri Rivers have reached full stage. As the Missouri falls it tears away the water-soaked banks, as the receding waters remove their support, and carries annually about 400,000,000 cubic yards of material into the Mississippi River during July and August; so that the waters become saturated with suspended material, and large quantities are rolled along the bottom. The River now commences to fall rapidly, which causes a rapid reduction in the volume and velocity of the flow. Then the great quantities of material which were carried in suspension and rolled along the bottom with the higher velocity are deposited on the nearest bar, which causes the bars to rise very rapidly, so that at times bars show less than 8 feet of water when the water is 23 feet on the St. Louis gauge, the zero of which is several feet above the bottom of the navigation channel. Then the dredges make a cut through the bar which the River will ordinarily widen to the full channel width without further assistance. *Joint Abstract 99-100.* These channels will then ordinarily remain in good condition throughout the year unless there should be a big flood followed by a rapidly falling river, when the same trouble with formation of bars will occur again. *Joint Abstract 100.* The rapid fall in the river stage which causes the rapid formation of bars, means a drop of from 6 inches to 1 foot in a day, which, at the stage when bars form, would mean a decrease in flow of from 20,000 to 30,000 c. s. f. *Joint Abstract 100-101.* The dredges cut a channel from 12 to 14 feet beneath the water surface. *Joint Abstract 94-95.* It is not any lack of water that causes trouble, but the rapid changes in flow and velocity which cause trouble through formation of bars. *Joint Abstract 100.* A constant increment of 10,000 c. s. f. does not make the channels through the bars last any longer, or any easier to cut. *Joint Abstract 101.* It would require an increment of 310,000 c. s. f. to provide a channel 9 feet deep in the Mississippi River without dredging and regularization. *Joint Abstract 101.* With dredging and regularization there is enough water without any increment, and it is of no value to navigation. The best navigation on the Mississippi is by all odds at low water. *Joint Abstract 103, 104.*

The correctness of the foregoing opinion of General Bixby was conclusively established by his cross examination when counsel, in an effort to show an effect from the Chicago diversion, asked General Bixby to explain statements in the annual reports of the Chief of Engineers showing that from St. Louis to Cairo there was a six-foot channel in 1903 with a low water stage of 3.5 feet at standard low water, while there was an 8-foot channel in 1904 with a low water stage in the river of .6 of a foot below standard low water. *Joint Abstract 105-106.* Of course the river stages themselves demonstrated that there was a better navigation channel in 1904 than in 1903, although the river was four feet higher in 1903, in agreement with General Bixby's testimony that low water produces the best navigation channels in the Mississippi; but it should be noted that the Chicago diversion in 1903, the year of the 6-foot channel, was 4971 c. s. f., while in 1904, the year of the 8-foot channel, it was 4793 c. s. f. *Joint Abstract 107.*

If navigable depths in the Mississippi River depend upon the Chicago diversion, then this illustration of defendants' counsel demonstrates that a *decrease* of 188 c. s. f. in the diversion *increased* the navigable depths 2 feet.

In addition to the foregoing comprehensive and conclusive exposition of this question by General Bixby, the fact that the Chicago diversion is not a factor in or of any benefit to navigation on the Mississippi is likewise shown in many Government Reports. *Joint Abstract 107-112.*

The defendants produced a number of witnesses in an effort to establish some value to navigation on the Mississippi by reason of the Chicago diversion. While their principal witness, Major Gotwals, had had no experience on river work, except from 1924 to 1926, he does not disagree materially with General Bixby. He states that the plan for the Mississippi River improvement is to contract the River to uniform widths with the hope of causing it to cut through the bars, though he does not believe that it would eliminate all dredging. *Joint Abstract 92.* Low water is not of very long duration during the navigation season. *Joint Abstract 93.* He agrees that the formation of the bars depends on the rate of fall of the river; that it is the fluctuations of the river and not the quantity of water which makes the trouble, and that if 10,000 c. s. f. (which is more than the Chicago diversion) were taken from the present flow, there would still be adequate water for navigation. *Joint Abstract 95.* Only once since 1872 has the flow into the river during the navigation season fallen as low as 40,000 c. s. f. *Joint Abstract 97.* Of course the addition of a constant increment does not affect the fluctuations in stage and velocity. Major Gotwals points out that the diversion does increase the flood hazards in the lower river. *Joint Abstract 96.*

The witness, Woermann, Assistant Civilian Engineer in the Chicago Engineering office, advanced the theory that the rise in stage was reflected in navigable depths at low water; but when confronted with a conflicting report of his superior officer, stated that he would not say that such report was an error but that it was a conservative statement. *Joint Abstract 82-83.* He knew of no official report made by any member of the Corps of Engineers which would support his theory, and admitted that he had no data which was not in the hands of the various Boards of Engineers who had made the various official reports in the discharge of their official duties. He agreed that either dredging, or regularization, or both, were necessary to create a channel of 8 feet. *Joint Abstract 83-84.*

The defendants introduced the testimony of Berry, Barrett and Neyhe, who had operated tows or packets on the Mississippi River. With respect to their testimony it is sufficient to point out that at least since 1881 the Federal Government has been continuously improving the navigation channels of the Mississippi River, the effect of which improvements they innocently ascribe to the Chicago diversion. The utter worthlessness of their testimony is apparent in the following ways: Berry reported that his barges grounded in the summer or fall of 1900, but that on the next trip, taken about three weeks later, his barges, loaded to the same depth, did not ground, which he attributed to the Chicago diversion. *Joint Abstract 85.* In the first place the diversion was less than 3,000 c. s. f. in 1900, and in the second place the effect of the diversion for that year, if any, had been fully felt at the time of the trip when the barges grounded, some nine months after the diversion commenced. *Master's Report 72.* Barrett discovered the effect of the Chicago diversion in 1901 or 1902, on a trip where he claimed to find seven or eight feet of water in the channel up to Grafton and only three or three and one-half feet above Grafton. *Joint Abstract 86.* Hence his conclusion is based upon an alleged difference of five feet of water immediately below the mouth of the Illinois River whereby he attributes an added depth of five feet to a diversion of approximately 4,000 c. s. f. *Master's Report 22.* The ridiculousness of this sort of testimony is apparent on its face. The difference, of course, was caused by the absence of the maintenance of any Federal improvement above Grafton. The observations of the witness Neyhe have the same defect. Their conclusions are no doubt in part due to the infirmity of memory, and in part to their ignorance of the effect of the constant work of the Government in improving the channels through the years.

The other defendants' witnesses were Ashburn, Brent and Randolph. The testimony of Ashburn was confined to the existence of a Federal barge line on the Mississippi. *Joint Abstract 64-65.* The testimony of Brent was chiefly for the purpose of identifying operating charts used by the witness Randolph. These operating charts purported to show groundings of barges and tugs of the barge service. Brent operated from an office in New Orleans and knew nothing of the depths to which the various barges were loaded, or the cause of the groundings. *Joint Abstract 65-73.* The cause, no doubt, was accurately stated by the defendants' witness, Gotwals, who pointed out that nearly all such groundings were due to the efforts of the navigators to keep as far as possible from the center of the navigation channel in order to avoid the currents, to poor judgment and to the use of boats with rudders missing and various other defects. *Joint Abstract 93-94.* Of course no navigator ever confesses to his superior that the grounding is the result of his incompetent navigation. His report always blames the grounding upon the failure of the Federal Government to maintain the channels.

However, the worthlessness of the data was conclusively demonstrated by the witness, Randolph. This witness was not a graduate of any school of engineering; demonstrated no practical experience in river work; had never done any engineering work on the Mississippi River—his experience being confined to two or three boat rides—and his conclusions were based solely upon charts of operations of the Government barge line introduced by the witness Brent, and some other charts and graphs which had been theretofore issued in certain government reports. His conclusions were not based upon any personal experience or knowledge. *Joint Abstract 78.*

To demonstrate that his testimony is of no assistance in this matter it is only necessary to point out that in his illustration of his conclusions that a diversion helped navigable depths, he selected a grounding shown by the operating charts of the Mississippi Barge Line on September 21, 1922, where, according to these charts, the barge grounded with a stage of 5 feet on the St. Louis gauge, whereas the barge released itself and proceeded on its way at a stage of 4 feet on the St. Louis gauge. Hence the only result of his testimony was that in 1 foot less water the barge proceeded without obstruction, whereas it had been tied up with a stage 1 foot higher, and all within 24 hours. *Joint Abstract 79.*

Considering all of this testimony which related to the Mississippi, complainants submit that it is overwhelmingly established by the evidence of this case that 8500 c. s. f. from Lake Michigan is of no value to navigation on the Mississippi River. Certainly it cannot be said that the defendants, who have the burden of proof on this issue, have established any value to navigation on the Mississippi by reason of this diversion in the light of this testimony. Moreover, in connection with both the Mississippi and Illinos Rivers, it must be borne in mind that the period of so-called low water during the navigation season is of very short duration. Any diversion for that purpose would necessarily be for a very short period of time each season, whereas the instant diversion continues throughout the year, whether it be in low water, or in time of flood, when any effect could not be other than disastrous.

5.

The disposal of the sewage of Chicago is not a navigation purpose.

The only navigation purpose for this diversion suggested by the Special Master is the prevention of the pollution of the Chicago River and adjacent Lake by the sewage of the Sanitary District. *Special Master's Report, 167-170.* The argument to this effect is: The Sanitary District produces or threatens to produce an illegal public nuisance by so polluting the water of the Chicago River and the adjacent part of Lake Michigan as to constitute an obstruction to navigation. *A fortiori* the Secretary of War may provide for the abatement of this illegal public nuisance by a Permit authorizing the removal of the navigable waters obstructed so as to create another obstruction to navigation, and such a procedure is a navigation purpose. This conclusion ignores the sequence of events. The purpose of such a Permit is to take care of the Chicago sewage and not to improve navigation in the Lake. The navigable capacity of the Lake is not improved thereby but is decreased—the only result has been that the sewage of Chicago has been taken care of at the expense of the navigable capacity.

The obstruction thus created by the Chicago nuisance is an illegal obstruction. Then if the Secretary's Permit is valid, he has substituted a legal obstruction to the navigable capacity of the waters for the purpose of relieving the Sanitary District of Chicago of the consequence of its illegal acts. It would not be contended that the Secretary of War could authorize the Sanitary District of Chicago to tax Minnesota, Wisconsin, Ohio, Michigan, Pennsylvania, New York and Canada to remove a nuisance which it had illegally created. However, if the Secretary of War may authorize the Sanitary District to remove its illegal nuisance by a method which damages all of the complainant States in the ways, and to the extent herein found, with no right of complaint or redress on their part, the right of extraterritorial taxation on these States for the benefit of the disposal of the sewage of Chicago has been very effectively conferred in an indirect way.

VII.

THE SANITARY DISTRICT HAS KNOWINGLY AND INTENTIONALLY VIOLATED THE TERMS AND CONDITIONS OF ALL OF THE VARIOUS PERMITS ISSUED BY THE SECRETARIES OF WAR FROM APRIL 1, 1903 TO DATE.

The Permit of January 17, 1903 finally fixed the diversion from and after March 31, 1903 at 250,000 c. f. m., or 4167 c. s. f. *Master's Report 43.* The only Permits issued subsequent to that time and prior to the present Permit, were those of September 11, 1907 and June 30, 1910, which retained the same restrictions as to the quantity of diversion. *Master's Report 51, 59-60.* From 1903 to 1925 the Sanitary District greatly exceeded the limitation of this permit by diverting quantities of water which reached a maximum of well over twice the quantity provided by the Permit. *Master's Report 22-23.* During the whole of this time they asserted the right to take as much water as they pleased, regardless of the objections of the complainant States, the Dominion of Canada, and the Federal Government. *Joint Abstract 148, 151-152, 156.* In the Government suit the Sanitary District denied the right of the United States to limit the flow. *Master's Report 170.* Hence it is clear that from 1903 to 1925 the Sanitary District wilfully violated all the Permits obtained from the Secretaries of War. *Complainants' Exception XXI.*

The Permit of March 3, 1925 limited the instantaneous maximum diversion to 11,000 c s. f. *Master's Report 78.* The method of measuring the diversion provided in the Permit was defined in the recommendation of the District Engineer pursuant to which the Permit of March 3, 1925 was issued. This definition provided that the diversion should be measured by the flow at Lockport. *Joint Abstract p. 170, paragraph 4.* On November 16, 1905 a diversion of 13,415 c. s. f. was attained, and on September 13, 1926 a diversion of 12,765 was attained. *Joint Abstract 184.* While under the terms of the Permit the domestic pumpage of Chicago was not considered in measuring the mean annual average of 8500 c. f. s. provided by the Permit, this is not the fact with reference to the instantaneous maximum of 11,000 c. f. s. which was an absolute limit on peak flows granted solely to guard against reversal of the Chicago River in times of maximum storm flows of 10,000 c. s. f. under the claims of the Chicago Sanitary District. See *Report of District Engineer, paragraph 6. Joint Abstract 171-172.* Even if the domestic pumpage were added to the figure of 11,000, both of these flows would violate the limitations of the Permit on instantaneous flow. The witness Ramey, Assistant Chief Engineer of the Sanitary District, attempted to avoid the consequence of these facts by advancing the theory that the instantaneous flow was not to be measured at Lockport. *Joint Abstract 184.* If it were not to be measured at Lockport, it would not be measured anywhere; and that contention is contrary to the official recommendations and interpretations upon which the Permit is based.

The first condition of the Permit of March 3, 1925 was: "There shall be no unreasonable interference with navigation by the work herein authorized." *Master's Report 78.*

For a discussion of the interference with navigation which has been occasioned by this diversion, complainants refer to Section III (1) pages 9 to 12, *ante.* The evidence and findings conclusively establish that this diversion has seriously obstructed the navigable capacity of waters having a shoreline of 8300 miles with 400 harbors, in addition to the innumerable ports, landings and shallow waters used for fishing, boating and allied purposes. It has substantially diminished the value and utility of the great fleet of vessels operating on the Great Lakes. It has diminished substantially the value and utility of all of the commercial facilities provided at Federal and local, private and municipal expense along the 8300 miles of shoreline of this waterway, and has substantially burdened the industries and commercial interests of States having a population of approximately 40,000,000 people. This is in addition to the damages to property and other rights not related to the use of these waters for navigation purposes. If this does not constitute an unreasonable interference with navigation, it would be difficult in the extreme to imagine what would have to be done to create an unreasonable interference. So that complainants contend that it is conclusively established that the Sanitary District operating under the Permit of March 3, 1925, has caused an unreasonable interference to navigation and has therefore voided the Permit. There has been inflicted a substantial injury to nearly 44% of the total waterborne commerce of the United States, amounting in 1925 to over 210,000,000 cargo tons of freight with a domestic or coastwise tonnage exceeding the total coastwise trade of all of the ocean ports of the United States by more than 30,000,000 cargo tons and a foreign commerce constituting 13.8% of the total foreign commerce of the United States. *Joint Abstract 185-186.*

Condition 8 of the Permit requires that the City of Chicago should adopt a plan for metering at least 90% of its water service and provides for the execution of that program at the average rate of 10% per annum thereafter. *Master's Report 79.* Since the close of the hearing before the Special Master and the final submission of this case to him on June 3, 1927, the City of Chicago, acting through its duly elected officers, has refused further to carry out Condition No. 8 of the Permit of March 3, 1925, by refusing to install further meters to measure the domestic water supply of the City, and by refusing to further read meters theretofore installed under the provisions of the Ordinance of the City of Chicago pursuant to the requirements of Condition No. 8 of said Permit. Obviously these facts, occurring since the close of the testimony, cannot appear in the record taken before the Special Master, but complainants are confident that defendants will not deny the truth of these facts.

Hence, complainants submit that the Sanitary District has violated the conditions of the Permit of March 3, 1925,

1. By exceeding the limitation on instantaneous maximum diversion.
2. By creating an unreasonable interference to navigation in violation of Condition 1 of the Permit, and
3. By the City of Chicago refusing to provide for the metering of its domestic water service as required by Condition 8 of the Permit.

Complainants' Exception XXIX.

Under the construction of the Permit adopted by the War Department and the State Department, the violation of Condition 8 with respect to the metering of the water supply leaves no limit upon the quantity of water which may be diverted, other than the voluntary moderation of Chicago. Past experience compels the complainants to regard that as a very illusory safeguard.

VIII.

THE QUESTION OF COMPENSATION WORKS ON THE GREAT LAKES IS NOT INVOLVED IN THIS CASE; AND THEIR EFFECTIVENESS IS NOT ESTABLISHED.

Evidence with respect to compensating works on the Great Lakes was received over the objection of the complainants. *Joint Abstract 183. Complainants' Exception XV.*

Complainants submit that all evidence on compensating works in this case is incompetent, irrelevant and immaterial, because:

> (1) the construction of compensating works in the Great Lakes and their connecting waters is dependent upon the consent and authorization of the Congress of the United States and solely under its control and not within the control of either the complainants or defendants herein, and when or if the Congress of the United States will ever act with reference to said compensating works is not known
>
> (2) construction of compensating works in the Great Lakes and their connecting waters is dependent upon the consent and joint action of the Kingdom of Great Britain and when or if the government of the Kingdom of Great Britain will ever act with reference to or consent to the construction of compensating works in said waters is not within the control of the complainants or defendants herein and is not known
>
> (3) the complainants are not required as a matter of law to construct compensating works for the purpose of minimizing the damages inflicted upon them by the creation and maintenance of the nuisance involved herein by the defendants.

If the question of compensating works were material the Special Master should have found that some of the damages caused by the abstraction of these waters could not be mitigated or minimized by the construction of compensating works. *Joint Abstract 152, 183. Master's Report 72, 65.*

The evidence received relates to the possibility of minimizing the damages caused by the Chicago diversion, by the construction of compensating works. If there were no Chicago diversion, compensating works, if found feasible, would improve conditions on the Great Lakes in general. There is no proof, and it is not at all certain, that sufficient compensation could be provided without the creation of obstructive currents to provide the best possible conditions on the Lakes, and in addition thereto, overcome the lowering caused by the Chicago diversion. This is especially true with reference to the probable deepening of harbors and channels incident to the construction of the Great Lawrence waterway. Hence, if compensating works were material in this case, the Special Master should have found that conditions would be better with the construction of compensating works and no Chicago diversion than conditions would be with the construction of compensating works and the continuation of the Chicago diversion, and that the complainant States and their peoples are entitled to the full benefits which might flow from the construction of compensating works in the Great Lakes free from diminution by reason of the nuisance and abstraction created by the defendants.

IX.

THE EFFECT OF CONTINUING THE ABSTRACTION.

The effect of continuing this abstraction will be to perpetuate for all time these great and serious injuries to the complainant states and their peoples. The effect of recognizing the Permit of March 3, 1925 as a valid authority for the abstraction of these waters and the infliction of these injuries upon the complainant States and their peoples will be to permit not only the continuance of the present damages, but an obvious and substantial increase in their extent. Further such a holding subjects the complainant States to future damage, limited only by the voluntary moderation of the defendants. The illusory character of any hopes so based is shown by Chicago's treatment of the subject in the past. Should this abstraction be determined to be legal and one of which neither the States nor their peoples can complain, then every other State and municipality on the Great Lakes in the United States or Canada must have the same right; and the end of the recognition of such a pretentious claim cannot be foreseen. If a single raid upon this great natural resource does not destroy its usefulness for all time, a multiplicity of such raids will do so.

X.

THE EFFECT OF ABATING THE ABSTRACTION.

The abatement of this abstraction will compel the City of Chicago and the Sanitary District to take care of their sewage disposal and their water supply problems at their own expense, instead of at the expense of the property, States and peoples other than those of the State of Illinois littoral to the Great Lakes, in the same way in which such problems must be met and such expense must be borne by every other State and municipality in the United States. On the other hand, Chicago and Illinois will share in the great benefits which will flow from a restoration of lake levels.

THE LAW.

On page 140 of the report of the Special Master, the questions of law are stated to be seven, as follows:

> (1) Whether the complainants present a justiciable controversy and have the requisite interest to entitle them to invoke the jurisdiction of the Court; and if so,
>
> (2) Whether the State of Illinois had the right, as against the complainants, to divert the waters of Lake Michigan in the manner and for the purposes shown, without the consent of the United States; and, if not,
>
> (3) Whether Congress has the authority to control the diversion, that is, in its regulation to determine whether and to what extent the diversion should be permitted; and if so,
>
> (4) Whether Congress has given the permission; and, if it has not directly,
>
> (5) Whether the Secretary of War had authority under the Act of March 3, 1899, to regulate the diversion; and if so,
>
> (6) Whether the permit of March 3, 1925, and its conditions, are valid; and, finally,
>
> (7) As to the provisions of the decree which should be entered, in the light of the determination of these questions.

We propose to discuss these questions in the order stated by the Special Master.

Before, however, entering upon a detailed discussion of these questions separately, it may be helpful to attempt a brief and condensed statement of the facts which present the problem.

The City of Chicago was a village in 1840. It is now the second city in population in the United States, having an area of 191 square miles with 24 miles of frontage on Lake Michigan. From the first its sewers emptied into Lake Michigan and its water supply was drawn therefrom. Its population grew with unprecedented rapidity and about the year 1880 it became apparent that the pollution of the waters of the lake by sewage discharge imperiled the city's water supply. Public agitation on this subject led to the employment of eminent sanitary engineers to devise a plan to overcome this evil and in 1887 a report was made proposing three plans, of which one was the excavation of a canal across the Continental Divide which would reverse the current of the Chicago River and create of it and the Sanitary Canal a vast open sewer emptying into the Des Plaines River at Lockport and carrying the sewage of the city *via* the Des Plaines River and Illinois River into the Mississippi. Dilution of the sewage was to be effected by the abstraction of water from Lake Michigan. This plan was recommended as being economical and, as makeweights in its favor, the sanitary engineers pointed out that the canal when constructed would provide a waterway and would also render available a valuable water power at Lockport twice as large as the Mississippi at Minneapolis.

The Legislature of Illinois by the Act of May 28, 1889, authorized the creation of sanitary districts to provide for drainage and empowered such districts to improve navigable or other waterways. This Act required that any channel constructed for the discharge of sewage outside of the district should be of sufficient capacity to contain a continuous flow of at least 200 cubic feet per minute for each 1000 of population served by the district and, with special reference to the water of Lake Michigan, that if any channel was constructed which abstracted them or caused their flow into the Des Plaines or Illinois Rivers, such channel should have the capacity to contain not less than 300,000 cubic feet of water per minute, with a further proviso that if the population drained into such channel at any time exceed 1,500,000, the channel should be of such size as to contain a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of population and under certain conditions looked to a continuous flow in the channel of 600,000 cubic feet of water per minute, as being the ultimate abstraction of water from Lake Michigan for sewage purposes by such district.

Pursuant to the enabling act of Illinois, the Sanitary District of Chicago was organized in 1890, originally embracing an area of 185 square miles but by later acts this area has been increased until it now comprises 438 square miles, extending from the Illinois state line on the south and east to the northern boundary of Cook County, thus embracing the metropolitan area of Chicago which consists of a total of fifty-four cities, towns and villages.

The authorities of the Sanitary District proceeded to construct the principal canal, which extends from the west fork of the south branch of the Chicago River to the Des Plaines River near Lockport, a distance of about 28 miles. At Lockport controlling locks were built with 7 sluice gates, each 30 feet wide, and a moveable dam, but no locks by which any vessel could be lowered into the Des Plaines River, a fall of about 41 feet. The flow in the canal was maintained by the operation of the sluice gates. The construction of this work was begun in 1892 and the completed canal was opened on the 17th day of January 1900.

All of the foregoing was done by the State of Illinois and, under its authority, by the Sanitary District of Chicago, without the consent of the Government of the United States and without the consent of any of the states, or of the Dominion of Canada, bordering upon the Great Lakes, except that in 1896 upon the application of the Sanitary District, the Secretary of War authorized certain modifications in the cross section of the Chicago River with the reservation that the permit did not constitute an approval of the plans of the Sanitary District, and in May of 1899 a permit issued by the Secretary of War temporarily authorized the opening of the channel and the reversal of the flow of the Chicago River under very definite reservations.

By the authority of a later Act of the Legislature of Illinois (Act of May 14, 1903, Illinois Laws, 1903, page 113) the corporate limits of the Sanitary District were increased and additional powers given it and by 1907, under authority of this Act, the main channel had been extended 11,000 feet so as to concentrate the fall for power purposes at the present power house site at Lockport, where the waters were discharged into a non-navigable tailrace until 1910, when a small lock was provided for the first time at the Southwest end of the Drainage Canal. *Master's Report 19.*

This lock connected with the old Illinois and Michigan Canal and had no relation to the so-called deep waterway, and little if any water diverted from Lake Michigan was needed for its operation. The amendment to the Constitution of Illinois under which the so-called deep waterway project has been proposed was passed in 1908 but the first legislation under it was not passed until 1915.

Various permits and modifications of permits were issued by the War Department from time to time, which will be discussed later. Except for these permits of the Secretary of War, there is no action by Congress or by the Legislature of any State or country bordering on the Great Lakes System, which authorizes or consents to the action taken by the Sanitary District under the authority of the Legislature of the State of Illinois, or waives or compromises any right which such riparian States may have in the premises.

The natural outlet of the Great Lakes is through the St. Lawrence River to the Atlantic Ocean, and the level of the Great Lakes in the state of nature is controlled by the outlet from Lake Erie through the Niagara River into Lake Ontario. The Chicago Drainage Canal opened a new outlet by carrying the water of the Great Lakes across the Continental Divide in a volume twice as great as that of the Mississippi at Minneapolis. The effect of this was not at first fully apparent but it soon became clear that the level of the entire Great Lakes System, except Lake Superior which is confined at the Sault St. Marie River, was permanently lowered. The effect of this lowering has now been stabilized and the Master finds *(Master's Report, page 104)* that a diversion of 8500 second feet at Chicago lowers the levels of Lakes Michigan and Huron six inches and the levels of Lakes Erie and Ontario five inches, and the evidence shows that this lowering extends in the St. Lawrence River to Montreal and thence in diminishing degrees to Quebec. *Master's Report, page 98.*

During all these years from 1900, when the Sanitary Canal was opened, to 1925 there was imposed upon the Sanitary District by the several permits of the Secretaries of War the maximum limitation of 4167 cubic second feet of permitted withdrawal of water from Lake Michigan, but until the decision by this Court of the case of *Sanitary District vs. Chicago,* 266 U. S. 405, the Sanitary District of Chicago and the State of Illinois denied the authority of the United States to limit these withdrawals of water from Lake Michigan, and from 1908 to 1925, against the protest of the United States and in defiance of the limitations sought to be imposed by the Secretaries of War in their permits, continuously withdrew about twice as much water as the maximum allowed under the permits, so that at least one half of the damage done by the Sanitary District is not only wholly unauthorized but was done deliberately in defiance of the authority of the United States.

The damage done by the Sanitary District is insusceptible of brief statement. Vast and extensive works of the Government of the United States for the improvement of navigation, even more costly local and private works in the one hundred harbors on the Great Lakes have all been rendered less useful and, therefore, less valuable. The water borne commerce of the Great Lakes, which is greater in tonnage than the aggregate Atlantic Seaboard and Gulf commerce of the country, has been damaged by this injury to the channels and the injury thus caused primarily to the steel industry, upon which America's supremacy rests, spreads like a grease stain through all the subsidiary and finishing steel industries in the great industrial civilizations which have been built up around and depend upon the economies of lake transportation. In addition to this, private property and public property on the Lakes, improved with reference to the normal levels of these waters, have been damaged, both by being rendered less valuable and less convenient and also by exposures and the necessity for reconstruction to adapt them to the lower stage of the water.

The Master's Report does not undertake to estimate by any standard the amount of this damage, but it does find the damage actual and substantial and points out impressively the character and wide extent of destruction of public and private property thus wrought.

We stand then in the presence of a vast injury inflicted by a State upon other States and their citizens, definitely proved and affirmatively found by the Master. It is also found that the injured States have neither consented to the injury nor waived their rights, and the question to be determined is whether wrongs so obvious and so insupportable are left without remedy by the system which federates the states into a union for the purpose of "insuring domestic tranquillity and promoting the general welfare." If the State of Illinois has the right to do this thing and the complainant States have no redress, it ought to be possible to find the basis of the right on the one hand and the reason for the paralysis on the other.

It is apparent that if the States of the Union were independent nations, Illinois could proceed safely only upon treaties between her and the other states affected by her acts. Is the Constitution such a treaty?

It is apparent that had Illinois undertaken so to injure the other riparian States, in the absence of such a treaty, there would have been a resort to defensive measures by the injured States. Possible defensive measures, used in similar controversies between independent States, range all the way from non-intercourse acts to war. Indeed non-intercourse, privately organized, has been frequently urged, in this very case, as a means of arousing Chicago, through her commercial interests, to a realization of the wrong inflicted upon her neighbors. But in a public way both non-intercourse and war between States is impossible. The right of self defense, the right to protect these great interests by traditional weapons has been surrendered. Does this leave the states defenseless?

In surrendering the right of self defense have the States also surrendered *all* the rights which independent states would naturally defend? If not, what are the limits of the surrender and what processes of vindication remain for those not surrendered?

To these questions this Court has repeatedly given answers, thus establishing principles, if not a code, of interstate international law. We believe that the Special Master has erred in the application of these principles in the case at bar and proceed, with deep respect for the learning of the Special Master, to analyze his conclusions in the light of the decided cases.

I.

"WHETHER THE COMPLAINANTS PRESENT A JUSTICIABLE CONTROVERSY AND HAVE THE REQUISITE INTEREST TO ENTITLE THEM TO INVOKE THE JURISDICTION OF THE COURT."

The Special Master's conclusion upon this question is:

> "I am unable to conclude that the rights of the complainant states with respect to the diversion at Chicago of the waters of Lake Michigan, directly resulting in an appreciable diminution of the waters of the Great Lakes and connecting channels, to the alleged injury of the commercial and navigation interests of these states and their people, are any less susceptible of judicial determination than the rights of Kansas, Wyoming and North Dakota with respect to the waters of interstate streams." *(Page 143 Master's Report)*
>
> "On this question of jurisdiction, I find no difficulty, so far as the interest of the complainant states is concerned." *(Page 144 Master's Report)*

In short, the Special Master sustains the jurisdiction both on the ground of the character of the case, as constituting a controversy between states, and as to the interest of the complainants.

When this matter was heard before this Court on the motions to dismiss, it was disposed of by a Per Curiam memorandum 270 U. S. 634 on the authority of *Kansas vs. Colorado,* 185 U. S. 125, 147.

By Section 2 of Article III of the Constitution of the United States, it is provided that,

> "The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, * * * to Controversies between two or more states;—between a State and Citizens of another State; * * *
>
> "In all Cases * * * in which a State shall be Party, the supreme Court shall have original Juris-

> diction. In all the other Cases before mentioned, the supreme Court shall have appellate Jurisdiction, both as to Law and Fact, with such Exceptions, and under such Regulations as the Congress shall make."

The history of the foregoing provision has been frequently examined by this Court. Perhaps the fullest statement of it is found in the opinion of Mr. Justice Shiras in *Missouri vs. Illinois and the Sanitary District of Chicago,* 180 U. S. 208, 219, *et seq.* From this history it is clear that the Constitutional Convention foresaw, as inevitable, controversies between the states and rejected alike resorts to force and political agencies for their composition. The jurisdiction of this Court was, therefore, defined as covering all *cases* in law and equity arising under the Constitution and the laws of the United States, and in addition thereto, as a larger and different class, to *controversies* between two or more States. In the opinion of Chief Justice Marshall, *Cohens vs. Virginia,* 6 Wheaton 264, the jurisdiction of this Court, under this donation of power, depended entirely on the character of the parties that is to say, no matter what the cause of the controversy, if the parties to it were States of the Union, this Court has jurisdiction, but it has come to be clear that there may be controversies between states so non-judicial and political in character as to be insusceptible of judicial determination. The remark of Mr. Justice Bradley in *Hans vs. Louisiana,* 140 U. S. 1, indicates that the court is unwilling to restrict controversies between States to the traditional limits of actions at law and suits in equity, so that the rule may now fairly be regarded to be that whenever a controversy arises between states which can be disposed of by the application of rules of law, principles of international law, the language of the Constitution itself, or those obvious principles of morality and good conscience by which courts of equity have regulated the rights of individuals, the controversy comes within the jurisdiction of this Court.

In the language of Mr. Justice Bradley, "The Constitution has made some things justiciable which were not known as such at the common law."

In effect this Court, when dealing with controversies between States sits as an adjourned session of the Constitutional Convention. The court has no jurisdiction of purely political questions but it is the conservator of the great purposes for which the Constitution was ordained, and its function is to apply the spirit of that Constitution to the relations between the states in order that the Union itself may be preserved. Happily, no case can be found in which the court has sought to extend its jurisdiction into purely political controversies. Happily, no case can be found in which the court has declined to exercise its jurisdiction in the case of a controversy between states which lends itself to treatment by analogies drawn from any of the procedures of judicial or arbitral tribunals in the administration of private or public rights.

The cases cited by the Special Master fully support the conclusions reached by him, but they do not exhaust the subject.

The cases in this Court between States from 1789 now number about one hundred and cover a great variety of controversies, ranging from boundary disputes and the diversion of water from interstate streams to regulations imposing restraints on interstate commerce to the prejudice of the people of other states. Throughout this entire body of cases the principle is firm that the jurisdiction of this Court is the alternative to that resort to force and its palliatives with which independent States enforce their sovereign rights and protect the interests of their people.

Controversies between States are all great controversies. The dignity of the parties is alway impressive and the judgments of this Court in such cases illustrate at once the dignity and solemnity of the jurisdiction.

Kansas vs. Colorado, 185 U. S. 125. Kansas brought suit against Colorado in the Supreme Court of the United States to prevent Colorado from depriving Kansas of the water of a river accustomed to flow through and across her territory, with the consequent destruction of her property and of the property of her citizens, to the injury of their health and comfort. Colorado demurred to the bill. The court overruled the demurrer and gave Colorado an opportunity to answer the bill. In the opinion by Mr. Chief Justice Fuller the historical summary set forth in *Missouri vs. Illinois,* 180 U. S. 208, is referred to with approval as showing jurisdiction in the Supreme Court in controversies between States. On page 142 it is said:

> "As will be perceived, the court there ruled that the mere fact that a state had no pecuniary interest in the controversy would not defeat the original jurisdiction of this court which might be invoked by the state as *parens patriae,* trustee, guardian or representative of all or a considerable portion of its citizens, and that the threatened pollution of the waters of a river flowing between states under the authority of one of them, thereby putting the health and comfort of the citizens of the other in jeopardy, presented a cause of action justiciable under the Constitution."

In support of the demurrer Colorado urged her sovereign right to deal as she saw fit with waters within her own state boundaries; that the moral obligations of a State to observe the demands of comity cannot be made the subject of a controversy between states; that the bill was indefinite and defective in various ways, but the court brushed all these objections aside, saying that:

> "Without subjecting the bill to minute criticism, we think its averments sufficient to present questions as to the power of one State of the Union to wholly deprive another of the water of a river arising in the former, and, by nature, flowing into and through the latter, and that therefore this court, speaking broadly, has jurisdiction."

On page 146 the Chief Justice defines the attitude of the Supreme Court in such controversies, saying,

> "Sitting, as it were, as an international as well as a domestic tribunal, we apply Federal law, State law and international law, as the exigencies of the particular case may demand, and we are unwilling in this case to proceed on the mere technical admissions made by the demurrer, nor do we regard it as necessary, whatever imperfections a close analysis of the pending bill may disclose, to compel its amendment at this stage of the litigation."

The Court, therefore, directed an answer to be filed and indicated the character of proof which it felt important to be produced.

Kansas vs. Colorado, 206 U. S. 46. This case, disposed of on demurrer in the 185th U. S., came before the court on the proofs for final action. In the meantime the United States filed an intervening petition, claiming the right to control the waters of the river to aid in the reclamation of arid lands. There was no contention that any proposed or threatened action affected navigability in the stream, since the stream was not navigable, in fact. Counsel for the United States admitted that there was no express power in the Constitution whereby the United States had any control over the water for irrigation purposes, but relied upon the general inherent power of the sovereign and urged that acts of Congress with regard to reclamation be regarded as dominant over the right of both States, Kansas and Colorado. As to this branch of the case, the court held that the power of Congress over streams was limited to the preservation or improvement of their navigability and that, except as to this Federal power, full control over these waters is vested in the States. The intervening petition of the United States was therefore dismissed without prejudice to any action which it might thereafter see fit to take in respect to the use of the waters in question for maintaining it, improving the navigability of the river.

Coming now to the controversy between the two States, the opinion by Mr. Justice Brewer recites at great length the basis of the Supreme Court's jurisdiction in original actions between States, reviewing all the earlier cases. On page 97 it is said:

> "One cardinal rule underlying all the relations of the States to each other is that of equality of right. Each State stands on the same level with all the rest. It can impose its own legislation on no one of the others and is bound to yield its own views to none. Yet whenever, as in the case of *Missouri v. Illinois,* 180 U. S. 208, the action of one State reaches through the agency of natural laws, into the territory of another State, the question of the extent and the limitations of the rights of the two States becomes a matter of justiciable dispute between them and this court is called upon to settle that dispute in such a way as will recognize the equal rights of both and at the same time establish justice between them. In other words, through these successive disputes and decisions, this court is practically building up what may not improperly be called interstate common law."

The case contains a discussion of the rights of upper and lower proprietors on flowing streams and denies the right of a proprietor materially to interfere with the equal rights of others to the benefits of the water in its natural state.

Georgia v. Tennessee Copper Company, 206 U. S. 230. This is a suit brought by the State of Georgia against the

Tennessee Copper Company, a citizen of Tennessee, to abate the nuisance caused by fumes from the Tennessee Copper Company discharged over Georgia Territory. The bill alleges that the consequence of the discharge of these fumes is a wholesale destruction of forests, orchards and crops in five counties of the State of Georgia. On page 237, Mr. Justice Holmes in the opinion says that the amount of property directly owned by the State in the territory alleged to be affected is negligible, but that this is a suit by a State for an injury to it in its capacity of quasi-sovereign.

> "In that capacity the State has an interest independent of and behind the titles of its citizens in all the earth and air within its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air."***
>
> "When the States by their union made the forcible abatement of outside nuisances impossible to each, they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the ground of their still remaining quasi-sovereign interests and the alternative to force is a suit in this court. * * *
>
> "It is a fair and reasonable demand on the part of a sovereign that air over its territory shall not be polluted on a great scale by a sulphurous acid gas, that the forests on its mountains, be they better or worse, and whatever domestic destruction they have suffered should not further be destroyed or threatened by the act of persons beyond its control, that the crops and orchards on its hills should not be endangered from the same source. If every such demand is to be enforced this must be. * * *"

North Dakota v. Minnesota, 263 U. S. 365. In this case North Dakota had a controversy with the State of Minnesota with regard to a change made by Minnesota in the method of draining surface waters from lands within her borders whereby the flow of an interstate stream was increased greatly beyond its natural capacity, thus throwing water on farms in the State of North Dakota. The jurisdiction of the Supreme Court in such a controversy was questioned by Minnesota, but in the opinion by Chief Justice Taft the jurisdiction is sustained.

The question is of especial interest because it reviews the previous decisions of the court as follows:

> "The jurisdiction and procedure of this Court in controversies between States of the Union differ from those which it pursues in suits between private parties. This grows out of the history of the creation of the power in that it was conferred by the Constitution as a substitute for the diplomatic settlement of controversies between sovereigns and a possible resort to force. The jurisdiction is therefore limited generally to disputes which, between States entirely independent, might be properly the subject of diplomatic adjustment. They must be suits 'by a State for an injury to it in its capacity of quasi-sovereign. In that capacity the State has an interest independent of and behind the title of its citizens, in all the earth and air within its domain.' 'When the States by their union made the forcible abatement of outside nuisances impossible to each, they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the ground of their still remaining quasi-sovereign interests; and the alternative to force is a suit in this court.' *Georgia v. Tennessee Copper Co.,* 206 U. S. 230, 237. In accord with this principle, this Court has entertained a suit by one State to enjoin the deposit by another State, in an interstate stream, of drainage containing noxious typhoid germs because dangerous to the health of the inhabitants of the former. *Missouri v. Illinois,* 180 U. S. 208, 241; s. c. 200 U. S. 496, 518. It has assumed jurisdiction to hear and determine a bill to restrain one State from a diversion of water from an interstate stream by which the lands of a State lower down on the

stream may be deprived of the use of its water for irrigation in alleged violation of the right of the lower State. *Kansas v. Colorado,* 185 U. S. 125, 141, 143; s. c. 206 U. S. 46, 95. In *Wyoming v. Colorado,* 259 U. S. 419, 464, it granted relief to one State to prevent another from diverting water from an interstate stream to the injury of rights acquired through prior appropriations of the water by land owners of the former State under the doctrine of appropriation recognized and administered in both States. In *Georgia v. Tennessee Copper Co., supra,* it enjoined in behalf of a State the generation and spread of noxious fumes by a factory in another State because it was a public nuisance in destroying crops and forests within the borders of the former State. In *Pennsylvania v. West Virginia,* 262 U. S. 553, 592, at the suit of one State, this Court has enjoined another State from enforcing its statute by which the flow of natural gas in interstate commerce from the latter State was forbidden, to the threatened loss and suffering of the people of the suing State who had become dependent for comfort and health upon its use. It needs no argument in the light of these authorities, to reach the conclusion that, where one State, by a change in its method of draining water from lands within its border, increases the flow into an interstate stream, so that its natural capacity is greatly exceeded and the water is thrown upon the farms of another State, the latter State has such an interest as quasi-sovereign in the comfort, health and prosperity of its farms owners that resort may be had to this Court for relief. It is the creation of a public nuisance of simple type for which a State may properly ask an injunction.

"In such action by one State against another, the burden on the complainant State of sustaining the allegations of its complaint is much greater than that imposed upon a complainant in an ordinary suit between private parties. 'Before this court can be moved to exercise its extraordinary power under the Constitution to control the conduct of one State at the suit of another, the threatened invasion of rights must be of serious magnitude and it must be established by clear and convincing evidence.' " *New York v. New Jersey,* 256 U. S. 296, 309; *Missouri v. Illinois,* 200 U. S. 496. 521.

The foregoing cases are conclusive upon both branches of this inquiry. In addition to them but without further analysis we cite to the Court *Pennsylvania v. The Wheeling Bridge Company,* 13 Howard 518; *Wyoming v. Colorado,* 259 U. S. 419; *New York v. New Jersey,* 256 U. S. 296, *Pennsylvania v. West Virginia,* 262 U. S. 553; *Hans v. Louisiana,* 134 U. S. 1.

II.

"WHETHER THE STATE OF ILLINOIS HAD THE RIGHT, AS AGAINST THE COMPLAINANTS, TO DIVERT THE WATERS OF LAKE MICHIGAN IN THE MANNER AND FOR THE PURPOSES SHOWN, WITHOUT THE CONSENT OF THE UNITED STATES."

To this question the answer of the Special Master is that "the action of the State of Illinois was and is unlawful unless validly permitted by Congress directly or through the action of the Secretary of War." (Report of Special Master, page 148)

For this conclusion the Special Master rests primarily upon the decision by this Court in *Sanitary District v. United States,* 266 U. S. 405, and it does support the answer, but the question and answer completely understate the issue in the case at bar.

Sanitary District v. United States was a suit by the Government to restrain the Sanitary District from abstracting water from Lake Michigan through the Sanitary Canal in excess of 4167 cubic second feet, that being the maximum limit permitted in the permit issued by the Secretary of War. The case presented no question as to the rights of any of the States now complainant. The only States other than Illinois concerned in that action were the so-called River States, allowed to file briefs *amici curiae,* which attempted to assert a right to an increase in the artificial flow from Lake Michigan in the supposed interest of an enlargement of the navigable depths of the Mississippi River. This claim of right on the part of the River States was summarily disposed of by this Court, the interest being said not to be a right at all but a mere consideration which the River States might address to Congress to induce modification of the law under which the Secretary of War's permit was issued. This Court added the further significant sentence, "It is doubtful at least whether the Secretary was authorized to consider the remote interests of the Mississippi States or the sanitary needs of Chicago."

In *Sanitary District v. United States* the facts as to the construction and operation of the Sanitary Canal were all shown, together with the successive temporary permits of the Secretary of War under which the current of the Chicago River had been reversed. All the legislation of the State of Illinois and of Congress in the premises was in the record, and the relief asked by the Government was that the Sanitary District be enjoined from diverting water from Lake Michigan in excess of 250,000 cubic feet per minute. It was conceded that an act of Congress would be required to authorize such diversion and it was contended that the Secretary of War had construed the Act of March 2, 1827, as affirmatively authorizing the diversion. It was frankly claimed on behalf of the Sanitary District that the Illinois Act of May 29, 1889, authorized and directed the abstraction of water from Lake Michigan by the Sanitary District under the police power and for the purpose of disposing of the sewage of the District. Further the Sanitary District denied the authority of the Secretary of War to make any findings or conclusions of fact and asserted that the whole matter was appropriate for a decision by Congress, as a legislative matter, but inappropriate for attempted limits by the Secretary of War as an administrative matter.

On behalf of the Government it was asserted that all obstructions to the navigable capacity of interstate waters without authority from Congress have always been held unlawful; that under the compact contained in Article 4 of the Ordinance of 1787, Illinois had no right to interfere with or decrease the navigable capacity of Lake Michigan or any other of the Great Lakes; that under Section 10 of the Act of 1899, an act of Congress is necessary to authorize the creation of an obstruction to the navigable capacity of navigable waters of the United States and that the authority of the Secretary of War on the recommendation of the Chief of Engineers covers only modifications which do not amount to an obstruction. (See Abstracts of Briefs, 266 U. S. 406-423)

As the only relief asked was an injunction sought by the United States to restrain diversion of water in excess of 250,000 feet per minute, the only question the court was called upon to consider was whether the United States had the right, in the interest of navigation, to limit such withdrawals. In other words, whether the United States had the veto power upon such withdrawals, whether the United States could affirmatively authorize such withdrawals, *in invitum* the reserved rights of the riparian states, was not presented by the record or necessary to be considered to dispose of the case. In the opinion of the court it is said,

> "The United States is asserting its sovereign power to regulate commerce and to control the navigable waters within its jurisdiction. It has a standing in this suit not only to remove obstruction to interstate and foreign commerce, the main ground, which we will deal with last, but also to carry out treaty obligations

to a foreign power bordering upon some of the Lakes concerned, and, it may be, also on the footing of an ultimate sovereign interest in the Lakes. * * *

"The main ground is the authority of the United States to remove obstructions to interstate and foreign commerce. There is no question that this power is superior to that of the States to provide for the welfare or necessities of their inhabitants."

In the case at bar, the parties, the rights and the relief sought are different. Here sister States are seeking to vindicate reserved rights. In *Sanitary District v. United States* the Government was seeking to protect a delegated trust.

It is important to remember what the Sanitary District has done and the purpose for which it has been done. This record conclusively shows that the Sanitary Canal was built by the Sanitary District for sanitary purposes. The legislation of the State of Illinois creating the Sanitary District originated in a sanitary need and was addressed to the improvement of a sanitary condition. The Sanitary Canal was built and operated with sluice gates at Lockport and with no connection making through navigation possible from 1900 to 1910. The lock installed in 1910 at Lockport, a mere incident as a power development, was a small connection to the old Illinois and Michigan Canal, making little if any demand upon the Great Lakes System for water for navigation purposes and it was not until 1915 that the first legislation was passed looking to the use of the diverted water for deep water navigation purposes. Even now no such navigation use is being made so that this Sanitary Canal has been abstracting water from Lake Michigan for 28 years, and has caused all the damage complained of, for sanitary and power purposes.

This Court has twice examined this situation. In *Missouri v. Illinois and the Sanitary District of Chicago,* 180 U. S. 208, the question was whether the State of Missouri could protect itself against an alleged nuisance created by the sewage discharged through the Des Plaines and Illinois Rivers into the Mississippi above St. Louis, it being contended by Missouri that a substantial impairment of the health and prosperity of the towns and cities of that State was being caused by the pollution of the Mississippi River and that the entire State was injuriously affected thereby. The case was, therefore, the right of a State to restrain a public nuisance. Later in the same case (*200 U. S. 496*) the facts having been ascertained, the court dismissed the bill for the reason that the existence of the nuisance and its injurious effect had not been proved, but the dismissal was without prejudice. Throughout this examination of the questions the canal was treated as a sanitary agency. Again in *United States v. the Sanitary District,* 266 U. S. 405, the court had the facts before it and held that the canal was primarily a means of disposing of the sewage of the City of Chicago.

As we shall point out more fully later, the evidence in this case shows that all the applications of the Sanitary District to the Secretary of War have been based upon the sanitary needs of Chicago and the permits of the Secretary of War, including the permit now in effect have been reluctantly issued in deference to Chicago's sanitary needs and have in no case either been applied for or granted in furtherance of navigation.

The Supreme Court of Illinois has been called upon to interpret the legislation of that State and has held that the canal was built as a sewage disposal plant under the police power of the State and not for navigation purposes.

In *Beidler, et al. v. Sanitary District of Chicago,* 211 Ill. 628, decided October 24, 1904, the facts were that long prior to 1900 the South Branch Dock Company, owning a large tract of land fronting on the South branch of the Chicago River, excavated and constructed a number of canals through its property extending north from the river and connected therewith, and then so subdivided their property that each lot fronted either on the river or one of the canals. Sixty-six of these lots were sold to Jacob Beidler, plaintiff in the action. The lots were used as coal, lumber and other docks. The Sanitary District of Chicago in 1900 connected its drainage channel with the South Branch of the Chicago River, reversing the flow of that stream and diminishing the supply of water in the river, and in each of the canals, with the effect of lowering the water six feet. Beidler sued the Sanitary District for the consequent damage.

The court held that the excavation of the original canals had created riparian rights appurtenant to the lots fronting on the canals which were of like character and sanctity with the riparian rights appurtenant to lands fronting on the river in its natural state; that the lowering of the water in the canals by the action of the Drainage District constituted a taking of the property of the plaintiff, for which damages by way of compensation could be recovered.

It was urged on behalf of the Sanitary District that its action in constructing the Sanitary canal was in furtherance of navigation and that the dominant easement of the public in these waters for navigation purposes made any damages like those suffered by the plaintiff merely incidental to the regulation of the stream for navigation purposes, and therefore not a basis for recovery. In the course of the opinion the court says:

> "The right of the public in this stream is the right to navigate it. No right can be acquired by prescription which will interfere with this right of

navigation. It does not appear from the declaration in this case that filling these canals with water from the river interfered in any wise with navigation. In view of the length of the canals and the amount of water necessarily required to fill them to the level of the river, the diversion of the waters to the canals was an appropriation of the water adverse to the rights of other owners of abutting property, and, as the appropriation did not violate the public right of navigation, the owner of each lot fronting upon either of these canals acquired by prescription the same riparian rights in the waters therein that he would have had if the canals had been natural waterways, and, under the authorities above cited, his title extended to the middle of the canal.

"Section 13 of Article 2 of the Constitution of the state provides, 'Private property shall not be taken or damaged for public use without just compensation' and the question is here presented whether the damages sustained by appellants are within this language of the Constitution. * * *

"Now, if the owners of the various lots abutting on the canals in question have acquired by prescription the same right to the enjoyment of the use of the water in these canals at the ordinary level that they would have, had these canals been natural and not artificial waterways, it is apparent that it is their right to have the water flow into these canals to the same height that it did prior to the opening of the drainage district channel.

"It is urged in opposition to this view that the title of the riparian owner is subordinate to such use of the water as may be consistent with or demanded by the public right of navigation, and that the rights of the plaintiffs are subject to the paramount authority of the state to make any and all improvements to facilitate navigation; and it is argued that, as section 24 of the sanitary district act declares that the drainage channel is a navigable stream, consequently, reducing the level of the water in the Chicago river for the purpose of filling the sanitary channel was in the interest and for the purpose of navigation, and that, as the rights of plaintiffs were subject to the rights of the public to make any and all improvements to facilitate navigation, the damages inflicted are not of a character for which recovery may be had. To this there are two answers: While it is true that the rights of the plaintiffs are subject to the public right of navigation, and that damages resulting in consequence of any work by the public for the purpose of improving navigation are damages for which no recovery can be had, still it must be manifest that the right of navigation and the right of improvement for purposes of navigation, which are superior to the rights of plaintiffs, must be the right to navigate the South Branch of the Chicago River and to improve navigation in that branch, or some stream or lake whose waters naturally flow into that branch, or into which that branch naturally flows. Here the waters were taken and their general levels reduced for the purpose of making navigable an artificial channel, and not for the purpose of facilitating the navigation of the South Branch of the Chicago River, or any stream or body of water naturally emptying into it, or any stream or lake into which it naturally empties.

"Again, it is evident, from an examination of the act for the creation of sanitary districts, that the primary and principal purpose of their creation under the statute is to provide for the preservation of the public health by improving the facilities for the final disposition of sewage and by supplying pure water. The fact that a navigable waterway may be created is a mere incident, and not one of the purposes for which a sanitary district is created."

Thus we have the authoritative determination of the Supreme Court of Illinois to the effect that the purpose of the canal was sanitary and that the claim that the facilities of navigation were improved is inadmissible for the reason, both that such facilities for navigation are entirely incidental and also that they comprise no part of the improvement of natural waterways but rather the creation of an artificial waterway, so that the subjection of estates affected by the improvement to the incidental damage resulting from the improvement of navigable streams would not apply. The damage was not done in the improvement of the navigation of the Chicago River but in the creation of a waterway against the course of nature in a place where no navigable waterway existed in a state of nature and as to which the damaged estates were under no implied obligation to sustain without compensation any incidental damage.

It is definitely established in the United States, and particularly in those States which formerly constituted a part of the Northwest Territory, that the ownership of and dominion and sovereignity over lands under the navigable waters of the Great Lakes, within the limits of several States, belong to the respective States in which they are found. This was held in *Illinois Central Railroad Company v. Illinois*, 146 U. S. 387. See also *Shively v. Bolby*, 152 U. S. 1. This ownership includes not merely the land under the water but the water over the land and has been described as a full proprietory ownership subject to Federal control over navigation. *Port of Seattle v. Oregon, etc.*, 255 U. S. 56. But it is equally well settled that this full proprietorship is in a trust capacity.

The Supreme Courts of the States themselves have recognized and declared this trust. Thus in *State of Ohio v. The Cleveland and Pittsburgh Railroad Company, et al.*, 94 O. S. 61, it is said,

> "The title of land under the waters of Lake Erie within the limits of the State of Ohio is in the State, as trustee, for the benefit of the people, for public

> uses for which it may be adapted. * * * The ownership of the waters of Lake Erie and of the land under them within the state is a matter of public concern. The trust with which they are held is Governmental and the state, as trustee for the people, can not by acquiescence or otherwise abandon the trust property or permit a diversion of it to private uses different from the object for which the trust was created."

In re *Crawford County Levee and Drainage District*, 182 Wisc. 404. This was a proceeding to establish a Drainage District in Winnesheik bottoms adjacent to the Mississippi. The effect of the proposed drainage would be to enclose certain sloughs, render innavigable certain ponds theretofore navigated by small craft, and cause the discontinuance of a ferry between one of the large sloughs and the river. The Secretary of War had issued a permit in the usual form authorizing the work, but the court held that the work as carried out would destroy navigable waters of the State and that they could not be lawfully destroyed through a drainage scheme. In its opinion the court refers to the Ordinance of 1787 as creating a trust in the State for the preservation of the navigable waters and says,

> "From our acceptance of the provisions referred to of the Ordinance of 1787 it follows that it is not a question of state policy as to whether or not we shall preserve inviolate our navigable waters. We are by organic law compelled so to do. *Economy L. & P. Co. v. U. S.*, 256 U. S. 113, 41 Sup. Ct. 409. That we have scrupulously endeavored to carry out the mandate of the organic law and of the legislative enactments quoted, the decisions of this court abundantly show. We are the trustee of the navigable waters within our borders for the benefit not only of the people of our own state but for the benefit of the people of the whole United States. And this trust we cannot diminish or abrogate by any act of our own. We accepted the

> trusteeship in our organic law as a condition of becoming a state, and we must execute it according to its intent and purpose until released by action other than that of this state. *Economy L. & P. v. U. S.*, 256 U. S. 113, 41 Sup. Ct. 409. Neither the state nor this court has anything to do with the wisdom of the policy of keeping inviolate our navigable waters. The supreme law so directs, and its mandate not only justifies but compels the continuance of the policy."

That these lands and waters are thus owned by the States upon a trust, has been held by this Court in *Illinois Central Railroad v. Illinois*, 146 U. S. 387, and the character of this trust is stated in the opinion of the court at page 452 and the following, as follows:

> "That the State holds the title to the lands under the navigable waters of Lake Michigan, within its limits, in the same manner that the State holds title to soils under tide water, by the common law, we have already shown, and that title necessarily carries with it control over the waters above them whenever the lands are subjected to use. But it is a title different in character from that which the State holds in lands intended for sale. It is different from the title which the United States hold in the public lands which are open to pre-emption and sale. It is a title held in trust for the people of the State that they may enjoy the navigation of the waters, carry on commerce over them, and have liberty of fishing therein freed from the obstruction or interference of private parties. The interest of the people in the navigation of the waters and in commerce over them may be improved in many instances by the erection of wharves, docks and piers therein, for which purpose the State may grant parcels of the submerged lands; and, so long as their disposition is made for such purpose, no valid objections can be made to the grants. It is grants of parcels of lands under navigable waters, that may afford foundation for wharves, piers, docks and other structures in aid of commerce, and grants of parcels

which, being occupied, do not substantially impair the public interest in the lands and waters remaining, that are chiefly considered and sustained in the adjudged cases as a valid exercise of legislative power consistently with the trust to the public upon which such lands are held by the State. But that is a very different doctrine from the one which would sanction the abdication of the general control of the State over lands under the navigable waters of an entire harbor or bay, or of a sea or lake. Such abdication is not consistent with the exercise of that trust which requires the government of the State to preserve such waters for the use of the public. The trust devolving upon the State for the public, and which can only be discharged by the management and control of property in which the public has an interest, cannot be relinquished by a transfer of the property. The control of the State for the purposes of the trust can never be lost, except as to such parcels as are used in promoting the interests of the public therein, or can be disposed of without any substantial impairment of the public interest in the lands and waters remaining. It is only by observing the distinction between a grant of such parcels for the improvement of the public interest, or which when occupied do not substantially impair the public interest in the lands and waters remaining, and a grant of the whole property in which the public is interested, that the language of the adjudged cases can be reconciled. * * * A grant of all the lands under the navigable waters of a State has never been adjudged to be within the legislative power; and any attempted grant of the kind would be held, if not absolutely void on its face, as subject to revocation. The State can no more abdicate its trust over property in which the whole people are interested like navigable waters and soils under them, so as to leave them entirely under the use and control of private parties, except in the instance of parcels mentioned for the improvement of the navigation and use of the waters, or when parcels can be disposed of without impairment of the public interest in what remains, than it can abdicate its police powers in the administration of government and the preservation of the peace."

It is then established that the States bordering on the Great Lakes own the waters thereof and the lands under them, upon a solemn trust to preserve those waters in their natural condition, or improved in accordance with their natural condition, in trust for the benefit of the people of the state. This trust is not passive merely and is not exhausted by imposing a limitation upon the State against granting rights in derogation of it, but is an active trust and calls upon the State to defend the trust property against encroachments and diminutions, so that the complainant states in these actions are here as trustees seeking to preserve the navigable capacity of these waters and to preserve the natural benefits of these waters to the people of the respective States and to the littoral owners in the States, whose rights are injuriously affected by the diversion at Chicago. It is beyond question that the State of Wisconsin would have the right to prevent a citizen of Wisconsin from diminishing the navigable capacity of Lake Michigan to the injury of the interests of the State and of littoral owners in the State. It would be the duty of the State of Wisconsin to prohibit any such action within its borders. The same duty and the same right obtain as to each other riparian State of the Great Lakes waterway, and the question, therefore, is whether these complainant States have the right, through this Court, to protect this trust property against injury at the hands of the State of Illinois, it being clear that each of the complainant States has both the right and the duty to protect the trust property against such an injury within its own borders.

The Special Master in his answer to question of law Number One has, as we have seen, held affirmatively that the interests of the complainant States affected by the action of the Sanitary District are of such character as to invoke the jurisdiction of this Court, and that the interests of the complainants are shown by the record to have been substantially injured by the action of the Sanitary District (Master's Report, page 143).

Again the Master says:

> "On this question of jurisdiction, I find no difficulty so far as the interest of the complainant States is concerned. If Missouri and New York could maintain suits to prevent the pollution of their adjacent waters, if Kansas, Wyoming and North Dakota were entitled to invoke the jurisdiction with respect to their rights in interstate streams; if Georgia could bring suit to prevent injury caused by the discharge of noxious gases by a Tennessee corporation across the border and into her territory, on the ground of injuries to the interests of the State and her people; it would seem that the complainant States in this case have similar interests and enjoy the same right. In *Missouri v. Illinois,* 180 U. S. 241, the Court said that suits brought by individuals, each for personal injuries threatened or received, would be a wholly inadequate remedy. Substantial impairment of the health and prosperity of the towns and cities of the States situated on the Mississippi River, including its commercial metropolis, would seriously affect the entire State. In *Georgia v. Tennessee Copper Company,* 206 U. S. p. 237, it was said that the suit was 'by a State for an injury to it in its capacity of quasi-sovereign. In that capacity, the State has an interest independent of and behind the title of its citizens, in all the earth and air within its domain.' I should say the same as to water.
>
> "In *Pennsylvania v. West Virginia,* 262 U. S. p. 592, it was said that the withdrawal of the natural gas from the interstate stream was 'a matter of grave public concern in which the State, as the representative of the public, has an interest apart from that of the individuals affected.'"

In his consideration of the second question of law, the Special Master, after stating his reliance upon *Sanitary District of Chicago v. United States,* says:

> "Moreover, it is unnecessary to consider what right the State of Illinois would have had to create the diversion in the absence of prohibition by Congress, for if Congress has the power to prohibit, it has effectively prohibited action of this sort save on compliance with specified requirements." (Master's Report, page 147)

It must, however, be clear that if the complainant States have the interests necessary to sustain the jurisdiction of this Court in this case and those interests have been substantially injured as held by the Master, then the State of Illinois could have no right to divert the waters of Lake Michigan in the manner and for the purpose shown unless it derives that right from either the consent of the injured States, assuming that it could be lawfully given, or the affirmative authority of the United States, if the United States has the power to give such authority and has given it.

The complainants, of course, do not question the power of the United States under the commerce clause of the Constitution to regulate interstate commerce, nor do they question that their ownership and control of navigable waters within their boundaries are subject to Federal control over navigation, *Port of Seattle v. Oregon, etc.,* 255 U. S. 56, but we regard it as demonstrated, by the consistent holdings of this Court, that in the absence of power in the United States, affirmatively exercised, to authorize this diversion, the complainant States have the right in this Court to relief which will prohibit the injury which they are now sustaining at the hands of Illinois to their trust estate in the navigable waters within their borders.

As a matter of fact, passing by for the moment all questions with regard to the rights of the Federal Government, this Court has definitely settled the rights of the States among themselves with regard to the waters of interstate streams. The three cases of *Kansas v. Colorado,* 185 U. S. 125; *Kansas v. Colorado,* 206 U. S. 46; and *Wyoming v. Colorado,* 259 U. S. 419, establish as between adjoining States their relative rights in accordance with right and equity and in harmony with the constitutional principles of state equality. Thus in *Wyoming v. Colorado, supra,* it is said,

> "The decision in *Kansas v. Colorado,* 206 U. S. 46, was a pioneer in its field. On some of the questions presented it was intended to be and is comprehensive, and on others it was intended to be within narrower limits, * * * On full consideration it was broadly determined that a controversy between two States over the diversion and use of waters of a stream passing from one to the other makes a matter for investigation and determination by this court in the exercise of its original jurisdiction, and also that the upper State on such a stream does not have such ownership or control of the waters flowing therein as entitles her to divert and use them regardless of any injury or prejudice to the rights of the lower State in the stream."

These cases are authority for the general proposition that the upper proprietor may not destroy the right of the lower proprietor by diverting the water of the stream and preventing its flow in its natural state. The case at bar, of course, presents this situation in its most magnified form. The Sanitary District and the State of Illinois are by this record shown not only to divert and withhold all the waters which in the state of nature were contributed by the Chicago and Calumet Rivers to Lake Michigan and so the general Great Lakes waterway, but they abstract and divert from Lake Michigan water contributed by other States in a quantity twenty times as great as the State of Illinois in the state of nature contributed to that waterway.

This leads us to the discussion of the third question of law propounded by the Special Master.

III.

"WHETHER CONGRESS HAS THE AUTHORITY TO CONTROL THE DIVERSION, THAT IS, IN ITS REGULATION TO DETERMINE WHETHER AND TO WHAT EXTENT THE DIVERSION SHOULD BE PERMITTED."

As we have seen, the complainant States own the lands and waters of the Great Lakes in trust for the public and have both the right and duty to protect this trust unless their right is destroyed and their duty absolved by the intervention of the dominant power of the United States, duly exercised. We have further seen that the ownership and dominion of the complainant States is subject to the control of navigation by the United States. The question here to be considered, therefore, is whether, under the commerce clause of the Constitution, the control of navigation empowers the United States affirmatively to authorize the destruction of these natural navigable waters,

1. In the interest of local sanitation, or
2. For the creation of an artificial waterway, which the Government may determine to be, in its opinion, more advantageous than the natural waterway.

It must be clear that if the Government can authorize the abstraction of water from the Great Lakes for sanitation at Chicago, it can both authorize the abstraction of all the water which Chicago needs for that purpose, as the limits of the Sanitary District are further extended and the growth of its population expands its need, and also that it can authorize similar abstractions for the sanitary needs of all the other populations along the shores of the waterway. That this threatens the destruction of the waterway is obvious, as the value of the waterway depends upon the available depths and each reduction of those depths is *pro tanto* a destruction of the waterway. It must be equally clear that if the Government has the power to authorize the abstraction of water from the Great Lakes to make this thirty miles of drainage canal navigable, it must have the power to authorize similar abstractions to the extent necessary to create other artificial waterways. Nor is the illustration fanciful. There is already local demand being created for a new artificial waterway which will tap Lake Erie, empty its water into the Wabash, and thus make another artificial waterway, in competition with the drainage canal, for the Great Lakes to the Gulf deep waterway route. We are, of course, only at the beginning of the plans which will be made if it be established that the Government has power to transfer the natural advantages of the Great Lakes waterway to the less favored sections of the country, and opportunities are abundant in both the United States and Canada along the six thousand miles of shore line on the Great Lakes waterway, excluding Lake Superior.

On page 149 of the Special Master's Report, the question now under consideration is restated with reference to five grounds assigned by the complainants. We consider these grounds in the same order.

1.

"That the diversion constitutes the taking of complainants' property without due process of law and without just compensation in violation of the Fifth Amendment."

In his discussion of this question, the Special Master holds that the States have sovereign and proprietory rights over the navigable waters and the lands underlying them, within their boundaries, subject to the powers surrendered to the National Government; and that the States admitted to the Union subsequent to the original thirteen were admitted as equal States and have the same rights as those States with respect to navigable waters and the land under such waters, within their respective jurisdiction. *Port of Seattle v. Oregon & Washington Railroad Co.*, 255 U. S. 56; *Shively v. Bowlby*, 152 U. S. 1. It is therefore important to see what powers have been surrendered to the general Government. The statement in the Port of Seattle case (page 63) is that,

> "the right of the United States in the navigable waters within the several states is limited to the control thereof for purposes of navigation."

In *United States v. Holt State Bank, et al.*, 270 U. S. 49, the question arose as to the title to the bed of Mud Lake in Minnesota, a navigable waterway which had been emptied by a drainage scheme under the authority of the State of Minnesota and also with the assent of the Federal Government. It is important to note that this destruction of a navigable water had been carried out under the authority of a law of Minnesota, and that the Government of the United States merely gave its assent, that is, declined to exercise its veto power. As bearing upon the whole subject, it is also important to note that the assent of the Government of the United States was not attempted to be given by a mere permit of the Secretary of War, but was given by a special act of Congress passed for the purpose. *Act of May 20, 1908, c. 181, 35 Stat. 169.* In its opinion the court defines the respective rights of the State and of Congress as follows:

> "It is settled law in this country that lands underlying navigable waters within a state belong to the state in its sovereign capacity and may be used and disposed of as it may elect, subject to the paramount power of Congress to control such waters for the purposes of navigation in commerce among the states and with foreign nations, * * *" (Page 54).

Throughout the cases in this Court, without exception, the distinction has been preserved between the rights of the States on the one hand, and the power of the general Government on the other. The power of the general Government is such power as has been surrendered to it by the States. The rights of the States are all the rights which have not been surrendered to the general Government. The language of the surrender is found in Section 8 of Article I of the Constitution,

> "The Congress shall have power * * * to regulate commerce with foreign nations and among the several states and with the Indian tribes."

This language must, of course, be interpreted in the light of the great dogma of constitutional interpretation, that,

> "If the end be legitimate, and within the scope of the Constitution, all the means which are appropriate, which are plainly adapted to that end, and which are not prohibited, may constitutionally be employed to carry it into effect." *McCulloch v. Maryland,* 4 Wheat. 316.

To this must be added the observation that the extent of the power given to Congress in this or in any other clause of Section 8 must be determined not only by the immediate language of the grant but by the limitations, if any, found elsewhere in the Constitution. The great constitutional guarantees were ordained to restrain, sometimes state action and sometimes Federal action, in the preservation of rights which the people were not yet ready to surrender.

Let us then see what the rights of the States are with regard to these waters and the lands under them.

We have already seen in general phrase that the States "have the ownership and dominion" or in the phrase of the Master, the States "have sovereign and proprietory rights over the navigable waters and the land under them."

The interest of the complaining States is a full proprietary interest as upon a public trust. The derivation of this title and its character has been traced by this Court in a series of cases beginning with, *Martin v. Wadell,* 16 Peters 367; See also *Barney v. Koekuk,* 94 U. S. 324; *Pollard's Lessee v. Hagen,* 3 Howard 212; *The Genessee Chief,* 12 Howard 443; *Illinois Central Railroad v. Illinois,* 146 U. S. 387; *Shively v. Bowlby,* 152 U. S. 1; *St. Anthony's Falls Power Company v. St. Paul,* 168 U. S. 349.

The nature and extent of this proprietorship and the duty imposed upon the State as trustee has been frequently examined and declared by this Court, thus in *Kansas v. Colorado,* 206 U. S. 46, a suit was brought by Kansas against Colorado and certain corporations organized under its laws to restrain them from diverting the water of the Arkansas River for the irrigation of lands of Colorado, thereby preventing the natural and customary flow of the river into Kansas. The United States filed an intervening petition claiming a right to control the water of the river to aid in the reclamation of arid lands, but not claiming that the diversion of the water tended to diminish the navigability of the river. The intervening petition of the United States was dismissed on the ground that while Congress has general legislative jurisdiction over the territories and may control the flow of water in their streams, it has no right to control waters within the limits of States, except its control over navigable waters, and that full control of these waters is, subject to the exception named, vested in the State.

In *Hudson County Water Company v. McCarter,* 209 U. S. 349, it was held on the authority of *Kansas v. Colorado,* 185 U. S. 125, and *Georgia v. Tennessee Copper Company,* 206 U. S. 230, that the State, as quasi-sovereign and representative of the interests of the public, has a standing in court to protect the atmosphere and the water and the forests within its territory, irrespective of the assent or dissent of the private owners immediately concerned and that *a State has a constitutional power to insist that its natural advantages remain unimpaired* and is not dependent upon any reason for its will so to do.[3] In the exercise of this power the State may prohibit diversion of the waters of its important streams to points outside its boundaries.

In State of *North Dakota v. State of Minnesota,* 263 U. S. 361, it is held that the ownership and duty of the State are such that where a sister State, by changing its method of drainage, increases the flow of an interstate stream so that water is thrown upon the farms of another State, the latter State has such an interest, as quasi-sovereign, in the comfort, health and prosperity of her farm owners that relief by injunction may be had upon application to this Court against the State causing the injury. In this holding, this Court adopts the doctrine established in the state courts that one owning land on a watercourse has rights of use limited by the equal rights of his neighbors, and applies this principle of private law to the conflicting public rights of independent States. The effect of this holding is that in addition to its sovereign right within its own borders, the State, as trustee, is the repository and defender of the private rights of its citizens and is under obligation to represent and vindicate those rights when they are invaded by the action of a State which is beyond the reach of individual applications for redress. *Pennsylvania v. Wheeling Bridge Company,* 13 Howard 518; *Pennsylvania v. West Virginia,* 262 U. S. 553; *Georgia v. Tennessee Copper Company,* 206 U. S. 230.

From these cases and the great body of decided law of which they are merely an illustrative part, it is clear that the States have the combined capacity of political sovereignty and proprietorship, and that in both of these capacities they have the rights and duties of independent nations, in the protection of their own political interests and the public and private interests of their citizens, which belong to independent nations except to the extent that they have limited this right by their concessions in the Constitution.

This subject is fully discussed and decided as to its general principles in *Georgia v. Tennessee Copper Company,* 206 U. S. 231, where it is said,

> "When the States by their union made the forcible abatement of outside nuisances impossible to each, they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the ground of their still remaining quasi-sovereign interests; and the alternative to force is a suit in this court.
>
> "* * * If the State has a case at all, it is somewhat more certainly entitled to specific relief than a private party might be. It is not lightly to be required to give up quasi-sovereign rights for pay; and, apart from the difficulty of valuing such rights in money, if that be its choice it may insist that an infraction of them shall be stopped. The States by entering the

> Union did not sink to the position of private owners subject to one system of private laws. This court has not quite the same freedom to balance the harm that will be done by an injunction against that of which the plaintiff complains, that it would have in deciding between two subjects of a single political power. Without excluding the considerations that equity always takes into account, we cannot give the weight that was given them in argument to a comparison between the damage threatened to the plaintiff and the calamity of a possible stop to the defendants' business * * *."

A specially interpretative consideration, affecting States carved out of the Northwest Territory, arises from the provisions of Article 4 of the Ordinance of 1787. This Ordinance was promulgated by the Congress of the Confederation prior to the taking effect of the Constitution of 1789. The Ordinance was passed on the 13th day of July 1787, the Constitution was signed by the members of the Convention on the 17th day of September in the same year. But the Ordinance itself declared "the navigable waters leading into the Mississippi and the St. Lawrence and the carrying places between them shall be common highways and forever free". This clause has been held to impose upon the States constituted out of the Northwest Territory a limitation upon their sovereignty and proprietorship of navigable waters within their limits. By it they are made guardians of these navigable waters and may not injure or destroy their navigability. *In Re Crawford County L. & D. District,* 182 Wis. 404; *Economy Light and Power Company v. United States,* 256 U. S. 113. The purpose of this Ordinance and of the Constitution, prepared at the same time and in the same atmosphere of public intention and purpose, was to declare for all times the preservation inviolate of the natural waterways of the country. The intensity of this purpose can only be appreciated if we recall that these great enactments were made half a century before the building of the first railroad, by men who knew no other great arteries of trade and commerce but navigable waters, and who lived in a civilization which was extending itself westward from the sea coast by following and building cities upon the banks of navigable streams. With such thoughts in mind, it is not possible to think that the Fathers on the one hand restrained the sovereign and practically independent colonies from sacrificing navigable waters within their boundaries, and on the other donated to a general Government about to be created, the power to destroy those navigable waters. The language of the Constitution which makes the surrender to the general Government is general. It is the power to regulate commerce among the several States. It leaves in the States all the power not in conflict with the power given to Congress and not inconsistent with the means which Congress may find appropriate in the exercise of its power. But wide as this power of regulation may be, under the doctrine of *Gibbons v. Ogden*, 9 Wheat. 1, it can hardly be contended that it is wide enough to authorize Congress to destroy the things it is authorized to regulate in order to create something else it prefers to regulate. This Court has held from the beginning that Congress has the right to regulate navigable waters. Until now no one has ever suggested that, as a means adapted to the exercise of its power of regulation, Congress has the power to declare a stretch of dry land thirty miles long, extending over the Continental Divide, to be a navigable stream and make its declaration good by affirmatively authorizing the destruction of a natural navigable water in order to transfer its quality of navigability to the artificial structure.

The Fifth Amendment is clearly a limitation upon the power of Congress under Section 8 of Article I of the Constitution.

In *Monongahela Navigation Company v. United States*, 148 U. S. 312, it is said,

> "But like the other powers granted to Congress by the Constitution, the power to regulate commerce is subject to all the limitations imposed by such instrument, and among them is that of the Fifth Amendment, we have heretofore quoted. Congress has supreme control over the regulation of commerce, but if, in exercising that supreme control, it deems it necessary to take private property, then it must proceed subject to the limitations imposed by this Fifth Amendment and can take only on payment of just compensation. The power to regulate commerce is not given in any broader terms than that to establish post offices and post roads; but, if Congress wishes to take private property upon which to build a post office, it must either agree upon the price with the owner, or in condemnation pay just compensation therefor." (Page 336)

The validity of this principle has never been doubted in this Court, but a great variety of cases have arisen presenting the question as to whether or not a particular act of the Federal Government in furtherance of navigation did in fact constitute a taking of private property or merely caused incidental damage to property so related to the navigable stream in question as to be under a servitude to bear without compensation damages incident to the improvement of the stream. In some of the cases the distinction seems to be as between an actual taking of the physical property and a damage to the property, but this distinction does not appear to be entirely satisfactory. Property may be so damaged as to be useless. To deny the owner compensation merely permitting him to have the barren satisfaction of retaining the legal title and perhaps having physical possession of property he could no longer use, would be to victimize him by forms of law rather than to render justice according to the merits of his cause. The true distinction would rather seem to be that riparian property has, implicit in its location, such a relation to the stream that it must bear the normal consequences of those improvements in the stream which are made in order to render the stream more serviceable for the great purposes of national commerce. This servitude derives from the location of the land and is natural and obvious. If the stream be deepened with a consequent increasing erosion of its banks, the damage is natural. If the Government selects one or the other of two possible channels for improvement and thus incidentally neglects or even injures property upon the other channel, it is again clear that this is a mere incident of the servitude. That which nature has intended man has perfected with regard to the channel improved and that possibility was inherent in the fact that the stream was a navigable stream. If on the other hand for the purpose of improving a stream it be widened, thus doing more than nature intended, and for this purpose land must be actually taken, compensation must be paid because the Government in the public interest, has gone beyond nature's intended process and has so exceeded the servitude of the riparian owner. Similarly, if land not adjacent to a navigable stream be taken or damaged as by excavating stone from it to improve a navigable stream nearby or remote, the taking or injury must be compensated because the land thus damaged is under no servitude to contribute to the improvement. Similarly, if the land bordering upon a navigable stream be injured by an impairment of the navigability of the stream, which does not arise from an effort to improve the stream and does not in fact improve the stream but is for another purpose, as for instance to provide sanitary appliances for a city or to create an artificial waterway, the damage constitutes a taking because there is no servitude in the riparian proprietors along navigable waters to endure a damage to their property for the benefit of the sanitation of a remote city or for the creation of an artificial waterway, however useful, at a place where nature has not intended one to be. This does not mean that the artificial waterway may not be useful, but it means that the creation of it is beyond the servitude of the riparian proprietors of the stream which is sacrificed for its creation.

A full discussion of this subject is found in the important case of *Fulton Light, Heat & Power Co. v. State*, 200 N. Y. 400. This case grew out of the construction of the New York State Barge Canal. In the course of the construction, it became necessary to parallel the Oswego River with an artificial canal and the question arose as to whether the diversion of the waters of the Oswego River into the artificial Canal constituted such an improvement of the river as a waterway as to impose damages caused to riparian owners as a mere incident for which compensation was not necessary to be paid. The Court of Appeals of New York held,

> "While the state may make improvements in navigable rivers for the purpose of aiding navigation without regard to the ownership of the bed, the interest of the riparian owner therein being subordinate to the public easement of which the state is trustee, the state cannot divert the waters of a river to the injury of a riparian owner by constructing a canal wholly outside the channel of the river without paying compensation for such injuries."

In the body of the opinion it is said,

> "But when, under the plea of the improvement of navigation, the property of the riparian owner is

> taken, or diminished by the diversion of the waters, for a public work not within, but wholly outside, the channel of the river, I think there is a clear case for the enforcement of the constitutional guaranty of compensation. If the appropriation is for a purpose not incidental to the natural, or public, servitude in the river, how could that provision of the fundamental law of this government—so instinct with the principle of justice,—find juster application? The State, by the exercise of its power of eminent domain, could take these claimants' lands and divert from their power plant properties the water power, which operated them, upon making just compensation therefor; but in my opinion, it had no unlimited right to make a use of the river for a public purpose, except as such purpose was related to the improvement of the channel, or bed, of the river itself for purposes of navigation or transportation."

To the point that the servitude of riparian property for the benefit of navigation does not extend to the invasion of riparian rights by the sovereign or otherwise, for the creation of an artificial waterway, for power purposes, for drainage purposes, for irrigation purposes, for municipal water supply, or for any purpose other than improving the navigable waters to which the riparian property is littoral, complainants cite without discussion the following cases:

Ex parte Jennings, 6 Cow. 518, 16 Am. Dec. 447; *Canal Fund Commissioners v. Kempshall,* 26 Wend. 404; *Cooper v. Williams,* 5 Ohio 391, 24 Am. Dec. 299; *Buckingham v. Smith,* 10 Ohio 288; *In re Dancy Drainage District,* 129 Wisc. 129, 108 N. W. 202; *In re City of New York,* 168 N. Y. 134, 61 N. E. 158, at 161; *Smith v. City of Rochester,* 92 N. Y. 464; *United States v. Great Falls Mfg. Co.,* 112 U. S. 645; *Pine v. New York,* 103 Fed. 337 (Affirmed, 112 Fed. 98, Reversed on other grounds, 185 U. S. 93); *McCord* *v. High,* 40 Iowa 336; *Barrett v. Metcalf,* 12 Tex. Civ. App. 247, 33 S. W. 758.

As a matter of fact the situation is anomalous. Under the decision of the Supreme Court of Illinois, the State in which this diversion is made, the citizens of that State, who are riparian owners upon the Chicago River are entitled to damages, *Beidler, et al. v. Sanitary District of Chicago,* 211 Ill. 628, while everybody outside of the State of Illinois, according to the claims of the Sanitary District here urged, who is likewise injured is denied relief, for it must be clear that if riparian owners upon the Great Lakes System outside of Illinois are accorded the rights given to Beidler by the Supreme Court of that State, then these injured riparian owners outside of Illinois have rights which their States may enforce under the doctrine of *Tennessee Copper Co. v. Georgia.* The State can not be compelled to accept compensation but may seek in this Court to restrain the injury.

When the cases in this Court are examined from this point of view, it will be found the distinction suggested controls the decisions and further that this Court has consistently regarded navigable streams *in their natural condition* as the basis for the determination of the rights both of individual riparian proprietors and the cases of conflicting sovereignties. Here, of course, we have the complainant States asserting both their own quasi-sovereign and proprietory rights and representing as *parens patriae* the rights of their citizens, owners of lands abutting upon this waterway.

In *United States v. Rio Grande Irrigation Company,* 174 U. S. 690, the court had before it an application of the United States to restrain the Rio Grande Land and Irrigation Company from building a dam across the Rio Grande River in the Territory of New Mexico and appropriating the waters of that stream for the purposes of irrigation. The river within the limits of the Territory was not navigable and the purpose was to accumulate and impound waters from the river in unlimited quantities and distribute the same through canals, ditches and pipe lines. On behalf of the United States it was claimed that the Rio Grande was navigable in the State of Texas and that its navigability depended upon a continuous flow of the waters sought to be impounded in New Mexico. This view the court sustained in spite of the custom of the country, altering the common law rule with regard to the abstraction of waters for irrigation purposes. The court points out at page 707 the Act of September 19, 1890, and holds it to be a declaration by Congress prohibiting the creation of any obstruction to the navigable capacity of waters in respect to which the United States has jurisdiction. For this reason the court declines to limit its view to the treatment of the waters of rivers in the innavigable reaches and directs a decree which will prevent any substantial diminution of the navigability of the stream within the limits of its present navigability, thus conserving the stream as nature made it and required, of upper proprietors and upper States, recognition of their obligation not to interfere with the navigability which nature had created.

In *United States v. Lynah,* 188 U. S. 445, the Government in an effort to improve the Savannah River constructed a dam across the river and lands belonging to individuals were flooded, totally destroying their value. This was held to be a taking of private property within the scope of the Fifth Amendment. The court said that although the work done was in improvement of the navigability of a navigable river, the injuries could not be regarded as purely consequential. In the opinion of the court all the early cases were examined at length and the doctrine of *Pumpelly v. Green Bay Co.,* 13 Wall 316, was followed.

In *United States v. Cress,* 243 U. S. 316, it appeared that in improving the navigation of the Cumberland River in Kentucky, the Federal Government, by means of a lock and dam, raised the water above the natural level so that lands on a non-navigable tributary not normally invaded thereby, were subjected permanently to periodical overflows substantially injuring, though not destroying their value. This was held to be a partial taking of property which could only be done upon compensation. In the opinion a very careful re-examination is made of all the cases including *Gibson v. United States,* 166 U. S. 269; *Scranton v. Wheeler,* 179 U. S. 143; and *Jackson v. United States,* 230 U. S. 1. In the opinion the nature of the servitude of riparian lands is carefully examined and the conclusion reached that,

> "It follows from what we have said that the servitude of privately-owned lands forming the banks and bed of a stream to the interests of navigation is a natural servitude, confined to such streams as in their ordinary and natural condition are navigable in fact, and confined to the natural condition of the stream. And, assuming that riparian owners upon non-navigable tributaries of navigable streams are subject to such inconveniences as may arise from the exercise of the common right of navigation, this in like manner must be limited to the natural right. The findings make it clear that the dams in question, constructed by the Government in the Cumberland and Kentucky Rivers, respectively, are for raising the level of those streams along certain stretches by means of back water, so as to render them, to the extent of the raising, artificial canals instead of natural waterways."

In the case of *Sanguinetti vs. United States,* 264 U. S. 146, which is cited by the Special Master, the principle of liability is clearly recognized but relief is denied because it was doubted in that case whether the injury complained of was caused by the structure erected by the Government and because it was not certain that there was "an actual, permanent invasion of the land," since the floods were exceptional and were a mere indeterminate addition to periodical floods which occurred prior to the Government's intervention.

In the case at bar, the various injuries to the complainant states are permanent and they proceed not from an improvement of navigable waters of the United States in accordance with their natural condition, but from a a construction in defiance of nature's intention. On the principle of these cases, it is clear that the States, cities and individuals, who have improved their lands with reference to the Great Lakes waterway, as nature's provision for their use, and have built up a vast civilization about this waterway which depends upon its maintenance and improvement in order to further its efficiency in performing a service which nature obviously intended it to perform, have the servitude to bear all the incidental damage which flows from improvements in the watercourse, but it is not conceivable that these interests are under any servitude which requires them to bear the injury caused by the construction of unnatural and artificial watercourses, which not only do not improve the serviceableness of the Great Lakes water system but directly, permanently and substantially damage it in the interest of an artificial waterway. In questions of this kind, the existence of a power can be not improperly argued by supposing a critical use of the power. Could the United States acquire a strip of land from Lake Michigan or Lake Erie to the Gulf of Mexico and thus create a great inland waterway by excavating a canal, drawing off the waters of the Great Lakes and terminating the Great Lakes waterway at Niagara

Falls? Perhaps it is not necessary to answer that question as to the power of the Federal Government as it is not presented in this record, but clearly if the United States has the power to create any such waterway, the power is subject to the limitations of the Fifth Amendment and the damage caused to a great industrial civilization which has built itself securely about the Great Lakes could not be called incidental to the improvement of navigable waters of the United States.

This question is, of course, important only if this Court should find itself obliged to hold that the Sanitary District and the State of Illinois have no power to withdraw water from Lake Michigan against the protest of the complainant States, except as they derive power so to do from the permits issued by the Secretary of War. Should the Court arrive at such a point, we submit it would be obliged to hold that the United States could not itself thus and for these purposes diminish the navigable capacity of the Great Lakes without responding to the obligations imposed by the Fifth Amendment and that it could not therefore empower the State of Illinois and the Sanitary District so to do.

2.

"That Congress could not authorize the diversion from the Great Lakes-St. Lawrence watershed to the Mississippi watershed."

Much that is said above in discussing the application of the Fifth Amendment applies to the question now to be considered. The trust upon which the States hold their property and dominion over these waters is that they shall be preserved inviolate, their navigable capacity preserved and their navigation facilitated. The powers of the Federal Government are likewise given to it upon trust and all that this Court has said about the implications to be drawn from the natural condition of the waters in these waterways characterizes the trust and limits the power both of the States and of the Federal Government. But this Court applies great principles of equity in the interpretation of the Constitution and where it is asked to find a power, the exercise of which is at variance with plain principles of equity and good conscience, it will find that power only if given in express words and will not construct it by doubtful implications.

It is not too much to say that the whole industrial and commercial structure of the United States has been built about the existence of two great waterways separated by the Continental Divide, opening interstate and international communication by the St. Lawrence on the one hand and the Mississippi on the other. Each has its natural advantages. In the basin of each of these waterways, vast populations have built up their social and industrial institutions to use to the maximum these natural advantages. An intense but constitutionally restrained rivalry exists between the two sections and the dominant character of their respective civilizations has been determined, throughout the past one hundred years, as much by their respective advantages as by their common advantages. That the natural advantages of the Great Lakes region should now be sacrificed to the drainage of Chicago or to the improvement in the navigable depths of the Mississippi would be at variance with the just expectations of the States and their peoples, who have settled the Great Lakes region and built it into an efficient industrial empire. To destroy these just expectations would be grossly inequitable and as we have seen, there is no express language in the Constitution which requires the implication of any such power. It can not be that the power will be found to be implied by the absence of a limitation in the Constitution to which the

Special Master calls attention. (Special Master's Report, page 153.)

In *Hudson County Water Company v. McCarter,* 209 U. S. 349, 356, this Court said,

> "But we agree with the New Jersey courts, and think it quite beyond any rational view of riparian rights that an agreement, of no matter what private owners, could sanction the diversion of an important stream outside the boundaries of the State in which it flows. The private right to appropriate is subject not only to the rights of lower owners but to the initial limitation that it may not substantially diminish one of the great foundations of public welfare and health. We are of opinion, further, that the constitutional power of the State to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use or speculation as to future needs. The legal conception of the necessary is apt to be confined to somewhat rudimentary wants and there are benefits from a great river that might escape a lawyer's view. But the State is not required to submit even to an aesthetic analysis. Any analysis may be inadequate. It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one a reason for its will."

The question of the diversion of water from one watershed to another was raised in *Wyoming v. Colorado,* 259 U. S. 419. In its opinion the court held the point to be of no importance for the reason that both Wyoming and Colorado had adopted domestic policies with regard to diversion which disregarded the watershed. We know of no other case in which this question has been raised.

We present the question to the Court to be considered in determining the extent of the power given by the Constitution to Congress. Conceding freely and fully the dominance of Congress in its regulation of navigable waters, we yet submit that the meaning of the donation of power is that Congress shall have the right to regulate those waters where they are and not to carry them by artificial channels to some other place to be regulated, and that this limitation upon the power of Congress grows stronger with each interest built up around navigable waters, in their natural condition and location, until it becomes irresistible in such a case as that at bar, where the whole industrial and commercial fabric of the civilization of great States depends upon the unimpaired preservation of the natural advantages which caused men to seek locations and build their cities and the avenues of trade and commerce in relation to those natural advantages.

The Special Master at page 157 of his report expresses the belief that this Court necessarily recognized the power of Congress to authorize the diversion of water from Lake Michigan to the Mississippi watershed in its decision in *Sanitary District of Chicago v. United States,* 266 U. S. 405. As we have already pointed out, the power of Congress to veto action prejudicial to the navigability of a stream is an entirely different thing from a power in Congress to authorize, that is to say, to supply authority for, such action. The only question at issue in *Sanitary District of Chicago v. United States* was whether the United States had the power to veto the abstraction of Lake Michigan water to the prejudice of the navigable capacity of the Great Lakes. It is true that United States was not seeking to impose an absolute, but a limited veto, and the court sustained the veto to the extent of the relief sought. Further than that it was not asked to go and could not go on the issue presented.

3.

"That the authorization of the diversion would constitute a preference of the ports of one State over those of another in violation of Article I, Section 9, Clause 6 of the Constitution."

The question is as to the construction of Article I, Section 9, Clause 6, of the Constitution, which reads,

> "No preference shall be given by any Regulation of Commerce or Revenue, to the Ports of one State over those of another; nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another."

The question of the construction of this clause has been raised in only two cases. In *Pennsylvania v. Wheeling Bridge Company,* 18 How. 421, it was held by a divided court that this clause did not apply to the circumstances of that case. In *South Carolina v. Georgia,* 93 U. S. 4, where the clause clearly had no application to the facts, the court at page 13 said,

> "It was there said that the prohibition of such a preference does not extend to acts which may directly benefit the ports of one State, and only incidentally injuriously effect those of another, such as the improvement of rivers and harbors, the erection of lighthouses, and other facilities of commerce."

This clause is an express limitation upon the power of Congress in regulating commerce and can not be understood as applicable to those laws only which are passed for the purpose of revenue. *Gibbons v. Ogden,* 9 Wheat. 1, 191.

It is submitted that the true application and construction of this clause is as follows.

Congress may improve the harbors of a particular State and create therein additional facilities for the convenience of commerce, without making a like improvement in the ports of another State; and although the result of these improvements may be to attract some commerce from the ports of the second State to the ports of the first State, by reason of the additional conveniences and facilities for commerce thus provided, the detriment to the ports of the second State is incidental and not within the terms of the prohibition. The ports of the second State have all of the advantages and natural facilities which they had before the improvements in question were made. Nothing has been taken from them. However, if Congress undertakes not merely to provide additional facilities and improvements in the ports of one State which it does not provide in the ports of another, but in addition thereto attempts to take away from the ports of such other State the facilities which existed therein in a state of nature and transfer them to the ports of the first State, it is a direct preference and prohibited by the terms of this clause. It would not be contended that Congress could make a valid law requiring all navigation in the Northwest Territory to be carried on in and through the ports of Illinois and prohibit the carrying on of any navigation in or through the ports of Wisconsin, Michigan, or other States of the Northwest Territory. Such a law would clearly violate this clause of the Constitution. If, on the other hand, Congress should pass a law directing that all of the water in the ports of Wisconsin and Michigan should be taken away and given to the ports of Illinois, can it be said that such a law would be any the less within the prohibition of this clause? The same result has been accomplished. It is not the fact of improvement in the ports of Illinois which may incidentally attract commerce from the ports of Wisconsin and Michigan which renders the law invalid, but it is the fact of taking away from the ports of Wisconsin and Michigan their natural navigation facilities and transferring them to the ports of Illinois. If that be conceded, can it be said that if Congress passes a law taking away from the ports of Wisconsin and Michigan six inches, or any other substantial part of their navigable capacity, and transferring such water so taken from the ports of Wisconsin and Michigan to the ports of Illinois, that it is any the less within the language and spirit of this prohibition?

The prohibition of this clause is not against a little preference, or against a medium preference, but against any preference. Can it be said that taking the water out of Milwaukee Harbor and giving it to the ports of Illinois is an incidental effect on Milwaukee Harbor? It is a positive and direct act by which the navigation facilities of one State are taken away and given to another State.

The Special Master quotes with apparent approval a statement in *Pennsylvania v. Wheeling Bridge Company, supra,* to the effect that,

> "It will not do to say that the exercise of an admitted power of Congress conferred by the Constitution is to be withheld, if it appears, or can be shown, that the effect and operation of the law may incidentally extend beyond the limitation of the power."

We say that it will not do to say that an express limitation upon a power delegated to Congress shall be ignored because the enforcement of that limitation will limit the very power for the control of which it was adopted. This limitation on the power to regulate interstate commerce was placed in the Constitution by the people for their protection. In a country as large as ours, composed of forty-eight States, some weak some strong, without such a provision it would be a simple matter for the stronger States, or a coalition of States to subordinate the interests of one State and its ports to the selfish advantage of another State or States, and to destroy navigation in the ports of one State for the benefit of another. No power to change Congressmen could help the small State.

If taking the waters, which are a gift of nature, away from the ports of one State and giving them to another does not constitute a preference between the States, it would be difficult to imagine what would constitute such a preference. When the waters, constituting a gift of nature in the ports of one State upon which navigation alone is possible, are taken away and given to another State, it is idle to say that the right of navigation remains or that the damage or preference is incidental.

This clause is an absolute bar to any attempt of Congress to take any such quantity of water away from the ports of the complainant States as will constitute an obstruction to, or on impairment of, their navigable capacity and give it to the ports of Illinois. Complainants respectfully submit that the Special Master erred in concluding that this clause was not a limitation upon the power of Congress to take water from the ports of the complainant States and give it to Illinois. It must be remembered that this is not an act performed in the ports of Illinois without any direct or physical effect on the ports of Wisconsin and Michigan, but it is an act which physically takes place in its inception in the ports of Wisconsin and Michigan and ends in the transportation of their natural advantages to the ports of Illinois.

4.

The power of Congress extends to the protection and improvement of navigation, but not to its destruction or to the creation of obstructions to navigable capacity.

The precise question presented here is—May an act of Congress, resting solely upon an alleged exercise of the power to regulate interstate commerce, be held valid upon the sole ground that it destroys navigation or obstructs navigable capacity? There is presented here no conflicting claims of navigation or commerce. *Master's Report 63.*

If this power exists, it must rest on an abstract right of Congress to authorize persons or corporations to destroy navigation or obstruct navigable waters of the United States without regard to the purpose. *Wheeling Bridge Case,* 18 Howard, 421; *South Carolina v. Georgia,* 93 U. S. 4; *Miller v. Mayer,* 109 U. S. 385; and *The Louisville Bridge Co. v. United States,* 242 U. S. 409, (cited by the Special Master) represent conflicting claims of navigation or of different kinds of interstate commerce. *United States v. Chandler-Dunbar Co.,* 229 U. S. 53, represents conflicting claims of power and navigation. None of these cases related to obstruction of navigable capacity. This case represents nothing but the assertion of a naked right to obstruct or destroy navigation for an unrelated purpose. The distinction was well pointed out in *Woodruff v. N. Bloomfield Gravel Mining Company,* 18 Fed. 753, where the court said, p. 778:

> "Congress is authorized to '*regulate,*' but not *destroy* 'commerce among the states.' It may, undoubtedly, in its wisdom, obstruct, or, perhaps, destroy navigation, to a limited extent, at particular points, for the purpose of its general advantage and improvement on a larger general scale, such, for example, as by authorizing the building of a railroad or post-road bridge across a navigable stream; but it cannot destroy, or authorize the destruction, entire or partial, of the whole system of navigable waters of a state for purposes wholly foreign to commerce or post-roads, or to their regulation."

The Special Master in his report sums up the limitations of the powers of Congress over navigable waters as follows:

> "It has been declared by this Court that 'the right of the United States in the navigable waters within the several States is limited to the control thereof for pur-

> poses of navigation' (*Port of Seattle v. Oregon & Washington R. Co.,* 255 U. S. 56, 63) and 'while Congress, in the exercise of this power, may adopt, in its judgment, any means having some positive relation to the control of navigation and not otherwise inconsistent with the Constitution, *United States v. Chandler-Dunbar Co.,* 229 U. S. 62, it may not arbitrarily destroy or impair the rights of riparian owners by legislation which has no real or substantial relation to the control of navigation or appropriateness to that end.' *United States v. River Rouge Improvement Company,* 239 U. S. 411, 419." *Master's Report 160.*

Let us consider the rights of Congress to create an obstruction or destroy navigable capacity in the light of these rules. The only relation to navigation in the instant case is the fact that the act destroys or obstructs the navigable capacity of the waters in question. Can an act of Congress, which would otherwise be void, be rendered valid solely because it obstructs and destroys navigation? Is that the real, reasonable and substantial relation and appropriateness to the purposes for which the power was delegated, which is said to be the controlling factor in determining the validity of congressional action in relation to interstate commerce? The fallacy of the argument of the Special Master lies in first assuming that the action of Congress has reasonable relation to the control of navigation, from which hypothesis the argument proceeds upon the basis of cases of a very different character, as heretofore stated, to the conclusion that the exercise of the power is valid. Such an argument begs the whole question. Certainly none of the foregoing cases sustained the naked right of Congress to destroy or obstruct the navigable waters of the United States for any or no reason. They simply stand for the principle that, where there are conflicting claims of navigation or interstate commerce, Congress may lawfully, in balancing these conflicting claims, create some interference with navigation at a local point in furtherance of navigation or commerce as a whole.

Of course the destruction of a waterway with 8300 miles of shoreline can hardly be said to be local. However, the difficulty arises from the attempt to deduce an arbitrary power to destroy or obstruct navigable waters from an analogy to the power to balance conflicting claims of navigation or interstate commerce with the result of creating some slight interference with navigation at a local point, but with benefit to navigation or commerce as a whole. It is idle to discuss whether Congress can authorize the destruction or obstruction of navigation at one point for the benefit or improvement of navigation at another point, because that is not the case at bar. The case at bar raises the question flatly of whether Congress has the power to destroy or obstruct navigation as an abstract right so that the purpose or relation of the destruction or obstruction of navigation is immaterial. Complainants submit that there is no case which supports such a conclusion but that such a conclusion is contrary to the principles of all of the decided cases. The question here presented is not what Congress might do in the furtherance of a general scheme for the improvement of navigation, but whether Congress can authorize the obstruction or destruction of navigation on the sole ground that the power to regulate interstate commerce has been delegated to it. Congress's power is limited to the control of the navigable waters for the purpose of improving and fostering navigation. At that point the power ends. *Kansas v. Colorado,* 185 U. S. 125.

If, however, Congress did have the power to authorize the obstruction or destruction of navigation and navigable capacity as an abstract right, it could not exercise that power in the face of the Fifth Amendment, without compensation. The servitude of riparian property in favor of navigation is limited to the incidental damages which may flow from the improvement of the navigable waters by the United States. There is no principle that riparian property is subjected to the burden of bearing damages without compensation, which may be caused by the creation of an obstruction to or the destruction of navigable waters. Assuming that Congress should decide that it would be better as a matter of national welfare that the waters of a small interstate navigable river should be drawn off in laterals for irrigation purposes than that the river should be preserved as an avenue of commerce for the small tonnage carried, would the riparian property owners be required to submit to this destruction of this navigable waterway without compensation? Would the destruction of the navigable waterway be part of the servitude of riparian property for the benefit of navigation? The answers are obvious. Clearly if Congress had the power to carry out such a scheme and chose to do so, compensation would have to be provided. Likewise, in the instant case, if it be assumed that Congress has the abstract power to create an obstruction in, or to destroy these navigable waters, compensation must be provided for the riparian owners. Since no compensation has been provided the act is forbidden on the part of the Government by the Fifth Amendment, and on the part of the State of Illinois by the Fourteenth.

5.

If it be assumed that Congress would have the power to divert water for purposes of navigation, Congress has no power to authorize the present diversion for purposes of sanitation and power development.

The Special Master states that the present diversion is for the purpose of disposing of the sewage of Chicago. *Master's Report 165.* However, the desire for profits from the use of the water abstracted from the Great Lakes for water power purposes, is not merely incidental, but has become a dominant factor, equal to, if not greater than, the sanitation motive in the demands of Illinois for the abstraction of large quantities of water. It cannot be fairly said that the desire to obtain a net annual income of $3,000,000 for the State of Illinois from the abstraction of immense quantities of water from the Great Lakes for power purposes is *merely incidental.* See *Fact Brief, Part V, 2, pages 24-31 ante.*

Thus the question now arises—Can the Congress authorize such a diversion as will substantially obstruct or impair the navigable capacity of the Great Lakes for local use in sewage disposal, and for the development of water power? The Special Master apparently concedes that, standing alone and without relation to any other purpose or effect, it would be beyond the power of Congress to authorize the obstruction or destruction of the navigable waters of the United States for the purpose of enabling private or municipal corporations to dispose of sewage or develop waterpower.

Clearly the public easement for navigation, although it comprehends the right to improve navigable waters for navigation purposes, does not extend to the appropriation of the waters or the damaging of riparian property, without compensation, for waterpower, sewage or drainage purposes. *Buckingham v. Smith,* 10 Ohio 288; *In re Dancy Drainage District,* 129 Wis. 129, 108 N. W. 202; *Smith v. City of Rochester,* 92 N. Y. 464; *Walker v. Board of Public Works,* 16 Ohio, 440; *U. S. v. Great Falls Mfg. Co.,* 112 U. S. 645. See also pages 102-105, *ante.*

In re *City of New York,* 168 N. Y. 134; 61 N. E. 158, at page 161 the Court said:

> "Does this principle of implied or reserved power extend to any public use of the tideway or the waters beyond the same for purposes not related to, or connected with, navigation and commerce? The basis of the theory upon which the trusteeship of the state in our tideways and tidewaters is founded seems to be that there are certain rights of navigation and commerce by water which are common to all, and are, therefore, paramount to the rights of individuals. As was said in the *New York & S. I. Ferry Co. Case,* 68 N. Y. 77: 'The sea and the navigable rivers are natural highways, and any obstruction of the common right or exclusive appropriation of their use is injurious to commerce, and, if permitted at the will of the sovereign, would very likely end in crippling, if not destroying it.' Therefore the state, which is the public in concrete form, is charged with the duties and vested with the powers essential to the establishment and preservation of these common rights. The very implication of the trust upon which the state holds the tideway and tidewaters speaks of the definite purpose for which it was created. If the state may use the waterways for any purpose whatsoever, then it is no longer a trustee, but an irresponsible autocrat. If it may erect upon our tideways or tidewaters any kind of structure that may be suggested by the whim or caprice of those who happen to be in power, it will be possible to destroy navigation and commerce by the very means designed for their preservation and improvement."

However, it is said that one of the basic contentions of the complainant states is that the diversion affects navigation. But the sole effect of the diversion on navigation is to obstruct or destroy it! If Congress has no power to authorize the diversion solely for sanitation and water power purposes with attendant injury and damage to riparian property, or to apportion the property rights of property owners along the shores of the Great Lakes by congressional fiat, then the power to authorize this diversion must depend upon the arbitrary and naked right of Congress to obstruct or destroy navigation, merely because it is such navigation. The argument is that because the diversion obstructs navigation, Congress may authorize it. Clearly, if the diversion did not obstruct navigation, Congress could not authorize it for sanitation and power purposes as against these complainants. Then the power of Congress, if it exists, to authorize a third party to destroy the property rights of the complainant states and their peoples, must rest upon the fact that it incidentally destroys navigation also. Is it reasonable to conclude that because an act which would otherwise illegally destroy the property of the complainant States and their peoples, also illegally destroys navigation, the very magnitude of the injury inflicted and the illegality of the act gives rise to a power in Congress to authorize it?

But, it is argued that if this were not so Congress would have no power to impose penalties for the diversion of these navigable waters; that the injured states could not impose penalties because they cannot legislate extraterritorially, and that the only remedy would be by an application to this Court for an injunction. *Master's Report 166.* If that were true it would surely be a much more happy state of affairs for the injured complainants than the one created by the construction of the Special

Master. However, the conclusion does not follow from the premise. It does not follow that, because Congress cannot authorize this diversion and the obstruction of these navigable waters for the purposes of sanitation and water-power, it cannot forbid the diversion for the preservation of the navigable waterways of the United States. Clearly no one may obstruct the navigable capacity of any of the navigable waters of the United States without the affirmative consent of Congress. But that does not mean that Congress would have the power to destroy a navigable waterway for irrigation purposes or some other purpose wholly unrelated to navigation. Congress has the power under the Eighteenth Amendment to pass legislation to control and forbid the manufacture, sale and transportation of intoxicating liquors, but it would hardly be contended that, because Congress has the power to forbid, it likewise has the power to authorize the manufacture and sale of intoxicating liquors. But if the reasoning of the Special Master were correct, that would necessarily follow. Cases like the cited case of *Miller v. Mayer,* 109 U. S. 385, have no application to this question. First, the question of the right of Congress to balance conflicting claims between two kinds of interstate commerce and the right of Congress to authorize the destruction of navigable waters and navigation for purposes of waterpower and sewage disposal are very different things. Second, even congressional authorization for the erection of a bridge in a particular locality does not empower the permittee to erect the bridge on someone else's land or to damage other people's property without compensation. The right to appropriate other people's property in the construction of the bridge, regardless of the authorization by Congress, could only be obtained through the exercise of the power of eminent domain. However, under the construction of constitutional power adopted by the Special Master, the authorization of Congress to create an obstruction which is not part of a navigation scheme, carries with it the right in the permittee to appropriate the property rights of all of the riparian owners in the complainant States without compensation, and against their will.

It is said that if Congress has the power to prohibit a diversion of navigable waters it is not tenable to say that it may not determine in its discretion what diversions it will prohibit. *Master's Report 166-167.* That may well be conceded without having any bearing on the answer to the question under discussion. Obviously Congress does not have to act; and if it does act for the purpose of protecting the waterways entrusted to its care, it may act to such extent as it sees fit; but the concession that it does not have to exercise its right of prohibition—or if it does exercise it, need only exercise it to the degree which it sees fit—is no ground for reaching the conclusion that it may authorize the destruction of riparian property or a raid upon the navigable waters of the United States for local sanitation and power. To do so invades the reserved rights of the States and confiscates property of their citizens. Since no power to appropriate the navigable waters of the United States for waterpower and sewage disposal has been delegated to Congress, the power of Congress with respect to the appropriation of these waters for those purposes is limited to its right to prohibit any appropriation which will destroy or substantially injure any of the navigable waters entrusted to its care, *Kansas v. Colorado,* 185 U. S. 125; *United States v. Rio Grande Dam & Irrigation Co.,* 174 U. S. 690; but it is not empowered to authorize such an appropriation for such purposes merely on the ground that the appropriation destroys the navigable waters which Congress has the duty to protect. The power to approve implies the power to disapprove, but the power to veto does not imply the power to create or authorize.

We again invite the attention of the Court to the fact that if it were conceivable that Congress, under the power to regulate navigable waters, implied from the power to regulate interstate commerce, had the power to authorize the appropriation of navigable waters for sanitation and power, clearly that could not be done without compensation under the Fifth Amendment. The servitude to which riparian property is subject in relation to the improvement of navigable waterways does not include the power to destroy or substantially injure riparian property for purposes of sanitation and power. Hence if Congress had the power to give such authority, it could only be exercised by virtue of eminent domain.

The only relation which the Special Master finds between this diversion and navigation is to prevent the pollution of the navigable waters of the United States in the Chicago River and adjacent portions of Lake Michigan. It is said that the discharge of this sewage into these waters without treatment might, and probably would, create such a pestilental condition as to constitute an obstruction to navigation thereon. Therefore, it is concluded that Congress may prevent or authorize the removal of this nuisance and obstruction to navigation by removing the navigable waters themselves. In short, Chicago, having created, or threatened to create, an illegal nuisance or obstruction to the navigable waters of the United States, may, if she will only consent to refrain from this violation of law, dispose of her sewage at the expense of the complainant States. But in the last analysis, what was sought to be done, and what was done, was to take care of the Chicago sewage. Navigation has not been improved; the navigable capacity of the Lakes has been decreased. The only result has been that the sewage of Chicago has been taken care of at the expense of navigable capacity. Congress has simply authorized the appropriation of these waters and the damage to the complainants for local sewage disposal and waterpower. We may go around the circle as we will, but it always brings us back to the initial question—Can Congress authorize a diversion of navigable waters, with an attendant obstruction or destruction of navigation, and with an immense damage to riparian property for local sewage disposal and waterpower desires? This we deny, and we believe that the Master's argument concedes the correctness of the conclusion. The power was never delegated to Congress to appropriate the navigable waters of the United States and to inflict untold damage upon riparian property without compensation, for sewage disposal or waterpower. The only result has been to dispose of the Chicago sewage.

The case of *New York v. New Jersey,* 256 U. S. 296, cited by the Special Master, is not authority for the Master's conclusion. In that case the power to prohibit was sustained; any power to authorize an act which would destroy property in New York on the ground that it involved an obstruction to navigation was denied. It is obvious that Congress can prevent the pollution of navigable waters of the United States to such an extent as to interfere with their navigable capacity or usefulness; but from that it does not follow that Congress can authorize the diversion of the navigable waters themselves for the purpose of taking care of the sewage of the wrongdoers. Congress can require this nuisance to be abated. But the minute that it attempts to authorize the abatement of the nuisance by the abstraction of the navigable waters themselves and the substantial obstruction and impairment of their navigable capacity, it attempts to authorize such obstruction and destruction for the purpose of sewage disposal and not for the purpose of navigation. The appropriation of these navigable waters by Congress for the purpose of disposing of the sewage of the City of Chicago was not one of the powers delegated to Congress by the Constitution, and plainly is not a power which Congress can confer upon the State of Illinois and the Sanitary District.

IV.

WHETHER CONGRESS HAS GIVEN THE PERMISSION?

The question is whether, if it be assumed that Congress has power to control the diversion, Congress has exercised that power directly. After reviewing the various contentions of the defendants, the Special Master concluded on this branch of the case as follows:

> "I am unable to find that Congress, apart from the authority conferred upon the Secretary of War by Section 10 of the Act of March 3, 1899, and his action thereunder, which will be discussed later, has authorized the diversion in question. *Master's Report 173.*

In summarizing his conclusions on this question the Special Master states:

> "My conclusions are: * * *
>
> 4. That Congress has not directly authorized the diversion in question." *Master's Report 196.*

The reasons which the defendants advanced in an attempt to support their contention of a direct congressional authorization were of the most specious character. So far as they rested upon any basis of fact, the Special Master states that such facts are set forth in his report, pages 26-72, 85. *Master's Report 172.* It is our purpose to point out briefly that such acts of Congress and reports of Government Engineers as are therein referred to have no relation to this diversion, and much less constitute any direct Congressional authorization therefor.

The first class of material relied upon by the defendants relates to a series of surveys made by various Federal Engineers on the Illinois River, of which some called for a report on or voluntarily adverted to the feasibility of a water connection between the Illinois River and Lake Michigan. However, the water connection between Lake Michigan and the Illinois River, which was under consideration in these various reports, provided for a much smaller channel than that of the Drainage Canal, and involved an insignificant diversion of water for navigation purposes compared to the enormous diversion of the Chicago Sanitary District for sewage purposes. In these reports Congress was repeatedly advised that a diversion of less than 1,000 second feet would be more than ample for such a water connection for navigation purposes, and for any reasonable needs of navigation on the Illinois River. See *Fact Brief* pp. 34-35 *ante. Joint Abstract 41-45.* Can such proposals be said to have any relation to a diversion of 10,000 c. s. f. for sewage disposal? In the light of these reports and other information, Congress has always refused to pass numerous bills which the Sanitary District has caused to be introduced from time to time in various guises for the purpose of attempting to secure direct authorization of Congress for this diversion. However, none of these reports of surveys was ever accepted or acted upon by Congress. Congress receives a great variety of reports upon an infinite number of questions containing all manner of suggestions. If this argument is to be accepted then Congress can never safely receive a report of any character or the Federal Government will be bound by all of the various suggestions therein, whether accepted or acted upon at all.

As a further basis of this contention defendants relied upon various appropriations for the improvement of the Chicago harbor, commencing with the appropriation contained in the River and Harbor Act of July 13, 1892. *Master's Report 29.* We do not know why the defendants did not also urge the various appropriations for the Chicago harbor in the different River and Harbor Acts of Congress made during the fifty or one hundred years prior to 1892, for they had as much relation to the Chicago diversion as did the Act of July 13, 1892, or any of the five subsequent Acts cited. *Master's Report 33, 36.* Likewise it would have been as pertinent to have cited the Congressional appropriations for the improvements of the harbors of Duluth, Milwaukee, Cleveland, or Buffalo, for their relation to the Chicago diversion would have been the same, to-wit, none. From the inauguration of a system of Federal improvements in the Great Lakes and their connecting channels, the Federal Government constantly increased the depth of the Federal channels and Federal harbors provided in and on the lakes, as the needs of that great commerce, reflected in the constantly increasing draft of vessels employed, demanded, until the Federal plan eventually provided for channels 21 feet deep and a like depth in all of the principal harbors on the Great Lakes, of which the Chicago harbor was one until the interference with navigation therein produced by the acts of the Sanitary District, coupled with changing economic conditions, reduced the Chicago harbor to minor importance. See *Fact Brief* p. 19 *ante.* Most harbors on the Great Lakes have been obtained by dredging at the mouths of rivers and as far back in the channel of the river as the extent of commerce and location of industries using water transportation rendered desirable or necessary. All Federal improvements in the Chicago River, being then the harbor of Chicago, related to lake navigation, and the general scheme of its improvement, and not to this diversion which entered into a drainage channel, and until 1910 discharged into a non-navigable tailrace. At that date a small lock, 22 feet wide was installed. A freight vessel drawing 21 feet, with ~~a beam~~ of 19 feet, would be an interesting contribution to marine engineering.

The Act of July 13, 1892, specifically provided for improving the Chicago harbor. *Master's Report 29.* The Act of March 3, 1899, provided for a 21 foot channel to the stockyards on the South branch of the Chicago River and to Belmont Avenue on the North branch of the Chicago River. Obviously this improvement related to lake traffic and not to the diversion. The North branch of the Chicago River was not then a part of the diversion scheme of the Sanitary District, as the application to construct the North channel was not even made until September 11, 1907. *Master's Report 51.* The improvement of the South branch likewise related to lake navigation, as the stockyards were located at a considerable distance South of the point where the Drainage Canal connected with the South branch. The diversion of the Sanitary District depreciated these improvements, whereupon the Federal government abandoned all of its projects in the Chicago River, except in the main branch (a distance of a mile from the mouth of the river to its forks). Therefore, in 1902, after pointing out that Chicago, by its use of the Chicago River as the main sewer of the City, had depreciated the value of the Federal Improvement and subjected large sections of the river to deteriorating influences as a navigable channel by reason of its use as an open sewer, the Federal District Engineer stated that the United States Government should not be called upon to maintain channels so used, and that the Federal project in both the North and South branches of the river should, therefore, be abandoned, stating: "Accordingly, no estimate for maintaining the channel excavated under the project of 1896 is submitted." *Annual Report of the Chief of Engineers 1902. Appendix K K p. 2097.*

The lowering of the tunnels under the Chicago River, provided for in the Act of March 3, 1899, was occasioned by the fact that these tunnels were limiting the draft of lake vessels plying to and from the port of Chicago so as to constitute an obstruction to lake navigation. This was expressly declared by Congress in the Act of April 27, 1904. *33 Stat. 314.* The tunnels had been constructed under the authority of the City of Chicago, which was therefore required to remove them, or cause them to be removed, without expense to the Federal government. The statute of April 27, 1904, was one of the underlying reasons for the decision in *West Chicago Street Railway Company vs. Chicago,* 201 U. S. 506, 527. These tunnels limited the draft of vessels to about 16 feet, which was obviously inconsistent with a program for 21 foot channels on the lakes. All of these improvements in the Chicago harbor had no more relation to the diversion than the similar improvements made in the harbors of Duluth, Milwaukee, Cleveland and Buffalo.

The Act of Congress of June 25, 1910 (36 Stat. 659, 660), appropriating $1,000,000 for the construction of a waterway from Lockport to the mouth of the Illinois River, provided that no portion of such appropriation should be expended until a plan had been submitted to and approved by Congress. In view of the repeated Government reports that less than 1,000 second feet of diversion would be more than ample for navigation purposes on such a waterway, this Act has no relation to a diversion of 10,000 c. s. f. However, any argument based thereon is conclusively answered by the fact that this appropriation was repealed by the Act of Congress of March 4, 1915, before any part of it had been expended or any work done thereunder. *Joint Abstract 112.*

The suggestion that the project depth in the Illinois River could not have been maintained without a diversion of 8500 c. s. f., is irrelevant and entirely unsupported by the evidence. The evidence is that the project of 1880 on the Illinois River, based on the low water of 1879, was never completed; that sufficient appropriations were not provided to complete this project; and that the project depth was not available even with the diversion. This condition arose solely from the fact that the project had neither been completed nor adequately maintained. *Fact Brief* 40-44 *ante.* No doubt Congress felt that the insignificant commerce on the Illinois River did not justify large expenditures. *Master's Report 119.* Reference is made to the Acts of Congress of 1822 and 1827 with reference to the construction of the old Illinois and Michigan Canal. This was a canal for navigation purposes, and not for sewage disposal, and had no possible relation to the instant diversion for that purpose. Originally it did not take its water supply from Lake Michigan; and the water required was insignificant in amount. The contention was well disposed of by Secretary of War Stimson in his decision of January 8, 1913.

> "The Sanitary canal has never received the direct sanction of Congress. It was built solely under the authority of the State of Illinois, as given in its 1889 general act for creating sanitary districts. And although pursuant to the suggestion of my predecessors the question of the propriety of its diversion of water from Lake Michigan was presented urgently in the report of the Chief of Engineers for the years 1899 and 1900 as transmitted to Congress, no action upon the question has ever been taken by that body. In the argument before me it was urged that the present canal represented the growth and development of a national policy expressed in two acts of Congress, 1822 and 1827, which authorized the construction of a canal 'to connect the Illinois River with Lake Michi-

> gan,' thus connecting the two watersheds. (Acts of Mar. 30, 1822, and Mar. 2, 1827.) But these statutes authorized a canal for the purpose of navigation and not sanitation. (*Missouri v. Illinois,* 200 U. S. 526.) The Illinois and Michigan Canal, actually constructed under their authority, derived its water for navigation purposes from the Calumet, Des Plaines and Chicago Rivers, and not from the Lakes. And although in the latter part of its existence it was used to a very slight extent to help purify the waters of the Chicago River and thus sanitate the City of Chicago, such a purpose could not have been dreamed of at the time its construction was authorized by Congress, 90 years ago. I cannot see that its authorization and construction offer the slightest congressional sanction for the great canal now under discussion, which was not even contemplated until much more than half a century later." *Joint Abstract 147-148.*

In commenting upon the contention that the Act of Congress of 1827 constituted congressional authority for the diversion, the Hon. James M. Beck, then Solicitor General of the United States, and now the Chief Counsel of the Sanitary District of Chicago, in his argument before this Court in the Government suit, said:

> "And I venture to say that no more untenable proposition has been advanced to this Court—and that is saying a great deal—that the suggestion that an act of Congress in 1827, granting land in aid of the construction of a canal for navigation purposes, before Chicago had any political existence, should be regarded, for all future time, as an authority to a city, that thereafter came into existence, to construct a canal, the cost of which they say, with its attendant works, now amounts to $100,000,000—not for the purpose of navigation, but primarily as a common sewer. To say that the construction of a little canal nearly a century ago, for one purpose, is an implied authority for the construction of another canal for an entirely

different purpose, is a proposition that I shall not take the time of the Court to discuss further." *Page 6.*

The conclusion of the Special Master is amply sustained in his report. In reporting on the application of the Sanitary District to open the Drainage Canal, Captain Marshall, on April 24, 1899, stated that it was strange that the Sanitary District had constructed such a channel without finding out whether the United States or other interested parties would permit the diversion of any of the waters of Lake Michigan, and further suggested that the question presented was beyond the decision of any executive officer and should be referred to Congress. *Joint Abstract 134, 136.* The Permit of May 8, 1899, advised that the Secretary of War would submit the question to Congress for decision. *Master's Report 39.* From time to time officers of the Engineering Corps of the War Department, either denied or doubted the power of the Secretary of War to authorize these diversions without direct authority of Congress. In 1913 the Secretary of War doubted his authority to authorize this diversion. From 1908 to 1925 the United States prosecuted a suit to enjoin the construction of an additional channel for diversion purposes and to reduce the amount of the abstraction. In 1922 Congress, on the recommendation of the Secretary of War, refused to pass a bill designed to secure congressional authorization for the diversion. *Master's Report 71.* All of these Acts, and many more, establish conclusively that Congress has not directly authorized the diversion.

The conduct of the Sanitary District is eloquent testimony of the fact that it did not believe that its diversion had ever been authorized by Congress. For nearly 30 years, from 1896 to 1925, inclusive, the Sanitary District of Chicago repeatedly sought Permits from various Secretaries of War, first, to institute the diversion, and thereafter, on numerous occasions, to increase its extent. Is it conceivable that if the defendants had even fancied that the Congress of the United States had directly authorized this diversion they would have constantly harrassed the Secretaries of War for authority for a diversion which had the direct authorization of Congress itself? All of the Federal improvements are in the Chicago River. The situation is exactly the reverse of that involved in *Wisconsin vs. Duluth,* 96 U. S. 379. There the relief sought was the destruction of the Federal improvement. Here the relief sought will greatly improve conditions in and add to the value of the Federal improvements in the Chicago River. See *Fact Brief* 32 *ante*. The contention is conclusively disposed of by the Special Master in the following manner:

> "The argument that Congress, aside from the action of the Secretary of War, has authorized the diversion, at once raises the question—In what amount has the diversion been thus authorized? There is nothing in any of the acts of Congress upon which the defendants rely specifying any particular quantity of water which could be diverted and it could hardly be considered a reasonable contention that the acts of Congress justified any diversion of water from Lake Michigan that the State of Illinois and the Sanitary District might see fit to make. It is manifest that it was the view of the War Department that Congress had not acted directly and whatever the Department did was subject to such action as Congress might take. In the report of the Board of Engineers required by the Act of June 13, 1902, transmitted to Congress on December 18, 1905, the Board said: 'The taking of large quantities of water from Lake Michigan for drainage purposes has not been authorized by Congress. It has been the policy of the War Department thus far to regulate the quantity of water which is admitted to the canal by the necessities of navigation in the Chicago River' (*supra* p. 44). This shows the

> understanding at that time. In 1907, in denying the application for an increase in the amount permitted to be diverted, the Secretary of War considered that it might 'be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States' (*supra*, p. 51). This understanding that Congress had not yet acted directly so as to authorize the diversion in question has continued. It was in this view that the United States prosecuted its suit to decree in this Court to enjoin the defendants from taking more water from Lake Michigan than the Secretary of War had allowed." *Master's Report 175.*

The defendants have filed no exception to the foregoing conclusion of the Special Master and obviously concede that the conclusion is correct.

V.

WHETHER THE SECRETARY OF WAR HAD AUTHORITY UNDER THE ACT OF MARCH 3, 1899, TO REGULATE THE DIVERSION.

If it be assumed that Congress would have the power to authorize directly this diversion, the question is then presented of whether it has delegated this power to, or conferred this power upon, the Secretary of War. This question involves the construction of Section 10 of the Act of March 31, 1899, *30 Stat. 1151, U. S. C. Tit. 33, Sec. 403.* Section 10 is as follows:

> "That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States outside established harbor lines, or where no harbor lines have been established, except on plans recom-

mended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

In considering the interpretation of this statute it is our purpose: first, to analyze the statute in an effort to determine what the plain language of the statute means under the commonly accepted principles of grammar and syntax; second, to discuss the history of this statute with a view of determining whether any light can be thrown upon its interpretation; third, to discuss what, if any, practical construction has been had of this Section, and its weight in relation to the plain language of the statute; fourth, to discuss what, if any, judicial interpretation of this statute has been had with reference to its application to a situation such as the instant case.

1.

Analysis of Language and Meaning of Statute.

The first provision of this section states: "That the creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of any waters of the United States is hereby prohibited." It would be difficult to conceive of any more precise, comprehensive and definite statement that this. It is not a prohibition of any obstruction to navigation, but to any obstruction to the navigable capacity; and anything wherever and however done which tends to destroy navigable capacity, is within the terms of the prohibition. If this provision were standing alone, clearly there could be no contention but that no obstruction could be created to the navigable capacity of any of the waters of the United States without the affirmative authorization of Congress, to-wit, a general or special act of Congress. If any other conclusion is to be reached, it must be based upon the subsequent provisions of the statute.

The next, or what might be termed the second, provision of the statute reads:

> "and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War."

The question immediately presents itself—Is this an exception from the general prohibition clearly stated in the first part of the Act, or is it cumulative in character so as to extend the control of the navigable waters of the United States beyond what is imported by the direct prohibition against the creation of any obstruction not affirmatively authorized by Congress? Those, who contend that this provision creates an exception to the general prohibition against obstructing the navigable capacity of the waters of the United States are confronted at the outset by the fact that the quoted provision is stated in the conjunctive and under all of the rules of grammar applicable to the English language, constitutes an addition to what has gone before, and not an exception therefrom. It must be admitted that if the intention were to create an exception, singularly inapt language was used. This statute was not the work of inexperienced legislators. It was the fruit of the best efforts of men who had years of experience in Congressional legislation, aided by the careful revision and drafting of the most expert legal and engineering minds of the War Department, pursuant to the directions to the Secretary of War contained in the Act of Congress of June 3, 1896. That neither the Congress nor the drafters of this Section were ignorant of the customary language employed in statutes where exception to a general provision is sought, is clearly demonstrated by Section 9 of the Act of March 3, 1899 relating to the construction of bridges over navigable waters, where, after the general statement at the beginning of the Section, the provision for construction of bridges over intrastate waterways commenced with the usual words: "Provided that," and clearly stated an exception to the preceding general prohibition.

But it is said that Congress could not have meant what is clearly stated, because if it had meant what it said, a special act of Congress would be required for the construction of every wharf, pier, boom or dolphin, which is said to be unthinkable. This contention proceeds upon an obvious fallacy. If the general prohibition of this Section stood alone and the second provision now under discussion, and the third which will subsequently be discussed, were eliminated entirely, it would not require a special act of Congress to authorize the construction of every wharf, pier, etc. Wharves, piers, dolphins, etc., do not necessarily, or even ordinarily, create an obstruction to the navigable capacity of a waterway. In fact, they ordinarily increase the navigable capacity of a waterway. Certainly if they are properly constructed and providently located, they constitute no obstruction to the navigable capacity. Hence, if the second provision of this section were stricken from the Act, wharves, piers, dolphins, etc., could be constructed without an express statute of Congress, so long as they did not obstruct the navigable capacity of a waterway of the United States.

In *Yates vs. Milwaukee,* 10 Wallace, 497, the City of Milwaukee sought to abate Yates' Wharf on the Milwaukee River as an illegal structure. This Court held on the evidence in that case that there was no proof that the wharf constituted an obstruction to navigation, and that under those circumstances, the wharf could not be abated, but that if the City of Milwaukee desired to widen the channel of the Milwaukee River and deemed it necessary to remove the wharf for that purpose, the city must first provide compensation for the property so taken for a public use. Again in *Dutton, et al., vs. Strong, et al.,* 66 U. S. (1 Black) 23, at pages 31-32, it is held that piers, wharves and similar structures are legal, unless they are so located and constructed, as to constitute an obstruction and the burden is on the one asserting that fact to prove it. A similar rule is laid down in *Illinois Central Railroad vs. Illinois,* 146 U. S. 387 at 445-446. Many other cases might be cited to show that the structures herein enumerated are not necessarily, or even ordinarily, obstructions to the navigable capacity of a waterway, and that in the absence of a requirement for a permit, such as is incorporated in the second part of this section, it would in each case be a question for the jury as to whether the particular structure was as a matter of fact an obstruction to navigable capacity.

The question then presents itself—What was the object of incorporating the second provision whereby the recommendation of the Chief of Engineers and authorization of the Secretary of War were necessary before any of the structures enumerated could be erected? The effect of the provision and the reasons therefor are apparent on analysis. The effect of the provision is that none of these structures may be erected, even though they do not constitute an obstruction to the navigable capacity of any of the waters of the United States, without nevertheless obtaining the recommendation of the Chief of Engineers and the approval of the Secretary of War. Thus we find that in accordance with the clear meaning of the statute under all of the accepted rules of construction of the English language, there has been added to the force of the general provision a cumulative requirement that a Permit of the Secretary of War must be secured notwithstanding the fact that the proposed structure, as and in the place to be erected, will not constitute an obstruction to the navigable capacity of any waters of the United States. If we are to adopt the contrary construction of the Special Master to the effect that this provision is not merely a cumulative requirement in addition to the requirement that no obstruction of navigable waters of the United States may be created without the affirmative action of Congress, but that on the contrary, as to the enumerated structures and acts, an exception is created whereby they may be erected on a Permit of the Secretary of War, no matter what manner of obstruction may be created, then, we must conclude that the Permit of the Secretary of War is only necessary where the structure will create an obstruction to navigable capacity and would otherwise be within the prohibition of the first section of the Act. But that result would not only be contrary to the explicit language of the Act, but also to its purpose.

To hold that any of the structures, regardless of whether they obstruct the navigable capacity, can be erected under this Act upon a Permit of the Secretary of War, would be to fly in the face of every consideration and every purpose which led to the adoption of this Act, as will be more fully demonstrated in the discussion of the history thereof. The purpose of this cumulative provision to the effect that a Permit of the Secretary of War must be obtained for any of these structures regardless of whether they create an obstruction to navigable capacity, was so that the absence of a Permit in and of itself, would be sufficient ground for their abatement if desired by the Secretary of War. Theretofore the Secretary of War could only abate such structures if they were in fact an obstruction to navigable capacity, and hence the opinion of the Secretary of War in his efforts to conserve and protect the navigable waters of the United States was, in each case, where he sought to abate such a structure which was, in his opinion, an obstruction to the navigable capacity, subject to the varying decisions of juries as to whether the particular structure was in fact an obstruction to navigable capacity. In this connection, we quote the statement made in a lecture before the Engineers School at Fort Humphreys, Virginia, on April 23, 1926, by Judge G. W. Koonce who drafted this Act, and who has been a law officer of the Corp of Engineers for forty years, with duties in connection with navigable waterways, chiefly involving the study, interpretation and application of laws relating to the improvement and protection of navigable waterways. Judge Koonce said:

> "One of the most effective features of section 10, and which tends to induce observance of its requirements, is that in case of a violation it is unnecessary to prove that the act committed has resulted in the impairment of navigation. As the law previously stood, the construction of a wharf, or other trespass on the waterway, without governmental authority, was not unlawful unless navigation was obstructed or impaired thereby, and the burden of proving this to the satisfaction of a jury rested on the Government whenever a prosecution for violation of the law was attempted. Under section 10, as well as section 13 relating to the discharge or deposit of refuse matter in navigable waters, the commission of any of the acts forbidden, not their results, constitute the offense, and the commission subjects the offending party to the prescribed penalty, regardless of whether or not there is any actual injury to navigation."

Hence, this cumulative requirement was added to the general prohibition, so that the judgment of the Secretary of War in abating such of these structures as seemed to him desirable and proper was unfettered by the requirements that his judgment on the necessity of the abatement should be submitted in each particular case to the verdict of a jury as to whether the Secretary's opinion that the structure was an obstruction to navigable capacity was in fact correct. Accordingly, it is apparent that the contention stated in the Special Master's report that the construction here contended for would require the conclusion that no wharf, pier, or other structure could be built without a special act of Congress is based upon a misapprehension of the nature and purpose of this provision.

It is stated that a pier, wharf, or other of the structures enumerated might be an obstruction to navigable capacity in a particular area, although to the advantage of navigation more broadly considered. If the argument intended to be made by this statement means that because a pier or wharf might slightly project into or over the waters, although not into the navigation channels of the waterway, so as to interfere in any manner with the use of the channel for a navigable waterway, it nevertheless would constitute an obstruction to the navigable capacity, because a vessel could not run over the area where the pier stood, the argument is specious and fails to take into consideration, the judicial decisions laying down what constitutes an obstruction to the navigable capacity. See *Yates vs. Milwaukee, supra*, p. 141. This argument likewise rests upon an additional fallacy. The general prohibition in the first part of this section is not against any obstruction to navigation, but against any obstruction to the navigable capacity of a waterway. Hence, a pier, dolphin, or other aid to navigation, which might be argued to constitute a technical obstruction to navigation at the precise point of its location on a navigable waterway, would nevertheless improve the navigable capacity of the waterway and would not be within the general prohibition of the first part of this section. If on the other hand we are to adopt the construction of the Special Master, then, if the Secretary of War were to authorize the construction of a pier reaching entirely across the navigable channel of the Ohio River so as to cut off all navigation, it would be a valid act within the power of the Secretary of War, and require no affirmative sanction of the Congress of the United States. We submit that the construction of the complainants not only accords with the plain language of the statute, but accords with the rule of reason, while the construction of the Special Master does not.

If it be conceded that the erection of a pier which does not project into the navigable channel, would come within the literal prohibition of the first part of the section (which complainants submit is not the fact), the language should be construed in the light of reason, so as not to comprehend such a technicality having no relation to the purposes of the Act. This conclusion would follow from the construction of the Sherman Anti-Trust Act of 1890 by the Supreme Court. It will be recalled that that Act declares:

> "Every contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce among the several states or with foreign nations, is hereby declared to be illegal." U. S. Comp. Stat. 1916, section 8820.

The words are as definite and commanding as any that could be written, although it is true that section 10 of the Act of 1899 may be considered just as compelling. The Supreme Court, faced with the interpretation of the Sherman Anti-Trust Act, *held,* by Chief Justice White in *Standard Oil Company vs. U. S.,* 221 U. S. 1, that the Act should be construed in the light of reason and that as so construed it prohibited only those contracts and combinations amounting to an unreasonable or undue restraint of trade.

There remains to be considered the final provision of this section, which reads:

> "and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

The question is again presented—Is this provision an exception to the requirements of the general prohibition contained in the first part of the section? It will be noted again that this provision is in the conjunctive, and in the ordinary understanding of the English language imports something in addition to that which has gone before, and not a subtraction therefrom. As far as the construction to be derived from the language itself is concerned, everything that has been said with reference to the preceding provision regarding the building of wharves, etc., applies with equal force. Let us consider the acts enumerated in this provision for which it is said the recommendations of the Chief of Engineers and the Secretary of War are necessary: The provision states that it shall not be lawful to excavate or fill, or in any manner alter or modify the course, location, condition or capacity of any of the navigable waters of the United States without a Permit. Does it say that it shall not be lawful to alter them in such a manner as to obstruct their navigable capacity? The answer is clearly in the negative. It is immaterial whether the alteration will obstruct the navigable capacity, or whether it will in fact increase the navigable capacity. Even though the act will increase the navigable capacity, it can not be done without the Permit of the Secretary of War. The contrary conclusion proceeds upon the false assumption that the section is intended to provide for acts which will necessarily obstruct the navigable capacity of the waters. Such is not the fact. The purpose and effect of the provision is cumulative, so that in order to perform such work, the work not only must not come within the prohibition of the first section against creating an obstruction to the navigable capacity of the waters of the United States, but in addition thereto, it must be approved by the Chief of Engineers and the Secretary of War. The same reasons for this cumulative requirement apply, as were heretofore stated, with reference to the second provision of the Act relating to the construction of wharves, etc. An additional reason applies to both this and the preceding section. It not infrequently happens that at the time of the proposed erection of the structures enumerated in the second provision, and of the doing of the acts enumerated in the third provision, they would not, under the then existing conditions, create an obstruction to the navigable capacity of the particular channel or waterway, and hence would not be illegal under the general prohibition of the first section; but that under tentative plans of improvement of the War Department and looking to the future, such structures would become, within their probable useful life, obstructions to the navigable capacity of the channel on carrying out the proposed improvements. Then the Secretary of War would be confronted with the problems and the burden of abating these structures—legal when erected. By making the erections of these structures conditional upon the permission of the Secretary of War, even though they do not constitute an obstruction to the navigable capacity of any waterway, the Secretary of War retains control over their erection so that he may provide against the circumstances just described in the light of the future plans of the Department, and so that by the revocation of those Permits at any time the structures become *ipso facto* illegal, regardless of whether or not, they are in fact obstructions to the navigable capacity of the waters in question. In addition to these considerations there are conditions such as are described in *Philadelphia vs. Stimson,* 223 U. S. 605, 629, where it was pointed out that the practice of some riparian owners of filling in the land between the high and low watermark so confined the Allegheny River that in time of flood the waters were unduly confined with destructive effect. Many of these acts would not by any stretch of the imagination obstruct the navigable capacity of the River, but they were undesirable from the standpoint of preservation of channel and public works therein. Under the cumulative sections of this Act they could not be done without the permission of the Secretary of War, even though they did not constitute an obstruction of navigable capacity.

But, it is suggested that under such a construction, such structures are erected and acts performed by the owner at the peril that they may be subsequently determined to be in fact obstructive to navigable capacity, and abated. There certainly is nothing novel in such a situation. Even a structure affirmatively authorized by a special act of Congress may be summarily abated at any time that either a subsequent Secretary of War or subsequent Congress changes its mind with regard to the structure and the result is *damnum absque injuria.* Thus in *Greenleaf Lumber Company vs. Garrison,* 237 U. S. 251 it was held that where complainant's wharf was built in 1873 through shallow water out to the navigable channel of the stream, where such wharf was within the port-line established by the Norfolk wardens under authority of the State of Virginia, where fourteen years later, in 1890, the Secretary of War established exactly the same line, and thus left the complainant's wharf a lawful structure within the harbor line, where Congress, by the Act of March 4, 1911 (36 Stat. 1275), made an appropriation to purchase the land and widen the channel, nevertheless, the Secretary of War might lay a new harbor line, leaving the complainant's wharf outside thereof, and the wharf and soil upon which it stood could be taken from the owner and the result was *damnum absque injuria.* We fail to see where the construction of the Special Master has placed those erecting such structures in any less precarious condition, or where the construction here urged by the complainants will place them in any more precarious situation. In fact, the construction of the Special Master increases the already hazardous position occupied by riparian proprietors.

It is submitted that the construction of this statute here urged by the complainants not only comports with the clear meaning of the explicit language used by Congress, but that the contrary construction leads to unreasonable and ridiculous results. Under the complainants' construction this section is a well-rounded policy, consistent in all its parts and adapted in every way to carrying out the obvious purpose of Congress. It provides not only that it is unlawful to create any obstruction to navigable capacity of the waters of the United States, but in addition thereto the acts enumerated in the second and third provisions of the Section can not be done, even though they do not obstruct navigable capacity, without a Permit of the Secretary of War. These provisions leave the control of the Secretary over these waters unfettered and render it unnecessary to submit the question of whether such structures and acts constitute an obstruction in fact to navigable capacity, because the absence of a Permit renders them illegal, without regard to their obstructive character. If we adopt the other construction, we must say that Congress has declared that no obstruction shall be created to the navigable capacity of the waters of the United States unless it has been authorized by the Secretary of War. If that is the meaning of the statute, the question instantly arises—Why was the first section put in the Act at all? It can hardly be said that it was put into the Act for the purpose of nullification immediately thereafter. If the construction of the Special Master is correct, we challenge anyone to name any obstruction to the navigable capacity of the waters of the United States which would not be comprehended within the enumerated structures and acts of the second and third provisions. If the Master's construction is correct, there is no act affecting the navigable capacity of waters of the United States and not specifically covered by some other Act of Congress or Section of this Act which would not be covered by the second and third provisions of Section 10. Then we have the situation that aside from bridges, covered by Section 9 of the Act of March 3, 1899, any and every obstruction of the navigable capacity of the waters of the United States can be authorized by the Secretary of War. The question then again instantly presents itself—If the Master's interpretation of the statute is correct, why did the Congress use several hundred words to say in effect "No obstruction of the navigable capacity of the waters of the United States shall be lawful unless it has been authorized by the Secretary of War"?

What are the further results of adopting the Master's construction? We must conclude that Congress, which, in Section 9 of the same Act in which the Section under discussion was enacted, expressly retained the right to say whether a bridge should be constructed over any interstate river, such as for instance the little St. Croix River between Minnesota and Wisconsin, delegated to the Secretary of War the right and power to determine, without limitation, what obstruction might be created to the navigable capacity of a waterway with 8300 miles of shoreline littoral to which were states embracing nearly one-half of the population of the nation, with the attendant depreciation of all of the Federal improvements which had been placed by that Congress or its predecessors in these navigable waters. We reach a conclusion that Congress has reserved to itself alone the right to determine whether a little bridge should be constructed across an insignificant river, but has delegated to the Secretary of War the right to determine whether the Great Lakes should be drained into the Mississippi River. If the Secretary of War can authorize an obstruction of six inches to the navigable capacity of the Great Lakes-St. Lawrence system with all of the immense and immeasurable damage found in this case, then who is to say that he can not authorize an obstruction of one foot, of two feet, or of ten? Is it conceivable that Congress ever intended to delegate such a power, and this in the face of the fact that it is necessary to do violence to the plain language of the Congressional act in order to reach such a conclusion?

2.

History of the Rivers and Harbors Act of 1899.

The Special Master, after reviewing the provisions of the Rivers and Harbors Act of September 19, 1890, called attention to the change in the language of the general prohibition with respect to the creation of obstructions to the navigable capacity of the waters of the United States, to "affirmatively authorized by Congress" from "affirmatively authorized by law." The Master then states "This change in the words of the first clause of Section 10 was for the purpose of making mere State authorization inadequate.

Sanitary District vs. United States, 266 U. S. 405, 429. *United States vs. Bellingham Bay Boom Company,* 176 U. S. 211." *Master's Report 179.* In view of this apparent argument that the only purpose of the adoption of the Rivers and Harbors Act of March 3, 1899 was to overcome the decision in the *United States vs. Bellingham Bay Boom Company, supra,* it is desirable to examine the history of this Act. By Section 2 of the Rivers and Harbors Act of June 3, 1896, Congress directed the Secretary of War as follows:

> "To cause to be prepared a compilation of all general laws that had been enacted from time to time by Congress for the maintenance, protection, and preservation of the navigable waters of the United States, and to submit the same to Congress with such recommendation as to *revision, emendation, or enlargement* of the said laws as in his judgment would be most advantageous to the public interest."

Pursuant to this direction the Secretary of War caused a bill to be drafted which was transmitted to Congress by the Secretary of War February 10, 1897, and printed as House Executive Document No. 293 of that session. To show the care with which this Bill was drafted we quote from a lecture delivered by Judge G. W. Koonce, officer of the Corp of Engineers, with forty years experience in the consideration of questions involving the study, interpretation, and application of laws relating to the improvement and protection of navigable waterways. In a lecture before the Engineering Class at Fort Humphreys, Virginia on April 23, 1926, Judge Koonce said:

> "This (the proposal of the War Department for the revision and enlargement of the laws for the protection of navigable waterways) was accepted by the Committee and was made section 2 of the act of June 3, 1896. Immediately after the passage of the act I took up the, to me, very agreeable task contemplated

> by this section. All the previous laws were carefully compiled and studied, and a complete bill was drafted covering all phases of the subject, and embodying such changes and additions as the experience of the department, through a long period of administration, showed to be essential for the effective conservation of the interests of navigation. This bill consisting of 13 sections was submitted to a number of the ablest and most experienced of our engineer officers for consideration and suggestive criticism, and was approved by them. It was transmitted to Congress by the Secretary of War February 10, 1897, and was printed as House Executive Document No. 293, of that session."

The Bill drafted by the War Department slumbered unnoticed for some time, but was later incorporated in the Rivers and Harbors Act of March 3, 1899 and became Sections 9 to 20 of that Act. Thus we see that Sections 9 and 10 of the River and Harbor Act of March 3, 1899 were drafted prior to February 10, 1897. The case of the *United States vs. Bellingham Bay Boom Company, supra,* was not decided until January 29, 1900, although it had been decided in the lower court June 28, 1897. It, therefore, cannot be said that an Act, drafted prior to February 10, 1897 and enacted into law on March 3, 1899, was adopted merely for the purpose of avoiding the effect of a decision of this Court.

Hence, it is obvious that the Act of March 3, 1899 was adopted in order to provide a new and comprehensive law carefully worded so as to state what was deemed to be the best policy of the Federal Government for the preservation of the navigable waters of the nation. It was an amplification and revision of the old law. The plain language of the statute must not be cavalierly disposed of by the simple statement that it was passed for the purpose of avoiding the effect of a court decision. We invite attention to the extreme care with which this Act was drafted by the ablest legal and engineering officers of the War Department and approved by the experienced members of Congress after it had been before them for nearly three years, in order to show that the plain language of such carefully considered legislation is not to be lightly cast aside.

3.

There has been no practical construction of Section 10 of the Act of March 3, 1899 sustaining the construction adopted by the Special Master.

The Special Master cites what is alleged to be the practical construction of this Act by the War Department in support of his interpretation, and quotes from the opinion of the Acting Attorney General (February 13, 1925, 34 Op. Atty. Gen. 410, 416) as follows:

> "I am informed that for a long period of years it has been the practice of the War Department to issue Permits under Section 10 of the Act of March 3, 1899, without requiring that the particular project be first authorized by Special Act of Congress." *Master's Report 185.*

This statement is no evidence of a practical construction, by the War Department, authorizing the Permit of March 3, 1925. The structures and acts covered by the Permits of the Secretaries of War through the long period of years mentioned, were of a very different character. Permits were required for all of the structures and acts enumerated in the second and third parts of Section 10, regardless of the fact that they did not constitute an obstruction in fact of the navigable capacity of waters of the United States. Thus, in 1913 Secretary Stimson pointed out that the question involved with relation to the issuance of a Permit for the diversion of water from the Great Lakes "is quite different in character, for example, from the question of fixing the proper location of a pierhead line, or the height or width of a draw bridge over a navigable stream—fair samples of the class of questions which come to the Secretary of War for decision under the above-mentioned Act of 1899." *Master's Report 64.* In Section V, 1, pages 138 to 151, *supra,* it has been shown that; Under Section 10 a permit of the Secretary of War was required for the erection of all structures and the performance of all acts enumerated in the last two parts of Section 10, where such structures and acts did not create an obstruction to the navigable capacity of the waters of the United States. *These,* of course, were the character of structures and acts for which the War Department had issued Permits for many years without a special act of Congress. That is a very different thing from saying that the Secretary of War had been authorizing all manner of obstructions to the navigable capacity of the waters of the United States without a special act of Congress for a long period of years. The latter would have to be the fact to lend any aid to the construction adopted by the Special Master.

The question of whether the Secretary of War had the power or attempted to exercise the power to authorize any work—no matter how destructive to navigable capacity —without a special act of Congress, presents very different considerations. It must be remembered that the question at issue here, involving the power of the Secretary of War to authorize Chicago to divert immense quantities of water from the Great Lakes and thus create an obstruction to navigable capacity, unparalleled in degree and extent, is unique and not to be compared with the location of a dolphin. We submit that there is no evidence, and we do not believe that any can be produced, of any practice of the War Department to authorize obstructions to the navigable capacity of waters of the United States aside from the diversion of the Sanitary District of Chicago. Hence, if there is any practical construction in any degree sustaining the interpretation of the Special Master, it must rest upon the Permits to the defendant.

Therefore, the question arises—What has been the attitude of the War Department with respect to that diversion? We find that prior to the opening of the Drainage Canal, the Sanitary District applied for the Permit of March 3, 1896, to do work in the Chicago River. The District Engineer indicated great doubt as to the power of the War Department to authorize any diversion with the attendant lowering of the Lakes, but stated that inasmuch as the then pending application did not involve diversion, the Permit could be granted. *Joint Abstract 133.* The Secretary of War, in his Permit of July 3, 1896, stated that it was not to be interpreted as approval of the plans to divert water. *Master's Report 34-35.* A similar condition was incorporated in the Permit of November 16, 1897. *Joint Abstract 133.* On April 4, 1899, in passing on the application to open the drainage canal, the District Engineer stated that it was a strange fact that Chicago had proceeded with this plan without inquiring whether the United States would permit diversion from the Great Lakes, and that the question was too great and important for him even to venture an opinion thereon, or to be authorized by executive officers, and should be referred to Congress. *Joint Abstract 134, 136.* In the Permit of May 3, 1899, the Secretary advised that he would submit the matter to Congress for its consideration and ultimate decision. *Master's Report 39.* Other Permits contain similar statements. *Master's Report 40.* In 1907 the Chief Engineer specifically declared that it was beyond the powers of the War Department to authorize a diversion which would create an obstruction to the navigable capacity of the Great Lakes. *Joint Abstract 141, 142.* In 1910 the succeeding Chief of Engineers reaffirmed this position. *Joint Abstract 143.* In 1912 a memorandum of the District Engineer at Chicago, prepared under instructions of Secretary Stimson, reaffirmed this position. *Joint Abstract 144, 145.* In the decision of January 8, 1913 Secretary Stimson expressed grave doubt as to his authority as Secretary of War to authorize such an obstruction to the navigable capacity of the Lakes and referred to the fact that his predecessors seemed to have had similar doubts, although Secretary Stimson found it unnecessary to rest his decision on that ground, because the application was without merit on the facts. *Master's Report 63, 64; Joint Abstract 147.* There is no further practical construction with reference to this diversion prior to the Permit of March 3, 1925, when the Secretary of War entertained such doubts as to his authority to authorize such an obstruction that he sought the opinion of the Attorney General of the United States as evidenced by the report of the Special Master. *Master's Report 185.* Hence, this contention of a long-settled practical construction by the War Department of its power to authorize an obstruction to the navigable capacity of the waters of the United States simmers down to the fact that by March 3, 1925 the Secretary of War felt such grave doubts as to his authority that he was unwilling to act until he secured the advice of the law branch of the Federal Government. It is peculiar, indeed, that he found it necessary to do so if a long-considered practice through the years had placed this question on the firm foundation of undoubted, long-established, practical construction. Hence, it would appear that instead of long-continued conviction of power, the belief that the War Department did not have the power had persisted up to and included the issuance of the last Permit, even if the Department's doubt of the existence of its power suddenly stopped then. In connection with the opinion of Acting Attorney General Beck of February 13, 1925, it is interesting to note that after a labored argument for the purpose of sustaining a view of the power of the Secretary of War previously determined to be desirable for the purpose of supplying a *modus vivendi* for an alleged emergency, it is said:

> "This view as to the nature of your powers seems to me a reasonable construction of the pertinent acts of Congress. It is, in any event, the only construction that would prevent irreparable harm, and, therefore, presumably, it is a construction which Congress itself would favor; and I therefore so advise you."

In short, the Acting Attorney General with apparent doubt of the legality of the procedure, advises the Secretary of War nevertheless to "take the bull by the horns" and issue the permit, whether legal or not, as the only existing means of extricating Chicago from the alleged precarious situation in which it had been placed by the illegal acts of the Sanitary District. It should be noted that this advice is directly contrary to the interpretation of this section urged in the Government brief of Mr. Beck, the then Solicitor General of the United States, but now Chief Counsel for the Sanitary District. In that brief Mr. Beck urged the same construction as now urged by the complainants. See brief of appellee, *Sanitary District vs. United States,* pages 174, 175, and synopsis of briefs *Sanitary District vs. United States,* 266 U. S. 405 at 419.

In connection with all of these Permits for this diversion this fact must be borne in mind: Chicago had persisted throughout the years in wilfull disregard and defiance of the Federal Government. It was unwilling to adopt other and possibly more expensive methods for the disposal of sewage, or to cut down its profits from generating electric power by the abstraction of the waters of the Lakes. It presented each Secretary of War with a *fait accompli.* It said, in effect:

> "By our own wilfull misconduct we have placed ourselves and our citizens in a position where the immediate cessation of this diversion would be disastrous to the health of all the people of Chicago. What are you going to do about it? Are you going to insist on the termination of our lawless acts and imperil the health of all of the people of Chicago?"

These Secretaries of War were presented with the question of whether they should attempt to keep some supervisory regulation over this diversion, whether legal or not, or let Chicago proceed on its lawless way. These Permits, extorted from reluctant Secretaries of War, with fear, and in some cases conviction, that the Permit was beyond their power, it is now attempted to use as a practical construction against the complainants. It would be as reasonable to contend that an act enforced at the point of a gun was a practical construction on the part of the victim of his powers. Of course, it requires no argument to show that a real practical construction by the War Department could not prevail against the plain language of the statute.

In this connection the Special Master cites *Cummings vs. Chicago,* 188 U. S. 410, and interprets the decision as a construction of Section 10 to the effect that no act of Congress is necessary to authorize an obstruction to the navigable capacity of the waters of the United States. The question in that case was whether in order to construct a dock it was necessary to secure a building permit from the proper Department of the City of Chicago. There was no suggestion that the dock constituted an obstruction to the navigable capacity of the waters. The case has no relevancy to the point at issue. As was pointed out in Section V, 1, (pp. 138-151, *supra*) a Permit was necessary to construct this dock, although it did not obstruct the navigable capacity of the River. This case merely held that in addition thereto the permittee must comply with the local laws. If the case had raised the question of whether the dock would be an obstruction to navigable capacity, the case would be in point; but such is not the fact.

4.

The judicial construction of Section 10.

We now pass to the question of what, if any, judicial construction of Section 10 of the Rivers and Harbors Act of March 3, 1899, has been had with reference to the particular point at issue. It has already been pointed out that *Cummings vs. Chicago,* 188 U. S. 410, constitutes no authority whatever for a construction of this Section to the effect that the Secretary of War is empowered to authorize the creation of an obstruction to the navigable capacity of the waters of the United States. The Special Master cites *Maine Water Company vs. Knickerbocker Steam Towage Company,* 99 Me. 473, upon the question of whether the affirmative authority of Congress must be evidenced in the cases covered by the second and third provisions of Section 10. That case related to the right of the Water Company to lay a pipeline across the Kennebec River upon obtaining a Permit from the Secretary of War. It does not appear that the pipeline was laid in such a way as to create an obstruction to the navigable capacity of the waters of the United States. Hence, the question of whether the Secretary of War had authority to authorize an obstruction was not involved; it was merely one of those cases where the Permit of the Secretary of War was required under the cumulative provisions of the second part of Section 10, although it was not an obstruction to navigable capacity. Hence. the discussion of the Maine Court is not only *obiter* but proceeds upon an obvious fallacy. It assumes that if the Secretary of War were not empowered under the second and third parts of Section 10 to authorize the obstruction of the navigable capacity of the waters of the United States, then no one of those structures could be erected without a special act of Congress. The error in this assumption has already been demonstrated in Part V, 1, *ante* pages 138-151. It is said that this case was cited with apparent approval, although not directly upon this point, in *Southern Pacific Co. vs. Olympian Dredging Company,* 260 U. S. 205, 210. Since it was not cited on the point at issue, it can hardly be said to gain weight thereby on that point. However, it should be noted that the real groundwork of the decision of the *Southern Pacific Co. vs. Olympian Dredging Company, supra,* was that the Railroad Company had not been guilty of any actionable negligence without regard to the effect of the Permit of the Secretary of War. In this case the Railroad Company had cut off the piles of an old bridge in a careful and competent manner so that there was, in fact, no obstruction to navigation. Twenty-two years later, as the result of the operations of the Federal Government, and not due to natural causes, the bed of the River was lowered so that the stumps of the piles protruded and caused damage. Hence, it was held that there was no negligence. The court quoted with approval the decision of the District Judge as follows, (page 211):

> "While the Railroad Company was perhaps required to take notice of ordinary changes in the course of channel of the stream from natural causes and provide against any injury that might result from such changes, it could not, in my opinion, be required to take notice of such radical changes as occurred here by the acts of the government, over which it had no control, and which it had no reason to anticipate or provide against."

And in conclusion, the Court said, (page 212):

> "The obstruction did not develop until years afterward, and was due to causes which they were not

> bound to anticipate and provide against, and for which they were in no degree responsible."

That this was the basis of the decision is shown by the following cases cited in its support:

The Plymouth, 275 Fed. 483;
The Douglass, 7 Prob. Div. (1882) 157.

All that is involved in the decision in *Sanitary District vs. United States*, 266 U. S. 405, 428-429, which is in part quoted by the Special Master, is that the obstruction of the navigable capacity of the Great Lakes is clearly prohibited by the first part of Section 10. The question of whether the Secretary of War had the authority to authorize an obstruction to the navigable capacity of the waters of the United States was not before the court nor involved in the decision. The Federal Government only asked to have the diversion enjoined as to the excess over 4167 c. s. f. It could have asked to have the whole of the diversion enjoined. Clearly it could ask for less; and it was not necessary for the Court to consider or determine the reason for not requesting a total cessation of the diversion.

While Section 10 of the Act of March 3, 1925 has not been construed by this Court with reference to the point here at issue, it was construed by the Circuit Court in *Hubbard vs. Fort*, 188 Fed. 987. The court held that under this section the Secretary of War was without power to authorize an obstruction to the navigable capacity of the waters of the United States but that such an obstruction could only be authorized by an Act of Congress. In the course of the opinion,—pages 992-993, the court said:

> "So far as applicable to the present question, such section may be summarized thus: First, the creation of any obstruction to the navigable capacity of any waters of the United States is prohibited unless af-

firmatively authorized by Congress; second, it shall not be lawful to build any structure in a navigable river or water of the United States, except on plans recommended by the chief of engineers and authorized by the Secretary of War; and, third, it shall not be lawful to excavate or fill the channel of any navigable water of the United States unless such work is recommended by said Secretary of War prior to beginning the same."

We quote further from the discussion of this act in *Hubbard vs. Fort, supra,* pages 996-997:

> "If Congress intended that as to all other obstructions not prohibited by section 9, no affirmative action by Congress should be necessary, but that they might be constructed upon obtaining the permission of the Secretary of War it used singularly inapt and ambiguous language in expressing such intention.
>
> "The use of the word 'authorize' instead of 'approve' does not change the Secretary of War's act from permissory to plenary. Two of the definitions of the word 'authorize' are to approve of; to formally sanction. *Cent. Dict. & Cyc.* What does the Secretary of War authorize? Not the building of the structures mentioned in the second part of this section, but the plans to which such construction is to conform. And what does he authorize as to excavating, filling, altering, etc., of the channel of navigable waters, but the commencement, the character, and the manner of doing such work? While the language here employed is not as felicitous and clear as it might be, yet, when it is considered that Congress here revising and amending, any other interpretation than that such official action by the designated executive officer was to be had only after the initial power to do such works shall have been procured from Congress would be to unnecessarily limit the plain and unambiguous language used in the first part of this section by which full control over all the works in interstate waters was kept in Congress itself."

Such cases as the *Monongahela Bridge Co. vs. U. S.*, 216 U. S. 177, cited in *Southern Pacific Co. vs. Olympian Dredging Company, supra,* bring nothing to the construction of this Section on the point at issue. That case merely involved the construction of Section 18 of the Rivers and Harbors Act of March 3, 1899, wherein the Secretary of War was authorized to require the removal of an obstruction to navigation in the form of a bridge, after notice to parties in interest and opportunity to be heard, in the event that he found that the bridge was in fact an obstruction to navigation. In the instant discussion of Section 10, the question is not what Congress could have done, but what it did; and, secondly, the granting of power to the Secretary of War to require the removal of a structure which has been determined to be an obstruction in fact to navigation, and the granting of power to the Secretary of War to authorize the creation of obstructions to the navigable capacity of the waters of the United States present very different questions. Any action under Section 18 could not be other than a benefit to the navigable capacity, whereas, under the construction of Section 10, adopted by the Special Master, the action of the Secretary of War could obstruct or destroy any or all of the navigable waters of the United States.

It may be further pointed out that the construction of the statute in *Hubbard vs. Fort, supra,* accorded with the construction adopted by the War Department in this respect. In his lecture before the School of Engineers on April 23, 1925, Judge Koonce said!

> "In one of the early cases it became necessary for the department to consider the question whether the second clause of this section so qualifies the prohibitory provision of the first clause as to confer on the Secretary of War power to authorize obstructions to navigable capacity. In other words, notwithstanding the positive prohibition in the first clause, can the

second clause be construed as a declaration by Congress that any work, however destructive it may be to navigable capacity, may be done provided it is recommended by the Chief of Engineers and authorized by the Secretary of War. On this question the Chief of Engineers maintained:—

> "That the essence of the whole section is contained in the first clause, the obvious purpose of which is to prevent the execution of any work or the doing of any act that will obstruct, injure, or destroy the navigable capacity of any navigable water unless expressedly authorized by Congress:—that the succeeding clause making it unlawful to build any structure, or to modify the condition or capacity of a navigable water, without the prior recommendation of the Chief of Engineers and authorization of the Secretary of War, was intended to insure the accomplishment of the aforesaid purpose, and not to empower them to authorize obstructive works:—that the effect of this latter clause is to necessitate the submission of every project of the kind to the Chief of Engineers and the Secretary of War, and to commit to them the duty of investigating and determining whether or not the project will obstruct or injure navigability:—that if these officers find as a fact that a projected work will not amount to an obstruction to navigable capacity they may authorize it, but if they find that it will be such an obstruction the affirmative action of Congress must be sought and obtained. This interpretation of the statute subsequently received judicial support, as you may see by referring to the case of *Hubbard v. Fort*, 188 Fed. 987."

See also to same effect Opinion of Attorney General Wickersham, 27 Op. Atty. Gen. 327 at 331.

Moreover, whatever construction may be given to this statute, it can not be construed to empower the Secretary of War to authorize the diversion of navigable waters of the United States and the consequent destruction or obstruction of their navigable capacity for local power and sanitation purposes. Attention was called to this fact by the court in *Sanitary District vs. United States,* 266 U. S. 405, at 431 where the court said:

> "It is doubtful at least whether the Secretary was authorized to consider * * * the sanitary needs of Chicago."

Certainly, the Secretary was not empowered to authorize the diversion and destruction of the navigable capacity of the waters of the United States for such purposes. It is conclusively established by the evidence that the Secretary did attempt to authorize this diversion for sanitary and power purposes and for those purposes alone. See Fact Brief, pages 17-32, *supra.* It is submitted that Congress itself could not authorize the diversion for such purposes and with such consequence, but in any event, it is clear that Congress never intended and never in fact conferred such power upon the Secretary of War by Section 10 of the Act of March 3, 1899.

VI.

WHETHER THE PERMIT OF MARCH 3, 1925, AND ITS CONDITIONS, ARE VALID.

The foregoing statement of this question by the Special Master in his preliminary enumeration of the questions of law involved, is narrower than his statement of the question preliminary to his detailed discussion thereof, where the question is stated to be not only as to the validity, but as to the *effect* of the Permit of March 3, 1925. *Master's Report 191.* In any event, the question is: First, as to the validity of the Permit of March 3, 1925, and, second, as to its effect. The contentions of the complainants are, first, that the Permit of March 3, 1925, is invalid, and, second, that if said Permit were valid, pursuant to Section 10 of the Act of March 3, 1899, it would constitute no defense to this bill.

The contentions of the complainants that the Permit of March 3, 1925, is invalid, because it is not within the terms of Section 10 of the Act of March 3, 1899, and because if it were otherwise within the terms of that statute, a diversion obstructive to navigable capacity for the purpose of local sanitation and power is not comprehended within the terms of said statute, has been discussed in Section V *ante* pp. 138-166. However, assuming that the issuance of the Permit of March 3, 1925 was a lawful exercise of power validly conferred upon the Secretary of War by Section 10 of the Act of March 3, 1899, there remain to be considered two questions: First, has the permit been rendered void and inoperative through violation of its terms by the Sanitary District? Second, if the permit has not been voided by violation of its terms, does it constitute a defense to this bill?

1.

The Sanitary District has voided the Permit of March 3, 1925, by violation of its terms.

If the Permit of March 3, 1925, constitutes a valid consent of the Secretary of War to the abstraction of these waters, that consent was based upon and made operative upon the observance of certain conditions. Among these conditions were included: (1) That the instantaneous maximum diversion should not exceed 11,000 c. s. f.; (2) That there should be no unreasonable interference with navigation by the act authorized; and (3) That the City of Chicago should carry out a prescribed plan for the metering of its domestic water supply. It is submitted that the uncontradicted facts in the record and the unchallenged findings of the Special Master conclusively establish the violation of the first two conditions enumerated. On the facts which have arisen since the submission of this cause to the Special Master on June 3, 1927, and which the defendants cannot deny, the third condition has been violated and ignored. See Fact Brief, Part VII, pages 55-57, *ante*. The Special Master recognizes that there has been an unreasonable interference with navigation by the acts performed under color of this Permit, but seeks to avoid the effect of the violation of these conditions on the ground that the conditions were imposed for the purpose of reserving the right of immediate revocation by the Secretary of War. This argument is untenable for two reasons. First, the tenth condition of the Permit of March 3, 1925, specially reserves the power of the Secretary of War to revoke the Permit at will for any or no reason. Second such a Permit would be revocable at the will of the Secretary of War in the event that it created an obstruction to navigation or navigable capacity without any reservation in the Permit whatever. So that it is clear that it cannot fairly be said that these conditions were for the purpose of reserving or preserving the control of the Secretary of War, or the right of the Secretary of War to revoke the Permit before it expired according to its terms. On the contrary, the conditions of the Permit are express limitations on and conditions of any authority which can be claimed thereunder; and said Permit cannot be asserted as an authority for any acts in excess or in violation of such conditions. It is said that condition (1) with respect to creating unreasonable interference with navigation was merely to provide for the manner of withdrawing the water. *Master's Report 195-196.* The Permit clearly provided that the water should not be withdrawn in excess of a mean annual average of 8500 c. s. f. and an instantaneous maximum of 11,000 c. s. f. This provided for the *manner* in which the water should be withdrawn. What other manner was there in which the water could be withdrawn? If the condition against causing an interference to navigation had no application to the quantity of water withdrawn in relation to its effect upon navigation, what possible effect could it have upon, or possible relation could it have to, the withdrawal of this water. If this Permit of the Secretary of War was valid, it had the effect of a statute; and it would be a novel principle that a person, specially injured by the violation of the conditions or limitations of a Federal statute, could not maintain an action to redress such grievance, but that the violator would be fully protected by the statute which he had infringed.

The conclusive character of the evidence of such violation has been discussed in the Fact brief and will not be repeated here. *Ante* pp. 55-56.

2.

If the Permit has not been voided by the violation of its terms, it nevertheless does not constitute a defense to this bill.

If the Permit of March 3, 1925, purports to authorize any abstraction of the water of the Great Lakes, which would injure their navigable capacity, such a grant would be in derogation of the public rights and should, therefore, be strictly construed against the grantee or permittee. *Louisville Bridge Co. v. United States,* 242 U. S. 409. Construing the Permit of the Secretary of War in the light of the recognized rules of construction, it only purports to authorize the Sanitary District to abstract so much of the water of the Great Lakes as will not injure their navigable capacity, but not exceeding 8500 c. s. f. in any event. The District is limited to such quantity as will not injure the navigable capacity of the Great Lakes, no matter how small that quantity may be. Under the state of the record in this case, that amount certainly cannot be in excess of 1000 c. s. f.

The Permit of March 3, 1925, was prefaced by the following note:

> "It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. **It merely expresses the assent of the Federal Government so far as concerns the public rights of navigation.** (See *Cummings v. Chicago,* 188 U. S., 410.)"

According to the construction adopted by the Special Master, the only effect of this note is to require the assent of the State of Illinois under the doctrine of *Cummings v. Chicago,* 188 U. S. 410. The Special Master construes this language as though it read: "That it does not authorize any injury to private property or invasion of private rights in the State of Illinois, but you are hereby authorized to inflict any damages on private property or invade any private rights you may see fit in the States of Wisconsin, Michigan, Ohio, Pennsylvania and New York."

It is said that the act is to be done only in the State of Illinois. This was a Permit to take water. The question is immediately presented: From where is the water to be taken? The uncontradicted evidence in this case is that the mean annual contribution of the State of Illinois under natural conditions to the net water supply of the Great Lakes system is 503 second feet. There has been, and is being taken, approximately 8500 c. s. f., and the right is asserted under this Permit to take approximately 10,000 c. s. f. From where does the additional 8000 or 9500 c. s. f., come? The obvious fact is that it comes directly from Wisconsin and Michigan. If the logic of the Special

Master is sound, then in the event that this 8000 or 9500 c. s. f. not contributed by Illinois was abstracted through a pipeline, having its opening for the admission of water directly in the waters of Michigan and Wisconsin, but controlled by a faucet at Chicago on the other end of the pipeline, we would reach the conclusion that the act was performed in Illinois, because the faucet was turned at Chicago. This is not merely to sacrifice substance to form which would be unthinkable in a court of equity, but it is to fly in the face of the physical facts.

But the end is not yet. The practical results of such logic are even more alarming. Under this doctrine the Sanitary District is required to render compensation for all injury to private property and invasion of private rights in the State of Illinois for whose benefit the diversion is had. This is not a theory, but the settled law. *Beidler v. Sanitary-District of Chicago,* 211 Illinois, 628. On the other hand, the Sanitary District may inflict, and does inflict, immensely greater damage to private property and private rights in the complainant states with immunity from granting compensation. Here then a state with sixty miles of shore line out of a total of 8300 miles on this waterway by this construction of the Permit is required to give compensation within such state, but may inflict any amount of damage and does inflict immeasurable damage upon the property along 8240 miles of the shore line with immunity from liability. Such a construction is at variance with every principle of equity and good conscience.

Complainants submit that under the uncontrovertible physical facts of this case from 8000 to 9500 c. s. f. of water is directly removed and abstracted from the territory of Wisconsin and Michigan, that this act is performed in those states and that under the doctrine of *Cummings v. Chicago, supra,* the assent of those states is required. Otherwise, it is a Permit to Illinois to raid its sister states and appropriate their property and natural resources without their consent and without compensation.

However, there is an even greater difficulty in construing this Permit as a defense to this action. It must be remembered that the damages inflicted by the Sanitary District fall into three classes: First, the direct damages to navigation, second, the immense damages to riparian property without any regard to the injury to navigation, and third, the damage to the proprietary and quasi-sovereign rights of the complainant states, including the riparian damage to the great parks upon these shores. The questions are then presented—Is the Permit of March 3, 1925, a sword or merely a shield, and if it is merely a shield, to what extent and for what purposes does it constitute a shield? Does an *ex parte* permit of the Secretary of War clothe the permittee with all the powers of the Federal Government but with none of its responsibilities? We must distinguish between a permissive consent or waiver of the Secretary of War and an affirmative act of the Federal Government itself. Thus, in *United States v. Chandler-Dunbar Co.,* 229 U. S. 53, there was an act of the Federal Government itself appropriating the waters and incidentally the water power of the power company to the purposes of navigation. Could the Secretary of War have authorized another power company to appropriate the power rights of the Chandler-Dunbar Company for power purposes?

We believe the law may be made clear by a comparison of two cases. In *Scranton v. Wheeler,* 179 U. S. 141, the Federal Government constructed a pier in the St. Mary's River on the submerged lands in front of the riparian property of Scranton, for the improvement of navigation, in such a manner as to cut off his access to the navigable channel.

It was held that this was *damnum absque injuria,* because the act of the Federal Government fell within the servitude upon riparian property with reference to the improvement of navigable waters by the United States. Now let us consider the case of *Cobb v. Commissioners of Lincoln Park,* 202 Illinois, 427. In that case Cobb asserted the right to construct a wharf on the submerged lands in front of Lincoln Park by virtue of a Permit issued by the Secretary of War under Section 10 of the Act of March 3, 1899. The question presented was not one of compliance with state regulations such as was presented in *Cummings v. Chicago, supra,* but it was one of property rights. The question was whether Cobb by virtue of this Permit obtained the right to erect a wharf on submerged lands in front of property belonging to another. It was held that the Permit of the Secretary constituted no authority whatever for infringing the rights of the riparian property owner. The correctness of the decision cannot be questioned. If the Federal Government had undertaken to erect a pier on the submerged lands in front of Lincoln Park for improvement of navigation, it would have had a clear legal right to do so, because the riparian property was subject to the servitude of the right of the Federal Government to improve navigable waters. However, it was not part of the servitude on the riparian property that a private individual might build a wharf on the submerged lands in front thereof and the servitude could not be so enlarged by a permit of the Secretary of War. The Constitution did not give private individuals, nor did it give the State of Illinois, the right to do either direct or incidental damage to riparian property owners on the navigable waters of the United States. In the course of its decision, the Supreme Court of Illinois after adverting to the rights of the general Government under *Scranton v. Wheeler, supra,* said: (439, 440)

> "Appellant not having, by the law of this State, the right to construct a wharf over his neighbor's submerged lands without his neighbor's consent, could not acquire that right, without his neighbor's consent, by obtaining a license from the Secretary of War.
>
> "* * * * * But such permission is not given to override the rights of the owners of the submerged lands. It is, as said above, a declaration by the guardian of the interests of the public at large that the proposed structure will not interfere with navigation. It is strictly permissive, and not an authorization by paramount authority to build the structure."

If the construction of the Special Master is correct, then a private individual may obtain the property right to construct a pier, wharf or do any other work in the waters in front of the riparian property of others no matter how injurious or destructive it may be to that property by virtue of the simple process of obtaining a Permit of the Secretary of War. Can it be contended that the servitude imposed upon riparian property for the improvement of navigation by the United States permits the Secretary of War to thus apportion private property rights as he sees fit? If so, the servitude of riparian property for the benefit of navigation relates not merely to the acts of the Federal Government in improving navigation, but comprehends the injury of riparian property by anyone, so long as he can get a Permit from the Secretary of War. This construction is contrary to every case which has ever been decided in the United States construing the effect of such Permit. In addition to *Cobb v. Commissioners, supra,* we invite attention to the following cases:

Such a Permit was construed in the case of *In Re Crawford County Levee & Drainage District,* 182 Wis. 404. There the Drainage District asserted its right to drain certain lands in the Winnesheik bottoms on the Mississippi River in a manner which would render non-navigable, some of the sloughs and side channels of the Mississippi River on the authority of a Permit of the Secretary of War and on the further ground that the closing of these sloughs and side channels would improve navigation in the main channel of the Mississippi River. The court held that the Permit of the Secretary of War was a mere waiver of Federal objection as far as the rights of navigation were concerned, that it created no property rights in the permittee and constituted no authority for destroying navigable waters of Wisconsin or injuring private property and that the benefit, if any, to navigation on the main channel of the Mississippi River was immaterial, because the Drainage District had not been entrusted with the improvement of the navigable waters of the United States. In this connection the court said at page 412:

> "But it is claimed that the permit issued by the War Department grants federal authority to carry out the drainage scheme. In this plaintiffs are mistaken. The permit expressly states that it does not grant 'any infringement of federal, state, or local laws or regulations.' 'That there shall be no unreasonable interference with navigation by the work herein authorized,' and 'that no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure.' "

With respect to the claim of improvement of the main channel of the Mississippi by the drainage district, the court said at page 415:

> "But however that fact may be, it is clear that the proposed district has no legal authority to destroy navigable waters of our state for the purpose of aiding the navigation of the main channel of the Mississippi River."

The same question was presented in *Attorney General ex rel. Becker v. Bay Boom W. R. & F. Co.,* 172 Wis. 363, 178 N. W. 569. The defendant likewise claimed the right to maintain a dike in a meandered inland lake in Wisconsin by virtue of a Permit from the Secretary of War. On that point, the court said pages 375, 376:

> "The federal permit expressly declares that it grants no property rights or exclusive privileges and that the free use by the public of the area inclosed is not to be prevented. The application for the permit and the grant of it presupposes that there was a body of navigable water; otherwise it was an idle ceremony. It is considered that the facts show that the construction of the dike was not sought by defendant for the improvement of navigation and that its location and construction is in fact an injury to the public easement and that the federal permit, in the light of the conditions upon which it is granted, does not vest defendant with the right to continue the dike, since it is an encroachment and injury to the enjoyment of the public easements of navigation and the rights of fishing and hunting."

In *Hubbard v. Fort,* 188 Fed. 987, defendant likewise asserted that a Permit of the Secretary of War was authority to perform the act without regard to the rights of the State of New Jersey or riparian property owners. The court overruled this contention and in the course of its opinion, page 999, said:

> "This is not a case of the United States government seeking to make a crossing of this interstate stream in the exercise of its governmental powers, but an attempt to override a sovereign state's opposition to the use of its submerged land by a corporation of its own creation, under the claim of being engaged in interstate commerce."

The same conclusion was reached by the court in *Wilson v. Hudson County Water Co.,* 76 N. J. Eq. 543, 76 Atl. 560, where the court at page 588 said:

> "* * * * * and, assuming that the permission of the general government to the excavation and laying of the proposed pipe line is necessary, such permission is not given to override the rights of the owner of the submerged lands, namely, the State of New Jersey, and it is, as said, the declaration by the guardian of the interests of the public at large that the proposed work will not interfere with navigation, and is strictly permissive, and not an authorization by paramount authority to do the work proposed."

The Permit of the Secretary of War was likewise held to be no authority to invade property rights, but to be a mere waiver or consent on the part of the federal government as far as rights of navigation were concerned in *Commonwealth v. Pennsylvania R. Co.,* 72 Pa. Sup. Ct. 353, *Thlinket Packing Co. v. Harrison Co.,* 5 Alaska, 471, *Columbia Salmon Co., v. Berg,* 5 Alaska, 538.

However, the fact that a Permit of the Secretary of War is no defense in this case, is conclusively established by *New York v. New Jersey,* 256 U. S. 296. This was an action to enjoin the State of New Jersey from dumping a large quantity of sewerage into Upper New York Bay through the agency of a sewage district, such as is involved in the instant case, on the ground that the resulting nuisance would be injurious to the health, property and welfare of the people of New York. The bill was filed in 1908. Immediately thereafter, the federal government intervened on the ground that the inadequacy of the proposed sewage treatment would result in injury to navigation and commerce as well as to government property. Subsequently, the federal government entered into a stipulation with the sewage commissioners acting under authority of the State of New Jersey, approved by the Secretary of War, whereby the federal government consented to the carrying out of the sewage project upon certain conditions as to treatment of sewage and manner of its discharge into Upper New York Bay, which conditions were designed and accepted by the federal government as proper protection of the navigable waters against injury to navigation and commerce from the discharge of the sewage. This stipulation was then embodied in a Permit issued by the Secretary of War to the Sewage Commissioners. The government withdrew from the case and its petition was dismissed on May 16, 1910. Thereafter, under the direction of this Court, testimony was taken until 1913 to determine whether the discharge of the sewage under these conditions would in fact be injurious to the health, property and prosperity of the people of New York. However, the case was not brought on for argument until 1918, when the court in a decision appearing in 249 U. S. 202, directed the taking of additional testimony to determine, first, whether any practical modification of the proposed sewer system would reduce the polluting effect; second, whether any practical plan for sewage disposal would lessen the pollution effect of the sewage of New York City; and, third, as to the degree of pollution of New York Harbor and the change since the taking of the testimony was closed. After the taking of this testimony, the case came on for final disposition in this Court. After a consideration of the testimony, the Court said:

> "Considering all of this evidence, and much more which we cannot detail, we must conclude that the complainants have failed to show by the convincing evidence which the law requires that the sewage which the defendants intend to discharge into Upper New York Bay, even if treated only in the manner specifically described in the stipulation with the United States Government, would so corrupt the water of the Bay as to create a public nuisance by causing offensive odors or unsightly deposits on the surface or that it would seriously add to the pollution of it."

Whereupon the Court dismissed the bill without prejudice to a renewal of the application for an injunction if the proposed sewer in operation should prove sufficiently injurious to the waters of the Bay to injure the health, welfare or commerce of the people of New York. If the conclusion of the Special Master were correct, then this Court should have dismissed the bill as soon as the federal government made its stipulation; and surely, when the stipulation was incorporated in the Permit of the Secretary of War, the Court should have told New York:

> "It is immaterial whether or how much this pollution may damage the property, health or prosperity of the people of New York, because the Secretary of War has issued a Permit and that is final."

But this Court not only did not so dismiss the bill, but when the case failed on the proof, it reserved the right of New York to renew its application, not when or if New Jersey should perform this act without a Permit of the Secretary of War, but when or if it should appear that the act was in fact injurious to the health, property and prosperity of the people of New York.

The conclusion of the Special Master proceeds upon the assumption, that if the federal government is satisfied as far as interference with the rights of navigation is concerned, that is conclusive upon states or private parties having entirely different rights. If we were to assume in this case that the Permit was a defense against damages flowing from the interference with navigation of these waters, it clearly could be no defense to the second and third types of damages suffered in this case which are to the riparian property rights of the citizens of the complainant states and to the proprietary and *quasi*-sovereign rights of the states themselves. These damages would flow from this act regardless of whether there had ever been any navigation on the Great Lakes, and even though they were in fact non-navigable. The same principle may be deduced from *International Bridge Co. v. New York,* 254 U. S. 126, 132.

Even if the federal government were engaged in a sanitation scheme, it could not do damage for that purpose without compensation. Suppose the federal government created a sanitation scheme for an army post or camp which created a nuisance in navigable waters. Could it injure the private property of other riparian owners without compensation for that purpose? Suppose a pier were erected as in *Scranton v. Wheeler, supra,* by the federal government, not to improve navigation, but in front of the riparian property on New York Harbor for the purpose of providing a landing place for vessels operated by the United States Shipping Board. Could it appropriate that property for that purpose without compensation? The conclusion of the Special Master fails to recognize, first, that this is not an act of the federal government in the improvement of navigation, but an act of the Sanitary District to whom the complainant states have delegated nothing, and second, that a waiver of objections to interference with navigation by the federal government, if valid, cannot justify or be a defense against damages, other than those arising from an interference with navigation, inflicted upon third parties. Here the damage is not limited to interference with navigation, but includes vast damage of an entirely different character. The cases may be searched in vain to find any judicial authority for such a construction. The inequity and injustice flowing from such a construction is clear. See also pages 124-125, *ante.*

In this section of the brief complainants have discussed or cited every case where it was contended that a Permit of the Secretary of War constituted affirmative authority to invade the property rights of a third party. Every one of them denies such a claim and is directly contrary to the conclusion of the Special Master.

VII.

AS TO THE PROVISIONS OF THE DECREE WHICH SHOULD BE ENTERED, IN THE LIGHT OF THE DETERMINATION OF THE FOREGOING QUESTIONS.

If the foregoing contentions of the complainants with respect to the principles of law applicable to this case are correct, they are entitled to a decree, dismissing the respective petitions of the intervening States and enjoining the State of Illinois and the Sanitary District of Chicago from abstracting any of the water of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency.

Respectfully submitted,

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IN THE

Supreme Court of the United States

October Term, 1927

No. ~~12~~ — ORIGINAL 11

STATE OF NEW YORK,
Complainant,

against

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

Brief on Behalf of the ~~Applicant~~, State of New York in Support of Its Exceptions Taken to the Conclusions of Law Contained in the Report of Hon. Charles E. Hughes, Special Master.

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In the Supreme Court of the United States

OCTOBER TERM, 1927.

No. 12 — ORIGINAL.

STATE OF NEW YORK,
Complainant,
against
STATE OF ILLINOIS AND SANITARY DISTRICT, OF CHICAGO,
Defendants.

HISTORY OF THE CASE

By motion dated September 17, 1926, the State of New York and State of Michigan jointly moved in the Supreme Court of the United States to amend the complaint of the State of Michigan against the State of Illinois and the Sanitary District of Chicago, theretofore filed and answered by such defendants, so as to bring in the State of New York as an additional party complainant in such Michigan action. Opposed by the defendants, this motion was denied by the United States Supreme Court, but the State of New York was permitted, however, to file a separate bill of complaint similar to the proposed joint Michigan and New York complaint. This action was therefore commenced in October, 1926, by the State of New York serving its separate complaint upon the defendants State of Illinois and Sanitary District of Chicago.

Subsequently, upon the petition of the State of New York, the Supreme Court permitted it to participate in the trial of the related suit of No. 7 Original, the *States of Wisconsin, Ohio, Pennsylvania and Minnesota against the*

State of Illinois and the Sanitary District of Chicago "in like manner as if those suits had been consolidated." The Wisconsin action by order of June 7, 1926, had been referred to the Hon. Charles E. Hughes as Special Master to take the evidence and report the same to the Court with his findings of fact, conclusions of law and recommendations for a decree subject to the examination, consideration, approval, modification, or other disposition by the Court. The order permitting New York to participate in the trial of the Wisconsin case stated "this order is made without prejudice to the authority of the Court hereafter to make any order which it may deem proper, respecting the matters set forth in the third paragraph of the bill of complaint in the case of the *State of New York* v. *the State of Illinois and Sanitary District of Chicago,* and respecting the issues that may arise from the presence of that paragraph in that bill of complaint."

Referring to this order, the Special Master ruled as follows:

> "I shall receive the evidence which may be offered by the State of New York, in like manner as if its suit had been consolidated with the suit of the *State of Wisconsin* v. *The State of Illinois and Sanitary District of Chicago.*
>
> "It will be noted, however, that the order of the Supreme Court to that effect reserves the matters set forth in the third paragraph of the bill of complaint in the case of the *State of New York* v. *the State of Illinois and Sanitary District of Chicago.*
>
> "Accordingly, I shall not receive evidence with respect to any matter set forth in the third paragraph of the bill of complaint in that suit, until the further order of the Supreme Court." (Transcript, p. 1311.)

This third paragraph of New York's complaint set forth the allegations of injury caused to the water power interests of the State and its citizens on the Niagara and St. Lawrence rivers by the Chicago abstraction of waters from the Great Lakes-St. Lawrence Waterway.

The defendants failed to voluntarily answer the complaint of the State of New York. A motion for an order compelling such answer therefore was made. The Supreme Court on April 18, 1927, ordered that

> "the answer heretofore filed by defendants in this case to bill of complaint in related case of *Michigan* v. *Illinois and Sanitary District of Chicago* may and shall be accepted and treated as their answer to bill of complaint in this case, other than paragraph III thereof."

Subsequently, the motion of the defendants to strike out paragraph III, and New York's related motion to compel the defendants to answer its allegations were argued. On May 31, 1927, on an opinion of Mr. Justice Van Devanter, the Court struck out paragraph III from New York's bill of complaint, without prejudice. The Court's action was upon the theory that no injury would result from Chicago's diversion to the present water power developments on the Niagara and St. Lawrence rivers or to any definitely established projects.

In accordance with the Court's permission, the New York action was tried before the Special Master simultaneously with the Wisconsin and Michigan cases. Evidence was offered by New York in support of the allegations contained in its complaint with the exception of those relating to the damage to its water power rights and interests.

NEW YORK'S VITAL INTEREST IN THE GREAT LAKES ST. LAWRENCE WATERWAY

The Court's Special Master, Honorable Charles E. Hughes, concludes his discussion of the damage to the complainants, caused by the Chicago diversion, with the finding, "that the complainants have established that the diversion through the Chicago Drainage Canal has caused substantial damage to their navigation, commerce and other interests." (Report, p. 118.) The Master made no attempt to find the degree in which the complainant states had suffered from Chicago's abstraction, nor was this necessary. It should be pointed out, however, that the State of New York, both in its proprietary and sovereign capacities, has suffered tremendous injury as a result of Chicago's interference with the Great Lakes-St. Lawrence Waterway.

It might be erroneously thought, from the motions presented to the Court relating to the water power injuries set forth in paragraph III of New York's bill of complaint, that the State was solely interested in that particular class of damage. It is true that the water power injury to the State and its citizens was estimated by Colonel Hugh L. Cooper at over $100,000,000.00. (Transcript, pp. 1312–1348.) It is also true that no regulating, compensating or other kinds of works can be constructed which would recover on the Niagara-St. Lawrence rivers, the power lost by the diversion of the Great Lakes-St. Lawrence watershed. Such was the finding of the Joint Board of Engineers on St. Lawrence Waterway, appointed by the governments of United States and Canada, in paragraph 244 in their report of November 16, 1926, (Exhibit No. 147), although it is obvious that water permanently extracted from the upper reaches of this waterway cannot be used for power purposes down-stream. The Court, however, has deferred the presentation of this issue, and it is only referred to here to emphasize the fact that despite the magnitude of this water power injury, New York State has navigational and commercial interest in the Great Lakes-St. Lawrence Waterway which is second to none.

An examination of the report of the War Department and the United States Shipping Board entitled "Transportation on the Great Lakes" (Exhibit No. 95), to which the report of the Special Master makes frequent reference, gives the statistics of the volume of commerce entering and leaving New York ports on Lake Erie and Lake Ontario and on the St. Lawrence and Niagara rivers. It appears from the undisputed evidence that this is largely a bulk-commodity movement, passing between the upper lakes and Lake Erie with Buffalo as the easterly terminus. The fact that practically all of this through commerce is carried in large lake vessels drawing from 21 to 23 feet of water when fully loaded, vessels which cannot pass through the Welland Canal as it is presently constructed, have caused Buffalo, New York, to became one of the great ports of the United States, and, for that matter, of the entire world.

At the trial before the Special Master, a picture of the varied nature and extent of New York's interest in the navigation and commerce of the Great Lakes was given by detailed proof of the commerce of Buffalo and the improvements made at private and public expense to facilitate its movement and handling. It was shown that while the Federal government constructed the outer breakwater and entrance channels, the State, city and private concerns had united to construct and maintain the inner harbor. Two extensive portions with well-equipped terminals and piers, known as Erie and Ohio Basins, cost the State approximately $4,000,000.00. (Transcript, p. 1803.) The city of Buffalo, up to 1926, had expended approximately $5,000,000.00 in the construction of the City Ship Canal, Buffalo Creek and other portions of the harbor. (Transcript, p. 1803.) The extensive and varied nature of the harbor improvements and terminal facilities, including grain elevators, iron ore and coal docks, sand, stone, and gravel yards, freight houses of the seven different connecting railroads were all described by competent witnesses.

In view of its situation, it is not surprising to learn that Buffalo is the chief port on the entire Great Lakes-St. Lawrence Waterway in the value of the total commerce handled. (Exhibit No. 95, 1913–1923, inclusive, pp. 52, 53.) In gross tonnage, its commerce has been exceeded on the Great Lakes only by the combined ports of Duluth-Superior Lakes, and in the States of Minnesota and Wisconsin. (Exhibit No. 95, pp. 44–45.) Some idea of the importance of the commerce of the port of Buffalo may be gained by comparing its gross tonnage with that of all of the ports of the United States, and its insular possessions.

In the year 1925, according to reports of the United States Shipping Board (Exhibit No. 144) the gross tonnage of Buffalo was exceeded only by New York City, Duluth-Superior, San Francisco, and Los Angeles. In foreign commerce, Buffalo, in the same year, took a higher position. Though not a seaboard, its trade with foreign nations was greater than any United States port other than New York, New Orleans and Philadelphia.

Of all the large commerce movements on the Great Lakes, the one in which the State of New York is chiefly interested is the grain movement. Entirely apart from the large sums which the State, municipalities and citizens have spent in providing terminal facilities, grain elevators and even a Barge Canal to facilitate transportation of this commodity, the State has a greater interest in seeing that the cost of flour to its citizens is not increased because of the enhanced transportation charges resulting from the Chicago diversion.

Grain which is used by the eastern states, as well as New York, for the food supply of their vast and congested population centers, and also the grain which is exported to European countries, is chiefly carried by Great Lakes vessels to the port of Buffalo. Eighty-four per cent of the total grain shipments to the United States ports on the Great Lakes, in the year 1923, was received at Buffalo. There, it is trans-shipped into canal barges and railroad cars. Portions of it go to the flour mills of eastern New York. Other portions are consumed in the State of New York, and vast quantities are distributed to eastern states and foreign countries. There are great businesses owned and operated by citizens of the State of New York which are dependent upon the shipment, receipt, milling and distribution of this vast grain movement.

Grain, however, is only one of the great commodities of lake-borne commerce in which New York is vitally interested. From the Lake Superior ports there annually is shipped to the ports on the lower lakes great quantities of iron ore. The absence of coal deposits in the Mid-West necessitate the location of the steel mills in the eastern States. New York has extensive iron and steel mills and receives great quantities of this lake-borne iron ore through the Port of Buffalo. Additional amounts are trans-shipped there for distribution to other points in eastern states. Over five and one-half million tons of iron ore were unloaded from Great Lakes vessels in Buffalo in the year 1923. (Exhibit No. 95, p. 267 and map opposite p. 268.)

The iron and steel mills of New York also consume great quantities of fluxing stone which is imported from the upper peninsula of Michigan via lake vessels and unloaded at Buffalo. (Exhibit No. 95, p. 366, map opposite p. 366.)

The commerce at Buffalo is not one-sided, however. Practically all of the lake-borne anthracite coal used in the Mid-Western States is shipped from her docks. Vessels bringing iron ore and grain to Buffalo returned to the west with 97 per cent of such lake-borne western coal movement. (Exhibit No. 95, pp. 309–310; second map opposite p. 310.)

In package freight, Buffalo again leads the ports of the Great Lakes in the volume of commerce received and shipped. This classification includes chiefly flour, automobiles, copper, feeds, cement, lime, articles manufactured from iron and steel, sugar, salt, fruits and vegetables and other miscellaneous merchandise. (Exhibit No. 95, pp. 371–375.)

The freight carried over the Great Lakes-St. Lawrence Waterway is of far greater consequence to the welfare of New York, the other complainant states, and the nation as a whole, than is the passenger traffic, but consideration must also be given that the waterway is extensively used as a highway for such traffic. From 1910 to 1923, inclusive, in each year, approximately 5,000,000 passengers have been transported in lake vessels. In 1923, about one-half of the entire number was to or from New York ports, Buffalo leading with a traffic of 2,712,179 persons. (Exhibit No. 95, pp. 56–57.)

The commerce of Buffalo is so varied and of such great magnitude that it overshadows the other ports of New York on Lake Ontario and on the Niagara and St. Lawrence rivers. They, nevertheless, are engaged in the lake trade on a large scale. Alexandria Bay receives more wood pulp, pulpwood and other forest products than any other port on the Great Lakes. (Exhibit No. 95, pp. 368, 369.) The car ferry traffic of Ogdensburg and of Charlotte (Rochester, N. Y.), in 1923, amounted to approximately 1,000,000 tons each. Oswego receives large quantities of grain, Charlotte and Sodus Point ship quantities of bituminous and anthracite coal to Canadian ports on Lake Ontario and to American ports on the St. Lawrence river. (Exhibit No. 95, p. 415, pp. 300–365, maps opposite p. 310.)

It is a matter of historical knowledge that New York's commercial position followed its opening highway of trade between the Atlantic seaboard and the Great Lakes-St. Lawrence Waterway, thus making itself the channel of trade between the vast interior sections of the country, rich in agricultural and natural produce, and the manufacturing states along the Atlantic coast and foreign countries. The opinions of this court have recognized this fact. In the case of *The Robert W. Parsons,* 191 U. S. 17 (1903), the court said:

> "The Erie Canal, though wholly within the State of New York, is a great highway of commerce between ports in different states and foreign countries." * * * "The canal was amply sufficient, and for twenty years was the principal means of communication with the northwest, and was not only the highway over which all the merchandise was carried between the Hudson River and the Great Lakes, but was largely used for the transportation of passengers in the great western immigration which immediately followed its construction."

The new Barge Canal, which has replaced the old Erie Canal, is open to such commerce as cares to use it and is free from all tolls. It is equipped with terminals, grain elevators and other modern facilities and affords a twelve foot depth of water between the Niagara at Tonawanda and the Hudson at Waterford. At Tonawanda, access to Lake Erie is had by the Niagara River. In the interior of the State, the Canal is connected with Lake Ontario by the Oswego Canal. To the north, the eastern end of the Canal is again united with the Great Lakes-St. Lawrence Waterway by means of the Champlain Canal, Lake Champlain, Richelieu River and Chamblay Canal. The Seneca and Cayuga Canal connects the Finger Lakes region in the heart of the State. This great artificial waterway makes a very large proportion of the entire State, and particularly its commercial and populated sections, a natural tributary to the Great Lakes-St. Lawrence Waterway. This court has recently recognized the importance of the Barge Canal as a part of a great interstate highway of trade in the case of *The United States of America and Interstate Commerce Commission* v. *The New York Central Railroad Company,* 71 U. S. (L. ed.) 350; 272 U. S. 457, wherein the railroad company was compelled to furnish switching connections with the Erie Basin terminal of the Canal in Buffalo harbor. The court pointed out that "about 75 per cent of the traffic passing over" the canal "is interstate" and held that "where as here, interstate and intrastate transactions are interwoven, the regulation of the latter is so incidental to and inseparable from the regulation of the former as properly to be deemed included in the authority over interstate commerce conferred by statute."

It is apparent from a study of these undisputed facts that the State of New York as the quasi-sovereign of its great population, dependent upon the commerce of the Great Lakes for a portion of its food supply; of its citizens engaged in the manufacture, transportation and distribution of the commerce between it and other states and nations adjacent to the Great Lakes-St. Lawrence Waterway; as the proprietor of a great canal system costing about $174,000,000.00, solely designed to connect this waterway with the interior of the State and to facilitate the movement of commerce between the waterway and points in eastern states and foreign countries, has a great and vital interest in the commerce and navigation of the Great Lakes-St. Lawrence Waterway. When the city of Chicago, as the Special Master found, in aid of its sewage disposal problems and for the development of water power, reaches out through the operation of natural laws and lowers the levels of the Great Lakes, an injury is done which so strikes at the welfare of the State and its citizens that this court should not permit its continuance.

THE QUESTION RAISED BY THE STATE OF NEW YORK

The main question which underlies this entire controversy—the answer to which is so vital to the welfare of New York and its citizens and affects the structure of state and national government—may be simply expressed.

> *Can Congress, acting through the Secretary of War, lawfully permit a municipality such as the Sanitary District of Chicago, to divert water from a natural waterway for sewage disposal and water power purposes, upon the sole ground that, through the resulting injury, commerce is affected?*

In view of the importance of this question, the State of New York lays aside its exceptions to the Special Master's findings of fact, and accepts his report on the facts as though wholly correct. Exceptions to conclusions of law, save as they relate to this one central question, are likewise disregarded.

STATEMENT OF FACTS WHICH RELATE TO THE LEGAL QUESTION RAISED IN THIS BRIEF

(a) The Diversion and Its Effect.

The Special Master finds that a diversion of 8,500 c. f. s. through the drainage canal of the Sanitary District of Chicago "lowers the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; the levels of Lakes Erie and Ontario, approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the above mentioned lakes, to the same extent, respectively." (Report p. 104.)

It is further found that the diversion of about 8,500 c.f.s. has continued for a sufficient period of time to cause and has caused such lowering of the mean levels of the lakes. If the diversion at Chicago were ended the mean level of the lakes and rivers would be raised to the same extent that they had been lowered respectively by the diversion. (Report p. 105.)

(b) THE RESULTING INJURY.

The Special Master finds that the lowering of the levels of the lakes and connecting waters occasioned by the Chicago diversion "has caused substantial damage to" the "navigation, commercial and other interests" of New York and the other complainant states . (Report p. 118.)

Among the other injuries the Master finds that "there is sufficient evidence to require the finding that a lowering of six inches has been a substantial contribution to the injury caused by the total reduction, in connection with fishing and hunting grounds, the availability and conveniences of beaches at summer resorts, and public parks." (Report p. 117). This general finding is based on specific proof, among other things, with reference to the injuries caused property owners in the Thousand Island section of the St. Lawrence River on New York's northern boundary by the diversion.

While the Master could not clearly determine the extent which the Chicago diversion had contributed to the decay of pile foundations of docks and other structures resulting from the lowering of lake levels occasioned both by natural causes and the Chicago abstraction, he nevertheless recognizes damages of this character. (Report p. 117). The complainants in their proof on this point selected the harbor and city of Milwaukee as a typical example. That a similar injury would be sustained at the port of Buffalo, New York, many of whose docks, piers, terminals, trestles, etc., rest on pile foundations is evident. (Exhibit 95).

These and other injuries resulting from the Chicago abstraction are small, however, compared to the damage done to the commerce of the Great Lakes-St. Lawrence Waterway in which the State of New York has such an outstanding interest. As to this the Master says "I am satisfied that the evidence requires the finding that the lowering of lake levels of approximately six inches has had a substantial and injurious effect upon the carrying capacity of vessels, and has deprived navigation and commercial interests of the facilities which otherwise they would have enjoyed in commerce on the Great Lakes." (Report p. 116).

(c) THE PURPOSES OF THE CHICAGO ABSTRACTION.

An examination of the entire history of the Chicago diversion including all the permits, governmental reports and documents indicates that the main purpose of constructing the sanitary canal was to obtain a cheap method of disposing of Chicago's sewage and the trade waste of the manufacturing plants and stockyards. To quote from the Special Master's Report "there is no doubt that the diversion is primarily for the purposes of sanitation. Whatever may be said as to the service of the diverted water in relation to a waterway to the Mississippi, or as to the possible benefit of its contribution to the navigation of that river at low water stages, it remains true that the disposition of Chicago's sewage has been the dominant factor in the promotion, maintenance and development of the enterprise by the State of Illinois and the Sanitary District." (Report p. 165). That such is the fact cannot be seriously questioned before this court, for on two occasions, in the decisions of *Missouri* v. *Illinois,* 200 U. S. 496 and *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 424, the court recognized that the Sanitary District's channel was constructed "primarily as a means to dispose of the sewage of Chicago".

The Master further finds that the development of water power is an incidental object of the diversion. "The purpose of utilizing the flow through the drainage canal to develop power is also undoubtedly present, although subordinated to the exigency of sanitation. So far as the diverted water is used for the development of power, the use is merely incidental." (Report p. 165).

An examination of the testimony that particularly refers to the existing water power plants of the Sanitary Districts and the contemplated plants on the Illinois and Desplaines rivers, might raise some question as to whether or not the water power projects did not stand on a parity with the needs of sanitation among the purposes of the diversion. In fact the Master finds that up until the time when the District made a contract for the sale of all the power that it could produce, it manipulated the flow through the drainage canal in accordance with the demands for power produced at its Lockport, Illinois plant. This he points out resulted in a larger flow in the evening and during the night when the power load was heaviest. (Report p. 26).

The purposes of the diversion have not been construed through the medium of any Congressional approval. Despite the defendants' attempt, through reference to a century of reports of secretaries of war, acts of Congress and other documents, there is no evidence that Congress has directly approved the diversion. The Master says "I am unable to find that Congress, apart from the authority conferred upon the Secretary of War by Section 10 of the Act of March 3, 1899, and his action thereunder, * * * has authorized the diversion in question." (Report p. 173). In fact Congress has been exceedingly careful to prevent being placed, even indirectly, in the position of approving the diversion. In the Rivers and Harbors Act of January 21, 1927 (44 Stat. Pt. 2, 1010, 1013) which involved an improvement of a small stretch of the Illinois

River. Congress was careful to add a proviso "that nothing in this act shall be construed as authorizing any diversion of water from Lake Michigan." (Report p. 85.)

The only authoritative expression of Federal approval is to be found in the permit of the Secretary of War of March 3, 1925. As will be remembered that permit followed the decision in the government case, *Sanitary District of Chicago v. United States.* Yet there is nothing in the permit of the Secretary of War or in the application of the Sanitary District to show that it was issued for anything other than for the sanitary needs of the city of Chicago. The terms of the permit require a program of constructing sewage disposal works to be carried out and a like project for metering the water service in the city of Chicago, under both of which the necessities of diversion for sanitary purposes would be decreased. Controlling works were ordered to be placed in the drainage canal in order to prevent in times of storm the reversal of flow and the pollution of the waters of Lake Michigan, which are used as Chicago's drinking supply. (Report, p. 77.)

The only provisions relating to navigation are two clauses used in permits of this character forbidding an "unreasonable interference with navigation by the work herein authorized" and stating "that no attempt shall be made by the permittee to forbid the full and free use by the public of any navigable waters of the United States"—both of which provisions are obviously violated when the Special Master finds that the diversion has lowered the levels of the Great Lakes to the substantial injury of the commerce which passes over them. As a matter of fact the Secretary of War on March 3, 1925, in transmitting the permit to the Sanitary District clearly construed the purpose of its issuance when he wrote "this department has always held and continues to hold that *the taking of an excessive amount of water for sanitation* at Chicago does affect navigation on the Great Lakes adversely, and that this diversion of water from Lake Michigan should be reduced to reasonable limits with utmost dispatch." (Report p. 80.)

There is an inference contained in the Special Master's Report that the Secretary of War might have considered that the diversion might be of some aid to navigation on the Mississippi River. Thus the Master says "upon all the facts, it was *permissible* for the Secretary of War to reach the conclusion that the diversion from Lake Michigan of 8,500 c. f. s., was to some extent, an aid to the navigation of the Mississippi River in time of low water." (Report p. 124.) While the Secretary of War might have so speculated, there is no evidence to show that in fact he gave any consideration to such a possible fact of the diversion. The testimony produced before the Special Master indicates that through the peculiar hydraulics of that river and its shifting sand bar bottom, that the addition of Lake Michigan water to it would have no appreciable affect upon its navigation. Even with all the government reports and the best witnesses obtainable who were conversant with the Mississippi phenomena, the Special Master was forced to conclude that although the diversion might increase the navigable depths over bars on the Mississippi River during low water "that the extent of this increase is not the subject of sufficiently accurate determination to warrant a finding." (Report p. 124.)

As a matter of fact it is not necessary to give much time to the discussion of this point, for impliedly at least, it was passed upon by this court in the decision in the government case. At that time representatives of the Mississippi Valley states appeared before the court to object that the action of Secretary of War Stimson on January 6, 1913, in refusing to permit increased diversion, had not given consideration to its effect upon the navigation of the Mississippi. The court overruled this objection and indicated that it was no part of his duty to consider such a claim, stating "it is doubtful at least whether the Secretary was authorized to consider the remote interests of the Mississippi states * * *."

It is clear from the Master's report and the representations of the Sanitary District of Chicago that the amount of the diversion is governed by the sanitary needs of Chicago. The volume of flow which is necessary to dilute safely the sewage of the city is the measure of diversion sought for by the defendants. (Report, pp. 73, 132–139.)

It is obvious from a consideration of the facts that the action of the Secretary of War on March 3, 1925, had as its sole purpose the prevention of an epidemic or catastrophe which it was felt might result from the sudden reduction of the illegal diversion by Chicago to the amount then allowed under the old permit of the Secretary of War. It is further apparent that the major purpose of this diversion from the time of the original inception of the scheme down to the present, was to provide a cheap method of disposing of Chicago's sewage and also to provide hydro-electric power. It makes little difference which was the major and which the minor purpose. Both are essentially local in character. Neither of them in any way that can be measured has any beneficial effect upon navigation. On the contrary, all evidence shows, and the Special Master finds, that the diversion affects navigation to its serious and substantial detriment and to the injury of the great commerce of the Great Lakes-St. Lawrence Waterway.

ARGUMENT ON THE LAW

I

The State of New York has the right for itself and in behalf of its citizens to insist that the waters of the Great Lakes–St. Lawrence Waterway flow down to it without diminution by the defendants, the State of Illinois and Sanitary District of Chicago.

(a) Position of the Special Master.

The Master gives as his legal conclusion that—

> "The States have sovereign and proprietary rights over the navigable waters, and the lands underlying them, within their boundaries subject to the powers surrendered to the national government. * * * The States have authority to determine for themselves such rules of property as they may deem expedient with respect to the waters within their borders, both navigable and non-navigable, and the ownership of the lands forming their beds and banks. *United States* v. *Cress,* 243 U. S. 316, 319; *Barney* v. *Keokuk,* 94 U. S. 324."

The State of New York is in accord with that position, which is amply supported by the following authorities:

(b) Under the Common Law.

It is the rule of the English Common Law that a person owning land adjoining a natural waterway is entitled to receive the waters without pollution or substantial diminution. "Water," said Blackstone, "is a movable, wandering thing and must of necessity continue coming by the law of nature; so that I can have only a temporary, transient, usufructary property thereon." (*Blackstone's Commentaries,* Book II, pp. 14 and 18.)

The riparian proprietor may not make such an extraordinary or artificial use that navigation will be interfered with.

Farnham, Waters and Water Rights, § 64b.

> "It is the well settled general rule that a riparian proprietor has a right to have the water of a stream flow down to his land as it was wont to run, in its natural mode and course, undiminished in quantity and unimpaired in quality"
>
> *Ruling Case Law, Waters,* § 30.

There is no need to make extensive citation of authorities as to what the rule of common law is, for the Court itself in *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690 (1899) has rendered such a discussion unnecessary.

> "The unquestioned rule of the common law was that every riparian owner was entitled to the continued natural flow of the stream. It is enough, without other citations or quotations, to quote the language of Chancellor Kent, 3 Kent Co., § 439:
>
> > 'Every proprietor of lands on the banks of a river has naturally an equal right of the use of the water which flows in the stream adjacent to his lands, as it was wont to run (*currere solebat*) without diminution or alteration. No proprietor has a right to use the water to the prejudice of other proprietors, above or below him, unless he has a prior right to divert it, or a title to some exclusive enjoyment. He has no property in the water itself, but a simple usufruct while it passes along. *Aqu currit et debet currere ut currere solebat* is the language of the law. Though he may use the water while it runs over his land as an incident to the land, he cannot unreasonably detain it, or give it another direction, and he must return it to its ordinary channel when it leaves his estate.'
>
> "This is undoubted, and the rule obtains in those States in the Union which have simply adopted the common law * * *."

In the later case of *Kansas* v. *Colorado,* 206 U. S. 46, p. 85, the Court again says:

> "The right to the flow of a stream was one recognized at common law, for a trespass upon which a cause of action existed."

(*c*) *Under the Law of Riparian Rights as it Exists in the State of Illinois and in the State of New York.*

While the United State Supreme Court has declared its right to apply any law, international, state, or otherwise, which it deems appropriate to the exigencies of a particular case, it is noteworthy that in interstate conflicts it has attempted as far as possible to base its decision upon the local law which obtains in the states involved in the controversy. An examination of the two great interstate river disputes, *Kansas* v. *Colorado, supra,* and *Wyoming* v. *Colorado,** shows the great weight accorded by the Court to this consideration. In the first case the Court was obviously troubled in its decision by the fact that in Colorado the rule of appropriation had been adopted while Kansas, with certain modifications, was a riparian law State. Neither State could enforce its rule upon the other, and there was no Federal statute or other superior law governing both parties. "The actual decision reached was in the nature of a compromise, as is often the case in International arbitrations," says Herbert A. Smith in *The American Supreme Court as an International Tribunal* (1920), p. 88. In the latter case, however, the Court's problem was comparatively simple. Both were Simon-pure appropriation states. Neither could complain if the Court applied the same rule of law as between citizens along the interstate river in both States as each State had adopted within its own limits.

The problem, therefore, presented to the Court by the complaint in the New York action likewise is comparatively simple for both Illinois and New York have adopted the same common law rule,—that a lower riparian proprietor is entitled to have a stream come down to him substantially undiminished.

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* 259 U. S. 419.

> "The States have authority to establish for themselves such rules of property as they may deem expedient with respects to the streams of water within their borders, both navigable and non-navigable, and the ownership of the lands forming their beds and banks."
>
> *United States* v. *Cress,* 243 U. S. 316 (1916).

In the case of *Smith* v. *City of Rochester,* 92 N. Y. 472 (1883), Chief Judge Ruger referred to the temporary enjoyment or usufructuary right of a riparian proprietor under the common law, and said:

> "The rule of the common law of England has been uniformly deemed to apply in this country to the effluents of all navigable waters as well as to all those which are non-navigable, * * .* These rules were made the fundamental law of this State by its original Constitution and have been readopted upon every subsequent revision of that instrument.
>
> "* * * the sovereign right grew out of and was based upon the public benefits in promoting trade and commerce, supposed to be derived from keeping open navigable bodies of water as public highways for the common use of the people.
>
> "* * * This right, being founded upon the public benefit supposed to be derived from their use as a highway, cannot be extended to a different purpose inconsistent with its original use. The diversion of these waters for the purposes of furnishing the inhabitants of a large city with that element for domestic uses, * * * is an object totally inconsistent with

> their use as a public highway or the common right of all the people to their benefits."

The common law rules of waters generally, as well as with reference to the riparian right to the undiminished flow of streams, has been adopted in New York, the only important change being the extension of the State's ownership of lands under water of tidal streams to the boundary lakes and rivers and to certain other important streams.

> *Fulton Light, Heat & Power Co.* v. *State of New York,* 200 N. Y. 400 (1911).
> *The Canal Appraisers* v. *People, ex rel. Tibbits,* 17 Wend. 371.
> *People* v. *Canal Appraisers,* 33 N. Y. 461.
> *Danes* v. *State of New York,* 219 N. Y. 67.
> *Matter of Commrs. of State Reservation at Niagara,* 37 Hun 537, aff'd 102 N. Y. 734 (1885).

In *Revell* v. *People,* 177 Ill. 479, 52 N. E. 1055, the Supreme Court of Illinois said:

> "The State of Illinois has adopted the common law as it existed prior to March 24, 1606—the fourth year of James I, and in the absence of any statute of the state changing the common law in regard to rights of riparian owners the common law as it then existed must control."

In the same case the court said:

> "We are aware of no statute of this state changing the common law, nor has there been established any custom or usage which modifies the common law." (P. 484.)

Not only have the Illinois courts held that the common law was adopted as the law of that State, but the Supreme Court of the United States has declared that the common law rule as to rights of riparian owners is the settled law of Illinois.

In *Hardin* v. *Jordan,* 140 U. S. 371 (1891), this Court held that it was absolutely settled in Illinois that the rule of the common law was the law of that State in regard to the rights of riparian owners. Mr. Justice Bradley, at page 385, said:

> "It is our judgment that the law of Illinois, in this regard (the rights of riparian owners) is the common law, and nothing else; * * *."

In *Beidler* v. *Sanitary District of Chicago,* 211 Ill. 628, 71 N. E. 1118, the Supreme Court said:

> "A riparian owner has the right to use the water in the stream.* * * The limitation and extent of the use of the water is that it shall not * * * impair the right of use of water by other riparian owners."

> *Washington Ice Co.* v. *Shortall,* 101 Ill. 46.
> *Mount Greenwood Cemetery Assn.,* 159 Ill. 385, 42 N. E. 891.
> *Bliss et al.* v. *Kennedy,* 43 Ill. 67, 75.

It has been consistently held that the diversion of water from a stream by the upstream owner, which water is not returned to the stream, constitutes an impairment of the right of use of the water by the downstream riparian owner.

It therefore follows that under the law of the State of New York or under the law of Illinois, the citizens and State of New York, owners of property abutting upon

Lakes Erie and Ontario and upon the Niagara and St. Lawrence rivers, as riparian owners, have the right to the full flow of the stream as nature provided it, undiminished by any diversion.

The acts of the defendants State of Illinois and Sanitary District of Chicago, in the abstraction of 8,500 c.f.s. of water from Lake Michigan and in its diversion into the Mississippi watershed for the purpose of sewage disposal and hydro-electric power development, constitute an illegal use of the waters of a natural watercourse, actionable under the law of Illinois or the law of New York. The complaint of the State of New York asks the Court to apply the same rule that the Illinois courts would apply in a similar matter properly before them.

(*d*) *Under International Law.*

The Supreme Court has said that in controversies between quasi-sovereign States it applies "international law" as the exigencies of the particular case may demand.

> *Kansas* v. *Colorado,* 185 U. S. 125 (1902).
> *The Paquette Habana,* 175 U. S. 677, 700.

The Great Lakes-St. Lawrence Waterway being, in fact, the boundary between the Dominion of Canada and the United States of America, the principles of international law are particularly appropriate.

The treaties recognize the importance of unobstructed navigation over the waterway. By the treaty of Washington of May 8, 1871, Article XXVI, it was agreed that the portion of the St. Lawrence river wholly within the Dominion of Canada "shall forever remain free and open for the purposes of commerce to the citizens of the United States." By Article I of the present treaty between Great Britain and the United States, concluded January 11, 1909, and dealing with boundary waters between the United

States and Canada, it was declared that all of such navigable boundary waters should "forever continue free and open for the purposes of commerce to the inhabitants and to the ships, vessels, and boats of both countries equally." Article III further provides that "no further or other uses or abstractions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdiction and with the approval as hereinafter provided, or a joint commission, to be known as the International Joint Commission." According to Hyde (*International Law, Chiefly as Interpreted and Applied by the United States,* § 183) such a duty imposed upon a riparian State either by international law or treaty to maintain the navigability of an international waterway "implies an obligation also to check within places subject to the control of such State commission of any acts which, unless restricted, would prove injurious to navigation generally. This obligation would seem to render improper the tolerance of any diversion productive of such an effect even though it should occur at a point where the river ceased to be navigable and lay wholly within the domain of the acquiescent territorial sovereign.

Hyde also lays down the rule that an international stream must be considered as a unity rather than from the viewpoint of the selfish needs of a particular State seeking to divert its waters. "Where a river traverses or serves as the boundary of territories of several States," says he in § 183, "the existence of the river interest, as such, becomes the more apparent, because of the common concern of all in its welfare."

This last principle seems peculiarly appropriate to the controversy before the court in the three related cases. On the one hand we have a single State, with a very limited shore line and which in a state of nature contributed but a trifling fraction of the total water supply of the Great Lakes-St. Lawrence Waterway, permanently withdrawing from such waterway for sewage disposal purposes the equivalent of a sizable river,—a river which the Chicago engineers themselves claim to be one-quarter of the extreme low water flow of the Mississippi river itself. On the other hand are the six complainant States with their vast populations struggling to preserve unobstructed the navigation of this waterway for the use of their citizens and for the mutual benefit of their peoples and those countless others in all the States of the Union who are affected by any obstruction to the navigable capacity or any increase in freight rates of the Great Lakes-St. Lawrence Waterway.

An excellent statement of the rights of States and nations in an interstate or international stream is given by Farnham (*Waters and Water Rights*, Vol. 1, § 6).

> "A river which flows through the territory of several states or nations is their common property. Each is entitled to its navigation throughout its whole extent, so far as it can be exercised without injury to the rights of others. It is a great natural highway conferring, besides the facilities of navigation, certain incidental advantages, such as fishery and the right to use the power for water and irrigation. Neither nation can do any act which will deprive the other of the benefits of those rights and advantages. The inherent right of a nation to protect itself and its territory would justify the one lower down the stream in preventing by force the one further up from turning the river out of its course, or in consuming so much of the water for purposes of its own as to deprive the former of its benefit. Conversely, the upper owner would have a right to prevent an obstruction of the stream

> which would prevent fish from ascending to its shores, or interfere with its rights of navigation. To prevent resort to force, courts of arbitration would protect these rights, and the courts of the respective nations will prevent acts on the part of their own subjects which interfere with the rights of subjects of other states. And courts having a supervisory jurisdiction over the acts of the political department of government will prevent acts by that department which will injure the rights of neighboring states. The gifts of nature are for the benefit of mankind, and no aggregation of men can assert and exercise such rights and ownership of them as will deprive others having equal rights, and means of enjoying them, of such enjoyment. The acts of nations must be governed by principles of right and justice. The days of force and self-aggrandizement at the expense of neighboring nations are past, and the common right to enjoy the bountiful provisions of Providence must be preserved. * * * One state cannot authorize changes in the river which will injure property in another state. And the upper state cannot divert the water to the injury of property or the destruction of navigation lower down, and attempts to do so will be restrained by courts having jurisdiction of the parties."

This principle has the support of the decisions in *Holyoke Water Power Co.* v. *Lyman*, 15 Wall. 500, 21 L. ed. 133; *Holyoke Water Power Co.* v. *Connecticut River Co.*, 52 Conn. 570, 20 Fed. 71; *Pine* v. *New York*, 112 Fed. 98; *Kansas* v. *Colorado*, 185 U. S. 125; *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690; *Conant* v. *Deep Creek & C. Valley Irrigation Co.*, 23 Utah 627, 66 Pac. 188.

The Northwest Ordinance of July 13, 1787 (Art. IV) for the Government of the territory northwest of the river

Ohio has an important bearing on the present case. In a dispute in a case between States the Ordinance is in fact equivalent to an interstate treaty or compact. It declared "The navigable waters leading into the Mississippi or the St. Lawrence, and the carrying places between the same, shall be common highways, and forever free, as well to the inhabitants of the said territory, as to the citizens of the United States, and those of any other States that may be admitted into the Confederacy, without any tax, impost or duty therefor." This ordinance is still in force today and while it does not prevent the improvement of navigation it does assure to all the States interested in the waters covered by it that no one state may obstruct their navigable capacity.

Huse v. *Glover,* 119 U. S. 544 (1886).

Referring to the Northwest Ordinance in the action of the *Economy Light and Power Co.* v. *United States,* 256 U. S. 113, the United States Supreme Court stated that "so far as it established public rights of highway in navigable waters capable of bearing commerce from State to State [as it did in the case of the Great Lakes-St. Lawrence Waterway], it did not regulate internal affairs alone, and was no more capable of repeal by one of the States than any other regulation of interstate commerce enacted by Congress."

The Sanitary District of Chicago in constructing its Sewage Canal and the State of Illinois in authorizing and directing the abstraction of lake waters have obstructed the Great Lakes-St. Lawrence Waterway and burdened the interstate commerce thereon, in violation of this interstate compact. New York in behalf of its citizens has the right to protest and by its complaint in this action it seeks the injunction of the court against the further continuance of the violation of the implied covenant of the Northwest Ordinance.

The residuum of sovereignty which the State of Illinois possesses as a member of the Union is less than that of the completely independent Nation. Yet even the territorial supremacy of such a nation "does not give a boundless liberty of action. * * * The State is, in spite of its territorial supremacy not allowed to alter the natural conditions of its own territory to the disadvantage of the natural conditions of the territory of a neighboring State —for instance, to stop or to divert the flow of a river which runs from its own into neighboring territory. (Oppenheim on International Law, 3d ed., vol. 1, p. 211, (920).)

(e) Under the Decisions of the United States Supreme Court.

1. GENERALLY.

This court has recognized and applied in many cases the rule of the common law as to the right of a lower riparian owner to receive a stream without substantial diminution as laid down by Chancellor Kent. Only in the arid states of the west where physical necessities have required the application of a different rule has the court deviated from this ancient and well established doctrine.

In the case of the *United States* v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690 (1899), the United States objected to the defendant's diversion on the ground that although made on a non-navigable portion of the Rio Grande River it impaired the navigable capacity of the river further down-stream. The defendant pointed out that Congress itself had passed certain statutes, particularly the Act of 1866, which recognized the applicability of the rule of appropriation ~~as~~ to government property located in these states of the arid West which had definitely adopted such principle of law. The Court, however, decided that even such statutes could not be construed "to hold that Congress, by these acts meant to confer upon any State right to appropriate all the waters of tributary streams which unite into a navigable watercourse, and so destroy the navigability of that watercourse in derogation of the interests of all the people of the United States." (P. 706.) The basis of this decision, although not the language, was absolute priority of navigation over any other use of a waterway. No matter what Congress had said in the Act of 1866, the Court refused to permit any interpretation that would allow an injury to the navigable capacity of the lower river.

2. Interstate Decisions.

The rule that a State may not divert the waters of a natural watercourse to the injury of a downstream state or its citizens has been applied by the United States Supreme Court in interstate controversies where even the great consideration of navigation was lacking.

The position of the defendants in this case is substantially the same as that of defendant, Colorado in the cases of *Kansas* v. *Colorado, supra,* and *Wyoming* v. *Colorado, supra.* In those two cases the State of Colorado or its citizens were diverting water for the irrigation of arid regions. In the present case the Special Master has held that the diversion from the Great Lakes–St. Lawrence Waterway to the Mississippi watershed by the defendants is to provide a cheap method of sewage disposal and for the development of hydro-electric power. (An examination of the documentary history of this abstraction shows that the idea of providing navigation between the Great Lakes and the Mississippi apparently was never thought of by the defendants until the tremendous havoc which the abstraction had wrought upon the navigation of the Great Lakes–St. Lawrence Waterway had raised a storm of protest from all the States littoral to the Great Lakes and from the United States Government itself.) In *Kansas* v. *Colorado,* the Court refused the injunction on the ground that the evidence failed to show there had been such a material depletion of the waters of the Arkansas River by Colorado or its citizens as to occasion substantial injury to the interests of Kansas, by destroying the equitable proportion of benefits between the two States resulting from the flow of the river. Considerations arising out of the extent of the applicability of the appropriation doctrine also appear to have largely influenced the Court in its decision. No claim, it should be noted, was made in this case that the diversion tended to diminish the navigability of the river. The decision in the case of *Wyoming* v. *Colorado,* turned upon the application of the appropriation doctrine. The Court in granting an injunction against the State of Colorado held that between two appropriation States an interstate stream should be treated as a unity and the appropriation doctrine applied without respect to States lines.

> "The contention of Colorado that she as a State rightfully may divert and use, as she may choose, the waters flowing within her boundaries in this interstate stream, regardless of any prejudice that this may work to others having rights in the stream below her boundary, can not be maintained. The river throughout its course in both States is but a single stream wherein each State has an interest which should be respected by the other. A like contention was set up by Colorado in her answer in *Kansas* v. *Colorado* and was adjudged untenable. Further consideration satisfies us that the ruling was right. It has support in other cases, of which *Rickey Land & Cattle Co.* v. *Miller & Lux,* 218 U. S. 258; *Bean* v. *Morris,* 221 U. S. 485; *Missouri* v. *Illinois,* 180 U. S. 208, and 200 U. S. 496; and *Georgia* v. *Tennessee Copper Co.,* 206 U. S. 230, are examples." (P. 466.)

In *Pine* v. *The State of New York,* two private citizens of the State of Connecticut objected to the diversion of a small *unnavigable* stream which arose in New York State, crossed into Connecticut and emptied into Long Island Sound within the latter's territory. The diversion was pursuant to a statute of the New York Legislature and used for New York City's water supply. Compensation for injuries occasioned to lower riparian proprietors in both States was required by the act. The Circuit Court of Appeals in the Second Circuit (112 Fed. 98 [1901]) enjoined the defendant from continuing the diversion. The rule was laid down as settled that the State of New York in the exercise of its power of eminent domain could not authorize one of its municipalities to divert the waters of a non-navigable interstate stream to the injury of riparian owners on such stream in another State. The acts of the city of New York complained of were held to amount to a taking of the property of the riparian proprietors in the State of Connecticut without authority of law and in violation of their constitutional rights. "The State of New York," said the Court, "cannot authorize the taking of property in Connecticut." When this case was appealed to the United States Supreme Court (*New York City* v. *Pine,* 185 U. S. 93 [1902]) the injunction was vacated upon the sole ground, however, that the plaintiffs had not themselves done equity, that they had sat by without protest while the city of New York had built the dams and other structures necessary to divert this new water supply and that they had been dilatory in commencing their action. The Court assumed without deciding their correctness, the various rules of law governing interstate diversions as laid down by the Circuit Court of Appeals. It did state, however, that "We start in this with the assumption that there was no power in the city of New York, by any proceedings in the States of New York or Connecticut to acquire the right of appropriating this water and thus depriving the plaintiffs of its continued flow."

In the case of *Hudson Water Co.* v. *McCarter, Attorney General of New Jersey,* 209 U. S. 349, (1907) the question involved was the constitutionality of an act of the New Jersey Legislature prohibiting the diversion by artificial means of the streams of that State to points in neighboring States. The case arose through a contract made by the Hudson Water Company to supply, by means of a pipe, a portion of New York City through the diversion of a New Jersey stream. In sustaining the constitutionality of the New Jersey statute and in granting an injunction against the proposed diversion, the Court recognized as settled that a State may protect its property in interstate streams from diversion without its limits. Said the Court, "*What a State may protect by suit in this Court from interference in the name of property outside the State's jurisdiction,* one would think it could protect by statute from interference in the same name within." The Court of Errors and Appeals of the State of New Jersey in the decision below had "pointed out that the riparian proprietor has no right to divert waters for more than a reasonable distance from the body of a stream or for other than the well known ordinary uses, and that for any purpose anywhere he is narrowly limited in amount. It went on to infer that his only right in the body of the stream is to have the flow continuing and that there is a residuum of public ownership in the State." The Supreme Court preferred to rest its affirmance of the decree below upon the broader grounds of the police powers of the State, but in so doing it quoted the above statement without disapproval.

At common law, a corollary of the right of a riparian proprietor to have the waters of a stream come to him without substantial diminution, was the equal right to receive them free from pollution by upper proprietors. In the case of *Missouri* v. *Illinois, supra,* this question was raised between States and on interstate rivers. The Court over the protest of the State of Illinois and Sanitary District of Chicago, entertained jurisdiction, but upon examining the proof held that it had not been proved to its satisfaction that any substantial injury had as yet been occasioned to the inhabitants of Missouri through the defendant's acts in turning the Illinois River into Chicago's sewer. The complaint was therefore dismissed without prejudice to its later renewal.

Again, in *New York* v. *New Jersey,* 256 U. S. 296 (1921) the Supreme Court entertained jurisdiction of a controversy between New York and New Jersey as to a method of sewage disposal which was proposed and which the State of New York claimed would grossly pollute the waters of the Hudson and East Rivers in the vicinity of New York City. While the Court again determined that the evidence was not sufficiently clear to conclusively establish that the pollution would be of serious magnitude to cause injury to the health, comfort and prosperity of the people of New York, there is, however, no suggestions in the decision that the rule of law upon which the New York complaint was based was unsound or that it was inappropriate to an interstate dispute.

In *Georgia* v. *Tennessee Copper Co., supra,* an injunction was granted against the defendant discharging over the complainant's territory noxious fumes which caused and threatened damage on a considerable scale to the forests and vegetable life, if not the health, within the State of Georgia. While the pollution was carried by the air rather than borne by the waters of an interstate stream, the underlying principle is the same. If, as the Court said in that case, a State, as a quasi sovereign, "has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain" and "it has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air," so has the State of New York a far greater right to enjoin the acts of the State of Illinois and the Sanitary District of

Chicago which have obstructed the navigable capacity of the waterways navigated by the citizens of New York, interfered with the interstate commerce in which they are engaged, damaged their property and injured the property of the State itself.

3. THE RIGHT OF THE STATE OF NEW YORK.

It is the right of the State of New York to insist that the Great Lakes-St. Lawrence Waterway—whose shores it built upon, whose harbors it improved, whose waters its commerce navigated, while Illinois was still a wilderness—be unobstructed by the acts of the defendants and to insist that the waters flow to it without diminution.

The writers on the English common law, compared the waters of a running stream to wild animals in whom no one had absolute ownership. A riparian proprietor, they said, has only the usufructary right of using, to a reasonable and limited extent, the waters flowing past his property, returning them without substantial diminution to the stream.

The Supreme Court, it would seem, in controversies between American States, has extended rather than modified this strict doctrine and has recognized in a downstream riparian State a greater title in the flowing waters of an interstate river. In the footnote to the dissenting opinion of Mr. Justice Brandeis in the case of *Pennsylvania and Ohio* v. *State of West Virginia,* 262 U. S. 553, at page 608–9 (1923) and presumably written by the learned Justice, it is said *"The State has a property interest in running water naturally flowing into it* and in the public waters and air within its boundaries. *Georgia* v. *Tennessee Copper Co.,* 206 U. S. 230-237. *If the running water is withheld its property is taken."*

In the majority opinion written by the same Justice in the case of *Port of Seattle* v. *Oregon and Washington Railroad Co., et al.,* 255 U. S. 56 (1920), the Court held;

> "The right of the United States in the navigable waters within the several States is limited to the control thereof for purposes of navigation. Subject to that right Washington became, upon its organization as a State, *the owner of the navigable waters within its boundaries* and the land under the same. *Weber* v. *Board of Harbor Commissioners,* 18 Wall. 57."

Speaking of the great interest a State has in the preservation of its rivers, even though the reference was to a mere intrastate stream, the court in *Hudson Water Co.* v. *McCarter, Attorney-General of New Jersey, supra,* said:

> "It is recognized that the State as quasi-sovereign representative of the interests of the public has a standing in court to protect the atmosphere, the water and the forests within its territory, irrespective of the assent or dissent of the private owners of the land most immediately concerned. * * * It appears to us that few public interests are more obvious, indisputable and independent of particular theory than the interest of the public of a State to maintain the rivers that are wholly within it substantially undiminished, except by such drafts upon them as the guardian of the public welfare may permit for the purpose of turning them to a more perfect use. Thus public interest is omnipresent wherever there is a state, and grows more pressing as population grows. We are of the opinion, further, that the constitutional power of the State to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use or speculation as to future needs. The legal conception of the necessary is apt to be confined to somewhat rudimentary wants, and there are benefits from a great river

that might escape a lawyer's view. But the State is not required to submit even to an aesthetic analysis. Any analysis may be inadequate. It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one a reason for its will."

The State of New York is the owner of the lands under the waters of Lakes Erie and Ontario and the Niagara and St. Lawrence Rivers within its lmiits.

> *Illinois Central Railroad* v. *State of Illinois,* 146 U. S. 387 (1892);
> *Matter of Long Sault Development Company,* 212 N. Y. 1 (1914); 242 U. S. 272 (1916);
> *Matter of Commissioners of the State Reservation at Niagara,* 37 Hun 537, aff'd 102 N. Y. 734 (1885);
> *Fulton Light, Heat & Power Co.* v. *State of New York,* 200 N. Y. 400 (1911).

It has a property interest in the running water naturally flowing to such lands and its shores on the lakes and rivers of the Great Lakes-St. Lawrence Waterway. When such running water is withheld and permanently diverted into the Mississippi watershed, the property of the State of New York is taken, and it is entitled to an injunction sought in its bill of complaint. Such a withholding of the running water as the acts of the defendants have caused violates the rights of the State and its citizens guaranteed by the Constitution.

4. THE JUSTICE OF NEW YORK'S COMPLAINT.

The Supreme Court has said that through the succession of interstate decisions the "court is practically building up what may not improperly be called interstate common law." *Kansas* v. *Colorado,* 206 U. S. 346 (1906).

"One cardinal rule" of the decision of interstate disputes by the United States Supreme Court and "underlying all the relations of the States to each other, is that of equality of right. Each State stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none." *Kansas* v. *Colorado, supra.*

Another cardinal principle which might be adduced from the decisions of interstate controversies by the court is its insistence that the strict rule of law will not be applied unless the threatened invasion by one State of the rights of another be of serious magnitude and established by clear and convincing evidence. *New York* v. *New Jersey, supra,* at page 309. Sitting, by virtue of the Constitution, to settle and compose interstate conflicts, it is more than a mere court of law. It never does, nor never should, exact the legal pound of flesh. Before the injunctive power of the court is exercised at the request of any State that State should not only found its complaint upon sound principles of law, but it should also prove that it, or its people, have been substantially injured and that justice warrants the granting of the relief sought.

This New York has done.

The tremendous damage that its citizens have sustained from the defendants' acts has been convincingly shown. The unreasonableness of the Chicago abstraction—to give one community cheap sewage disposal and hydro-electric power at the expense of burdening the interstate and foreign commerce of a large part of the nation—is obvious.

When the Special Master holds that the Chicago diversion has lowered the levels of the Great Lakes and substantially impaired the movement of commerce to the serious injury of the complainants, the right of the State of New York to come to this court and demand that the diversion be terminated, is clearly established. In order to approve the Chicago abstraction, it would be necessary to totally disregard the rights of riparian ownership which have been recognized by this and other courts for many years. To reverse this settled law, would be in effect to decide that any community in the furtherance of any purely local purpose, such as sewage disposal or the development of hydro-electricity, may upset the natural flow of the waterways of the Nation to the injury of the private and public rights and uses which have sprung up through the years—in this case, to the substantial damage of the greatest inland water-borne commerce of the world.

II

Neither the Congress of the United States nor the Secretary of War have been delegated power by the States to permit this diversion for sewage and hydro-electric power development purposes to the detriment of the State of New York and its citizens and to the substantial injury of interstate commerce.

(*a*) *The position of the Special Master.*

It is found by the Special Master that the diversion lowers the levels of the Great Lakes-St. Lawrence Waterway, and causes substantial injury to the commerce passing over it and to the Great Lakes States and their citizens. The purpose of the diversion, he finds to be primarily for the disposal of Chicago's sewage and incidentally, for the development of hydro-electric energy — purely local purposes.

The argument contained in his third conclusion of law is that Congress has jurisdiction if the diversion merely *affects navigation.* As Congress could prevent this injury, the Special Master contends it could permit it.

Reference is made to the possible impairment of navigation should Chicago be permitted to discharge its sewage into Lake Michigan. No testimony was given on this point by either side. Furthermore, any injury which might result from such a cause to the free movement of commerce would be caused to a greater degree by the discharge of the sewage into the restricted Des Plaines and Illinois rivers. Also mention is made of the possible benefit the diversion might have upon navigation of the Mississippi River during periods of low water, but on this point the testimony was so unsatisfactory and indefinite that the Master stated it could not support a finding. These two possible benefits to commerce and navigation through the diversion are so utterly trivial in comparison with the tremendous injury which has been done by the diversion to the commerce passing over the Great Lakes-St. Lawrence Waterway, that they must be disregarded. The mere supposition that if Congress had acted, it might have considered these details when Congress has refused to act; or the belief that the Secretary of War might have given them consideration, when his permit of March 3, 1925, and his letter accompanying it showed plainly that the purpose of the diversion was to aid in solving Chicago's sewage disposal problem; are too speculative to permit any serious comparison between them and the proved damage to the commerce of the Great Lakes-St. Lawrence Waterway.

The controversy therefore resolves itself into a determination whether or not the Special Master's proposition is sound, that if navigation is affected, although injuriously, the Secretary of War may permit a diversion for the benefit of Chicago's sewage disposal and water power development. It is respectfully submitted to the Court that the States have not surrendered to the Federal government the right to permit a diversion from a natural watercourse for the local purposes of a municipality and to the serious injury of a great commerce merely because, through that injury, navigation is affected. The control over the rights of riparian owners has not been vested in the Federal government to the extent that navigation may be injured to aid in solving the local problems of an upper riparian community.

(*b*) *The nature of the powers of the Federal Government over Navigable Waters.*

The sole power of Congress or of its agent, the Secretary of War, over the Great Lakes-St. Lawrence Waterway is the constitutional authority "to regulate Commerce with Foreign Nations and among the several States." (U. S. Constitution, Article I, section 8, clause 3.)

The clause originally was designed to prevent trade wars among the States.

> "It is very probable that all that was in the minds of the framers of the Constitution when they drafted the Commerce Clause was to give the National Government power to prevent the States from interfering with the freedom of interstate and foreign commerce." *The Law of the American Constitution,* (1922) section 85.

The Federalist papers of both Hamilton and Madison show that such an interpretation was placed by them upon the Commerce Clause.

The Federalist, Nos. VII, XLII.

But under the decisions of this court, the Federal power under this clause has been vastly extended. The authority to regulate commerce was interpreted to include the power to regulate navigation. *Gibbons* v. *Ogden,* 9 Wheat. 1 (1824). This in turn was enlarged to comprehend

> "control * * * of all of the navigable waters of the United States, which are accessible from a State other than those in which they lie. * * * This necessarily includes the power to keep them open and free from any obstruction to their navigation, imposed by the States or otherwise; to remove such obstructions when they exist; and to provide by such

sanctions as they may deem proper, against the occurrence of the evil and for the punishment of offenders.'' *Gilman* v. *Pennsylvania,* 3 Wall. 713 (1865).

Other decisions have extended Congressional jurisdiction over waterways bearing interstate and foreign commerce from tide-water to the Great Lakes and then to all navigable waters, artificial as well as natural.

> *Thomas Jefferson,* 10 Wheat. 428 (1825).
> *Steamboat Orleans* v. *Phoebus,* 11 Peters 175 (1837);
> *The Genesee Chief,* 12 How. 443 (1851);
> *Jackson* v. *Steamboat Magnolia,* 20 How. 296 1857);
> *The Robert W. Parsons* (*Erie Canal*), 191 U. S. 17 (1903);
> *The Daniel Ball,* 10 Wall. 557 (1870);
> *Economy Light & Power Co.* v. *United States,* 256 U. S. 113 (1921).

There can be no doubt but that Congress has control in aid of navigation over all the navigable waters of the United States which are accessible from a State other than those in which they lie.

> *Gilman* v. *Philadelphia,* 3 Wall. Rep. 713 (1865);
> *Philadelphia Co.* v. *Stimson,* 223 U. S. 605 (1911).

This necessarily includes the power to keep them open and free from obstructions to navigation imposed by the States or otherwise; to remove such obstructions when they exist and to improve the waterway by artificial means.

Miller v. *New York,* 109 U. S. 385 (1883);
Transportation Co. v. *Chicago,* 99 U. S. 635;
Union Bridge Co. v. *United States,* 204 U. S. 364 (1906);
Gibson v. *United States,* 166 U. S. 269 (1896);
United States v. *Chandler-Dunbar Company,* 229 U. S. 53 (1912).

(*a*) *The discretion vested in the Congress and its exercise.*

Great discretion and authority unquestionably is vested in Congress to determine what is an obstruction of a navigable river.

Gilman v. *Philadelphia,* 3 Wall. Repts. 713 (1865);
Pennsylvania v. *Wheeling Bridge Co.,* 18 How. 421;
Philadelphia Co. v. *Stimson,* 223 U. S. 605 (1911);
Economy Light, Heat & Power Co. v. *United States,* 256 U. S. 113 (1921);
Miller v. *New York,* 109 U. S. 385 (1883);
Union Bridge Co. v. *United States,* 204 U. S. 364 (1906);
Gibson v. *United States,* 166 U. S. 269 (1896);
United States v. *Chandler-Dunbar Co.,* 229 U. S. 53 (1912).

It is to be presumed, however, that Congress in the exercise of the discretion vested in it will act in good faith and weigh carefully the facts presented in every case. The Supreme Court was careful to follow the broad statement of congressional discretion contained in its Chandler-Dunbar opinion with the definite conclusion drawn from a review of the facts that "Congress did not act arbitrarily."

There must be some limit to the power to exercise discretion. Congress, in the present situation, has studiously avoided granting any approval of the Chicago abstraction. It is not conceivable that Congress in the sound exercise of discretion could ever seriously weigh the trifling commerce which has existed between Lake Michigan and the Mississippi River in the past, or in such future commerce as the most inspired partisan could prophesy, against the tremendous interstate and foreign trade carried today over the Great Lakes-St. Lawrence Waterway.

The cases in which the Supreme Court deals with the discretion vested in Congress to determine what constitutes an obstruction of a navigable waterway relate to what might be described as the normal intendment of the term "obstruction." All of them to some extent involves the question of whether or not a bridge, or a pier, or a dam was so constructed as to impair or restrict the free navigation of a natural waterway. Thus in *Chicago Transportation Co.* v. *Pennsylvania Co.,* 246 Fed. 190 (1917), the owners of a dock complained that the construction of a bridge across the river prevented sailing vessels with high masts reaching the dock as formerly. The cases with reference to dams arose on the power to inconvenience or obstruct certain commerce on a particular river by the erection of a dam across the same. In these the court held that the navigation of the river as a whole might be considered and if deeper water were generally afforded by the dam and a lock was constructed for the passage of vessels around it, a proper exercise might be said to have taken place of the governmental discretion. (*Escanaba Co.* v. *Chicago,* 107 U. S. 678 (1882); *Huse* v. *Glover,* 119 U. S. 543 (1886).

In the *Chandler-Dunbar Case,* the question was raised incidentally as to whether the dam and regulating works constructed at the outlet of Lake Superior was an unlawful obstruction of navigation. The Court in deciding that it was not, tested the exercise of the discretion vested in Congress by the importance and volume of the commerce passing between Lake Superior and the lower Great Lakes. In view of this extensive navigation the Court held that the large control which Congress had assumed and the property it had appropriated was in a reasonable exercise of its discretion. It should always be remembered, in view of the broad language of the opinion in this particular case, that it arose primarily on the objection that the Federal Government in appropriating the plaintiff's property for the purposes of improving navigation had taken more than was necessary for the public use to the detriment of the private riparian owner.

All of these cases dealt with an obstruction of the navigable capacity of a natural water course within the limits of the stream itself and the language of the Court as to the broad discretion vested in Congress was with direct reference to this type of obstruction. In all of them there were conflicting commercial interests. Thus, in the two decisions in ***Pennsylvania* v. *Wheeling Bridge Company*,** the Court established the power of Congress to weigh the comparative benefits and disadvantages resulting from a bridge which would carry mail and other interstate commerce over a river which would, to some extent, hinder its navigation.

In none of these cases was there involved the question of a permanent diversion, or, as more appropriately expressed herein, an abstraction of waters from a natural navigable waterway into an entirely different and separate watershed in such substantial amounts as to indirectly result in an actual obstruction of the navigable capacity of the first waterway. In these cases the attention of the Court was always directed to the effect of "structures placed in the river," "tunnels under or bridges over the river" and similar "obstructions" to the navigable capacity. The question before the Court for decision was whether the commerce and navigation of the stream as a whole was benefited by what might amount to a temporary impediment to the navigation and commerce within a particular locality.

This power of the Federal government is a trust power for the benefit of navigation. Certainly when all authority is derived from the State Congress cannot exercise a higher degree of control than they had. For example, both New York and Illinois own the lands under the Great Lakes-St. Lawrence Waterway. Yet the courts have determined that neither State may part with such lands under water to such an extent that the right of present, or the opportunity to improve future, navigation is impaired. Grants may be made of lands for the construction of docks and wharves in aid of navigation. The State of Illinois, however, the United States Supreme Court held in *Illinois Central Railroad* v. *Illinois,* 146 U. S. 387 (1892), could not abdicate its control over the land under the waters of Lake Michigan adjacent to Chicago Harbor. "Such abdication is not consistent with the exercise of that trust which requires the Government of the State to preserve such waters for the use of the public. The trust devolving upon the State for the public, and which can only be discharged by the management and control of property in which the public has an interest, cannot be relinquished by a transfer of the property. The control of the State for the purposes of the trust can never be lost, except as to such parcels as are used in promoting the interests of the public therein, or can be disposed of without any substantial impairment of the public interest in the lands and waters remaining. * * * The State can no more abdicate its trust over property in which the whole people are interested, like navigable waters and the soils under them * * * than it can abdicate its police powers in the administration of government and the preservation of the peace. * * * The ownership of the navigable waters of the harbor and of the lands under them is a subject of public concern to the whole people of the State. The trust with which they are held, therefore, is governmental and cannot be alienated, except in those instances mentioned of parcels used in the improvement of the interest thus held, or when parcels can be disposed of without detriment to the public interest in the lands and waters remaining."

The same question arose with reference to a grant of the Legislature of New York to a corporation to use certain portions of the State's lands under the St. Lawrence River. In this case there was a proviso that the grantee should not impair or obstruct navigation but maintain it in as good condition as at the time of the grant. The highest Court of the State of New York in the *Matter of Long Sault Development Co.*, 212 N. Y. 1 (1914), declared the grant void as surrendering the sovereign power and control of the State to a private corporation. The Court held the State was bound to retain the control over the public waters of the State in the public interest of navigation. The United States Supreme Court in dismissing the appeal of the company spoke with obvious approval of the decision in the New York Court. (*Long Sault Development Co.* v. *Call*, 242 U. S. 272 (1916.)

If the trust in which the State holds the lands under water "is governmental and cannot be alienated" surely the powers of the Federal Government which has no property right in the beds or waters of navigable streams must also and far more clearly be governmental and inalienable, The trust vested in the Federal Government by the Commerce Clause for the preservation of navigation and commerce is of the same essence as that which developed upon the States through their retained ownership of the beds of navigable waters.

No question of discretion, however, is really involved in the transfer of waters of the Great Lakes-St. Lawrence Waterway to the Mississippi watershed. If Congress should authorize this, or if the permit of the Secretary of

War of March 3, 1925, should be held to lawfully permit such a transfer, it would amount to a complete abdication of the governmental control and the trust vested in the Federal Government to preserve, and, if it sees fit, to improve the navigation of the Great Lakes-St. Lawrence Waterway in the interest of the interstate and foreign commerce thereon. When the abstraction takes place the water is for all times lost to the natural waterway and with it the Federal Government abdicates its governmental trust. Grants of land under navigable waters may only be made in aid of navigation and commerce, say the Courts,—by the States which own the lands. Can it be said that the Federal Government, owning no property and possessing only a sovereign governmental trust, may obstruct a great waterway for the benefit of the domestic needs of one community? The abdication of the control over a portion of the waters of the Great Lakes-St. Lawrence Waterway by permitting their diversion to the detriment of navigation into another watershed is not an exercise of discretion, but an unlawful surrender of a sovereign trust.

(*d*) *Federal Government has no Power to Authorize the Chicago Abstraction for Sewage Disposal and Hydro-electric Power Development Purposes.*

The question involved in this case is more than a mere abuse of the discretion vested in Congress. The authority delegated it by the States was for the furtherance of interstate or foreign commerce—not for any local municipal purposes such as sewage disposal. Congressional jurisdiction over waterways is

> "for the protection or advancement of either interstate or foreign commerce." The Daniel Ball, 10 Wall. 557, (1870).
>
> "Congress is the constitutional protector of foreign and interstate commerce." *Bridge Company* v. *U. S.*,

> 105 U. S. 470, 480. Congress "has the control of all navigable waters between the States, or connected with the ocean, *so as to protect and serve their free navigation.* * * * The power is vested in Congress * * * *so far as may be necessary to insure their free navigation. Miller* v. *Mayor of New York,* 109 U. S. 385 (1883). Even in as recent a case as *Appleby* v. *City of New York,* 271 U. S. 364 (1926), this Court, in dismissing the contention that the Secretary of War's order establishing pier and bulkhead lines had revested title to the land under water in the original grantee, i. e., city of New York, states "it does not attempt to vest it in the city. *It could not do so if it would.*"

Just as "every structure in the water of a navigable river is subordinate to the right of navigation," *United States* v. *Chandler-Dunbar Co., supra,* so, too, must every act of Congress be in the interest of navigation and interstate commerce, to constitute a constitutional exercise of the power surrendered by the States. If the Federal action is not in the interest of commerce or the improvement of navigable waters, as, for example, the case before the Court where the permit of the Secretary of War of March 3, 1925, deals exclusively with the use of the Great Lakes-St. Lawrence waters for the local sewage disposal purposes of the city of Chicago, then such action is unlawful.

> "Congress is authorized to '*regulate,*' but not to *destroy* 'commerce among the states.' It may, undoubtedly, in its wisdom, obstruct, or, perhaps, destroy navigation, to a limited extent, at particular points, for the purpose of its general advantage and improvement on a larger general scale, such, for example, as by authorizing the building of a railroad or post-road bridge across a navigable stream; but it cannot de-

> stroy, or authorize the destruction, entire or partial, of the whole system of navigable waters of a state for purposes wholly foreign to commerce or post-roads, or to their regulation. If congress could so authorize, or, as it is claimed, has so authorized, the acts complained of as to make them lawful, then it can authorize, and it has authorized, the filling up and utter destruction of all the navigable rivers, streams, and bays of the state, for there is no limit fixed to the amount of *debris* that may be sent down; and upon the hypothesis claimed, if such waters are not filled up and destroyed, it is for want of physical capacity to do it, and not because it is unlawful.
>
> "But the injury to navigation is not the only element of a public nuisance in the case. The injuries already accomplished, and those still accruing, as well as those threatened to the cities and riparian proprietors of a large extent of country, if unlawful, constitute a public nuisance of themselves, irrespective of the injuries to navigation; and there can be no possible ground for maintaining that congress has authority to legalize such injuries, and take away their character of a public nuisance. There is, then, no plausible ground for holding that congress has ever attempted to make the acts complained of unlawful or, if it had, that there is any power vested in congress to effect that purpose. These acts, therefore, have not been legalized by reason of any congressional action." *Woodruff* v. *North Bloomfield Mining Co.*, 18 Fed. 753, 778.

The title of New York and its citizens in the waters, shores and bed of the Great Lakes-St. Lawrence Waterway admittedly is subject to the servitude that the waterway may be improved by Congress for the benefit of navigation. In some situations, improvements might cause some local or consequential injury to particular property. Beyond this servitude, the State and its citizens have the right to expect and demand the natural and undiminished flow of the watercourse.

There is no greater power in Congress, arising from the Commerce Clause, to dispose of the waters of the Great Lakes for the real or fancied benefit of some single section of the nation, than to dispose of the lands under their navigable waters. Yet the Supreme Court has held that

> "To give to the United States the right to transfer to a citizen the title to the shores and soils under the navigable waters, would be placing in their hands a weapon which might be wielded greatly to the injury of State sovereignty and deprive the States of the power to exercise a numerous and important class of police powers." *Pollards' Lessee* v. *Hagan et al.*, 44 U. S. 212 (3 How. 212, 1845).

In *Hardin* v. *Jordan*, 140 U. S. 371 (1891), the Court again laid down the rule in even stronger terms.

> "such title to the shore and lands under water is regarded as incidental to the sovereignty of the State—a portion of the royalties belonging thereto and held in trust for the public purposes of navigation and fishery—and cannot be granted out to individuals by the United States."

The value of lands under water, however, is dependent upon the flow of water over them and the uses to which such water may be put. To a State, the primary value of the beds of lakes came from the extent to which the waters over them could be navigated. Today, the use of the waters for the generation of hydro-electricity at places where a fall occurs, is also of great importance. It is the supply of water that gives the submerged lands their value to

State or citizen. Without the water the lands are of little consequence.

All property rights and ownership in the shores, beds and waters of navigable lakes and rivers are vested in the State and its citizens. The Federal Government has only a sovereign power to act in furtherance of interstate or foreign commerce and for improvement of the waters over which such commerce moves. It possesses no property right in navigable waters or the land beneath them. To quote from a recent opinion written by Mr. Justice Brandeis:

> "The right of the United States in the navigable waters within the several States is limited to the control thereof for purposes of navigation. Subject to that right, Washington became, upon its organization as a State, the owner of the navigable waters within its boundaries and of the land under the same." *Port of Seattle* v. *Oregon & Washington Railroad Co., et al.*, 255 U. S. 56 (1920).

Except as Congress has been granted power by the Constitution, none can be exercised.

> "When the Revolution took place, the people of each State became themselves sovereign; and in that character hold the absolute right to all the navigable waters, and the soils under them, for their own common use, subject only to the rights since surrendered by the Constitution to the general Government." *Martin* v. *Waddell*, 16 Peters, 367 (1842).

This is true even though the Federal Government may correctly determine that the exercise of some new power would be beneficial to the nation at large. In the case of *Kansas* v. *Colorado,* 206 U. S. 46 (1906), the United States

Government intervened, claiming the right to control the waters for the reclamation of arid lands. It was argued that Congress had full control over navigable streams; that only by National control could the arid lands of the West be brought to tillable condition and that the United States was itself the owner of extensive lands on the particular river in question. The Court, however, dismissed its petition to intervene, even though it conceded the desirability of Federal action. No power had been granted the United States by the Constitution to deal with irrigation or the reclamation of arid lands. It is just as evident that no power has been lawfully granted in the present situation to the United States to permit Chicago to abstract a substantial portion of the flow of the Great Lakes-St. Lawrence Waterway for its sewage disposa[illegible]nd water power development purposes.

Entirely apart from the injury to the navigable waters over which commerce moves, there is the separate consideration of the damage to the commerce itself. It has ever been the evident desire of Congress and of this Court to prevent anything which might impair the free movement of interstate and foreign trade. Through its injunctive power, the Court has forbidden the commission of acts which might hinder the free movement of commerce among the States. Particularly striking, however, and of great force in the decision of the present controversy, is the case of the *State of Pennsylvania and the State of Ohio* v. *State of West Virginia*, 262 U. S. 553 (1923). In that case the commerce in question was the transportation of natural gas from West Virginia to Pennsylvania and Ohio by means of pipes. Viewing with alarm the approaching exhaustion of this natural resource and acting to preserve it for its own citizens, the Legislature of West Virginia passed a statute which, if executed, probably would have diminished, and perhaps eventually entirely prevented the export of this commodity. Citizens and State institutions of Pennsylvania and Ohio had for years used natural gas for light and heat and enjoyed the low rates at which it could be sold, as compared with artificially made gas. The Supreme Court of the United States by a divided court granted the request of the complainant states, declared void the act of the West Virginia Legislature and enjoined the officers and officials of that State from executing the statute.

As Mr. Justice Brandeis pointed out in his dissenting opinion, there is "a fundamental difference" between the "alleged right to acquire by purchase and to bring into a State natural gas produced elsewhere" and "to have the water of an interstate stream continue to flow into a state" as in *Kansas* v. *Colorado, supra,* "or the right recognized in *Missouri* v. *Illinois,* 180 U. S. 208, *New York* v. *New Jersey,* 256 U. S. 296 and *Georgia* v. *Tennessee Copper Co.,* 206 U. S. 230, to have the waters and the air within one State kept reasonably free from pollution originating in another."

Despite the fundamental difference pointed out by Mr. Justice Brandeis the Court declared that "the purpose of the commerce clause was to protect commercial intercourse from invidious restraints, to prevent interference through conflicting or hostile state laws and to insure uniformity in regulation. It means, that, in the matter of interstate commerce we are a single nation—one and the same people."

If the Court thought the importation of a single commodity—one that could be easily and economically replaced—into two states for the use of a portion of their citizens, warranted the drastic relief granted, surely the Court here must grant the injunction sought by the State of New York and the other five complainant states who seek to protect the commercial intercourse of their vast populations carried on among themselves and with other states and nations over the Great Lakes-St. Lawrence Waterway from the far more invidious restraints, from the greater damage and from the more serious burdens, which result from the acts of the defendants in saving the citizens of a single municipality of the State of Illinois the expense of proper sewage disposal plants.

It is therefore respectfully submitted to this Court that neither Congress nor its agent, the Secretary of War, has been delegated by the States through the Commerce Clause any authority to permit substantial injury to be done to the commerce and the riparian rights of the State of New York and its citizens through the Chicago diversion for sewage disposal and hydro-electric power development purposes.

III

Even if Congress had the power under the Commerce Clause to deprive the States of their sovereign and proprietary rights in aid of a Sanitation and Water Power Project, no such power has been delegated by it to the Secretary of War, and the permit of March 3rd, 1925, cannot be construed as having that effect.

The permit of March 3, 1925, purports to be issued pursuant to section 10 of the Rivers and Harbors Act (Act of March 3, 1899, 30 Stat. 1151, U. S. C. Tit. 33, § 403). Despite the language of the statute, that any obstruction to the navigable capacity of waters of the United States is prohibited unless "affirmatively authorized by Congress," the Master finds that by it Congress delegated sufficient authority to the Secretary of War to allow the issuance of the permit of March 3, 1925 (Report, pp 176–191).

It seems doubtful that the statute is susceptible of such a construction.

Hubbard v. *Fort*, 188 Fed. 987.

Even assuming, however, only for the purposes of argument, that said section 10 is authority generally for the Secretary of War to issue permits in aid of sanitation and water power projects, the necessary effect of which will be detrimental to navigation, the question still remains whether the permit of March 3, 1925, can have the effect of depriving the states of their sovereign and proprietary rights.

The obvious purpose of Section 10 is to protect the navigable waters of the United States. The creation of obstructions not affirmatively authorized by Congress is prohibited, and it is made unlawful to do certain specified acts except in accordance with plans recommended by the Chief of Engineers and authorized by the Secretary of War.

Congress recognized the fact that certain local needs might require the placing of obstructions in and above navigable waters. In order to protect the navigation of such waters it has delegated to the Secretary of War the power of approval conferred by Section 10, and made it unlawful to create such obstructions without such approval.

We may assume for purposes of argument that the power is thus delegated to the Secretary of War to decide whether a given obstruction will injuriously affect navigation, and we may even assume that the courts will not review his decision. The effect, however, of his decision, is limited. The permit merely has the effect of a consent in so far only as the Government of the United States is concerned. To that extent it may be assumed that the Government of the United States has withdrawn its right to object. Having the power to prohibit any obstruction whatever, the Government, through the action of the Secretary of War under his delegated authority, merely says that it will not exercise that power. Such a consent cannot operate in such fashion as to take away rights of the states, and it is plain that the statute was not intended to have that effect, even assuming that it was within the constitutional power of Congress to take away such rights.

The distinction between such a case as this and one where the power of Congress is exercised in aid of navigation is obvious. To take the case supposed by the Master, if Congress had decided that it was in the interest of the country as a whole to open a waterway connecting Lake Michigan with the Gulf, it may be assumed but only for purposes of argument, that under its paramount power over navigation, Congress could authorize a diversion of water from one water shed to another, and that the resulting injury to the states, would be *damnum absque injuria*. We are dealing, however, with a project not in aid of navigation but in aid primarily, as the Master has found, of sanitation, and, incidentally, water power. The power of Congress under the Commerce Clause to consent to such a project, and thus to withhold the objection which it otherwise might interpose, plainly does not extend to a deprivation of the sovereign and proprietary rights of the states in aid of such a project, and even if Congress had the power, the act delegating the authority to the Secretary of War should not be construed so broadly unless such a construction be required by its plain terms. Such an extreme power must be granted in clear and express terms. Yet, the Master finds that Section 10 is so "ambiguous" that he has to go to departmental practice to determine even that the Secretary of War has delegated power to issue such a permit at all without express congressional approval. (Report, p. 184.) In short, the states' rights may be taken by Congress or pursuant to its authority in aid of navigation but not in aid of a local purpose over which Congress has no jurisdiction whatever, except perforce of its power to prevent obstructions to navigable waters. The permit, therefore, even assuming that it was granted perforce of congressional authority, must be limited in its effect to the plain purpose expressed in the act delegating the authority which is to prevent interference with navigation.

As a matter of fact, the Secretary of War so construed his authority. The permit of March 3, 1925, is prefaced with the following note:

> "Note.—It is is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings* v. *Chicago,* 188 U. S. 410).

That construction by the Secretary of War of his own authority is amply supported by the case cited by him.

IV

The Facts alleged in the Bill of Complaint of the State of New York, supported by the proof in the trial of the case and by the Special Master's Report and the law applicable to this interstate dispute requires the issuance of an injunction restraining the defendant State of Illinois and its agent the Sanitary District of Chicago and each of them and each of their officers, agents and servants from reversing the flow of the Chicago River or in any manner obstructing its natural flow so as to prevent it from flowing in the course of Nature into the Great Lakes and restraining them from diverting any water whatever from Lake Michigan and its natural tributaries in such a manner as to permanently divert the same from the said Lake and the Great Lakes–St. Lawrence Watershed.

Respectfully submitted,

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1927.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants,
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS,
Intervening Defendants.

No. 7, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12, Original.

BRIEF ON BEHALF OF INTERVENING DEFENDANTS, MISSISSIPPI RIVER STATES.

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NORTH T. GENTRY,
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GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

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INTRODUCTION.

The comprehensive report of the distinguished Special Master contains such a clear and convincing analysis of the law in support of his conclusions which we here ask the court to adopt, that it is unnecessary for us to burden the court with a complete answer to all the assertions of fact and arguments of law contained in the voluminous briefs filed by the complainant states.

We therefore propose in this brief, to present the contentions of the intervening Mississippi River States (hereinafter called the "River States"), and the peculiar importance of their interest and contentions in this controversy. We shall then discuss certain fundamental assertions of fact as contained in complainants' briefs, upon which their entire case rests, but which on consideration of the Special Master's report and the record, will appear to be without foundation. We shall also, by way of supplement only to the legal conclusions of the Special Master, present certain arguments on the law in answer to some of the complainants' contentions.

Effect of the Special Master's Report.

In asking the court to accept the findings of fact and conclusions of law of the Special Master, it is not necessary to point to the many considerations which give his report peculiar weight and authority. As to conclusions of fact, the decisions of this court lay down a clear and simple rule by which to determine whether any exception to his findings should be sustained. In the language of this court, in *Davis* v. *Schwartz*, 155 U. S. 636; 39 Law. Ed. 293, his finding is not "absolutely conclusive, as if there be no testimony tending to support it; but so far as it depends upon conflicting testimony, or upon the credibility of witnesses, or so far as there is any testimony consistent with the findings, it must be treated as unassailable."

The following decisions are cited in the opinion in *Davis* v. *Schwartz*, in support of this rule:

Wiscart v. *Dauchy*, 3 U. S. 3 Dall. 321; *Bond* v. *Brown*, 53 U. S. 12 Howe, 254; *Graham* v. *Bayne*, 59 U. S. 18 Howe, 16, 62; *Norris* v. *Jackson*, 76 U. S. 9 Wall 125; *Mercantile Mut. Ins. Co.* v. *Folsom*, 85 U. S. 18 Wall 237, 249; *The Abbottsford* v. *Johnson*, 98 U. S. 440; see also *Hutchins* v. *Minnesota*, 209 U. S. 250, 52 Law. Ed. 777.

STATEMENT.

The Case of the River States.

The original bill in this case was filed by the State of Wisconsin several years prior to the decision of this court in *United States* v. *Sanitary District,* 266 U. S. 405.

Before the argument in the Sanitary District case, all of the complainants in the instant case, appeared as *amici curiae* on the side of the Federal Government, which was seeking, as the court will remember, to enjoin a diversion from Lake Michigan *to the extent that it exceeded* the amount authorized by the then permit of the Secretary of War.

At the same time, four of the River States,—Missouri, Kentucky, Tennessee and Louisiana,—obtained leave as *amici curiae* to appear and support the defense of the Sanitary District.

After the decision of the Sanitary District case, the complainant states, which had supported the contentions of the Government, apparently not satisfied with the decision in the Sanitary District case, filed an amended bill in the Wisconsin case, in which, in addition to the original complainant, the States of Ohio, Minnesota and Pennsylvania joined; and subsequently, Michigan and New York each filed an original bill, all three cases being then referred to the Honorable Charles Evans Hughes, as Special Master, by an order "with the same effect as if consolidated."

After the filing of this amended bill in the Wisconsin case (No. 7, Original), the same four River States above named, obtained leave and intervened as co-defendants in No. 7 Original, and subsequently were joined by the

States of Arkansas and Mississippi. While this intervention occurred in the Wisconsin case, this controversy has been submitted to the Special Master on the faith of the court's order of reference, just as though the intervening River States had been made co-defendants in all three cases.

It should be noted with emphasis at the outset, and should be kept prominently in mind throughout the consideration of this case, that the Lake States, in seeking to enjoin the diversion that has been expressly permitted by Congress through the Secretary of War as its agent, *are attempting through judicial proceedings, to interfere with and prevent the functioning of the political branch of the government.*

They are asking the *Judicial* Department of the Government *to grant a remedy,* the *necessary effect of which* would be *to interfere with* the exercise by the Secretary of War, of a discretionary power and duty imposed upon him *by Congress* in *its legislative and administrative control* over interstate commerce, and to substitute the judicial determination by this court, for the conclusions of the Chief of Engineers and of the Secretary of War, in their administrative control over the navigable waters of the United States.

The conclusion of the Special Master that no such relief should be granted, is manifestly correct.

Water is being diverted from Lake Michigan through the Sanitary Canal into the Illinois River and thence into the Mississippi, under the authority of a permit of the Secretary of War, issued by him as the agent of Congress, under Section 10 of the Act of 1899. The contention of the River States is that this water is essential to the maintenance of navigation on the Mississippi under present conditions; and that the benefit to navigation on the Mississippi, produced by the diversion, was before the Secretary of War for consideration by him when he issued the said permit of March 3, 1925, and was sufficient in law to justify the exercise of the power delegated to him by Section 10 of the Act of 1899, an Act of Congress passed under the commerce clause of the Constitution.

The Special Master has so held.

In addition to the reasons assigned by the Special Master in reaching this conclusion, we point out that the moving effect, as a matter of law, of the fact of benefit produced upon Mississippi River navigation is strengthened and, we submit, rendered conclusive, by later acts of Congress imposing specific duties on the Secretary of War in connection with the conduct of commerce on this river.

The legal sufficiency of this benefit to Mississippi River navigation, to justify the action of the Secretary of War in issuing the permit, rests, first, upon the actual contribution to channel depth and width thereby produced, and, second, upon a proper conception of the relative economic importance of this waterway.

Concerning the benefit to Mississippi River navigation produced by the diversion, the Special Master reached the following conclusions:

> "My conclusion is that the diversion from Lake Michigan, through the Drainage Canal, increases to some extent, during low water, the navigable depths over bars of the Mississippi River, but that the extent of this increase is not the subject of sufficiently accurate determination to warrant a finding. Upon all the facts it was permissible for the Secretary of War to reach the conclusion that the diversion from Lake Michigan of 8500 c. f. s. was, to some extent, an aid to navigation on the Mississippi River in time of low water. * * * It is not controverted that the

> Secretary of War had these considerations before him on the application and hearing which resulted in the permit of March 3, 1925."

The fact that the Special Master did not appraise definitely, the extent of the benefit to the Mississippi River resulting from the Chicago diversion, does not, we submit, tend in any degree to lessen the legal effect of his above conclusions.

The complainants seek a drastic injunction based upon a claim of injury resulting from the diversion to navigation on the Great Lakes. It is quite clear that the Special Master was compelled, by reason of the nature of the relief sought, to find the extent and nature of this injury, as closely as the evidence would permit. The effect of the benefit to navigation on the Mississippi, however, is pertinent, merely to show legal justification for this exercise of power delegated to the Secretary of War.

It was clearly, as the Special Master held, within the authority of the Secretary of War to decide on the information available to him, first, whether such benefit to navigation on the Mississippi results, and second, whether the extent of such benefit was sufficient to call into action his authority to permit the diversion. It was therefore merely necessary for the Special Master to find that a material benefit did in fact result, sufficient in law for the Secretary of War to consider. As an inducement to the exercise of an administrative discretion, otherwise not judicially reviewable; and, as shown above, this was the conclusion of the Special Master.

It is significant that this very important conclusion of the Special Master, sustaining the contentions for the River States, is either belittled or brushed aside as unworthy of notice in the briefs for the complainants, a method of treatment indicating that no adequate attack upon this conclusion of the Special Master was found. The complainants throughout their briefs, assert that no benefit to navigation on the Mississippi or elsewhere, has resulted from the diversion.

In the Michigan brief, the entire case of the River States is brushed aside. (Michigan brief, pp. 50-53.)

New York, though claiming to accept the Special Master's findings, likewise attempts to belittle the evidence proving benefits to navigation on the Mississippi and the necessary legal effect of such findings. (New York brief, p. 16.)

The Wisconsin brief discusses the evidence, and claims that there was conflicting evidence. Applying the rule above quoted from *Davis* v. *Schwartz,* 155 U. S. 636, as to the conclusive effect of the master's findings upon conflicting evidence, it necessarily follows in respect of this discussion in the Wisconsin brief (pp. 43-52) that their exceptions to the findings of the Special Master on this point cannot be sustained.

As a matter of fact, the analysis of evidence which follows, not only demonstrates the correctness of the Special Master's findings, but clearly shows that he could have found, had it been necessary for him to make a more definite finding, that the Chicago diversion contributes at least six inches of depth at the critical points of navigation on the Mississippi, at all stages of the river up to mean stage, that is during approximately one-half of each navigation season. And the evidence offered by complainants to meet our contentions, entirely supports this conclusion.

6

ANALYSIS OF TESTIMONY AS TO BENEFICIAL EFFECT OF DIVERSION, IN MISSISSIPPI RIVER NAVIGATION.

Referring to pages 114 and 115 of the Special Master's report, it will be seen that navigation is conducted on the Great Lakes at vessel drafts of 18 feet or more, and the Special Master finds that a lowering of six inches out of an average draft of 20 feet is a material lowering and capable of producing damage to navigation. The project depth, established by Congress, for the Mississippi River from St. Louis to Cairo is eight feet, and from Cairo south nine feet, with channel widths of, respectively, 200 and 250 feet. If six inches of these depths, during all stages of water from low water to mean stage, is contributed as a result of the diversion from Lake Michigan, the complainants can hardly contend that this amount of contribution is not material in view of their position as to the effect of the lowering of the Great Lakes' levels, which, they contend, is not more than six inches.

To support their contentions, the River States rely upon the testimony of three engineers, and of three navigators of long experience on the river antedating the diversion from Lake Michigan, and the principal operating officials of the Mississippi-Warrior Barge Line, conducted by the Inland Waterways Corporation pursuant to Act of Congress, under the direction and authority of the Secretary of War, all of the stock of which is owned by the United States.

To meet this testimony, the complainants offered only the testimony of General W. H. Bixby, formerly chief of engineers, and a number of official engineer's reports, the more important of which were prepared by General Bixby in his several official capacities.

If, on analysis, it appears that General Bixby himself admits a benefit of six inches or more resulting from the diversion, there remains no basis for exception to these conclusions of the Special Master.

General Bixby's testimony in narrative form is found at pages 97-107 of the joint abstract. He begins by giving a detailed description of the Mississippi River, pointing out that from a navigation standpoint, it is composed of a series of deep pools separated every three or four miles by bars, with an average depth considerably deeper than the Government project depths, but the limiting depths being the amount of water found over the bars. Due to the fact that the volume of the stream varies greatly and carries a large burden of silt from bank erosion and from contributions of tributaries, particularly the Missouri, bars move and rise and fall, with different stages in the stream. General Bixby described these phenomena in detail, finally arriving at the conclusion (page 101 of the joint abstract), that the contribution of 10,000 second feet from Lake Michigan has no appreciable effect upon navigation of the Mississippi.

On cross-examination, however, he admitted (Joint Abst., 102) that at low water the addition of 10,000 second feet was sufficient to raise the stage one foot, *i. e.* raises the surface plane of the water, one foot. He stated that bars begin to form at stages between 15 and 23 feet on the gauge at St. Louis, and low water at St. Louis is at one foot on the gauge. When referred to certain charts in H. D. No. 50, 61st Congress, 1st Session, a report rendered in 1909 by a board of which General Bixby was the chairman, he admitted that up to 15 feet on the gauge, the effect of an addition of 10,000 second feet would be to raise the stage one foot. He stated (p. 103, Joint Abstract):

"due to the rise of bars at low water because of

> the diversion of 10,000 second feet, there is only an increase of half of the one foot and a half, that is, seven-tenths of a foot so far as navigable depth is concerned. *When the water is rising, the bars form only half as fast as the water surface rises. The bars rise about two feet for every five feet in water stage as the water goes up. As the river falls, the bars go down only half the decrease in stage.*" (Italics ours.)

It follows necessarily, therefore, that up to 15 feet on the St. Louis gauge, on General Bixby's own testimony and assuming that the bars rise and fall exactly as described by him, there is an increase of navigable depth of six inches or more over the bars caused by the diversion, since, as General Bixby testified, the addition of this water raises the stage one foot or more.

At page 102, joint abstract, General Bixby interpreted Exhibit 507 which showed the average stages of the Mississippi for each day, based upon determinations made by the Government engineers over a period of 60 years, and stated that from this exhibit, the river exceeded 20 feet on the gauge at St. Louis an average each year of only ten days; that about the first of July, the 20-foot stage was left and the river began to fall uniformly until about the 10th of September when it was 9 feet, then declining uniformly to 8 feet in November and down to about 5 feet on the 19th of December. It is quite apparent, therefore, that at all stages below 15 feet, which means, on the statements above referred to, most of the period from the first of July to the end of the navigation season in December, on General Bixby's own testimony, a diversion of water from Lake Michigan contributes at least six inches to the navigable depth of the Mississippi.

At page 105, joint abstract, General Bixby made a statement clearly defining the conclusion stated on his direct examination, that the addition of 10,000 second feet from Lake Michigan "has no appreciable effect on the navigation on the Mississippi River", when he says, "I would regard a change of from three to six inches as insignificant under those circumstances." We respectfully submit that it is not open to question, that in conducting navigation in eight or nine feet of water, the addition of six inches in depth would be substantial. Certainly the complainants, who contend that six inches is substantial in conducting 20 foot navigation, are in no position to agree with General Bixby's conclusion that it is not substantial.

In considering General Bixby's testimony, the Court should bear in mind that in his official capacity while in the service of the Government, he was the author of two important reports upon the Mississippi River, from which voluminous quotations are to be found in the joint abstract. These reports are known as Complainants' Exhibit 177, H. D. No. 4, 69th Congress, 1st Session, Report on the Illinois Waterway (a quotation from this is found at page 108 of the Abstract) and H. D. No. 50, 61st Congress, 1st Session. The latter report made in 1909, is the most comprehensive report available upon the Mississippi River and long quotations therefrom are found in the abstract. This same report, however, contains in addition to the engineers' conclusions, a vast amount of basic data in the shape of measured discharges, tables of depths, curves of relation between stage and discharge and similar matters. This data is not an expression of opinion, but is the scientific determination of fact as made by the engineer corps throughout many years of service on the river. The most important item of this kind in this report, is the curve of relation between river stage and bar heights. This chart was introduced as Defendants' Exhibit 526 by the witness, Colonel Robert Isham Randolph, and was entitled as follows (Joint Abst., 77):

> "Curves showing Relations between River Stage to Bar Heights and Depths Limiting Navigation in the Mississippi River between St. Louis and Cairo compiled for the Board of Examination and Survey of Mississippi River from the records of the United States Engineer Office, St. Louis, Missouri, for the years 1896 to 1908. The curve of mean depths shows for each foot of stage the average of the best depths found in the channel crossings of all bars between St. Louis and Cairo, and indicates the relation between mean bar height and stage: the total number of soundings represented by each reference mark being stated opposite thereto."

General Bixby, himself, on cross-examination, referred to this chart and described it as follows:

> "I refer to the chart in Doc. No. 50, 61st Congress, 1st Session, the report of the 1909 Board, showing the correlation between bars and water stage for 12 years between 1896 and 1908, and there were some 30,000 soundings taken in getting up that chart. The chart shows not only the location of the soundings with reference to stage, but also the depth of the controlling bar on each trip, that is, the least depth on the trip. And these controlling depths are plotted on a curve. The chart is Plat 2 of H. D. 50. * * *" (Joint Abst., 102; Trans., 8290.)

The witness' last statement in reference to the chart is not very clear. There were in fact two curves, one showing the mean depths over bars and the consequent ratio of increase in such depths to increases of stage, and the other curve, as the witness states, shows a similar relation for the least depths over bars. The chart itself describes the latter curve as follows:

> "The average of the line channel depths, one for each through trip between St. Louis and Cairo, found by boats operated by the U. S. Engineering Office, indicates the relation between the controlling depth and the stage, the least depth of each trip

> being shown as a small dot, and the mean of all trips within a half foot of each foot of stage being shown as a large circle." (Joint Abst., 80; Trans., 4894.)

The information given by this curve, in other words the actual specific result of 30,000 soundings taken during an eight-year period is accurately described by the witness Randolph as follows:

> "The curve indicates in general that as the river rises the bars rise with the river so that at gauge 10, for instance, an increase of stage of one foot indicates an increase of depth over bars of approximately seven-tenths of a foot." (Joint Abst., 77; Trans., 4540.)

His attention having been directed to this curve, on cross-examination General Bixby says:

> "Due to the rise of bars at low water, because of the diversion of 10,000 second feet, there is only an increase of half of the one foot and a half, that is, seven-tenths of a foot so far as navigable depth is concerned. When the water is rising, the bars form only half as fast as the water surface rises. The bars rise about two feet for every five feet in water stage as the river goes up. As the river falls, the bars go down only half the decrease in stage."

We emphasize these statements and the specific record of soundings embodied in this chart, because these statements clearly define what was in the mind of General Bixby and his associated engineers in the various reports to be found in the joint abstract, when they say that the effect of the Chicago diversion upon navigation in the Mississippi is "small" or that it is doubtful if there is "material increase" in navigability, or similar expressions. The whole question, of course, is what is meant by the purely relative terms used. When the matter is referred to the express record of actual results of soundings extending over a period of eight years, the conclusion is irresistible that there is at least an increase of one-half as much in depth over bars as there is an increase in stage. And as previously pointed out in General Bixby's own testimony, there is an increase in stage as shown by the Government discharge records of one and four-tenths feet at St. Louis by an increment of 10,000 second feet at low water and up to mean stages an increase of at least a foot. From this it follows necessarily, that if the diversion from Lake Michigan were cut off, there would be a decrease in navigable depths over the bars—the critical points of navigation on the Mississippi—of at least six inches. A decrease of this amount may or may not be "small" or "material," as the individual may happen to regard it, but for the purposes of this case, in view of the insistence of the complainants that a decrease of six inches is material on the Great Lakes where navigation is normally conducted at available depths of approximately 20 feet, or more, six inches must be taken as material (substantial); and therefore we respectfully submit, that on the testimony of the complainants' sole witness, there was shown to be a substantial beneficial effect on the navigation of the Mississippi, by the diversion from Lake Michigan.

To support our contention on this point, we introduced the testimony of Colonel Robert Isham Randolph, a qualified engineer, who had prepared detailed charts to approximate and define the extent of the benefit due to the diversion, based, as he stated, upon a careful scientific appraisal of all available Government data. He took the records as found in all of the engineering reports and prepared a comprehensive study. His conclusion was in accordance with that above stated. In addition, we offered the testimony of Mr. Woermann, a civil assistant government engineer of many years experience on both the Illinois and Mississippi Rivers, whose conclusion was based upon his long service and familiarity with these problems, and is identical with that of Colonel Randolph; and finally we introduced the testimony of Major Gotwals, at present United States district engineer at St. Louis, who had made a careful and comprehensive study as a part of the preparation of data for submission to Congress, accepted by it as the basis for the recently changed project for the improvement of the Mississippi between the mouths of the Missouri and the Ohio. Major Gotwals' testimony, obviously unprejudiced, was summed up by him in his Exhibit No. 1186 (Joint Abst., 91), a table prepared by him to show the effect of 10,000 second feet diversion from Lake Michigan, on the Mississippi River at Grafton, St. Louis, Columbus, Helena, Vicksburg and New Orleans. He testified that this was prepared from official reports and from the latest discharge and rating curves. Summing the matter up, he said that above the Missouri, since the Illinois and Upper Mississippi are streams with fixed beds, rise of stage would be reflected by a corresponding increase in navigable depth, and below the mouth of the Missouri, "the effect of a rise in stage on navigable depths would be about one-half the rise in stage." (Joint Abst., 92.)

In addition, we offered the testimony of Captain William L. Berry, Captain Oscar F. Barrett and Captain H. W. Neyhe, all of whom had been engaged in the navigation of the Mississippi as pilots, vessel captains and in other capacities for periods long antedating the beginning of the diversion from Lake Michigan in 1900. (Joint Abst., 84, 85, 87.) Their testimony was to the effect that the diversion had increased navigable depths and widths of channel, and they pointed out that after the diversion had become established there was a marked difference in the Mississippi channel below Grafton (which is at the mouth of the Illinois River), but no difference above Grafton. In other words, the conclusion is irresistible that rainfall, climatic conditions, etc., did not product this change, as any such causes would have operated just as much above the juncture of the Illinois and Mississippi Rivers as below.

General Bixby himself admitted on cross-examination, that he had never been able to find a practical navigator on the river who did not think that the diversion benefited navigation. And we respectfully submit that the testimony of men engaged from day to day in the navigation of this river and thus familiar with all of its peculiarities and difficulties, is after all as conclusive as any engineer's theories, particularly when it is apparent that such engineering conclusions are inconsistent with the actual measurements upon which they are based.

To prove the importance of this improvement in the navigability of the Mississippi, we introduced the testimony of Major-General T. Q. Ashburn, executive of the Inland Waterways Corporation, which operates pursuant to the mandate of Congress, the Mississippi-Warrior Barge Line. By the Inland Waterways Corporation Act to which we will refer later, the Secretary of War is made the incorporator of this corporation, of which the United States owns all the stock, and General Ashburn was delegated by the Secretary of War as his subordinate to conduct this operation. We also produced the testimony of Theodore Brent, who had formerly been federal manager of the line in the period preceding the existence of the corporation, and since that period traffic manager, and who was personally familiar through eight years of official experience, with the difficulties of conducting this transportation facility in the insufficient and constantly changing channels of the Mississippi River.

It is implied in the Inland Waterways Corporation Act and we understand is generally understood, that the Government is in one sense thus conducting a demonstration of the practicability of navigation and common carrier service on the Mississippi. Mr. Brent's testimony was to the effect that proper and essential operating profits can only be obtained by what may be called wholesale operation, the transporting in one tow by a towboat and a number of barges, of very large amounts of freight, thus reducing labor cost and making available the true economies of water transport; and throughout his testimony he emphasized the absolute dependence of this line upon sufficient navigable depths and widths of channel. We respectfully submit that his testimony compels the conclusion that a six-inch addition to the depth of the Mississippi River constitutes a substantial and valuable improvement to the navigability of the river.

Consequently, as the Special Master concluded, it was proper for the Secretary of War,—officially advised of these facts as he must be presumed to have been, and shown by the evidence to have been in fact so advised,—to take into consideration this benefit to navigation resulting from the diversion, in determining whether or not to grant the permit of March 3, 1925.

The joint abstract shows a portion of the transcript containing the offer of Defendants' Exhibit 1158 (Joint Abst., 173-177), and a condensation of an excerpt from that exhibit. (Joint Abst., 177-178.)

This exhibit was a transcript of the hearing held by the Secretary of War in Washington, February 21, 1925, on the application of the Sanitary District for the permit subsequently granted March 3, 1925. The Special Master at first considered this offer inadmissible as not competent to prove the truth of the statements made by the various parties appearing before the Secretary of War and set forth verbatim in the transcript, but when it was pointed out that the offer was simply to show what were the claims made to the Secretary of War, he ruled that this offer was competent and the evidence was received. Counsel for the River States joined in said offer for the express purpose of showing that there had been presented to the Secretary of War a claim that the navigation on the Illinois River and the Mississippi would be benefited by continuing the diversion; and that this claim was made, is clearly shown by the excerpt from the transcript set forth in the joint abstract at pages 177-178.

But that a claim of benefit to navigation on the Illinois and Mississippi was before the Secretary of War is proved by other uncontradicted evidence. The formal application of the Sanitary District for the permit, appears in part at page 158 (joint abstract), and shows that there was submitted with the formal application a statement of facts, which shows (Joint Abst., 160), that the Sanitary District in October, 1924, engaged twenty-eight consulting sanitary and hydraulic engineers, leaders of the profession, to make an exhaustive and complete review of the works of the district, including this diversion, and the unanimous report of this board, together with the basic data, is shown by the statement of facts to have been also submitted to the Secretary of War with the application of the district. Excerpts from this engineering report contained, in the following words, the conclusions of these engineers (Joint Abst., 162):

> "Diversion of water at Chicago * * * improves navigation in the waterways from the Great Lakes down the Illinois and Mississippi Valleys;"

and again (Joint Abst., 167) as follows:

> "An average annual diversion of 10,000 cubic feet per second at Chicago would reduce the cost of com-

> pleting and operating the 9-foot waterway from the lakes to the Gulf of Mexico, would improve navigation conditions down to and below Memphis, and would dispense with four of the nine locks which would be required with a diversion of 1,000 or 2,000 cubic feet per second. This would make feasible a 9-foot channel without locks from the Gulf of Mexico to within 100 miles of Chicago."
>
> "The improved Illinois waterway will adequately connect the Mississippi Valley with the Great Lakes. Such a connection will encourage navigation, and will give the Middle West and Gulf States a better opportunity to share in the benefits to be derived from ample and desirable facilities for water-borne commerce between the Gulf and the Lakes. Such a waterway is of international importance, and with the completion of the improvements in the Illinois River is a possibility within three or four years."

On the record before the court, therefore, the exceptions taken by the complainants to the Master's conclusion that the Secretary of War did have before him for consideration the benefits to navigation resulting from the diversion on the Mississippi River, should be denied. Complainants cite no evidence to sustain these exceptions, and by the written documents actually submitted to him as a part of the application of the Sanitary District, these claims were clearly and definitely presented.

We therefore respectfully submit that the complainants' exceptions to the findings and conclusions of the Special Master as to a substantial benefit to Mississippi River navigation caused by the diversion should be denied, first, because they rest upon evidence as to which there was a conflict, and under the doctrine of *Davis* v. *Schwartz, supra,* his conclusions are final in such case; second, because not only his conclusion as made was fully sustained by the weight of the evidence, but, if the legal issue had so required, the evidence would have compelled a finding that the navigable depth of the Mississippi River was increased at least six inches; and, third, because the record shows that the above facts and contentions, constituting a sufficient legal basis on which to grant a permit in the interest of navigability, were before the Secretary of War when he granted the permit of March 3, 1925.

DUE TO THE ECONOMIC SITUATION OF THE MISSISSIPPI VALLEY, A DIVERSION TENDING TO IMPROVE AND MAINTAIN THIS RIVER NAVIGATION, IS A MATTER OF RECOGNIZED NATIONAL IMPORTANCE.

As the court will take judicial notice, the states in the Mississippi Valley, and particularly those states on whose behalf this brief is filed, are primarily dependent for their prosperity and economic progress upon agriculture; the southern states upon cotton; the northern states upon the production of grain and corn.

The situation in the Middle West, and particularly in the states here represented, is best described in the language of Secretary Hoover in a report filed by him on Great Lakes-to-Ocean Waterways, in 1927 (in evidence, Defendant's Exhibit 1209), where he says:

> "In the mid-west, the territory tributary to any of these projects, the economic situation is considerably distorted; there is much agricultural distress and incessant demands for remedial legislation. This situation to a large extent has been brought about by transportation changes. Increases in railway rates since the war force the mid-west farmer to pay from 6 to 12 cents more per bushel to reach world markets than before the war. Foreign farmers produce close to ocean ports and pay but little, if any, more than prewar costs, because shipping rates are substantially at prewar levels. While it is true that these rate increases apply only on the exports of grain, nevertheless the price which the farmer receives in foreign markets is the principal factor in determining his return upon the whole crop, not

alone the export balance. It is this transportation differential that is, unquestionably, one of the most important causes for our present agricultural depression.

Coincident with these increased rail rates the mid-west has also been affected adversely by the operation of the Panama Canal. Cheapened water transportation has brought the coasts relatively closer together at the same time that increased rail rates, figuratively speaking, have moved the mid-west farther from seaboard. This situation has been expressed graphically by setting up a new measuring unit in the shape of the number of cents that it takes to move a ton of freight. By using this measuring rod, it can be stated, that for a certain manufacturer, these postwar influences have moved Chicago 336 cents away from the Pacific coast, while New York has been moved 224 cents closer to the Pacific coast.

These factors operate reciprocally and not only place a handicap on the outbound products of the mid-west, but also add to the costs of inbound supplies.

All of these influences have had a very far-reaching effect; certain classes of industry have migrated to the seaboard; agriculture has been greatly depressed, and, through the increasing separation of agriculture and manufacture, both have been affected adversely. The net result has been to accentuate one of our present-day evils—the concentration of industry and population in urban communities.

The waterway projects under consideration offer a measure of relief for these conditions. Transportation has brought about economic distortion; in the proposed waterways we have an instrument which will have a beneficial effect and tend largely to restore the former satisfactory economic situation. The Panama Canal cannot be closed; the railroad rates cannot be reduced without impairing disastrously the usefulness of our carriers, but a Great Lakes-to-the-Ocean waterway offers the mid-west a substantial rate advantage which will enable it to compete successfully once more in the world markets." (p. 4.)

He also says:

> "In the interest of national transportation this country should make the best possible use of the water transportation facilities which nature has provided. We are rapidly improving our inland waterways. The Ohio River development from Pittsburgh to Louisville is now completed and is carrying an increasing traffic. Development of that portion from Cincinnati to St. Louis and of other segments of the Mississippi trunk system is contemplated. This development will link up the entire south, central, and southern commercial sections with a barge waterway. There is a barge canal connecting the Great Lakes with the Hudson River which makes possible traffic between the Great Lakes and New York City.
>
> While we are making rapid strides in rail, river, and canal transportation it is all the more necessary where it is practicable and feasible from an engineering viewpoint, that, if it be economically advisable, we improve our waterway possibilites where transportation costs are the cheapest and where the benefits derived will be the greatest." (p. 11.)

(Department of Commerce, Great Lakes-to-Ocean Waterways. Economic Survey, Domestic Commerce Series, No. 4, Washington, 1927, pages 4 and 11.)

These statements are amply supported by the testimony of Mr. Brent, traffic manager of the Inland Waterways Corporation. (Joint Abst., 72-73.)

Complainants' Arguments Are Predicated Upon Assertions of Fact Directly Contrary to the Findings of the Special Master.

The brief on behalf of Wisconsin (pages 32-43), contains arguments in support of the following statement:

> "Past and present diversions have not been, and are not now, in aid of navigation on the Illinois waterway, and if and when the Illinois waterway is ever completed, all diversion in excess of 1,000 second feet will not be for the benefit of navigation on that waterway."

The Michigan brief (pages 43-50), discusses the following:

> "The greatest amount of water required to be abstracted from Lake Michigan for the need of navigation from Lake Michigan to the mouth of the Illinois River would be 1,000 c. f. s. * * *"

In reference to the effect of the diversion upon the Illinois waterway and the above contentions of complainants, the Special Master found (Report, p. 122) as follows:

> "The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than 1,000 c. f. s. of water is sufficient to supply all needs of navigation. *I am unable so to find.*" (Italics ours.)

He further found (Report, p. 120) as follows:

> "The Federal project depth (on the Illinois River) has been seven feet; but this could not have been maintained without at least 8500 c. f. s. from Lake Michigan, which gives, in the lower Illinois, about four feet of the low water depth of seven feet. The Chicago diversion has increased the navigable capacity of the river. This stretch of the river is adaptable to improvement as an open channel, but if there were no diversion at Chicago, a large amount of improvements and several locks and dams would have to be provided. The question appears to be largely one of cost."

We shall not discuss the evidence which supports the above findings of the Special Master as this will be presented in detail in the brief on behalf of Illinois and the Sanitary District, but under the rule applicable to the effect of the Special Master's findings above pointed out, in view of the fact that no claim is made that these findings are not supported by competent testimony even though there be contradicting testimony, the finding of the Special Master is conclusive.

The brief of Wisconsin states (p. 52):

> "The disposal of the sewage of Chicago is not a navigation purpose."

And the discussion on this point claims that no benefit results to navigation from the prevention of serious polution of the Chicago harbor bound to follow from a shutting off of the diversion.

The Special Master found otherwise (Report, p. 193), as follows:

> "It appeared that a diversion of 4167 c. f. s. was not sufficient to keep the Chicago River reversed at all times, and when not kept reversed, the enormous volume of Chicago's sewage would pour into the lake and under present conditions could not fail to create a pestilential condition in the lake, and in the port and harbor of Chicago. The nature of the injury which would be sustained by the interests of navigation and commerce, and the propriety of the intervention of the United States, in such a case were pointed out by the Court in *New York* v. *New Jersey*, 256 U. S. 296. * * * Called upon to consider the effect upon navigation of the stoppage, or reduction, of an actual, existing diversion, he had to determine what he would permit in the face of a definite and inescapable exigency. What was necessary to prevent intolerable conditions in the waters of the lake, and in the port and harbor of Chicago? Within what time could steps be taken which would permit a reduction of the quantity diverted with safety to navigation? What should be the nature of the steps to be taken? What supervision should there be of the work necessary to be done? These questions none the less related to navigation because they involved questions of sanitation."

In addition to the foregoing references to complainants' briefs, the Court will find a number of places throughout their arguments, in which the fact of benefit to navigation through the prevention of serious damage to the Chicago harbor as above found by the Master, is denied. It should be noted that the complainants did not even file exceptions to these findings, consequently their assertions, contrary to the Master's findings, should not be considered by the Court.

The Master also found (Report, p. 138) as follows:

> "It is plain that the present flow from Lake Michigan through the drainage canal could not be immediately cut off or reduced to 1,000 c. f. s., and in consequence the sewage of the Sanitary District in its present condition turned into Lake Michigan without exposing the inhabitants of the District to the grave risk of water borne diseases, by contamination of the water supply taken from the lake. The Chicago River and the waters of the lake about the city would be filthy and noisome, with serious injury to the commerce of Chicago harbor. It appears from the testimony that it would take several years, not less than five years and perhaps ten years, or even more, before the sewage of the district, with such treatment as is practicable, could be turned into the lake and the diversion from the lake stopped or greatly reduced, without serious risk to the health of the people of Chicago."

The Special Master thus finds additional benefits to the conduct of interstate commerce in that the continuance of the diversion will prevent disaster to the City of Chicago and to the capacity of its inhabitants to engage in interstate commerce, which, in and of itself constitutes adequate ground for the issuanec of the permit as clearly within the scope of the congressional power to regulate commerce. The community of Chicago is so large, and conducts such an important part of the interstate commerce of the country, that the prevention of disease epidemics such as is found by the Special Master would result from shutting off the diversion, is in itself a proper exercise under these circumstances, of the power to regulate commerce, for it is clearly competent under this grant of power not only to affirmatively create channels for the movement of interstate commerce, but to protect those already existing, and prevent interruptions thereto.

THROUGHOUT THEIR BRIEFS COMPLAINANTS OVERSTATE AND GROSSLY EXAGGERATE THE DAMAGE CLAIMED BY THEM TO RESULT FROM THE DIVERSION.

The principal damage claimed is the six inch lowering of the levels of the water in the channels of the Great Lakes, with the consequent injury to the conduct of commerce through these channels.

By figuring the additional cargo that could be carried with additional depths, complainants have sought to appraise this damage, but it is to be noted that throughout their briefs and throughout the findings of the Special Master in reference to this damage, there is no statement anywhere, nor any suggestion of claim that any tonnage moving in interstate commerce was in fact prevented from being transported over the Great Lakes by reason of the lowering resulting from the diversion.

As suggested in Col. Markham's report, quoted at page 114 of the Special Master's Report, the sole effect of additional depth would be to render unnecessary the use of a small number of the smaller water carriers in conducting the Great Lakes commerce. The only possible effect of the lowering has been to slightly increase the cost of operation by requiring more voyages to carry the tonnage offered; and in view of the Special Master's failure to find any specific amount of increase of cost and the failure of the complainants to make any specific claim in this particular, the court may assume that the complainants did not offer evidence tending to show the actual increase in cost.

As suggested in their briefs, complainants' proof consisted in attempting to show the amount of freight which could have moved if vessels had been loaded six inches deeper, and in applying to that imaginary volume of freight, the revenue to be derived from such movement, without, however, any proof tending to show that any such freight was actually in existence and seeking carriage over and above the tonnage actually handled by the Great Lakes vessels.

Complainants also lay great stress upon damage to their riparian rights, and in their briefs invariably misstate the Special Master's conclusions as to these contentions.

In his description of the Great Lakes, the Special Master finds that the levels of these lakes are constantly fluctuating, due to natural causes without regard to the effect of the diversion.

The report says (page 86):

> "Computations show that the average supply received from the land areas about equals that received as rainfall on the lakes, but that roughly 40 per cent of this total gross supply is lost by evaporation. The net suply varies widely. The records show rates of net supply to the whole lake system exceeding 800,000 c. f. s. for a month, and they also show months during which the evaporation from the lakes exceeded the water received from all sources, with a consequent negative net supply. The average monthly net supply for the months of April and May is at a rate exceeding 500,000 c. f. s., and the average net supply for the month of November is at a rate of less than 20,000 c. f. s. The lakes absorb the great variations in supply, because of the rise and fall of their levels. When the supply is high they rise and store water; when it is low they fall and deliver the stored water. The average annual rise and fall of the various lakes due to the seasonal variations in supply is from 1¼ to 2 feet, but extreme variations

> in seasonal supply have caused fluctuations in lake levels ranging from 2.67 feet on Lake Superior to over 4 feet on Lake Ontario. Extreme high and low lake levels are reached at the ends of periods of excessive or deficient supply extending over several years. The period of low rainfall occurring during the past few years has brought down the levels of the lakes, and with other factors has produced record low levels on Lakes Michigan, Huron and Erie."

The Special Master's Report further finds that various artificial causes other than the Chicago diversion, have tended to produce effects upon the levels of the Great Lakes. These are listed in the table shown at page 97.

In reference to damage to riparian interests, the Special Master's conclusion is as follows (page 117):

> "But there is sufficient evidence to require the finding that a lowering of six inches has been a substantial contribution to the injury caused by the total reduction, in connection with fishing and hunting grounds, the availability and conveniences of beaches at summer resorts, and public parks. * * * My conclusion on this branch of the case is that, while the damage proved to have been sustained by the complainants has been due to the combination of causes which have brought about the total lowering of the levels of the lakes and connecting waters, the contribution made by the diversion of the water of Lake Michigan through the Chicago drainage canal must be regarded as substantial, although the proportion of the damage caused by the reduction of approximately six inches is not susceptible of exact computation."

The report of the Special Master in giving figures of mean lake levels shows that in the years mentioned, from 1913 to 1920 (*i. e.* 1913, 1916, 1918 and 1920), the mean levels of the lakes were higher than in the five year period from 1895 to 1899 (Special Master's Report, pp. 88-89); and the table on page 88, shows that the mean levels have widely fluctuated, and, further, that the mean levels were higher during the earlier periods. These earlier higher mean levels obviously obtained prior to the present Federal improved channels through the Great Lakes. It is quite clear that when outlet channels are deepened outflows increase, and although the complainants, on their theory, have a right to complain against the Federal Government for uncovering large stretches of beach below the high water marks that obtained in the period beginning in 1860, no such complaint has ever been made because complainants have received the benefit, through increased navigation facilities, of these deepened outlet channels.

But the fluctuation which is constantly going on in the levels of the lakes, changing not only from year to year but from day to day, demonstrates that it is impossible,—and the Special Master so found,—to appraise the exact extent of damage to riparian rights resulting from the Chicago diversion. The briefs of complainants discuss this claim of damage throughout as if it were an appreciable and measured factor. They, therefore, totally disregard the Special Master's conclusions above quoted, and in all consideration of their arguments it should be remembered, that all that the Special Master has found the defendants to be responsible for, is an increase of the total reduction from original high-water mark, the amount of which, though found to be substantial, he finds cannot be determined from the evidence. And in considering the legal effect of this finding, the fact should be noted that natural causes at times bring back the levels to those existing before the diversion began, and so far as riparian damage is concerned, it is quite clear from the levels given in the report (joint abstract and table, p. 88), that there are many periods during which the diversion has continued, when there has been no riparian damage from this source, because the original levels had been restored by natural causes.

This absence of certainty of any riparian damage, both as to extent and duration, are highly important to consider, in view of complainants' contentions upon the 5th Amendment.

Complainants' briefs also discuss their claim for damage to agricultural and horticultural interests, from a theoretical change in water tables alleged to fluctuate with the lake levels and consequently to be lowered by the diversion.

This claim of damage was not sustained by the Special Master and complainants have not seen fit to include, in the Joint Abstract, the conflicting testimony upon which his conclusion was reached.

THE EFFECT OF THE MASTER'S FINDINGS AS TO REMEDIAL OR COMPENSATORY WORKS.

Complainants seek in their briefs to build a monumental case of damage to the navigability of the Great Lakes and to complainants' riparian rights, in support of their prayer for a drastic injunction looking to the future.

The Special Master found as a fact (Report, pp. 125-131), that compensating works in the outlet channels of the Great Lakes could, without interfering with navigation, be constructed at relatively slight expense, in such a way as to restore the original lake levels and thus entirely prevent any damage resulting from continued diversion,—thereby eliminating all substance from the alleged equities of this, the sole complaint of the Lake States.

COMPLAINANTS' PRESENT CONTENTION THAT THE CONDITIONS OF THE PERMIT HAVE BEEN VIOLATED.

The Special Master found (Report, p. 81):

> "It appears from the evidence that up to the time of the taking of testimony herein, the Sanitary District had substantially complied with the conditions of the permit" (of March 3, 1925).

Notwithstanding this finding, complainants in their briefs insist that the Sanitary District has violated the conditions of this permit. We shall not discuss the evidence referred to by them to support this contention, because the brief of Illinois and the Sanitary District will do so, but we submit that such portions of complainants' briefs as refer to matters entirely outside the record, should not be taken into consideration.

ARGUMENT.

INTRODUCTION.

The report of the Special Master contains a clear analysis of the legal issues, and a comprehensive and, we submit, conclusive discussion of each point of law involved, supported by ample citations of authority. Aside from our duty not to burden the court with repetition, it would be folly for us to attempt to improve upon the Special Master's statement of the law. We therefore beg leave to adopt his report as our brief upon the law of this controversy, and we shall here submit only a few points intended to answer certain arguments now presented in complainants' briefs, and thereby to supplement the reasoning of the Special Master as stated in his report.

THE MOTION TO DISMISS THE WISCONSIN BILL.

Before discussing the legal issues, we respectfully invite attention to the state of the record. A motion to dismiss the amended bill of Wisconsin, Ohio, Minnesota and Pennsylvania (in No. 7, Original), was filed, presented and argued. The Court disposed of this motion, in effect, by reserving it for decision until the Master's report came in, so it is still to be disposed of by the Court.

The basis of our motion to dismiss was, that this amended bill of said Lake States failed to disclose a sufficient interest either proprietary or quasi sovereign to invoke the exercise of the extraordinary original jurisdiction of this Court. For a discussion of the reasons in support of the motion and an analysis of previous decisions of this Court, we beg leave to refer to the briefs heretofore filed on behalf of the River States in support of said motion to dismiss, and we now respectfully ask that the motion heretofore made be sustained.

I.

THE PERMIT OF MARCH 3, 1925, WAS BASED ON ADEQUATE CONSTITUTIONAL GROUNDS SHOWING DIRECT AND SUBSTANTIAL BENEFITS TO NAVIGABILITY.

The urgent contentions for complainants, that the permit of March 3, 1925, was issued solely for the benefit of sanitation and water power and had no substantial relation to navigability, cannot avail to overcome the findings of the Special Master that the permit does benefit navigability in several substantial respects, and that the permit therefore rests on an adequate constitutional basis under the commerce clause.

There is, however, an additional and important basis having a direct relation to navigation, not mentioned by the Special Master but shown by the record, upon which the action of the Secretary of War in issuing the permit may also rest, viz. the duties to navigate the Mississippi that are expressly imposed on the Secretary of War by Sections 201 and 500, of the Transportation Act of 1920, and by the Inland Waterways Corporation Act of June 3, 1924. (43 Stat. L. 360.)

By these statutes Congress imposed a mandate on the Secretary of War, to conduct a common carrier transportation service on the Mississippi River, a duty necessarily predicated on the decision by Congress that its performance by the Secretary of War will be in the national interest for the benefit of navigation.

The extent to which the Middle West, and particularly the River States, have been suffering from what Secretary Hoover terms "economic distortions" due to maladjustment of transportation facilities and costs resulting from the World War, is a matter of common knowledge of which this Court can take judicial notice; and is also shown by the evidence heretofore mentioned and now before the Court.

That these economic evils are in process of relief by the increasing use of the Mississippi in interstate commerce, has also been shown.

So the Secretary of War, having authority under Section 10, to permit a diversion of water from Lake Michigan into the Mississippi and thereby to improve its navigability, is at the same time, though by later statutes, charged by Congress with the mandatory duty of navigating the Mississippi by operating a common carrier barge line.

And we respectfully submit, that in considering and deciding whether it would be for the benefit of navigation as a whole, to substantially improve the navigability of the Mississippi by exercising his authority under Section 10 and granting a permit to authorize this diversion, the Secretary of War was not only at liberty, but was in duty bound, to rest his conclusion that the diversion should be permitted, upon the direct aid that the diversion would give to him in the performance of his duty to conduct the barge line navigation on the Mississippi. This benefit constituted an additional constitutional basis for his action under Section 10. It broadened and strengthened the grounds for his action, and constituted an additional reason and purpose, resting squarely on navigability, for the permit that he issued.

This is particularly true, since the evidence shows that this added reason was expressly called to his attention at the hearing held by him prior to his decision that the permit should issue.

II.

THE CONFLICT BETWEEN THE CONTENTIONS OF THE COMPLAINANTS AS TO THE CONSTRUCTION TO BE GIVEN TO SECTION 10 OF THE ACT OF 1899.

In the New York brief (No. 12 Original), counsel merely doubt the master's construction and cite *Hubbard* v. *Fort,* 188 Fed. 987, without discussion. They refer to the prohibition of obstructions to navigation not affirmatively authorized by Congress, but admit (Brief, p. 56) that "Congress recognized the fact that certain local needs might require the placing of obstructions in and above (sic) navigable waters." This, as counsel recognize though attempting to qualify their admission, necessarily delegates to the Secretary of War legal authority to determine whether the particular obstruction for which his permit is sought, falls within the class which the statute authorizes him to permit. Counsel then argue that the permit of the Secretary of War is merely negative, a "withdrawal" of the broad power of the United States to forbid any obstruction.

In the Michigan case (No. 11, Original), counsel take the extreme, though entirely conflicting position, that the first clause in Section 10 forbids any obstruction at all except upon affirmative action by Congress. This position is argued at great length. Counsel suggest (Brief, p. 116) that only alterations of navigable capacity that do not in fact amount to obstructions, can be lawfully authorized by the Secretary of War's permit. If this be the construction of the statute, the Secretary is clearly given authority to determine whether a given project in fact amounts to an obstruction, and his permit amounts to his administrative finding that the work authorized is not a legal obstruction. Under well settled principles, such an administrative determination is not to be judicially set aside unless found to be entirely arbitrary or clearly beyond the statutory power.

At page 132 of this brief, counsel say:

> "Section 10 of the Act of March 3, 1899, definitely and positively prohibits '*obstructions to navigable capacity*'. IT DOES NOT PROHIBIT THOSE WORKS WHICH ARE IN AID OF NAVIGATION." (Italics ours.)

By this admission alone, counsel have disposed of their entire case. For, in the first place, on this construction of the statute the Secretary of War must have authority as a precedent to the grant of any permit, to determine whether in fact a particular alteration of navigable capacity benefits navigation as a whole. And such administrative determination is not to be set aside by a court except because of a clear and indisputable abuse of official discretion. And, on the facts in the case at bar, as we have shown above, the alteration of navigable capacity authorized by the permit of March 3, 1925, must have been found by the Secretary of War, to materially benefit navigation in important particulars.

In the Wisconsin brief (No. 7, Original) counsel say that the structures referred to in the second clause of Section 10, wharves, piers, dolphins, etc., "do not necessarily, or even ordinarily, create an obstruction to the navigable capacity" (Brief, p. 140). This very statement again implies that a question of fact arises in each instance upon the request for a permit. Counsel say, at pages 144-5:

> "Hence, a pier, dolphin, or other aid to navigation, which might be argued to constitute a technical obstruction to navigation at the precise point of its location on a navigable waterway, would nevertheless improve the navigable capacity of the waterway and would not be within the general prohibition of the first part of this section."

In the case at bar, the mere awarding of the Sanitary District permit by the Secretary of War raises a presumption, not to be lightly overcome, that the work authorized "improves the navigable capacity of the waterway." As counsel in these statements suggest, any such work, large or small, must almost inevitably to greater or less extent, obstruct navigation. On their own theory, the Secretary of War has delegated authority when application for a permit is made, to determine on all the facts, whether the amount of obstruction inevitably present is sufficiently overcome by the amount of resulting increase in navigable capacity.

In the case at bar, we have shown above, the nature, importance, and great extent of increase to the navigability of important waterways resulting from this diversion, and the further fact—usually not present—that at small expense all resultant temporary obstruction may, by the creation of compensation works, be entirely eliminated. We submit that these facts demonstrate there is no ground here for any claim ~~of abuse of~~ administrative authority.

If these several arguments really conflict with and contradict each other, this fact is persuasive that this court should accept the well founded, carefully reasoned conclusion of the Special Master. He said (Report, p. 190):

"The true intent of the Act of Congress was that

> unreasonable obstructions to navigation, and navigable capacity, were prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction.''

But it will be seen that each of these four constructions admits the delegation to the Secretary of War of some kind of discretion. New York admits an authority, not defined, to be delegated; Michigan, we contend, admits authority to authorize those structures which will benefit navigation; Wisconsin, goes further and admits authority to authorize an obstruction if it increases navigable capacity. The essential difference between these several interpretations of the statute is very slight. The Special Master's construction is merely broader than complainants in that he uses a general phrase obviously capable of meeting every question that could arise. Complainants' counsel, arguing more narrowly, do not, we submit, differ in essentials from the Special Master's conclusion.

The only question before this court, on any of these interpretations of Section 10, urged by complainants' counsel, is whether there has, in this case, been shown to be such an abuse of administrative authority as to require this court to set it aside. Complainants do not clearly meet this question. Their labored and lengthy arguments as to the interpretation of Section 10, are only designed to avoid the necessity of attempting to show a clear abuse of administrative discretion. They either deny any benefits to navigation resulting from the diversion, or ignore the existence of these benefits. But the Special Master found that such benefits—specific and substantial increases of navigable capacity—do in fact result from the Secretary of War's permit.

The familiar rule defining the extent of this court's jurisdiction to review administrative findings, is well stated in the language of Mr. Chief Justice White in the decision of this court in *Interstate Commerce Commission v. Illinois Cent-al Railroad,* 215 U. S. at page 470, in the following expression:

> "* * * we must consider (a) all relevant questions of constitutional power or right; (b) all pertinent questions as to whether the administrative order is within the scope of the delegated authority under which it purports to have been made; and (c) a proposition which we state independently, although in its essence it may be contained in the previous one, viz., whether, even although the order be in form within the delegated power, nevertheless it must be treated as not embraced therein, because the exertion of authority which is questioned has been manifested in such an unreasonable manner as to cause it, in truth, to be within the elementary rule that the substance, and not the shadow, determines the validity of the exercise of the power."

Complainants here, make no attempt whatever to bring their case within this rule. They merely urge a construction of Section 10, which avoids the necessity of asking this court to review the action of the Secretary of War in issuing the permit. The validity of the Secretary of War's permit tested by this rule, is indisputable.

III.

CERTAIN ADDITIONAL SUGGESTIONS IN SUPPORT OF THE SPECIAL MASTER'S CONSTRUCTION OF SECTION 10.

An analysis of the reasoning of the Special Master on the correct construction to be given to Section 10, as compared with the reasons urged in complainants' briefs in their attempt to attack his conclusions, shows that complainants' attempts are fully met and overcome by the reasoning and authorities in the Special Master's report.

There are, however, two points upon which additional suggestions seem justified:

(1) Any study of Sections 7 and 9 of the Act of 1899, as compared with Sections 9 and 10 of the Act of 1890, will show by the rearrangement in the Act of 1899, of the several classes of obstructions and by the method prescribed for obtaining Congressional consent as to each class, that when there was *an intent to require dual consent* (of Congress and of the Secretary of War, *such intent was clearly expressed.*

Thus it is indisputable, that in respect of the particular obstructions (bridges, etc.) named in Section 9 (Act of 1899), Congress considered their nature to be such as to merit the consideration and consent of Congress itself, supplemented or accompanied by the approval of the chief of engineers and of the Secretary of War. Consequently, in said Section 9, we find a prohibition of the commencement of construction of certain specified obstructions until the consent of Congress to the building of such structures, shall have been obtained, *and* until the plans for the same shall have been submitted to and approved by the chief of engineers and by the Secretary of War.

Two conclusions are necessary from the above provision requiring dual consent: (a) that Congress intended that as to certain enumerated obstructions, it would require dual consent; and (b) that the intent in drafting said Section 9, was to gather into Section 9, the particular kinds of obstructions as to which Congress intended to require dual consent.

Having thus by Section 9 singled out and included within it, those particular obstructions as to which Congress intended to require dual consent, and having as to said obstructions clearly expressed its requirement of such dual consent, Congress then proceeded in Section 10 to deal with all other kinds of obstructions and work affecting navigability; and it did so by again grouping into classes certain kinds of obstructions, and as to each class prescribed what form of Congressional consent should be necessary in order to render them lawful, but as to neither of these classes, did Congress use any language similar to that used in Section 9 by which it had expressed its requirement of dual consent.

We therefore respectfully submit that it is clear that Congress did not intend any of these particular kinds of obstruction enumerated in the separate classes described in Section 10, to require dual consent, and that consequently the only consent expressed in Section 10, namely, that of the Secretary of War upon the recommendation of the chief of engineers, can be considered as intended by Congress.

(2) As an additional consideration supplementing the reasoning of the Special Master, and particularly concerning the contention strongly pressed in one of complainants' briefs,—that the first clause of Section 10 forbids all obstructions to navigation and that, therefore, all of the subjects of the later two clauses of the section must be first affirmatively authorized by Congress,—we suggest the following answer to this construction of the statute.

The last two clauses of the statute would require, under complainants' construction, first an affirmative act of Congress and second a permit authorized by the Secretary of War upon the recommendation of the chief of engineers. But, any subsequent Congress might decide to grant its permission by specific statute without also requiring any administrative action by the Secretary of War. This would clearly be within the power of Congress, and in earlier years was its usual practice. Complainants' construction necessarily implies that the requirement as to permit from the Secretary of War in the last two clauses, either is an attempt to impose a restriction upon the actions of future Congresses by prohibiting them from directly granting Congressional permission for a particular obstruction without the added action of the Secretary of War,—a construction that would be clearly void; or else the specific language requiring administrative permits must be entirely disregarded. Under well-settled rules of statutory interpretation such a nullifying construction of this section, whose ambiguity is emphasized by the inability of complainants to agree upon its meaning, must be avoided if any other reasonable construction can be found.

IV

THE DECISION OF THIS COURT IN SANITARY DISTRICT VS. UNITED STATES, 266 U. S. 405, HAS DETERMINED THE CONTROLLING ISSUES OF LAW INVOLVED IN THE MERITS OF THIS CONTROVERSY.

We present this point because of the efforts in the briefs for complainants, to limit the effect of the decision in the Sanitary District case within much narrower scope than is justified by the decision itself, and so to minimize its effect in the instant case.

Thus in the brief for Wisconsin (page 162), counsel say (italics ours):

> "*All that is involved* in the decision in *Sanitary District* v. *U. S.* 266 U. S. 405, 426-429, which is in

> part quoted by the Special Master, is *that the obstruction of the navigable capacity of the Great Lakes* is clearly *prohibited by the first part of Section* 10. The question *whether the Secretary of War had the authority to authorize an obstruction to the navigable capacity* of the waters of the United States *was not before the Court, nor involved in the decision.*"

And in the brief for Michigan (page 148), counsel say (italics ours):

> "The decision of this Court in *Sanitary District* v. *United States, does not construe or interpret Section* 10 as *delegating power to the Secretary of War to affirmatively authorize an obstruction to the navigable capacity of the Great Lakes.*"

And on page 149, same brief, counsel also say (itali[illegible] ours):

> "The use made of Section 10 in that case was *confined to its first clause.* The second and third clauses and the extent of the power under them, *was not discussed because not involved.* It is respectfully urged that this Court *is not committed to any construction of the second or third clauses of Section* 10 by anything said or any principle involved in that case."

We respectfully submit, that even a casual reading of the opinion of this Court in the Sanitary District case, discloses that the above quoted statements are incorrect and incomplete, and that the following points were there decided in relation to this very diversion of water from Lake Michigan, and in a case, in the briefing and argument of which all of these same Lake States participated on the side of the Government in seeking to sustain the very powers of the Secretary of War that the Lake States now attack, and in which several of these same River States participated on the side of the Sanitary District, in seeking to question the extent of the power of the Secretary of War under all portions of Section 10. So the construction of Section 10, was involved and discussed and the court decided:

1. That this diversion of water from Lake Michigan is of such "national importance," that it "cannot be done without the consent of the United States" (266 U. S. at page 426).

2. That Section 10 of the Rivers and Harbors Appropriation Act of March 3, 1899,

> "Repeatedly has been held to be constitutional in respect of the power given by the Secretary of War," (266 U. S. at p. 428).

3. That the same Section 10 was quoted, discussed and construed by the court in its opinion:

(a) As "covering," *i. e.,* applicable to and determinative of, the Sanitary District case, in which the Government successfully contended that the diversion then being made was unlawful, because and to the extent that, the quantity of water being diverted *exceeded that expressly authorized by the permit* then in effect.

(b) As so applicable and determinative, *even though the diversion authorized by the Secretary of War* under Section 10, *might "change the condition* of the Lakes and the Chicago River, admitted to be navigable," *even to the extent of creating "an obstruction to their navigable capacity";* and

(c) As applicable "prospectively to the water henceforth to be withdrawn"; and

(d) As holding that the withdrawal then being made, "*is prohibited* by Congress *except so far* as it *may be authorized by the Secretary of War,"*—meaning, of course, by a permit.

These conclusions, (a) to (d) inclusive, seem unavoidable, from the following part of the opinion (italics ours):

Referring to Section 10, as applicable to the Sanitary District case, the court said (266 U. S. at p. 429):

> "There is *neither reason nor opportunity* for *a construction that would not cover the present case. As now applied* it *concerns a change in the condition* of the Lakes and the Chicago River, admitted to be navigable, and, *if that were necessary, an obstruction to their navigable capacity, U. S.* v. *Rio Grande Dam & Irrig. Co.* 174 U. S. 690, without regard to remote questions of policy. It *is applied prospectively to the water henceforth to be withdrawn. This withdrawal* is *prohibited by Congress, except so far as it may be authorized by the Secretary of War.*"

We respectfully submit that this last sentence means, and it can only mean, that *so far as authorized* by the Secretary of War under Section 10 of the act, this withdrawal of water *is not prohibited* by Congress, *and is therefore valid.*

Further, in speaking of the contentions of the River States, the opinion says (266 U. S. at 431, italics ours):

> "The interest that the river states have in increasing the artificial flow from Lake Michigan is not a right, but merely a consideration that they may address to Congress, if they see fit, to induce *a modification* of *the law that now forbids that increase unless approved as prescribed.*"

The words "unless approved as prescribed" necessarily mean, in the connection in which they were used, that the authorization of the Secretary of War and the approval of the chief of engineers under the later parts of Section 10, would *render lawful* a diversion *that without them* would be *forbidden by the first part of Section* 10.

In saying that "the interest that the River States have *in increasing* the *artificial flow* from Lake Michigan is not a right, etc.," we understand the court to mean that if the River States seek (as they did in the Sanitary District case) *a larger diversion than is authorized by a permit of the Secretary of War under Section* 10, they would have to obtain Congressional action *modifying Section* 10, *"the law* that *now forbids that increase unless approved as prescribed."*

But the River States, conforming to the above decision, respectfully contend in the instant case, that by obtaining the permit of March 3, 1925, the Sanitary District did obtain from Congress through the Secretary of War as agent of Congress, authority to make the diversion now under attack, and that the increase in the amount being diverted is not forbidden by Section 10, because it has thus been "approved, as prescribed" by Section 10.

Consequently, no question of title in the River States is here involved.

But the Court says that the "interest" of the River States "in increasing the artificial flow from Lake Michigan is not a right, but merely a consideration that they may address to Congress * * *"; so it follows, necessarily, that the River States may present their interests to the agent of Congress if, as we have shown, Congress has delegated to an agent authority in the premises. Clearly the court here decided that the interest of the RiverStates, if supported by the facts, constitutes a consideration, which the Secretary of War must take into account.

Even the direction in the opinion concerning the decree to be entered, shows that the decision was predicated on the conclusion by the court that a permit for the full amount being taken, *would have been a valid de-*

fense. Thus the court said (266 U. S. at 432; italics ours):

> "The decree for an injunction as prayed is affirmed, to go into effect in sixty days—*without prejudice* to *any permit that may be issued by the Secretary of War according to law.*"

It should be noted that the attitude of the Government in the Sanitary District case was, that the diversion of water then being made, was unlawful because and to the extent that the quantity then being taken, *exceeded* that *expressly authorized* by the permit then in effect. And the whole theory of the Government's case was predicated on the contention that the diversion was lawful under the permit to the extent of the quantity allowed by the permit to be taken, but *was unlawful as to any quantity in excess of that allowed by the permit.*

The conclusion is therefore inevitable, that the decision in the Sanitary District case not only upheld the constitutional validity of Section 10, but it also construed all parts of the Act of March 3, 1899, as meaning, that the Secretary of War had power upon the recommendation of the chief of engineers, *to authorize* the Sanitary District *by his permit, to divert* from Lake Michigan *such quantity of water and under such conditions to be observed by the permittee,* as the Secretary of War might in the reasonable exercise of his power, find appropriate in the interests of navigation and navigability.

If the contentions being made in complainants' briefs, as to the scope and meaning of Section 10, had any merit, it would have been wholly unnecessary for the Court in the Sanitary District case, to do more than hold that *direct* authorization by Congress was necessary under Section 10. Such a ruling would have ended the entire controversy. And the fact that the Court did not so hold, but did hold in effect, that even though the direct consent of Congress had not been obtained, nevertheless a diversion to the extent authorized by permit of the Secretary was valid, argues conclusively that the later parts of Section 10, were not only construed, but were upheld as giving the Secretary of War power *by his permit to authorize this very diversion.* And this, even though the diversion did *create* "*an obstruction* to the navigable capacity" of the Great Lakes.

V.

THE NATURE AND EXTENT OF THE DAMAGE TO THE COMPLAINANTS' RIPARIAN RIGHTS DOES NOT CONSTITUTE A TAKING OF THEIR PROPERTY WITHIN THE MEANING OF THE FIFTH AMENDMENT.

As we understand complainants' position, they admit that their rights in navigation on the Great Lakes are subject to the exercise of the paramount power of Congress to control navigation; but, they insist, that they have such a title to the lands within their respective borders beneath the waters of the Lakes, as to make the damage to their riparian rights constitute a taking of property within the meaning of the 5th Amendment.

Assuming for argument only, but not admitting, that this Amendment applies to the case at bar, we respectfully submit that the character of damage as found by the Special Master to have been suffered by complainants from the diversion, falls far short of a "taking" of property within the meaning of the 5th Amendment.

The Special Master found (Report, p. 117):

> "But there is sufficient evidence to require the finding that a lowering of six inches has been a substantial contribution to the injury caused by the total reduction, in connection with fishing and hunting grounds, the availability and conveniences of beaches at summer resorts, and public parks."

And again (Report, p. 118):

> "My conclusion on this branch of the case is that, while the damage proved to have been sustained by the complainants, has been due to the combination of causes which have brought about the total lowering of the levels of the lakes, the contribution made by the diversion of the water of Lake Michigan through the Chicago Drainage Canal must be regarded as substantial, although the proportion of the damage caused by the reduction of approximately six inches is not susceptible of exact computation."

We submit that the Special Master's conclusion therefore is, that due to both natural and artificial causes, other than this diversion, there would in any event have been a lowering of the levels of the Great Lakes, which would have caused this identical damage but to an indeterminately lesser degree. The Special Master's finding, therefore, is that there is no proof of damage to riparian rights which can be found to be exclusively due to the acts of these defendants.

The Special Master has reviewed the decisions of this court at length in his report, and has cited all of the pertinent cases. The sum and substance of these decisions as applicable here, is, that to constitute "a taking" of property within the meaning of the 5th Amendment, there must be a certain, inevitable deprivation of the right or opportunity to use specific property over at least a materially definite period of each year, which interruption of use amounts to a complete denial of a user otherwise existing. No case can be found, and the complainants do not cite any, where a taking of property has been legally found to result from a mere increase of damage or interruption to user, which would otherwise, due to other causes for which the defendant is in no wise responsible, inevitably have existed.

The 5th Amendment has been held to be a limitation upon the power of eminent domain where a taking has occurred in fact within the meaning of this limitation; in most instances it has been held by this Court that as the result of the exercise of the power of eminent domain, actual title to the property taken has been transferred by the mere act of taking. It is undoubtedly due to this view of the effect of the amendment, that this Court is always careful to point out that a constitutional taking requires a permanent and continuous damage.

In the case at bar, the Special Master has found that the levels of the Great Lakes may be restored to what they would have been had the diversion not taken place, or even to higher levels, by the construction of compensating or regulating works in the outlet channels. (Report, pp. 125-131.)

The report of the Special Master at page 54, quotes Article 4, of the Treaty of 1909, between the United States and Canada. This article provides, that except in cases provided for by special agreement between them, the High Contracting Parties will not permit the construction of remedial or protective works, the effect of which is to raise the natural level of waters on either side of the boundary, unless the construction or maintenance thereof is approved by the International Joint Commission. In other words, the Treaty itself contemplates the construction of such remedial works, and in view of the fact that the United States Government has authorized through the permit of the Secretary of War this diversion, which has caused the damage above referred to, and is well advised that this damage can be entirely eliminated by the construction of these works, we respectfully submit that this court should indulge a presumption that the continuance of this damage will be relatively brief—so brief that aside from other considerations, its relatively slight duration alone, would prevent it from being construed to be a taking of property within the meaning of the 5th Amendment.

Article IV of the Treaty of 1909 with Canada (Report, p. 54) contemplates the construction of such remedial works. One of the conditions of the Secretary of War's permit of March 3, 1925, required the Sanitary District to deposit $1,000,000 toward the payment of its share of the cost of such remedial works, and this deposit has been made.

Can a partial temporary damage, which can be entirely eliminated, and toward the elimination of which Illinois and the Sanitary District have already done everything required by the United States, be regarded—whatever be its present character or extent—as a taking of property within the meaning of the 5th Amendment?

VI.

THE ADMITTED ECONOMIC RIVALRY AT THE BOTTOM OF THIS CONTROVERSY IS ITSELF, SUFFICIENT TO JUSTIFY THE PRESENT EXERCISE OF THE CONGRESSIONAL POWER TO REGULATE COMMERCE.

In the brief filed in No. 7, Original, the Wisconsin case, at page 110, the following statements are made:

> "It is not too much to say that the whole industrial and commercial structure of the United States has been built about the existence of two great waterways separated by the *Continental Divide*, opening interstate and international communication by the St. Lawrence on the one hand and the Mississippi on the other. Each has its natural advantages. In the basin of each of these waterways, vast populations have built up their social and industrial institutions and use to the maximum these natural

> advantages. An intense but constitutionally restrained rivalry exists between the two sections and the dominant character of their respective civilizations, has been determined, throughout the past one hundred years, as much by their respective advantages as by their common advantages.
>
> That the natural advantages of the Great Lakes region should now be sacrificed to the drainage of Chicago or to the improvement in the navigable depths of the Mississippi would be at variance with the just expectations of the states and their peoples, who have settled the Great Lakes region and built it into an efficient industrial empire."

The foregoing statement suggests the self-evident fact that the commercial structure of the United States exists solely by virtue of the constant interplay of interstate commerce between all of the various regions and localities of this country. As commerce is, in the main, directed by self interest, rivalries between localities necessarily exist as well as between individuals, and the complainants admit that sectional rivalry is at the bottom of this controversy. It is submitted that the unequal results of such sectional rivalry and the evils following its uncontrolled exercise, were the actuating causes for giving to the Federal Government the power to regulate interstate commerce, including, of course, the power to create channels of communication usable by such commerce.

We submit that in the foregoing statement of complainants the real gist of the complaint presented by the Lake States is very clearly indicated. By the gift of nature they possess an unequalled channel for water communication stretching from their shores to the Atlantic Ocean. The Middle West, chiefly dependent upon agriculture, in order to compete in world markets on an equality with other regions not only in this country but abroad, is seeking a practicable channel for water communication, which alone, by the economies of such carriage, will relieve this vast section of our country from economic burdens now weighing heavily upon it.

Can there be any question that in the exercise of its power to regulate commerce, Congress is authorized to create such a channel when it is apparent that this will tend to remove discriminations seriously retarding the growth and prosperity of the entire Mississippi Valley? Is it not apparent that this sectional rivalry, thus admitted by the complainants, will tend to disappear when this water channel of communication extending from the Gulf, up the Mississippi Valley, is perfected and made available not only for the Mississippi Valley but by the connection of the Illinois River, through the Drainage Canal into Lake Michigan, to all of the complainant states? Substantial benefits from this new instrument for the conduct of interstate commerce are necessarily bound to inure to the complainants as well as to the defendants. Can there be any question but that the power of Congress is sufficient to reach out of its own accord, without regard to state action, to create such a channel of communication which would tend to minimize existing inequitable economic burdens and eliminate a sectional rivalry which through recent years, due to increasing competition, has become more and more acute and if permitted to exist uncontrolled, certain in the future to prove of serious detriment to the national welfare?

If the power is broad enough for this purpose, as we submit its description above demonstrates, still more has Congress the authority to permit a state, by its unaided efforts, to bring about such beneficial results. No state could be expected to assume the expense and burden of this construction if it did not receive very direct and demonstrable individual benefit. The fact that Illinois is able to solve an acute sanitary problem and relieve itself of some of the expense through the incidental development of power, certainly is no argument against the wisdow of the executive branch of the Government, exercising the authority conferred upon it by the legislative branch, to authorize the defendant Illinois to bring into being such essential benefits to the nation at large.

We also submit that the selfish desire of the complainant states to maintain an advantage, the mere existence of which imposes a serious burden upon many sister states, is certainly no consideration to address to the conscience of a chancellor.

Conclusion.

We again respectfully call attention to the fact that in its essence this suit is an attack on *an administrative act* of the Federal Government. The judicial department is being asked to interfere with the political department. This Court is being asked to enjoin an administrative act of the Secretary of War (as the agent of Congress), done by him in the exercise of a power that this Court has already held was validly delegated to him by Congress, in respect of this same diversion.

We therefore respectfully submit that this Court should enter a decree adopting the Special Master's report in all particulars, sustaining defendants' motions to dismiss the bill in the Wisconsin case (No. 7, Original) for the reason that the bill fails to disclose sufficient interest in the complainants to justify an exercise of this court's original jurisdiction, and dismissing the bills in the other two cases for want of equity.

Respectfully submitted,

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CHARLES ELMORE CROPLEY
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.

No. ~~7,~~ 6
Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

No. ~~11,~~ 10
Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

No. ~~12,~~ 11
Original.

Brief for Defendants, Illinois and the Sanitary District of Chicago.

CHAMPLIN LAW PRINTING COMPANY, CHICAGO

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IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.
No. 7, Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 11, Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 12, Original.

Brief for Defendants, Illinois and the Sanitary District of Chicago.

PRELIMINARY STATEMENT.

In support of their exceptions, the complainants have filed one brief in each of these three cases. The principal criticisms, appearing in each brief are common to all of them.

For convenience in replying, the arrangement of the brief filed by Wisconsin, *et al.*, will be followed so far as possible, referring at appropriate places to additional criticisms or arguments, appearing in the briefs of Michigan and New York.

Some of the exceptions are not urged. A joint abstract of those portions of the record pertinent to a consideration of the exceptions relied upon has been prepared. Therefore, it is assumed that all exceptions to findings of fact, which are not supported by the joint abstract, are waived. New York has expressly laid aside all of "its exceptions to the Special Master's findings of fact, and accepts his report on the facts as though wholly correct" (N. Y. Brief 11).

The findings of fact, to which exceptions are now pressed, are:

(1) "It appears from the evidence that, up to the time of the taking of the testimony herein, the Sanitary District had substantially complied with the conditions of the permit (March 3, 1925)" (Master's Report 81).

(2) "Before the diversion began in 1900, the official reference datum for Federal improvements and for obtaining and maintaining the established project depth in the Illinois River was the low water of 1879. Since then, this reference datum has been officially changed from time to time, so as to conform to existing low water as affected by the diversion" (Master's Report 71).

(3) "The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than 1,000

c.f.s. of water is sufficient to supply all the needs of navigation. I am unable so to find. The needs of navigation on that waterway will depend upon the carrying out of plans already adopted and upon the ultimate decision of Congress with respect to water communication between Lake Michigan and the Mississippi River, the extent to which locks and dams are to be used or installed, that is, the character of the improvements and the amount which it is determined to expend" (Master's Report 122).

(4) "With present diversion, the depth will be about nine feet. If the diversion were reduced materially below 4,167 c.f.s., it would necessitate radical changes in the design and location of the locks, three of which are already either constructed or under construction, and increased outlays" (Master's Report 119).

(5) "The profile map accompanying the plans" (for Illinois Waterway, approved by Chief of Engineers and Secretary of War) "contains a notation that the water services shown were 'based on an assumed flow of 4,167 c.f.s., already approved, as a diversion from Lake Michigan, plus the normal flow from other sources in various pools'; that is, the assumption was of 6,000 c.f.s. flow, made up of 500 c.f.s. as an actual low water flow, 4,167 c.f.s. from Lake Michigan, and 1,395 c.f.s., as averaging the amount of Chicago's pumpage" (Master's Report 120).

(6) "My conclusion is that the diversion from Lake Michigan through the drainage canal increases to some extent during low water the navigable depths over the bars on the Mississippi River, but that the extent of this increase is not the subject of sufficiently accurate determination to warrant a finding. Upon all the facts, it was permissible for the Secre-

tary of War to reach the conclusion that the diversion from Lake Michigan of 8,500 c.f.s., was to some extent, an aid to the navigation of the Mississippi River in time of low water" (Master's Report 124).

(7) "This evidence simply serves to show the national interest in the navigation of the Mississippi River, and this may well be taken for granted; but the question here is considered to be one with respect to the effect of the Chicago diversion in giving an improved depth of channel. It is not controverted that the Secretary of War had these considerations before him, on the application and hearing which resulted in the permit of March 3, 1925" (Master's Report 125).

(8) "So far as the diverted water is used for the development of power, the use is merely incidental" (Master's Report 165 and 25).

(9) "In the present instance there seems to be no opportunity for dispute as to the long continued and uniform construction of Section 10 of the Act of 1899 by the War Department. It has been its view that in the cases for which provision is made in the last two clauses of Section 10 of the Act of 1899 a specific authorization by congressional act is not required and that the action of the Secretary of War upon the recommendation of the Chief of Engineers is sufficient" (Master's Report 185).

The Master's Report is a complete and succinct statement of the facts. It requires no embellishments or additions. Yet counsel have chosen to re-state in their own language many of the findings of fact, to which no exceptions are now pressed. In many instances their exposition of the facts is wholly improper and misleading.

As to findings of fact to which exceptions are now pressed, we believe that the joint abstract of record clearly shows that if the Master had not found as he did, but had found as complainants contend, he would have found contrary to the manifest weight of the evidence.

At the outset it should be borne in mind that:

> "As the case was referred by the court to a Master to report, not the evidence merely, but the facts of the case, and his conclusions of law thereon, we think that his finding, so far as it involves questions of fact, is attended by a presumption of correctness similar to that in the case of a finding by a referee, the special verdict of a jury, the findings of a circuit court under Revised Statutes, Sec. 649, or in an admiralty cause appealed to this court."
>
> *Davis* v. *Schwartz,* 155 U. S. 631, at 637.

See, also,

Hutchins v. *Munn,* 209 U. S. 246, 250.

BRIEF ON FACTS.

I.

Between the finding of the Master that defendants' diversion is one of a combination of causes contributing to injury in a substantial but undetermined amount and complainants' predication thereon of "destruction of their navigation" and of "immense and incalculable loss," there is a wide difference which must be emphasized in any consideration of law, fact, equity and remedy in this suit.

The Master limited his consideration of the question of injury sustained to a determination of a sufficient showing of interest of complainant states and injury thereto to sustain their status as complainants under the principles of this court governing suits between states. Since his final conclusion was that the suits should be dismissed, he found it unnecessary to appraise injuries even to the extent necessary to balance equities in the event that the prayer of the bills should be considered. We understand that the full extent of his finding was that there is damage at least sufficient to take the case out of the rule *de minimus*—"substantial" damage.

The evidence showed that in the year this suit was filed, Lake Michigan was at its lowest level in sixty-five years, and 32 inches below its fifty-year norm (Master's Report 88). The witnesses generally testified to damages sustained by reason of this lowering of nearly a yard (Master's Report 116). The Master found that the lowering effect of defendants' diversion is 6 inches; that it is one of a combination of causes contributing to certain of the injuries in a substantial but undetermined amount. Apart from the technical findings, it must be obvious that while in such a situation a lowering of 6 inches might make a substantial contribution to a combined effect, there is no tenable conclusion that such a small proportion of the total lowering is a matter of vast concern.

Complainants, however, seize upon the Master's finding, magnify it beyond reason and end by making an argument that could be no more frantic if their lives, their fortunes and their sacred honor were at hazard. The witness Markham (Master's Report 114) estimated that if, in 1923 (an extreme low-water year), there had been six inches more draft, the Lake Superior traffic could have been carried on the larger freighters with the elimination of about thirty freighters of the smaller class from traffic. The loss here then was the difference *in cost* between carrying a small proportion of the lake cargo on large rather than on small craft.

Observe how complainants utilize this testimony (Wis. Brief 9). They multiply the difference in displacement due to six inches lost draft—not by the *increase in cost*—but by a freight rate (which is not *the* freight rate) and leave the implication that the result applies to every trip of every vessel.

The testimony as to damage applied to the lowest-water years in sixty-five years' experience and in view of the present rapidly mounting levels of the lakes is even now inapplicable. Of course, all vessels are not loaded to capacity on every trip. The up-lake movement is largely in ballast. Ships carry coal up-lake practically as ballast and at stop-loss freight rates and no hindrance to the up-lake movement is shown. There was no evidence of loss to anyone on the coal movement. The iron-ore movement is shown (Master's Report 112) to be two-thirds of the remainder of lake-borne traffic.

Lake commerce is said to be 44 per cent of the total water-borne commerce of the United States (Wis. Brief 10). These are impressive figures, but they lose some of their impressiveness when we reflect that 58 per cent of the ton mileage is about the heaviest and lowest grade freight in the category—iron ore, that grain enters into the ton-mile computation to the extent of 11 per cent of all and about 50 per cent of it is Canadian (Master's Report 110-112).

We do not wish to be understood as minimizing the importance of lake-borne traffic or to argue against the Master's finding of substantial damage, but we do wish to refute the implication of impending national tragedy in complainants' briefs. The fact that the lakes are an important highway of commerce bearing a vast tonnage, leads to no such conclusion as that the coal supply and the mining industry of the up-lake states and the steel-making industry and food supply of the down-lake states is threatened or even consciously impaired by anything defendants have done (Wis. Brief 11-12).

Complainants imply that the Master's Report finds a proved damage to docks due to complainants' diversion. We do not understand that the Master made such a finding. A vertical pile must be kept moist to its top or it will decay. Since many piles along the lakes have been installed, the lakes have fallen some 32 inches. The piles have decayed. They would have decayed had there been no diversion. Had the diversion stood alone they would not have decayed because capillarity keeps them moist for 11 inches from the waterline. The Master found specifically (Master's Report 117),

> "Instances of such decay have been given, and the damaging effect at Milwaukee of the lowering of the level of the adjacent waters has been shown. But the

extent to which ~~the six~~-inch reduction in that level has contributed to this injury does not clearly appear."

The Master's finding with reference to property damage of a non-navigational character, merely was that much of the testimony permits of no satisfactory conclusion "that can be attributed exclusively to the Chicago diversion" (Master's Report 116, 117). He concludes with reference to fishing and hunting grounds, availability and convenience of beaches at summer resorts and public parks, that the lowering of six inches has been "a substantial contribution to the injury caused by the total reduction" in lake levels due to all causes (Master's Report 117). So that this damage is most remote and inconsequential and not possible to be measured. On the claimed damage to agricultural and horiticultural interests, the Master concludes that the "injury alleged" has not been "sufficiently shown to warrant its consideration" (Master's Report 117).

These are the plain findings of the so-called "property damages of a non-navigational character" (Wis. Brief 13-15). Yet counsel refer to these damages as "immense." What the cost of reconstructing dock walls in Montreal Harbor has to do with damage to docks, wharves and piers in harbors and landings along the shore lines of the complainant states, we are unable to conjecture.

As to the elaborate, but tenuous and bucolic evidence offered of injury to agricultural and horticultural interests, the Master has found (Master's Report 117) that it failed of proof. His words are "not sufficiently shown to warrant its consideration."

Of course, one measure of damage is proof of the means and amount by which it can be compensated and this matter is amply covered in the Master's Report, pages 125-131, where it is shown by a singular unanimity of the reports of every engineering body (and there are many) who ever examined the subject that the effect of every injury considered in this suit could readily, and relatively cheaply, be offset by simple and certainly effective remedial works in the outlets of the lakes, and further that such works would remedy not only the effects of our diversions but the far greater effect of the whole congeries of artificial causes which have affected these waters adversely and do so with concomitant benefits to be derived in no other way. All complainants have to say to this is to raise such technical objections as that they ought not to be considered because they depend on the action of Congress and the consent of Canada—this is too serious a matter to be caromed off in that light fashion. If complainants are sincere in seeking to have navigation restored, they should welcome such a solution for it is by all odds the best available.

II.

The War Department—and not defendants—is now in control of this diversion. Its policy of control has been succinctly stated. Under that policy and under the facts in this case, there is and can be no threat of increase in damage to complainant states.

Complainants assert (Wis. Brief 6) that since the domestic pumpage shows a steady and rapid increase, there is no definite limitation of the claim of right to divert waters, and refer to the table on pages 22 and 23 of the Master's Report, wherein by years from the time of the opening of the Drainage Canal in 1900, when the population of the Sanitary District was about a million and a half, to and including the year 1926, when the population was approximately 3,300,000, the sewage flow or pumpage is shown. This sewage flow was 449 c.f.s. in 1900, and in 1926, 1,395 c.f.s., indicating simply the normal increase of pumpage due to increase in population. This pumpage is small in comparison with the total diversion and is to be limited, if not reduced, by the condition of the permit requiring the metering of the water supply (Master's Report 76).

Conditions 7 and 9 of the permit of March 3, 1925, are, viz.:

> "7. That the execution of the sewage treatment program and the diversion of water from Lake Michigan *shall be under the supervision of the U. S. District Engineer at Chicago, and the diversion of water from Lake Michigan shall be under his direct control in times of flood on the Illinois and Des Plaines Rivers.*
>
> 9. That if, in the judgment of the Chief of Engineers and the Secretary of War, sufficient progress has not been made by the end of each calendar year in the program of sewage treatment prescribed herein so as to insure full compliance with the provisions of condition 4, this permit may be revoked without notice."

It is further to be remembered that this diversion, beyond 4,167 c.f.s., now stands enjoined by a decree of this court "without prejudice to any permit that may be issued by the Secretary of War according to law." The conditions quoted above are part of the permit so issued by the Secretary of War. On February 2, 1922, the Secretary of War succinctly states the policy of the War Department, viz. (Master's Report 71):

> "It is clear that, under the condition of affairs created by the Chicago Sanitary District, the diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago. It is by no means established, however, that the quantity required for that purpose, either now or

> in the future, is 10,000 cubic feet per second. I regard it as inadvisable to permit the diversions in that amount, or in any amount exceeding the amount now fixed by the Department, without full and complete information concerning the necessity therefor. It is my view that the quantity authorized should be limited to the lowest possible for sanitation, after the sewage has been purified to the utmost extent practicable before it is discharged into the sanitary canal. I regard it as extremely inadvisable to grant the city of Chicago, or any other agency, the right in perpetuity to take from the lake a definite quantity of water. It is not improbable that within a generation a method may be found to separate the valuable fertilizing elements from sewage, as a consequence of which the withdrawal of water from the lake to dilute the sewage will no longer be necessary."

Under such circumstances the argument (Wis. Brief 15, 53, 58) that the defendants threaten to increase the damage and will do so if complainants' prayer is not granted becomes untenable. Their apprehension, if any, must be in respect of the power and willingness of the United States justly and sincerely to govern this matter which has thus been so entirely absorbed within its control.

III.

The history of this canal and of Federal, Congressional and Administrative action in respect thereof, while found by the Master not to constitute direct Congressional authorization of this diversion, yet establishes:

(a) That, in its relation to the national system of internal navigation, it is and ever has been a navigation project.

Complainants contend that none of defendants' acts have any relation to navigation, that the navigation element is an afterthought dragged in, after complainants began to complain, for the purpose of concealing what they say is the true and sole purpose of defendants' works—sanitation (Wis. Brief 16). They say that Congress never contemplated defendants' acts save with disapprobation, that it never contemplated any authorization of them by the Secretary of War and that all that defendants have done has been in contumacious defiance of the Federal Government and of the rights of sister states.

On this subject, the Master has clearly stated the situation:

> "There is no doubt that the diversion is primarily for the purposes of sanitation. Whatever may be said as to the service of the diverted water in relation to a waterway to the Mississippi or as to the possible benefit of its contribution to the navigation of that river at low water stages, it remains true that the disposition of Chicago's sewage has been the dominant factor in the promotion, maintenance and development of the enterprise by the State of Illinois and the Sanitary District. The purpose of utilizing the flow through the drainage canal to develop power is also actually present, although subordinated to the exigencies of sanitation. So far as the diverted water is used for the development of power, the use is merely incidental" (Master's Report 165).

Again the Master states in his report (26):

> "It does not appear that the mean monthly or the mean daily flow at any time during the operation of the drainage canal exceeded the amount required by the State of Illinois, under the Act of 1889 as amended, for dilution purposes, that is, 20,000 cubic feet per minute for each 100,000 of population."

The Master's final conclusion requires no additional support by citing the following history, but a proper refutation of some portions of complainants' briefs and a proper understanding of the bearing of the historical record, set forth in the Master's Report on these assertions of complainants does require some comment.

Complainants contend that all defendants have done has no relation to navigation, and that the navigation element is speciously dragged in to mask the use of the canal for sanitation (Wisconsin Brief 16-52; Michigan Brief 34-50; New York Brief 13-18).

Congress secured the site of the canal by Indian treaties of 1795 and 1816, and by Act of 1818 amended the act delineating the boundaries of Illinois to make them include this site for the purpose of inducing the state to open water communication between Lake Michigan and the Illinois River (page 1677, 32 Annals of 15 Congress).

The report of the Master discloses (11) that the site of the canal was an ancient waterway of exploration, colonization and trade; that the feasibility and military and commercial importance of a continuous water connection was early emphasized and that by the Acts of 1822 (3 Stat. 659) and 1827 (March 2, 1827) Congress authorized and aided the construction of a canal along this site. It will be recalled that in the first quarter of the last century, the power of Congress itself directly to undertake internal improvements was seriously questioned and the means usually employed was to aid the states by land grants. The authorization and intention of the early canal contemplated a water level route drawing water from Lake Michigan and discharging it into the Mississippi system (Master's Report 12). This canal was built, developed, used and proved so inadequate that President Lincoln in 1861 recommended its improvement to Congress as a military and commercial measure. In 1861 the Illinois Legislature undertook studies to improve the through waterway as a navigation project pure and simple. By 1865 a new element (Chicago sewage) began to impose itself into the canal problem which, up to that time, had related solely to navigation. By 1872 (13) this element had assumed large proportions. In the meantime, beginning, as we have seen, in 1861, the Federal Government became active in this field. By Acts of 1866 and 1867 surveys were called for which, when rendered, emphasized the importance of the waterway from Lake Michigan to the Mississippi. By Act of 1888 (25 Stat. 419) Congress called on the Secretary of War for surveys, plans and estimates for a waterway here having capacity and facilities adequate for the largest Mississippi steamboats and naval vessels suitable for defense in time of war, to be not less than 160 feet wide and 40 feet deep. The year before this act of Congress a board of eminent sanitary engineers had recommended the bold and then unprecedented project of the great rock cut of the Sanitary and Ship Canal, calling attention, as an additional incentive to the city, to the magnificent waterway which would thereby be provided between Chicago and the Mississippi. The year afterward (1889) the Illinois Legislature passed a joint resolution (Master's Report 17) announcing its policy to create a great waterway along this route, requesting the United States to co-operate and to cease the work of canalization of the Illinois River and to apply all available funds to a new plan making use of water from Lake Michigan. The next day the Illinois Legislature passed the Act of May 29, 1889, creating the Sanitary District and authorizing the Sanitary and Ship Canal. The dimensions of the canal should be compared with the dimensions of the waterway which Congress had directed surveyed and estimated for the year before—160 feet wide at the bottom with a depth of water not less than 18 feet.

Section 23 of the Sanitary District Act (Master's Report 14) which specifies the dimensions of the future Sanitary and Ship Canal to be constructed under that Act, clearly demonstrates that the canal was to be so constructed that it would not only serve to divert the drainage and sewage and water from Lake Michigan to oxidize same, but would also serve as a waterway. That section provides that the channel to be built by which any of the waters of Lake Michigan shall be caused to pass into the DesPlaines or Illinois Rivers shall be of sufficient size and capacity to produce and maintain a continuous flow of not less than 300,000 cubic feet of water per minute of a depth not less than 14 feet and a current not to exceed 3 miles per hour. If cut through a rocky stratum, then it was to have twice the flowage capacity and to be not less than 18 feet deep and not less than 160 feet bottom width. Thus the depth and the maximum velocity specified was important for navigation. If the channel was to be constructed only for the purpose of diverting the sewage, and drainage, of sufficient lake water to oxidize same, then the depth and velocity would have been unimportant. Section 24 of the Act (Master's Report 16) specifically provides that when the channel is completed and water turned in to the amount of 300,000 cubic feet per minute, it is declared to be a navigable stream. Again, in Section 12, Cahill's Revised Statutes of Illinois, 1927, Chap. 42, Paragraph 349, it is provided

> "That all bridges built across such channel shall not necessarily interfere with or obstruct the navigation of such channel, when the same becomes a navigable stream, as provided in Section 24 of this Act, but such bridges shall be so constructed that they can be raised, swung or moved out of the way of vessels, tugs, boats, or other water craft navigating such channel."

Section 3 of the Act of May 14, 1903, amending and supplementing the original Sanitary District Act passed May 29, 1889, Cahill's Revised Statutes of Illinois, Chap. 42, Paragraph 382, provided:

> "Said sanitary district shall permit all water craft navigating or purposing to navigate said Illinois and Michigan Canal to navigate the water of all said channels of said sanitary district promptly, without delay and without payment of any tolls or lockage charges for so navigating in said channels."

While authority was granted by the General Assembly of Illinois to organize Sanitary Districts under the Act of May 29, 1889, for the purpose of building and maintaining outlets for the drainage and sewage as a primary object, yet there was an express condition upon the grant of such powers that the main channel to be constructed should be so built and maintained that it could be useful for navigation and should be and become a navigable waterway. The general assembly further, with reference to adjuncts to this channel authorized to be built under the Act of May 14, 1903, provided that they should be constructed and maintained so that boats navigating the Illinois-Michigan Canal might pass along such adjuncts.

The report of Captain Marshall of August 9, 1893, made pursuant to the Congressional Act of 1892 (Master's Report 29), when Chicago's population was slightly over a million, clearly shows the conditions which existed in the Chicago River and Chicago Harbor, navigable waters of the United States. That it was necessary to remove, this report states (Master's Report 29).

> "'The insufficient discharge of the pumps into the canal' (referring to the Illinois and Michigan Canal) 'results in rainless weather, in a very feeble current from the lake toward the pumps at Bridgeport, and in an indescribable state of putridity and offensiveness in the Chicago River, due to domestic sewage and a discharge from manufacturing establishments through the sewers into the river. At ordinary rains, upon freshets in the DesPlaines or Chicago rivers drainage areas, great volumes of putrescent matter are disgorged into

> the lake through the mouth of the Chicago River, threatening the water supply of the city, which, in the main is taken through tunnels under the bed of the lake from two inlet cribs, situate, one north of and the other south of, and a few miles distant from the mouth of the river. To remedy the, at times, insupportable and disgusting condition of the river and its branches; to purify the river and to preserve the city water, relief is now sought under the State laws by constructing a drainage canal from the South Branch of Chicago River to the DesPlaines River above Joliet, capable of discharging into the Illinois River Valley from 300,000 to 600,000 cubic feet of water per minute.' "

But complainants say that all these utterances and acts of defendants were a subterfuge and that the third paragraph of the Memorial Resolution of May 28, 1889, of the Illinois Legislature, "lets the cat out of the bag." They construe that resolution as requesting the United States to pay for the canal from the Chicago River to Lake Joliet, when, as a matter of fact, the only request was that the United States aid in such construction. They also wonder how this channel from Chicago to Joliet is to be of any value when it was to connect with a channel of only seven feet in depth, but they apparently forget that the resolution also asked that the United States project a channel from Joliet to La Salle of similar capacity to the one to be built above, and not less than fourteen feet, and capable of future development (Master's Report 17).

The only value of this resolution in this controversy is to show the purpose that Illinois had at that time in promoting a deep waterway to the Mississippi River and the Gulf. The Master finds (Master's Report 26, 27) and there is no exception taken to this finding, that from the time of President Lincoln, the commercial importance of enlarging the Illinois and Michigan Canal and improving the Illinois River, was before Congress and reported upon by engineers, pursuant to congressional acts, the first Government Engineer's Report being made March 2, 1867. "Reports under these and later acts emphasized the value of a waterway from Lake Michigan to the Gulf of Mexico" (Master's Report 26, 27).

It must be remembered that up to this time no one suggested that defendants would lower the level of the Great Lakes. On August 16, 1895, a War Department board suggested this result to the Secretary of War. It is also obvious that in 1889 both State and Federal Governments were eager to open a Great Lakes to the Gulf Waterway, and for both these reasons there was no occasion or object for subterfuge on the part of the State of Illinois. There was no hidden motive back of these solemn and deliberate acts taken by our State and the people of Chicago to take advantage of the complainants or any of their people. The method adopted by Chicago to divert and oxidize its sewage was "at that time the method commonly used" (Master's Report 132). Chicago undertook to build the most expensive link in the waterway to the Gulf of Mexico by cutting a canal through the Continental Divide. The Illinois Legislature gave Chicago the authority, with the condition that the canal should be so constructed that it would serve as a navigation canal. The United States encouraged the enterprise because the canal would provide an important part of the inland waterways system of the United States connecting the Great Lakes with the Gulf of Mexico, and would also relieve the Chicago River and Chicago Harbor of obstruction to its navigable capacity due to the great sewage pollution therein, and at that time the method adopted to take care of Chicago's sewage was the practical and best method, and is still lawful (Joint Abst. 155, 161).

Of course, the primary object of the Sanitary District in deepening and widening the channels of the Chicago River and its branches, was to enlarge them sufficiently to permit the diversion through them of water from Lake Michigan, so that a current would not be created injurious to navigation. But the physical acts of deepening and widening these channels, was in keeping with the purpose of the Federal Government of the United States, for Congress had under the Act of March 3, 1899 (Master's Report 36), fixed the project depths of the channels of those rivers at 21 feet, and provided for the replacement of bridges and the removal of piers and for the lowering of tunnels and the widening and straightening of the river for these purposes has, of course, greatly increased its navigable capacity.

The above history is important; first, because it refutes complainants' claim that sanitation and that alone was the sole object and motive for defendants' acts, and that the State of Illinois memorialized Congress in 1889 about the intention of Illinois to create a Great Lakes-to-Mississippi Waterway to deceive Congress and the public; second, because consistently since 1822 it indicates at least willingness and, as we believe, invitation and encouragement on the part of Congress for defendants to do what they did do; third, because it shows that, far from proceeding (as complainants charge) in an equivocal, lawless, and insincere fashion, to create this great engineering work, defendants were moving with honesty of purpose, declaring their plans to the world, and hoping by these plans to turn their necessity into a national benefit with no thought of harm to any interest.

Although the Master has found that this record of Federal action may not be construed as direct Congressional authority, yet he has found that this and subsequent history has a bearing on the construction of the Act of March 3, 1899 (Master's Report 174).

Specifically as to complainants' contention that the canal and diversion never was a navigation project, this record shows that from the beginning and continuously it has been a navigation project. Presently, sanitation became a coordinate motive. The overwhelming requirements of the Chicago situation required attention, but there is scarcely one of the Government surveys attending the inception of the project which does not commend its utility and purpose for navigation. The fact governing the construction of this particular canal is well stated in the report of the Joint Board of Engineers required by the Act of June 13, 1902 (32 Stat. 364) (Master's Report 44). "Although the primary object of the Chicago Drainage Canal was the discharge of Chicago sewage, its function as a channel for navigation was kept in view from the beginning." We understand this to be the Master's own conclusion (Master's Report 26, 165). It was also the conclusion of this court in *Sanitary District* v. *U. S.,* 266 U. S. 405.

This waterway, early, became an object of national concern. The political atmosphere attending and remaining with this project until several years after the turn of the century must not be forgotten. There can be no question that at its inception, no one ever questioned the benefit to be derived from defendants' acts. From about 1910 a new note begins to creep into official communications with reference to the navigation aspect of this canal. Lake commerce increased by leaps and bounds, chiefly due to the growth of our steel industry. The Mississippi waterway project languished. But what defendants had undertaken *had already been accomplished.* It is no temporary makeshift. The great rock-cut joining the two water systems is one of the notable engineering feats of the world. This court has well said that a hundred years is a short time in the life of the nation. The matter of internal waterways begins, as is common knowledge, to move again into economic prominence

(Master's Report 118). The abatement of the great works here provided should not be lightly considered.

Taking advantage of a nadir point in the life cycle of this waterway, complainants have stressed with strident iteration every circumstance of its temporary languishment to persuade the court that there is no element of navigation here involved. It is true that at completion of the canal and for some time thereafter there was no adequate connection with the waters below and toward the Mississippi. But it must be remembered that defendants believed, and had reason to believe, from the projects then considered in Congress, that the Federal Government would provide practically navigable channels below. It is true that there has not been a great commerce on this waterway, but that was not due to the inadequacy of what defendants had done. It was due to the desuetude into which fell the Federal projects for adequate channels in connecting waters. We shall not here detail all of complainants' railing against the navigation features of this canal. The answer to all is the same. The canal was conceived as a connecting link, without which a Lakes-to-Gulf waterway would be impossible. It was credited with great value as such when it was conceived. Its value as such remains, and if there is anywhere any circumstance to change the terse appraisal of this court (*Sanitary District* v. *U. S.*, 266 U. S. 405) on this subject we are not aware of it.

> "While its interest to defendant is primarily to dispose of the sewage of Chicago * * * it has been an object of attention of the United States as opening water transportation between the Great Lakes and the Mississippi and Gulf. * * * It will be well to bear in mind * * * that this suit is not for the purpose of doing away with the channel which the United States we have no doubt would be most unwilling to see closed. * * * We repeat that we assume that the United States desires to see the canal maintained * * *"

(b) Congress has fostered, aided and encouraged the creation of defendants' canal and diversion and has used the result of it.

September 19, 1890, Congress passed the first broadly restrictive legislation assuming full control of navigable waters. Defendants' canal was commenced in 1892. There can be no question that, under this act, the Secretary of War had been delegated authority to authorize structures of the kind contemplated (p. 79, Point I. *infra*).

The Master's Report (27-41) sets forth very briefly a few of the principal acts of the Federal Government up to the time the water was turned into the canal. It is shown (27) that the local U. S. Engineer attached to his report to Congress on a Lakes-to-Mississippi waterway 160 feet wide, 14 feet deep, made pursuant to the Rivers and Harbors Act of 1888, the Memorial of Illinois stating its intention and also the full text of the Illinois act authorizing the canal. In 1892 Congress asked for a report from the U. S. District Engineer on what the Government ought to do in the Chicago River. In 1893 this report was made. This report outlined defendants' plan to reverse the Chicago River to carry the drainage into the Des Plaines. It showed that the Chicago River could not accommodate this flow from the Lake without very sweeping changes. It stated that to accommodate the prospective flow the river would have to be deepened to 18 feet, many bridges remodeled and the tunnels under the river deepened. It recommended that Congress decide whether it intended to use the river as a slip for traffic or as a link in the Lakes-to-the-Mississippi Waterway. It stated changes in the river that would be "in the interest of commerce and navigation." It estimated costs for these changes, but suggested that *maintenance*—not original cost—should be paid by Chicago as long as sewage was dumped in the river. Complainants assert that by this report and the action thereon Congress abandoned the Chicago River as a navigation project. By Act of June 3, 1896, Congress authorized the improvements recommended by the District Engineer. Thereafter the Sanitary District, acting under War Department permits and the War Department acting under specific acts of Congress, worked side by side in the Chicago River. In the meantime Congress by Acts of 1896, '97, '98 and '99 continued to direct surveys and reports of projects of various size and capacity to hook-up the Sanitary and Ship Canal with a waterway to the Mississippi (Master's Report 35-36) and continued appropriations for improvement of the Chicago River. These surveys invariably recommended such a waterway. Under the very Act of March 3, 1899 (30 Stat. 1146), Congress, in outlining the detail of its work side by side with the Sanitary District in the Chicago River in accordance with the local express recommendation in 1893, provided that the cost of removing tunnels and changing bridges should be done by the City of Chicago without expense to the United States.

Now whatever the *legal* effect of this joint endeavor may have been, there is no question that its practical effect was a co-operative effort on the part of the United States and the Sanitary District to prepare the Chicago River segment of defendants' diversion works to receive and accommodate the diversion. Complainants contend that this Federal work was no more than would have been done in the normal course of harbor improvement (Wisconsin Brief 131). There can be no doubt in any practical mind upon referring to Major Marshall's report (Master's Report 29-33) and to the excerpt from the Act of March 3, 1899 (Master's Report 36) that no such wholesale reconstruction of the Chicago River would ever have been undertaken except for the conscious purpose of creating a practical segment of defendants' works for diversion. Indeed, Major Marshall specifically states (Master's Report 32) what is necessary for commerce and navigation alone and what in addition is necessary to accommodate diversion, and reference to what was done by Congress shows that it was operating on the latter plan. It shows Federal encouragement and invitation, it refutes complainants' oft-repeated contention that defendants have moved contumaciously in respect of Federal authority.

Especially considering the Act of March 3, 1899, under which complainants so vigorously contend that this diversion is inhibited, it is incredible, to say the least, that Congress would, in one section of that act, consciously authorize works to accommodate a diversion and, in another section, deny the use of these works.

During all this time, as related in the Master's Report (14-17), Congress was taking measures to utilize the effect of the prospective diversion in the Illinois River and the War Department plans for formal work in the Illinois River were drawn and executed on the basis of the use of the water diverted by defendants from Lake Michigan and practical navigation of the Government barge line in the Mississippi would be much impaired if not prevented without the addition of the deviated water at low stages of the river.

Other permits were issued by the Secretary of War, such as on May 8, 1899, authorizing the permittee to open the Sanitary and Ship Canal "and cause the waters of the Chicago River to flow into the same" and on July 11, 1900, for further deepening and widening the Chicago River, thereby completing the Government projects, provided for in the Act of March 3, 1899 (Master's Report 38-39).

On November 17, 1900, the Board of Engineers, appointed under the Act of Congress of March 3, 1899, to make "a survey and estimate * * * with a view to extension of navigation from the Illinois River to Lake Michigan," reported "the most economic route" to be "through the Sanitary Canal and the Chicago River, * * * thus complying with the terms of the Act of March 3, 1899," the construction of Section 10 of which is one of the questions here under consideration (Master's Report 40-41).

On June 6, 1900, Congress authorized the same Board of Engineers to report on "the proposed route from Illinois River to Lake Michigan," including "a proper connection * * * with the Sanitary and Ship Canal * * *," which the Board reported was "sufficient * * * for all of the requirements of navigation" (Master's Report 41).

(c) At every critical point in its history Congress has protected defendants' canal and diversion from interference.

In the Rivers and Harbors Act of 1902, Congress requested the President to join in the formation of an International Joint Commission to investigate the subject of Boundary Waters. The Commission was formed and reported on March 15, 1906. Its report (Master's Report 45) recommended that the Secretary of War be authorized to grant permits for diversion and, as to this canal, up to 10,000 c.s.f. The Canadian members reported likewise to their government (Master's Report 45) and explained their recommendation by saying that while they would receive 36,000 c.s.f. and American power companies 18,500 c.s.f., *their* allotment was counterbalanced by the 10,000 c.s.f. to be diverted at Chicago. The Joint Commission reported the same year to both governments and again recommended 10,000 c.s.f. at Chicago. As an interim measure, Congress in 1906 passed the Niagara Falls Act prohibiting diversions, *except* as authorized by the Secretary of War and especially providing that the prohibition should not be interpreted as prohibiting diversions for "*sanitary* or domestic *purposes* or for navigation, the amount of which may be fixed from time to time by the Congress of the United States *or by the Secretary of War under its direction.*" Complainants contend this may be construed to imply Congressional disapprobation of defendants' diversion. The Master thinks (188) that whatever inference may be drawn is to the contrary.

In view of the significant circumstances of the times—the imminence of the Boundary Water Treaty, the international negotiations so clearly outlined in the Master's Report, pages 44-48 and 187-188, and the Niagara Falls controversy—we contend that the Niagara Falls Act presupposes full knowledge on the part of Congress of all that defendants had done and anticipated, that it evinced a Congressional purpose to protect it, that it confirmed the Secretary's power to authorize it, and that it is eloquent of the Congressional interpretation of Section 10 of the Act of March 3, 1899, to the effect that the Secretary of War then had all the authority that was needed to authorize defendants' diversion even as against the claims of Canada (Master's Report 188).

That the Niagara Falls Act should be construed as we contend and as the Master found, is further supported by the fact that this very Act of Congress was based upon a report of the International Waterways Commission of March 19, 1906, made pursuant to Joint Resolution of Congress of March 15, 1906, directing such report to be made. Such International Waterways Commission Report set forth the diversions on the United States side to be protected, as follows (Master's Report 45):

	Cubic Feet
"Niagara Falls Hydraulic Power & Manufacturing Co.	**9,500**
"Niagara Falls Power Company	**8,600**
"Erie Canal, or its tenants (in addition to lock service)	**400**
"Chicago drainage canal	**10,000."**

The purpose of the Niagara Falls Act was the protection of said diversions.

Complainants are very apprehensive of the rights of Canada which they contend are threatened. The facts are set forth at pages 52 to 58 and 188 of the Master's Report. The Master does not discuss the treaty or its reservations further than to say that it does not operate to deprive the Secretary of War of his power under Section 10 of the Act of March 3, 1899.

Congress was astute to protect defendants' diversion and, although the Master has not interpreted the treaty and its reservations, he *has* included in his report the interpretation of his distinguished predecessors in the office of Secretary of State who negotiated the treaty. It is found at pages 56 to 58 of his report. It shows that our Government followed the recommendation of the Commission as set forth above and "traded" to the Canadians a right to divert 36,000 c.s.f. with the understanding that 10,000 c.s.f. were to be taken by defendants, and that it carefully safeguarded the question of diversions from Lake Michigan from the inhibition of the treaty.

Congress has had full knowledge of all that defendants have done and the effect of it. Congress has aided and cooperated in the doing of it. Congress has adopted and used the result of it. When it has been threatened Congress has protected it. Some of this Congressional action was taken in a statute now said to inhibit it. Upon such a record, a *theory that Congress has forbidden or intends to forbid it seems untenable.*

(d) No legislative or executive instrumentality of the Federal Government charged with responsibility for the regulation of navigation and commerce has ever recommended or even considered the cessation of defendants' diversion, or its radical reduction. The sole purpose of such instrumentalities has been to restrain increase of diversion and to avoid ultimate commitment to any permanently increased amount of diversion pending resolution of the present period of uncertainty and development of the sanitary and navigation problems involved.

The first official consideration of the possible effect of defendants' diversion on lake levels was that of a board of engineers constituted by Congress, which reported August 16, 1895 (Master's Report 33). After calling attention to the fact that no Federal control of such projects had been assumed by Congress until 1890, the report discussed the possible prospective effect of the diversion on lake levels, but it did not suggest that the diversion be not permitted. It merely suggested that regulation of the diversion must eventually be under the control of the Federal Government.

The next capital consideration of the diversion occurred when the channel of the Chicago River and the canal were ready to receive their initial increment af lake water. Their then capacity was only 5,000 cubic feet per second. The district engineer at Chicago reported that the question of the effect on lake levels was being considered by the Board of Engineers on Deep Waterways, that the effect of the proposed diversion on current in the Chicago River was a serious consideration, that the subject should eventually be controlled by Congress and that, in the meantime, a permit should be given for the then capacity of the channel subject only to the condition of regulation by the Secretary if currents should prove destructive. This recommendation was approved by the Chief of Engineers and diversion *up to the then capacity of the channel* was authorized by the Secretary of War (Master's Report 38). There was no suggestion that, due to its effect on lake levels, the diversion should not be permitted.

For several years after opening the canal, the only conditions imposed in modifying permits arose from the difficulty experienced in the Chicago River by reason of its narrow, shallow and tortuous channels. Both the Federal Government and defendant Sanitary District expended large sums and did a great deal of work to improve the Chicago River so that *it might accommodate its then flow and receive a greater flow* and the contemporary correspondence discloses no conflict between the Federal Government and the local authorities, but only an earnest cooperative attempt to produce conditions under which the diversion might continue with safety to navigation in the Chicago River.

About 1907, defendant Sanitary District began to request from the War Department authority for increased diversion (Master's Report 49). The Department took the position that the project of such *increase* should be submitted to Congress. But it did not suggest *decrease.* On the contrary, all of the engineering boards which, in the period 1905 to date, have considered the problem, including the International Waterways Commission, have specifically disclaimed an intention to condemn the Chicago diversion.

The Chief of Engineers forwarded to Congress the report of the Deep Waterways Board on December 18, 1905 (Master's Report 43), epitomizing a part of it, viz:

> "In this connection the Board states that it does not condemn the present plan of taking 10,000 cubic feet

> per second, believing as it does that some such amount will be needed to protect the lives and health of the people of a great city and of a populous valley; but it invites attention to the fact that *if a much larger amount be taken it will be necessary to construct remedial works elsewhere,* and that these are, or should be, of an international character. It is led to make this remark by the attitude of the Illinois legislature and of the other principal advocates of this enterprise, which is that the 14-foot waterway is only a beginning, and that a much deeper channel ultimately should be constructed, which means that a much larger volume of water must be taken from Lake Michigan. It is the opinion of the Board that the sanitary reasons for the abstraction of water so far exceed and over-shadow the commercial reasons that the amount should be strictly limited by the sanitary necessities of the case. It is impossible to fix a limit to the future growth of Chicago. In a future not remote larger amounts of water may be needed for sanitary purposes, and channels deeper than 14 feet will then become practicable in the open alluvial portion of the Illinois River."

Even the Canadian section of the International Waterways Commission in reporting to their government (Master's Report 46) the draft for the Boundary Waters Treaty recommended by them, stated as to defendants' diversion:

> "Permanent or complete diversion of such waters are wrong in principle and should *hereafter* be absolutely prohibited. The diversion by the Chicago Drainage Canal *should be limited to the use of not more than* 10,000 *cubic feet* per second."

The joint report of that commission (Master's Report 46) all Canadian and American members) recommended:

> "The commission, therefore, recommends that such diversions, exclusive of water required for domestic use and the service of locks in navigation canals, be limited on the Canadian side to 36,000 cubic feet per

> second, and on the United States side to 18,500 cubic feet per second (*and in addition thereto, a diversion for sanitary purposes not to exceed* 10,000 *cubic feet per second, be authorized* for the Chicago drainage canal), and that a treaty or legislation be had limiting these diversions to the quantities mentioned."

and also,

> "The diversion of large bodies of water from Lake Michigan for supplying the drainage canal has not been authorized by Congress, but there appears to be a tacit general agreement that no objection will be made to the diversion of 10,000 cubic feet per second as originally planned."

The full Commission specifically and finally recommended,

> "A careful consideration of all the circumstances leads us to the conclusion that the diversion of 10,000 cubic feet per second through the Chicago River will, with proper treatment of the sewage from areas now sparsely occupied, provide for all the population which will ever be tributary to that river, and that the amount named will therefore suffice for the sanitary purposes of the city for all time. Incidentally it will provide for the largest navigable waterway from Lake Michigan to the Mississippi River, which has been considered by Congress.
>
> We therefore recommend that the Government *of the United States prohibit the diversion of more than* 10,000 *cubic feet per second* for the Chicago Drainage Canal."

The Boundary Waters Treaty of 1909, negotiated in accordance with these recommendations, contains no suggestion of any reduction of defendant's diversion. On the contrary it is clearly shown by the proceedings before the Foreign Relations Committee of the Senate and the interpretation of the then Secretary of State who negotiated the treaty, that the treaty was understood to preserve the right of diversion up to 10,000 c.s.f.

On March 23, 1908 (Master's Report 52), litigation by the Federal Government against defendant Sanitary District was instituted, the purpose being to determine whether the Sanitary District could be controlled by the Secretary of War in diverting water through a new channel and reversing the Calumet and Little Calumet Rivers as well as the Chicago River. In its inception this litigation was not directed toward diversion through the original intake from Lake Michigan, but solely to prevent the extension of existing drainage facilities to include the Calumet River. In its inception this was "friendly" litigation intended to secure judicial interpretation of certain disputed legal principles. On October 6, 1913, a new suit intended to prevent diversion of water *in any amount in excess of War Department permits* was instituted. It is clear, however, that the purpose of this suit was not to *reduce* the diversion which, under pressing necessity, had increased far beyond the War Department permit authorizing 4,167 c.s.f. The object of the suit was to vindicate the principle that the War Department has a legal right to regulate the diversion and not to enforce any wish of the Government to enjoin or even reduce the diversion. With this the Wisconsin brief seems to agree (Wis. Brief 78, 79). Two circumstances demonstrate this conclusion. Immediately after the decree the War Department issued a permit authorizing diversions of 8,500 c.s.f. annual average and 11,000 c.s.f. instantaneous maximum. Also, in the Government's brief before the court, the conclusion stated:

> "Yet the government's position must not be misunderstood. Nothing that has been urged before the Court is intended to belittle or ignore the welfare of the great and progressive community growing within appellants' district. Whether the emergency is as great as certain of appellants' witnesses have intimated or not, Chicago's problem in the matter is a

> serious and perplexing one in which the entire nation should have a sympathetic interest and to the solution of which the nation by its duly constituted authorities should address itself without delay. * * *
>
> "Throughout the litigation the government of the United States have not been unmindful of the welfare of the people of Chicago * * * It is a condition and not a legal theory that confronts the government. The question is not judicial and *this Court will presume that the legislative and executive branches of the government will not be unmindful of the equities of the situation.* As this serious problem will require time for its careful consideration, the government cannot object if the Secretary of War, acting on the recommendation of the Chief of Engineers sees fit, pending action of Congress and as a *modus vivendi* to modify the existing permit and temporarily permit a greater diversion of water."

Pending and after the decision in the Federal case, four important engineering reports have been submitted to Congress on the perplexing subject of lake levels, the Warren, Markham and Putnam reports and the report of the International Joint Board on the St. Lawrence Waterway (Master's Report 66, 96). The general tenor of all these reports is, that this diversion affects lake levels, that due to the powerful combination of causes operating in that direction the lake level problem is serious and the lowering of levels due to all causes must be compensated, that no natural return to Nineteenth Century normality may be expected, that compensation works are relatively cheap and entirely practicable, that all causes affecting lake levels must be vigorously supervised and restricted by the Federal Government, that everything possible must be done to give impetus to auxiliary sewage disposal works to prevent the increase and gradually to reduce the amount of defendants' diversion. But in not one of these technical reports is there the slightest suggestion that defendants' diversion should be enjoined or that any means should be taken looking toward its radical reduction. All recognize the necessities and the complexity of the situation and the recommendation of all is the only sound and common sense conclusion that any review of these circumstances leaves as inevitable that the matter is one for engineering and administrative supervision and regulation (Master's Report 193). It is not capable of solution by fiat. It involves hundreds of undetermined forces and can be resolved only by a wise process of administration, over a long period of time.

The most elaborate of these reports is the so-called Warren report compiled pursuant to Public Resolution No. 8, 67th Congress, and submitted November 9, 1920. The net recommendation of the report was that a diversion of 10,000 c.s.f. be permitted and the Sanitary District provide sewage disposal and water purification works to take care of the increased demand of the growing population. Also, that it agree to 10,000 c.s.f. as an ultimate limit and pay for compensating works to remedy the effect of the diversion. The Board of Engineers for Rivers and Harbors concurred but recommended a diversion of 6,800 c.s.f. instead of 10,000 c.s.f. The Chief of Engineers recommended deferment of decision on the increased amount of diversion until the Sanitary District had worked out and presented detailed plans of proposed sewage disposal works to reduce to a minimum the quantity of water necessary for sewage dilution and transportation (Master's Report 68).

The so-called Putnam report approved by the Secretary of War April 19, 1924, was a memorandum report which was not intended to be comprehensive and did not change the War Department policy. It recommended a necessary diversion of 8,500 c.s.f. and held forth the possibility of a reduction as the sewage disposal plants progressed to 4,167 c.s.f. *within a period of about twenty years.* This conclusion is, of course, tentative and was based on preliminary engineering studies. It was specifically approved by the Secretary of War as "not modifying or reviewing" the Warren report just discussed. In an approved statement regarding it is included a statement of the present policy of the War Department as follows:

> "It is clear that under the condition of affairs created by the Chicago Sanitary District, the diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago. It is by no means established, however, that the quantity required for that purpose, either now or in the future, is 10,000 cubic feet per second. I regard it as inadvisable to permit the diversion in that amount, or in any amount exceeding the amount now fixed by the department, without full and complete information concerning the necessity therefor. It is my view that the quantity authorized should be limited to the lowest possible for sanitation, after the sewage has been purified to the utmost extent practicable before its discharge into the sanitary canal. I regard it as extremely inadvisable to grant the city of Chicago, or any other agency, the right in perpetuity to take from the lake a definite quantity of water."

It must be borne in mind that when, in these statements by the Secretary of War and War Department Engineers they mention the necessity of a certain amount of diversion for "sanitation," they must necessarily have had in mind that the word "sanitation" embraced not only the freeing of the water supply of Chicago from pollution, but also the elimination of pestilential and unsanitary conditions in the Chicago Harbor, Chicago River and its branches for the improvement of navigation.

These are typical and controlling instances of statements of the view and policy of the Federal Government. Nowhere in the evidence will there be found an expression of any view or any policy subscribing to the advisability, the expediency, the practicability, or the justice of any of the action urged upon the court by complainants in this suit. The bill seeks to cut square across the whole course and policy of Federal legislation, adjudication, and administration in this matter and to seek by injunctive decree action sought and not heretofore found at the hands of Congress and the War Department.

IV.

While a compelling motive of defendant, Sanitary District in making the very great outlay necessary to construct the canal was disposal of sewage, said defendant was also persuaded to the method adopted by the hope of opening a great waterway to the gulf. Defendant State of Illinois had and has had no other motive than the latter.

On this subject, the Master has clearly stated the situation (Master's Report 165):

> "There is no doubt that the diversion is primarily for the purposes of sanitation. Whatever may be said as to the service of the diverted water in relation to a waterway to the Mississippi or as to the possible benefit of its contribution to the navigation of that river at low water stages, it remains true that the disposition of Chicago's sewage has been the dominant factor in the promotion, maintenance and development of the enterprise by the State of Illinois and the Sanitary District."

The foremost engineers of that day were called into conference by the City of Chicago in 1887. After careful study they unanimously recommended as the only feasible solution of the problem, an enlargement of the ancient spillway of Lake Michigan. They recommended such dimensions for this canal as would insure an amount of water sufficient to dilute the sewage in the Chicago River and, at the same time, protect the Lake. To do this it was necessary to reverse the flow of the Chicago River even in time of storm. Their purpose was also to provide ample dilution against future needs. But they advanced as a principal support of their recommendations that such a canal would make possible the long cherished project of a waterway from the lakes to the Mississippi by providing a channel from Lake Michigan to the Illinois River of sufficient size to accommodate the largest Mississippi River craft, and to provide a never-failing supply of water in sufficient quantity to offset all seasonal deficiencies in the Illinois and Mississippi Rivers.

The cost of the proposed Sanitary and Ship Canal was certain to impose an unusual financial burden on Chicago. Her motive in assuming it was two-fold; no other means were available to her to secure the stark municipal necessities of sewage disposal and safe water; the project offered her commercial access by water to the Mississippi Basin. As for the State of Illinois outside of Chicago, however, the first-named motive was a deterrent. It involved some pollution in two of her principal rivers and the release of a certain amount of initiative and control of her waterway policy. Thus, so far as Illinois is concerned, her sole incentive and purpose was and ever had been the improvement of navigation from Lake Michigan to the Mississippi. As for the City of Chicago, she had no alternative save the one adopted. Her physical condition forcing this decision was in part the direction of flow of the Chicago River, and that flow was turned westward by virtue of the laws of the State of Illinois and of the early laws of the United States, for it must be remembered that, while there may not be direct Congressional authorization of the present diversion, the Acts of 1822 and 1827 did contemplate an Illinois-Michigan Canal on a water level and hence at least a partial reversal of the Chicago River.

Illinois welcomed the opportunity thus presented to secure an engineering work, the advisability of which had been universally recommended by Federal and state engineers and the cost of which was so great that it probably never would have been assumed by either the Federal or state governments. That cost of over $40,000,000 for the canal alone imposed a per capita burden on the people of Chicago many times that of the Panama Canal. It equals the amount the Federal Government has expended on the principal Great Lake improvements—the channels between Lakes Superior and Erie, including the locks and regulating works at Sault Ste. Marie.

It is ~~not~~ averred in the bill nor is it shown in the evidence that at any time prior to the last ten years there was any means of disposing of her sewage available to Chicago other than the one adopted.

V.

Defendants' canal and diversion and other works aid navigation in each of the following respects:

(a) It makes possible an adequate water-outlet of the Mississippi basin to the Great Lakes.

First of all it must be obvious from the history of the Illinois and Michigan Canal and the early history of the Sanitary and Ship Canal, that the rocky backbone of the continental divide between Lake Michigan and the Mississippi system, is not an easy obstacle to overcome. What defendants have done at tremendous expense is to provide there a great artificial water-gap through which traffic to any reasonably anticipated extent *can* be accommodated, whenever, in the development of economic necessity (now rapidly approaching), the lower and far less difficult works connecting the canal with the Mississippi shall have been provided. Complainants contend that there is no important navigation there now, and in the absence of such navigation, consideration of the facilities provided in advance is unwarranted. The great traffic on the lakes would have been impossible without Federal foresight and provision because in their natural state their connecting waters were not navigable in the modern sense. There traffic followed improvement. Here, complainants contend improvement must follow traffic. Of course, this is impossible, for without provision of adequate waterways there can be no traffic. On this point, the Master remarks (122):

> "The needs of navigation on that waterway will depend upon the carrying out of plans already adopted and upon the ultimate decision of Congress with respect to water communication between Lake Michigan and the Mississippi River."

(b) Defendants' canal and diversion improve present navigation on the Illinois and Mississippi Rivers and it is the only reasonably practicable method of making early and adequate navigation thereon possible.

The Panama Canal has proved a serious economic handicap to the industrial development of the Mississippi Valley. By opening a short all-water route and forcing down rail rates, it has provided cheap transportation from our eastern seaboard to the west coast of both continents and to the orient. This benefit is not enjoyed by states of the Mississippi Basin, which, though much closer to the west coast, pay a higher freight rate to that region. The economic prostration of agriculture in the Mississippi Valley is largely traceable to the excessive cost of transportation of farm products to European markets (Master's Report 118). Both problems are serious and the only sound solution yet advanced for either is the provision of adequate and practicable water-routes from the interior to the Gulf.

The "Lakes-to-Gulf Waterway" project, first proposed by Pere Joliet in 1674, and constantly advocated since, is two and one-half centuries old. It has never been rendered practicable. It requires provision against low water and sand bars in the Mississippi and against low water in the Illinois River and a practicable channel from the Illinois River to Lake Michigan.

The Mississippi is a capricious stream. From the mouth of the Missouri it bears great quantities of silt and when the streams are in a falling stage this silt deposits in bars which obstruct navigation. The rise and fall of the river are seasonal and hence the river is annually obstructed by these bars. At low water there is less than 30,000 c.s.f. of flow in the river above St. Louis and nearly one-fourth of this now comes from Lake Michigan. When the bars form, dredges are sent out to provide a channel through them while navigation waits in the river to get through the gaps thus opened (Joint Abst. 97).

The only effective provision of a channel in the Mississippi offered before defendants' diversion was this desultory dredging at critical points over sand bars after the bars occur. This makeshift method ill comports with the vast provision of artificial channels on the Great Lakes. Decrease of diversion would increase reliance on dredging.

Complainants' only testimony against the benefit of diversion to the Mississippi was that of General Bixby, formerly Chief of Engineers, and now retired. He strangely concluded that six inches depth over bars at low water added by defendants' diversion is of no value to navigation; that better methods are not worth their cost for this river; and that practical rivermen do not know what they are talking about when they claim benefit from the diversion.

There was other evidence in the form of reports of the War Department that it was planning or could maintain project depths in the Mississippi without diversion but nothing impairs these controlling facts:

(1) Present low water depths are not great enough to serve navigation requirements.
(2) Present low water depths have not been available without defendants' diversion.
(3) There is no assurance that present depths can be or will be maintained without defendants' diversion.

The Mississippi needs every possible inch of increased available depth and the water added from Lake Michigan is clear gain of from six inches to one foot of depth over bars at its critical low-water. Every practical river man was certain and emphatic that defendants' diversion is indispensable to the maintenance of practicable navigation on the Mississippi (Joint Abst. 84-88).

There was conflict between General Bixby and several witnesses who testified for the defendants, including Major Gotwals, United States Engineer stationed at St. Louis (Joint Abst. 88-97). His conclusion was that an increment of 8,000 c.s.f. will raise the low water plane at St. Louis about one foot, and increase the navigable depth about one-half foot. If a six-inch lowering of lake levels is an *injury to navigation* in the 21-foot channels of the Great Lakes, surely a six-inch increase of navigable depths should be *an aid to navigation* in the 6, 8 and 9-foot channels of the Mississippi.

General Bixby seemed to be of the opinion that the less water there was in the river, the greater would be the depths for navigation (Joint Abst. 101-108). In any event, the Master saw and heard the witnesses testify. His finding ought not to be disturbed.

The lower Illinois River from Utica to the Mississippi is a shallow, sluggish, but clear-water stream carrying only 500 to 1,000 c.s.f. of natural low water flow. In its natural state it is inadequate to modern river navigation. The Federal project depth has been seven feet but at no time with no more work than it has received would it have been maintained without at least 8,500 c.s.f. from Lake Michigan water, which is responsible for over four feet of the low water depth of seven feet. The project depths are maintained from an improvement plane which includes defendants' diversion and even with this the depths were not secured by the Federal Government until 1925. This stretch of the river is adaptable to improvement best as an open channel and, if there were no diversion, a very great amount of improvement in the channel, requiring years to complete, and at least five and possibly more locks and dams would have to be provided to permit any navigation at all. Without at least 1,500 c.s.f. from Lake Michigan, the Illinois Waterway could not be operated at all. With the existing diversion, this stretch of the river can remain open and, with a very slight amount of improvement already provided by Congress, will afford a splendid nine-foot navigable channel.

It appears that the Federal project for the Illinois River below Utica was adopted in 1880, and provided for seven feet depth below low water of 1879, which was before the diversion began, and that low water of 1879 was the reference datum for such improvement.

The Master found that since the diversion in 1900, the reference plane had been officially changed from time to time to conform to existing low water as affected by the diversion (Master's Report 71). He also found that a diversion of 1,000 c.f.s. *is not* sufficient to supply all the needs of navigation on the Illinois River (Master's Report 122).

James R. Fuller, who was Assistant Engineer in the United States Engineer Corps and stationed at Peoria, Illinois, and who had been in the Government service since 1889, testified that when he began work on the Illinois River in 1889, the reference plane or datum for the improvement in the Illinois River was the low water of 1879, and that the project provided for a navigable channel of seven feet at such low water; that after 1893, when it became certain that the Sanitary and Ship Canal was going to be completed, the old reference datum was abandoned, and a reference plane was used based upon the proposed diversion (Joint Abst. 14); that at no time during the low water years from 1900 to the present time, was the diversion required to provide seven feet at low water at the critical points of navigation, less than 8,500 c.s.f. That 8,500 c.s.f. would raise the low water about 9 feet; that the actual diversions raised the water in the Illinois River at LaSalle, in 1901, 5.5 feet; in 1910, 7.5 feet; in 1914, 8 feet; in 1919, 9.3 feet; in 1925, 9.6 feet; at Peoria, in 1901, about 2.8 feet; in 1910, 5.4 feet; in 1914, 6 feet; in 1919, 6.5 feet; in 1925, about 6.7 feet; and below Kampsville Dam, in 1901, 2.5 feet; in 1910, 4 feet; in 1914, 3.7 feet; in 1919, 4.3 feet; that on the 3d of March, 1925, as conditions then existed in ordinary practice it would have taken about five years to have dredged or otherwise improved the Illinois River so as to have made available the project depth of 7 feet and the project width of 200 feet with a diversion of only

3,000 c.s.f.; that it would take about five years from the present time to accomplish the same result with the same diversion; and that without any diversion, it would take two to two and a half times as long (Joint Abst. 16). To the same effect, see Woermann's testimony (Joint Abst. 11-12).

The Putnam Report, Exhibit 1, November 1, 1923, entitled "Diversion of Water from Lake Michigan," in referring to the time required to obtain 7 feet depth with a diversion of 4,167 c. s.f. in the Illinois River, stated that it would take approximately five years from that date, and that "a reduction in diversion to 4,167 cubic feet per second could not be made without detriment to navigation before that time." The conditions on March 3, 1925, so far as obtaining project depths were concerned, were the same as they were when the above report was made.

There was offered in evidence correspondence between the District Engineer and Division Engineer and the Chief of Engineers, concerning the reference datum used and employed in the improvements of the Illinois River. This correspondence covered a period from 1900 to 1920 (Joint Abst. 18-28), and shows that continuously during the period of this diversion, the maintenance of navigation upon the Illinois River at all times depended and still depends upon the diversion from Lake Michigan in substantially the amount authorized. When the Chief of Engineers came to recommend and the Secretary of War to grant the permit of March 3, 1925, they were confronted with these conditions. In order to maintain navigation on the Illinois River, it was necessary to have the diversion he then authorized. At that time to have obtained the depths necessary for navigation, would have required ten years for the construction work, assuming that the necessary funds and equipment were made available.

The findings of the Master clearly establish that the diversion is not only a *direct and substantial benefit,* but an *absolute necessity,* to *navigation,* in *four separate* and *important* aspects, viz:

(1) By removing the impairment by pollution ("injurious to navigation" and to "the allied interests of interstate commerce, a matter of national concern") to the navigable capacity of Lake Michigan and the Port and Harbor of Chicago, because "navigation * * * requires something more than fluid and a boat" * * * and "there must be water conditions which make navigation practicable * * *" (Master's Report 167, 170).

(2) By furnishing "water * * * sufficient to supply the needs of navigation" on the Illinois Waterway and the quantity of flow upon which the plans and structures thereof are based, any material reduction of which "would necessitate radical changes in the design and location of the locks * * *" (Master's Report 119, 120, 122).

(3) By providing "about 4 feet of the low water depth of 7 feet" in the Illinois River, without which the Federal project therein would not have been, and *within the next ten or twelve years* could not be, obtained (Master's Report 120; Joint Abst. 17).

(4) By establishing project depths and furnishing "an aid to the navigation of the Mississippi River * * *" (Master's Report 124).

"It is not controverted that the Secretary of War had these considerations before him, on the application and hearing which resulted in the permit of March 3, 1925" (Master's Report 125).

If the diversion were not permitted in substantially the amount authorized, so as "to keep the Chicago River reversed at all times," there would be created "a pestilential condition in the Lake and in the Port and Harbor of Chicago. The nature of the injury which would be sustained by the interests of navigation and commerce and the property of the intervention of the United States in such a case were pointed out by the court in *New York* v. *New Jersey,* 256 U. S. 296" (Master's Report 193-194).

The Secretary of War was "called upon to consider the effect upon navigation of the stoppage, or reduction of an actual, existing diversion"—an effect "injurious to navigation" and to "the allied interests of interstate commerce, a matter of national concern" (Master's Report 167, 170, 194).

A diversion was absolutely necessary to navigation upon the Illinois Waterway, for which "there is no adequate water supply for lockage, except by diversion from Lake Michigan. * * * If the diversion were reduced materially below 4,167 c.f.s., it would necessitate radical changes in the design and location of the locks, three of which are already either constructed or under construction" and upon "which between $5,000,000 and $6,000,000 has been expended, or is payable under contracts" (Master's Report 119-120).

Without a diversion of substantially the amount authorized, the navigable depths in the Illinois River between Utica and its mouth would be only about 3 feet instead of 7 feet, required by the Federal project, which, without this diversion, could never have been obtained and could not now be obtained inside of *ten or twelve years.* The diversion is also "an aid to the navigation of the Mississippi * * *" (Master's Report 124).

Complainants urge that the diversion is "solely for sanitation and power," because they say that such a purpose was indicated by the Secretary of War in a letter transmitting the permit. This letter is not subject to that construction. The language is, "that the taking of an excessive amount of water for sanitation * * * does affect navigation on the Great Lakes adversely, * * *" (Master's Report 80). The Secretary of War does not state that the amount authorized is "excessive," nor that the purpose of the diversion is "solely for sanitation." Neither does he say that it is for "power." If the Secretary's supposed "declaration of purpose" is to control, then complainants are in error when they say that "the diversion is also for power." Their argument is that the "purpose" determines the "effect" of the diversion. "The purpose of the diversion is not to be considered without regard to its effect. * * * It is the consequence, not the purpose, that is important in the national aspect" (Master's Report 165-166).

For example, the "*purpose*" of levees may be solely that of *flood control,* but their "*effect*" may be either to *aid* or *obstruct navigation.* In such a case, it is the "*effect*" not the "*purpose*" that determines the power of Congress. And the converse is true, for it is held that, "* * * levees built * * * in aid of navigation at the same time afford protection from overflow, and thus served a twofold purpose * * *." *Jackson* v. *United States,* 230 U. S. 1, 18.

The foregoing specific findings (showing that the diversion is a direct and essential benefit to navigation in the four important aspects, above mentioned) completely destroys the contention of the complainants that "the diversion is solely for sanitation and power," which constitute the fact-basis for their propositions of law. Since these are built one upon the other, they both must fall together.

These findings conclusively establish that this case *does present* (if that be necessary) "*conflicting claims of navi-*

gation and commere," within the construction of the cases contended for by complainants and upon which they rely.

Complainants are emphatic that neither the great artificial watergap of the Canal, nor the obviously vastly increased navigable capacity of the Illinois by reason of diversion, nor the certainly improved depths over the Mississippi sand bars has any relation whatever to navigation. Here again common sense would seem to us to obviate the necessity for argument for if complainants are right, there would be better navigation in the Mississippi with no water at all.

This sort of urging trifles with a subject too serious for such frivolity, for let there be no misapprehension on the practical effect of injunction or substantial reduction of the diversion. Either would indefinitely postpone, if it did not completely frustrate, any practicable provision of navigation from the Great Lakes to the Gulf of Mexico—a project which, if it retains the benefit of the existing diversion, is very close to practical consummation.

In such circumstances the averment that the present diversion is not necessary to or bears no reasonable relation to interstate commerce and navigation is without merit. Determination of the amount of diversion necessary to commerce is a highly technical and difficult engineering choice between two methods of navigation improvement. It has far-reaching political bearings. *It is an administrative and legislative question which the Court should not undertake to decide.*

(c) Diversion improves, and does not injure, navigable capacity Chicago River.

Complainants make great point of *early* engineers' reports to the effect that the diversion impaired the navigability of the Chicago River by introducing a swift current therein.

This happened. Practically the whole joint effort of both the United States and the Sanitary District between 1900 and 1910 was devoted to the task of overcoming this. It was overcome. There is an important traffic there now. It does not now suffer from the current and there is neither evidence nor finding to that effect. A considerable portion of the shipping has gone elsewhere but for other reasons. But the actual result of these improvements was to straighten the river, remove conditions of unspeakable filth therefrom, broaden it to a uniform width of 200 feet, provide a uniform depth of 21 feet and within any reasonable intendment of the English language vastly improve its navigable capacity.

(d) The diversion is the only presently practicable means of preventing conditions at the greatest internal center of interstate commerce of the United States, which, through pestilence on land, an unspeakably noisome condition in the Chicago River and Harbor and the lake offshore, and a lethal pollution of the waters of the whole southern end of Lake Michigan, would stand as such an obstruction to commerce and navigation as would require the immediate intervention of Federal power.

It is stated that the disposal of sewage of Chicago is not a navigation purpose, and that the Master found that the prevention of the pollution of the Chicago River and adjacent lake by the sewage of the Sanitary District, was the only navigation purpose for the diversion (Wis. Brief 52).

It is difficult to understand how counsel can say that the Master found that the prevention of the pollution of the Chicago River and adjacent lake was the only navigation purpose of the diversion in view of the several findings of the Master on the subject of the value of this diversion for navigation on the Illinois Waterway and on the Illinois and Mississippi Rivers, to which the complainants apparently take strenuous exception. However, complainants do not take issue with the proposition that the prevention of the pollution of the Chicago River and adjacent lake, was a navigation purpose and directly connected with navigation. Their only quarrel is that the Secretary of War had no right to take that situation into consideration, because, as they say, the condition was illegal. It is not unlawful to discharge into navigable waters, sewage "in a liquid state flowing from streets and sewers" (Master's Report 167). But the Secretary was confronted with no theory but with the condition as it existed on March 3, 1925. If he refused a permit for approximately the 8,500 c.s.f. diversion, pestilential and unwholesome conditions would immediately exist in those navigable waters, "injurious to navigation" and to "the allied interests of interstate commerce, a matter of national concern" (Master's Report 167, 170). Had the diversion never existed, and it was proposed, he might properly have granted a diversion to remove this condition. In any event, what the Secretary was called upon to do, in granting or refusing the permit, was clearly within the administrative power delegated to him.

New York makes the statement that no testimony was given on the subject of the obstruction and impairment by pollution to the navigable capacity of Lake Michigan and the Port and Harbor of Chicago and of the Chicago River which would result, if no diversion were permitted or if the diversion was not sufficient to keep the Chicago River reversed at all times (N. Y. Brief 39). This is a strange assertion, in view of the statement of New York (N. Y. Brief 11) to the effect that "the State of New York lays aside its exceptions to the Special Master's findings of fact and accepts his report on the facts, as though wholly correct".

On this subject, the Master's findings are specific and direct, as follows:

> "The Secretary of War had to consider the effect of an immediate stoppage of any diversion in excess of 4,167 c.f.s. There could be no question as to the consequences of such action" (Master's Report 193).
>
> "It is plain that the present flow from Lake Michigan through the drainage canal could not be immediately cut off, or reduced to 1,000 c.f.s. * * * The Chicago River and the waters of the lake about the city would be filthy and noisome, with serious injury to the commerce of Chicago harbor" (Master's Report 138).
>
> "These questions would concern not simply the health of the citizens of Chicago and the adjacent territory, but also the interest of navigation, questions of the sort which were appropriately before the Secretary of War. It appeared that a diversion of 4,167 c.f.s. was not sufficient to keep the Chicago River reversed at all times, and when not kept reversed, the enormous volume of Chicago's sewage would pour into the lake and under present conditions could not fail to create a pestilential condition in the lake, and in the port and harbor of Chicago" (Master's Report 193).

It goes without saying that the Master would not have made these vital and important findings of fact without evidence to support them. However, no exceptions whatever are filed by any of complainants to any of these findings. Not only that, but no evidence to the contrary appears in the Joint Abstract, filed pursuant to the order of this Court of January 4, 1928, which required the complainants to submit "in narrative form * * *, such parts of the record as they deem necessary to support their exceptions * * *". The record is replete with evidence fully supporting these findings, but it was not necessary for the defendants to incorporate this evidence in the Joint Abstract for the obvious reason that no evidence to the contrary was incorporated therein by the complainants. These findings of the Master must, therefore, stand as conclusive, both because no exceptions thereto have been filed by complainants and because no evidence to the contrary has been incorporated in the Joint Abstract. Furthermore, so far as New York is concerned it expressly accepts the Master's "report on the facts as * * * wholly correct" (N. Y. Brief 11).

Thus, it is not only established beyond all controversy by the findings, but it is both expressly (and by failure to file exceptions thereto) conceded by complainants, that the diversion, in the amount authorized by the permit of March 3, 1925, is a direct and substantial benefit to navigation, by preventing and removing the obstruction and impairment, by pollution, to the navigable capacity of Lake Michigan, the Port and Harbor of Chicago and the Chicago River, which would have been "injurious to navigation" and to "the allied interests of interstate commerce, a matter of national concern" (Master's Report 167, 170).

This is covered by the further specific finding of the Master, as follows:

> "The continuous introduction of such a pestilential mass into the harbor and the lake would * * * affect navigation and the allied interests of interstate commerce, a matter of national concern" (Master's Report 169-170).

As is well said by the Special Master,

> "Navigation is not an abstract conception. It requires something more than fluid and a boat. There must be water conditions which make navigation practicable, and Congress is concerned with these conditions" (Master's Report 167).

It is, of course, wholly unnecessary to point out the position of Chicago as the metropolis of the middle west, the greatest railroad center in the world, and the central clearing house of internal commerce in both people and things. To contend that consideration by the Secretary of the protection of the off-shore waters, the harbor, the drinking water of persons passing through the great *entrepot,* and indeed the purity of waters in the southern end of Lake Michigan was not in the interests of interstate navigation and commerce because it happened also to invade the field of sanitation is nothing short of folly.

VI.

Use of the diversion for water power is an incidental and harmless afterthought which does not influence the diversion or the amount of it.

Nothing will be found in the initial acts of defendant Illinois on the subject of water power in connection with the canal and diversion. They were authorized in 1889 but it was not until 1907 (Wis. Brief 24) that there was any use of the diversion for the production of power. It was an afterthought and not an incentive for action. Not to have utilized the flow would have been an economic crime. Surely the use of it can have no bearing on the merits of the diversion.

Much is made by complainants of the so-called manipulation or change of flow to take care of peak load conditions. This meant merely the storing of water for a time during the day and building up a head at the lower end of the channel, which was used at peak load times. It did not have any effect upon the use of the water for navigation or for sanitation (Joint Abst. 126).

Counsel's zeal to find some sinister motive for this diversion different from that disclosed by the evidence and by the Master's Report, causes them to assert the most extraordinary proposition (Wis. Brief 24-31), namely, that the amendment to the constitution of Illinois authorizing the construction of the Illinois Waterway, was solely for the purpose of power. The Sanitary and Ship Canal had been built with a capacity of 10,000 cubic feet per second, which was the amount required to keep the Chicago River reversed. The channels of the Chicago River and its branches have been deepened and widened at an expenditure of many millions of dollars, for the purpose of effectively caring for this diversion without creating a current unreasonably obstructive to navigation. This work was done pursuant to the approval of the Chief of Engineers and Secretary of War (Master's Report 39, 43). Congress had required and reports had been made by the Engineer Corps with reference to the use of the Sanitary and Ship Canal and the diversion through it for the improvement of the Illinois River. Likewise, from the opening of the canal, the diversion has been depended upon by the United States in its maintenance of project depths for navigation in the Illinois River. The engineers, in reporting upon the amount of diversion, had stated that 10,000 second feet diversion would undoubtedly be permitted by the Secretary of War when the Chicago River had been improved (Master's Report 44). The International Waterways Commission had recommended that a diversion of that amount be allowed (Master's Report 45, 46). The water in passing from the channel to the DesPlaines River at Lockport dropped about 34 feet. This water was going and would continue to go to waste (Master's Report 24, 26), unless works were installed to develop it. All this was merely incidental to the main operations of the Sanitary and Ship Canal, and was for the purpose of conserving this waste energy. Governor Deneen in his message in regard to the Illinois Waterway, mentioned the fact that the water power could be developed incidentally to the operation of the

Illinois Waterway, but emphasized the value and importance of the canal as a connecting link in the Lakes to the Gulf Waterway of national concern (Joint Abst. 113, 115).

VII.

The present inadequacy of Federal and other navigation works in waters connecting defendants' works with the Gulf of Mexico, does not detract from the advisability of Congress preserving the former, nor does it warrant complainants' insistence on impracticable methods of lockage and other novel provisions for navigation on the Lakes-to-Gulf Waterway suggested by them.

Complainants contend that all the commerce to be anticipated could be accommodated with less than 1,000 c.f.s. of diversion and that they have a right to insist that the court base its judgment on the worth of what defendants have done and the future of the whole project on a plan for a Lakes-to-Gulf Waterway sponsored by themselves which substitutes a canalization of the Illinois, complete reliance on dredging in the Illinois and the Mississippi, and a diversion of only 1,000 c.f.s. for the larger and more practicable possibilities inherent in the present situation. The argument is in effect:

(*a*) There is now no such volume of commerce on the Sanitary and Ship Canal, the DesPlaines, Illinois and Mississippi Rivers as warrants such a waterway. The method of dredging sandbars after they occur is good enough for the present commerce on the Mississippi and there is little commerce on the Illinois.

(*b*) The Illinois could be accommodated to any such navigation as is now practiced or, under present conditions, promised, by complete canalization, and under such canalization a diversion of from 1000 to 1500 cubic feet per second would be sufficient.

It is a principal averment and prayer of the bill that no diversion is necessary for navigation anywhere or that the Court should determine the amount of such diversion as the Court thinks necessary and enjoin the rest. The decision thereby presented to the Court, is

> Which is a better solution of the Lakes-to-Gulf waterway problem:
>
> (*a*) Destruction of the present electrical, sewage, drainage, and water system of Chicago; operation of the Sanitary and Ship Canal by locks and dams; relocating and rebuilding the structures of the Illinois Waterway; complete canalization of the Illinois River by an elaborate series of locks and dams; dredging at prohibitive expense a new and deeper channel in the lower Illinois; increase of dredging activity on Mississippi sand bars to increase the five-foot depths encountered before diversion to the nine-foot depths necessary to modern craft; possibly building locks in the Mississippi; and pestilential, noisome, unsanitary and unhealthful conditions, "injurious to navigation" and to "the allied interests of interstate commerce * * *", in Chicago River and Harbor and surrounding waters? or—
>
> (*b*) Open water navigation in the Sanitary and Ship Canal as at present; use of the nearly completed locks Illinois has constructed in the Illinois Waterway; open water navigation with slight further dredging in the lower Illinois; open water navigation and project depths in the Mississippi; and Chicago River and Harbor and surrounding waters free from unsanitary and noisome sewage pollution, "injurious to navigation" and to "the allied interests of interstate commerce * * *"?

The plan for the waterway based on the latter decision is now nearing consummation and effectiveness. The former is an untried theory involving wholesale abandonment of vast and costly existing municipal and navigation facilities in favor of proposed projects of tremendous and unknown cost and hotly disputed practical utility. If the latter plan were practicable (which is uncertain) it could be effected only after a complete revision of the entire legislative and financial basis on which the present project is constructed. Determination in favor of the second plan by the Court would be a mere academic judicial opinion on a highly technical and probably moot engineering problem. *The Court could destroy what exists. It could create nothing to take its place.*

The diversity of opinion, testimony, purpose, and interest on this subject is extreme.

There is involved a conflict between economic areas, as well as between economic uses of water diverted. Congress has as yet not expressly committed itself either to confirmation or denial of the diversion practiced, apparently preferring to defer a final commitment as to the quantity of diversion until the many and complex technical aspects of the problem have resolved themselves into something concrete and tangible and in the meantime to leave the matter in the hands of the Secretary of War.

At its last session, Congress provided for a nine-foot channel from Utica, Illinois, to the mouth of the Illinois River and provided that the act should not be so construed as in itself an authorization of diversion of water from Lake Michigan. This provision was inserted to avoid prejudicing either party to the present suit. It of course contemplates and does not disturb the existing authorization. Whether it be construed to authorize diversion or not, low water datum planes for the Illinois River are determined by the Chief of Engineers; the low water datum for construction on that river assumes a diversion of 10,000 cubic feet per second; preliminary Federal surveys for the newly authorized improvement proceeded from that assumption; cessation of diversion would extend that period of improvement indefinitely and frustrate any practicable Lakes-to-Gulf Waterway in the meantime. No one has even estimated what time and effort would be necessary to increase the Mississippi project to nine feet and at the same time compensate for the one or more feet now provided at low water by the diversion. The caution of Congress in making a final commitment as to the quantity of diversion pending solution of the factors which should control that commitment can certainly never be construed as a commitment of Congress either to reduction or destruction of a project and policy to which it has adhered for over a century.

Some point is made in evidence that the vast commerce on the Great Lakes followed close on the heels of improvement of their channels and harbors. This is obviously true because, before improvement, they were in a less navigable condition and promised less commerce than the projected Lakes-to-Gulf Waterway in its present state. Where "improvement" practically means "creation" there could be no water-borne commerce until water capable of bearing it is provided.

As to the Lakes-to-Gulf Waterway, however, complainants' witnesses are of opinion that commerce should precede improvement, and that the fact that there is no commerce where commerce could not be, militates against any practicable project for river improvement. Considering the pressing necessity and growing discontent in the Mississippi Valley, this view will seem cynical in those regions. There has been no commerce because there has been no practicable flotation. The latter now seems attainable and attainment ought not to be discharged for a theory.

The waterway on the present plan has been the policy of the Federal Government for a century. That policy induced the existing facilities. Opposition from complainant states appeared later. If such opposition has created some misgivings in one Secretary of War as to the quantity of diversion that ought finally to be permitted, none ever suggested that that quantity ought to be reduced below 4,167 cubic feet per second, much less that it must be so reduced. Such misgivings have produced no ultimate change in the legislative or administrative status of the diversion. It is being practiced under permit and statute. Congress, aware of every aspect of it, has permitted it. Existing navigation facilities and projects are based upon it. The sole practicable present hope for adequate facilities rests upon it. *It is certainly no proper function of the Court to relieve the authorities, charged by the constitution and laws of the United States with responsibility for this policy and its administration, from the duty of deciding it and certainly it is no function of the Court to determine the engineering questions involved in that decision.*

Benefits to the Mississippi Basin from the Lakes-to-Gulf Waterway project, now approaching attainment, are assumed to be vast. Proof in detail of potential commerce was offered and declined because it might raise issues not capable of precise determination. But there is proof and there is no question that the freight rate structure throughout the Mississippi Valley will be benefited by it; that a portion of the handicap to that region created by the Panama Canal will be relieved by it, and that a vast commerce will move upon any practicable consummation of it.

It is asserted that the Illinois Waterway, when completed, will not require any diversion in excess of 1,000 c.f.s. for the benefit of navigation (Wis. Brief 32-35).

The Master says:

> "I am unable to so find. The needs of navigation on that waterway will depend upon the carrying out of plans already adopted * * *." (Master's Report 122).

On this issue, counsel for complainants urge in effect (Wis. Brief 32-35) that the Master should have believed the witness Bixby and not the witness Barnes. The Master saw and heard these witnesses and his judgment, therefore, will not be disturbed. The Master was not dealing with an imaginary Illinois Waterway or such an Illinois Waterway as complainants might design. He was dealing with the Illinois Waterway, as approved by the Secretary of War in March, 1920, and under actual construction more than two years before any of these suits were commenced (Master's Report 120).

With reference to the amount of diversion required for the Illinois Waterway, the Master's further findings are:

> "Plans for what is called the Illinois Waterway * * * are based on a diversion from Lake Michigan of at least 4,167 c.f.s. * * *
>
> If the diversion were reduced materially below 4,167 c.f.s., it would necessitate radical changes in the design and location of the locks, three of which are already either constructed or under construction, and increased outlays. Illinois has authorized the expenditure of $20,000,000 for the completion of the waterway, of which between $5,000,000 and $6,000,000 has been expended, or is payable under contracts" (Master's Report 119-120).

Complainants seek to overturn these findings because of what they call "a legal quibble" developed by them in the cross-examination of the witness Barnes. Such a "legal quibble," however, does not change the actual "design and location of the locks" of the Illinois Waterway, in which "it would necessitate radical changes * * * if the diversion were reduced materially below 4,167 c.f.s. * * *" as found by the Master (Master's Report 119).

Concerning the plans of the Illinois Waterway, which were approved by the Secretary of War, the Master further finds:

> "The profile map accompanying the plans contains a notation that the water services shown were 'based on an assumed flow of 4,167 c.f.s., already approved, as a diversion from Lake Michigan, plus the normal flow from other sources in various pools'; that is, the assumption was of 6,000 c.f.s. flow, made up of 500 c.f.s. as an actual low water flow, 4,167 c.f.s. from Lake Michigan, and 1,395 c.f.s., as averaging the amount of Chicago's pumpage" (Master's Report, 120).

Complainants quarrel with the portion of this finding which states that the total assumed flow of 6,000 c.f.s., upon which the plans of the Illinois Waterway were based, was made up in part by "1,395 c.f.s., as averaging the amount of Chicago's pumpage," because they say that in 1919 when the Illinois Waterway plans were presented the amount of the Chicago pumpage was not 1,395 c.f.s., but 1,176 c.f.s. This difference is of no importance. Counsel for complainants themselves say, "We think it wholly immaterial" (Wis. Brief 35). Nevertheless, it was proper for the engineers to take into consideration the growth of the population of Chicago and a corresponding increase of the domestic pumpage.

Further quibbling about how the figure of 6,000 c.f.s. is made up, complainants say that the Master erred in finding that it was in part "made up of 500 c.f.s., as the actual low water flow * * *". They say that the evidence is that the low water flow is nil, but the testimony is that in the Starved Rock pool, which is the place of the "6,000 c.f.s. flow" entry on the plans, the low water flow is about 500 c.f.s. (Joint Abst. 123). As complainants themselves say, it is "wholly immaterial" how the balance of the 6,000 c.f.s. is made up. The controlling findings of the Master are that the plans of the Illinois Waterway "are based on a diversion from Lake Michigan of at least 4,167 c.f.s.," and "if the diversion were reduced materially below 4,167 c.f.s. it would necessitate radical changes in the design and location of the locks, three of which are either constructed or under construction, and increased outlays". The notation on the plans expressly states that the water surfaces shown thereon are "based on an assumed flow of 4,167 c.f.s., already approved, as the diversion from Lake Michigan * * *" (Master's Report 120).

Therefore, as to the contention of complainants that any diversion in excess of 1,000 c.f.s. is not required for the Illinois Waterway, the Master was not only justified in concluding, but was bound to conclude, "I am unable to so find. The needs of navigation on that waterway will depend upon the carrying out of *plans already adopted* * * *" (Master's Report 122).

Complainants put great store in the fact that in the Illinois Waterway Act of June 17, 1919, there was an improved stretch of seven miles in the Illinois River between La Salle and Utica (Wis. Brief 28, 29). Naturally, the Illinois Waterway should necessarily extend through the shoal sections of the DesPlaines and Illinois Rivers, where the expense of the improvement was greater than the Federal Government was willing to bear. The improvement of the navigation in the lower river where the shoals were not so great, the Government section, would be easy and inexpensive. It was already understood that the Government development would be extended to the vicinity of the Utica bridge, where the Illinois Waterway ended, as was finally done in the Rivers and Harbors Act of 1927.

Of course, the inadequacy of federal and other works below the areas here in question justifies neither condemnation of the latter nor insistence by complainants that the court accept some special scheme of theirs which Congress has not in its wisdom adopted and the only purpose of which is to support the prayer in a highly adversary and hotly contested lawsuit. These are matters for legislative and administrative action and not for the determination of complainants nor—with all respect—of the court.

VIII.

Defendant Sanitary District has not violated the conditions of all the various permits issued to it since 1903, and even if it had, violation of earlier permits has no effect on the validity of the existing permit, and whether violation of conditions of the latter should cause its revocation is matter of concern to the Secretary who imposed such conditions and not to complainants.

Obviously, the validity of only one permit is here being considered, the one in effect—allegations of violations of previous permits are only asserted to discredit the adversary, but the assertion has no place in the controversy.

As to violations of the latter permit, since both the granting and revocation of it were within the discretion of the Secretary of War and since he conditioned his revocation on certain conditions which he imposed (and could have omitted had he chosen to do so) the violation thereof is no concern of complainants and has no place in this controversy.

As a matter of fact, however, the permit has not been violated. The Master has found that it has been substantially complied with.

> "It appears from the evidence that, up to the time of the taking of the testimony herein, the Sanitary

District had substantially complied with the conditions of the permit" (Master's Report 81).

The permit "authorizes the Sanitary District of Chicago to divert from Lake Michigan through its main drainage canal and auxiliary channels, an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second * * *" (Master's Report 78).

Complainants say that the terms of the permit have been violated, because *for a few minutes* at 5:00 p. m. on November 16, 1925, the "instantaneous maximum" was 13,415 c.f.s. and *for a few minutes* at 4:30 p. m. on September 13, 1926, the "instantaneous maximum" was 12,796 c.f.s., as measured at Lockport. The item of 13,415 c.f.s. includes a domestic pumpage of 1,338 c.f.s., leaving a balance of 12,077 c.f.s. or 1,077 c.f.s. in excess of the maximum limit, while the item of 12,796 c.f.s. includes a domestic pumpage of 1,395 c.f.s., leaving a balance of 11,401 c.f.s. or 401 c.f.s. in excess of the maximum limit. The amount of the domestic pumpage should be deducted, because the domestic pumpage is not diverted by the Sanitary District. Neither is the domestic pumpage diverted "from Lake Michigan * * * through its main drainage canal and auxiliary channels" (Master's Report 75).

The "instantaneous maximums" complained of were measured at Lockport. The permit does not provide that the "instantaneous maximum" *at Lockport* shall not exceed 11,000 c.f.s. The reading of the permit is that "the instantaneous maximum * * * from Lake Michigan * * * through its main drainage canal and auxiliary channels" shall not exceed 11,000 c.f.s. In other words, the plain meaning and intention are that "the instantaneous maximum" *withdrawn from Lake Michigan* shall not exceed 11,000 c.f.s. The flow is measured at Lockport, but the diversion "from Lake Michigan" takes place at the mouth of the Chicago River and at other intakes, situated 36 miles away. There is no violation of this provision of the permit unless "the instantaneous maximum" of the amount withdrawn "from Lake Michigan" at the mouth of the Chicago River and at the other intakes exceeds 11,000 cubic feet per second. There is no evidence in the record that "the instantaneous maximum" of the amount withdrawn "from Lake Michigan" exceeded the 11,000 c.f.s. limit.

Above the Lockport Lock, where the flow was measured, is a large pool. Between the Lockport Lock and the mouth of the Chicago River and the other intakes is an immense body of water from 36 to 47 miles long, from 22 to 26 feet deep and from 160 to 260 feet wide. When the flow is increased at Lockport, it takes many hours before *there is any increased flow,* and nearly 24 hours before *the full effect is felt,* at the mouth of the Chicago River or at the other intakes, 36 miles away. It is obvious, therefore, that evidence of *two instances* of "instantaneous maximums" from 401 c.f.s. to 1,077 c.f.s. in excess of the limit, occurring *for a few minutes* and measured at Lockport, is no proof of an "instantaneous maximum" in excess of the limit of diversion *"from Lake Michigan"* at the mouth of the Chicago River and at the other intakes, located from 36 to 47 miles away.

When the head is raised at the Lockport Lock due to a storage at that end of the channel, a sudden lowering of the gates (in order to increase the flow through the channel) might cause an extraordinarily large "instantaneous maximum" *for a few minutes,* when the measurement is being taken, but that would not be the amount of the "instantaneous maximum" *throughout the channels,* nor would it represent the "instantaneous maximum," being diverted "from Lake Michigan" at the mouth of the Chicago River and at the other intakes. This is made clear by the testimony of the witness, Ramey, as follows:

> "The half hourly readings at Lockport, the lower end of the channel, merely represents a discharge there at the instant at which the reading is taken. In order to determine what the flow is throughout the channel, it is necessary to have the average discharge at the end of the channel for a long period of hours" (Joint Abst. 125).

Further speaking of the two "instantaneous maximums" complained of, this witness said:

> "I know that that much flow has not passed through the channel. It is true that the flow is measured at Lockport, but the discharge from the end of the channel is not the same for any given half hour that the flow through the channel might be, and as I recall the wording the permit is 'instantaneous flow through the channel' " (Joint Abst. 184).

Because of low lake levels during the years 1925 and 1926, it was physically impossible to produce an instantaneous maximum of diversion in excess of 11,000 c.f.s. "from Lake Michigan" at the mouth of the Chicago River and at the other intakes and throughout "the main drainage canal and auxiliary channels." This is also established by the Report of the Chief of Engineers of March 29, 1926, in which he stated at, page 17:

> "Due to low lake levels, however, it is physically impracticable with existing works to withdraw more than about 8,250 cubic feet per second * * * so that the figure of 8,250 cubic feet per second represents the instantaneous maximum that can be withdrawn at the moment * * *" (Joint Abst. 185).

Complainants concede this in their briefs where they say:

> "The lesser flow in 1925 and 1926 was occasioned by the fact that lake levels had fallen so low that the Sanitary District found it physically impossible to draw a greater quantity of water through its existing channels in their then condition through those years" (Wis. Brief 5-6).

Under these circumstances and in view of the specific finding of the Master that all of the conditions of the present have been "*substantially complied with,*" the claim that these two instances of slightly excessive "instantaneous maximums" occurring for a few minutes each, over a period of several years, representing the *flow at Lockport,* but not representing the diversion "*from Lake Michigan,*" amount to such a violation of the permit as to destroy its validity, is little less than childish. It furnishes, however, some measure of their other contentions.

Complainants next claim (Wis. Brief 54) that the 6-inch lowering of lake levels is a violation of condition (1) of the permit, to the effect that

> "there shall be no unreasonable interference with navigation by the work herein authorized."

At the time the permit was issued, it was understood by the Secretary of War that the diversion authorized would lower lake levels, substantially to the extent found by the Master. Complainants' argument, therefore, is that the diversion is both *authorized and prohibited,* so that the permit is to be interpreted like the leave granted by the old woman in Mother Goose, who, when asked,

> "Mother, may I go out to swim?"

replied:

> "Yes, my darling daughter,
> Go, hang your clothes on a hickory limb,
> But don't go near the water."

Such a contention scarcely needs a reply. It is plain that this condition relates not to the *diversion,* expressly permitted, nor to the lowering of lake levels occasioned thereby, but to the "*work* * * * authorized" and necessary to be done, in order to effect the diversion and in order to comply with the other conditions of the permit, such as the construction of the controlling works at the mouth of the Chicago River, provided for in condition (6) thereof, and to the manner of effecting the diversion, so as to avoid excessive currents and other obstructions in the Chicago River and in the Sanitary and Ship Canal. The Special Master well disposes of this contention with the following statement:

> "But this condition must be construed not as withdrawing or rendering nugatory the permission expressly granted but as providing that, in the manner of doing it, all that is done under that permission, and in performing the conditions of the permit, shall be done with reasonable regard for the interests of navigation" (Master's Report 196).

Complainants also say (Wis. Brief 56) "that since the close of the hearing, * * * the City of Chicago" has violated condition (8) of the permit, requiring the metering of its water supply. They admit that there is in the record no evidence of such violation. If this charge is true, it would be an easy matter for complainants to obtain leave to offer additional proof and undertake to sustain this claim by additional testimony. This they have not, and we believe they will not, attempt to do, for the very good reason that it would result only in failure. All of the conditions of the permit have been, and still are being, substantially complied with. That this is true was admitted in the oral argument before this Court on the motions to dismiss by all complainants then appearing, as is indicated by certain portions of the transcript of such oral argument, as follows:

> "Mr. Justice Sutherland (interposing): Is the City of Chicago or the Sanitary District doing anything now that they are not permitted to do by the order of the Secretary of War?
>
> Mr. Baker: So far as I know, they are not, sir" (Joint Abst. 186).

In this connection, it may not be out of place here to suggest that if the permit is invalid, as complainants contend, why do they find it necessary or advisable to make these desperate and futile efforts in attempting to show that its conditions have been violated?

IX.

It is shown that compensating works would cure all the ills complained of more effectively than cessation of diversion. Their consideration is therefore involved in this case, first, because relief from these ills and nothing more is the sole supportable prayer of complainants; second, because in such circumstances the cost of them is one measure of damages, and third, because the fact of their practicability should have a persuasive if not a compelling bearing on the question of remedy.

This case stands stripped of any consideration except the damage due to lowered lake levels. As to compensating works, the Master found on the unanimous opinion of all of the numerous engineering boards that had ever examined the question.

(1) That the Secretary of War had required a bond of the Sanitary District to insure payment by it of its share of the cost of such works (125 *et seq.*).

(2) That the Special Board appointed pursuant to the Act of June 25, 1910, the Board of Engineers for Rivers

and Harbors (reporting December 16, 1913), the so-called Warren Report and the Joint Board of Engineers (United States and Canada) reporting November 16, 1926, had all reported to the general effect that all the results of artificial lowering causes and some of the results of natural causes could be offset by restrictions of lake outlets, not difficult to install and relatively inexpensive.

Complainants are particularly vociferous against any such consideration, although it is obvious that an engineering expedient which, without dredging anywhere, simply increases available navigable depth by raising the water level, relieves all concerned of the expense of excavation in all waters to offset not only the relatively small effect of defendants' diversion but all the complex of causes which have lowered Lake Michigan levels 32 inches below their 50 year norm, is a method much to be preferred over any other than has been suggested.

But complainants (Wis. Brief 57) vigorously protest this solution and advance such purely technical and legalistic arguments as that there can be no such works without Congressional authorization and Canadian acquiescence, and that complainants are not required to construct such works to offset damages occasioned by defendants. Of course nobody even suggested that complainants should construct such works.

Considering the last objection first, if the Federal Government in its wisdom and at expense of defendants elects to afford relief in this fashion, complainants should not be heard to complain. Considering the fact that both Federal and Canadian engineers are recommending these works to their governments, and that Canadian dredging in the outlets of Huron is responsible (Master's Report 97) for a greater lowering of Lake Michigan than is defendants' diversion, it is no great argument that Canada must agree.

This is not a suit between individuals. It is as Wisconsin alleges a great arbitral proceeding between quasi-sovereign states on the sole question of lake levels. If they can be restored as against the effect of *all* causes by the expenditure of $3,000,000 to $4,000,000; and at the same time cure all complainants' ills and not impose an unconscionable burden on defendants, complainants should be the last to protest.

Furthermore, when no direct assessment of technical damages is possible, the cost of a complete obviation of all damage is a compelling measure of the extent to which complainants are really hurt. Finally in a case like this when a Special Master of such distinction reports that the injunction prayed by complaints is virtually impossible (and is so recognized by complainants themselves, Master's Report 139), such an effective alternative remedy to that sought by the bill ought to be welcomed by all concerned.

X.

Continuation of the diversion will create no new damage and afford no new precedent.

As was clearly demonstrated at p. 10, *supra,* defendants no longer control the diversion. The War Department has assumed control and responsibility. The only occasion for future apprehension of damage is a doubt of the integrity and determination of purpose in a great federal administrative department.

The court could do nothing more here than to substitute its own unequipped administration for an exactly similar course of surveillance and administration by the far better equipped War Department. At page 139 of the Master's Report it will be seen that this is precisely what complainant asks the court to do. But if complainant mistrusts the

Federal Government as represented in this matter by the War Department, then it is conceivable that they might not be satisfied with the court. Considering technical equipment, it seems certain that the court would prefer the War Department (rather than itself) for the execution of a task so difficult. (See Point VIII, p. 179, *infra.*)

XI.

The injunction sought would cause untold damage to defendants and to navigation and subject the lives and health of the inhabitants of the Sanitary District to serious danger. Complainants themselves recognized its impracticability in oral argument before the Master.

The Master found:

> "It is plain that the present flow from Lake Michigan through the drainage canal could not be immediately cut off, or reduced to 1,000 c.f.s., and in consequence the sewage of the Sanitary District in its present condition turned into Lake Michigan, without exposing the inhabitants of the District to grave risk of water-borne diseases, by contamination of the water supply taken from the lake. The Chicago River and the waters of the lake about the city would be filthy and noisome, with serious injury to the commerce of Chicago harbor. It appears from the testimony that it would take several years, not less than five years and perhaps ten years, or even more, before the sewage of the district, with such treatment as is practicable, could be turned into the lake and the diversion from the lake stopped or greatly reduced, without serious risk to the health of the people of Chicago.
>
> * * * * * *
>
> The complainants have recognized the impracticability of ordering an immediate cessation of the diversion, and the suggestion made in the closing argument on their behalf before the Special Master was that the

> Court should determine the rights of the parties, and direct a discontinuance of the diversion, but should suspend the operation of the decree and hold it in the Court with requirements from time to time as to the action, and the time, that should be taken to bring about a condition which would permit of the decree becoming effective" (Master's Report 138-139).

With reference to the same subject, the Master concluded (193):

> "So clearly do these consequences appear, that the complainants, pressing for a decree to prevent the diversion, at the same time suggest that the Court if it enters the decree should suspend its operation and direct the defendants to meet specified requirements, with a provision that the parties may come before the Court from time to time to show the difficulties encountered, the speed made, whether the delay was too great, asking in short that the Court should direct and supervise the steps necessary to be taken to make it possible ultimately to give effect to such a decree, which, it is recognized could not reasonably be made operative forthwith. And it is plain that this supervision would have to continue for a number of years. The Court would thus be compelled to deal with questions essentially of an administrative character. These questions would concern not simply the health of the citizens of Chicago and the adjacent territory, but also the interests of navigation, questions of the sort which were appropriately before the Secretary of War."

THE LAW.

Preliminary Statement.

This case and the issues of law and fact involved, may be well characterized in the language of this court with reference to the same subject-matter in *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 425:

> "It concerns the expenditures of great sums and the welfare of millions of men. But cost and importance, while they add to the solemnity of our duty, do not increase the difficulty of decision except as they induce argument upon matters that with less mighty interests no one would venture to dispute. The law is clear, and when it is known, the material facts are few."

When all the facts, as arranged by complainants in their briefs to suit their legal contentions, are considered, one and only one essential proposition stands forth, namely,

> "The United States is asserting its sovereign power to regulate commerce and control the navigable waters within its jurisdiction."
>
> *Sanitary District* v. *United States, supra.*

The defendants have filed no exceptions. We shall undertake only to sustain the Master's Report, which we adopt as a statement of the facts of the case and a brief on the law, sustaining the contentions of defendants. The record here consists of the Master's Report and the joint abstract of record.

Unfortunately for an unconfused consideration of the real questions involved, complainants have sought to restate many findings of fact, to which exceptions are not now pressed and in doing so have made them appear to have a different and unwarranted meaning. These statements, we have heretofore considered.

There also appears in the Wisconsin brief, under the heading of "The Law," what is called "A Condensed Statement of the Facts Which Present the Problem" (Wis. Brief 60). In such statement, the enterprise of the Sanitary and Ship Canal is presented, without regard to the many surrounding facts having to do with navigation and the interests and concern of the United States and of the State of Illinois. The diversion as authorized by the permit of March 3, 1925, is pictured as a mere obstruction to navigation, having no relation to navigation or the use of navigable waters of the United States in interstate commerce. It becomes a diversion only for the purpose of sanitation and water power and there is no "national concern."

Upon the facts so presented and thus distorted, complainants seek to base their propositions of law. We believe that a fair consideration and correct understanding of the case cannot be had, without brushing aside these misinterpretations and considering the facts as they are disclosed and clearly stated in the Master's Report.

The complainants have filed three separate briefs, aggregating approximately 500 pages of printed matter. Their contentions are necessarily expressed in different form, but in the main, the contentions of each brief with reference to what we deem to be the main questions involved, are substantially similar. The fifteen days allotted to us to prepare our briefs does not permit, without unduly prolonging our brief, a specific and direct answer to each and every contention. Complainants have sought to comment on each of the Master's conclusions of law, some of which we do not believe are now open to serious question. We believe that these contentions of the complainants will be best met by our presentation of what we believe to be the controlling questions in this case.

The Question of Justiciable Controversy.

On the motion to dismiss and before the Master, defendants contended; that the subject-matter of this suit is the navigable capacity of navigable waters of the United States; that complainants have neither domain nor property therein; that Congress has assumed exclusive sovereignty and domain thereof. It was therefore urged that the States have no right to sue, and the court has no jurisdiction to entertain their suit; because the rights sought to be vindicated are merely the rights of the people of these States to navigate national waters, and that, since these rights derive from their citizenship in the United States, and not from citizenship in these states, complainants could not bring suit on the rights of their citizens without violating the Eleventh Amendment.

(*New Hampshire* v. *Louisiana*, 108 U. S. 76;
Wisconsin v. *Pelican Insurance Co.*, 127 U. S. 265, 286;
Louisiana v. *Texas*, 176 U. S. 1, 16;
Massachusetts v. *Mellon*, 262 U. S. 447.)

It was further contended that the complaint was bad because the suit was in effect one to vindicate the freedom of interstate commerce, and no state has the right to sue for such purpose.

(*Louisiana* v. *Texas*, 176 U. S. 1;
Oklahoma v. *Atchison Ry.*, 222 U. S., at 289;
Oklahoma v. *Gulf, etc., Ry.*, 220 U. S. 290, at 301.)

and especially here, when the statute confines its vindication to suit by the Attorney General of the United States.

> (*Minnesota* v. *Northern Securities Co.*, 194 U. S. 46.)

It was further contended that complainants, showing no special injury different from that of the public at large, could not, under traditional principles of equity, sue themselves, but must rely on suits by the Attorney General.

> (*Georgetown* v. *Alexandria Canal Co.*, 12 Pet. 91;
> *Irwin* v. *Dixon*, 9 How. 10;
> *Mississippi, etc., Ry. Co.* v. *Ward*, 2 Black. 485, 499;
> *Gilman* v. *Philadelphia*, 3 Wall. 713, 744.)

and especially here, where a statute of the United States expressly provides for its vindication solely at suit by the Attorney General.

> (Sec. 17, Act of March 3, 1899.)
> (*Minnesota* v. *Northern Securities Co.*, 194 U. S. 46.)

Finally, we contended, that the suit was in effect one to coerce by decree of this court the legislative discretion of Congress and the administrative discretion of the War Department, taking the court into the province of both of the two great co-ordinate branches of Government—in a word, that what is here sought is decretal regulation of commerce and a review of a valid administrative determination.

> (*Marbury* v. *Madison*, 1 Cranch. 137, 170;
> *Georgia* v. *Stanton*, 6 Wall. 50, 75;
> *New Orleans* v. *Payne*, 147 U. S. 261;
> *So. Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205;
> *Passaic Bridge Cases*, 3 Wall., Appendix 782;
> *Missouri* v. *Illinois*, 200 U. S. 496.)

The Master concluded, however (140-146), that the court has frequently taken jurisdiction of controversies between states involving questions of dominion over physical domain and that the question as to whether previous administrative action in this case is valid (146) is appropriately presented for the decision of the court.

We have not excepted to this conclusion, but we do not understand that it goes further than to determine that states complainant have demonstrated a sufficient interest to have their suit entertained. We think that, on the facts as found by the Master, every one of the above contentions is valid and available as against the prayer of the complaint, and that this question is properly before the court on the motion to dismiss, the disposition of which motion was reserved by the court for final hearing. We refer to our briefs filed in support of said motion to dismiss.

I.

Congress has delegated to the Secretary of War power to authorize this diversion. When so authorized the diversion is lawful and the Secretary's act is immune from judicial review.

(a) This Court has interpreted the statute in consonance with defendants' contention.

For convenience in considering the interpretation of Section 10 of the Act of March 3, 1899, upon which this whole controversy hinges, we set forth below, in parallel columns, Sections 7 and 10 of the Rivers and Harbors Act of September 19, 1890, and, beside it, Sections 9, 10 and 12 of the Rivers and Harbors Act of March 3, 1899:

Sections 7 and 10, Rivers and Harbors Act of Septem-	Sections 9, 10 and 12, Rivers and Harbors Act of

ber 19, 1890 (Laws, Improvement of Rivers and Harbors, Vol. I, p. 582)—

"Sec. 7. That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty, or structure of any kind outside established harbor-lines, or in any navigable waters of the United States where no harbor-lines are or may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters, and it shall not be lawful hereafter to commence the construction of any bridge, bridgedraw, bridge piers and abutments, causeway or other works over or in any port, road, roadstead, haven, harbor, navigable river, or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works have been submitted to and approved by the Secretary of War, or to excavate or fill, or in any man-

March 3, 1899 (Laws, Improvement of Rivers and Harbors, Vol. 2, p. 886)—

"Sec. 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War: *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced. *And provided further,* that when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be ner to alter or modify the course, location, condition or capacity of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War; *Provided,* that this section shall not apply to any bridge, bridge-draw, bridge piers and abutments and construction of which has been heretofore duly authorized by law, or be so construed as to authorize the construction of any bridge, draw bridge, bridge piers and abutments, or other works, under an act of the legislature of any State, over or in any stream, port, roadstead, haven or harbor, or other navigable water not wholly within the limits of such State."

"*Sec.* 10. That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction, is hereby prohibited. The continuance of any such obstruction, except bridges, piers, docks and wharves, and similar structures erected for business purposes, whether heretofore or hereafter created, shall constitute an offense and each week's continuance

lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War."

"*Sec.* 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, of any such obstruction shall be deemed a separate offense.

Every person and every corporation which shall be guilty of creating or continuing any such unlawful obstruction in this act mentioned, or who shall violate the provisions of the last four preceding sections of this act, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five thousand dollars, or by imprisonment (in the case of a natural person) not exceeding one year,

outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

"*Sec.* 12. That every person and every corporation that shall violate any of the provisions of sections nine, ten, and eleven of this Act, or any rule or regulation made by the Secretary of War in pursuance of the provisions of the said section fourteen, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not exceeding twenty-five hundred dollars nor less than five hundred or by both such punishments, in the discretion of the court, the creating or continuing of any unlawful obstruction in this act mentioned may be prevented and such obstruction may be caused to be removed by the injunction of any circuit court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the Attorney-General of the United States."

dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court. And further, the *removal* of any *structures* or parts of structures erected in violation of the provisions of the said sections may be enforced by the injunction of any circuit court exercising jurisdiction in any district in which such structures may exist, and proper proceedings to this end may be instituted under the direction of the Attorney-General of the United States."

Construing Section 10 of the Act of 1899, the Master concluded (196):

> "That Congress has conferred authority upon the Secretary of War to regulate the diversion, provided he acts in reasonable relation to the purpose of his delegated authority and not arbitrarily."

As a basis for the above final conclusion, the Master said (Master's Report 182):

> "In the cases described in the second and third clauses of Section 10, Congress has given its affirmative authorization provided the requirements as to the recommendation of the Chief of Engineers and the authorization of the Secretary of War are met."

In discussing the question as to whether a justiciable controversy was presented, the Master stated (146):

> "The fact that the problem as now presented would seem to be one appropriate for administrative consid-

> eration and solution, if such could lawfully be had, does not defeat the jurisdiction to determine whether the administrative action hitherto taken has been valid."

Having concluded that the Secretary was authorized to grant a permit under Section 10 of the 1899 Act, the only question remaining was whether his act had *reasonable relation* to the *granted power* and whether his action was *arbitrary* or *capricious*, and so the Master states (190):

> "The Secretary of War's authority under Section 10 of the Act of March 3, 1899, is not to be regarded as unlimited. Such power could not be conferred. His action must have reasonable relation to the exercise of the power granted to Congress by the Constitution and to the purpose of the delegated authority, and must not be arbitrary or capricious."

If the Secretary has granted a permit which some person aggrieved by his action desires legally to question, it would be necessary for such person to institute a suit to enjoin action under the permit. In order that such a litigant should prevail in such a case, assuming that the permit had reasonable relation to the exercise of the power granted, it would be necessary to show that the Secretary's action was arbitrary or capricious. To establish that his action was arbitrary or capricious would require certainly a showing that the permit would result in unreasonable obstruction to navigation. Whereupon the Master concluded that *the legal result* and therefore (190):

> "the true intent of the Act of Congress was that unreasonable obstructions to navigation, and navigable capacity, were prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction."

The Master further concluded that the Secretary's (191)

> "determination as to what is or is not an unreasonable obstruction to navigation or navigable capacity in the circumstances of the particular case has the same effect and is as immune from judicial review as if Congress had acted directly" (Master's Report 190, 191).

The foregoing language of the Special Master is amply supported by his reasoning (176-191) and therefore we shall here confine ourselves to refutation of the argument in the Wisconsin brief.

Complainants' contention may be summarized, viz.: that, by the Rivers and Harbors Act of March 3, 1899, Congress never intended to delegate any authority to the Secretary of War to authorize obstructions to navigable capacity; that any such obstructions are inhibited by the statute; that the only purpose of the power delegated to the Secretary is to permit him to prohibit structures even though they are not obstructions to the end that the question of obstruction or no obstruction *may never be reviewed by courts or juries* (Wis. Brief 143). It is pertinent to observe that if such were the intentions of Congress, it either failed signally of its purpose or else Wisconsin and sister states complainant ought not to be here seeking to review the Secretary's permit.

These states have heretofore made the same contention here and have, as we think, failed to prevail with it.

There ought not to be any question as to the authority of the Secretary of War to issue the permit here involved under the March 3, 1899, Act, since the decision of this court in

> *Sanitary District of Chicago* v. *United States*, 266 U. S. 405.

It seems that every contention here presented by the complainants as to the construction of the March 3, 1899, Act, the power of the Secretary of War thereunder and the effect of his permit, was before the court, and the court's opinion does not leave open to argument any of these points here raised by complainants. In the case of *Sanitary District* v. *United States, supra,* all the complainants here appeared as *amici curiae* and filed a document entitled

> "Brief and Argument for the States of Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin, as *Amici Curiae.*"

In support of this brief, the states also appeared in oral argument. At page 34 of the brief of the complainants in said case as *amici curiae,* begins their argument with reference to the construction of the March 3, 1899, Act, and the power of the Secretary of War thereunder, under the heading

> *"The Secretary of War was without power to authorize any abstraction of such waters."*

Again, at page 36 in this argument, the *amici curiae* brief states:

> "It seems clear from an examination of the provisions of Sections 9 and 10 of the Rivers and Harbors Act of March 3, 1899, * * * that affirmative congressional action must be taken with regard to any construction or work which will obstruct the navigable capacity of any of the waters of the United States."

In the brief of the United States in that case, there is an argument under the heading (page 184):

> "Congress has committed to the Secretary of War and the Chief of Engineers the administrative duty of determining whether a modification of the condition, etc., of navigable waters is such that they can approve, or whether it amounts to an obstruction requiring af-

> firmative authorization from Congress. The determination of those questions by the Secretary of War and the Chief of Engineers is conclusive."

It would seem, therefore, that these contentions were determined by this court in the case of *Sanitary District* v. *United States, supra,* by the following language (page 429):

> **"This withdrawal is prohibited by Congress, except so far as it may be authorized by the Secretary of War."**

(b) Administrative interpretation of the statute has consistently been in consonance with defendants' contention.

Complainants assert (154) that there has been no administrative interpretation supporting the Master's conclusions. We shall refer hereafter (p. 96) to their reference to Judge Koonce's lecture in this regard. Judge Koonce is described as a "law officer" of the Corps of Engineers. We assume that the court will take judicial notice of the organization of the War Department and of the functions of the Judge Advocate General of the Army and the Chief of Engineers. Judge Koonce says (Wis. Brief 165) that the Chief of Engineers "maintained" the same construction for which complainants now contend. What became of this maintenance is disclosed (50) by the Master's Report, as follows:

Referring to the fact that a certain application for one of defendant's permits was made under Section 10 of the Act of March 3, 1899, the Secretary of War stated that the Chief of Engineers was at first of opinion that such a change in the flow of the Calumet River was not within the power of the Chief of Engineers to recommend, or within the power of the Secretary of War to permit. The Judge Advocate

General, however, to whom the question was submitted, held that Section 10 applied to the case, and that it was one in which the work could be allowed under the recommendation of the Chief of Engineers and the permission of the Secretary of War. Upon this construction of the statute, the Secretary of War requested the Chief of Engineers to make his recommendation. After quoting the adverse decision of the Chief of Engineers on the matter of advisability, Secretary Taft concluded as follows (Master's Report 50):

> "It is quite evident from the reading of the statute that Congress intended in this statute, as in many others, to give the Chief of Engineers authority, independent of the Secretary of War, in reaching a conclusion as to the wisdom and propriety of granting a permit under the section, and that unless the Chief of Engineers shall recommend the granting of the permit, the Secretary of War is without power to give the requisite authority. It follows, therefore, that the application must be denied, whatever my view of the case. * * *
>
> *While I agree in the construction of the Judge Advocate General that the issue is left by statute to the recommendation of the Chief of Engineers and the concurrent decision of the Secretary of War,* it may be fortunate that circumstances now require submission of this question of capital and national importance to the Congress of the United States."

The construction placed upon the act by this one of a succession of Chiefs of Engineers was thus not concurred in by the Judge Advocate General of the Army, whose opinion (interpreting the statute in consonance with the Master's finding) was approved by the then Secretary of War as has just been shown.

It is difficult to see how in the face of this crystalized administrative interpretation of the War Department, Wisconsin can contend, as she does (154-160) that there has been no interpretation by the War Department in accordance with the Master's finding. In addition to these departmental findings, the court is aware of the concurring interpretation of the statute by the Attorney General of the United States (Master's Report 185), set forth in full as an appendix to brief of Sanitary District on the motion to dismiss. The evidence is thus overwhelming against complainants' contention that there is no long established departmental interpretation of the Statute of 1899, in consonance with the Master's interpretation, and it is also worthy of remark that such departmental interpretation is not simply a generalized conclusion—it pertains to the facts and circumstances of this particular case. It should also be remarked that the opinion of Attorney General Wickersham (27 Op. Atty. Gen., 327, 331) cited at page 165 of the Wisconsin brief, as supporting their view of the interpretation of Section 10, is not even on the point here in controversy. It considers only whether the Secretary must consider damage to a bathing beach in granting a permit authorizing a dolphin.

The Master has set forth the various reasons for his interpretation of this statute so clearly that it would serve no purpose to review them, and we desire merely to call attention to this part of the Master's Report as a complete answer to all the contentions of the complainants to the contrary. He finds, specifically (Master's Report 185):

> "In the present instance there seems to be no opportunity for dispute as to the long continued and uniform construction of Section 10 of the Act of 1899 by the War Department. It has been its view that in the cases for which provision is made in the last two clauses of Section 10 of the Act of 1899 a specific authorization by congressional act is not required and that the action of the Secretary of War upon the recommendation of the Chief of Engineers is sufficient."

Attempting to refute this finding of the Master, counsel refer (Wis. Brief 154-160) to the conditions of the various permits that have been issued to the Sanitary District with reference to the diversion, and to the opinion of Secretary of War Stimson of January 8, 1913, when he refused the permit. But Secretary of War Stimson's opinion rested

> "his decision denying the application not upon the question of his legal authority, but on the appropriate exercise of his official discretion" (Master's Report 64, 186).

Counsel refer to the first condition of the various early permits, which provided, among other things, that it was the intention of the Secretary of War to submit the entire question to Congress, and if such were done, then the permit should be subject to any action that Congress might take (May 8, 1899, Permit, Master's Report 39). In

> *Sanitary District* v. *United States,* 266 U. S. 405, 429,

the court held that that condition was superfluous, because in any event the permit would be subject to the action of Congress.

Counsel refer to the permit of July 3, 1896 (Wis. Brief 156) and to the recommendation and application in respect thereof (Joint Abstract 133). The report of June 24, 1896, of the United States District Engineer at Chicago concerning the application for the July 3, 1896, permit, is merely a speculation by the District Engineer as to whether the question ought to be finally settled or decided by executive officers, or whether it is an international question. Then, with reference to the condition of the permit of July 3, 1896, counsel make (Wis. Brief 156) this surprising statement:

> "The Secretary of War, in his permit of July 3, 1896, stated that it was not to be interpreted as approval of

the plans to divert water (Master's Report 34-35)."

Upon reference to pages 34-35 of the Master's Report, which quotes the permit of July 3, 1896, we find that the real true words of the condition referred to by counsel, are as follows:

> "That this authority should not be interpreted as approval of the plans of the Sanitary District of Chicago *to introduce a current into the Chicago River.*"

In other words, there was no question in the Secretary's mind as to the power and authority to grant the diversion contemplated, but the only condition was, that there should be no current created in the Chicago River, thus making it incumbent upon the Sanitary District to enlarge the cross-section of the channels of the river to accommodate the diversion. And, strangely, in the very next sentence, counsel proceed:

> "A similar condition was incorporated in the permit of November 16, 1896" (Joint Abst. 133).

But the Joint Abstract shows that the particular permit

> "was conditioned that it should not be interpreted as approval of the plans of the Sanitary District of Chicago to introduce *a current into the Chicago River.*"

Counsel refer then (Wis. Brief 156) to the recommendation of the United States District Engineer of April 4, 1899, that the permit of May 8, 1899 (incorrectly referred to as May 3, 1899, in Wisconsin Brief) be granted and to the observations of the District Engineer that a matter of such magnitude should, in his belief, be settled by other authority than executive officers. However, the District Engineer assumed that the War Department had the authority to issue the permit, and recommended that *it should issue.*

It thus appears that in the whole gamut of argument and alleged instance advanced in the Wisconsin brief to overthrow the Master's interpretation of this statute, there is not one with substance or significance. As to the Michigan assertions on page 116 of her brief that the meaning of the language of the act is unmistakable, and on page 143, that it exhibits no *ambiguity* we have only to turn the latter page to find an equally emphatic assertion that the true interpretation of the statute has long been a matter of departmental doubt.

(c) The language and history of the statute support defendants' contention.

The Wisconsin Brief (138) quotes the first clause of the single sentence which constitutes Section 10 ("The creation of any obstruction to * * * navigable capacity * * * not affirmatively authorized by Congress is hereby prohibited; * * *") and then remarks that, if this sentence stood alone, there could be no doubt that any obstructions not authorized by Act of Congress would be unlawful. But this clause does not stand alone. It stands with Section 9 and with the two subsequent clauses of Section 10. Section 9 names a class of obstruction such as bridges, dams, dikes and causeways, and states a rule concerning them. They are unlawful until the consent of Congress to them has been obtained. Thus (by the use of the word "until") the *consent of Congress* is made an absolute condition precedent to their legality. The Secretary of War *"authorizes"* nothing under Section 9. His only function is to approve plans. Section 10 also names two classes of obstruction and states a rule to determine when they are lawful. But the rule governing the classes of obstructions in Section 9 is *not* the rule governing the class in Section 10. The latter are unlawful, *unless* the *work* has been *authorized* by the Secretary of War, It can hardly be presumed that the marked difference in these rules signifies nothing and especially so if Wisconsin is correct in saying that the statute is the "fruit of the best efforts of men who had years of experience in Congressional legislation" aided by "the most expert legal and engineering minds of the War Department." Why would such experts (in Section 9) unequivocally inhibit the first class of obstructions "*until* the consent of Congress" and confine the Secretary of War's function to approval of the *plans*, and then proceed to say (in Sec. 10) of the class of obstructions in which defendant's diversion falls that it "'shall not be lawful' to * * * alter or modify the * * * capacity of any port * * * *harbor* * * * *canal* * * * *lake* * * * or channel * * * UNLESS the WORK * * * has been AUTHORIZED by the Secretary of War prior to beginning the same?" Why is the consent of Congress specifically required as a condition precedent as to one class and not as to the other? Why is the lifting of the statutory inhibition predicated on a precedent event (the consent of Congress) by the word "*until*" in Section 9 and on words of exception—"*unless* (authorized by the Secretary of War)"—in Section 10? Why is the Secretary of War commissioned only to "*approve*" *plans* for the work in Section 9 while he is to "*authorize*" the work itself in Section 10?

Truly the fact that the inhibition of the first clause of Section 10 does not "stand alone" limits the sweeping intendment complainant gave to it. The answer to the questions in the preceding paragraph is that Congress intended to reserve to itself the authorization of those structures named in Section 9 and it committed to the Secretary of War the authorization of those named in Section 10.

Complainants do not accept the challenge of these questions which have been put to them in arguments and briefs and in the report of the Special Master (181). They seek to ignore the reasoning underlying the traditional official construction of this act and to build a new construction on a *tour-de-force* of syntactical ingenuity.

Thus, they remark (Wis. Brief 139) that the words of inhibition in the first clause of Section 10 are followed by the conjunctive "and," from which they conclude that nothing thereafter contained in the sentence can be construed as an exception to that inhibition.

Of course, the contention that the conjunctive "and" following an inhibition in a statutory sentence precludes the interpretation of subsequent clauses as exceptions is too slight to consider. It is only necessary in this section to substitute various *disjunctives* for the word "and" in this paragraph to see that the change would at most render the sentence meaningless and at least leave interpretation exactly where it now is with the conjunctive "and." For example:

> "The creation of * * * obstructions etc., * * * is prohibited, etc.,"
> (but)
> (except that)
> (provided that)
> (save that)
> (although)
> It shall not be lawful * * * to alter the * * * capacity of, any port, etc., * * * unless the work has been * * * authorized by the Secretary of War."

The truth is, of course, that the word creating the exception is the word "unless" and the fact that it appears later in the same sentence than the conjunctive "and" is utterly without significance.

There would be no room for complainant's argument on the meaning of Section 10, had the words of the first clause remained as they were in the earlier Act of 1890. For example:

> "The creation of any obstruction not affirmatively authorized *by law* etc., * * * is hereby prohibited * * * and it shall not be *lawful* * * * to alter the capacity etc., * * * unless the work has been * * * authorized by the Secretary of War."

Here we should have an inhibition of a general category of things except when they are "affirmatively *authorized* by law," i. e. "*lawful,*" followed immediately by a precise definition of the circumstances in which a certain class within that category shall be unlawful. This definition says that such class shall be unlawful "*unless* * * * the work * * * has been authorized by the Secretary of War." If (as we suppose) no one, in such circumstances, would have sufficient temerity to contend that the authorization of the Secretary would not legalize structures of the latter class, we are left to the question whether Congress, by substituting in the Act of 1899, the words "affirmatively authorized by Congress" for the words "affirmatively authorized by law" in the Act of 1890, intended to change this intendment. Did Congress intend to have the former words interpreted to mean "affirmatively authorized by Congress *by statute*" and, incidentally to burden itself thereby with the rapidly growing mass and complexity of technical questions arising in the administration of Rivers and Harbors and to remove such questions from the War Department where Congress had set up the only technical mechanism in the Government adequate to administer them? Or was there some other intent in the change of the word "law" to the word "Congress"?

The Special Master's Report (179) finds and describes another intent. This court has done likewise (*Sanitary District* v. *U. S.*, 266 U. S. 405, 429). The real intent was to obviate the danger that "authorized by law" might be taken to mean authorized by State law.

It has been the understanding of everyone that the change was made on account of the contentions and decision in the *Bellingham Bay Boom* case (Master's Report 179 and cases there cited) to obviate interpretation of the word "law" to include "state law." But Ohio says (152) that an old retainer of the Engineer Corps—its law officer in fact—once delivered a lecture in which he claimed to have drafted the Act of 1899 as early as February 10, 1896, whereas, the *Bellingham Bay Boom* case was not decided until June 28, 1897, and so Ohio concludes that the wish to preclude the words "affirmatively authorized by law" in the 1890 Act from being construed as "affirmatively authorized by State law" was *not* the motive for the change.

Pausing only to remark, that this old soldier's story is not in the record, was not produced at the trial and we had no opportunity to test it, that the draft as submitted was not in all respects the draft as enacted, and that a law officer of the Engineer Corps—if any such functionary there be, which we strongly doubt—would be well aware of the contentions in the *Bellingham* case long prior to its decision, it is pertinent to ask if the motive of the change was not to preclude State authorization, then what was the motive? Ohio says it was to "provide an amplification and revision of the old law, etc. (153)." But we are for the moment addressing only this change in a single word. This change did not "*amplify*" anything. Nobody questioned that an obstruction authorized by *Federal law* was good. To change the words to "authorized by Congress" did not advance by one iota the authority of the United States. All it did in fact was *to preclude authorization by State law,* and we challenge complainants to show any other purpose or effect of it.

But suppose the history of this change had been lacking; is this the sort of language "experienced legislators * * * the most expert legal * * * minds of the War Department * * *" would use to take a vast body of administration away from the Secretary of War and lodge it in Congress? It must be remembered that, in making this Act of 1899, these "experts" were not drafting a new law, they were making "a compilation of all general laws" on the subject and submitting "recommendations as to revision, emendation or enlargement." They were not limiting or restricting the old laws. They were addressing a well crystallized system of administration. It is inconceivable that they would have attempted to revolutionize it and change the very essence of the responsibility and authority of the War Department by any such verbal legerdemain as this, and then for the next twenty-nine years closely guard the secret magic of the changed word in the archives of the office of the Chief of Engineers, disclosing it, so far as we are told (Wis. Brief 143-152), only to young students in the cloisters of the Engineers' School at Fort Humphreys—reserving it even from the record in this case—to be revealed and used as a *coup de grace* by counsel for the State of Ohio at the eleventh hour and the fifty-ninth minute in this highly adversary proceeding. At the very moment of this amendment of the Act of 1890, the Secretary had, for several years, been granting permits for defendants' works under the earlier Act. Had he intended this sweeping change and restriction in his authority to grant such permits, we can at least assume that he would have recommended clear and unmistakable language and not such subtlety as this. Certainly, the Secretary did not conduct himself as though he had intended his draft of the new Act to impose any such restrictions on his power, for we find him granting permits for defendants' works under the 1890 Act right up to the enactment of the Act of 1899 and within a few months after such enactment continuing to grant similar permits without any change whatever of language, practice or conditions.

If such a change were intended it has never been effectuated. The Act of 1899 is one of an annual succession of Rivers and Harbors Acts. There is a new one every year. As the Special Master found (174), Congress has been intimately informed and acutely conscious of the interpretation placed on this act by succeeding Secretaries of War in this and many other matters for over a quarter of a century. Except for the opinion of one Chief of Engineers (whose function was not to interpret statutes for the War Department, and who was promptly overruled by the Judge Advocate General, Attorney General and Secretary of War, no question was ever raised of the Secretary's *authority* to grant permits for defendants' diversion or of the validity of such permits when granted. The only questions disclosed by the record pertain to the *advisability* of granting them.

Had Congress meant what complainants say it meant, and had it expressed that meaning by saying: "The creation of any obstruction * * * not affirmatively authorized by *Act of* Congress, etc., is hereby prohibited," then Congress would have delegated no discretion to the Secretary of War and *would* have kept to itself and withdrawn from the Secretary the determination in every case of the reasonableness or existence of every obstruction mentioned in the Section and of every conceivable obstruction not so mentioned. That Congress did not by such explicit language do this, that it is inconceivable that Congress intended to draw to itself and exclude from the Secretary every detail of administration of rivers and harbors, that the certain effect of the change it did make in this word was to preclude State authorization which theretofore had *not* been precluded, seems to us persuasive if not conclusive confirmation of the conclusion of the Special Master.

But this change of the word "law" to the word Congress was by no means the only change made in the Act of 1890. Section 7 of that Act of 1890 described in somewhat less detail all of the classes of structures now described in both Sections 9 and 10 of the Act of 1899. Section 7 did not begin (as does Section 10 of the 1899 Act) with a general inhibition of obstructions "not authorized by Congress." Before each of the classes named in Section 7, by inclusion or by reference, were the words "it shall not be lawful." Wharves, piers, dolphins, booms, etc., were not to be lawful "without the permission of the Secretary of War," *if* they obstructed navigation. And, by the way, here is proof positive that, in that act at least the Secretary *could* authorize obstructions. This is certain because if they were *not* obstructions they did not require a permit. It was only if they were obstructions that the Secretary's permit was necessary. Bridges, causeways, etc. (if over navigable waters wholly within a State and authorized by the State legislature), were not to be lawful until the location and plans had been approved by the Secretary of War. If such bridges were over waters not wholly within a state, they could not be authorized by a state legislature. Altering or modifying the capacity of the channel of navigable waters was not to be lawful unless "approved and authorized by the Secretary of War." Such was Section 7. Section 10 of the same Act (1890) provided that "the construction of any obstruction not affirmatively authorized by law, to the navigable capacity of any waters in respect of which the United States has jurisdiction is hereby prohibited." Then followed certain penal clauses. No one could well contend that, under this Act of 1890, Congress had inhibited *any of the named obstructions which the Secretary should authorize*, except bridges over interstate navigable waters.

For our present purposes it is fair to say that there is not one shadow of circumstance to indicate any reason for Congress wishing to *restrict* the authority of the Secretary by the changes introduced by the Act of 1899. On the contrary, Wisconsin's brief is eloquent with the argument that the intention was to *enlarge* it (143, 148, 149, 152). What were those changes? Broadly, the penal clauses were removed from Section 10 to a later section. Bridges, dikes, and causeways were grouped in Section 9 which was made unequivocal as to the necessity for *statutory* Congressional approval unless the navigable portions of the waterway lay entirely within the limits of a single state. The word "law" was changed to the word "Congress" and the class of structures comprised within the description "wharves, piers, dolphins, etc.," and alterations in navigable capacity, were moved from Section 7 of the Act of 1890 down into Section 10 of the new act *carrying with them the statement that they should not be lawful unless authorized by the Secretary of War.*

If in this shifting, there was a change in the prior rule under which the Secretary of War could legalize the structures of old Section 7 (new Section 10) by "*authorizing*" them, it must have been inadvertent because there is not one circumstance in the history or the language of the change to indicate any such intention.

Undismayed by these circumstances, Wisconsin's brief takes up alternative arguments (140). It considers first the structure mentioned in the second clause of Section 10, states them as "wharves, piers, dolphins, etc.," says that such structures are not necessarily *obstructions to navigable capacity* and in fact are usually not so, and therefore concludes that, if the class was not mentioned at all in Section 10, those structures which are not *in fact* obstructions would not violate the inhibition of the section. From this it is argued that the purpose of *including* them must have been *solely* to provide that all such structures—obstructive or not—are unlawful unless permitted by the Secretary, thus giving the Secretary complete arbitrary and conclusive control and discretion over all such structures. If it were otherwise, says the brief (i. e., if this clause were deleted), the structures would be in each case lawful until a *jury* found them to be obstructions. As it is they are unlawful if the Secretary refuses to permit them, and the ultimate purpose of this clause is therefore said to be *to remove from juries and repose in the Secretary the decision as to whether these structures be obstructions in fact* (Wisconsin Brief 143). So runs the argument and the result seems to be highly commended by complainants but they confine their commendation to the facility with which *non-permitted* structures may be abated by this provision that the Secretary's determination is independent of courts and juries (143). But how about the facility with which *permitted* structures may be *continued* without a finding of court or jury and solely on the Secretary's permit? If this rule works both ways, then Wisconsin and her associates ought not to be here for, if the Secretary's discretion in *denying* a permit is good and not reviewable by courts and juries then his discretion in *granting* one is also immune from review.

The dexterity of complainants' effort to extricate themselves from this position strips the late and great Houdini of his laurels.

The general prohibition says the brief (144) is not against obstruction to *navigation*. It is against obstruction to *navigable capacity.* The inference is—in fact, the assertion is—that the Secretary may authorize an obstruction to *navigation* but if he finds that a structure obstructs *navigable capacity* he reaches the dead-line of his authority and has no choice but to refuse the permit.

Of course this distinction is one without a difference. *Navigation* is defined in the Standard Dictionary as "the act of navigating or the state of being navigable"—capacity as "the ability to receive or contain." A cause which, acting in respect of a body of water, obstructs its "state of being navigable" also obstructs its "ability to receive or contain" navigation and vice versa. Also it is worthy of note that the third clause of Section 10 specifically includes modifications or alterations or excavations or fillings of the "capacity"—not the "navigability"—of various waters within that *class* of obstructions which the Secretary may authorize.

Wisconsin's brief seems not concerned with the dictionary. "Hence," it proceeds, "a pier, dolphin (or other aid to navigation which might be argued to constitute a technical obstruction to *navigation* at the precise point of the location) would nevertheless improve the *navigable capacity* of the waterway and would not be within the general prohibition. * * *" (We interpolate here the remark that this interpretation does not accord with *Hubbard* v. *Fort,* on which complainants so strongly rely. In that case the court said: "What is navigable capacity? Does it not mean the capability of being navigated over *any* part of the waters when in their normal condition?" and the court proceeds to find that it does mean just that. The Wisconsin quotation continues:) "If on the other hand we adopt the construction of the Special Master, then if the Secretary of War were to authorize the construction of a pier reaching entirely across the navigable channel of the Ohio

River so as to cut off all navigation, it would be a valid act within the power of the Secretary of War" (145). Of course it would *not* be a valid act because such a monstrosity would be obviously a mad caprice and under the Master's conclusion would be invalid. The foregoing quotation from the Wisconsin brief is included merely to emphasize how Wisconsin's distinction applies in practice. In other words, a pier—albeit it is a stark barrier to navigation—may be projected athwart a stream to the precise point where, in addition to obstructing "*navigation,*" it also obstructs "*navigable capacity.*" Up to *that* point the Secretary's permit for it is immune from judicial review, but beyond that point, Wisconsin can sue to enjoin the permittee, and courts and juries will immediately begin to function to determine whether the Secretary rightly decided the point in the stream where an obstruction to "*navigation*" became an obstruction to "*navigable capacity.*" What a frustration of the purpose advanced as the reason for the present wording of the statute—i. e., to prevent judicial review of administrative action! What administrative officer would choose to have his immunity from judicial review depend on such a hair-line distinction as that between navigability and navigable capacity, when by a more usual and obvious interpretation of the statute such as that of the Master, his discretion would be to determine the *reasonableness* of an obstruction and a review of it would depend on the presence or absence of fraud or the question whether he had acted arbitrarily or capriciously in the exercise of the power delegated to him by the statute?

We wonder why a pier was chosen for this illustration and its concomitant statement that such structures are not usually obstructions to navigation. Why not a boom? Why not a weir? They are both in the same statutory category as piers and dolphins. But according to all lexicographers a boom, in lumbering parlance, is "a chain or barrier of floating logs to retain timbers or saw logs behind it," and in maritime parlance it is "a chain of logs to intercept or detain the advance of a vessel" and "to boom" a river is to "obstruct it by means of a boom" while the word weir derives from a Saxon word meaning "obstruct" and is defined as an "obstruction placed in a stream to raise the water, divert it into a mill race or irrigation ditch or form a pond, etc." We cite these definitions because the logic of the Wisconsin theory rests on the assertion (140) that "wharves, piers, dolphins, etc." (the "etc." being booms, weirs, bulkheads, jetties or other structures) "do not necessarily or even ordinarily create an obstruction to the navigable capacity of a waterway." From this, as we have seen, Wisconsin concludes that when they are *obstructions,* the Secretary may not authorize them. Applying this rule to booms and weirs (which not only ordinarily but necessarily *are* obstructions both to navigation and navigable capacity), we see that, under the Wisconsin rule, the Secretary could never authorize them. But if this is so, why did Congress include them?

Of course Wisconsin's rule is impracticable. It is advanced as one which removes the Secretary's decision as to obstruction from the scrutiny of courts—and yet Wisconsin is here seeking to review such a decision. It becomes absurd unless there be such a thing as a distinction between "obstruction to navigation" and "obstruction to navigable capacity." There is no such distinction and, even if there were, the rule requires the Secretary to make it in each case and defeats its own purpose because, under the Wisconsin theory, the Secretary's decision on the distinction would always be subject to review if it were wrong.

The interpretation of Section 10 followed by the Master has for twenty-nine years been the interpretation followed by the War Department, approved by the Judge Advocate

General (which approval was concurred in by Secretary Taft), approved also by the Attorney General and acceded to by Congress (see p. 87, *supra*). But the Wisconsin brief seeks (148) to reduce it to an absurdity by saying that thereunder a permit would be necessary *only* where one of the structures mentioned in the second clause of Section 10 (wharves, piers, etc.) would in fact be an obstruction to navigable capacity. The theory of this distortion of the Master's interpretation is that the Master says that the first clause of Section 10 is an inhibition of obstructions and that the second clause makes exception of such obstructions as are authorized by the Secretary. From this the inference is drawn by Wisconsin that if structures in this class are *not* obstructions they are not inhibited and therefore need not be permitted. Of course the answer to this casuistry is that the structures in the second clause are therein specifically inhibited *by name* and would be unlawful unless permitted by the Secretary, if there were no general inhibition at all. The words are "*it shall not be lawful* to build or commence the building of any wharf, pier, dolphin, etc."

On page 150 Wisconsin challenges "anyone" to name any obstructive structures which would not be comprehended within the enumerated structures in the second and third clauses of Section 10, and therefore concludes that under the Master's interpretation of the statute, the Secretary could authorize anything except perhaps *bridges,* and asks with fine sarcasm why Section 9 is included at all: Why not simply say "no obstruction shall be lawful unless it has been authorized by the Secretary of War"? The answer to the "challenge" is that bridges, dams, dikes and causeways are not "comprehended within the enumerated structures of Section 10," because their enumeration in Section 9 excludes them from Section 10 and Congress included Section 9 for the purpose of preventing the structures therein named from being erected without federal statutory sanction in each case—a purpose which has been effectively pursued for the past twenty-nine years without any known exception.

Next, page 150, comes Old Faithful among complainants' arguments: Why would Congress retain to itself exclusive jurisdiction over interstate bridges some of which may be of no consequence, yet delegate to the Secretary the right to determine whether the "Great Lakes shall be drained into the Mississippi * * * immense and unmeasurable damage * * * 8300 miles of shore line * * * states embracing nearly one-half the population of the nation * * * who is to say he cannot authorize an obstruction of one foot or two feet or of ten * * * etcet., etcet., etcet."

We have noticed elsewhere (*supra*, pp. 5-37) the extent of harm done by what the Secretary has authorized, the attitude of Congress in that regard, and the practice indulged in by complainants of magnifying the withdrawal of six inches of water from Lake Michigan to make it appear to threaten a draining of the Great Lakes into the Mississippi Basin and many similar exaggerations. Of course, Congress has not delegated power to the Secretary to do arbitrary and capricious acts which have no relation to the purpose of the delegation and the Master has so concluded. When Congress authorizes a bridge there is some finality thereto. When the Secretary issues a revocable license for a diversion and then steps in under the sanction of this court and assumes active control thereof there is little likelihood of any ensuing cataclysm. One is a matter of more or less ultimate decision; the other is a question of day-to-day administrative control in a matter where, as this case amply demonstrates, nothing less than a highly organized technical control could cope with the situation which happens to be one of the most complex and difficult problems in our interior economy. (See Point VIII, p. 179.)

The question at all events is of interpretation of this statute and not of the wisdom of what Congress has done. The former is a question for judicial decision; the latter is not. It may be that Congress reserved authorization of bridges from the War Department because they are instrumentalities of land transportation—a field which has not been placed under the jurisdiction of the Secretary—and that it did not reserve alterations of navigable capacity because for a century it has committed to the War Department, under its direction, a very wide measure of authority over all that pertains to water transportation in the United States. Whatever the reason, the fact remains. Surely Honorable Newton D. Baker, who represents the State of Ohio, who for four of the most difficult years in the history of that Department administered its affairs with an ability that has never been adequately acknowledged, will be the last to say as a matter of cold practice—beyond the reach of questions suggested in fervid advocacy—that he could wish that fact otherwise than it is.

(d) The determination of the Secretary of War that the diversion is not unlawful is not reviewable.

The Master found (190, 191):

> The Secretary of War's authority under Section 10 of the Act of March 3, 1899, is not to be regarded as unlimited. Such power could not be conferred. His action must have reasonable relation to the exercise of the power granted to Congress by the Constitution and to the purpose of the delegated authority, and must not be arbitrary or capricious. The true intent of the Act of Congress was that unreasonable obstructions

> to navigation, and navigable capacity, were prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction. The power of Congress to make such a delegation of authority is deemed to be sustained by repeated decisions of this Court. *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, 208; *Sanitary District* v. *United States*, 266 U. S. 405, 428; *Field* v. *Clark*, 143 U. S. 649; *Butterfield* v. *Stranahan*, 192 U. S. 470; *Union Bridge Co.* v. *United States*, 204 U. S. 364, 386; *Monongahela Bridge Co.* v. *United States*, 216 U. S. 177, 192; *Louisville Bridge Co.* v. *United States*, 242 U. S. 409, 424, 425. And when the Secretary of War acts under the authority conferred by Congress, his determination as to what is or is not an unreasonable obstruction to navigation or navigable capacity in the circumstances of the particular case has the same effect and is as immune from judicial review as if Congress had acted directly. *Monongahela Bridge Co.* v. *United States*, 216 U. S. 177, 195; *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, 210.

The only question we wish here to discuss is that of the unreviewable nature of the determination of the Secretary of War that defendants' diversion does not constitute such an obstruction to navigation as to bring it within the inhibition of the statute.

It is complainants' own contention (143) that the very purpose of Section 10 is to do this very thing: i. e., place the Secretary's finding beyond judicial review. It is the Master's finding (191) that such purpose has been effected.

Two great and, so far as we have been able to learn, uncontested legal principles are involved here.

(1) This court will in no event *interfere with the process* of determination by an executive department of a matter entrusted to it by statute.

(2) This court will not review an administrative finding of fact by an executive department.

As is amply demonstrated in the Master's findings, the whole question of diversion, waterways, power, flood control, lake levels, pollution and international relations in boundary waters is in a process of administrative determination. The existing permit under which defendants' diversion is being practiced is "temporary." The policy of the War Department has been explicitly stated (*supra,* p. 36). Briefly it is not to commit itself to any final decision until the controlling facts are further developed. The question of power and navigation in the Great Lakes waterway is shown to be under international consideration in a very broad way. Recent disastrous developments on the Mississippi indicate something of the problem of the War Department as to that stream. The whole record is eloquent of the difficult administrative situation presented by these circumstances.

No final stability of determination has yet been reached. It is perfectly apparent that the Federal Government has the canal, the present diversion and the problems presented thereby, the Lakes-to-Gulf Waterway and the whole subject of lake levels still under observation, experiment, and control. When we use the words "Federal Government" we mean its entire machinery. Congress, constantly and intimately cognizant of all that has happened and is likely to happen, has passed statutes requiring surveys and work on this project, and has now under consideration bills affecting the diversion. The War Department has been constantly in observation and supervision, is now in much more direct control, and is concerning itself actively with all possible expedients to administer the situation. The State Department is actively negotiating with Canada on the very subject-matter—lake levels—to which this complaint is addressed.

It has consistently been the doctrine of this court that it should not intervene, under any such circumstances, at any suit. The principle was first expressed in one of the early classics of the court, in the following language:

> "It is scarcely necessary for the court to disclaim all pretensions to such a jurisdiction (mandamus to the President) * * * the province of the court is solely to decide on the rights of individuals, not to inquire how the executive officers perform their duties in which they have a discretion * * *" (*Marbury* v. *Madison*, 1 Cranch 137, 170.)

The effect, if not the intention, of the present suit is to restrict, influence, control, and coerce the action and final determination of each and every of these Federal instrumentalities in dealing with this problem. The effect on the international negotiations must necessarily be stultifying. The effect on other departments is equally obvious. A decree by this court would produce the result desired by the complainants, but such a result would be contrary to every legal principle which should govern this case.

Said Mr. Justice Miller in *Gaines* v. *Thompson*, 7 Wall, 347, 352, amplifying the principle deduced in *Marbury* v. *Madison* above:

> "* * * an officer to whom public duties are confided by law, is not subject to the control of the courts in the exercise of the judgment and discretion which the law reposes in him as a part of his official functions. Certain powers and duties are confided to those officers, and to them alone, and however the courts may, in ascertaining the rights of parties in suits properly before them, pass upon the legality of their

> acts, after the matter has once passed beyond their control, *there exists no power in the courts, by any of its processes, to act upon the officer so as to interfere with the exercise of that judgment while the matter is properly before him for action.*"

The doctrine of the only admissible basis of such a suit is defined in *U. S.* v. *Calif. Land Co.,* 148 U. S. 31, 43, where it is said:

> "The only questions which can arise between an individual claiming a right under the acts done, and the public, or any person denying its validity, are *power in the officer or fraud in the party.* All other questions are settled by the decision made or the acts done by the tribunal or officer, whether Executive (1 Cranch, 170); Legislative (4 Wheat. 423; 2 Pet. 412; 4 Pet. 563); Judicial (11 Mass. 227; 11 S. and R. 429; adopted in 2 Pet. 167, 168), or Special (20 Johns. 739, 740; 2 Dow P. C. 521 etc.) * * *."
>
> "* * * Until the legal title passes from the government, enquiry as to equitable rights comes within the cognizance of the Land Department. *Courts may not anticipate its action or take upon themselves the administration of the land grants of the United States.*" (*Oregon* v. *Hitchcock,* 202 U. S. 60, 70.)

The question as to what ought finally to be done about defendants' diversion is in process of determination. But the existing permit of the Secretary of War is an accomplished fact. It authorizes the diversion and by necessary intendment determines that it is in the interests of navigation and not unreasonably obstructive thereto. The bill prays the court to review this determination and specifically asks the *court* to find what quantity of diversion would be in the interest of navigation in the Illinois and Mississippi Rivers and also what kind of water and drainage system should be adopted by Chicago. Complainants in oral argument asked that the court suspend its decree, impose certain conditions upon diversion, and then supervise the performance of those conditions.

Under settled principles of law this action of the Secretary of War is not subject to review. It is clearly the law that courts are without power to interfere with or revise the action of a public officer in the exercise of that discretion imposed upon him by law as a part of his official function. (*U. S.* v. *Fisher,* 223 U. S. 683, 692; *Bates & Guild Co.* v. *Payne,* 194 U. S. 106, 109; *U. S.* v. *Hitchcock,* 190 U. S. 316, 324; *Kirwan* v. *Murphy,* 189 U. S. 35, 55; *Secretary* v. *McGarrahan,* 9 Wall. 298, 312; *Litchfield* v. *Register,* 9 Wall. 575, 577; *New Orleans* v. *Payne,* 147 U. S. 261, 266; *Marquez* v. *Frisbie,* 101 U. S. 473, 475; *Craig* v. *Leitensdorfer,* 123 U. S. 189, 210; *McCormick* v. *Hayes,* 159 U. S. 332, 342; *French* v. *Ryan,* 93 U. S. 169, 172.

The court has recognized a distinction between acts in exercise of discretionary powers and acts in respect of purely ministerial duties. The rule as enunciated in *Marbury* v. *Madison* is that courts may adjudicate in matters relative to the latter, but never in matters pertaining strictly to the former, and particularly is this true when the discretionary function is in process of being exercised. (*Kendall* v. *U. S.,* 12 Pet., 524, 610; *Decatur* v. *Paulding,* 14 Pet. 497, 509; *U. S.* v. *Lamont,* 155 U. S. 303, 308; *U. S.* v. *Black,* 128 U. S. 40, 44; *Noble* v. *Union River L. R. Co.,* 147 U. S. 165, 171; *U. S.* v. *Schurz,* 102 U. S. 378, 395; *Mississippi* v. *Johnson,* 4 Wall. 475, 498; *U. S.* v. *Windom,* 137 U. S. 636, 643; *Cunningham* v. *Macon R. R. Co.,* 109 U. S. 446, 453.

The power granted the Secretary of War is valid. (*Sanitary District* v. *U. S.,* 266 U. S. 405; *Butterfield* v. *Stranahan,* 192 U. S. 470, 496; *West* v. *Hitchcock,* 205 U. S. 80, 83; *Oceanic Steam Navigation Co.* v. *Stranahan,* 214 U. S. 320, 338; *Zakoniaie* v. *Wolfe,* 226 U. S. 272, 275; *Louisville*

Bridge Co. v. *U. S.,* 242 U. S. 409, 424; *Inter Mountain Rate Cases,* 234 U. S. 476; *First National Bank* v. *Union Trust Co.,* 224 U. S. 416.)

Many of the above mentioned cases are cited in the Selective Draft Law Cases, 245 U. S. 366, 389, where determinations by executive boards on a wide variety of vital matters were upheld.

A court of equity will intervene in a matter pertaining to the exercise of a discretionary power only to determine whether there was power in the officer or fraud in the party, or whether there was clear, unreasonable, and arbitrary abuse of discretionary power exercised. (*Ekiu* v. *U. S.,* 142 U. S. 651, 660; *Chae Chan Ping* v. *U. S.,* 130 U. S. 581, 609; *U. S.* v. *Ju Toy,* 198 U. S. 253, 261; *Fok Yung Yo* v. *U. S.,* 185 U. S. 296, 302; *Silberschein* v. *U. S.,* 266 U. S. 221, 225; *U. S.* v. *California Land Co.,* 148 U. S. 31; *Foley* v. *Harrison,* 15 How. 433, 448; *Johnson* v. *Towsley,* 13 Wall. 72, 83; *Smelting Co.* v. *Kemp,* 104 U. S. 636, 640; *Shepley* v. *Cowan,* 91 U. S. 330, 340; *Moore* v. *Robbins,* 96 U. S. 530, 535; *Quinby* v. *Conlan,* 104 U. S. 420, 426; *Steel* v. *Smelting Co.,* 106 U. S. 447, 450; *Lee* v. *Johnson,* 116 U. S. 48, 51; *Wright* v. *Roseberry,* 121 U. S. 488, 509.)

Particularly, where the courts are asked to interfere with lawful administrative determinations regulating commerce the courts have refused to interfere because such regulation requires uniformity of decision in order that there may be strict uniformity of rule, and it is obvious that, if the courts interfere with the determination of a single, controlling administrative unit, chaos will ensue. Strongly persuasive of the intent of Congress that the Secretary's determination is not subject to review is the fact that this statute confines its consideration to suits by the Attorney General of the United States. (See p. 162, *infra.*)

In *Texas and P. R. Co.* v. *Abilene Cotton Oil Co.*, 204 U. S. 426, the complaint was that an exorbitant rate had been exacted and the defense that the Interstate Commerce Commission had passed the rate. The court after remarking that, at common law, an action would lie said (440, 441):

> "* * *, for if it be that the standard of rates fixed in the mode provided by the statute could be treated on the complaint of a shipper by a court and jury as unreasonable, without reference to prior action by the Commission, finding the established rate to be unreasonable, and ordering the carrier to desist in the future from violating the act, it would come to pass that a shipper might obtain relief upon the basis that the established rate was unreasonable, *in the opinion of a court and jury, and thus such shipper would receive a preference or discrimination not enjoyed by those against whom the schedule of rates was continued to be enforced.* * * * If, without previous action by the Commission, power might be exerted by courts and juries generally to determine the reasonableness of an established rate, it would follow that, unless all courts reached an identical conclusion, a uniform standard of rates in the future would be impossible, as the standard would fluctuate and vary, dependent upon the divergent conclusions reached as to reasonableness by the various courts called upon to consider the subject as an original question. Indeed, the recognition of such a right is wholly inconsistent with the administrative power conferred upon the Commission. * * * Indeed, no reason can be perceived for the enactment of the provision * * * if the power was left in courts to grant relief on complaint of any shipper, upon the theory that the established rate could be disregarded and be treated as unreasonable, without reference to previous action by the Commission in the premises. This must be, because, if the power existed in both courts and the Commission to originally hear complaints on this subject, there might be a divergence between the action of the

Commission and the decision of a court. In other words, the established schedule might be found reasonable by the Commission in the first instance and unreasonable by a court acting originally, and thus a conflict would arise which would render the enforcement of the act impossible."

There is a particular indication in this case that Congress intended to make the decision of the Secretary of War final and to provide against any revision. The Act of 1890 provided:

> "*Sec.* 7.
>
> It shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty, or structure of any kind, outside established harbor-lines, or in any navigable waters of the United States where no harbor lines are or may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, *in such manner as shall obstruct or impair navigation.*"

The 1899 revision of the language was as follows:

> "*Sec.* 10.
>
> It shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river or other water of the United States outside established harbor lines or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War."

The purpose of the omission of the words "in such manner as shall obstruct or impair navigation" is clearly intended to remove any doubt that the Secretary's determination is final.

By Act of March 3, 1869 (15 Stat. 336) Congress provided that the construction of a bridge between New York and Brooklyn should be such as not to "*obstruct, impair, or injuriously modify the navigation of the river*"; but the question as to what form and location of construction would conform with these conditions, was to be submitted to the Secretary of War. The Secretary of War determined that a bridge, 135 feet in height, would satisfy the conditions. Miller brought his suit for an injunction to restrain the building of such a bridge, averring that the masts of a large proportion of vessels navigating the stream at this location exceeded 135 feet in height above mean high water, and that this obstruction to navigation would destroy the value of his warehouses above the bridge. Miller contended that the act of Congress imposed the absolute condition that the bridge should not "obstruct, impair or injuriously modify the navigation of the river." He contended that the known height of masts and the exact definition of height of span together constituted obstruction within arithmetical certainty, that it was still open to him to show that if constructed as proposed, it would be an obstruction to navigation as fully as though the Secretary's approval had not been had. He contended that since Congress could not give any such effect to the action of the Secretary, it being judicial in character, it was not to be assumed that it intended by the wording of such act to do so. This court said in *Miller* v. *Mayor,* 109 U. S. 385, at page 393:

> "There is in this position a misapprehension of the purport of the Act. By submitting the matter to the Secretary, Congress did not abdicate any of its authority to determine what should or should not be deemed an obstruction to the navigation of the river. It simply declared *that, upon a certain fact being established, the bridge should be deemed a lawful structure, and employed the Secretary of War as an agent to ascertain that fact.* Having power to regulate com-

> merce with foreign Nations and among the several States, and navigation being a branch of that commerce, it has the control of all navigable waters between the States. * * * Its power, therefore, to determine *what shall not be deemed, so far as that commerce is concerned, an obstruction, is necessarily paramount and conclusive.* * * * The efficiency of an act as a declaration of legislative will must, of course, come from Congress, but the *ascertainment of the contingency upon which the act shall take effect may be left to such agencies as it may designate.* * * *
>
> The bridge being constructed in accordance with the legislation of both the State and Federal Governments *must be deemed a lawful structure. It cannot after such legislation be treated as a public nuisance, and however much it may interfere* with the public right of navigation in the East River, and thereby affect the profits or business of private persons, it cannot, on that ground, be the subject of complaint before the courts. * * * *Every public improvement, whilst adding to the convenience of the people at large, affects, more or less injuriously, the interests of some. A new channel of commerce opened, turning trade into it from other courses, may affect the business and interests of persons who live on the old routes.*"

In *Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205, the Secretary had, under the preceding Act of 1890, determined that a row of sawed-off piling standing across a navigable stream like an *abatis* against the main road to a beleaguered city was not an obstruction. The dredging company sued for an injury due to the obstruction. The railroad company pleaded the Secretary's determination that it was no obstruction. This court said:

> "In the light of this general assumption by Congress of control over the subject and of the *large powers* delegated *to the Secretary,* the condition imposed by that officer cannot be considered otherwise than *as an authoritative determination of what was reasonably*

> *necessary to be done to insure free and safe navigation. * * * The Secretary of War evidently concluded that the situation was such as to require the removal of the old bridge and piles, but not such as to require the removal of the latter beyond the depth fixed by his order.* Whether the limitation in this respect was grounded alone upon what the Secretary considered would be sufficient to secure the safety of navigation, or upon the fact that to leave the stumps in the bed of the river would be of some positive service in stabilizing the shifting bed of the stream, or useful in some other way, does not appear. *It was not for the petitioners, however, to question either his reasons or his conclusions. They were justified in proceeding upon the assumption that what the Secretary, in the exercise of his lawful powers, declared to be no obstruction to navigation, was in fact no obstruction.* The language which this Court employed in *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177, 195, is pertinent:
>
> '* * * Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. It is for Congress, under the Constitution, to regulate the right of navigation by all appropriate means, *to declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined.* Its action in the premises cannot be revised or ignored by the courts or by juries, except that when it provides for an investigation of the facts, upon notice and after hearing, before final action is taken, the courts can see to it that executive officers perform their action to the mode prescribed by Congress.' "

See, also *Union Bridge Co.* v. *United States,* 204 U. S. 364, 385; *The Douglas,* 7 Probate Division (1882) 157; *Frost* v. *Railroad Co.,* 97 Me. 76; *Maine Water Co.* v. *Knickerbocker*

Steam Towage Co., 99 Me. 473; *The Plymouth*, 225 Fed. 483.

In *Louisville Bridge Co.* v. *U. S.*, 242 U. S. 409, a bridge across the Ohio had been constructed under the specific authority of the Acts of Congress of 1862 and 1865. Under Section 18 of the Rivers and Harbors Act of 1899, the Secretary determined that the bridge constituted an obstruction to navigation and the Bridge Company brought the case here, contending that what Congress had authorized as no obstruction the Secretary could not forbid as constituting an obstruction, and thus under his delegated authority virtually *work a repeal of a prior act of Congress.*

On this subject the court said:

> "* * * the declaration of Congress in the Act of 1865 that the bridge was a lawful structure was conclusive upon the question until Congress passed some inconsistent enactment. * * * *Although it may have been an obstruction in fact, it was not such in contemplation of law.* But Section 18 of the 1899 Act wrought a change in the law. * * * Congress thereby declared that *whenever the Secretary of War should find any bridge theretofore or thereafter* constructed over any of the navigable waterways of the United States to be an unreasonable obstruction to the free navigation of such waters * * * it should be the duty of the Secretary, after hearing all the parties concerned, to take action looking to the removal or alteration of the bridge. * * * As this Court repeatedly has held, this is not an unconstitutional delegation of legislative or judicial power * * *."

And, although the court was here dealing with a bridge declared by Congress (prior to the Secretary's decision under the later act) to be no obstruction, and although the effect of the Secretary's decision was to repeal the prior act, this court denied the appeal to review the decree which issued upon the request of the Secrtary of War and his administrative determination of fact.

Cases of this intendment could be multiplied. Only a few of those in which the facts and language seemed most appropriate to the circumstances of this case have been selected. More were not cited because it is believed that the principle in the subhead is so clearly established and so generally acknowledged that nothing more is necessary. If under Section 10 of the Act of 1899, *the Secretary of War had, as we have contended, authority to determine whether the acts here complained of were not such an obstruction of navigation as to invoke the inhibition of the statute, then there can be no doubt that his determination as recorded in these permits is beyond the reach of the bill and the jurisdiction of the court.* **The bill should be dismissed on this consideration alone.**

(e) The Secretary's action in granting the permits was neither capricious nor arbitrary. It bore a reasonable relation to the purpose of his delegated authority and was a sound and reasonable exercise of his statutory discretion.

Complainants advanced evidence to show that there is a conceivable plan of construction of a Lakes-to-Gulf waterway whereby navigation could be secured with a smaller diversion than that permitted. They also called some younger sanitary engineers to say that there is conceivable a sewerage and water supply system of Chicago which could be operated without diversion. Finally they produced letters written by Secretaries of War, one expressing doubt as to whether, under the statute, he could consider the sanitary needs of Chicago in granting a permit and the other expressing doubt as to whether he could consider navigation in the Lakes-to-Gulf waterway in granting the permit. Averring then that the diversion is for sanitation and was never conceived of or used for power, the contention is one of *abuse* of power and action not authorized by statute.

While we maintain that action of the Secretary cannot be *reviewed,* we concede that it can be *examined* to determine whether there has been abuse of power or excess of authority. (*Philadelphia Co.* v. *Stimson,* 14 Pet. 448.)

The data that was before the Secretary of War tending to show the necessity of diversion for navigation is set forth in the Master's Report and is analyzed at pages 39-54, *supra.* The facts refuting complainants' charge that defendants' canal is solely a sanitary expedient will be found at pages 12-23, *supra.*

There has long been a fierce contest as to the requirements of navigation on the Lakes-to-Gulf waterway. This record is burdened with facts on both sides of that contest. Exactly the same contest and the same facts were before the Secretary. The mere circumstance that there was a contest before the Secretary proves that there was *something to decide.* The fact that there is a contest here proves that complainants were dissatisfied with the decision and seek to review it here. That, as we have just shown, they may not do.

The Master's Report shows that for years before defendants' diversion was authorized exactly such a diversion through similar works was a prime project of Congress and the War Department. It shows that if diversion were enjoined there would be no navigation in the upper reaches of the Lakes-to-Gulf waterway and none could be restored without years of construction and the expenditure of millions of dollars. It shows that if diversion were enjoined the Chicago harbor would become a cesspool, Lake Michigan would be seriously polluted, and the great center of interstate commerce at Chicago would be gravely impaired. It shows that this situation could be relieved only after years of construction and the loss and direct expenditure of a vast treasure and incidental losses far greater still.

Such very briefly are the facts, the consideration of which by the Secretary in deciding that diversion is in the interest of navigation is claimed by complainants to be *abuse of power.* Refutation of this contention seems to need no argument.

But complainants urge that because one object of the diversion is sanitation, the permit should have been denied and that to grant it on any such consideration exceeds the statutory authority of the Secretary.

The Master's Report shows that pollution of the lakes is a serious and growing menace to navigation thereon. It shows that the cessation of diversion would render navigation on the Des Plaines and Illinois impossible by reason of pollution and would pollute Lake Michigan in amount almost as much as all the other pollution in all the other Great Lakes combined.

Regulation of navigation comprises something more than provision for the flotation of ships. Diversion is necessary and desirable for the flotation of commerce. It is also necessary and desirable for the sanitation of commerce. For whatever reason it was necessary or desirable for navigation the Secretary had a right under the statute to consider the reason and decide upon it. This he did and *if his action is subject to scrutiny against his authority, his decision is not subject to review against its expediency.*

But complainants say that even if his decision benefited commerce anywhere it was bad if it bore adversely on commerce anywhere.

The court has variously described what the Secretary does, viz.: He determines

> "What was reasonably necessary to be done to insure free and safe navigation * * *. The Secretary in the exercise of his lawful powers declared to be no obstruction to navigation what was in fact an obstruction." (*Southern Pacific Co.* v. *Olympian Dredging Co.*, 260 U. S. 205.)

In *Sanitary District* v. *U. S.*, 266 U. S. 405, the court said:

> "The withdrawal is prohibited by Congress *except so far as it may be authorized by the Secretary of War.*"

In *Corrigan Transportation Co.* v. *Sanitary District*, 137 Fed. 85, Mr. Justice Baker said:

> "Congress said to Illinois * * * 'You are not to change the course of the river unless you first obtain the Secretary's approval of your plan.' "

See also the language quoted from *Miller* v. *Mayor* at page 116, *supra*, holding that the Secretary decides what obstructions are unlawful, and on page 119 the language quoted from the *Louisville Bridge* case holding that, after the Secretary has acted, what may have been an obstruction in fact is not thereafter an obstruction in law. Such was the effect of the conclusion of the court in the second *Wheeling Bridge* case.

Citation on all sides of this refinement could be multiplied. But whether it be held that the Secretary of War authorizes an "obstruction" which he finds not to be such as to invoke the inhibition of the statute, or finds to be *no* obstruction in intendment of law that which may be to some extent an obstruction in fact, the result is the same. If the structures mentioned in the statute were not obstructions there would have been no need for the statute. In common sense the Secretary of War, who is entrusted with the maintenance of all navigable channels in the whole complex system of the United States, considers various proposed artificial works affecting navigation and determines whether in all their aspects they can be permitted with due regard for the interests of navigation. Each case is decided in view of all of its circumstances.

A case can hardly be imagined where the proposed works do not injure some aspect of navigation while benefitting some other aspect. In *Miller* v. *Mayor of New York*, 109 U. S. 385, 393, in speaking of a claim of injury to a wharf due to the construction of a bridge in East River below it, the court said:

> "*Every public improvement, whilst adding to the convenience of the people at large, affects, more or less injuriously, the interests of some. A new channel of commerce opened, turning trade into it from other courses, may affect the business and interests of persons who live on the old routes.*"

A more meticulous and painstaking effort to reach a just solution of a difficult problem it would be hard to find. The efforts of the Secretary of War to compose the conflicting necessities of the various ports and waters under his administration, by securing restoration of lake levels by compensation, by restriction of the Chicago diversion through additional facilities for sewage disposal, and by engineering surveys looking toward the solution of navigation problems in both great waterways *certainly does not indicate any abuse of his function or warrant any interposition of the court to control his determination or coerce his discretion.*

II.

Congress has power to authorize the diversion.

(1) The diversion does not constitute a taking of private property.

(a) Complainants have no property in the steamship lanes along the international boundary.

The findings of the Master seem to us amply to support the power of Congress in this regard and we adopt as our brief in chief the Master's Report 149-152. To this, in refutation of complainants' arguments, we add the following:

The main subject-matter and most of the evidence in this suit relates to navigable capacity of navigable waters of the United States, and particularly to the great steamship lanes from the head of Superior to the foot of Erie. For example, Wisconsin claims as injury the hindrance to bulk freighters in the principal traffic lanes. Yet this hindrance does not occur in Wisconsin, Pennsylvania, Minnesota, Ohio or New York. There is not a word in the Master's Report to show that it occurred in any of the states complainant and, as a matter of fact, the evidence showed that a substantial part of the area of hindrance was in Canadian waters. There was no showing of any hindrance not occurring within waters which are described in the Act of March 3, 1899, as navigable waters of the United States. Confining present consideration to this principal claim of injury—interference with bulk shipping—what private property of any complainant is taken by any effect of this diversion on the navigable capacity of the navigable waters of the United States? Could California maintain a suit against Florida on the basis of the causeway connecting the mainland with Key West on the basis of her property rights? Complainant states themselves do not navigate these waters, and, save for the State of Michigan, there is no hindrance to shipment by bulk freighters occurring in the waters of any of the complainant states. Stripped of the element of injury to navigation of bulk freighters, the rest of the showing of injury in complainants' case is insignificant.

What we are really addressing on this principal segment of the proof, is only the right of citizens of complainant states to navigate the navigable waters of the United States. In the first place, this right does not derive from their citizenship in these states. It derives from citizenship in the United States.

> "* * * He (a citizen of the United States) has the right to come to the seat of government * * * to free access to its seaports. * * * The right of the state to impede * * * the right which its citizens hold under it (the United States) has been universally denied. * * * If the right of passing through a State is one guaranteed to him by the Constitution * * * it must be sacred from State taxation * * *." (*Crandall* v. *Nevada*, 6 Wall., 44, 45.)
>
> "* * * The right to use the navigable waters of the United States * * * is dependent upon citizenship of the United States and not citizenship of a State * * *." (*Slaughter House Cases*, 16 Wall. 36, 79.)

In the second place, this right is not a *property* right, it is a personal privilege. It has been well described in *Frost* v. *Washington Ry.*, 97 Me. 76:

> "This right of plaintiff was not his private property nor even his private right. It could not be bought, sold, leased or inherited. He did not earn it, create it, or acquire it. He did not own it against the sovereign. The right was the right of the public, the title and control being in the sovereign in trust for the public and for the benefit of the general public and not for any

> particular individual. * * * The sovereign cannot take private property without * * * compensation * * * but the constitutional provision does not limit the power of the sovereign over public rights."

Whatever may be their rights as to other aspects of waters, neither these states nor their citizens have any property in the navigable capacity of those which constitute navigable waters of the United States and *a fortiori* they have no property in waters outside their physical domain.

The rights of the states were never more than *quasi-sovereign* and not property rights in the sense in which the word "property" is used in the Constitution. Whenever the court has had to pass upon this question it has decided against any suggestion of such a "property" right. In

Gilman v. *Philadelphia,* 3 Wall. 713,

referring to the absolute power of Congress over the matter of navigable rivers, the court said:

> "For this purpose *they are the public property of the nation,* and subject to all the requisite legislation of Congress. * * * *For these purposes Congress possesses all the powers which existed in the states before the adoption* of the national Constitution." * * *
>
> "Although the title to the shores and submerged soil is in the various states and individual owners under them, *it is always subject to the servitude in respect of navigation created in favor of the Federal government by the Constitution.* * * * *The primary use of waters* * * * *is for the purpose of navigation.* * * *"

Gibson v. *U. S.,* 166 U. S. 269, 272.

In so far as we are addressing the principal complaint in this case—the interference by defendants' diversion with navigable depths at critical points in the steamship lanes of the great bulk freighters—there is not even a debatable ground for complainants' argument that we are taking private property for public use without compensation, and this would be so regardless of whether we are authorized to divert by Section 10 of the Act of 1899 or not. If our acts be unlawful we may be committing a nominal tort in the event of some stranding or misadventure, but certainly we are taking the property of none of them or their citizens in the navigable capacity of such waters by reason of such hindrance.

(b) The doctrine of international law as applied by this court to the relations between states, and not the common law doctrine of riparian rights, is the governing law of this case and under those doctrines complainants have no property right to have all the water in the lakes flow to them without the slightest impairment in quantity.

The rules of private property are inapplicable to controversies between states. *Georgia* v. *Tennessee Copper Co.,* 206 U. S. 230, 237; *Kansas* v. *Colorado,* 206 U. S. 46, 51, 99; *Hudson Water Co.* v. *McCarter,* 209 U. S. 349, 354, 357; *Rickey Co.* v. *Miller & Sax,* 218 U. S. 208, 260, 261; *Bean* v. *Morris,* 221 U. S. 485, 486, 488.

The doctrines governing suits between states are those of international law as modified by the decisions of this court which adapt them to the relations of the quasi-sovereign states of the Union under the Constitution.

In *Missouri* v. *Illinois,* 200 U. S. 496, Mr. Justice Holmes said:

> "But the words of the Constitution would be a narrow ground upon which to construct and apply to the relations between states the same system of municipal law in all its details which would be applied between

> individuals. If we suppose a case which did not fall within the power of Congress to regulate, the result of a declaration of rights by this court would be the establishment of a rule which would be irrevocable by any power except that of this court to reverse its own decision, an amendment of the Constitution, or possibly an agreement between the States, sanctioned by the legislature of the United States."

In *North Dakota* v. *Minnesota*, 263 U. S. 365, Chief Justice Taft said:

> "The jurisdiction and procedure of this court in controversies between states of the Union differ from those which it pursues in suits between private parties. * * * The jurisdiction is * * * limited generally to disputes which, between states entirely independent, might be properly the subject of diplomatic adjustment. * * * In such action by one state against another, the burden on the complainant state of sustaining the allegations of its complaint is much greater than that imposed upon a complainant in an ordinary suit between private parties."

In delivering the opinion on the demurrer in the case of *Kansas* v. *Colorado*, 185 U. S. 125, Mr. Justice Fuller after discussing the claim of Colorado to her full rights as an independent state under the doctrine of international law, said:

> "But when one of our states complains of the infliction of such wrong or the deprivation of such rights by another state, how shall the existence of cause of complaint be ascertained, and be accommodated if well founded? * * * *Comity demanded that navigable rivers should be free, and therefore the freedom of the Mississippi, the Rhine, the Scheldt, the Danube, the St. Lawrence, the Amazon, and other rivers has been at different times secured by treaty;* but if a state of this Union deprives another state of its rights in a navigable stream, and Congress has not regulated the sub-

> ject, as no treaty can be made between them, how is the matter to be adjusted? * * * Sitting, as it were, as an international, as well as a domestic, tribunal, we apply *Federal law, state law, and international law*, as the exigencies of the particular case may demand."

In the opinion on the merits of the bill itself in *Kansas v. Colorado*, 206 U. S. 46, Mr. Justice Brewer said:

> "Controversies between the states are becoming frequent, and, in the rapidly changing conditions of life and business, are likely to become still more so. Involving, as they do, the rights of political communities which in many respects are sovereign and independent, they present not infrequently questions of far-reaching import and of exceeding difficulty. * * * '*International law is part of our law and must be ascertained and administered by courts of justice of appropriate jurisdiction as often as questions of right depending upon it are duly presented for their determination.*' * * * One cardinal rule, underlying all the relations of the states to each other, is that of equality of right. *Each state stands on the same level with all the rest. It can impose its own legislation on no one of the others, and is bound to yield its own views to none.*"

At international law an upper riparian state is under no servitude to a lower state to permit the water to flow down unimpaired in quantity.

Beginning about 1878, the Republic of Mexico commenced to advance a claim that diversions within the United States were obstructing practically all the waters of the Rio Grande, thereby impairing the rights of Mexico in the international section of the river, both as to navigation and agricultural uses.

In 1895 Attorney General Harmon addressing the following question (21 Opin. Atty. Gen. 274):

> "By the principles of international law, independent of any special treaty or convention, may Mexico right-

> fully claim that the obstruction and diversion of the waters of the Rio Grande * * * are violations of its rights which should not continue for the future and on account of which, so far as the past is concerned, Mexico should be awarded adequate indemnity?"

advised the State Department as follows:

> "It is stated by some authors that an obligation rests upon every country to receive streams which naturally flow into it from other countries; and they refer to this as a natural international servitude. (Heffter Droit Int., Sec. 43; 1 Phillemore Int. Law, p. 303.) Others deny the existence of all international servitudes, apart from agreement in some form. (Letters of Grotius quoted, 2 Hert., p. 106; Kluber Droit des Gens Moderne, Sec. 139; Bluntschli Droit Int. Code; Woolsey's Int. Law, Sec. 58; 1 Calvo Droit Int., Sec. 556.)
>
> "Such a servitude, however, if its existence be conceded, would not cover the present case or afford any real analogy to it. *The servient country may not obstruct the stream so as to cause the water to back up and overflow the territories of the other.* The dominant country may not divert the course of the stream so as to throw it upon the territory of the other at a *different place.* (See authorities, *supra.*) In either of such cases there would be a *direct invasion and injury* by one of the nations of the territory of the other. But when the *use of water by the inhabitants of the upper country results in reducing the volume of which enters the other, it is a diminution of the servitude.* The injury now complained of is *a remote and indirect consequence* of acts which operate as a deprivation by prior enjoyment. So it is evident that what is really contended for is a servitude which makes the lower country dominant and subjects the upper country to the burden of arresting its development and denying its inhabitants the use of a provision which nature has supplied entirely within its own territory.

"Such a consequence of the doctrine of international servitude is not within the language used by any writer with whose works I am familiar, and could not have been within the range of his thought without finding expression. * * *"

"The immediate as well as the possible consequences of the right asserted by Mexico show that its recognition is entirely inconsistent with the sovereignty of the United States over its national domain. Apart from the sum demanded by way of indemnity for the past, the claim involved not only the arrest of further settlement and development of large regions of country, but the abandonment, in great measure at least, of what has already been accomplished.

"It is well known that the clearing and settlement of a wooded country affects the flow of streams, making it not only generally less, but also subjects it to more sudden fluctuations between greater extremes, thereby exposing inhabitants on their banks to increase of the double danger of drought and flood. The principle now asserted might lead to consequences in other cases which need only be suggested. * * *

"The case presented is a novel one. Whether the circumstances make it possible or proper to take any action from *considerations of comity is a question which does not pertain to this department;* but that question should be decided as one of policy only, because, in my opinion, the *rules, principles, and precedents of international law impose no liability or obligation upon the United States.*"

The Mexican Government cited against the opinion Farnham's Law of Waters. The State Department learned from Mr. Farnham that his statements, contrary to the opinion of the Attorney General, were private opinions not based on authority. (See relation of above circumstances in 101 Minnesota 197, at 230.)

Thereafter the treaty of May 21, 1906, was negotiated between the United States and Mexico, Articles IV and V of which are as follows:

Article IV.

> "The delivery of water as herein provided *is not to be construed as a recognition by the United States of any claim on the part of Mexico to said waters;* and it is agreed that in consideration of such delivery of water Mexico waives any and all claims to the waters of the Rio Grande for any purpose whatever between the head of the present Mexican canal and Fort Quitman, Texas, and also declares fully settled and disposed of and hereby *waives all claims heretofore asserted or existing, or that may hereafter arise or be asserted against the United States on account of any damages alleged to have been sustained by the owners of land in Mexico by reason of the diversion by citizens of the United States* of waters of the Rio Grande."

Article V.

> "The *United States, in entering into this treaty, does not thereby concede, expressly or by implication, any legal basis for any claims heretofore asserted or which may be hereafter asserted by reason of any losses incurred by the owners of land in Mexico due or alleged to be due to the diversion of the waters* of the Rio Grande within the United States; nor does the United States in any way concede the establishment of any general principle or precedent by the concluding of this treaty. * * *"

This Federal doctrine is also the doctrine of the Supreme Court of Minnesota. Judge Elliott in *Minnesota Canal and Power Co.* v. *Pratt* (1907), 101 Minn. 197, at 228, says:

> "The respondents claim that, as the Birch Lake drainage area is tributary to the Rainy river and the various lakes which form the international boundary between the United States and Canada, the diversion of the waters to Lake Superior would be a violation

> of international comity. The contention cannot be sustained on principle or authority. Birch Lake and its tributary waters are entirely within the United States, and *under the generally accepted rules of international law are subject to its exclusive control without responsibility to any foreign government or its citizens.* Modern international law rests upon the conception of territorial sovereignty. The territory of a nation consists of the land and waters within its geographical boundaries and the waters which wash its shores to the extent of a marine league or other distance determined by custom or treaty, from the shore. See *Mortensen* v. *Peters* (1906), 14 Scots' Law Times, 227, 1 Am. Jour. Int. Law, 626 and article by A. H. Charterio in 16 Yale Law Review 471. Over this territory the jurisdiction of the nation is exclusive and absolute. *Schooner Exchange* v. *McFadden,* 7 Cranch. 116, 3 L. Ed. 287."

There seems to be no question of the position of the United States that a sovereign state has full rights of diversion of water within its borders as an attribute of its sovereignty.

> "Under the treaties with Mexico each republic reserves all rights within its own territorial limits. This would have been so on principles of international law without such reservation. States lying wholly within the United States belong exclusively to it, *and the soil within the United States is not burdened with a servitude in favor of Mexico in respect to any duty to so discharge the water as to promote or preserve the navigability of the Rio Grande."* (Sen. Doc. 104, 56th Cong., 2d session; *United States* v. *Rio Grande Dam and Irrigation Co.,* 9 N. M. 292; Sen. Doc. 154, 57th Cong., 2d session.)

As between States of the Union the court will enforce the doctrine of Comity (see quotation from *Kansas* v. *Colorado,* pp. 129, 130, *supra*), as to the waters of an interstate stream. Comity means an equitable division of burdens and benefits in the water and not a right in the lower state to all the water. Thus in *Kansas* v. *Colorado*, although Colorado was taking practically the entire low-water flow of the Arkansas River the court did not enjoin.

In *Corrigan Transportation Co.* v. *Sanitary District*, 137 Fed. 851, Mr. Justice Baker was speaking of Section 10 of the Act of March 3, 1899, and of this canal and diversion in a suit by an individual for an injury due to that diversion:

> "If Section 10 stands, libelants' attack fails, because defendant obtained the permit and complied with its conditions. If Section 10 falls, what is the result? If a matter affecting commerce is of national scope and susceptible of uniform regulation, the failure of Congress to speak to the subject is deemed equivalent to a declaration that the states shall let the matter alone; but if the matter is local, and concerns the public policy of a state, though it may incidentally affect interstate and foreign commerce, congressional inaction is a recognition that the subject is fitter for local regulation, and is an invitation that the state continue in the unimpeded exercise of its police powers. * * * The bridging, dredging, purification of a navigable waterway wholly within a state are matters of the latter class. *Escanaba Transportation Co.* v. *Chicago*, 107 U. S. 678; *Lake Shore, etc., Ry. Co.* v. *Ohio*, 165 U. S. 365. With the commerce clause in abeyance, Illinois, as to every being in the whole world except future Congresses, was absolute sovereign in the premises. The absolute sovereign may change the grade of *highways or may vacate them, may alter the courses and currents of rivers or may dam or fill them up, and neither alien nor subject traveler and navigator may complain.* **No one can claim a vested right to have the United States interfere with Illinois, nor can a cause of action arise from want of interference.**"

6

Upon the above authority it is clear that complainants have no *property* right to all the water in the Lakes without diminution by defendants and, as was clearly shown in the Mexican incident, neither they nor their citizens are entitled to damages by reason of such a diversion.

(c) The slight incidental injury to incorporeal rights disclosed by the findings does not constitute a taking of property.

Counsel have referred to various state authorities decided under state constitutions, the provisions of which are entirely different from the Federal Constitution to support their contention that similar injuries have been held to constitute a taking. An instance of this is their reliance on the *Beidler* case, discussed below at pp. 150-153. But complainants omit to state that the State Constitution in the *Beidler* case provides for compensation for *damage* to property as well as for *taking* of property.

In the case at bar there is no question of taking. The damages, if any suffered, are of the most consequential and remote character. There is no question involved here as to whether actions for damages could be sustained by complainants, or any of their citizens. If by the greatest stretch of the imagination it could be said that there was property or a taking, no injunction could be granted, because there is such *laches* and acquiescence that a court of equity would not be moved to act, and the claimants should be relegated to their suits for damages, if there are any

New York v. *Pine,* 185 U. S. 93.
U. S. v. *Lynah,* 188 U. S. 445.
Northern Pacific R. Co. v. *Smith,* 171 U. S. 260.
Los Angeles v. *Los Angeles City Water Co.,* 177 U. S. 558.

Sullivan v. *Portland and Kennebec R. Co.*, 94 U. S. 806.

Bowman, et al. v. *Wathen, et al.*, 1 How. 189.

Piatt v. *Vattier*, 9 Pet. 405.

In *Osborne & Company* v. *Missouri Pacific R. Co.*, 147 U. S. 155, a bill in equity was filed to enjoin the railroad company from constructing a track in the public street opposite the lands of the plaintiff. In affirming a decree dismissing the bill, the court said (259):

> "But where there is no direct taking of the estate itself, in whole or in part, and the injury complained of is the infliction of damage in respect to the complete enjoyment thereof, a court of equity must be satisfied that the threatened damage is substantial and the remedy at law in fact inadequate before restraint will be laid upon the progress of a public work. And if the case made discloses only a legal right to recover damages rather than to demand compensation, the court, will decline to interfere.
>
> In *McElroy* v. *Kansas City*, 21 Fed, Rep. 257, which was an application for an injunction to restrain the grading of a street in front of the complainant's lot, Mr. Justice Brewer, then circuit judge, considered under what circumstances a chancellor could grant such relief. It was ruled that, if the injury which the complainant would sustain from the act sought to be enjoined could be fully and easily compensated at law, while, on the other hand, the defendant would suffer great damage, and especially if the public would suffer great inconvenience, if the contemplated act were restrained, the injunction should be refused, and the complainant remitted to his action for damages."

In the case of *Manigault* v. *Springs*, 199 U. S. 473, a bill was filed by a riparian owner to enjoin another riparian owner from constructing in a navigable stream a dam authorized by the State of South Carolina, under a statute, which expressly provided for the payment of such damages as might be sustained by reason of the erection of the dam. It was conceded that the easement of the plaintiff had been taken and that the plaintiff was entitled to damages. However, the court said:

> "But it does not necessarily follow that an injunction should issue. * * * a court of equity is not bound to enjoin a public work authorized by statute, until compensation is paid, where no property is directly appropriated. This is particularly true where the damage is difficult of ascertainment at the time, and a reasonable provision is made by the law for compensation."

The case of *Northern Pacific R. Co.* v. *Smith,* 171 U. S. 260, was a suit to recover from the railroad company the possession of lands which had been taken without the payment of compensation and which had been in the possession of the railroad company for many years. In denying recovery, the court said (271):

> "There is abundant authority for the proposition that, while no man can be deprived of his property, even in the exercise of the right of eminent domain, unless he is compensated therefor, yet that the property holder, if cognizant of the facts may, by permitting a railroad company, without objection, to take possession of land, construct its track, and operate its road, preclude himself from a remedy by an action of ejectment. His remedy must be sought either in a suit in equity, or in a proceeding under the statute, if one be provided, regulating the appropriating of private property for railroad purposes."

Quoting from *McAulay* v. *Western Vermont R. R. Co.,* 33 Vt. 311, the court continues (272):

> "In these great public works, the shortest period of clear acquiescence, * * * will conclude the right

> * * * to stop the company in the progress of their works, and especially to stop the running of the road after it has been put in operation, whereby the public acquire an important interest in its continuance. * * * It is certain according to the English decisions, that he cannot stop the work, and especially the trains upon the road if he has in any sense, for the shortest period clearly given to the company * * * by his silence, to understand that he did not intend to object to their proceeding with their construction and operation."

These holdings are referred to in the case of *United States* v. *Lynah,* 188 U. S. 445, in which the court said, at page 467:

> "It does not appear that the plaintiffs took any action to stop the work done by the government, or protested against it. Their inaction and silence amount to an acquiescence—an assent to the appropriation by the government. In this respect the case is not dissimilar to that of a landowner who, knowing that a railroad company has entered upon his land and is engaged in constructing its road without having complied with the statute in respect to condemnation, is estopped from thereafter maintaining either trespass or ejectment, but is limited to a recovery of compensation. *Roberts* v. *Northern P. R. Co.,* 158 U. S. 1, 11; *Northern P. R. Co.* v. *Smith,* 171 U. S. 260, and cases cited in the opinion."

It seems to us almost absurd to say that hindrance to the progress of steamships in the lakes constitutes appropriation of any property in connection with the claim of injury to shipping. The only other finding of injury that is in this case is the one relating to the contribution of defendants' diversion to the claimed injury in connection with fishing and hunting grounds, the availability and convenience of beaches at summer resorts and public parks.

Complainants have filed no exception to the Master's findings in this respect. The one relating to damage to shipping is

> "I am satisfied that the evidence requires the finding that the lowering of lake levels of approximately 6 inches, has had a substantial and injurious effect upon the carrying capacity of vessels, and has deprived navigation and commercial interests of the facilities which otherwise they would have enjoyed in commerce on the Great Lakes" (Master's Report 116).

On the other question of injury, the finding is:

> "But there is sufficient evidence to require the finding that a lowering of 6 inches has been a substantial contribution to the injury caused by the total reduction in connection with fishing and hunting grounds, the availability and convenience of beaches at summer resorts and public parks" (Master's Report 117).

As to the claimed injury to agriculture and horticulture, the Master says that injury has not been sufficiently shown (Master's Report 117). As to pile foundations of structures, the supposed injury due to the contribution of 6 inches reduction of the lake levels, does not clearly appear (Master's Report 117).

No exceptions were filed to these findings, which characterize the effects of the diversion as an "injury" only, without even a suggestion that there is any appropriation or taking. The cases cited by the Master (Master's Report 149-152) seem to settle any and all contentions of the complainants as set forth in their briefs.

In

Sanguinetti v. *United States,* 264 U. S. 146, 149,

the court said:

> "Under these decisions and those hereafter cited, in order to create an enforceable liability against the Gov-

> ernment, it is, at least, necessary that the overflow be the direct result of the structure, and constitute an actual, permanent invasion of the land, amounting to an appropriation of, and *not merely an injury to, the property.*''

Counsel cite (Wis. Brief 95-99) a number of cases as to the right and jurisdiction of a State in the waters and submerged lands of navigable waterways within their borders, and conclude that such dominion over the waters and submerged lands is in the nature of a trust for the public. With this conclusion we agree, but the dominion of the state in such waters and submerged lands, including the interest or rights of riparian owners in such waters and submerged lands, is subject to the exercise of Congress over navigable waters under the Commerce Clause.

Judge Koonce of the War Department in a lecture of April 23, 1926, not included in the evidence but cited at numerous places in the Wisconsin brief, states the rule as follows:

> ''The property rights of a riparian owner in these areas as between himself and the state, or between himself and other persons, are subject to state authority and may be such as the legislature may prescribe. It must be said, however, that all state and private rights in the subject are more speculative than substantial.''

The injury mentioned in the above cited findings of the Master as to fishing and hunting grounds and availability and convenience of beaches and summer resorts and public parks, can relate only to lands which are subject to the servitude of navigation under the Commerce Clause; but complainants say that in view of the fact that the diversion is from one watershed to another and cannot be said to benefit or improve navigation in the St. Lawrence system of waterways from which the water is taken, that the servitude under the Commerce Clause does not exist. In other words, they would limit the exercise of the power of Congress under the Commerce Clause of the Constitution to a particular system of waterways; that is, the constitutional power would thus be limited by the division between watersheds. They disregard the expressions in many opinions of this court heretofore cited, to the effect that the powers delegated to Congress by the Constitution know no limitations such as state lines or regions, but may be exercised wherever the authority of the United States extends.

The Master found against the contention about watersheds at pages 152-158 of his report, and we have added certain authorities to those he cited (p. 154, *infra*).

In

> *Stockton, Attorney General,* v. *Baltimore and New York Railroad Company,* 32 Fed. 9, Circuit Court Division, New Jersey,

Mr. Justice Bradley, then one of the justices of this court, delivered the opinion. The case was commenced by information to restrain the defendants (railroad companies) from erecting a bridge across Arthur Kill, between New Jersey and Staten Island, in the State of New York, upon the land of the State situated on the shore and under the waters of said kill. The Staten Island Rapid Transit Company, one of the defendants, claimed the right to build the bridge and to occupy lands under water necessary for the support of its piers, under an act of Congress which provided that "it shall be lawful" for the Staten Island Railroad Company and the Baltimore and New York Railroad Company, or either of them, "to build and maintain a bridge across * * * Arthur Kill * * * for the passage of railroad trains." It was further provided that the plan of said bridge should be approved by the Secretary of War, which approval was obtained. The State raised the same contention here considered as to the taking of private property. But the court said:

> "The information states the ordinary doctrine that the state is owner of the shore and land under water of all navigable streams and arms of the sea within its borders; that this ownership was a part of the *jura regalia* of the king of Great Britain, by virtue of which he was seized and possessed of an estate in fee-simple absolute in said lands; and that, at the Revolution, this state, in its sovereign capacity, succeeded to the rights of the crown, and that this right of supreme dominion had never been ceded or surrendered to the United States; and that, without such cession or surrender, the United States could not take possession of said lands, or authorize other parties to do so, except by making compensation therefor, as provided in the fifth amendment to the constitution; and that, at the place of location of the proposed bridge, their ownership of the soil, on the part of the state, extended from ordinary high-water mark to the center line of the sound, being the boundary line between New Jersey and New York, as settled by agreement in 1833, and confirmed by act of congress, June 28, 1834. * * *"
>
> "*First,* it is denied that the land of the state can be taken at all without voluntary cession, or consent of the state legislature. If this is so, we are brought back to the dilemma of requiring the consent of the state in almost every case of an interstate line of communication by railroad, for hardly a case can arise in which some property belonging to a state will not be crossed. It will always be so at the passage of a navigable stream. This shows that the position cannot be sound, for it brings us to a *reductio ad absurdum.* It interposes an effectual barrier to the execution of a constitutional power vested in congress. It overlooks the fundamental principle that the constitution, and all laws made in pursuance thereof, are the supreme law of the land; for, if the consent of a state is necessary, such state may always, in pursuit of its own interests,

refuse its consent, and thus thwart the plain objects and purposes of the constitution.

* * * * * *

"But, *secondly,* it is contended that if the United States can constitutionally take the land of the state, as well as that of the citizen, for public purposes, without consent, it can only do so in the same manner, and subject to the same conditions, namely, that of making just compensation. It is urged that the language of the fifth amendment of the constitution is applicable to the case, and is imperative. This language is 'nor shall private property be taken for public use without just compensation.' It is insisted that the property of the state in lands under its navigable waters is private property, and comes strictly within the constitutional provision. It is significantly asked, can the United States take the state-house at Trenton, and the surrounding grounds belonging to the state, and appropriate them to the purposes of a railroad depot, or to any other use of the general government, without compensation? We do not apprehend that the decision of the present case involves or requires a serious answer to this question. The cases are clearly not parallel. The character of the title or ownership by which the state holds the state-house is quite different from that by which it holds the land under the navigable waters in and around its territory."

The court then agreed with the statement in the information as to the character of the state's jurisdiction over navigable waters and submerged lands, and said (20):

"Such being the character of the state's ownership of the land under water,—an ownership held, not for the purpose of emolument, but for public use, especially the public use of navigation and commerce,—the question arises whether it is a kind of property susceptible of pecuniary compensation, within the meaning of the constitution. The fifth amendment provides only that *private property* shall not be taken without compensation; making no reference to public property. But, if the phrase may have an application broad enough to include all property and ownership, the question would still arise whether the appropriation of a few square feet of the river bottom to the foundation of a bridge which is to be used for the transportation of an extensive commerce in aid and relief of that afforded by the water-way, is at all a diversion of the property from its original public use. It is not so considered when sea-walls, piers, wing-dams, and other structures are erected for the purpose of aiding commerce by improving and preserving the navigation. Why should it be deemed such when (without injury to the navigation) erections are made for the purpose of aiding and enlarging commerce beyond the capacity of the navigable stream itself, and of all the navigable waters of the country? It is commerce, and not navigation, which is the great object of constitutional care.

The power to regulate commerce is the basis of the power to regulate navigation, and navigable waters and streams, and these are so completely subject to the control of congress, as subsidiary to commerce, that it has become usual to call the entire navigable waters of the country the navigable waters of the United States. It matters little whether the United States had or has not the theoretical ownership and dominion in the waters, or the land under them; it has, what is more, the regulation and control of them for the purposes of commerce. So wide and extensive is the operation of this power that no state can place any obstruction in or upon any navigable waters against the will of congress, and congress may summarily remove such obstructions at its pleasure. And all this power is derived from the power 'to regulate commerce.' Is this power stayed when it comes to the question of erecting a bridge for the purposes of commerce across a navigable stream? We think not. We think that the power to regulate commerce between the states extends, not only to the control of the navigable waters of the country, and the lands under them, for the purposes of navigation, but for the purpose of

> erecting piers, bridges, and all other instrumentalities of commerce which, in the judgment of congress, may be necesary or expedient."

Complainants here say (Wis. Brief 96) that each state has sovereign and proprietary rights in all the waters within its borders and in the lands under them and that by withholding waters that would otherwise flow to them and cover the submerged lands to a higher level and, quite apart from the question of navigable capacity, our diversion takes property within the meaning of the 5th Amendment to the Constitution of the United States.

We think we have shown (pp. 128-136) that purely as between us and complainants, we were under no servitude to let all lake water flow to them without diminution. As a state of the Union we are under an obligation to do equity and justice—to observe comity toward our neighbors. We are under an obligation to obey the laws of the United States. If we do not do so, our act may be unlawful either because this court should declare that our exercise of sovereignty is unreasonable in respect of our duty of comity toward our sister states or that we are violating a law of the United States. But our failure in this regard would not constitute a *taking* of property.

Complainants quote the Master (Master's Report 149) as saying that they have sovereign and proprietary rights in these waters, but that was merely introductory to his finding that in the sense of the 5th Amendment no property of theirs is taken.

To base a suit upon this kind of a property right is a doctrine which has been rejected by this court.

In *Hudson Co.* v. *McCarter,* 209 U. S. 349, where the suit was brought by a state against a private trespasser, seeking to abstract and sell water needed in the state, Mr. Justice Holmes said:

> "We prefer to put the authority which cannot be denied in the *state upon a broader ground* * * * since in our opinion, *it is independent of the more or less attenuated* residuum of title that the state may be said to possess. * * *"

Indeed, it is a doctrine as old as the common law, that running water is not subject to ownership.

In *Geer* v. *Connecticut*, 161 U. S. 519, referring to a similar doctrine in respect of wild animals, the court said:

> "We take it to be correct doctrine that ownership of wild animals, so far as they are capable of *ownership,* is in the state, not as a proprietor, but in its sovereign capacity as the representative and for the benefit of all its people in common."

In most aspects waters are in the exclusive dominion of the state. But that dominion *is not proprietary.* It is simply *jus regium*—a right to regulate. From this *jus regium* flow riparian and all other water rights. They do not flow from *property* in the state. So far as the *jus regium* applies to the public right of navigation it is gone from the State to the United States, as elsewhere shown. The general subject was thoroughly expounded in

Illinois Central Ry. v. *Chicago,* 146 U. S. 387,

holding that a state has no such "property" as can be conveyed.

> "* * * the ownership and dominion over lands covered by tide waters * * * belong to the respective states * * * *subject to the paramount right of Congress to control their navigation.* * * * *The same doctrine is* * * * *held to be applicable to* * * * *the Great Lakes. These lakes possess all the general characteristics of open seas,* except in the freshness of their waters and in the absence of the ebb and flow of tide. In other respects they are inland seas. * * * *the same doctrine as to the dominion and sovereignty* * * * *of lands under*

the navigable waters of the Great Lakes applies which obtains at common law * * * of lands under tide waters * * *.

"* * * the state holds the title to the lands under the navigable waters of Lake Michigan * * *. *But it is a title different in character from that which the state holds in lands intended for sale.* * * * It is a title held in trust * * * abdication is not consistent with the exercise of that trust * * *. The control of the state for the purpose of the trust can never be lost. * * * General language sometimes found in opinions of the courts, expressive of absolute ownership and control by the State of lands under navigable waters, irrespective of any trust as to their use and disposition, must be read and construed with reference to the special facts of the particular cases.

"* * * THE POWER EXERCISED BY THE STATE OVER THE LANDS AND WATERS IS NOTHING MORE THAN WHAT IS CALLED 'JUS REGIUM,' THE RIGHT OF REGULATING, IMPROVING AND SECURING THEM FOR THE BENEFIT OF EVERY INDIVIDUAL CITIZEN. * * * (Referring with approval to the case of *Stockton* v. *Railroad Co.*, 32 Fed. Rep. 9.) '*The character of the title of ownership by which the state holds the state house is quite different from that by which it holds the land under the navigable waters in and around its territory.* * * * prior to the Revolution' the shore and lands under water of navigable streams and waters of the province of New Jersey belonged to the King. * * * *after the conquest the said lands were held by the state as they were by the King, in trust* * * * *subject* * * * *to the rights of navigation and commerce.*"

In

United States v. *Chandler-Dunbar Co.*, 229 U. S. 53, 69, 70, 72,

the court said:

"But whether this private right to the *use of the flow of the water* * * * be based upon the qualified

> title which the company had (from the state) to the bed of the river over which it flows, or of the ownership of land bordering upon the river, is of no prime importance. *In neither event can there be said to arise any ownership of the river.* * * * That the running water in a great navigable stream is capable of private ownership is inconceivable. * * * That riparian owners upon public navigable rivers have, in addition to the rights common to the public, certain rights to the use and enjoyment of the stream * * * must be conceded. * * * *These additional rights are not dependent upon title to the soil over which the river flows, but are incident to ownership upon the bank.* * * * It is for Congress to decide what is and is not an obstruction to navigation. * * * *Title is absolutely subordinate to the rights of navigation.* * * *"

So far as these states themselves are concerned then, their property is not taken by our diversion; first, because in withholding what would otherwise flow to them, we are taking nothing, and, second, because neither the corpus of the water nor the alleged right to have it flow to them is, of itself, property within the meaning of the 5th Amendment. Our action in any aspect we have yet discussed may be imagined for the sake of argument to be wrongful, but it is not a taking of private property within the meaning of the 5th Amendment.

But complainants go a step further and allege that our acts impair the enjoyment of themselves as corporate proprietors of public parks and of their citizens as individual riparian proprietors on the lakes.

Of course, if *as between us and them* (see pp. 128-136) (with no reference to our duty to the United States and solely in our relation as equal sovereigns) we are under no duty to let this water flow to them, our failure to let it flow is not a taking so far as the states are concerned, and we think, also, so far as their citizens are concerned. If there is a duty to let it flow, not conceding that our failure to do so is a taking, then, as between us and them, there is no constitutional requirement in the 5th Amendment to compensate them, because the 5th Amendment is not addressed to the states and is no restriction on our sovereign powers.

It is only if what we have done be regarded (as the Master has found) as an act under the authority of the Federal Government, that the 5th Amendment may be considered at all and here complainants are between the horns of a dilemma. If our act is *not* under such authority, the argument about the 5th Amendment vanishes. If our act *is* under Federal authority, their whole case falls and the incidental argument about taking of property is covered by the occasion in *Sanguinetti* v. *U. S.*, 264 U. S. 146, and there is no taking involved.

Great reliance is placed by complainants on the case of *Beidler* v. *Sanitary District*, 211 U. S. 628. There Beidler, the owner of water front lots facing a tributary of the Chicago River and slips communicating with such tributaries, sued the Sanitary District for damages done to his loading facilities, by reason of a drop of six feet in water levels opposite his docks due to the reversal of the Chicago River when lake water was turned into it in 1900. The suit was predicated on Section 13, Article 2 of the Constitution of the State of Illinois, which provides:

> "Private property shall not be taken *or damaged* for public use without just compensation."

This case has no bearing here. We are now considering solely the meaning of the 5th Amendment to the Constitution of the United States which says nothing about *damage* to private property by public enterprise.

Complainants, however, say that on the principles of the *Beidler* case it results that the Sanitary District is thus made responsible in damages to anyone injured within the State of Illinois, but that one similarly injured outside the state is denied relief. This sounds well, but of course it is a *non sequitur.* This discussion is as to whether the effects of this diversion constitute a taking—it is not as to whether persons anywhere are entitled to damages therefrom. The Sanitary District is not the State of Illinois. It is subject to suit. If any individual in any complainant state can show an unlawful or negligent act and a resulting damage, he has exactly the same right of action as any citizen of Illinois. The fact that there has never been any such suit during the twenty-eight years of this diversion ought to be fairly persuasive evidence on the substance behind complainants' argument on this whole subject of taking of property and injury to property rights.

Complainants also use the *Beidler* case to support their contention that defendants' diversion is a sanitary and not a navigation project. The Illinois Supreme Court in that case simply said that the principal purpose of the Sanitary District was sanitation and that the fact that a navigable waterway may be created is incidental. In a later case (*Mortell* v. *Clark*, 272 Ill. 201), squarely addressing the effect of defendants' works and of the Illinois Acts authorizing what defendants have done and the relation of both to Federal Statute, the court said (p. 213):

> "The (Illinois and Michigan) Canal was built under the authority of the act of Congress of March 2, 1827, the act of 1822 having been mutually abandoned by the State and Federal governments. (*Werling* v. *Ingersoll*. 181 U. S. 131; *Wells* v. *Wells*, 262 Ill. 320.) This Federal act did not provide just where the canal should enter Lake Michigan, simply stating that the land was granted for the purpose of opening 'a canal to unite

> the waters of the Illinois river with those of Lake Michigan,' etc. (Hurd's Stat. 1913, p. LXXXVIII.) The Sanitary District's main channel as now constructed practically complies with this act and furnishes a canal more suitable for navigation than the Illinois and Michigan canal. Furthermore, the Sag channel or cut-off is required to be navigable by said act of 1903, and the proof shows that the Calumet river is navigable to the point where it is intersected by the Sag channel. This cut-off would therefore also practically comply with both of said Federal acts as to furnishing part of the canal for connection of the Illinois river with Lake Michigan."

The Master found that the diversion was validly authorized under Federal law and that the damage shown is incidental and is, in no case, a taking within the meaning of the rule laid down in *Sanguinetti* v. *United States,* 264 U. S. 146, 149, and, therefore, that whatever damage there was amounted only to *damnum absque injuria.* Wisconsin now offers a novel suggestion that if the state improves the *natural* condition of a particular stream for navigation, the resulting incidental damage need not be compensated for, but if it replaces the natural course by an artificial by-path or improves it for any purpose save navigation—by which Wisconsin means only the flotation of ships—then incidental damage must be compensated for.

There is no such distinction. In the series of cases *U. S.* v. *Lynah,* 188 U. S. 445, and *U. S.* v. *Cress,* 243 U. S. 316, the law in favor of compensation for effects of river and harbor improvement was carried as far as it could be carried without making further progress in the perfection of our inland waterways impracticable. In the first case, backwater from a dam flooded the property in question, totally destroying its value. In the second case, backwater from the dam periodically flooded the property. In *Sanguinetti* v. *United States,* 264 U. S. 146, the floods were exceptional and were a mere indeterminate addition to periodical floods which occurred prior to the intervention of the Federal dam. This court held as to the first two cases that they constituted an actual permanent invasion of the land amounting to an appropriation of it, and as to the third, that it constituted merely an injury to the property, and that this did not amount to a taking in the Constitutional sense. This is the doctrine of *Gibson* v. *the United States,* 166 U. S. 269, and the cases cited on page 151 of the Master's Report.

More apt words could not be found to describe the effect of this diversion than Wisconsin used at page 102 of her brief in describing the *Sanguinetti* case—a damage constituting "a mere indeterminate addition to the periodical floods which occurred prior to the government's intervention." Our diversion creates a lowering of exactly the same nature. The lakes fluctuate secularly over little understood periods of perhaps thirty years. They fluctuate sporadically in intermediate cycles of five to seven years. They fluctuate annually with the ebb and flow of water run off and seasonal rains. It is only at periods of extreme low water that our diversion is injurious and then, as the Master found in nearly every branch of this case, our contribution to whatever injury there may be results from one factor in such a complex of causes that precise determination of its particular effect is impossible. The only circumstance where this was not so was in the hindrance to bulk freighters, but this was only an injury to the navigable capacity of national navigable waters.

We find nothing in any of the briefs to disturb the terse logic of the Master's conclusions (150-152), and we believe we have answered the new suggestion of complainants' briefs that as between the states themselves, independent of Federal authority or the lack of it, the diversion constitutes a taking of the property of either the states or their citizens.

(2) There is no restriction on the power of Congress to divert water from one watershed to another.

The Master disposed of this contention at pages 152-158. To this we add only the following observations:

This would be a quaint restriction which in principle, at least, would deny to our Government the power to undertake such great engineering works as the Panama and Suez Canals, the works on the upper Nile and such marvelous internal canal systems as that of the Republic of France and even the complainant State of New York itself.

Furthermore, this court has already said in *Missouri* v. *Illinois*, 200 U. S. 496, 526:

> "The natural features relied upon are of the smallest. And if, under any circumstances, they could affect the case it is enough to say that Illinois brought Chicago into the Mississippi watershed in pursuance, not only of its own statutes, but also of the Acts of Congress of March 30, 1822, and March 2, 1827, the validity of which is not disputed."

The same argument was advanced in the case of *Wyoming* v. *Colorado* (259 U. S. 419), when the court said (466):

> "The fact that the diversion is to such a watershed has a bearing in another connection, but does not in itself constitute a ground for condemning it."

Complainants bring no support to their proposition in this regard beyond its bare assertion.

(3) Article I, Section 9, Clause 6 of the Constitution does not inhibit this diversion because this diversion does not give preference to the ports of any state.

On this point, we adopt as our brief the Master's Report, pages 158-160.

(4) There is no restriction on the power of Congress to regulate navigation inherent in the fact that a particular regulation may destroy navigable capacity and, if there were, it has no application here because this diversion does not destroy navigation anywhere.

To the Master's findings on this point, pages 160-165, we have little to add.

The contention, as presented by the Wisconsin brief (116-120) reduces to the assertion that Congress cannot improve navigation anywhere if the improvement would obstruct it anywhere. Of course, this is obviously untenable.

But the controlling vice in this argument is here (as elsewhere in the brief), the exaggeration of a six-inch contribution to a 32-inch lowering into such a description as a "destruction of commerce."

Some of the extreme cases imagined in Wisconsin brief of such ruthless, unreasonable, and grotesquely absurd action as a wharf extending entirely across the Ohio River or a syphoning of the Great Lakes into the Gulf of Mexico, might be beyond the power of Congress, but it would be because Congress had gone mad and the exercise of power would fall outside the rule of "reasonable relation to the end to be attained" in regulating commerce. Another fallacy of complainants' attempted *reductio ad absurdum* is that the third clause of Section 10 does not authorize *destruction* of navigation upon, or navigable capacity, of a navigable water, but merely contemplates permission to alter or modify "the course, location, condition or capacity."

There is no circumstance of destruction in this case and all argument here that goes to denial of a Constitutional power because its exercise *might* be abused is beside the point because, as is demonstrated elsewhere, there is no abuse of power in this case.

(5) The diversion is not for the purpose of sanitation only. It is also for the purposes of navigation and, even if we examine its purpose of sanitation alone, we shall find that authorization thereof for that purpose was and is a regulation necessary and reasonably related to the protection of both navigation and interstate commerce on land.

The Master supports this contention (165-171). We have shown that the contention that this canal and diversion have no relation to navigation is without any substantial basis of fact.

The rapidly increasing pollution of the navigable waters of the United States has been considered here with no small apprehension in *Missouri* v. *Illinois,* 180 U. S. 208; 200 U. S. 496; *New York* v. *New Jersey,* 256 U. S. 296; *Sanitary District* v. *U. S.,* 266 U. S. 405. The magnitude of the danger of pollution of Lake Michigan by the discharge therein of Chicago sewage is shown by the Master (193) to be so great that complainants themselves in pressing for a decree recommended its immediate suspension (193) while alternative measures may be devised and put into effect—a process which the Master has found would involve a number of years.

If Congress can act to prevent the choking up of streams with sawdust, the impairment of streams by the dumping of acids, the obstruction of streams by bridges, dikes and causeways, it is a curious contention that, when it acts by any means at its disposal—positive or negative—to prevent the poisoning of the navigable waters of the United States, their conversion into noisome cesspools, or the avoidance of pestilence at the greatest internal center of interstate commerce, it is not acting with reasonable relation to the regulation, fostering and protection of commerce.

(a) The Secretary of War was justified under the authority delegated to him, in considering the beneficial effect upon interstate commerce of preventing the pollution of the drinking water supply of Chicago.

The Master finds (Master's Report 138):

> "It is plain that the present flow from Lake Michigan through the drainage canal could not be immediately cut off, or reduced to 1,000 c.f.s., and in consequence the sewage of the Sanitary District in its present condition turned into Lake Michigan, without exposing the inhabitants of the District to grave risk of water-borne diseases, by contamination of the water supply taken from the lake. The Chicago River and the waters of the lake about the city would be filthy and noisome, with serious injury to the commerce of Chicago harbor. It appears from the testimony that it would take several years, not less than five years and perhaps ten years, or even more, before the sewage of the district, with such treatment as is practicable, could be turned into the lake and the diversion from the lake stopped or greatly reduced, without serious risk to the health of the people of Chicago."

Again the Master finds (Master's Report 169-170):

> "The continuous introduction of such a pestilential mass in the harbor and the lake would not only affect the health of the citizens of Chicago viewed as a question of local police, through the contamination of its only water supply, but would also affect navigation and the allied interests of interstate commerce, a matter of national concern."

Lake Michigan, a navigable water of the United States, is used not only for the floatation of ships, but the waters are used otherwise in interstate commerce in furnishing a public water supply for a great center of interstate commerce, the place where substantially all the great transcontinental railroads converge. A vast number of people, perhaps upwards of 200,000 continuously (in addition to the regular residents of the city), hailing from different parts of the United States and the world, sojourn there. They represent Chicago's floating population. In addition, many people pass through the City, changing from one transcontinental train to another. Others travel through the city in interstate commerce by automobile. Trains engaged in interstate transportation of passengers depend upon Chicago's public water supply for drinking water to be used upon such trains. Likewise, boats passing to and from the Chicago River and Chicago Harbor depend upon the Chicago water supply for drinking water for their passengers. Boats and yachts plying in the Chicago Harbor carry people in interstate commerce who may become infected by polluted water. These considerations were set forth in Bulletin No. 83 of the Treasury Department, entitled "Sewage Pollution of Interstate and International Waters With Special Reference to the Spread of Typhoid Fever" (183):

> "The growth of the City of Chicago finds no parallel in history. From a population of 7,500 in 1843 it has grown to be the second city of the United States with a population in 1910 of more than 2,000,000. No argument is necessary to show the importance to the whole country of sanitary conditions in Chicago. Its vast commerce and giant industries make it the metropolis of an enormous territory and bring thousands of visitors daily from nearly every State in the Union. These visitors drink Chicago's milk and water and eat Chicago's food. Contamination of these articles of food or drink by typhoid fever germs means infection of the transients as well as citizens—transients who go to

> their homes in other states to establish new foci of typhoid fever. These transients and interstate travelers are less able to protect themselves against contaminated food or drink than the citizen who heeds the warnings of Chicago's excellent department of health. Thousands of interstate travelers drink water on trains which is taken aboard cars in this great railway center, and the character of Chicago's water supply is of vital importance to these travelers and to the States to which they are destined."

These considerations alone would have justified the Secretary of War in granting the permit, because of "the allied interest of interstate commerce, a matter of national concern" (Master's Report 169).

Bartlett v. *Lockwood*, 160 U. S. 357, 361:

> "While, under its power to regulate foreign and interstate commerce, the authority of Congress to establish quarantine regulations, and to protect the country as respects its commerce from contagious and infectious diseases, has never in recent years been questioned."

Hoke v. *United States*, 227 U. S. 308, 322, 323:

> "Our dual form of government has its perplexities, state and nation having different spheres of jurisdiction, as we have said; but it must be kept in mind that we are one people; and the powers reserved to the states and those conferred on the nation are adapted to be exercised, whether independently or concurrently, to promote the general welfare, material and moral.
>
> * * * * * *
>
> The principle established by the cases is the simple one, when rid of confusing and distracting considerations, that Congress has power over transportation 'among the several states'; that the power is complete in itself, and that Congress, as an incident to it, may adopt not only means necessary but convenient to its

exercise, and the means may have *the quality of police regulations.*"

New England Dredging Company v. *United States*, Circuit Court of Appeals, First Circuit, 144 Fed. 932, 934:

> "The power of the federal government over the navigable waters of its ocean harbors is absolute, general, and without limitations, except such as are prescribed by the Constitution; and, in the exercise of such power in the interest of and for the protection of commerce, it may well prescribe the manner in which the harbors shall be used; and, in the interest of sanitation and health, and of the general welfare, it may well protect its public waters from pollution."

We have shown (p. 54, *supra*) that the use of the diversion to generate power was a late and harmless afterthought having no bearing whatever as an incentive or purpose for our acts. It seems hardly to require argument that if there be no room to consider complainants' allegations in this regard on the question of incentive, there is certainly no room to consider them on the effect of this use of the water on the legal validity of the permit. If the diversion is lawful the use of the water is of no relevancy. Such in effect was the conclusion of the court in *Wyoming* v. *Colorado,* 259 U. S. 419. In *United States* v. *Chandler-Dunbar*, 229 U. S. 53, the court said:

> "If the primary purpose is legitimate, we can see no sound objection to leasing the excess of power over the needs of the Government."

To a similar effect is *Kaukauna Power Co.* v. *Green Bay,* 142 U. S. 254.

(6) The Ordinance of 1787 does not restrict the power of Congress to authorize this diversion.

Complainants say that defendants' diversion is in violation of the Ordinance of 1787. It has been repeatedly held that the provision of organic acts (such as the act admitting the State of Oregon into the Union, the Ordinance of the Northwest Territory and the Wisconsin State Constitution), providing that "all navigable waters shall be common highways and forever free," do not refer to *physical obstructions* but to *political regulations.*

Concerning these provisions this court said, in *Willamette Iron Bridge Co.* v. *Hatch,* 125 U. S. 1, on page 10:

> "What regulation of commerce does it affect? Does it prohibit physical obstructions and impediments to the navigation of the streams? Or does it prohibit only the imposition of duties for the use of navigation, and any discrimination denying to citizens of other states the equal right to such use? This question has been before this court, and has been decided in favor of the latter construction."

It was also held in *Withers* v. *Buckley,* 20 Howard 84, that such a provision did not prevent the legislature of a state "from improving by a canal the navigation of one of" its "navigable rivers and thereby diverting without compensation the flow of water * * *."

The *Withers* case is cited with approval by this court in the later case of *Shively* v. *Bowlby,* 152 U. S. 1, on 33.

See also *Economy Light and Power Co.* v. *U. S.,* 256 U. S. 120.

Moreover, the Supreme Court of Wisconsin, referring to this provision in the Wisconsin State Constitution, announced the same rule, and stated in the case of *In re Southern Wisconsin Power Co.,* 122 N. W. 801, 807:

> "The clause in the Constitution, providing that the navigable waters therein referred to 'shall be common highways and forever free,' etc., does not refer to phys-

ical obstructions of these waters, but refers to political regulations which would hamper the freedom of commerce."

III.

Congress has confined vindication of the Act of March 3, 1899, to suit by the Attorney General of the United States at the instance of the Secretary of War and certain of his subordinates.

The Act of 1899 is a comprehensive statute whereby Congress has assumed complete and exclusive control over navigable waters of the United States. (*So. Pac. Co.* v. *Olympian Dredging Co.*, 260 U. S. 205; *Sanitary District* v. *U. S.*, 266 U. S. 405.) In addition to setting up the mechanism for this control, the statute also declares the manner in which the aid of the courts may be invoked to enforce its provisions and in Section 17 it is provided:

> "that *the Department of Justice shall conduct the legal proceedings necessary to enforce the foregoing provisions of Section 9 to 16, inclusive*, of this act, and it shall be the *duty of District Attorneys of the United States* to vigorously prosecute all offenders against the same whenever *requested to do so by the Secretary of War* or by any of the officials hereinafter designated."

Section 12 of the act provides:

> "that every person and every corporation that shall violate any of the provisions of Section 9, 10 and 11, * * * shall be deemed guilty of a misdemeanor * * * and, further, *the removal of any structures or parts of structures erected in violation of the provisions of said section, may be enforced by the injunction of any Circuit Court* * * * *and proper proceedings to*

> *this end may be instituted under the direction of the Attorney of the United States.*"

Here, under both the civil and the criminal sections of the act, Congress has specifically designated the Federal Government as the sole party complainant. The words are mandatory and exclusive "The Department of Justice shall conduct the legal proceedings necessary to enforce * * * Section 10."

Exactly this question was addressed and conclusively decided in

> *Minnesota v. Northern Securities Co.*, 194 U. S. 46.

There, as here, the state sought to sue on proprietary and other interests as a body corporate. There, as here, there were provisions in the statute for criminal and injunctive procedure and both the setting of the context of similar provisions and the essential language of the statute were almost precisely what they are here. The court, squarely addressing the question of whether a state can maintain such a suit on such a statute, said:

> "Does the present suit really and substantially involve a dispute, or controversy properly *within the jurisdiction of the circuit court?* * * *
>
> By the 1st section of the anti-trust act every contract, combination in the form of a trust or otherwise, or conspiracy, in restraint of trade or commerce among the several states, is declared to be illegal." (In the instant case the language of the statute is "and it shall not be lawful") * * *
>
> "A violation of the provisions of each section is made a misdemeanor, punishable by a fine not exceeding $5,000 or imprisonment not exceeding one year, or by both said punishments in the discretion of the court." (The punitive section here is almost identical.) "Of course, a criminal prosecution under the

act must be in the name of the United States and in a court of the United States—the district attorney who conducts the prosecution being subject to the direction of the Attorney General as to the manner in which his duties shall be discharged. Rev. Stat. 362 (U. S. Comp. Stat. 1901, p. 208).

The 4th * * * Section of the Act is as follows:

'Sec. 4. *The several circuit courts of the United States are hereby invested with jurisdiction to prevent and restrain violations of this act; and it shall be the duty of the several district attorneys of the United States, in their respective districts, under the direction of the Attorney General, to institute proceedings in equity to prevent and restrain such violations.*

* * *

The act specifies four modes in which effect may be given to its provisions. It is clear that the present suit does not belong to either of those classes. *It is not a criminal proceeding* (Secs. 1, 2, 3), *nor a suit in equity in the name of the United States to restrain violations of the anti-trust act.* * * *

But it is said that as the Act of Congress was for the benefit of all the states and all the people, this case is to be deemed one arising under the laws of the United States, and, therefore, cognizable by the circuit court, because one of the objects of the State of Minnesota by its suit is to protect certain of its proprietary interests, which, it is alleged, would be injured by violations, on the part of the defendants, of the act of Congress. Let us see what, in that view, is the case as presented by the complaint.

The complaint alleged that the state is the owner of more than three million acres of land, of the value of more than fifteen millions of dollars, obtained by donation from the United States, and that '*the value of said lands, the the salability thereof depends, in very large measure upon having free, uninterrupted, and open competition in passenger and freight rates over the lines of railway owned and operated by said Great Northern and Northern Pacific Railway Companies.*'

It was further alleged that the state is the owner of, and has maintained at large expense, a state university, hospitals for the insane, normal schools for teachers, a training school for boys and girls, schools for deaf, dumb, blind, and feeble-minded persons, a state school for indigent and homeless children, and a state penitentiary; *that a great portion of the supplies of every kind for such institutions must, of necessity, be shipped* over the different lines of railway owned and operated by the Northern Pacific and Great Northern Railway Companies; that the amount of taxes which the state must collect, and *the successful maintenance of its public institutions, as well as the performance of its governmental functions and affairs,* depend largely upon the value of the real estate and personal property situated within the state, *and the general prosperity and business success of its citizens; and that such prosperity and business depend very largely upon maintaining in the state free, open, and unrestricted competition between the railway lines of those two companies.''* (In the instant case it was said that the price of coal for public buildings was increased by increased freight rates due to decreased levels. The evidence showed that the tendency of an injunction would be to increase freight rates and that present freight rates have nothing to do with levels.)

''The injury on account of which the present suit was brought is at most only remote and indirect; such an injury as would come alike, although in different degrees, to every individual owner of property in a state by reason of the suppression, in violation of the act of Congress, of free competition between interstate carriers engaged in business in such states; not such a direct, actual injury as that provided for in the 7th section of the Statute. If Minnesota may, by an original suit in its name, invoke the jurisdiction of the circuit court, because, alone, of the alleged remote and indirect injury to its proprietary interests arising from the mere absence of free competition in trade and commerce as carried on by interstate carriers within its limits, then every state upon like grounds, may maintain in its name, in the circuit court of the United States, a suit against interstate carriers engaged in business within their respective limits. Further, under that view, every individual owner of property in a state may, upon like general grounds, by an original suit, irrespective of any direct or special injury to him, invoke the original jurisdiction of a circuit court of the United States, to restrain and prevent violations of the Anti-Trust Act of Congress. We do not think that Congress contemplated any such methods for the enforcement of the Anti-Trust Act. We cannot suppose it was intended that enforcement of the Act should depend, in any degree, upon original suits in equity instituted by the states or by individuals to prevent violations of its provisions. On the contrary, taking all the sections of that Act together, we think that its intention was to limit direct proceedings in equity to prevent and restrain such violations of the Anti-Trust Act as cause injury to the general public, or to all alike, merely from the suppression of competition in trade and commerce among the several states and with foreign nations, to those instituted in the name of the United States, under 45th Section of the Act, by district attorneys of the United States, acting under the direction of the Attorney-General; thus securing the enforcement of the Act, so far as direct proceedings in equity are concerned, according to some uniform plan, operating throughout the entire country. Possibly the thought of Congress was that by such a limitation upon suits in equity of a general nature to restrain violations of the Act, irrespective of any direct injury sustained by particular persons or corporations, interstate and international trade and commerce, and those carrying on such trade and commerce, as well as the general business of the country, would not be needlessly disturbed by suits brought, on all sides, and in every direction, to accomplish improper or speculative purposes. *At any rate, the interpretation we have given of the Act is a more rea-*

> *sonable one.* **It is a safe and conservative interpretation, in view as well of the broad and exclusive power of Congress over interstate and international commerce as of the fact that, so far as such commerce is concerned, Congress has prescribed a specific mode for preventing restraints upon it—namely, suits in equity under the direction of the Attorney-General.** Of the present suit, the Attorney-General has no control, and is without any responsibility for the manner in which it is conducted, although, in its essential features, it is just such a suit as would be brought by his direction when proceeding under the 4th Section of the Anti-Trust Act."

It would be hard to find two cases more clearly alike on the question discussed in this portion of the decision in the above case of *Minnesota* v. *Northern Securities Co.* Wisconsin cannot be permitted to maintain this suit in the absence of the Attorney General without overruling the decision in that case.

Wilder Manufacturing Company v. *Corn Products Refining Company,* 236 U. S. 165, addressed the same question as that discussed in the *Northern Securities* case just cited. The manufacturing company sought to avoid suit by the refining company by a plea asking the court to determine that the refining company was a monopoly and had no legal existence because of violation of the Anti-Trust Act. The Anti-Trust Act provided (as we have just seen) for certain remedies, but only at suit of the Attorney General. The court said (174, 175):

> "The Anti-Trust Act was intended in the most comprehensive way to provide against combinations and conspiracies in restraint of trade or commerce, the monopolization of trade or commerce, or attempts to monopolize the same. * * * In other words, founded upon broad conceptions of public policy, the prohibitions of the statute were enacted to prevent *not the*

mere injury to an individual which would arise from the doing of the prohibited acts, but the harm to the general public which would be occasioned by the evils which it was contemplated would be prevented, and hence not only the prohibitions of the statute, but the remedies which it provided, were coextensive with such conceptions. Thus the statute expressly cast upon the Attorney General of the United States the responsibility of enforcing its provisions, making it the duty of the district attorneys of the United States in their respective districts, under his authority and direction, to act concerning any violations of the law. And in addition, evidently contemplating that the *official unity of initiative* which was thus created to give effect to the statute *required a like unity of judicial authority,* the statute in express terms vested the Circuit Court of the United States with 'jurisdiction to prevent and restrain violations of this act,' and besides expressly conferred the amplest discretion in such courts to join such parties as might be deemed necessary and to exert such remedies as would fully accomplish the purposes intended. * * *

It is true that there are no words of express exclusion of the right of individuals to act in the enforcement of the statute, or of courts generally to entertain complaints on that subject. But it is evident that such exclusion must be implied for a twofold reason: First, because of the familiar doctrine that 'where a statute creates a new offense and denounces the penalty, or gives a new right and declares the remedy, the punishment or the remedy can be only that which the statute prescribes.' *Farmers & M. Nat. Bank* v. *Dearing,* 91 U. S. 20, 35; *Barnet* v. *Muncie Nat. Bank,* 98 U. S. 555; *Oates* v. *First Nat. Bank,* 100 U. S. 239; *Stephens* v. *Monongahela Nat. Bank,* 111 U. S. 197; *Tennessee Coal, I. & R. Co.* v. *George,* 233 U. S. 354, 359."

In *Geddes* v. *Anaconda Copper Mining Company,* 254 U. S. 590, the court said (593):

"* * * *It is now the settled law that the remedies provided by the Anti-trust Act of July* 2, 1890, (26 Stat. at L. 209, chap. 647, Comp. Stat., Sec. 8820, 9 Fed. Stat. Anno., 2d ed., p. 644), *for enforcing the rights created by it, are exclusive;* and therefore, looking only to the act, a suit, such as we have here, would not now be entertained. *D. R. Wilder Mfg. Co.* v. *Corn Products Ref. Co.*, 236 U. S. 165, 174; *Paine Lumber Co.* v. *Neal*, 244 U. S. 459, 471; *United States* v. *Babcock*, 250 U. S. 328, 331."

In *General Investment Co.* v. *Lake Shore & Michigan Southern Railway Co.*, 260 U. S. 261, the court said (286):

> "As respects the Sherman Anti-trust Act as it stood before it was supplemented by the Clayton Act, *this court has heretofore determined that the civil remedies specially provided in the act for actual and threatened violations of its provisions were intended to be exclusive, and that those remedies consisted only of* (*a*)*suits for injunctions brought by the United States* in the public interest under sec. 4, and (b) *private actions to recover damages, brought under sec.* 7. *Minnesota* v. *Northern Securities Co.*, 194 U. S. 46, 71; *D. R. Wilder Mfg. Co.* v. *Corn Products Ref. Co.*, 236 U. S. 165, 174; *Paine Lumber Co.* v. *Neal*, 244 U. S. 459, 471; *Geddes* v. *Anaconda Copper Min. Co.*, 254 U. S. 590, 593."

Said Waite, C. J., in

Haycraft v. *United States*, 22 Wall. 81, 98:

> "Both the right and the remedy are, therefore, created by the same statute, and in such cases the remedy provided is exclusive of all others."

IV.

While the Master has found that Congress has not directly authorized the diversion, the evidence shows that for over a century Congress has invited the construction of a water connection here, that it has co-operated with defendants in creating it, and with full and immediate knowledge of defendants' diversion through it, has constantly acted to protect and foster it and has unmistakably registered its intention that it shall not be interfered with by any authority save its own.

The facts relied upon for the above statement are fully set forth in Point III, p. 12, *supra*. The Master has found (174):

> "Consideration by Congress of the advisability of the proposed waterway from Lake Michigan to the Illinois and Mississippi Rivers, demands by Congress for surveys, plans and estimates, the establishment of project depths, and appropriations for specified purposes, did not in my opinion constitute direct authority for the diversion in question, however that diversion, or the diversion of some quantity of water from Lake Michigan, might fit into an ultimate plan. The appropriations for widening and deepening the Chicago River, and the co-operation with the Sanitary District for several years in that improvement, committed Congress to the work as thus actually prescribed or authorized, but did not go further, whatever the advantage of that work in connection with the purposes of the Sanitary District's Canal. The action which has been taken by Congress may, indeed, be deemed to have an important bearing on the construction of the act of Congress under which, as Congress well knew, the Secretary of War granted permits for the diversion of specified quantities of water from Lake Michigan. But the point now is as to direct authorization by Congress of the diversion as distinguished from

action by the Secretary of War under the general authority Congress has conferred upon him.

The defendants invoke the doctrine of *Wisconsin* v. *Duluth*, 96 U. S. 379. There it was found that Congress had developed and was carrying out a system of corporate improvements at Duluth and had made appropriations for that purpose. The Court regarded the suit as an effort to have the Court forbid the execution of the work authorized and dismissed the bill. This decision may be regarded as applicable to the present case, if it be found that the Secretary of War's permit is valid and that the Federal Government under lawful authority has assumed charge of the diversion, its extent, and the conditions on which it is permitted. But the *Duluth* case is not considered to be an authority for the conclusion here that Congress has directly authorized the diversion, apart from the action of the Secretary of War."

Again, on page 188, referring to the Niagara Falls Act of 1906:

> "I find nothing in the Niagara Falls Act which can be deemed to indicate disapprobation by the Secretary of War of his authority under the Act of 1899; whatever inference may be drawn seems to me to be to the contrary."

And, on page 186:

> "This administrative construction of Section 10 does not lose, but rather gains, in strength from a consideration of the attitude of Congress. From the outset, Congress was promptly and fully advised of the construction of the drainage canal, the plans for the diversion of water from Lake Michigan, the amount of the diversion, and the permits granted by the Secretary of War. Action was taken by Congress in the light of these facts (*supra*, pp. 36, 41, 43). Congress provided for the widening and deepening of the Chicago River which was an essential part of the plans of the Sanitary District for the diversion through the drain-

> age canal (*supra*, p. 58). The use of that canal as a part of a waterway from Lake Michigan to the Mississippi was under consideration by Congress and Congress called for surveys and estimates with this in view (*supra*, p. 41). While, as I have said, Congress did not directly authorize the diversion, it was fully conversant with what had been done by the Sanitary District and with what had been permitted by the Secretary of War purporting to act under the general authority conferred by Congress in Section 10 of the Act of March 3, 1899, and it may be regarded *as significant that Congress having complete control, all the permits of the Secretary of War being subject to its action, did not at any time adopt measures either to prevent the diversion or to manifest disapproval of the construction which the Secretary of War had placed upon the statute.*"

We can no longer contend that these acts of the Federal Government constituted direct authorization for our diversion, in circumstance and amount as it existed, but we do contend that there was *initial* authority for our canal and for *some* diversion through it, and that the legislative and administrative history of this case is of great importance to the interpretation placed by Congress on the Act of March 3, 1899, the understanding by Congress that it had delegated power to the Secretary of War to authorize this diversion, and the desire of Congress that this executive administration of defendants' acts should not be interfered with by any authority other than its own.

The question here addressed is not whether Illinois has diminished the flow to her lower riparian sisters, but whether what she has done is in the

> "reasonable exercise of its sovereignty not unreasonably trespassing on any rights of Kansas * * * the scope of inquiry * * * is not limited to simple matter of whether any water of the Arkansas is withheld. * * * We must consider the effect of what

> has been done upon the condition in the respective states and so adjust the dispute upon the basis of equality of rights * * * equality of right and equity * * *." (*Kansas* v. *Colorado, supra.*)

To the extent of establishing their right to sue and the jurisdiction of the Court the Special Master has determined that there is "substantial" injury. So also did the Court in *Kansas* v. *Colorado*. But for the purpose of balancing equities here, the Master made no finding. Complainants seek to supply this by vastly exaggerated statement. The benefit to defendants of this diversion is not a question (as it was with Colorado) of something gained. It is not a gain; it is the sole protection they have to health and sanitation. The Master has found (193) not only that this diversion could not be presently enjoined but also that the time when it *could* be enjoined and the rate at which it could be reduced is impossible of predetermination. It is a problem of stark necessity. It can be solved only by the day-to-day inspection of unremitting administrative control (194). It is receiving that control (see permit of March 3, 1925, and Master's comments thereon, pages 73-85). In such circumstances it can hardly be said to be "comity" for complainants to insist on the prayers in their bills before this Court. On this reasoning we think the whole contention that there is a *property* right in complainants in the uninterrupted flow of these waters fails. Certainly the right a state has to expect comity from its neighbor is not a property right in the sense of the 5th Amendment.

V.

The United States (or the Secretary of War) and the City of Chicago are necessary and indispensable parties to this suit and the case cannot properly proceed without them.

All persons materially interested in the subject-matter of a suit in equity must be made parties to it. This rule applies to cases in the original jurisdiction of this court. *State of California* v. *Southern Pacific Co.,* 157 U. S. 229; *Minnesota* v. *Northern Securities Co.,* 184 U. S. 199.

As to the material and adverse interest of the United States, this is the identical subject-matter which was involved in the suit instituted by the United States against the Sanitary District of Chicago. *Sanitary District* v. *United States,* 266 U. S. 405. In that case, this court held that the United States had, not only an interest, but the *paramount and controlling interest*—an interest "*imminent and direct*"—in that subject-matter, and that the Sanitary and Ship Canal "has been * * * an object of attention to the United States as opening water communication between the Great Lakes and the Mississippi and the Gulf * * * which the United States, we have no doubt, would be most unwilling to see closed."

The amended bill asks that the taking of "*any water whatever* from Lake Michigan" be enjoined, that the amount of diversion "reasonably required for the purpose of navigation" be determined and that the determination of the Secretary of War, acting for Congress, of the amount of diversion proper in the regulation of navigation, be declared invalid and that the determination of this court be substituted therefor by a decree. Such a decree would injuriously affect the right of the United States, not only in its *exclusive* power to regulate interstate commerce in the Great Lakes, in the Sanitary and Ship Canal, and the Des Plaines, Illinois, and Missisippi Rivers, but also in all that has been done in creating the great national and international waterway of which the works here involved are a pivotal part. It would thus adversely affect the rights and interests of the United States in matters where, as this court said in the Sanitary District case, *supra*, "*the national importance is imminent and direct* * * *." The United States is thus a necessary and an indispensable party.

Whenever it appears "that to grant the relief prayed for would injuriously affect persons materially interested in the subject-matter who are not made parties to the suit," the court will dismiss the cause, even where the point is "not raised by the pleadings or suggested by * * * counsel." (*Minnesota* v. *Northern Securities Co.*, 184 U. S. 199), and this, even though such other parties "cannot be joined without ousting jurisdiction." (*State of California* v. *Southern Pacific*, 157 U. S. 229.)

As to the interest of the City of Chicago the record is eloquent of the fact that either the original or alternative decree prayed for in this case would practically ruin her. Though the Sanitary District initiates taxes, the City of Chicago suffers from them. She diverts water over which diversion the Sanitary District has no control. Hers is the duty of installing meters under the conditions of the 1925 permit. It is her streets that will be torn up if either decree prayed for is granted. It is her electrical system that is to be destroyed by the injunction requested. She must pay for that and suffer otherwise as perhaps no city was ever made to suffer by acts of its national government.

It is her water system which complainants demand shall be altered by super-tunnels, pollution and saturation with chlorine at a cost running into hundreds of millions of dollars. It is her beautiful water front that is sought to be ruined and her Chicago River that is to be turned into a privy vault in the heart of the city. It is her great buildings and docks which are to be destroyed. The Sanitary District has nothing to do with these things.

Why the City of Chicago was omitted to be joined is beyond comprehension. As to whether the case fails if she is not joined the case of the *State of California* v. *Southern Pacific Co.,* 157 U. S. 229, is exactly in point. This suit cannot proceed without Chicago.

VI.

Complainants have so frequently changed front as to the nature and extent of the remedy sought that defendants are now at a loss to know exactly what, if anything, they do ask.

(1) The original Wisconsin bill sought to enjoin only that portion of the diversion which was in excess of the amount which should be authorized by the Secretary of War.

(2) Complainants, as friends of the court in *Sanitary District* v. *U. S.,* 266 U. S. 405, sought only to enjoin diversion in excess of the amount authorized by the Secretary of War.

(3) In the amended bill of Wisconsin and in the bills of Michigan and New York, complainants seek to enjoin all diversion.

(4) In the oral argument on the motion to dismiss complainants asserted that 1,000 c.f.s. was sufficient for navigation and that the court should so find and enjoin diversion in excess of 1,000 c.f.s.

(5) In presenting their proofs before the Special Master complainants offered evidence to show that while some diversion was necessary for navigation this was limited to 1,000 c.f.s.

(6) In the oral argument before the Master complainants suggested that the court, if it enters a decree, should suspend its operation (Master's Report 139 and 193).

(7) In the briefs of complainants in support of their exceptions they ask the court to enjoin all diversion.

VII.

Defendants do not abandon, and understand that they do not lose the opportunity, if the occasion arises, later to press, certain defenses which are not argued here because they are not now material to support the findings and conclusions of the Special Master.

The Master has rested the determination of this case on his interpretation of Section 10 of the Act of March 3, 1899, that this statute reposes in the Secretary of War the absolute discretion to authorize defendants' acts as not constituting such an obstruction to the navigable waters of the United States as is inhibited by the statute, and has therefore found it unnecessary to consider the contentions made before him by complainants and now repeated in their briefs:

(a) That the permit of the Secretary of War was permissive merely, and that, therefore, the court should consider the mutual obligations and duties as between complainants and defendants, and, on a sort of modified doctrine of the case of *Cummings* v. *Chicago*, 188 U. S. 410, should conclude that whatever may be the authorization defendants hold from the *United States*, yet as *against complainants* the diversion would be unlawful if the effect of it in any way impairs any righ of complainant states.

(b) That the governing law of this case is the doctrine of riparian rights at common law, and, therefor if defendants, in any degree diminish the flow o waters to complainants, as lower riparian owners, a cause of action accrues to complainants regardless o the permit of the Secretary of War.

(c) That in this view, whatever authorization ma be found in the permit of March 3, 1925, it has no effect on rights and duties as between complainants an defendants, and that, therefore, regardless of the permit, the court is put to the determination of the relative rights of quasi-sovereign states as between eac other.

On this aspect of the case, defendants contended—

(a) That the governing rule in international la as between sovereign states is that there is no servitude in an upper riparian state in favor of a lowe state, and that the various treaties creating limite servitude in this regard represent concessions as matters of comity.

(b) That under the doctrine of *Kansas* v. *Colorad* this court will require such comity as between th quasi-sovereign states of the Union.

(c) That what will thus be required is not, however, an application of the common law of riparia rights, but a fair division of benefits and burdens and as an example that, in *Kansas* v. *Colorado* althoug Colorado was taking practically the entire low wate flow of the river, and this taking seriously impaired agriculture in the western tier of Kansas counties, ye

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the court, considering the great benefit to Colorado and the *relatively* small burden to the Arkansas Valley in the State of Kansas, balanced the equities and denied the relief.

(d) That similar consideration should govern here and, regarding the relatively small damage to complainants, and the economic catastrophe to defendants certain to result from injunction, the court should here also deny relief.

Defendants also showed and urged that the acquiescence of complainants for over a quarter of a century while the great complex sewage, water and electrical system of Chicago was created around and in reliance on this diversion was a bar to the relief sought. Many cases in American and English law were cited in support of this contention.

Defendants also showed the impairment of these waters for navigation by complainants and the Dominion of Canada chiefly by pollution, but also by diversions. Defendants also demonstrated that economic requirements of a rapidly expanding population in all states littoral of the lakes had resulted in many artificial changes in terrain and surface covering that had greatly and adversely affected the levels of the lake. On this basis, defendants advanced the defense of unclean hands.

VIII.

The questions raised by the complaint are administrative, legislative and political and are for this reason beyond decretal regulation. Injunction is an inappropriate remedy.

The Master (138-139, 170) has found that the questions presented are "peculiarly appropriate for legislative consideration or administrative action under legislative authority". He has shown that the situation presents a complex and difficult problem requiring constant and expert executive administration, and (139 and 192) that even complainants recognize this to the extent of asking the Court to suspend the operation of any decree and itself undertake this task of determination and administration. He remarks (170) that the concomitant consideration of compensating works is within the power of Congress. He calls attention (181) to the expert equipment of the War Department to deal with such problems and to the fact (65) that in granting complainants' request the court would be *"compelled to deal with questions essentially of an administrative character."* Indeed, the Master's thorough discussion of the subject on the above cited pages demonstrate that the only decree conceivable here is one whereby the court would undertake to proportion diversion to necessity periodically if not yearly; to supervise the construction of works to diminish it over a course of years. If this be doubted it is only necessary to look to see what the War Department *is doing.* By a method of trial and error which the Master says will take years, it is cooperating with Chicago to control the necessity for increase in diversion. The record in this case is eloquent of the engineering perplexities which will haunt every year of this endeavor. There is inevitably involved a course of complicated continuing administration which the court will not undertake.

Only the administrative and legislative branches of the Federal Government can undertake such problems.

The power of Congress over these waters is paramount, supreme and exclusive. There is no room in our system of government for the exercise of two sovereignties over the same subject matter. " * * * the elementary and long-settled doctrine is that there can be no divided authority over interstate commerce * * *". *Chicago, Rock Island and Pacific Railway Co.* v. *Hardwick Farmers Elevator Co.,* 226 U. S. 426. Complainant states have not *plenary power* to act as guardians of lake levels. At best, if they were permitted to prevail in such suits as these, they could prevent only diversions *within the United States.* They could not sue, or negotiate with, the British Empire or prevent diversions *within the Dominion of Canada.* Only the United States can protect lake levels from *both domestic and foreign diversions.* The power of the United States over lake levels must, of necessity, be paramount, supreme and exclusive. It is as much to the interests of complainants as it is to the interests of the other states of the Union that Congress should have paramount, supreme and exclusive jurisdiction over these national and international navigable waters.

The states sacrificed their dominion over waters to create a nation. It is hardly to be supposed that they did not do so on the understanding that what they gave up would be administered by the constructive, positive and political power of Congress and not by the negative and purely judicial power of a court.

Only Congress can dredge lakes, construct dams, dig canals and build breakwaters. This court cannot.

Only Congress can compose differences between economic areas, by mutual concession, compromise, composition and adjustment. This court cannot.

There is scarcely any aspect of this case which does not broaden and emphasize this view.

This is a controversy between economic areas and not between states in any fair sense of the term.

Its solution depends on engineers and officers of the Government and not on lawyers and courts.

A decree in this case could do no one any good. It could only hamper and embarrass the great constructive solution contemplated by the Federal Government. It might even prevent it entirely.

It would be a rash and unprecedented action to impose against this uniform decision and administration of over a quarter of a century a judicial decree cutting squarely across the whole course and policy of Federal legislation, adjudication and administration and by injunction to coerce, frustrate and stultify the judgment and determination of the rightful arbiters of the important questions entrusted to their care.

The suit of a state cannot import into the judicial power matters allocated by the Constitution to either of the other two great branches of the Federal Government. (*Georgia* v. *Stanton,* 6 Wall. 50, 75; *New Orleans* v. *Payne,* 147 U. S. 261, 266; *So. Pac. Co.* v. *Olympian Dredging Co.,* 260 U. S. 205; *Monongahela Bridge Co.* v. *U. S.,* 216 U. S. 177; *U. S.* v. *California Land Co.,* 148 U. S. 31, 43, and cases there cited; *Passaic Bridge Cases,* 3 Wall. Appendix 782; *Cherokee Nation* v. *Georgia,* 5 Pet. 1, 29-30; *Mass.* v. *Mellon,* 262 U. S. 447.)

The court cannot undertake such regulation as is here requested.

> "This power of regulation (fixing rates of speed on a railroad) * * * is a power legislative in character * * * the legislation may delegate to an administrative body the execution in detail of the legislative power of regulation * * * The courts have no right to intrude upon this function * * * In our opinion the injunction which was issued in this case constituted, in substance, the operation of a railway * * * was, in the first place, not within the limits of judicial power, and in the second place totally inconsistent with the power of regulation vested unmistakably by the

legislature in the executive authorities." (*Honolulu Co.* v. *Hawaii,* 211 U. S. 282, 291-293; see also *Plymouth Coal Co.* v. *Pa.,* 232 U. S. 531, on 543.)

It is one thing to inquire whether rates which have been charged and collected are reasonable—that is a judicial act; but entirely different thing to prescribe rates which shall be charged in the future—that is a legislative act." (*I. C. C.* v. *Cincinnati, etc. Ry.,* 167 U. S. 479, 499; *C. M., etc., Ry.* v. *Minnesota,* 134 U. S. 418, 458; *Reagan* v. *Farmers Loan and Trust Co.,* 154 U. S. 362, 397.)

Said Mr. Justice Holmes in a very similar case, *Missouri* *Illinois,* 200 U. S. 496:

> "But the fact that this court can decide does not mean, of course, that it takes the place of a legislature."

hat, in one sentence, is the whole of our contention under is point.

The problem here requires positive and constructive easures. The power invoked must of necessity be wholly egative and, in these circumstances, tremendously de- ructive. Complainants seek to invoke that power to co- ce the legislative and executive departments to a par- ular plan of their own choosing.

The court has consistently declined to undertake such gulation of commerce. Some of the expressions of the urt on these principles are excerpted below.

> "The proposed bridges will, in some measure, cause an obstruction of navigation. * * * Bridges are highways as necessary to the commerce and intercourse of the public as rivers. If every bridge over a navigable river be not necessarily a nuisance * * * *who is to judge of this necessity?* Who shall say what shall be the height of a pier, the width of a draw and how it shall be directed, managed and controlled? Is this a matter of

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judicial discretion or of legislative enactment? Can there be a nuisance which is authorized by law? In the course of seventy years of practical construction of the Constitution no act of Congress is to be found regulating such erections. * * * Where do we find any authority in the Constitution or acts of Congress for assuming it ourselves? These are questions which must be solved before this court can constitute itself *arbiter pontium* and assume the power of deciding where and when the public necessity demands a bridge, what is sufficient to draw or how much inconvenience to navigation will constitute a nuisance. The United States has no common law offenses and has passed no statute declaring such an erection be a nuisance. If so, *a court cannot interfere by arbitrary decree either to restrain the erection of a bridge or to define its form and proportions. It is plain that these are subjects of legislative, not judicial, discretion.* (*Passaic Bridge Cases*, 3 Wall. 782.) (Bridge case.)

"It cannot be necessary to say that where a public work of this character has been inaugurated or adopted by Congress and its management placed under control of its officers (referring to the whole system of lake harbors), *there exists no right in any other branch of the government to forbid the work or to prescribe the manner in which it shall be executed* * * * While the Engineering officers of the government are, under the authority of Congress, doing all they can to make the canal useful to commerce and keep it in good condition, this court can owe no duty to a state which requires it to order the City of Duluth to destroy it." (*Wisconsin* v. *Duluth*, 96 U. S. 379.)

"* * * It does not appear that the Secretary disregarded the fact or that he acted in any arbitrary manner or that he pursued any method not contemplated by Congress. It was not for the jury to weigh the evidence and determine, according to their judgment, as to what the necessities of navigation required, or whether the bridge was an unreasonable obstruction. The jury might have differed from the Secretary. That was immaterial, for Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject. *It is for Congress, under the Constitution, to regulate the rights of navigation by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction and to prescribe the way in which the question of obstruction shall be determined.* Its action in the premises cannot be revised or ignored by courts or *by juries.*" (*Monongahela Bridge Co.* v. *U. S.*, 216 U. S. 177.)

"So unfettered is this control of Congress over navigable streams of the country that its judgment as to whether construction in or over such a river is or is not an obstacle and a hindrance to navigation, is conclusive. *Such judgment and determination is the exercise of legislative power in respect of a subject wholly within its control.* * * * The conclusion to be drawn is that the question of whether the proper regulation and legislation of this river at the place in question required that no construction of any kind should be placed or continued in the river by riparian owners and whether the whole flow of the stream should be conceded for the use and safety of navigation, *are questions legislative in character,* and when Congress determined, as it did by the Act of March 3, 1909, that the whole river * * * was necessary for the purposes of navigation of said waters * * * that determination was conclusive." (*U. S.* v. *Chandler-Dunbar Co.*, 229 U. S. 53.)

"*It is Congress and not the judicial department, to which the Constitution has given the power to regulate commerce with foreign nations and among the several states.*" (*Transportation Co.* v. *Parkersburg,* 107 U. S. 691.)

There is another consideration which we do not advance on technical grounds, but solely for the sake of the light it may throw on the political nature of this controversy.

Is this a controversy between *states* in any sense of the word? We have here *thirteen* political sovereigns, grouped seven on one side and six on the other, and a foreign sovereignty whose interests are stressed in complainants' brief. The considerations which brought here Missouri, Tennessee, Louisiana, Kentucky, Arkansas, and Mississippi, are equally potent to bring Oklahoma, Kansas, Nebraska, Iowa and South Dakota. We understand that the southern and western four-fifths of Minnesota is ranged against the rest of that state as to which side her representation here should take.

Is this not rather a contest between economic areas than a contest between states? And if such be the case, is this court the tribunal to *compose* their differences? *And if it is, have any such arbitrary and absolute rights as are advanced as the basis of this suit any place in the consideration of it?*

We think that the Congress was devised and intended by the Constitution for such purposes as these. One state is not the nation—but 48 states are. When a controversy assumes such proportions and takes such directions as this one has assumed and taken, we believe the question *ipso facto* becomes political, and whether it does or not, the principles which should govern it were well laid down by Mr. Justice Clark, in *New York* v. *New Jersey,* 256 U. S. 296, where he said:

> "* * * We cannot withhold the suggestion inspired by a consideration of this case that the grave problems of sewage disposal presented by the large and growing populations living on the shores of New York Bay is one more likely to be wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the states so vitally interested in it than by proceedings in any court, however constituted."

We think this bill should be dismissed because it asks the court to invade the constitutional functions of the legislative and executive departments.

IX.

The special acts cited sustain defendants' not complainants' construction of Section 10.

Complainants say (Michigan Brief 160-165) that *general authority* was not intended to be delegated to the Chief of Engineers and Secretary of War by the Act of March 3, 1899, and support their contention by citing certain later *special* acts, giving *specific authority* to the Secretary of War—the argument being, that, if the general act was intended as sufficient, why should the special acts have been necessary?

These special acts, cited by complainants and relied upon by them to sustain this contention are: (1) Section 2 of the Act of May 9, 1900, to "regulate the floating of loose timber and logs, etc.," which for convenience will be called the "Floating Logs" Act; (2) Section 4 of the Act of March 3, 1905, "to prescribe regulations to govern the transporting and dumping into any navigable water * * * of dredgings * * * and other refuse material," which for convenience will be called the "Dumping Regulations" Act; (3) Section 4 of the Act of March 26, 1908, "to fix * * * pierhead and bulkhead lines * * * in the *inner* harbor of San Pedro," which for convenience will be called the "San Pedro Harbor" Act; (4) Section 5 of the Act of March 3, 1909, to make "regulations for * * * navigation of the south and southwest passes of the Mississippi * * * as * * * shall seem necessary * * * for the purpose of preventing any obstruction by the works therein constructed," which for convenience will be called the "Mississippi Passes" Act; (5) Section 5 of the Act of August 26, 1912, "to modify * * * harbor lines in front of the City of Chicago * * * so as to permit park extension work * * *," which for convenience will be called the "Chicago Park Extension" Act; (6) Section 1, Chapter 436 of the Act of June 25, 1910, to approve "plans * * * of the City of New York * * * to obstruct navigation of any * * * waterway, which does not form a connecting link between other navigable waters * * *, *by closing all or any portion of the same* or by building structures in or over the same * * *," which for convenience will be called the "New York City" Act; (7) Section 1 of the Act of March 4, 1913, "to make * * * regulations for the navigation of Ambrose Channel," which for convenience will be called the "Ambrose Channel" Act; (8) Act of July 27, 1916, "to fix * * * pierhead and bulkhead lines * * * *in* Newport Harbor, California * * *," which for convenience will be called the "Newport Harbor" Act, and (9) Seven "pending bills before the 70th Session of Congress," for the construction of bridges "across Little Calumet River" at Chicago, which for convenience will be called the "Little Calumet Bridges" Bills.

An examination of the special acts, relied upon by complainants to sustain this contention, clearly discloses that the powers specifically delegated by these later acts are not at all the same powers nor are they within the same powers as those "generally delegated" by the Act of 1899.

Complainants have quoted (Michigan Brief 164) only those portions of the "Floating Logs" Act which *suit* their contention, but omit other important portions thereof which ***completely destroy***, their contention, as to the Act of 1899. Section 15 of the latter act provides "that it shall not be lawful * * * to float loose timber and logs * * * in * * * channels actually navigated." The "Floating

Logs" Act provides: "That the prohibition contained in Section fifteen of * * * the * * * Act, approved March third, Eighteen Hundred Ninety-nine, against floating loose timbers and logs * * * in * * * channels actually navigated * * * shall not apply to any navigable * * * waterway * * * whereon the floating of loose timber and logs * * * is the principal method of navigation." Complainants have failed to quote this portion of the act and their reason for failing to do so is obvious. The portions which they have omitted clearly show that the "Floating Logs" Act is not inconsistent with the Master's and defendants' construction of the Act of 1899, but, on the contrary, it confirms Section 15 thereof and repeals it in part, by authorizing the Secretary of War to make regulations, permitting "the floating of loose timber and logs * * * in any navigable * * * waterway, whereon the floating of loose timber and logs * * * is the principal method of navigation". It clearly appears, therefore, that the "Floating Logs" Act is not *inconsistent*, but is in *complete harmony*, with the Act of 1899, and the Master's construction thereof.

Section 15 of the earlier act *prohibits* "the floating of loose timber and logs * * * in channels actually navigated," whereas the "Floating Logs" Act *allows* "the floating of loose timber and logs * * * in any navigable * * * waterway, whereon" *that* "is the principal method of navigation, * * * subject to the rules and regulations prescribed by the Secretary of War * * *".

The "Dumping Regulations" Act refers to *"any navigable water"* regardless of injuries to "anchorage and navigation," whereas those portions of the Act of March 3, 1899, quoted by complainants (Mich. Brief 162), authorizes the Secretary of War to "permit the deposit of any material," *only* "whenever in" his "judgment * * * anchorage and navigation will not be injured thereby * * *."

The "Dumping Regulations" Act authorizes the Secretary of War *"to prescribe regulations to govern,"* whereas by those portions of the Act of March 3, 1899, quoted by complainants, the Secretary of War is authorized to *"permit,"* the deposit of materials. The distinction is that in the earlier act the Secretary only *"may permit,"* while in the later one the Secretary may *"prescribe regulations,"* any violation of which "shall be subject to the penalties prescribed in Section 16 of the * * * Act of March third, Eighteen Hundred Ninety-nine, for the violation of the provisions of Section 13 of said Act." It will be seen, therefore, that the provisions of the "Dumping Regulations" Act are not only entirely consistent with the quoted portions of the Act of March 3, 1899, but that these provisions of the two acts are *mutual and inter-dependent,* in that the violation of "the regulations" authorized by the *later act* are "subject to the penalties" prescribed by the *earlier one.*

In the "San Pedro Harbor" Act the Secretary of War is "authorized to fix .* * * pierhead and bulkhead lines" (complainants say) (Mich. Brief 163), "in the harbor of San Pedro." Here, again, there is a misquotation. The language is not "* * * in the harbor of San Pedro," but the language is "in the *inner* harbor of San Pedro". Complainants argue that the "San Pedro Harbor" Act would have been unnecessary if the Secretary of War had *general authority* under Section 11 of the Act of March 3, 1899, which authorizes "the Secretary of War" to establish "harbor lines." That does not follow. The "San Pedro Harbor" Act authorizes the establishment, not of "harbor lines" but of "pierhead and bulkhead lines," inside the *harbor lines,* that is, "in the *inner* harbor of San

Pedro". But there is another distinction. Section 11 authorizes the Secretary of War to establish "harbor lines" only "where it is made manifest to the Secretary of War that the establishment of harbor lines is essential to the preservation and protection of harbors * * *". The "San Pedro Harbor" Act permits the establishment of "pierhead and bulkhead lines" (not "harbor lines") even though it is *not* "made manifest * * * that the establishment of" such "lines is essential to the preservation and protection * * * of the *inner* harbor of San Pedro * * *".

The "Mississippi Passes" Act, authorizing the Secretary of War "to make * * * rules and regulations for * * * navigation," is not inconsistent with any of the provisions of the earlier Act of March 3, 1899, which nowhere authorizes "rules and regulations for * * * navigation" to be made by the Secretary of War. Power to make rules and regulations cannot be ordered from a power to permit something. It must be specifically and explicitly granted. These later acts are, however, forceful illustrations of the growing tendency of Congress to delegate to the Secretary of War, whenever it sees fit, the full measure of the inherent powers of Congress over navigation and interstate commerce. They, therefore, strengthen rather than weaken the Master's construction of the Act of 1899.

The work authorized by the "Chicago Park Extension" Act could not have been permitted by the Secretary of War under the provisions of Section 11 of the Act of 1899, relating to "the establishment of harbor lines" for the reason that this "park extension work" was not "essential to the preservation and protection of harbors".

This is borne out by the opinion of the Judge Advocate General of December 9, 1913, concerning this case and addressed to the Secretary of War, in which the Judge Advocate General says:

> "Your authority for the establishment of harbor lines is found in section 11 of the Act of March 3, 1899, and appears to be limited by express language to cases where it is 'manifest to the Secretary of War that the establishment of harbor lines is essential to the preservation and protection of harbors'."
>
> (Judge Advocate General's Opinion, "Chicago Lake Front 4," December 9, 1913.)

Consequently, a special act was necessary.

Complainants omit from their quotation of the "New York City" Act the vital and controlling portions thereof as follows: "by closing all or any portion of the same or by building structures in or over the same * * *". Of course, under the Act of 1899, the Secretary of War could not have authorized the City of New York "to obstruct navigation of any * * * waterway * * * by closing all * * * of the same or by building structures in or over the same * * *," thereby, not merely *obstructing,* but *completely destroying, all navigable capacity.* Consequently, a special act was necessary. Furthermore, the Chief of Engineers had, no doubt, refused his recommendation.

The "Ambrose Channel" Act authorizes the Secretary of War to "make * * * rules and regulations for * * * navigation." This *special authorization* is not inconsistent with any *general authorization,* conferred by the Act of 1899, which nowhere authorizes "rules and regulations for * * * navigation," to be made by the Secretary of War.

The "Newport Harbor" Act authorizes the Secretary of War to establish, not "harbor lines," but "pierhead and bulkhead lines * * * in Newport Harbor * * *" (Mich.

Brief 163)—that is, *within* the harbor. This could not have been done by the Secretary of War under the general authority, delegated to him by Section 11 of the Act of 1899, because Section 11 relates to "harbor lines" and not to "pierhead and bulkhead lines," and because the special circumstances of the "Newport Harbor" case were such that it was *not* "made manifest * * * that the establishment of" such "lines" was "essential to the preservation and protection of harbors," which is a condition precedent to the exercise of his authority in such a case. Furthermore, the Newport Harbor application did not have the approval of the Chief of Engineers. He held "that there was no harbor in the commercial sense of the word at the place in question and that such harbor as in any sense might be there, required no harbor lines for its protection and preservation. He suggested that the underlying purpose must be the furtherance of a real estate proposition of some kind" (Judge Advocate General's Opinion 62-400, January 27, 1915).

In the "Newport Harbor" case the Secretary of War was advised by the written opinion of the Judge Advocate General that the Secretary of War was without power, under Section 11 of Act of 1899, to establish the lines in question for the reason that the Chief of Engineers had found that the establishment of such lines was not "essential to the preservation and protection of harbors."

This opinion is, in part, as follows:

> "The sole authority for the establishment of harbor lines is found in section 11 of the River and Harbor Act of March 3, 1899, * * *
>
> * * * * * *
>
> "Thus it is that before harbor lines can be established it must be manifest that they are essential to the preservation and protection of a harbor". (Judge

Advocate General's Opinion, 62-400, January 27, 1915.)

Under these circumstances, of course, it was necessary for those interested in the "Newport Harbor" case to have a special act authorizing the Secretary of War to establish the lines in question, because he was not authorized to do so under Section 11 of the Act of 1899, inasmuch as it was not "made manifest to" him "that the establishment of" these lines was "essential to the preservation and protection of harbors * * *".

The pendency of the "Little Calumet Bridges" bills has no bearing whatever upon the construction of Section 10 of the Act of 1899. These bills are apposite to Section 9, and not to Section 10, of that Act. But "the navigable portions" of Little Calumet River do not "lie wholly within the limits of a single state * * *," and, therefore, the bridges across the Little Calumet River do not come within the first proviso of Section 9, which permits the building of a bridge with the "authority of the legislature of a state across rivers and other waterways, the navigable portions of which lie wholly within the limits of a single state, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and Secretary of War * * *".

Therefore, express authority of Congress is necessary for the authorization of these bridges.

Of these special acts, relied upon by complainants, only the "New York City" Act is apposite to Section 10, but what was there sought to be done is not within its provisions. In the "New York City" case it was not desired merely to "alter or modify the * * * capacity" of navigable waters. In that Act, the authority granted was "to obstruct navigation" of the waterways in question, "by closing all * * * of the same or by building structures in or over the same * * *". This amounted to a *complete destruction of all navigable capacity* and was not merely an "*alteration or modification*" of the navigable capacity.

The "Dumping Regulations" Act is apposite to Section 13 of the Act of 1899. It does not require, as does Section 13, any finding that "anchorage and navigation will not be injured". It also authorizes the Secretary of War to make "regulations," a power not delegated in Section 13.

The "San Pedro Harbor," the "Chicago Park Extension," and the "Newport Harbor" acts are apposite, not to Section 10, but to Section 11, which authorizes the "establishment of harbor lines" only "where it is manifest that" such lines are "essential to the preservation and protection of harbors".

The "Ambrose Channel" and the "Mississippi Passes" acts, which authorize the making "of regulations" are apposite to no part of the Act of 1899, which nowhere authorizes "the making of regulations".

The "Little Calumet Bridges" bills are apposite, not to Section 10, but to Section 9, and they do not come within the provisions of Section 9, because "the navigable portions" of the Little Calumet River do not "lie wholly within the limits of a single state".

These special acts, therefore, being neither apposite to, nor within, the provisions of Section 10, certainly can have no bearing upon its construction. They do, however, emphasize the growing tendency of Congress to delegate to the Secretary of War, whenever it sees fit, the full measure of its inherent powers over navigation and interstate commerce.

Consequently these special acts strengthen, rather than weaken, the interpretation and construction placed upon Section 10 in the Master's Report.

X.

Complainants must show a clear legal right to the relief prayed. There can be no pretense that they have in any manner brought themselves within the test established by the court for suits between states.

Missouri v. *Illinois,* 200 U. S. 496.

> "But it does not follow that every matter which would warrant a resort to equity by one citizen against another in the same jurisdiction equally would warrant an interference by this court with the action of a state. * * * Before this Court ought to intervene, the case should be of serious magnitude, clearly and fully proved and the principle to be applied should be one which the court is prepared deliberately to maintain against all considerations on the other side."

See also,

New York v. *New Jersey,* 256 U. S. 296.
North Dakota v. *Minnesota,* 263 U. S. 365.
Kansas v. *Colorado,* 185 U. S. 125.

CONCLUSION.

This bill should be dismissed because:

1. It is a suit in the name of states and navigation but in the interest of individuals in violation of the eleventh amendment.

2. It is no just sense a suit between states. It is a controversy between economic areas, one of which crosses an international boundary. Its bearings are all political and its determination is peculiarly a function of Congress and not of this court.

3. It addresses a fundamental and intricate national problem, capable of many solutions which would be beneficial to the general good and seeks to restrict its determination to a single solution, inimical to the general good and beneficial to a single economic area and particular private interests.

4. It is an attempt to coerce the discretion of the legislative and executive departments of government in a matter committed exclusively to their care, and to embarrass and control the negotiations of government with a foreign state.

5. Solution of the problem presented involves continuous administration and relations with a foreign nation. As between states, it requires co-operation, composition and adjustment. Such solution is impossible in the

judicial field of absolute rights, instant determination and irrevocable decree—in a word, this is a problem which is political, legislative and administrative and not judicial in its nature.

6. The bill fails in every juridical requirement. It shows no right, no wrongful act, no injury. It is brought by the wrong parties complainant. It fails to join indispensable parties. The controversy is not presented in a manner appropriate to judicial cognizance. The complaint properly lies in the Constitutional field of other branches of the Federal Government. The relief prayed for is inappropriate to the functions and facilities of the court, outside its jurisdiction, and has incidental bearings repugnant to its purpose.

7. The decree of the court in Sanitary District v. United States and the permit of the Secretary of War issued in compliance therewith (both patent on the face of the bill), are a complete and conclusive answer to the complaint.

8. The bill is inappropriate to the subject-matter of the suit, to the jurisdiction of the court and to the nature of the questions involved.

9. The proof of injury is derivative, remote, indefinite and insufficient.

10. The injunction prayed would wreak a vast calamity with no correlative benefit to anybody.

11. The action has failed in every aspect—procedural, factual and equitable.

The bills of complaint in the three cases here involved should be dismissed at the cost of the complainants.

Respectfully submitted,

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Cyrus Dietz,
Hugh S. Johnson,
Special Counsel for Illinois

Maclay Hoyne,
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Solicitors for Defendant,
Sanitary District of Chicago.

O.T. 1930 ORIGINAL NOS.6,10 & 11,

Office Supreme Court, U. S.
FILED
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CHARLES ELMORE CROPLE
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES.

October Term, A. D. 1927.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.
No. 7, Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 11, Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 12, Original.

APPENDIX TO DEFENDANTS' BRIEF.

CHAMPLIN LAW PRINTING COMPANY, CHICAGO

NOTE.

Complainants' contention that the War Department interpretation of Section 10 of the 1899 Act of Congress has been in a state of uncertainty and has been and is contrary to the Special Master's interpretation, is further completely met by the Memorandum of the Judge Advocate General, February 12, 1907, to the Secretary of War, entitled "In the Matter of the Application of The Sanitary District of Chicago to reduce the flow of the Calumet River," approved by the Secretary of War by Memorandum of March 14, 1907. (Master's Report, 49-51.) This Memorandum of the Judge Advocate General is set forth in haec verba in the following pages.

WAR DEPARTMENT,

OFFICE OF THE JUDGE-ADVOCATE GENERAL, D.

WASHINGTON.

February 12, 1907.

In the Matter of the Application of the Sanitary District of Chicago to Reduce the Flow of the Calumet River.

Memorandum by the Judge Advocate General.

To reach a reasonable interpretation of Section 10 of the River and Harbor Act of March 3, 1899, it will be necessary to mention some preceding legislation. The matters which were made the subject of statutory regulation in the Act of March 3, 1899, had been previously made the subject of legislative consideration in the Act of September 19, 1890, which provided, *inter alia,* that:

> "Sec. 7. It shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty, or structure of any kind outside established harbor-lines, or in any navigable waters of the United States where no harbor-lines are or may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters.
>
> "And it shall not be lawful hereafter to commence the construction of any bridge, bridgedraw, bridge piers and abutments, causeway or other works over or in any port, road, roadstead, haven, harbor, navigable river, or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works have been submitted to and approved by the Secretary of War, or to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity

> of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War * * *" Sec. 7, Act of September 19, 1890 (26 Stat. L., 454).

Section 10 of the Act provides:

> "Sec. 10. That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction, is hereby prohibited. The continuance of any such obstruction, except bridges, piers, docks and wharves, and similar structures erected for business purposes, whether heretofore or hereafter created, shall constitute an offense and each week's continuance of any such obstruction shall be deemed a separate offense. Every person and every corporation which shall be guilty of creating or continuing any such unlawful obstruction in this act mentioned, or who shall violate the provisions of the last four preceding sections of this act, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five thousand dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court, the creating or continuing of any unlawful obstruction in this act mentioned may be prevented and such obstruction may be caused to be removed by the injunction of any circuit court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the Attorney-General of the United States." Sec. 10, Act of September 19, 1890 (26 Stat. L., 454, 455).

Section 7 of the Act of 1890 was amended in 1892, so as to read as follows:

> "Sec. 7. That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater,

> bulkhead, jetty or structure of any kind outside established harbor lines, or in any navigable waters of the United States where no harbor lines are or may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters;
>
> "And it shall not be lawful hereafter to commence the construction of any bridge, bridge draw, bridge piers and abutments, causeway, or other works over or in any port, road, roadstead, haven, harbor, navigable river or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works have been submitted to and approved by the Secretary of War, or to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless approved and authorized by the Secretary of War * * *" Sec. 7, Act of July 13, 1892 (27 Stat. L., 110).

The Act of 1890 seems to have given rise to considerable difficulty in execution; this is indicated by the language used in an opinion rendered by Attorney-General Olney in 1894, in which he says:

> "It may be admitted that the entire act is infelicitously, not to say clumsily, drawn, and that the proviso just cited is the most obscure and unfortunate portion of it. Nevertheless, when the general scope and tenor of the whole statute are considered in connection with its main purpose, and in view of the facts to which Congress must have meant it to apply, the difficulties attending its interpretation largely disappear and leave a tolerably intelligible and consistent piece of legislation." (XXI Opins. Atty. Gen. 42).

As a result the Act was made the subject of amendment in 1899, in which it was provided:

> "Sec. 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War: *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further,* That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War." Sec. 9, Act of March 3, 1899 (30 Stat. L., 1151).

Section 10 contained the requirement:

> "Sec. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recom-

> mended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same." Sec. 10, *Ibid.*

When the matter was undergoing consideration in the Senate, the sections of the Act of 1899 last above cited formed part of a series of amendments to the Act of 1890 which it was proposed to embody in the bill, and the Chairman of the Senate Committee on Commerce gave the following explanation of the contents and purpose of the amendments:

> "There are not ten words changed in the entire thirteen sections. It is a compilation. The Senator understands that these laws have been passed in this way: A section in a river and harbor act fifty years ago, another one forty years ago, another one twenty years ago, another one later, and so on down. We put a provision in the last river and harbor act to codify those laws. The Department have codified them, and in their careful examination during the codification they found two or three of them, relating principally to impediments placed in harbors and things of that kind, which required to be changed, as to just a word or two, because the Attorneys-General had rendered different decisions in regard to the effect of the law.
>
> "It seems to me there is no necessity of reading them. I will state further, as I said before, that I examined them myself. I then had them referred to a subcommittee of the Committee on Commerce to go over them carefully, and the subcommittee reported that they were all right." (Congl. Record, Vol. 32, part 3, page 2297).

With that explanation the amendments above cited were embodied in the Act of March 3, 1899.

It will be observed that Section 9 of the Act of 1899 relates to the construction of bridges, dams, dikes, or causeways over the navigable waters of the United States; that is to structures which completely cross a portion of the navigable waters, in most cases for the purpose of enabling commerce to be carried over or across the river, harbor or other navigable water in which the work is constructed. It will also be observed that Section 10 relates to the construction of works in the nature of wharves, piers, breakwaters, jetties, and the like, in the navigable waters, which project into, rather than cross the bodies of water in which they are located. Section 10 also contains some requirements in respect to excavations or fills, and to certain modifications of the course, location, or capacity of the navigable waters of the United States.

It is proper to observe also that Section 10 of the Act of 1890 is in substance a penal statute. The first three lines of Section 10 of the Act of 1890 are substantially the same as the first three lines of Section 10 in the Act of 1899. The remainder, however, of Section 10 of the Act of 1899 is a substantial reenactment of the requirements of the first clause of Section 7 of the Act of 1890.

The first clause of Section 7 of the Act of 1890 prescribed a method in which wharves, breakwaters, jetties, and other structures of similar character might be constructed in the navigable waters; that is, the Section provided that:

> "It shall not be lawful to build any wharf * * * without the permission of the Secretary of War."

That is, with the permission of the Secretary of War, it would be perfectly lawful to establish a structure of the classes described in Section 7 in such navigable waters;

and such, in fact, was the practice of the Department from 1890 to 1899, in granting permission for the establishment of obstructions in the navigable waters of the United States.

Section 10 of the Act of 1899 was constructed by taking the first clause of Section 10 of the Act of 1890, which was a penal clause pure and simple, and placing it at the head of the first paragraph of Section 7 of the Act of 1890, and the two clauses are so merged or combined as to form Section 10 of the Act of 1899; so that the question to be determined is, what change in interpretation or application has been imported into Section 10 of the Act of 1899 by this combination or merger of parts or clauses of Sections 7 and 10 of the Act of 1890? I think it will be conceded that, if the first clause of Section 10 of the Act of 1899 be removed, what remains will constitute a rule of action which will give no occasion for any difficulty in execution.

It is the view of the Chief of Engineers that the operation of the first clause of Section 10 is very important, and that it changes the character, meaning and application of the entire section. Reduced to its lowest terms that is the question which is referred to this office for opinion.

The first clause goes on to say—"That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited." So long as this clause constituted a part of Section 10 of the Act of 1890, its necessity was clear. It was a part of a penal statute and operated to create an unlawful status in respect to any obstruction theretofore or thereafter established in the navigable waters of the United States and a penalty for violation of its requirements was imposed in the statute. But what is prohibited in Section 10 of the Act of 1899?

The creation of any obstruction not *affirmatively* authorized by Congress.

For the purposes of this discussion the word "affirmatively" may be regarded as applying to a case in which positive permission in some form, for the establishment of a structure in the navigable waters has been given by Congress. The permission may be given in general terms, or it may apply to a particular case or class of cases. Congress might also have used the word "expressly" instead of "affirmatively." If that word had been used, I think the conclusion would have been inevitable that the consent of Congress would have to be given in each separate case, or, at the outside, in each class of cases which had been made the subject of explicit mention and description. It will thus appear that the word "affirmatively" is somewhat more general in its application than the word "expressly." A structure is "affirmatively" authorized if its authorization is positive and is not obtained from a statute by inference or implication. A structure is "expressly" authorized when a specific authority for that particular structure is given in an enactment of Congress.

If Section 7 of the Act of 1892, hereinbefore cited, be examined, a case of "affirmative" authorization will be disclosed. Section 7 goes on to say that it shall not be lawful to construct certain bridges, dams, etc., in the navigable waters, until the plans for the same have been submitted to and approved by the Chief of Engineers and by the Secretary of War. Here there is an express delegation of authority by Congress and it cannot be doubted that, if the plans have been submitted to those officers, and have been approved by them, the consent of Congress passes and the structure becomes lawful. In other words, the consent of Congress is given for the establishment of certain structures in the navigable waters of the United

States in cases where the plans have been submitted to and approved by the Secretary of War.

Omitting the first clause, Section 10 of the Act of 1899 contains an example of affirmative authorization. The Act goes on to say that it shall not be lawful to build any wharf, pier, etc., except on the plans recommended by the Chief of Engineers and authorized by the Secretary of War. From this it follows that, if the plans of the structure have been recommended by the Chief of Engineers and authorized by the Secretary of War, the work can be proceeded with as one coming within the affirmative authorization of Congress.

Section 9 of the Act of 1899 contains an example of "express" authorization, as the bridges and other structures which are provided for in that section are required to be authorized by Congress, if they are to be erected in the Navigable waters of the United States, and by the Legislature of the State if in waters lying wholly within the State. In both cases, however, the approval of the plans by the Secretary of War and Chief of Engineers is a necessary condition precedent to construction.

It will thus appear that Section 10 is composed of two clauses. The first of these clauses is general in its terms, and prohibits "the creation of any obstruction" which has not been "affirmatively authorized by Congress." The second clause is specific in character and prescribes an exact method of procedure; standing alone it conveys an ample delegation of power to the Secretary of War and Chief of Engineers to authorize the placing of certain obstructions in the navigable waters of the United States; indeed, the delegation of authority to allow refuse matter to be deposited in the navigable waters is accomplished in Section 13 of the same enactment by the use of identical language. A similar form of words was resorted to with a view to delegate certain powers to the Secretary of War in Section 7 of the Acts of September 19, 1890 and July 13, 1892.

The two apparently conflicting clauses of Section 10 of the Act of 1899 would thus seem to present a case for the construction of general and special clauses of legislation.

In laying down the rule of interpretation which is applicable in such cases, Bishop, in his "Written Laws," a standard authority in interpretation, says:

> "Where there are words expressive of a general intention, and then of a particular intention incompatible with it, the particular must be taken as an exception to the general, and so all the parts of the act will stand. And, as a broad proposition, general words in one clause may be restrained by the particular words in a subsequent clause of the same statute. This doctrine applies even to statutes enacted at different dates, and it will be more fully illustrated in other connections." (Bishop, Written Laws, Sec. 64).

Elsewhere the same author says:

> "Out of the special matter of the statute grows also a doctrine, spoken of likewise in other connections, whereby apparently conflicting provisions are reconciled and made harmonious. It is applicable equally to the different clauses of the same enactment, to different statutes at whatever different times passed, and to the common and statutory laws when viewed in combination. It is, that the general and specific in legal doctrine may mingle without antagonism, the specific being construed simply to impose restrictions and limitations on the general; so that general and specific provisions in the laws, both written and unwritten, may stand together, the latter qualifying and limiting the former." (*Ibid,* Sec. 112a). See also Endlich on Interpretation, Sec. 399; Sedgwick on Construction, p. 360; Black on Interpretation of Laws, p. 140.

In *State* v. *Inhabitants of City of Trenton* (38 N. J. Law, 64), it was said:

> "When a legislative act contains two sets of provisions, one giving specific and precise directions to do a particular thing, and the other in general terms prohibiting certain acts which would, in the general sense of the words used, include the particular act before authorized, the general clause does not control or affect the specific enactment."

Considerable light is thrown upon the question of interpretation which is here presented in the case of *Cummings* v. *Chicago* (188 U. S., 410). Cummings had applied to the Chief of Engineers for a permit to rebuild a dock on the Calumet River and, on May 12, 1900, and under the authority conferred by Section 10 of the Act of March 3, 1899, a permit had been issued by the Secretary of War and the Chief of Engineers for the reconstruction of the wharf. Cummings had omitted to obtain the permission of the Department of Public Works, which is required, by a municipal ordinance of the city of Chicago, as a condition precedent to such reconstruction. It was held by the court that neither the Act of September 19, 1890, nor that of March 3, 1899, vested the right in an individual to erect such an obstruction in the navigable waters of the United States without the consent of the local and Federal Governments.

Section 10 of the Act of 1899 is referred to in the decision, and it was not claimed by counsel that there was any express legislative authority for the rebuilding of the wharf. It was recognized by the court that the consent of Congress, as contemplated in the Acts of 1890 and 1899, had been given and was embodied in the permit issued by the Secretary of War and the Chief of Engineers for the reconstruction of the wharf, and this permit had been based on Section 10 of the Act of March 3, 1899. As the court was passing upon the exclusive power of Congress to control the placing of obstructions in the navigable waters, it could hardly have escaped its attention that there had been no express consent given by Congress for the rebuilding of Cummings' wharf in the Calumet River, and that the only consent in the case was that embodied in the permit issued by the Secretary of War and the Chief of Engineers on May 12, 1900. If this form of expressing the consent of the Federal Government had been deficient, in that an express authorization of Congress was necessary to the work of reconstruction, it would seem that the attention of the court would have been directed to it by the able counsel who represented the plaintiff and defendant in error.

In a subsequent case, *Montgomery* v. *Portland* (190 U. S., 89), the decision in *Cummings* v. *Chicago* was followed by the Supreme Court, and Section 10 of the Act of March 3, 1899, is fully cited by the court in its decision. Here again the consent of Congress was embodied in a permit issued by the Secretary of War, and if Montgomery's authority to construct his pier had been defective, not having been expressly given by Congress, it would hardly seem that the defect could have escaped the attention and comment of the court. In the course of the decision the court says:

> "It is only necessary to say that the act of 1899 does not manifest the purpose of Congress to go to that extent under the power to regulate foreign and interstate commerce and thereby to supersede the original authority of the States. The effect of that act, reasonably interpreted, is to make the erection of a structure in a navigable river, within the limits of a State, depend upon the concurrent or joint assent of both the National Government and the state government. The Secretary of War, acting under the authority conferred by Congress, may assent to the erection by

> private parties of such a structure. Without such assent the structure cannot be erected by them. But under existing legislation they must, before proceeding under such an authority, obtain also the assent of the State acting by its constituted agencies." (*Montgomery* v. *Portland,* 190 U. S., 89-105).

In *Corrigan Transit Company et al.* v. *Sanitary District of Chicago* (137 Fed. Rep., 851), a permit was issued by the Secretary of War and Chief of Engineers on May 8, 1899, authorizing the Sanitary District of Chicago to divert the waters of the Chicago River into the drainage canal, under certain conditions which are expressed in the permit. It was claimed by the plaintiff that the current created in consequence of the diversion was so great as to materially interfere with the movement of barges in the opposite direction. It was also held that the delegation of power by Congress to the Secretary of War was unconstitutional. As to this the court said:

> "Libelants have taken the further position here that the part of Section 10 (Act March 3, 1899, 30 Stat. 1151), which purports to authorize the Secretary of War to issue permits is unconstitutional as being a delegation of legislative power; * * *.
>
> "A decision of the question whether legislative power was delegated to the secretary (see *Field* v. *Clark,* 143 U. S. 649); (*Buttfield* v. *Stranahan,* 192 U. S. 470), is unnecessary, for the reason that libelants are in error in assuming that section 10, thus emasculated, would remain in force. Congress, acting under the commerce clause, said to Illinois, which would otherwise be sovereign, 'You are not to change the course of the river unless you first obtain the secretary's approval of your plan.' The sentence in its entirety—the subjunctive clause as well as the indicative—expressed the will of Congress. The expressed intention was, not to exclude Illinois utterly from exercising her police powers over the river for the welfare

> of her citizens (and that suggests a nice and delicate question), but to permit the continuation of the exercise upon condition. Now, if the conditional clause is to be deleted, it is not for the courts to construct a new congressional policy out of the fragment. *Compare Montgomery* v. *Portland* (190 U. S. 105)." *Corrigan Transit Co.* v. *Sanitary District of Chicago,* (137 Fed. Rep., 851-857).

I am therefore of opinion that the true construction of Section 10 of the Act of March 3, 1899, does not require the explicit consent of Congress for the placing of an obstruction in the navigable waters, but that an obstruction of the classes named therein may be placed in such waters when the plan of the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning of the same, and that excavations and fills may be made with the same authority.

There is another point of view from which the inclosed communication of the Chief of Enginers should be regarded.

The Acts of 1890 and 1892 vest, by delegation, a limited power in the Secretary of War to authorize the placing of obstructions in the navigable waters of the United States. In the amendments which were incorporated in this legislation by the Act of March 3, 1899, the delegation is made, not to the Secretary of War alone, but to the Secretary of War and the Chief of Engineers, each of whom is charged in the statute with an independent exercise of discretion.

It is therefore necessary to the issue of a permit, in the operation of Section 10 of the Act of March 3, 1899, that the Secretary of War and the Chief of Engineers should separately approve or recommend the placing of obstructions in the navigable waters of the United States. If either disapproves, or fails to recommend or approve, the issue of the instrument is defeated.

In the case in reference application has been made by the Sanitary District of the City of Chicago to reduce the flow of the Calumet River. In the inclosed communication, the Chief of Engineers clearly fails to recommend the alteration, or modification of the course, capacity, or flow of the Calumet River. As his recommendation is required to be had, as a condition precedent to the issue of the permit, the project necessarily fails, and it is the opinion of this office that no permit can lawfully issue.

Very respectfully,

Geo. B. Davis,
Judge Advocate General.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

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CHARLES ELMORE CROP
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In the Supreme Court of the United States

October Term, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS,
Intervening Defendants.

No. 7,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11,
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12,
Original.

BRIEF OF THE COMPLAINANT STATES IN OPPOSITION TO THE MOTION FILED BY THE CITY OF CHICAGO FOR LEAVE TO INTERVENE AS DEFENDANT AND TO FILE INTERVENING PETITION.

In the Supreme Court of the United States

October Term, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA,
Complainants,
vs.
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No. 12,
Original.

BRIEF OF THE COMPLAINANT STATES IN OPPOSITION TO THE MOTION FILED BY THE CITY OF CHICAGO FOR LEAVE TO INTERVENE AS DEFENDANT AND TO FILE INTERVENING PETITION.

The complainant States in the above entitled actions respectfully ask the Court to overrule and disallow the motion of the City of Chicago filed April 15, 1929, for leave to become a party defendant herein, to file an intervening petition herein, and to participate in the hearings of the Special Master upon the re-reference order of January 15, 1929.

An inspection of the petition which the City of Chicago asks leave to file shows that the City of Chicago admits that it has been aware of these proceedings from their inception. To permit it to intervene at this time would necessarily greatly delay the relief which this Court has decreed these complainant States entitled to have.

Furthermore, the City of Chicago by its proposed petition seeks to present evidence upon the following questions:

> (1) The physical situation of the City of Chicago with reference to Lake Michigan, the Chicago River, the so-called Sanitary Drainage Canal and the Des Plaines River. This physical situation is exhaustively covered in the record, taken before the Special Master, now before the Court.
>
> (2) The extent and character of the water supply of the City of Chicago and the steps necessary to be taken to protect it, in the event that the decree of this Court requires a discontinuance of the diversion of water from Lake Michigan and the City of Chicago and the Sanitary District continue to pollute the Chicago River and the waters of the Chicago Harbor. This subject is fully covered in the record, taken by the Special Master, now before the Court.
>
> (3) The character of the present sewer system of the City of Chicago, the possibility of its reconstruction to cause a separation of sanitary and storm water sewage, also the relation of Chicago, its public parks, bathing beaches and other public undertakings and of the public utilities of the City of Chicago to the waters of Lake Michigan and the waters of the Chicago River, and the effect upon these various public and private utilities of the discontinuance of the diversion of the waters of Lake Michigan which this Court has decreed.

All of these subjects are fully covered by testimony, taken by the Special Master, in the record now before the Court.

(4) The financial burden which would be imposed upon the City of Chicago by the necessity of reconstructing its water supply, and the installation of filtration plants. This subject is fully covered by testimony, taken by the Special Master, and is in the record now before the Court.

These complainant States, therefore, say that to permit the City of Chicago, as a new defendant in these proceedings, to attempt to re-examine questions already determined by this Court upon full examination by the Special Master, would indefinitely prolong the hearings and correspondingly delay the molding of the decree which this Court has directed, to bring about as rapidly as is practicable the discontinuance of the unlawful diversion of the waters of Lake Michigan and the restoration of the rights of these complainants.

These complainant States further say that under the decision of this Court, the matters sought to be set up in the petition by the City of Chicago are irrelevant and immaterial. None of them have to do with navigation except as they seek to make an excuse for continuing diversion for sanitary purposes. Even if it be conceded that the financial outlay which the City of Chicago would be required to make is great, this Court has held in this case that these complainants have a right to require a discontinuance of the diversion, except to the extent that the Court, upon this special re-reference, shall determine to be necessary for the maintenance of navigation in the Chicago River, which can not mean that Chicago is to be permitted to increase the quantity of diversion so necessary, by first continuing to render the Chicago River unnavigable by the continuous creation of nuisances therein.

For the reasons, therefore, that,

(1) This motion is too late in these proceedings to be equitably entitled to be considered;

(2) The record now before the Court, and the evidence already taken by the Special Master on the re-reference, show that the City of Chicago is in default by its gross and defiant failure to comply with the requirement, imposed by the Secretary of War, as a condition of the permit issued in 1925, in the matter of the installation of water meters upon its public and domestic water supply;

(3) That the matters sought to be set up are irrelevant and immaterial; and

(4) That all the matters sought to be urged by the City of Chicago have been fully and exhaustively presented by the State of Illinois and the Sanitary District, and have been ruled adversely to the State of Illinois and the Sanitary District and, therefore, to the City of Chicago, a subordinate political agency of that State, by this Court, on its consideration of the existing record;

these complainants respectfully urge that this motion be denied and overruled.

Respectfully submitted,

State of Wisconsin,
By John W. Reynolds, *Attorney General.*

State of Minnesota,
By G. A. Youngquist, *Attorney General.*

State of Ohio,
By Gilbert Bettman, *Attorney General.*

State of Pennsylvania,
By Cyrus E. Woods, *Attorney General.*

State of Michigan,
By Wilbur M. Brucker, *Attorney General.*

State of New York,
By Hamilton Ward, *Attorney General.*

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

Office Supreme Court, U
FILED
APR 15 1929
CHARLES ELMORE CRO
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IN THE

SUPREME COURT OF THE UNITED STATES

October Term, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 7 Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12 Original.

ANSWERING AFFIDAVIT ON BEHALF OF THE STATE OF NEW YORK TO MOTION OF CITY OF CHICAGO TO INTERVENE AS DEFENDANT.

State of New York,
City and County of New York, } *ss.:*

Now comes Albert J. Danaher, Assistant Attorney-General of the State of New York, who, answering the petition of the City of Chicago to be made an intervening party herein and being duly sworn, doth depose and say:

1. That the facts contained and set forth in said petition in Paragraphs Numbered 1 and 2 are not pertinent to the questions now being determined by the Special Master in accordance with the decision of this Court.

2. The fact that the City of Chicago takes its water supply from Lake Michigan is not and never has been in dispute in this controversy. The location of the City of Chicago, the course of the Chicago River and its branches, the location of the Sanitary Canal, the course of the Calumet and Little Calumet Rivers are all matters upon which evidence was received by the Special Master upon the hearings had before him and are facts found and discussed by him in his report (Report of the Special Master, pages 10 to 21 inclusive). The fact that industries are located on the banks of said rivers and canal was testified to and these industrial plants were described at length by witnesses sworn on behalf of the defendant Sanitary District of Chicago on the hearing of the case before the Special Master.

3. The effect of the opening of the Sanitary District Canal is discussed in the Special Master's Report, at Page 18, et seq. Evidence relating to the source of Chicago's water supply, the character of such supply, and the effect upon such water supply of the reduction of the diversion of water from Lake Michigan to 1000 second feet and to zero was given on behalf of the defendants as well as by witnesses for the complainant states, upon the hearing antecedent to the Special Master's Report. Reference is made thereto in the report. At Page 136 the Special Master said,"

> "Much expert testimony has been given on both sides with respect to the feasibility of sewage treatment works adequate to permit of a large reduction, or a complete cessation, of the diversion of water from Lake Michigan, while at the same time safeguarding the water supply which the lake affords." * * *

The public bathing beaches referred to in paragraph 8 of the petition were also the subject of testimony before the Special Master (Report of Special Master, page 136).

4. The decree for which the State of New York is asking is one which will carry out the decision of this court, viz.: that the Sanitary District of Chicago "construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than Lake diversion." If, in thus disposing of the sewage, filtration works are necessary to safeguard its water supply, the construction of said works is no more burdensome to Chicago than to other large cities where such plants have already been installed. Deponent further says that whatever may be necessary to be done in connection with the water supply of the city of Chicago is the direct result of the wrongful acts of the Sanitary District.

5. Deponent further shows that the relief prayed for in the bill of complaint of the State of New York was the complete cessation of the diversion of water from Lake Michigan by the Sanitary District of Chicago, for the purpose of disposing of the sewage of the district. As herein pointed out the effect of the cessation of this diversion upon the water supply of the City of Chicago was a matter upon which evidence was offered before the Special Master, prior to the submission of his report. The various officials of the City of Chicago, if they had read the bills of complaint herein, the testimony taken before the Special Master and the report submitted by him herein to this court, could not have been ignorant of the fact that the bill of complaint of the States of New York and Michigan both prayed for a complete cessation of the diversion. Having read the minutes of the hearings they must have known that testimony had been received as to the effect of such cessation on the water supply of said city. If they read the report of the Special Master they would have known that as to all the subjects referred to in the petition now submitted testimony has already been offered by both sides to the controversy and many of the facts discussed in the Master's report. While it is true the Sanitary District includes territory outside the City of Chicago it is also the fact that practically all the diversion from Lake Michigan has been for the purpose of dilluting the sewage of the city itself. The officials of that

city must of necessity have been aware of that fact. They knew of this controversy between the complainant states, the Sanitary District and the State of Illinois, and yet they sat idly by and waited until the case had been decided by this court. Now, when the only question left undetermined is the manner of enforcing the decision, they ask that the city of Chicago be made a party defendant. Deponent further says that the granting of this motion will delay the concluding of the taking of testimony by the Special Master and thus delay the entry of the decree by the Court.

6. Deponent further says that the City of Chicago has been guilty of laches in the making of the motion it now makes, and that no excuse has been shown for the delay, nor is any good reason shown for the granting of the order prayed for.

Deponent respectfully prays that this Honorable Court will deny the motion.

Albert J. Danaher.

Subscribed and sworn to before me this
13th day of April, 1929.

Alfred W. Jones,
Commissioner of Deeds, City of New York; N. Y. Co. Clerk's No. 12, Reg. No. 5-0; Kings Co. Clerk's No. 31, Reg. No. 105; Bronx Co. Clerk's No. 3, Reg. No. 30002; Queens Co. Clerk's No. 1443, Reg. No. 1162; Certificate filed in Richmond County. Commission Expires March 1st, 1930.

O.T. 1930 ORIGINAL NOS.6,10 & 11,

Office Supreme Court, U.
FILED
APR 15 1929
CHARLES ELMORE CRO
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 7, Original.

STATE OF MICHIGAN
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12, Original.

NOTICE, MOTION FOR LEAVE TO PRESENT PETITION FOR LEAVE TO INTERVENE AS DEFENDANT AND INTERVENTION PETITION.

CITY OF CHICAGO,
by SAMUEL A. ETTELSON,
Corporation Counsel,
Solicitor and of Counsel for Petitioner.

HAWKINS & LOOMIS CO., LAW PRINTERS, CHICAGO

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 7,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11,
Original.

STATE OF NEW YORK,
Complainant
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12,
Original.

NOTICE.

To HONORABLE JOHN W. REYNOLDS,
Attorney General for Wisconsin,
Madison, Wisconsin,
HONORABLE HERMAN L. EKERN,
Special Assistant Attorney General for Wisconsin,
208 *South LaSalle Street, Chicago, Illinois,*

HONORABLE RAYMOND T. JACKSON,
Special Assistant Attorney General for Wisconsin,
c/o HONORABLE NEWTON D. BAKER,
Union Trust Building,
Cleveland, Ohio,

HONORABLE HERBERT H. NAUJOKS,
Assistant Attorney General for Wisconsin,
Madison, Wisconsin,

HONORABLE G. A. YOUNGQUIST,
Attorney General for Minnesota,
St. Paul, Minnesota,

HONORABLE GILBERT BETTMAN,
Attorney General for Ohio,
Columbus, Ohio,

HONORABLE NEWTON D. BAKER,
Special Assistant Attorney General for Ohio,
Union Trust Building,
Cleveland, Ohio,

HONORABLE CYRUS E. WOODS,
Attorney General for Pennsylvania,
Harrisburg, Pennsylvania,

HONORABLE WILBER M. BRUCKER,
Attorney General for Michigan,
Lansing, Michigan,

HONORABLE HAMILTON WARD,
Attorney General for New York,
Albany New York,

HONORABLE ALBERT J. DANAHER,
Deputy Attorney General for New York,
Albany, New York,
Solicitors for Complainants:

Please Take Notice that at the opening of the Supreme Court of the United States on Monday the 15th day of April, 1929, the City of Chicago will present motion for leave to file intervening petition praying that it be permitted to be made an intervening defendant in the above entitled causes and to participate in the hearings before the Special Master upon the re-reference order of January 14, 1929, and in any further proceedings herein, such evidence as may be now in the record affecting the intervening petitioner to have the same force and effect as if the intervening petitioner had previously been a party to the proceedings.

City of Chicago,
By Samuel A. Ettelson,
Corporation Counsel.

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 7, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12, Original.

MOTION.

Now comes the City of Chicago, a municipal corporation of the State of Illinois, and moves the Court for leave to present and file its petition praying that it may be permitted to be made an intervening defendant herein and to participate in the hearings before the Special Master upon the re-reference order of January 14, 1929, and in any further proceedings herein, such evidence as may be now in the record affecting the intervening petitioner to have the same force and effect as if the intervening petitioner had previously been a party to the proceedings.

City of Chicago,
By Samuel A. Ettelson,
Corporation Counsel.

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants,

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 7, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12, Original.

PETITION.

The petitioner, the City of Chicago, a municipal corporation duly organized and existing under and by virtue of the laws of the State of Illinois, shows:

1. The petitioner was originally organized and incorporated as a city during the year 1837, pursuant to the provi-

sions of the statutes and laws of the State of Illinois then in force relating to the organization and incorporation of cities and villages. The people of the City of Chicago, at an election duly held, duly adopted and accepted an act of the General Assembly of the State of Illinois entitled "An Act to provide for the incorporation of cities and villages," approved April 10, 1872, in force July 1, 1872. The said act, among other things, empowers the city council of the said City of Chicago to construct and keep in repair, culverts, drains, sewers and cess-pools; to regulate the use thereof; to deepen, widen, dock, cover, wall, alter or change channel of water courses; to construct and keep in repair canals and slips for the accommodation of commerce; to erect and keep in repair public landing places, wharves, docks and levees; to regulate and control the use of public and private landing places, wharves, docks and levees; to provide for the cleansing and purification of waters, water courses and canals and the drainage or filling of ponds on private property whenever necessary to prevent or abate nuisances; to establish and maintain a fire department; to do all acts and make all regulations which may be necessary or expedient for the promotion of health or the suppression of diseases; to establish and maintain a water works system for the purpose of furnishing residents and inhabitants of the said city with water for the various uses of such inhabitants, such as drinking and quenching of thirst, cooking, bathing, manufacturing, prevention and extinquishment of fire and other uses to which water is ordinarily put by the residents and inhabitants of a city. The said act further provides that the city shall have jurisdiction upon all waters within or bordering on the same to the extent of three miles beyond the limits of the city or village, but not to exceed the limits of the state, and that it may prevent or punish any pollution or injury to the stream or source of water or to such water works, its jurisdiction for such purposes extending five miles beyond its corporate limits or so far as its water works may extend. The acts of the State of Illinois relating to the governing and powers of cities and villages, in force between the incorporation of the City of Chicago in 1837 and the passage of the said Act of 1872, granted powers to the city council similar to the powers herein enumerated as possessed by the city council under the said Cities and Villages Act of 1872.

2. Under an act of the general assembly of the State of Illinois entitled "An Act to create sanitary districts and to remove obstructions in the DesPlaines and Illinois River," approved May 29, 1889, in force July 1, 1889, the City of Chicago was obligated to furnish, has furnished and is now furnishing water from and by means of its water works at cost to the following named cities and villages located within the corporate territorial limits of the defendant the Sanitary District of Chicago—

Niles Center
Niles
Park Ridge
Tessville
River Grove
Elmwood Park
River Forest
Oak Park
Berwyn
Cicero
Blue Island
Calumet Park (Burr Oak)
Riverdale
Dalton
Harvey
Burnham
Calumet City
Markham
N. Riverside
Evergreen Park
Summit
Westchester
Broadview
E. Hazelcrest
Phoenix (Specialville)
Posen
Hazelcrest
Stickney
Forestview
Elmwood Park
Norwood Park
Loyden Township

3. Since the organization and incorporation of the City of Chicago, the only available water supply for the inhabitants and residents of said city has been and is now the waters of Lake Michigan, upon the shores of which lake the city is located, extending a distance of twenty-three and one-half miles

from the boundary line between Illinois and Indiana northerly to the southern corporate limits of the City of Evanston. Extending through the corporate limits of the City of Chicago and substantially in the heart of same, are the Chicago River, its various branches, such as the North Branch, the South Branch, the West Fork of the South Branch, the South Fork of the South Branch and the East and West Arms of said South Fork. Along the banks of said rivers and channels, navigable waters of the United States, various and sundry industries, business houses and plants of the city have been built and established. Connecting with the said rivers are the Main Drainage Canal and North Shore Channel built by the Sanitary District of Chicago, likewise such navigable waters. Through the southern portion of the territory of Chicago, the Calumet River and its branch, the Little Calumet, extends, which connects with Lake Calumet and with the Calumet Sag Channel of the Sanitary District of Chicago extending from the Little Calumet River to the Main Drainage Canal at Sag, Illinois, likewise navigable waters of the United States. The said waters of the Chicago River and its branches, Calumet and the Little Calumet River, and the other waters connecting with them, together with the waters of Lake Michigan in the vicinity of Chicago, are all physically and commercially inter-related and constitute, together with others, the waters of the Port of Chicago.

4. The water works system of Chicago was established by the City of Chicago about the year 1854, and thereafter about the year 1856 the City of Chicago established a sewer system. Since the establishment of the said water works and sewer system by the City of Chicago on the dates mentioned, the said water works and sewer systems have been enlarged and developed by the construction and building of pumping stations, intakes, tunnels, water pipes, sewers and other appurtenances, and the development of said systems of water works and sewers has progressed from the dates of their establish-

ment as the necessities of the residents and inhabitants of Chicago required, so that there exist at the present time and have existed for a great number of years past, complete water works and sewer systems whereby the residents and inhabitants of Chicago have been served and provided with their domestic water supply, and the sewage wastes and drainage of the City of Chicago have been disposed of by means of outlets therefor provided, and by such systems the lives of the people of Chicago have been preserved, their health has been protected and their public welfare, convenience and prosperity has been promoted. As a part of said water works system, the City of Chicago has maintained water intakes and cribs at various places in Lake Michigan some miles from the lake shore, and through such cribs or intakes and tunnels the water has been conveyed to the pumping stations, water works and land tunnels of the city, and thereby distributed to the residents, inhabitants and manufacturing and industrial plants of the city. In connection with the establishment and maintenance of said sewer system, the City of Chicago built and established sewers and intercepting sewers and outlets by which the sewage and drainage of the city was largely emptied into the Chicago River and its various branches.

5. The Sanitary District of Chicago, upwards of twenty years ago, constructed and maintained intercepting sewers by means of which the sewage and drainage that had been emptied directly into the lake from the sewers built by the City of Chicago, were carried and drained to the Chicago River and its branches. The opening of the Main Drainage Canal of the Sanitary District on January 17, 1900, furnished an outlet for all the sewage and drainage of the city at all times to the DesPlaines River.

6. Prior to the construction of the said Main Drainage Canal by the Sanitary District, and beginning with the year 1854, and until the present time, the City of Chicago has pro-

cured for its domestic water supply from Lake Michigan such water as was required, as it had and has the paramount, natural and public right to do. From the year 1848, the date of the opening of the Illinois and Michigan Canal by the State of Illinois, until the year 1865, a certain amount of water was pumped from the Chicago River to the said canal to meet the needs of navigation thereon. From the year 1865 to the year 1872 through an arrangement with the Canal Commissioners of the Illinois and Michigan Canal, the City of Chicago caused an amount of water to be pumped from the Chicago River into the Illinois and Michigan Canal, and thence to the DesPlaines River, for the purpose of discharging into same at ordinary times the sewage, and in addition an amount of water equal approximately to the average rain water run-off of the Chicago River Drainage area, in order to keep up and maintain navigation in the Chicago River, and to remove nuisance therein and thereon. In the year 1865 (Illinois Laws 1865, page 83), the legislature of Illinois authorized the City of Chicago to rebuild the summit level of the Illinois and Michigan Canal on the deep cut plan, whereby a gravity flow would be provided from the lake through the canal in its summit level to the DesPlaines River. By the year 1872, this improvement had been made in the summit level of the canal, and a larger quantity of water was thus withdrawn by gravity from the Chicago River through the Illinois and Michigan Canal to the DesPlaines River for the purpose of keeping up and maintaining navigation in the Chicago River and removing nuisances therein and thereon caused by the sewage and drainage. The amount of sewage and water withdrawn from the Chicago River by means of the said Illinois and Michigan Canal after it was constructed on the deep cut plan, exceeded the average rain water run-off of the Chicago River drainage area and the amount of the sewage of the city. This condition existed until the year 1881, when pursuant to action of the general assembly of Illinois (Illinois

Laws 1881, page 159) pumps were established at the northern terminus of the Illinois and Michigan Canal to discharge through the canal from the Chicago River a greater amount of sewage, drainage and water in order to maintain and keep up navigation in the Chicago River and other waters, and remove nuisances therein and thereon. The said pumps were established, and from that date until the opening of the Main Drainage Canal on January 17, 1900, an amount of sewage and water was discharged from the Chicago River by means of the Illinois and Michigan Canal to the DesPlaines River greatly in excess of the amount of the sewage and drainage of the city. After the opening of the Main Drainage Canal on January 17, 1900, which replaced the Illinois and Michigan Canal and furnished a larger outlet for the sewage and drainage, no drainage or sewage at any time was permitted to be discharged into Lake Michigan, but it was at all times discharged to the DesPlaines River. Thus, from the year 1865 and continuously, the sewage and drainage of the City of Chicago together with a certain amount of water direct from Lake Michigan to keep up navigation by removing nuisances on the Chicago River and its branches has been substantially at all times discharged to the DesPlaines River away from its water supply, and prior to 1900, the opening of the Main Drainage Canal, the only times sewage and drainage found their way into the lake were when storms upon the Chicago River drainage area exceeded the discharge capacity of the Illinois and Michigan Canal to the DesPlaines River.

7. The City of Chicago and the residents and inhabitants thereof, have enjoyed for many years a water supply unpolluted by the sewage wastes and drainage of the city and its environs, and the City of Chicago has developed and maintained its water supply works and water works system and now maintains them, relying upon Lake Michigan water which goes into its water works system, being unpolluted and uncontaminated by said sewage wastes and drainage. If the sew-

age, artificially treated to the greatest practicable extent known in the art, and the wastes and drainage at storm times, are discharged into Lake Michigan, its water supply will become polluted and contaminated, requiring the re-location of all its cribs and intakes, the construction of new tunnels, the construction, establishment and maintenance of a complete water filtering system, and, in general, the rehabilitation of its entire water works system as the City is informed and believes and so states to be the fact at a cost of upwards of one hundred and twenty-three million dollars. In addition, it will be necessary to change its combined sewer system to what is known as a separate sewer system, whereby one system would carry the sewage and another system would carry the drainage, street wash and other similar wastes. The cost of a separate sewer system of this character, as the City is informed and believes and so states to be the fact would be upwards of three hundred and thirty million dollars. Upon the installation of such works for its water supply and the establishment of the said separate sewer systems, the water supply of Chicago and its people would still be polluted and contaminated. The only barrier against infection by means of water-borne diseases would be the aforesaid re-location of the water intakes in Lake Michigan and the establishment and maintenance of a complete water filtration plant, a mechanical barrier certain at times to fail of complete performance thus endangering the health of the people of Chicago.

8. The City of Chicago has created, now owns and maintains many public bathing beaches on the shores of Lake Michigan and has constructed and owns many public parks along such waters. These contribute greatly to the health, comfort and happiness of the people of the City of Chicago. If the sewage artificially treated to the greatest practicable extent, together with waste and drainage at storm times be discharged into Lake Michigan, the waters thereof will be-

come increasingly polluted and the uses and benefits from such parks and public bathing beaches will be gradually lessened and eventually completely destroyed; as will also yacht and commercial harbors now owned and operated by the city along the shores of Lake Michigan which will become less and less usable and all of the waters of the Port of Chicago including Lake Michigan adjoining the shores of the City of Chicago will become so polluted as to interfere with and obstruct the conduct of navigation thereon.

9. The City of Chicago is without means to finance any such extensive construction program for its water works system and for its sewer system. The territorial limits of the City of Chicago are wholly within those of the Sanitary District of Chicago, and there is a very small amount in value of the taxable property of the Sanitary District outside the limits of the City of Chicago. The Sanitary District, as your petitioner is informed and believes, and upon such information and belief states the fact to be, has laid out a program for the construction of artificial sewage purification works to meet the requirements of the Court's order and opinion of January 14, 1929, estimated to cost upwards of $176,000,000. The discharge of the artificially treated sewage and storm water into Lake Michigan will cause damage to the public utilities as petitioner is informed and believes and so states to be the fact of upwards of one hundred and eighty-six million dollars, by depriving them of condensing water for the various plants located on the Chicago River or its branches, which damage will be sustained by the residents and inhabitants principally of Chicago through the necessary increase of utility rates to take care of this damage. The economic burden which would thus fall upon Chicago by, through and as the result of the discharge of artificially treated sewage and storm flow and wastes into Lake Michigan, can not be borne by the taxpayers and people of Chicago, and if such burden is visited upon them, the prosperity,

welfare and progress of the people of Chicago, and the business and commercial interests thereof, will be materially hampered and injured.

10. While various officials of the City of Chicago have known of the pendency of the above entitled suits instituted by the various states complainant, it has been understood by them and petitioner so alleges the fact to be that the complainants' bills do not seek a decree which would require the discharge of artificially treated sewage and wastes and storm flow into Lake Michigan. Furthermore, the City of Chicago and its officials have rested in the belief, as found and concluded by the Honorable Charles Evans Hughes, Special Master, that under the Acts of Congress in such case made and provided, the chief of engineers and Secretary of War were authorized to regulate the diversion by the Sanitary District of Chicago, and that in such regulation the rights and interests of the City of Chicago and its people would be considered, and that they would not be deprived of their paramount and natural right in the public waters, to take, use and dispose of such waters of Lake Michigan as is required for domestic purposes, and that the sewage wastes and drainage of the city could be discharged and disposed of by the city, in such manner as would best promote the public welfare and convenience. The City of Chicago does not understand that it is the direction of the opinion and order of the Supreme Court of January 14, 1929, that sewage, untreated or treated to the greatest practicable extent known in the art (which purification can be attained only to the extent of eighty-five per cent of purity), including the wastes, drainage and storm flow of the city, should be discharged into Lake Michigan.

While, as before stated, it had been understood by the City of Chicago that the only purpose of complainants in the institution of the above entitled suits was to enjoin any unwarranted portion of the diversion of water directly from Lake Michigan by the Sanitary District of Chicago, yet your petitioner is informed and believes, and upon such information states the fact to be, that counsel for complainants in the above entitled cause stated at the hearing before the Special Master on, to wit, March 29, 1929, that they would seek a decree which would require in its enforcement the discharge of the artificially treated sewage, including drainage storm water and wastes of the City of Chicago and its environs, into Lake Michigan. This is the first time that the officers of the City of Chicago have had any knowledge that any such decree would be sought.

Petitioner alleges that if the plan of complainants aforesaid be required by decree to be entered in the above entitled causes there will result a condition of nuisance in all of the waters of the Port of Chicago and a gross pollution of the domestic water supply of the City; that such pollution will inevitably produce grave epidemics of typhoid fever and other water born diseases resulting in the loss of many lives and much sickness and suffering, and that such infection will be spread through a territory with a radius of at least 500 miles from Chicago and will have a most harmful effect upon many of the citizens of the complainant states themselves.

Therefore, your petitioner, in performance of its duty to the residents, inhabitants, taxpayers and people of Chicago and of those other cities and villages within the limits of the Sanitary District depending upon the City of Chicago for their domestic water supplies, presents this petition, seeking to be made party thereto as intervening defendant, without, however, seeking any delay in the proceedings in said causes either before the Special Master, pursuant to the re-reference order of January 14, 1929, or before the Court, and that the City of Chicago as such intervening defendant should be permitted to participate in the hearings before the said Special Master upon said re-reference, offering such evidence as it may be advised to be appropriate, and likewise to participate in any hearings or proceedings before this Court upon the Special Master's report, it being understood that any and all evidence now offered and received, material and relevant, affecting the rights and interests of the City of Chicago, shall be treated as in evidence the same as if the City of Chicago had been a party at the time such evidence was offered and received.

Wherefore, your petitioner prays that it may be permitted to intervene herein and be made party hereto as intervening defendant in all of said causes, and that it be permitted to participate in the future proceedings before the Special Master pursuant to the re-reference order of this Court of January 14, 1929, offering such evidence as it may consider appropriate and relevant, and that it further be permitted to participate in any further proceedings or hearings before this Court upon the Special Master's report to be made and for such other and further relief as this Honorable Court may grant; and your petitioner will ever pray.

THE CITY OF CHICAGO,
By SAMUEL A. ETTELSON,
Its Corporation Counsel.

ence, offering such evidence as it may be advised to be appropriate, and likewise to participate in any hearings or proceedings before this Court upon the Special Master's report, it being understood that any and all evidence now offered and received, material and relevant, affecting the rights and interests of the City of Chicago, shall be treated as in evidence the same as if the City of Chicago had been a party at the time such evidence was offered and received.

Wherefore, your petitioner prays that it may be permitted to intervene herein and be made party hereto as intervening defendant in all of said causes, and that it be permitted to participate in the future proceedings before the Special Master pursuant to the re-reference order of this Court of January 14, 1929, offering such evidence as it may consider appropriate and relevant, and that it further be permitted to participate in any further proceedings or hearings before this Court upon the Special Master's report to be made and for such other and further relief as this Honorable Court may grant; and your petitioner will ever pray.

The City of Chicago,
By Samuel A. Ettelson,
Its Corporation Counsel.

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, Complainants, *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** Defendants. **STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,** Intervening Defendants.	No. 7, Original.
STATE OF MICHIGAN, Complainant, *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** Defendants.	No. 11, Original.
STATE OF NEW YORK, Complainant, *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** Defendants.	No. 12, Original.

AFFIDAVIT.

State of Illinois, }
County of Cook, } ss.

Samuel A. Ettelson, being first duly sworn, on oath deposes and says that he is the Corporation Counsel of the City of Chicago; that he has read the foregoing petition for leave to intervene in the above entitled causes to which this affidavit is attached, and knows the contents of the same; that the allegations thereof are true to the knowledge of this affiant, except those allegations therein alleged to be upon information and belief, and those allegations this affiant verily believes to be true.

Further affiant saith not.

Samuel A. Ettelson

Subscribed and sworn to before me this 10th day of April, A. D. 1929.

Estelle M. Larson
Notary Public.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

Office Supreme Court,
FILED
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IN THE

SUPREME COURT OF THE UNITED STATES.

October Term, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, Complainants, *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, Defendants. STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, Intervening Defendants.	No. 7, Original.
STATE OF MICHIGAN, Complainant, *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, Defendants.	No. 11, Original.
STATE OF NEW YORK, Complainant, *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, Defendants.	No. 12, Original.

SUGGESTIONS BY THE CITY OF CHICAGO IN REPLY TO BRIEF AND AFFIDAVIT IN OPPOSITION TO THE MOTION AND PETITION OF THE CITY OF CHICAGO FOR LEAVE TO INTERVENE AS A CO-DEFENDANT.

CITY OF CHICAGO,
By Samuel A. Ettelson,
Corporation Counsel,
Solicitor and of Counsel for Petitioner.

IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, A. D. 1928.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, **Complainants,** *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** **Defendants.** **STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,** **Intervening Defendants.**	**Original. No. 7,**
STATE OF MICHIGAN, **Complainant,** *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** **Defendants.**	**No. 11, Original.**
STATE OF NEW YORK, **Complainant,** *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** **Defendants.**	**No. 12. Original.**

SUGGESTIONS BY THE CITY OF CHICAGO IN REPLY TO BRIEF AND AFFIDAVIT IN OPPOSITION TO THE MOTION AND PETITION OF THE CITY OF CHICAGO FOR LEAVE TO INTERVENE AS A CO-DEFENDANT.

The City of Chicago submits these suggestions in reply to the affidavit and brief of complainants opposing the petition of the City to intervene because both the purpose and effect of the City's petition are misconceived and misstated.

1. In its petition the City expressly states (p. 17) that the City does not seek any delay in this proceeding.

The City by the very prayer of its petition clearly adopts all pertinent evidence that may affect its rights now in the record and by this request clearly denies the intention to seek to duplicate such evidence. Thus, the City does not seek to offer evidence as to any of the four points set out in detail in the brief in behalf of the complainants. On the ground thus suggested, therefore, no delay will result from the City's intervention; and these facts, which are obvious from a fair consideration of the City's petition, answer completely the principal ground of the complainants' objection.

2. Complainants state that they prayed in the original bill of the State of New York—but, it should be noted, *not* in the Wisconsin bill—for "the complete cessation of the diversion of water from Lake Michigan by the Sanitary District of Chicago for the purpose of disposing of the sewage of the district." (Affidavit in opposition, paragraph 5, page 3.)

The statement for the first time made by counsel for complainants at the hearing before the Special Master on March 29th last, less than three weeks ago, was that complainants would seek a decree which would require in its enforcement the discharge of artificially treated sewage as well as storm water drainage into Lake Michigan, from which the City of Chicago takes its drinking water.

In other words, the bill prays an injunction in the usual form against a certain diversion claimed to be illegal—against the continued performance of certain acts of the

Sanitary District. Complainants' counsel now propose a mandatory injunction which will require not only the cessation of illegal diversion by the Sanitary District, but also an affirmative act directly resulting in pollution of Chicago's drinking water. This mandatory injunction affects the interests of the City in a special and an entirely different way, and to an entirely different extent, than the prohibitive form of injunction sought for by the original bills.

In this connection the City desires to point out that the diversion may be entirely stopped without necessarily polluting the water supply of the City, if the Sanitary District erect a gate or dam at the mouth of the Chicago River, in accordance with the suggestion of the War Department. The Court will remember that the War Department required as one of the conditions of the permit of March 3, 1925, that plans for such gate or lock be submitted by the Sanitary District within a reasonable time, and that such gate or lock be thereafter constructed before the expiration of the permit. It has been testified on the present rereference hearing before the Special Master by the Chief of Engineers of the United States Army that such plans have been duly submitted, but that the Chief of Engineers has not yet decided which of several alternative plans will be selected, and for that reason, and that reason only, such gate or lock has not yet been constructed.

It follows, necessarily, that the relief complainants' counsel now announce they will seek would not only render impossible the use of any such gate or lock, but will, of course, necessarily deprive the City of the protection to be thus afforded it, a protection upon which the City has heretofore relied, and, it is respectfully submitted, has had a right so to rely.

3. Without regard to these matters, the City respectfully submits that it is an essential party, if the proper

scope and effect of the re-reference, as ordered by this Court in its opinion of January 14, 1929, be carried out. The Court says in the last paragraph of its opinion:

> "To determine the practical measures needed to effect the object just stated and the period required for their completion, there will be need for the examination of experts; and the appropriate provisions of the necessary decree will require careful consideration."

Throughout the concluding part of the opinion, the Court clearly manifests its purpose to obtain by the re-reference such information as will permit an equitable adjustment of the conflicting rights and interests of the parties concerned. The relief sought by complainants, as now defined by them, beyond question vitally affects the City of Chicago, and, as stated in the City's petition, the City is prepared to prove not only by evidence now in the record but by other evidence, if so required, that such relief will impose upon the City a financial burden which will exceed several hundred millions of dollars. The spirit of the re-reference—a composition in accordance with the well established principles of equity—requires that the Special Master be fully advised as to the financial capacity of the City of Chicago to meet and carry out this heavy burden. The Master should be informed as to Chicago's income, the extent of its unexpended bonding power, as to the revenue it may reasonably anticipate during the years to come to be derived from taxation and from other sources. In addition, the City could with propriety submit the other demands which the needs and the rights of its citizens require in connection with the expenditure of the City's revenue. All of this information is not only pertinent to the inquiry before the Special Master, but, we submit, is essential if the purpose and spirit of the Court's opinion be carried out. If the Special Master, as a result of the re-reference, submits a decree which, in accordance with equitable principles, will accord the relief to the complainants the Court has found they are entitled to, it seems to us that he will necessarily have to consider the City's rights in the premises, so as not to impose an undue or inequitable burden upon any of the people to be affected by it. Clearly, as to these matters solely affecting the City of Chicago, the Sanitary District has no right or authority or responsibility, and only the City, itself, may offer competent and conclusive evidence.

The papers submitted by complainants in opposition to this motion pay no attention to the nature of the re-reference hearing, which, as we submit, is conclusive upon our right to intervene. In a word, the City could with propriety assume that the Sanitary District in its own interests would present every legal contention in support of its claimed right to divert water from Lake Michigan for the purpose of disposing of sewage of the district, but since the Sanitary District has no authority or responsibility in reference to procuring for the citizens of Chicago a pure and unpolluted drinking water, the City must assume responsibility in this connection.

The City of Chicago,
By Samuel A. Ettelson,
Corporation Counsel.

Samuel A. Ettelson,
Of Counsel.

ABSTRACT OF PRINCIPAL POINTS IN SPECIAL MASTER'S REPORT IN CHICAGO DIVERSION CASE.

(This abstract is merely intended to aid as a convenient summary, and is not to be taken as adding to or modifying in any way the text of the Special Master's Report.)

The Supreme Court of the United States, by order of January 14, 1929, referred certain questions to Charles Evans Hughes as Special Master to take testimony and report his conclusions and recommendations for a decree. Under the permit of the Secretary of War of March 3, 1925, a diversion of 8,500 cubic feet per second of water from Lake Michigan through the Chicago Drainage Canal was authorized. This permit expires on December 31, 1929. The Supreme Court in its opinion of January 14, 1929 sustained this permit, which was temporary and conditional, in view of the existing exigency. The Court said that it might be "that some flow from the Lake is necessary to keep up navigation in the Chicago River, which really is part of the Port of Chicago, but that amount is negligible as compared with 8,500 second feet now being diverted;" and that beyond that negligible quantity the validity of the Secretary's permit derived its support from a situation produced by the Sanitary District in violation of the rights of the complainant States. The Court considered it to be its duty by an appropriate decree to compel the reduction of the diversion to a point where it would rest on a legal basis. The Court said: "The Sanitary District authorities, relying on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore they can not now complain if an immediately heavy burden is placed upon the District because of their attitude and course. The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion."

The Special Master states that the questions referred to him are deemed to be (1) the practical measures necessary for the disposition of the sewage of the Sanitary District; (2) the time within which these sewage disposal works can be completed and put into operation; (3) the reductions in the diversion that will be practicable immediately and from time to time pending the completion of the sewage disposal works; and (4) the diversion, if any, of water from Lake Michigan which will be necessary for the purpose of maintaining navigation in the Chicago River as a part of the Port of Chicago after these sewage disposal works are in full operation.

The Special Master took voluminous testimony and the case was finally submitted to him, after oral argument and upon briefs, on October 18, 1929.

The Sanitary District presented before the Master a comprehensive program for treatment of the sewage and wastes, within the area of the District, in four main treatment units, the North Side, Calumet, West Side and Southwest Side treatment plants. This program, which was substantially approved by the complainant States so far as sewage treatment is concerned, is found by the Master to afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes of all the area within the District, and also, in times of storm, of approximately 150% of the ordinary dry weather flow of sewage and wastes. The Master also finds that what is described as "complete treatment" of the sewage taken to the treatment works does not amount to 100% purification; that with efficient operation the proposed treatment plants should attain not less than an annual average of 85% purification of the sewage treated and that it is probable that the degree of purification will be 90% or more. The Master finds that the remainder of the storm flow, in excess of the volume treated in the sewage treatment plants, will pass into the Chicago River and its branches and into the canals of the

Sanitary District, and that any storm flow so passed will contain sewage and wastes which have not been treated by the sewage treatment works.

There was serious controversy as to the time within which the sewage treatment program could be completed. The Sanitary District estimated that twelve to fifteen years would be needed to complete the program in its entirety. The complainant States insisted that five to six years would be sufficient. The North Side plant would have been completed by December 31, 1929, but for the delay in construction during the current year on account of lack of funds. It is expected to be completed by April or May, 1930. The Sanitary District asked that July 1, 1930, be taken as the effective date.

The proposed Southwest Side treatment plant will take the longest to construct and thus is the controlling factor. The site has not yet been acquired. This plant will take care of the Stockyards' wastes in addition to domestic sewage, and the Sanitary District claims that further investigations are necessary in order properly to design the plant.

The Master reports that after consideration of all the evidence, the following times should be allowed for completion of the respective works: The North Side plant, July 1, 1930; the Calumet plant, December 31, 1933; the West Side plant, December 31, 1935; the Southwest Side plant, and with it the completion of the entire sewage treatment program, in nine calendar years, that is, by December 31, 1938.

With respect to the reduction of the diversion, the defendants point to the recent rise in the levels of Lake Michigan and of the other Great Lakes and urge that the necessity for immediate reduction in the diversion no longer exists. The Master has reported this evidence to the Court showing that in 1928 the mean level of Lake Michigan was approximately twenty-one inches higher than that for the year 1926, and that in 1929, there was a further decided rise so that in July the mean level of Lake Michigan was approximately three feet and nine inches higher than at the corresponding time in 1926. The Master states, however, that this change in lake levels which he reports for the information of the Court cannot be taken to modify the decision of the Court, under which he is acting, with respect to the legal rights of the complainants in relation to the diversion or as to the nature of the ultimate relief to be awarded.

The complainant States proposed a reduction of the diversion on December 31, 1929 (on the expectation of the completion by that time of the North Side plant) from 8,500 cubic feet per second to 6,500 cubic feet per second. These figures refer to the annual average direct diversion of lake water by the Sanitary District and are exclusive of the water pumped by Chicago for its domestic purposes. The Master reports that the annual average direct diversion by the Sanitary District of water from Lake Michigan should be reduced to 6,500 cubic feet per second on July 1, 1930. This is exclusive of pumpage.

It was not disputed that the practicability of a further reduction of the direct diversion during the construction of the sewage treatment program depends upon whether controlling works are installed in the Chicago River, or at or near the head of the Chicago Drainage Canal, in order to prevent the reversal of the Chicago River in times of storm, or whether the hydraulics of the Chicago River and Drainage Canal would permit the prevention of reversal of the River with the present controlling works at Lockport. That is, it was not disputed that there could be no further progressive reductions in the diversion pending the completion of the sewage treatment program beyond the point where substantial reversals of the Chicago River are prevented.

The Master finds that the evidence is not sufficient to warrant a conclusion that the present controlling works at Lockport would be adequate for this purpose.

The Sanitary District included in its program the construction of controlling works either in the Chicago River or at or near the head of the Drainage Canal. The complainant States stated that they did not regard such works as essential and that their construction should be left to the discretion of the defendants. In the exhibit of the complainants' program submitted by their sanitary expert, provision was made for a reduction of the direct diversion (that is, exclusive of pumpage) pending the completion of the sewage treatment works, and with control works built by December 31, 1932, to 5,000 cubic feet per second on that date, and to 3,000 cubic feet per second on December 31, 1933. No further reduction was proposed before the sewage treatment works were completed. The installation of new controlling works in the Chicago River, or in the Drainage Canal, these being navigable waterways, would necessarily be subject under the applicable act of Congress to the approval of the Secretary of War on the recommendation of the Chief of Engineers. The Master finds that, subject to the approval of the Secretary of War, controlling works should be constructed by the Sanitary District for the purpose of preventing reversals of the Chicago River at times of storm; that for this purpose the Sanitary District should immediately submit plans for such works to the Chief of Engineers and that such controlling works should be constructed by the Sanitary District within two years after receiving the authorization of the Secretary of War. The Master finds that when such controlling works have been constructed the diversion by the Sanitary District of water from Lake Michigan should not exceed the annual average of 5,000 cubic feet per second in addition to domestic pumpage. The Master finds that there is not sufficient evidence to warrant a present requirement for the further reduction to 3,000 cubic feet per second at the particular time stated by complainants, but recommends in his report that there should be a provision in the decree for an appropriate examination of results from time to time as the work of sewage treatment progresses. In this way there may be a reduction to 3,000 cubic feet per second or to such other amount as the Court may find to be feasible in the light of the situation then existing.

The complainant States asked that on the completion of the sewage treatment works all flow at Lockport should be enjoined, which would mean not only the entire cessation of the direct diversion by the Sanitary District, but also the termination of the discharge at Lockport of the pumpage, that is, of the water taken by the City of Chicago for domestic purposes and entering the Chicago River and the Drainage Canal as sewage. The Master finds that the question of pumpage is incidental to that relating to the direct diversion by the Sanitary District. These suits were brought to restrain the abstraction of water from Lake Michigan by the Sanitary District and not to challenge the right of the City of Chicago to take water from the Lake for its water supply. The Supreme Court in its opinion described these suits as brought "for an injunction against the State of Illinois and the Sanitary District of Chicago from continuing to withdraw 8,500 cubic feet of water a second from Lake Michigan at Chicago," and this amount of 8,500 cubic feet per second is the diversion by the Sanitary District allowed by the permit of March 3, 1925, exclusive of pumpage. The Master does not regard it as open to serious question that the City of Chicago under authority of the State has the riparian right to take water from Lake Michigan for the ordinary uses of its inhabitants and, if it were sought to prevent an abuse of that right through the taking of an unreasonable amount, it would be necessary to present that issue in an appropriate manner. The Master further expresses the opinion that if Chicago is entitled to take its water supply from Lake Michigan for the ordinary and reasonable uses of its inhabitants, it cannot be said that the State or the City is subject to any established rule of law which requires it to turn into the Lake what is no longer water but is sewage or the effluent of sewage treatment plants. If there were a way of destroying the sewage or sewage effluent altogether, or evaporating it, it does not appear that the State or the City would violate any right of the complainants in doing so. But as there is no means known at present of otherwise disposing of the effluent from the sewage treatment plants, it is assumed that it must either be turned into the Canal and River, thence to be discharged at Lockport, or be carried into Lake Michigan. The question of the disposition of the effluent from the sewage treatment plants thus requires consideration in connection with the award of relief as to the direct diversion by the Sanitary District.

The Master further points out that under the opinion of the Supreme Court in the present suits the question of the allowance of the diversion of water from Lake Michigan in the interest of a waterway to the Mississippi is not deemed to be open to consideration as the Court has found that Congress had not acted directly so as to authorize the diversion in question, and in the Rivers and Harbors Act of January 21, 1927, Congress had declared that nothing therein contained should be construed as authorizing any diversion of water from Lake Michigan.

The Master, therefore, in dealing with the question of what diversion, if any, would be necessary for navigation after the sewage treatment program had been full carried out, has considered the conditions in the Chicago River as a part of the Port of Chicago, as indicated in the opinion of the Supreme Court.

The characteristics and effect of the effluent from the sewage treatment plants when in full operation were estimated variously by the expert witnesses. The witnesses for the complainant States say that the effluent would be stable, odorless and clear; that conditions in the River would be greatly superior to those now obtaining and would not be detrimental to navigation. This was contested by the witnesses for the Sanitary District. The difficulties of prediction inhere in the attempt to estimate results on such a vast and unprecedented scale of sewage treatment as that involved in the disposal of the sewage of a population now estimated at over 3,500,000, with an additional population equivalent of industrial wastes of 1,500,000, and an estimated total of human population, and population equivalent of industrial wastes, of 6,800,000 in 1945. The experience of very much smaller communities, the Master says, affords little aid in determining the effect of this enormous volume of effluent from the sewage treatment works and the storm water run-off containing untreated sewage flowing into the channels of the Drainage Canal and the Chicago River. The complainants have suggested that outfall sewers or tunnels might be built to take the effluents directly to Lake Michigan, but the Master did not find the evidence to be convincing that this would be a reasonable requirement. The sanitary expert for the complainants stated that it would be practicable in the sense that it could physically be done, but that he did not mean that it was practicable in the sense that he would recommend doing it as an available means for the City in disposing of its sewage at this time. This would also still leave the problem of the storm flow. It was also suggested that circulating water might be pumped from the existing pumping stations into the Drainage Canal and the Chicago and Calumet Rivers which might create proper conditions in the Canal and Rivers, but it was testified that the result would be to carry whatever filth there was in these channels to the Lake more rapidly. The effluents from the sewage treatment plants and the storm water must go somewhere and the Master finds that if they are taken away from the Lake and discharged through the Canal at Lockport both the danger to the water supply will be removed and conditions suitable to navigation can be maintained. It is well established, however, that if the effluent from the sewage treatment plants and the storm water are to be discharged through the Drainage Canal at Lockport some flow from the Lake will be required. The Master concludes that, so far as the question can be determined at this time, the interests of navigation in the Chicago River as a part of the Port of Chicago, when the sewage treatment program has been carried out, will require that the flow of the Drainage Canal be discharged at Lockport and that for this purpose there will be necessary a diversion of water from Lake Michigan of an annual average of not less than 1,000 cubic feet per second and that it would be safer to allow a mean annual diversion of 1,500 cubic feet per second, in addition to pumpage. These amounts of 1,000 and 1,500 cubic feet per second are comparable with the 8,500 cubic feet per second now allowed.

The Master believes that this disposition will be in accord with the equitable principles which appropriately govern the exercise of the jurisdiction to determine controversies between States, a jurisdiction which is unfettered by technicalities and in the last analysis is for the purpose of establishing substantial justice. In the present instance, equitable considerations are those applicable with appropriate regard to the substantial rights of the complainants after the Sanitary District has carried out its program for sewage treatment. The Master points out that in his former report it was found to be possible to determine with approximate accuracy the full extent of a particular diversion of water from the Great Lakes; that a diversion did not operate to cause a continuous and never-ending lowering of levels, but that within practical limits under present conditions an approximate equilibrium would be reached within a period of time which could be calculated, after which the effect of the diversion would cease to increase. Accordingly, in the former report it was determined that the full effect of a mean annual diversion of 8,500 cubic feet per second of water from Lake Michigan through the Drainage Canal was to lower the levels of Lake Michigan and Lake Huron approximately six inches at mean lake levels; the levels of Lake Erie and Lake Ontario approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the above mentioned lakes, to the same extent respectively. It was also found that if the diversion at Chicago were ended, assuming that other diversions from the Great Lakes remained the same, the mean levels of the lakes and rivers affected by the Chicago diversion would finally be raised to the same extent as they had been lowered respectively by that diversion. On a similar calculation, the entire effect of a mean annual diversion of 1,000 cubic feet per second by the Sanitary District would be the lowering of Lakes Michigan and Huron approximately seven-tenths of an inch, and, of a mean annual diversion of 1,500 cubic feet per second, approximately one inch at mean lake levels. The Master states that it can hardly be maintained that a diversion not exceeding an annual average of 1,500 cubic feet per second would produce such a substantial injury to the complainants, when the fluctuations of lake levels due to other causes than diversions are considered, as to preclude attention to the serious consequences which may result from a failure to maintain suitable conditions in the interests of navigation in case all flow at Lockport should be terminated. In the Master's opinion, such an extreme requirement, after the Sanitary District has provided for sewage treatment so far as practicable, should await more exact knowledge as to its effect. It is also stated in the report, in accordance with the statement made before the Master by the Chief of Engineers that temporary diversions of a greater flow than the average annual diversion in order to prevent sewage contaminated water from a storm water run-off from reaching Lake Michigan will not affect in any sensible degree the levels of the Great Lakes.

The Master recommends that provision should be made in the decree for an examination of results after the completion of the sewage treatment works so there may be such further or other relief in respect to the diversion of water from Lake Michigan as may be found to be feasible. For this purpose the Master recommends that the decree should provide for semi-annual reports by the Sanitary District on July first and January first of each year beginning July 1, 1930, adequately setting forth the progress made in the construction of the sewage treatment plants, and also the extent and effects of the operation of such plants as have been placed in operation, and the average diversion of water from Lake Michigan from the entry of the decree to the date of the report. The Master recommends that, on the coming in of each of said reports and on due notice, any of the parties, complainants or defendants, may apply to the Court for such action or relief either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of the sewage treatment plants, or with respect to the diversion of the water from Lake Michigan, as may be deemed to be appropriate. It is also recommended that irrespective of the filing of such reports, any of the parties may apply to the Court for any further action or relief and that the Court shall retain jurisdiction of the suits for the purpose of any order or direction or modification of the decree or any supplemental decree, which it may consider at any time to be proper in relation to the subject matter of the controversy.

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IN THE

SUPREME COURT OF THE UNITED STATES.

October Term, 1929.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.
No. 7 Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 11 Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
No. 12 Original.

REPORT OF THE SPECIAL MASTER ON RE-REFERENCE.

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IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1929.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, *vs.* State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7 Original.
State of Michigan, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 11 Original.
State of New York, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 12 Original.

REPORT OF THE SPECIAL MASTER ON RE-REFERENCE.

Pursuant to the order herein, of January 14, 1929, the parties, the complainants and the defendants State of Illinois and Sanitary District of Chicago, having appeared before me at public hearings in the City of Chicago and in ~~the~~ City of Washington, District of Columbia, at various times between March 25, 1929, and October 4, 1929, and having presented their evidence, and the testimony of certain witnesses called by me having also been received, and the said parties having been heard in argument with respect to the findings of fact, conclusions of law, and recommendations for a decree, which they have requested, respectively, and the matter having been finally submitted on October 18, 1929, I have reported the testimony thus taken, with exhibits, by filing the same in the Office of the Clerk of this Court with my certificate; and I now submit to the Court the following report, setting forth my conclusions and recommendations for a decree.

The Questions Referred to The Special Master.

By its order of January 14, 1929, the cause was referred to me as Special Master "for further examination into the questions indicated by the opinion of this Court this day announced". After referring to the unauthorized increase of the diversion by the Sanitary District of Chicago, pending the suit of the United States, from 4167 cubic feet per second to 8500 cubic feet per second in order to dispose of the sewage in the Sanitary District, and to the exigency which was met by the permit of the Secretary of War of March 3, 1925, which permitted temporarily and upon stated conditions a diversion of 8500 c. f. s.,* the Court said (278 U. S. 367, 418-421):

> "It will be perceived that the interference which was the basis of the Secretary's permit, and which the latter was intended to eliminate, resulted directly from the failure of the Sanitary District to take care of its sewage in some way other than by promoting or continuing the existing diversion. It may be that some flow from the Lake is necessary to keep up navigation in the Chicago River, which really is part of the Port of Chicago, but that amount is negligible as compared with 8,500 second feet now being diverted. Hence,

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*For convenience, the abbreviation c. f. s. will be used for cubic feet per second.

beyond that negligible quantity, the validity of the Secretary's permit derives its support entirely from a situation produced by the Sanitary District in violation of the complainants' rights; and but for that support complainants might properly press for an immediate shutting down by injunction of the diversion, save any small part needed to maintain navigation in the river. In these circumstances we think they are entitled to a decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end. But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction.

* * * * * * *

"In increasing the diversion from 4,167 cubic feet a second to 8,500, the Sanitary District defied the authority of the National Government resting in the Secretary of War. And in so far as the prior diversion was not for the purposes of maintaining navigation in the Chicago River it was without any legal basis, because made for an inadmissible purpose. It therefore is the duty of this Court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis and thus to restore the navigable capacity of Lake Michigan to its proper level. The Sanitary District authorities, relying on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore they can not now complain if an immediately heavy burden is placed upon the District because of their attitude and course. The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion.

"Though the restoration of just rights to the complainants will be gradual instead of immediate it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project.

* * * * * * *

"To determine the practical measures needed to effect the object just stated and the period required for their completion there will be need for the examination of experts; and the appropriate provisions of the necessary decree will require careful consideration. For this reason, the case will be again referred to the Master for a further examination into the questions indicated."

The questions thus indicated are deemed to be these:

(1) What are the practical measures necessary for the disposition of the sewage of the Sanitary District of Chicago through other means than the diversion of water from Lake Michigan;

(2) Within what time can these sewage disposal works be completed and put into operation;

(3) What reductions in the diversion will be practicable immediately, and from time to time, pending the completion of the sewage disposal works;

(4) What diversion, if any, of water from Lake Michigan will be necessary for the purpose of maintaining navigation in the Chicago River, as a part of the Port of Chicago, after these sewage disposal works are in full operation?

Findings of Fact.

First. *The practical measures necessary for the disposition of the sewage of the Sanitary District of Chicago through other means than lake diversion.*

The area of the Sanitary District of Chicago (as increased in 1927) comprises approximately 442 square miles, extending from the Illinois State Line on the south and east to the boundary of Cook County on the north, with about 34 miles of frontage on Lake Michigan, thus embracing Chicago and its suburbs. There are 60 municipalities wholly or partly within its limits, with an estimated population of about 3,500,000.

1. *The present situation.*

There are at present within the Sanitary District six works for sewage treatment: the Des Plaines River Works, the North Side Works, and the Calumet Works, and the three small plants known as the Morton Grove, the Glen View and the North-brook.

The North Side Works are completed except that the North Side Pumping Station, which is essential to full operation, is still unfinished. There is also in course of construction the plant known as the West Side Sewage Treatment Works.

The permit issued by the Secretary of War on March 3, 1925, provided as one of its conditions that the Sanitary District should "carry out a program of sewage treatment by artificial processes which will provide the equivalent of the complete (100%) treatment of the sewage of a human population of at least 1,200,000 before the expiration of the permit" on December 31, 1929.

Colonel Schulz, Division Engineer of the Lakes' Division of the Corps of Engineers, United States Army, formerly District Engineer at Chicago, testified (March 25, 1929) as to the existing status of sewage treatment as follows:

"The present status of sewage treatment, including construction work carried out by the Sanitary District, covers the Des Plaines River, 47,000 people, on 100% basis; the Calumet Treatment Plant, 64,500, partly on an 85% basis, partly on a 33⅓% basis; the North Side Treatment Plant, 602,500, 85%. The North Side Treatment Plant is now in operation to the extent of taking care of some 200,000 to 250,000 population; but the 602,500 represents the 100% treatment which from a construction standpoint has been built.

"The West Side Treatment Plant, constructively, 722,200 people; at 33⅓%, 240,500.

"Three small plants, known as the Morton Grove, the Glen View and the Northbrook, 5,000 people, 85% basis, equivalent to 4,000, 100%.

"Total, 958,500 people on 100% basis at the present time.

"The permit runs to December 31, 1929, when the balance of the works are to be put in operation which would give the 1,200,000 population treatment required by this condition.

"In addition to this, the Corn Products Plant has relieved the Canal of an equivalent population of 360,000. This, added to the 958,500, would represent actual and constructive at the present time, of 1,318,500 population.

"When I use the word 'constructive' I mean the actual physical buildings that have been built but can not be placed in use for lack of some further construction to be carried on."

The Sanitary District of Chicago presented the following tabulation of sewage treatment works, and expenditures therefor, as of December 31, 1928:

(Defendants' Exhibit 1385)

DES PLAINES RIVER PROJECT:	*Expenditure to December 31, 1928*
Des Plaines River Sewage Treatment Works	$1,497,329.34

Des Plaines River Intercepting Sewer	713,508.61	
Elmwood Park Outfall Sewer	446,665.65	
Elmwood Park Pumping Station	25,984.33	
Broadview - Bellwood Outfall Sewer	458,727.23	
Oak Park Outfall Sewer	823,104.37	
		$3,965,319.53
CALUMET PROJECT:		
Calumet Sewage Treatment Works	$6,982,805.14	
Calumet Intercepting Sewer	8,545,382.47	
Calumet Pumping Station	1,533,532.65	
Calumet Power Plant	1,172,221.42	
95th St. Pumping Station	923,980.34	
		$19,157,922.02
NORTH SIDE PROJECT:		
North Side Sewage Treatment Works (Practically finished)	$18,949,483.06	
North Side Intercepting Sewer	11,724,146.60	
Evanston Pumping Station	505,917.67	
Evanston Intercepting Sewer	1,453,853.31	
North Shore Intercepting Sewer	796,212.17	
Clifton Ave. Pumping Station	32,651.56	
Niles Center Outfall Sewer	25,258.17	
		$33,487,522.54
WEST SIDE PROJECT:		
52nd Ave. Intercepting Sewer	$282,060.61	
Salt Creek Intercepting Sewer (Contracts 1 and 2)	2,820,000.00	
West Side Intercepting Sewer Contract No. 1)	3,140,000.00	
		$6,242,060.61
MISCELLANEOUS PLANTS AND SEWERS:		
Morton Grove Treatment Works	$66,384.06	
Glenview Treatment Works	103,516.41	
Northbrook Treatment Works	90,669.64	
Park Ridge Outfall Sewer	242,027.95	
		$502,598.06
		$63,355,422.76

2. *The program of the Sanitary District of Chicago for sewage treatment works.*

This program was presented on this re-reference through the testimony of Langdon Pearse, sanitary engineer of the

Sanitary District of Chicago. The sewage of the area of the Sanitary District of Chicago is to be treated in the four main projects known, respectively, as the North Side, the West Side, the Southwest Side, and the Calumet projects. The program involves modifications and extensions of the plans presented on the original reference, and provides for the addition of a large number of intercepting sewers in order to pick up all the sewage so far as it is practically possible of each of the four divisions of the total area of the Sanitary District and treat it in a single sewage disposal plant.

(a) The North Side project has been changed to include the area in general tributary to the Chicago River watershed on the North Branch. This area will include that part of Chicago north of Fullerton Avenue and in addition the City of Evanston and a number of villages. The sewage treatment works are located in the Village of Niles Center and constitute what is known as a modern activated sludge plant. Mr. Pearse testified that it was designed for a population of 830,000 and that on the completion of the North Branch Pumping Station the plant will be adequate for the entire area and for that population. He stated that at the present time there was a population of about 800,000 tributary to these works. The program of the Sanitary District contemplates certain additions in order to make adequate provision up to the year 1945. The designed basis for that year is 178 gallons per capita per day.

(b) The West Side project relates to the area south and west of the North Side project, including that part of Chicago between Fullerton Avenue and the Chicago River and Main Channel, the Loop district, and certain towns along Salt Creek and the lower Des Plaines River. The plant is under construction and is located in the Village of Stickney. It is designed to treat the sewage of a population of 1,850,000 persons, as of 1940, by sedimentation in Imhoff tanks, in addition to providing for the digestion of sludge brought from the North Side sewage treatment works. Upon the completion of the Imhoff tank plant and appurtenances, it is proposed to add an activated sludge plant. When the West Side works are finished, the Des Plaines River plant will be abandoned except for experimental purposes. The designed basis for 1945 is 216 gallons per capita per day.

(c) The Southwest Side project covers generally the region between the West Side project and the Calumet project. The plant has not been designed or constructed nor has the site been obtained. The program of the Sanitary District contemplates a plant to be located to the south of the West Side sewage treatment works and south of the Main Channel of the Sanitary District. Mr. Pearse testified that this plant is to be provided to take care of the domestic sewage of the project area and also the stockyards' wastes. The plant is to be of the activated sludge type with the necessary works and appurtenances. The designed basis of this plant for 1945 is 256 gallons per capita per day.

(d) The Calumet area lies to the south from Eighty-seventh Street. The initial installation was designed for a population of 225,000. The plant is to be extended so as to handle the increase of population of the present tributary area, as well as the population of an additional area, and will consist of Imhoff tanks and trickling filters, with the necessary works and appurtenances, so as to treat the sewage of a total population of 455,000 as of the year 1945. The designed basis for that year is 250 gallons per capita per day.

(e) The program of the Sanitary District includes the intercepting sewers, pumping stations, disposal stations and other works pertinent to its construction program, in order to collect and treat all the sewage originating within the boundaries of the Sanitary District of Chicago.

This program of the Sanitary District is summarized, with estimates of cost, in the following statement submitted in connection with Mr. Pearse's testimony:

(Defendants' Exhibit 1387)

THE SANITARY DISTRICT OF CHICAGO

Tabulation of Estimates on Sewage Treatment Program up to 1945 after Dec. 31, 1928.

Des Plaines River Project:	*Estimated Cost*	
(In its entirety including the proposed Des Plaines Intercepting Sewer extending to the City of Des Plaines, hooking up the sewage of the Des Plaines River Valley and bringing it to the West Side Works)	$4,025,000.00	
Hillside-Berkeley Outlet Sewer..	230,000.00	
		$4,255,000.00
Calumet Project:		
(This project will include enlarging the Calumet Sewage Treatment Works for complete treatment and to take care of the additional territory which is to be brought in)		
Calumet Sewage Treatment Works Enlargement	$11,718,000.00	
Calumet Intercepting Sewers (To bring in Colfax and South Park Avenues areas)	2,359,000.00	
Harvey Intercepting Sewer....	1,500,000.00	
Calumet City Intercepting Sewer	1,500,000.00	
California Ave. Outfall Sewer..	940,000.00	
Evergreen Park - Mt. Greenwood Sewer	725,000.00	
Blue Island Extension.........	750,000.00	
California Ave. - Evergreen Park Extension	1,000,000.00	
		$20,492,000.00
North Side Project:		
North Side Sewage Treatment ment Works (enlargement)...	$700,000.00	
Howard Street Intercepting Sewer	2,268,000.00	
North Shore Relief Sewer......	815,000.00	
Additional North Side Int. Sewer	1,000,000.00	
		$4,783,000.00

WEST SIDE PROJECT:		
West Side Sewage Treatment Works (To complete sedimentation plant)	$8,679,000.00	
West Side Sewage Treatment Works	31,890,000.00	
(This will include the additional works required for complete treatment)		
West Side Intercepting Sewer (Remaining contracts)	15,750,000.00	
Additional West Side Intercepting Sewers	2,000,000.00	
Oak Park Intercepting Sewer, District's share	3,500,000.00	
		$61,819,000.00
SOUTHWEST SIDE PROJECT:		
Southwest Side Sewage Treatment Works	$38,870,000.00	
(This will provide complete treatment)		
Southwest Side Intercepting Sewer	7,900,000.00	
South Side Intercepting Sewer	18,640,000.00	
Racine Avenue Pumping Station	4,025,000.00	
Connections	943,000.00	
Miscellaneous	439,000.00	
		$70,817,000.00
MISCELLANEOUS PLANTS AND SEWERS:		
Allowance for unforeseen additions or extensions of intercepting sewers and treatment works to provide complete treatment		$10,000,000.00
		$172,166,000.00
Chicago River Controlling Works		4,000,000.00
Grand Total		$176,166,000.00

This program of the Sanitary District embraces (in addition to sewage treatment works) the installation of controlling works at or near the mouth of the Chicago River, or near the northern or eastern terminus of the Drainage Canal, in order to prevent reversals of the river and the discharge at storm times of the sewage effluent and the storm water with untreated sewage into Lake Michigan. This part of the program will be considered later in connection with the reduction of the diversion of water from the Lake (*infra,* pp. 105-117).

Sewage Treatment Processes.

The description of the processes, to which the program of the Sanitary District refers, is briefiy as follows: The processes are sedimentation, followed by trickling filters, and what is called the activated sludge process.

The sedimentation—trickling filter—process consists of coarse bar screens, skimming tanks, grit chambers, sedimentation tanks, trickling filters, final settling tanks, and sludge drying beds. The coarse bar screens are used to remove large floating material; the skimming tanks intercept oil, grease and floating solids; the grit chambers remove the sand and grit. Imhoff sedimentation tanks have an upper compartment for sedimentation and a lower compartment for the digestion of the settled solids. Part of the organic matter passes off as gas, part is liquefied and part remains as sludge. After digestion the remaining material or sludge is removed and dried on sludge drying beds. Trickling filters which are used after the sedimentation process are underdrained beds. The clarified sewage from the tanks is sprinkled over the surface of the bed through nozzles. The unstable, putrescible organic matter is changed to stable, mineral matter.

The activated sludge process is similar to the sedimentation process in the preliminary steps. The sewage passes through coarse bar screens, grit chambers, fine screens or preliminary settling and skimming tanks, aeration tanks, and final settling tanks. As the sewage enters the aeration tanks it is mixed with activated sludge and a constant stream of air is bubbled up through the mixture serving both for agitation and oxidation. The final settling tanks are the next step. The sludge which settles to the bottom of these tanks is continuously removed, a portion is returned to the sewage as it enters the aeration tanks and the excess is disposed of either by pressing and drying for a fertilizer or by digestion in deep tanks.

Adequacy of the proposed sewage treatment works.

Mr. Pearse has been connected with the Sanitary District of Chicago since 1909, and as sanitary engineer has made a comprehensive and thorough study of its sewage disposal problems. He prepared the plans for, and supervised, the construction of the Calumet, Des Plaines River, North-brook, Glen View, Morton Grove and North Side Treatment Plants, of the Sanitary District and has provided plans for, and supervised, the existing work on the West Side Sewage Treatment Plant. He has also had considerable experience as consulting sanitary engineer in private practice. In connection with the Sanitary District work he has visited sewage plants of the United States, England, France and Germany for the purpose of ascertaining the best and latest methods. Mr. Pearse testified that the population served by these works at the end of fifteen years (1945) would be 6,366,000, including a human population of 4,785,000 and an additional number estimated at 1,581,000 for what is called "the population equivalent allowed for industrial wastes." Mr. Pearse stated that this program "would take care of the sewage of that population so far as present engineering knowledge would permit it to be taken care of." In his opinion, the plan submitted "for sewage treatment up to 1945 is the best plan that can be devised to take care of all the sewage of the population, whether the effluent goes to the Mississippi watershed or whether it goes to the Lake."

The growth of the population, within the District, after the year 1945, has been estimated at from 60,000 to 100,000 a year. Additional works will have to be added to carry the treatment forward and the Sanitary District has estimated an amount of $9,070,000 to make provision for this purpose to the year 1955.

The program does not include the treatment of all the storm water. The plants are designed to take care of about 50% in excess of the dry weather sewage flow.

The opinion expressed by Mr. Pearse as to the adequacy of the program of the Sanitary District was supported by other sanitary experts called by the defendants.

Harrison P. Eddy, of Boston, was graduated at the Worcester Polytechnic Institute in 1891; was employed by the city of Worcester as Superintendent of Sewage Treatment Plant and later, until 1907, as Superintendent of Sewers, having direct charge of the operation of the sewer system and sewage treatment. Since then, he has served seventy-five municipalities as consulting engineer including the cities of Boston, New Orleans, Louisville, Cincinnati, Buffalo, Pittsburgh, Dayton, Akron, Toronto, Milwaukee, Cleveland and Chicago. His first service to the Sanitary District of Chicago was as a member of a commission with George W. Fuller and T. Chalkley Hatton investigating the problem of the disposal of sewage from the North Side, called the North Side Treatment Project. He is now engaged on the sewage disposal work of Hartford, Connecticut, Rochester, New York, and Louisville, Kentucky. Mr. Eddy was one of the twenty-eight engineers known as the Engineering Board of Review employed by the Sanitary District of Chicago in September, 1924, to make a comprehensive examination and report. Since about the middle of February of this year (1929), he has been one of a group of engineers reviewing the whole sewage problem now confronting the Sanitary District. That group is divided into sub-committees and he is a member of the committee which has particular reference to sewage disposal, his associates being Dean Marston, President of the American Society of Civil Engineers, John H. Gregory, Professor of Civil and Sanitary Engineering in Johns Hopkins University, and Asa Phillips, formerly of the District of Columbia Sewer Department. Referring to the program of construction outlined by Mr. Pearse and to the various items mentioned in Defendants' Exhibit 1387 (*supra*), Mr. Eddy testified:

> "That program is based on the scientific principles upon which the successful treatment and purification of sewage must be founded. The allowances and bases of design which have been adopted are such as to assure satisfactory purification of the sewage, and the type and design of the works are in accordance with best practice and in accord with the latest developments of the art. They conform to researches which have been carried out in various places, and particularly by the District itself and are up-to-date. The art is rapidly changing. Even before these works can be completed, undoubtedly improvements will be suggested which should be investigated and very likely adopted, if they are found to be actual improvements. The program in so far as bases of design are concerned, should be considered in a measure tentative, depending upon investigations which will have to be made as the work is carried out and as the conditions change. But as of today, I consider that the program is in full accord with the best practice and the most modern ideas."*

Mr. Eddy further testified that the storm water designed to be taken care of in excess of the sewage flow is approximately 50% of the sewage flow. Taking the annual average storm discharge, he would expect that from 40 to 50% would be carried to the treatment plants and would be treated in the same manner, although perhaps not to the degree of efficiency, with which the dry weather flow would be treated. The degree of efficiency would be due to the effect of the storm water upon the treatment process.

Professor John H. Gregory, of Baltimore, another sanitary expert witness for the defendants, has been in active practice since his graduation at the Massachusetts Institute of Technology in 1895. From 1904 to 1909, he was in active charge of the design and construction of both water works and sewerage works of Columbus, Ohio. In 1909 and 1910, he was resident engineer of the Passaic River Valley sewage project and also was engineer with the Metropolitan Sewerage Commission of New York. From 1911 to 1917, he was a member of the firm of Hering & Gregory, consulting engineers in New York who designed the Albany Sewage Disposal Works and those in Trenton, New Jersey. From about 1920, he has been in charge of the Civil Engineering Department of the Engineering School and of the Sanitary Engineering Department of the School of Hygiene and Public Health of the Johns Hopkins University, also continuing in private practice. For the past eight years he has been consulting engineer of the Sewer Department of Baltimore in connection with the design and construction of large sewers and sewage treatment works. For the past three years he has been consulting engineer for Columbus, Ohio, in connection with its present sewage disposal program. He has served from 100 to 125 cities and towns in the United States on problems in relation to sanitary engineering. In 1925, he was one of a committee of three engineers to deal with the sewage situation at Detroit. Mr. Eddy was another one of this committee. Professor Gregory was also a member of the Engineering Board of Review of the Sanitary District in 1924, and from February of this year he has been serving as one of the group of engineers mentioned by Mr. Eddy with respect to the sewage disposal plans of the Sanitary District. He testified as follows in relation to the adequacy of the program which the Sanitary District has presented:

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*The complainants prepared an Abstract of the testimony presented by them on the re-reference, and the defendants prepared an Abstract of the testimony presented by both parties. Quotations in this Report from the testimony are taken, for the most part, from one or the other of these Abstracts.

> "From the standpoint of design and construction, I think the program mentioned in said exhibit" (Exhibit 1387, *supra*) "is a reasonable one. I have considered the main bases of design. The designs are in accordance with the best accepted practice at the present time, and in accordance with the present state of the art on sewage treatment.

> "Under this program, when the works are in operation, a portion of the storm flow will reach the sewage treatment works. The sewers of Chicago are a combined system, and whatever excess capacity there might be in the sewers over and above the dry weather flow at times of storm will carry the storm water to the treatment works, where that storm water, together with the sewage, will receive treatment. The remainder of the storm water would overflow into the water channels and the rivers.
>
> "When I speak of capacity of the sewers, I am referring to intercepting sewers. The intercepting sewers I undestand are designed for a capacity of 50% in excess of the dry weather flow."

3. *The Complainants' program.*

So far as the sewage treatment works are concerned, the complainants have not proposed any radical changes in the program of the Sanitary District of Chicago. They have not objected to the division of the territory into the projects above described, or to the collection of the sewage in one plant in each project area, or to the types of the plants designed by the Sanitary District or to the general methods of treatment proposed. The complainants state that a practical program for the disposal of the sewage of the Sanitary District by means other than lake diversion will be provided by completion of the North Side, West Side and Calumet sewage disposal plants, by the construction of the Southwest Side sewage disposal plant, and by the construction of a water filtration plant.

Complainants have presented their Exhibit 238 as a concise tabular representation of their program, including a statement of the dates on which they contend the respective portions could be completed. This exhibit (omitting for the present that portion of the exhibit which relates to the proposed limitation of the diversion (see *infra,* p. 88) is as follows:

(Complainants' Exhibit 238)

PROGRAM FOR DISPOSAL OF SEWAGE OF THE SANITARY DISTRICT OF CHICAGO BY MEANS OTHER THAN LAKE DIVERSION

Sewage Disposal Construction	Date of Completion
North Side Plant (Complete)	December 31, 1929
West Side Plant	
Tanks	December 31, 1929
Complete treatment	December 31, 1933
Calumet Plant (Complete)	December 31, 1932
South-west Side Plant	
Tank Treatment	December 31, 1932
Complete Treatment	December 31, 1935
Water Filtration Plants	December 31, 1934

The complainants say that this program for sewage treatment is substantially the same as the program submitted by the Sanitary District. That is, as stated in the complainants' brief, "the complainants' sanitary experts approve generally of the methods of treatment of the sewage proposed and the types of the various plants built or to be constructed by the Sanitary District of Chicago, although they recommend various changes in the method of operation of the plants, and do not approve the estimates of quantities or of costs which have been made on behalf of the Sanitary District."

L. R. Howson is the leading sanitary expert for the complainants. He was graduated from the University of Wisconsin in civil engineering in 1908 and received the degree of civil engineer from the same institution in 1912, for work done subsequent to graduation. Since 1913, he has been a member of the firm of Alvord, Burdick & Howson of Chicago, whose work consists of various phases of hydraulic and sanitary engineering, including sewerage and sewage disposal, water supply and water treatment. It appears that they have investigated sewerage and sewage disposal problems for a number of cities. In 1925, Mr. Howson's firm was retained by the War Department as competent and disinterested experts to make a thorough study of the disposal of the sewage of the Sanitary District of Chicago and questions relating to the diversion of water from Lake Michigan and in April of that year they made an elaborate report (signed by Mr. Burdick and Mr. Howson) to the district engineer at Chicago. Major General Edgar Jadwin, Chief of Engineers, testified that the War Department has been following the lead of this firm in relation to sanitary questions. Stating his conclusion as to what would be a practical program for the disposal of the sewage of the Sanitary District by means other than lake diversion in a manner that would not be detrimental to the Chicago water supply, Mr. Howson testified:

> "With respect to sewage disposal, such a program involves the completion of the North Side pumping station, and the placing in full operation of the North Side activated sludge plant. At the West Side it involves the completion of the work now in progress on the pumping station, Imhoff tanks, skimming tanks, and the sludge drying beds, for which contracts are let, and the installation of complete secondary treatment by the activated sludge process.
>
> "At the Southwest plant it involves complete treatment of the sewage through the preliminary process of tankage, followed by activated sludge treatment.
>
> "At the Calumet plant, the Imhoff installation now there should be enlarged, followed by secondary treatment of the sprinkling filter type.
>
> "In all these projects, of course, the necessary intercepting sewers to get the sewage to the plant are involved. That is substantially the program, as I understand it, outlined by the engineers for the Chicago Sanitary District, which I believe to be a good program, well adapted to meet the conditions.
>
> "No major modifications of the program of the Sanitary District to achieve the best practical sewage dis-

posal so far as the plants themselves are concerned are necessary. It would be wise to give the preliminary treatment to a larger per cent of the storm water overflow; that is, put it through the preliminary tanks and then by-pass it without putting it through the aeration tanks and secondary treatment. The program as a whole, with that modification, which is not essential, but which will somewhat improve it, is well adapted to the situation. Whether or not the North Side plant will require enlargement before 1945, may be contingent upon whether or not Chicago meters its water supply in the meantime. Aside from those minor things, the program is a good one.

"I am not affirming the correctness of the estimates involved in the construction of these various plants, but am referring to the efficiency of those plants from the sewage disposal viewpoint. With respect to water supply Chicago should install efficient filtration works for the entire supply."

George B. Gascoigne, sanitary expert called for the complainants, is a consulting sanitary engineer residing in a suburb of Cleveland, Ohio. He was graduated in civil engineering from the Ohio State University in 1910. In addition to his relation to a number of small works, he has been in charge of the investigation of processes of sewage treatment for the city of Cleveland and has been consulting engineer in the supervision of the construction of the Cleveland Southerly Sewage Treatment Works recently completed under his direction. This is a plant costing about $3,500,000 and serving about 300,000 persons. On the original reference in 1927, he testified that he had served about twenty-five municipalities upon major sewage projects. Since then he has visited many sewage plants in Europe. In cooperation with the engineering staff of the city of Buffalo, he is now employed to develop a comprehensive plan of sewerage and sewage treatment and to prepare, submit plans and specifications for the South Buffalo Sewage Works which will serve about 300,000 persons.

Comprehensive plans of sewage treatment have been completed under his direction for the westerly portion of Cuyahoga County, Ohio, covering an area of about 87,000 acres and estimated to cost eventually about $7,000,000. After stating what in his judgment would be a practical program for the disposal of the sewage of the Sanitary District, Mr. Gascoigne testified:

> "This is not exactly the same program for sewage treatment which was proposed by the Sanitary District. The difference is the possible substitution of aeration treatment at the Calumet site for trickling filters, and the treatment of from two to three times the average sewage flow instead of 50 per cent of the average flow, as proposed by the Sanitary District. The treatment of from two to three times the sewage flow refers to treatment in the preliminary tanks of the excess flow, and by-passing the final treatment. That would not require any enlargement of the present facilities but simply the use of the present facilities to a greater extent with nothing but the possible additional cost of operation.
>
> "The difference between the average dry weather flow and the average sewage flow is that the average sewage flow reaching the treatment works is the average of all the flows that arrive there, while the average dry weather flow is the average of the flows that reach a plant during dry weather flow conditions. The average sewage flow is usually about 10 or 15 per cent larger than the average dry weather flow, and the difference might be greater.
>
> "This program is intended to serve 1945 conditions. It is not necessary to enlarge the North Side Plant to serve 1945 conditions.
>
> "In this program I am not assuming larger or different facilities for sewage treatment than those contemplated for the Sanitary District in the program to which their witnesses have testified. I am assuming the same devices but operated a little differently."

Darwin W. Townsend, another of complainants' sanitary experts, has been engaged in sanitary engineering work for the past nineteen years, fourteen of which has been in connection with the activated sludge process of sewage disposal. From 1910 to 1914, he was employed by T. Chalkley Hatton, consulting engineer at Wilmington, Delaware, upon designs and the preparation of plans for sewage disposal, water filtration plants, and general water works systems. From 1914 to the present time, he has been employed by the sewage authorities of Milwaukee being at first chief draftsman, then engineer of designs and at present is assistant chief engineer. Mr. Hatton was Chief Engineer of the Sewerage Commissions of Milwaukee when Mr. Townsend entered that employment. It also appears that Mr. Townsend assisted Mr. Hatton on his report on the North Side Sewage Treatment Works in Chicago. Mr. Townsend testified that from 1917 to 1923, he was in charge of the preparation of designs for Milwaukee's activated sludge plant being under the direction of Mr. Hatton. He was in direct charge of preparation of plans for intercepting sewers, from 1923 to 1927, and has had general supervision of all construction and design work on behalf of the commissions of Milwaukee. He states that the total expenditures on this work from 1914 to date approximated $25,000,000. Mr. Townsend, after giving his views as to a practical program for sewage treatment in the Sanitary District of Chicago, testified:

> "This program is for 1945 conditions and substantially the plan for sewage disposal which has been proposed by the Sanitary District. It would be advisable to make provision for taking through the preliminary portions of the treatment plants a quantity of storm water equivalent to about three times the average dry water flow and by-passing the effluent between the preliminary tanks and the activated sludge tanks. This does not involve any enlargement of the plans but merely a different utilization of the preliminary

treatment plant. It is not necessary to enlarge the North Side activated sludge plant for 1945 basis."

Joseph W. Ellms, called for the complainants, is a consulting sanitary engineer residing at Cleveland. He was educated at the Massachusetts Institute of Technology and from about the year 1896 has been engaged in the investigation of water purification methods. In 1918, he was retained by the city of Cleveland as its engineer of water purification and started the filtration plant there. Since his testimony in the former reference in this proceeding, he has been in charge of the operation of that plant and also of the sewage disposal plant at Cleveland. He testified that he was familiar with the works that had been constructed by the Sanitary District of Chicago for sewage disposal and with the program which the Sanitary District had submitted. As to these, he said:

> "The works constructed or to be constructed, as proposed by the Sanitary District under this program, are, from the standpoint of present knowledge of the art of sanitary engineering, the best possible works to be constructed from any practicable standpoint to completely treat the sewage arising within the District."

The evidence does not, in my judgment, furnish a basis for a finding that enlargements are necessary in the sewage disposal plants as proposed in the program of the Sanitary District. The complainants state that the changes they propose in these plants relate to their operation. Mr. Howson said that his proposed modification would "somewhat improve" the program, but that the modification was "not essential." Mr. Gascoigne assumed that the change he proposed "would require no enlargement of the plants proposed to be built". Mr. Townsend said that no enlargement would be required, "but merely a different utilization of the preliminary treatment plant."

The complainants have not proposed the installation of a separate system of sanitary sewers. When the defendants presented testimony as to their estimates of the extremely heavy, and in their view prohibitive, cost that would be involved in that undertaking (estimated by William R. Matthews, engineer of the Bureau of Sewers of Chicago at over $400,000,000) counsel for complainants stated that complainants' program does not provide for any such sewer system; that the defendants had not advanced any program involving the construction of a separate sewer system for Chicago nor had the complainants. "Nowhere," says the complainants' brief, "have any of complainants' witnesses stated that there was any necessity to construct such a system". No plans have been furnished by the complainants for a different system of interceptors. It appears that Chicago has a combined sewer system and under the complainants' program the sewage reaching the treatment plants over and above the dry weather flow will depend upon the excess capacity of the sewers over and above that flow. The question raised by the complainants thus apparently depends on the method of operation of the preliminary treatment. As the suggested change does not appear to be regarded as an essential feature, its feasibility may be left to be determined in the course of the actual operations.

The complainants, however, state that the program they propose does materially differ from the one presented by the Sanitary District in two respects. The first is that the program of the Sanitary District contemplates a continued diversion of a certain amount of lake water, while the complainants propose that there shall be no diversion whatever or any flow at Lockport after the completion of the program. But this difference between the two programs does not relate to the character of the sewage treatment works, as such, but to the disposition of the effluent, a question which will be examined later. The second difference is that the program presented by the complainants provides for the installation of water purification works for all the domestic water supply of the City of Chicago. But the complainants recognize that the construction of such works is not a part of the program for the treatment of the sewage of the Sanitary District and in the findings of fact which the complainants have requested it is stated that, since the construction of water filtration plants is not an indispensable element in the practical disposal of the sewage by means other than lake diversion, the construction of such water purification works should be left to the discretion of the defendants. It also appears that the design and construction of water filtration plants for the City of Chicago is under the jurisdiction of that city which has not been made a party to this suit. Thus, what are stated in the complainants' brief to be the two material differences between the two programs do not relate to the sewage treatment works.

The complainants also say that while "they consider any additions to or modifications of their program, summarized in Exhibit 238, to be wholly unnecessary," they have pointed out that "there are several variations which might be incorporated in that program, if Chicago desired to improve the present standard or quality of its water supply, or entertained any honest doubt as to the efficacy of this program from the public health standpoint. These variations are the extension of the present intakes" (for the water supply), "the substitution of a new intake off the North Shore in the vicinity of Wilmette, chlorination of the sewage effluent and/or the installation of control works at the junction of the drainage canal and the Chicago River." The complainants say that they do not urge any of these modifications and in their proposed findings they state that the "construction or installation of any such additional works or structures should be left to the discretion of the defendants."

4. *Efficacy of the proposed sewage treatment.*

What is called "complete treatment" is not absolutely complete; that is, 100% purification does not appear to be practicable. The experts for the respective parties differ as to the degree of purification which will be achieved by the proposed sewage treatment works of the Sanitary District when completed and put in full operation. Mr. Pearse testified for the defendants that the "practical degree of purification is 85%. At times on monthly averages it may be 90 or even 92% for activated sludge process". On his cross-examination, Mr. Pearse acknowledged the correctness of the statement in a publication entitled "Engineering Works, The Sanitary District of Chicago, August, 1928" that the activated sludge progess "accomplishes from 85 to 95 per cent. reduction of the biochemical oxygen demand, 90 to 95 per cent. reduction of suspended solids and from 92 to 98 per cent. reduction in bacteria". He said that he was talking "of ranges on a large program". He felt "that we can do better than 85%. We may be able to average 90%." But he thought that the effect "should be evaluated when, as and if it had happened in actual performance."

Mr. Eddy testified on this point as follows:

> "The degree of purification to be accomplished will necessarily vary according to conditions. Under certain conditions it will be very high, fully 90%, possibly as high as 95% at times. Under other conditions the degree of purification will not be as high, and will drop to 85 or 80 or possibly lower.
>
> "The conditions which affect the degree of purification are the temperature, the storm flows, the industrial wastes which are discharged into the sewers, and other conditions which affect chiefly the biological action upon which the processes employed for the most part depend. Taking all of the plants into consideration, a general average of 85% of purification is a reasonable assumption."

Professor Gregory testified that 100% purification of sewage was not practicable; that the degree of purification depended upon a number of different factors,—"the season of the year, the rate of flow coming to the treatment works, and as to whether it is normal dry weather flow or carrying considerable volumes of storm water." It was his opinion that "by and large an annual average in the neighborhood of 85% can be accomplished."

The complainants attribute a higher degree of efficiency to the sewage treatment process. Mr. Howson testified:

> "A properly operated modern activated sludge plant will remove from 90 to 95% of the suspended solids, approximately 95% of the bacteria and 95% of the biochemical oxygen demand."

Mr. Gascoigne put the removal at "from 90 to 95% of the suspended matter, averaging 92%;" "of biochemical oxygen demand from 90 to 95%, averaging 92%," and "95% of the bacteria."

Mr. Townsend testified that a properly designed and efficiently operated activated sludge plant "should remove 95% of the suspended solids, 95% of the bacteria, and should effect a reduction of 96% of the biochemical oxygen demand."

Complainants also refer to the testimony of George W. Fuller, sanitary expert called for the defendants on the original reference to the effect that trickling filters with final sedimentation would remove 80 to 90% of the suspended solids, 90% or more of the bacteria, or possibly 95% so far as the B coli group of bacteria, which will not multiply, are concerned. Mr. Fuller added that the activated sludge process would be slightly more efficient depending upon operating conditions. He said that modern activated sludge plants have removed 98% of the bacteria.

The complainants contend that on the testimony presented by defendants the average efficiency of the proposed sewage disposal plants would be in excess of

90% and that, on the testimony introduced by the complainants, the average efficiency at ordinary times would be approximately 95%. The complainants also insist that practically 100% of the bacteria would be removed by chlorination of the effluent and that it is only bacteria which affect health.

As no works have yet been built which afford a demonstration on the scale proposed in the program of the Sanitary District, the evidence can be that of expert opinion only and the proof of actual efficiency must await the operation of the plants. The evidence justifies the conclusion that an average of 85% purification is the *minimum* that can reasonably be expected and that there is a strong probability that the average efficiency of the sewage treatment plants will be as high as 90% and it may be still higher.

There has been much controversy as to the character of the effluent from the sewage treatment plants operating with this degree of efficiency. For the defendants, Mr. Pearse testified that on the assumption of 85% purification, the remainder of 15% would represent "what the treatment has been unable to reach of the organic matter. Some of it may be finely divided colloidal matter of various compositions, and would represent also in a general way the raw sewage of a population equal to 15% of the total population from which the effluent is derived." He based this statement upon a test of the reduction of the biochemical oxygen demand. Hence, the defendants argue, on the assumption of a treatment of from 85 to 90% efficiency, that the effluent from the sewage treatment plants would be equivalent to the raw sewage or untreated wastes of 10 to 15% of the population. Mr. Pearse's attention was called to the pamphlet issued by the Sanitary District in August, 1928, which stated that in the activated sludge process, the effluent discharged from the final settling tanks is "a clear, non-putrescible, odorless liquid". Mr. Pearse testified that this is "a reasonably correct statement with the understanding that the term 'non-putrescible' is based on a particular type of test.'' The liquid is reasonably clear. At times there are degrees of cloudiness produced by the passage of suspended matter. There is a certain amount of very finely divided suspended matter that passes out of the tanks, that varies according to the skill of the operators.'' Mr. Pearse, in a hearing before the Committee on Rivers and Harbors of the House of Representatives in 1924, stated: ''The biological processes, such as sprinkling filters, or activated sludge, when properly operated, produce a high grade effluent, requiring no dilution, in which fish can live. The effluent, further, will create no nuisance, and can be turned into a water course, even though dry, without fear of consequences. Such a process removes about 80 to 90 per cent. of the bacteria. However, where bacterial removal is desired, sterilizing agents must be employed.'' On the original reference, Mr. Pearse admitted the foregoing statement, but said that he was endeavoring to explain the matter ''in a purely general, brief way to non-technical men.'' He reaffirmed that the statement was correct ''in that fish were living in the effluent of the Sanitary District trickling filters right at the filters. Young carp were living in the effluent, some shiners from Lake Michigan, and some others.''

Mr. Eddy testified:

> ''The sewage effluents will contain some relatively finely divided suspended matter. This is spoken of as floc. It looks like very small particles of sponge as it is seen in the settling tanks after aeration at the activated sludge plants. Such matter, although every provision practicable is made for its removal in the tanks, does escape in substantial quantities in the aggregate. These matters will tend to settle in the waterways by coalescing, forming larger particles, by being carried into quiet water where there is opportunity for sedimentation. They will become attracted to the sides and to structures like piles, piers, and constitute a

> sediment on the sides and on the bottom which will draw upon the supply of dissolved oxygen in the waters themselves."

The complainants call attention to a statement by Mr. Eddy in November, 1919, to the Board of Estimate of Milwaukee:

> "The activated sludge system will produce an effluent which is—speaking now in general terms—as good in appearance as the lake water itself. It won't show material color—it won't contain a noticeable quantity of suspended matter. It will be very low in bacteria, although in that respect there will be more than there are in the normal lake water, of course; it does not completely sterilize the sewage; and in all respects is an effluent which ought to be absolutely satisfactory. I think that there can be no question upon that point."

Dr. F. W. Mohlman, for ten years director of laboratories for the Sanitary District, who had made an investigation of conditions at Milwaukee during the past summer, testified that he had observed the effluent from various activated sludge plants and that it was not "clear, sparkling and odorless" as contended by complainants. As to the term "stability", the witness stated that "the term 'stable', 'stability', as applied to an effluent from a sewage treatment plant, refers to a chemical or biochemical determination which is made in a closed bottle in the presence of a dye, methylene blue. The disappearance of the blue color of this dye coincides with the disappearance of oxygen, both dissolved oxygen and ozygen present in nitrates. This is the extent of the stability test." On cross-examination he said that "turbidity" is one measure of clearness of a liquid," and he estimated that a good activated sludge effluent "might have a turbidity of twenty"; he said that it was not customary in the analysis of sewage effluents to test that; that the maximum turbidity of the drinking water at Chicago in April, 1927, was 115 parts per million, the average was 56 and the minimum was 8". Referring to the statement made by Mr. Eddy in 1919 (*supra*), Dr. Mohlman agreed that "in general terms" the activated sludge system will produce an effluent which is "as good in appearance as the lake water is at times."

The complainants' sanitary experts testified that the effluent of a modern activated sludge plant is "stable, odorless and clear". Mr. Howson said that the effluent of such a plant "discharged into an open channel, without dilution, will remain stable indefinitely." Combatting the view that the percentage which fell short of complete purification would be equivalent to the raw sewage or untreated wastes of a similar percentage of the population, Mr. Howson testified:

> "The residual organic matter in the effluent of an activated sludge treatment plant is very different from an equal percentage of the raw sewage as a potential source of nuisance. The organic matter in the raw sewage would be in coarse visible shape, would be in an environment which would not be capable of supplying the amount of oxygen necessary to keep it from putrefying, and it would putrefy. The organic matter remaining in the activated sludge effluent would be finely divided, practically invisible to the eye, would be in an environment of an effluent which contains an excess of oxygen in the form of dissolved oxygen or as nitrate oxygen, in excess of the demand of the organic matter, so that the organic matter remaining in the effluent would not subsequently putrefy. The available oxygen in the effluent of a well operated activated sludge plant is equal to or greater than the oxygen demand so as to preserve the stability of the effluent."

Mr. Gascoigne also testified on this point as follows:

> "Assuming 90 per cent treatment of the sewage of a city, the practical result is not equivalent to the

> discharge of 10 per cent. of the sewage of the city in a raw state. The objectionable substances of raw sewage may be classified as floating solids, fatty and oily products, settleable solids, non-settleable putrescible matters, and bacteria. The effluents from sewage treatment works providing 90 per cent. treatment, especially if it be of the activated sludge type, will be clear, sparkling and odorless, and have remaining in it of the above five substances, only a very small or minor part of the putrescible matter and bacteria. Therefore, the discharge of the raw sewage of say, 500,000 people or approximately 10 per cent. of the population estimated tributary of the Sanitary District sewage works in 1950 is an entirely different matter, from a nuisance and public health standpoint, from discharging in the Chicago River and its branches the effluent from sewage works serving,—say, 5,000,000 people."

Mr. Townsend said:

> "With respect to a comparison of the residual organic matter in the effluent of an activated sludge sewage treatment plant with an equal percentage of the raw sewage as a potential source of nuisance, from the standpoint of bulk, the organic load would be the same. However, from the standpoint of environment of the organic load in the two cases, there is a radical difference. In the case of the organic matter in the effluent, the effluent is rich in oxygen both in the form of dissolved oxygen and nitrates. This oxygen supply, being more than adequate to meet the oxygen demand results in stability. In case of raw sewage, the contained oxygen supply may be or rather is decidedly deficient, the net result being that the oxygen demand could not be supplied and putrefaction would result."

The effect of storm water overflow, in carrying with it untreated sewage and wastes, was recognized. Mr. Ellms, one of the complainants' witnesses, testified as to storm flow:

"Assuming that the controlling works were not operated and that there is no discharge from the canal to the Des Plaines River at any time, matters of sewage origin could not be prevented from reaching the Calumet River and Lake Michigan from the Chicago River. During storm times the quantity of entirely untreated sewage matter that would be discharged into the Chicago River and thence into the Lake, would depend on the amount of storm flow that was permitted to bypass the sewage disposal plants. The storm overflows directly from the sewers to the river would pass directly into the river. It might be possible that with storm flow some particles of sewage origin would be visible, but the dilution would be very great, as a rule, according to the amount of storm discharge. That would pass into the Lake.

"When the sewers first begin to spill over through these by-passes into the river, that is the time when one gets the large amount of accumulated sewage, etc., and heavy matter in the sewers.

"Intercepting or trunk sewers have overflows directly into the river. In using the word 'by-passing' I had in mind the sewage treatment plants themselves in which a certain amount of the strong storm flow would be treated in settling tanks first and then not carried through the complete process but the rest of the sewage by-passed.

"Assuming that the sewage treatment plants are completed in accordance with this program, and assuming a storm, the sewers, becoming charged with heavy flow, will increase the flow at the sewage treatment plants. As this flow increases it may be more than the different parts of the plant can treat completely; and consequently it may be necessary to remove some of the sewage before it has passed through all of the processes for which the plant is built, and this portion which is by-passed is what the witness had reference to before as being by-passed directly to the main outfalls and into the river. Also there are other outfalls or overflows necessary upon certain of the relief sewers which the witness understands carries water directly into the river, but which never passes through or into the plants. Such overflows are not carried to the plant at all.

"Such other flows consist of sewage and storm water which is not carried through the plant. As to that harmonizing with my view that the program is a complete system of sewage treatment, it is the usual practice, because otherwise there would be so much sewage carried into these trunk sewers and interceptors that no treatment plants would be large enough to carry them. I am referring to storm conditions. The overflow is at such ~~an~~ elevation that the sewers will carry a certain amount over the usual average flows and the plants are designed for the purpose of taking care of more than the dry weather flow. In the absence of storm, that is, under the normal condition without storms, no sewage would go directly into the river after this sewage treatment program was completed. The sewage to which the witness referred as passing into the river in time of storm, in addition to that which would be by-passed at the sewage treatment works, was from the relief overflows along the interceptors.

"The method of treating the dry weather flow and a certain percentage of the storm water flow is the common and usual practice. I do not know of any city in this country with a combined sewer system where the combined storm water flow and the sewage are treated. I think a very large proportion of the storm water is treated in some plants in England by tank method of settlement. That is not complete treatment. The entire flow is not given complete treatment. I had some recollection that there were certain plants in England that did tank all of their storm flow. I cannot mention any of them,—I do not remember one."

Conclusions. With respect to the defendants' program for sewage treatment works, I find:

(1) That the completion of the North Side, West Side, Calumet, and Southwest Side Sewage Treatment works,

above described, with their appurtenances and the necessary intercepting sewers, and the efficient operation of these plants, will afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes of all the area comprised within the Sanitary District of Chicago, and also, in times of storm, of approximately 150% of the ordinary dry weather flow of sewage and wastes; that in the actual operation of these plants it may appear that a greater amount of the storm flow can be treated at least in part.

(2) That what is described as "complete treatment" of the sewage taken to the sewage treatment works (that is, apart from the excess storm flow which remains untreated) does not amount to 100% purification; that with efficient operation the proposed sewage treatment plants should attain not less than an annual average of 85% purification of the sewage treated, and that it is probable that the degree of purification will be 90% or more.

(3) That the remainder of the storm flow, in excess of the volume treated in the sewage treatment plants, will pass into the Chicago River and its branches, and into the canals of the Sanitary District, and any storm flow so passed into the river, its branches and the canals, will contain sewage and wastes which have not been treated by the sewage treatment works.

Second. *The time within which the sewage disposal works can be completed and put into operation.*

General Estimates. While the sanitary experts of the respective parties are in close agreement as to the appropriate methods of sewage treatment and the proper types of treatment plants, there is a wide difference in their estimates as to the time that should be allowed for the completion of the Sanitary District's program.

Defendants' witnesses. The sanitary experts of the defendants estimate that from twelve to fifteen years will be required for the completion of the sewage treatment plants.

Mr. Pearse testified (referring to the program summarized in Defendants' Exhibit 1387):

> "It is my opinion that it will take in general fifteen years to carry out the program; assuming that everything was to go right and the money was readily forthcoming as required by the engineers, we might complete it in twelve years. If, on the other hand things do not go right, if we have delays that are contingent upon public delays of various character such as have occurred here through injunctions, it might be more than fifteen years.
>
> * * * * * * *
>
> "I think that fifteen years is a fair estimate, and even if the work were private work, to complete it in that time would be subject to commendation. It is difficult to fix exact times for this kind of work because of the unknown factors in figuring ahead from twelve to fifteen years."

On cross-examination he further testified:

> "A private corporation might do it in twelve years, but I doubt whether a municipality here, under the experience that I have had in eighteen years, could do it in less than twelve years, and in figuring the time I assumed that the funds would be forthcoming for the work; that there was no question of limit of funds and I based my opinion as to time also upon a knowledge of the volume of work that can be routed through an organization like the Sanitary District and handling it with the contractors that are available to do that work and the speed which they have exhibited in handling

such work; that I have had to take the yardstick of dollars; that it is very difficult to analyze work the way counsel have tried to drag it out on cross examination by taking each particular part of the works, and the volume of work was estimated in dollars that the Sanitary organization has been able to do in the past four years; that the volume of work that the Sanitary District has been able to put out averaged about $5,000,000 a year; that the total amount of sewage treatment works in the program is very close to $100,000,000 so that it would be necessary to double the amount of work that has been actually routed through the organization in order to design the work and get out all the plans that are needed in ten years. When contract plans are made, you are not through the job. You have hundreds, even thousands of plans that come in from contractors that have to be checked. There are supplementary plans. Frequently it is necessary to re-draw the plans because the contractor comes in with a new foreman on the work and it has to be re-designed. Work has to be re-designed frequently to fit the contractors' plant.

". . . The sewers may be built in the time it would take to build the treatment works. Design work on treatment works must be co-extensive on two or three works at the same time. You cannot take the whole of the plant and design the whole of it at the start. We would want to get working on two plants and carry them along. Measurement of time depends on an estimate of expense."

Mr. Eddy's estimate of the time for completion of the program was from thirteen to fifteen years. He said:

"With reasonable allowance for inevitable delays which cannot be specified in detail, but which are well known to exist on almost all work of this kind, a period of say thirteen years for construction, with perhaps an allowance of two years for delay, is as short a period as is suitable for the design, construction, tuning up and placing in full complete operation of the treatment works. That time can probably be reduced somewhat. If it is done, however, it will be done at an increase in cost of work, not only actual cost, but in decrease in value of work when it shall have been completed.

"The reasons why I have fixed the time of completion of the entire program at from thirteen to fifteen years are:

"Development of a suitable personnel in the engineering office for design; the thorough investigation and studies of preliminary design, as to the exact process to be adopted; investigation of the industrial wastes for the Southwest Plant. This is an important factor not only with respect to the plant itself, but with respect to the success of the plant; type of plant, the dimensions of the plant, the success of the plant in operation, depends in very large measure upon the character and quantity of the industrial wastes.

"No investigation of that subject has been made for some twelve years. Industrial wastes are estimated to represent about 50% of the load upon the Southwest Plant. An investigation of that subject should be made, in my judgment.

"In addition, there is the ordinary preparation of detail drawings and designs. The actual construction work must be laid out and conducted in such a way that there shall not be conflict of contractors, so that all contractors, are able to work to advantage. Time is required for tuning up and testing the plant, after it shall have been completed. A long period of time, as much as a year, frequently is required before the plant can be efficiently operated, after it has been practically completed, due to the necessity of testing and adjustments, in some cases new parts and making the plant thoroughly effective.

". . . There is not much difficulty in securing the ordinary designers and draftsmen. The delay comes in securing the key men necessary to carry the work forward in an efficient manner.

"Whenever an organization is increased, it is almost always the case that there is a loss of efficiency due to the new men. For the increase in the District's office to carry out the program in accordance with the time I have suggested, there might be a period of a year and a half to two years required before the design department is brought to a high standard of efficiency. That will mean delay. It will also mean expense, the discarding of designs and drawings."

Professor Gregory testified:

"The length of time is dependent upon the time necessary to get the Southwest Side Sewage Treatment Works into operation. The sewers and sewage pumping stations can be built at least within the time needed to build the Southwest Side Works. Barring any unforeseen delays which very frequently, or often, occur on large work, it would require somewhere from twelve to fourteen years. I think twelve would be a minimum, which would require very expeditious designing and construction. They might be built in twelve years. But providing for some factor of safety, twelve to fourteen years is proper.

"In making the estimate of time, I have assumed that the moneys for the construction work would be provided as and when needed.

"My reasons for this estimate of time are based upon the fact that the Southwest Side Works involve the problem of handling and treating a large amount of industrial wastes from the Stock Yards; that the first step in the problem would be the ascertaining of the present conditions with reference to the Stock Yards' wastes, of which there has been no investigation since 1917, and it should be ascertained whether the conditions are now as they were then; that six months to a year may be needed for that investigation; that time is needed for a decision as to the type of works after the character of these wastes is known, that time would be required for the acquisi-

> tion of the site; that time will be needed for the study of preliminary layouts—arrangement of the works to best serve the treatment of such sewage and how they can be arranged on the ground available; that after a decision has been made as to arrangement, considerable time for the preparation of the contract plans and specifications for the first heavy contract work would be required; that after that is started, the problems of design and construction would go along together and subsequent contracts would be made to provide for the complete construction of the work; that at the end of the construction period a time is needed for what is often spoken of as tuning up and adjustment; that there is another problem which enters very largely into the time element, and that is the question of designing force; that it is very difficult to get high-grade competent engineers, especially those who may have had some experience along the line of works which have to be built."

The defendants also refer to the testimony of George W. Fuller, an eminent expert of broad experience, who testified on the original reference as follows:

> "I think it would be 1945, assuming that the District has funds in hand, before it could complete the program that was reviewed and approved by the Engineering Board of Review and adopted by the Trustees of the Sanitary District two years ago."

Complainants' witnesses. The general estimate of the complainants' sanitary experts of the time required for the completion of the entire program for the sewage treatment works was from five to six years. Mr. Howson testified:

> "Assuming the funds to be available, from five to six years would be a reasonable period of time for the design and construction of the work involved in the

> program, which I have outlined. I have made an estimate of the time of completion of the various sewage disposal plants involved in this program on the basis of a reasonable allowance of time, but proceeding as rapidly as possible without unduly increasing the expense."

In complainants' Exhibit 238, Mr. Howson put as the latest date for the completion of the entire program, December 31, 1935. As to the basis of his estimate, Mr. Howson said:

> "The basis of my conclusions with respect to the period of time required for the design and construction of the various plants involved in the sewage disposal program is that the design of the major units, either Imhoff tanks or aeration tanks, could be completed in approximately six months' time and that approximately two months additional would be required for contractors to figure and the taking of bids, so that the first construction would probably start in some eight or nine months. The other plans could be going along concurrently and the entire design completed in a year and a half. Such a design program would permit the uninterrupted continuation of construction work from the date when construction was begun on the first unit. This program contemplates the designing being done by three organizations, one of which would be the Sanitary District and the other two probably done in consulting engineering offices. The employment of consulting engineers to design two of these plants would not increase the cost. That part of my estimate of time which involves the construction period of these plants is based upon a knowledge of construction progress in large work including progress on some of the more important work of the Chicago Sanitary District. It is also based upon estimates and data complied by experienced contractors and builders, with whom I have consulted.

> "This program contemplates the concurrent construction of several plants. That is practical from a construction standpoint."

In the report of Alvord, Burdick & Howson to the War Department in April, 1925, which was in large part Mr. Howson's production, and the statements in which he testified were accurate as to the facts and sound as to opinions, it was stated:

> "It would be our opinion that five years' time, under average construction conditions, would be a reasonable minimum estimate of the time required to design and build the intercepters and sewage treatment plants at the costs herein outlined. Even with the most unfavorable construction conditions, the contingency of labor troubles, and similar delays, we can see no reason why the period should exceed eight to ten years.
>
> "All of the above is predicated upon the ability of the Sanitary District to finance the program within the construction period."

Mr. Gascoigne testified:

> "Assuming the funds to be available, from five to six years would be a reasonable period of time for the design and construction of the sewage disposal plants involved in this program."

He said that there should be full operation of the Southwest Side plant, which would take the longest time to finish, by December 31, 1935.

The basis of his opinion was given as follows:

> "The basis of my judgment as to the period of time required for the design and construction of the various plants is that a major contract for one of these larger plants, such as the aeration tanks and the sludge settling tanks could be put under contract in a period

> of nine months, six of which would be necessary for the design, about two months for the receiving bids, and another month for the awarding of contracts, and that the complete design for one of these larger plants could be completed in a year and a half. That process of designing would permit uninterrupted continuation of the construction program on an individual plant.
>
> "This estimate of the time for design and construction of these plants does not contemplate that all of the designing work will be accomplished in the Sanitary District municipal offices; but that the design of the intercepting sewers will be completed by the engineering department of the Sanitary District, which will also design one of the larger sewage treatment works; and that two of the larger sewage treatment works will be designed by outside engineering organizations. The employment of consulting firms of sanitary engineers to design two of these sewage treatment plants would not increase the cost.
>
> "The basis of my judgment in estimating the time required for construction is my experience in constructing similar works, the progress which has been made on the North Side Sewage Works, and consultation with construction engineers and contractors who have gone into this matter in detail."

On further examination, Mr. Gascoigne stated that he had allowed practically six years and a half altogether for the completion of the Southwest Side Plant.

Mr. Townsend testified that the entire program could be carried out, assuming the funds to be available, and assuming such progress as could be made without materially increasing the cost, in a period from five to six years. On cross-examination he stated that he allowed the five year period for construction and he would add a year and eight months for contingencies. So that, referring to the Southwest Side plant, he "would make the time six years and eight months for completion from the present time."

In the above mentioned report of Alvord, Burdick & Howson to the War Department data were assembled relating to construction progress on Sanitary District contracts and on certain other enterprises of large magnitude. Among these the following may be mentioned:

Description	Approximate cost	Start of Work or Date of Contract	Date of Completion	Period of Construction	Ave. Exp. per year in Period
Sanitary District Work:					
Calumet Treatment Works..	$6,125,000	19~~22~~ 20	1922	2 yrs.	3,000,000
North Side Treatment Works	5,900,000	1923	1926**	3½ yrs.	1,700,000
Chicago Produce Market	17,000,000	1925	1925	6 mos.	34,000,000
Union Station (Chicago)	60,000,000	1916	1925	9 yrs.	6,660,000
Greater N. Y. Water Supply..	176,000,000	1907	1917	10 yrs.	17,600,000
Milwaukee Sewage Disposal Plant	8,167,000	1918	1925	7 yrs.	1,160,000

**Date of completion in contract.

The defendants point out that the North Side Treatment Works, as shown by defendant's Exhibit 1385, cost about $18,950,000; that preliminary studies for the design of this plant were started in 1921 and that, while the first contract for the aeration tanks was let in August, 1923, the works consisting of the aeration portion of an activated sludge plant, were placed in operation about October, 1928. The pumping station which is essential to the complete operation of the plant is not yet finished (*infra*, pp. 45, 46).

With respect to the Milwaukee Sewage Disposal Plant, Mr. Townsend testified on cross-examination that preliminary plans or study plans were prepared as far back as 1916; that the first contract plans were begun in 1918; that the first contract was let in December, 1918, that work was begun in February, 1919, and that the plant was put in operation in June, 1925; that the plant to its designed capacity began operating constinuously in January, 1928. This delay in full operation, Mr. Townsend explained, was incident to the manufacture of commercial fertilizer at Milwaukee which involved a dewatering process undemonstrated up to that time. He said that this difficulty would not have arisen if the sludge had been disposed of in sludge drying beds.

Reference was also made (on the cross-examination of Mr. Gascoigne) to the time taken for the completion of the activated sludge plant at Cleveland. Mr. Gascoigne stated that demonstration and experimental work as regards activated sludge "oriented around the years 1915 and 1916"; that there were a number of preliminary studies; that the project drawings for the Southerly Sewage Works at Cleveland were submitted in July, 1924; that the plans and specifications were completed in March, 1925; that bids were received in October of that year; that the contract was awarded in March, 1926; that the date for completion was fixed by the successful contractor at November 1, 1927; that the plant went into operation about July 1, 1928 and was believed to be in full operation at the time the witness was testifying (April, 1929). This is apart from sludge beds for which proceedings to award contract are under way. The sludge has been stored in the bottom of the Imhoff tanks.

The evidence as to the time of the completion of each of the sewage treatment works, separately considered.

The controversy becomes more sharply defined as each of the treatment plants of the Sanitary District is considered by itself. The main dispute relates to the treatment works themselves, as there is no reason to doubt that the intercepting sewers and isolated pumping stations can be provided within the time required for the construction of the treatment plants.

North Side Treatment Works (*supra*, p. 8). There is no substantial controversy with respect to these. They are practically complete except for the North Side Pumping Station. At the early hearings on the re-reference (March-April, 1929) it was assumed that this pumping station could be finished so that the works could be put into full operation by December 31, 1929. But on account of lack of funds the work was suspended. Funds have recently been provided and Mr. Ramey, the assistant chief engineer of the Sanitary District, testified (September, 1929), that the pumping station was now seventy-five per cent. completed and that it would require about six to eight months more to finish it. He expected that the North Side plant would be in full operation by April 1 or May 1, 1930. The defendants' proposed findings give July 1, 1930 as the effective date.

Calumet Treatment Works (enlargement, *supra,* p. 9). Mr. Pearse, for the defendants, testified that it might take between two years and two years and a half to design this plant. He allowed, roughly, "a period for design and construction of something like four to four and a half years." The present plant was built in about two years; the work of construction was commenced during October, 1920, and the works were placed in operation in September, 1922.

Mr. Eddy, for the defendants, stated that the design for the Calumet Complete Treatment Plant should be started at once, following early with construction and should be in operation January 1, 1936. He gave no special reason for this long period, that is, aside from the general considerations to which he testified in giving his estimates for the completion of the entire program as above stated.

Complainants' program (Exhibit 238, *supra,* p. 18) puts December 31, 1932, as the date for the completion of the Calumet plant. This was supported by the testimony of Messrs. Howson, Gascoigne and Townsend. Mr. Howson's testimony was that "the additional Imhoff tanks, the sprinkling filters and the secondary sedimentation tanks, that is, the complete process for Calumet" could be in operation by that date.

On all the testimony, including that of Mr. Pearse, it seems to be a reasonable conclusion that this plant can be completed, provided that the work proceeds promptly, and concurrently with other work, by December 31, 1933.

West Side Treatment Works (*supra,* pp. 8, 9). There is little disagreement with regard to the time for completion of Batteries A and B for sedimentation. Mr. Eddy testified that these should be completed and in operation January 1, 1930. Professor Gregory fixed January 1, 1930, for the first battery and "sometime in 1930" for the second battery. Mr. Ramey stated (September, 1929) that Battery A was complete; that Battery B was seventy per cent. complete and would require from five to six working months to finish; that the sludge drying beds would require a year to complete, but that some of the beds would be ready by June 1, 1930. The complainants' witnesses (testifying last April) put the completion of the two batteries at December 31, 1929.

As to the third battery (C), Mr. Eddy testified, for the defendants, that it should be in operation on July 1, 1932, and that the complete treatment plant should be in operation January 1, 1941. Professor Gregory's estimate was that the remaining sedimentation works for the West Side plant should go into operation "sometime in the year 1933" and the complete treatment works about January 1, 1942. He added that he had contemplated starting the design for these works at the beginning of 1932, and that if the design could be started earlier the date of operation would be somewhat advanced.

For the complainants, the time for the completion of the third battery and also the aeration tanks so as to effect complete treatment at the West Side plant was fixed by Mr. Howson at December 31, 1933; by Mr. Gascoigne at December 31, 1934; by Mr. Townsend at December 31, 1932.

The long time allowed by defendants' witnesses for the completion of the West Side Treatment Plant (1940-1941) does not seem to me to be justified. The estimate apparently depends in considerable measure upon a contemplated order of precedence of work on the defendants' program and does not seem to comply with the demand of the opinion of this Court for reasonable expedition. The site has been acquired, the contemplated methods of treatment have been the subject of investigation and careful study for a long period; and while the proposed works are on an extensive scale they embody processes with which the staff of the Sanitary District has become expertly familiar.

The evidence shows that, at all events, this plant can be completed, if the work is prosecuted concurrently with the rest of the defendants' program, well within the time which may be allowed for the construction of the Southwest Side Treatment Plant, and my conclusion is that the West Side Treatment Plant should be completed and in operation by December 31, 1935.

Southwest Side Treatment Works. This plant is the critical, or controlling, factor in the program of the Sanitary District as it admittedly will take the longest time to construct. It is to be a vast plant, three times as large as the North Side Treatment Plant, according to estimated quantities. The defendants emphasize the general considerations with respect to organization, personnel, the time required for special investigations, preliminary studies, designs and plans, as already stated, that is, in substance, what has been quoted from the testimony of the sanitary experts Pearse, Eddy and Gregory.

Mr. Eddy testified that the portion of this plant which is planned for sedimentation should be in operation January 1, 1936, and the entire plant, for complete treatment, January 1, 1943.

Professor Gregory said that the complete treatment works should go into operation "sometime in 1942". He said that "to completely design the Southwest plant from A to Z would require from three to four years." But he said further:

> "Aeration tanks might be the part of the work that would take the longest to design. If you made no allowance for any preliminary studies at all and no allowance at the end of the construction for tuning up, the construction time would be three years, the design

> time two years, making five years for the construction of the Southwest Side Plant. Leaving out the tuning-up period, the period of construction and design would be five years, but not taken as a whole. I didn't say that I thought the whole design would start on the first day. I have given you my best judgment as to the reasonable period for carrying on the design of some portions of the work after some other portions had been put under contract and were under construction. Some of the structural designs would be carried on simultaneously and some of them would be deferred."

The complainants' program (Exhibit 238) puts the date for the completion of the tank treatment at this plant December 31, 1932, and for complete treatment December 31, 1935. Their sanitary experts, Howson, Gascoigne and Townsend testified to this effect. Mr. Gascoigne stated:

> "I allowed four years for completing the plant after the contracts were let. I have allowed practically six and one-half years altogether for the completion of the plant. I did not allow two and one-half years for whatever is necessary up to the time of letting contracts. I have allowed a year and a half to prepare plans and specifications, four years for construction, and a six to twelve months period to take care of the tuning up and getting things into shape and to provide for contingencies that nobody can tell about in advance. I have allowed one and a half years for everything that I think necessary up to the letting of the contracts."

Mr. Gascoigne further testified that he allowed 1,000 working days as the time for construction in the four year period.

Mr. Townsend estimated five years as the time for construction and added a year and eight months as a reasonable safety factor for contingencies, making in all six years and eight months.

Steps preliminary to the physical construction of the Southwest Side plant.

Acquisition of site. The Sanitary District has had in contemplation for this plant about six hundred acres lying to the south of the West Side plant and south of the main channel of the Drainage Canal. This location has been designated generally by the Sanitary District on its map, but the site has not yet been acquired. Mr. Henry A. Berger, recently elected a trustee of the Sanitary District, testified as to its difficulties. He stated that under the statutes of Illinois it is a condition precedent to condemnation proceedings that a *bona fide* offer of purchase should be made to the owners of the land sought to be acquired. The Sanitary District could not make such an offer without the moneys being available, and it was without funds. The legislature of Illinois had required the Sanitary District to submit its bond issues to a *referendum.* It had not made such a submission to the voters of the District but, immediately following the decision of this Court in January last, the Sanitary District sought authority from the legislature to issue bonds, without a *referendum,* unlimited in amount but limited to the specific purpose of carrying out any decree of this Court, or any order of a department of government or any act of Congress. Much opposition developed to the granting of this authority. It was at a time when charges had been made with respect to the padding of the payrolls of the Sanitary District and the payrolls had been reduced from about 5,000 to about 1,300. There was also a grand jury investigation into charges of mal-administration. After discussions, an amendment was introduced limiting the amount for a bond issue, without a *referendum,* to $40,000,000, and specifying the projects to be covered. The bill in that form passed in the State Senate, but there was opposition in the House. After consultation with the Governor, the amount was fixed at $27,000,000. An amendment to attach a *referendum* clause was defeated in the House by a majority of one. In the Senate the bill finally passed wi a margin of one vote and in the House with a majority of seven. The legislation became effective on July 1, 1929. The Sanitary District prepared the necessary bond ordinances, a contract for the printing of the bonds was made on competitive bids, as required by statute, and the bonds were offered for sale in August. The highest bid received (92½) was regarded as too low and the bids were rejected. The bonds were advertised and a bid of 93.89 was accepted. The bonds had a ready sale and a credit resulted to the treasury of the Sanitary District about September 20, 1929.

On taking up the question of acquiring the contemplated site for the Southwest Side Plant, it was found that the proposed tract had been sub-divided for purposes of sale in lots and that there were many separate owners. The Sanitary District has considered another site in the same general location, but from a quarter to half a mile further west, and this project at the last hearing on this re-reference was under consideration by the engineers of the Sanitary District. This question can be determined promptly and there seems to be no reason why proceedings for purchase or condemnation should not go speedily forward. It is stated that under the practice in Illinois condemnation suits are expedited. It appears that under the law of Illinois possession cannot be taken until judgment in condemnation has been entered and the money paid, or secured in case of appeal by the owner.

In the estimates given by the complainants' witnesses, it does not appear that time has been allowed for the acquisition of the site. Mr. Howson's estimate of from five to six years, or according to Complainants' Exhibit 238, to December 31, 1935, was apparently for design and construction. Mr. Gascoigne testified that he did not know whether the site for the Southwest Side plant had been acquired. He allowed a year and a half for what was necessary up to the time of letting contracts. While he did not profess to be familiar with the Illinois law, he seemed to be under the impression that it would be sufficient to start condemnation proceedings and that construction could proceed on giving a bond to cover the final award. Mr. Townsend testified that he "did not take into consideration the question as to whether the site had been acquired." His estimate of time was based, he said, entirely upon his opinion and knowledge of the time required to construct the Milwaukee plant. He said that the site for that plant was available from the start, as it was city property. Mr. Townsend estimated that the work of construction could be done in five years and he allowed an additional year and eight months for contingencies, whatever they might be, which he thought would cover the acquisition of a site.

It is manifest that the time within which the site for the Southwest Side plant can be acquired cannot be definitely stated and can only be approximated with reference to the usual course of legal proceedings. But these proceedings should be taken into consideration in determining the time which should be allowed for the necessary steps preliminary to the physical construction of this plant.

Preliminary studies in relation to industrial wastes. The Southwest Side plant is intended to deal with industrial wastes, including those of the stockyards and the packingtown area, and these are estimated to constitute about fifty per cent. of the load upon the plant and a volume equivalent to sewage of about 1,000,000 persons. It is urged by the defendants that before the plant can be properly designed, the type of works must be determined upon after the present character of the wastes is known. Mr. Pearse testified that the Sanitary District ran an experimental plant at the stockyards for about three years prior to the entry of the United States into the War and that tests for treating these wastes by various processes were made in 1917; that no determinations have been made since that time and that the packers have refused entry into their plants. Mr. Pearse did not know whether the wastes from such works at this time were the same as they had been and it was his opinion that the matter should now be investigated; that there may have been some changes in the processes of manufacture or additions to capacities and other matters of which he had no knowledge. Mr. Pearse said that it "might take a year to explore the conditions" obtaining in the packers' plant and "after that, there would be preliminary study and plans which would take a couple of years. It might be a little less, but probably would not be more." Mr. Eddy testified that the type of plant, its dimensions and success in operation depended in very large measure upon the character and quantity of the industrial wastes. Professor Gregory gave a similar opinion; he said that six months to a year might be required for the investigation.

The complainants point to a statement in the description by the Sanitary District in its pamphlet issued under date of August, 1928, as follows:

> "The Sanitary District began the study of sewage disposal by methods other than dilution on March 1, 1909. A laboratory was established at Thirty-ninth Street for this study. This was closed in February, 1924, a new laboratory being established at 1014 South Michigan Avenue. In May, 1928, the Main Laboratory was moved to the 5th and 6th floors of 845 South Wabash Avenue. New equipment, incubators and chemical apparatus were installed in these quarters suitable for chemical and bacteriological research on sewage and industrial wastes. Experimental sewage testing stations were built and operated at Thirty-ninth Street, on domestic sewage from 1908 to 1911; at the Stockyards, on packing house wastes from 1912 to 1918; along the North Branch, on tannery wastes from 1919 to 1922; at Argo on the special wastes of the Corn Products Refinery Company, from 1920 to 1926; and at the plant of the Sherwin-Williams Paint Company from 1926 to 1928. In 1925, the industrial wastes were estimated as equivalent to a population of over 1,600,000. In 1928, the Corn Products wastes would have been equivalent to 400,000 population if no recoveries had been made, but by means of the 'bottling up' process installed in

> September, 1926, this equivalent has been reduced to 50,000 in 1928, giving a reduction of 350,000 from the total load of industrial wastes. This waste is therefore the first to be eliminated from the treatment program.
>
> "The Packingtown situation is still in the State and Federal courts in an effort to determine where the responsibility for treatment rests. Processes of treatment have been worked out. Regardless of division of cost, the most practicable solution now seems to be to carry the wastes west to the proposed Southwest Treatment Works for treatment mixed with domestic sewage from the tributary area."

The complainants insist that the defendants' contention ignores the fact that packing wastes are being treated in the activated sludge plant at Milwaukee; that these wastes come from plants operated by the same management as that which operates the packing plants at Chicago and where any innovation in that industry would necessarily be in force and effect. It is urged that the manufacture of fertilizer by the packing plants has grown greatly, showing that both the quantity of waste in proportion to the "kill" has lessened and that the quantity of objectionable matter in the waste has likewise decreased. It is also insisted by the complainants that the amount of the "kill" at the Chicago packing houses is available "to every one by the year and by the day." The defendants in reply refer to the testimony of the complainants' sanitary expert, Townsend, the assistant chief engineer at the Milwaukee plant. He testified: "Assuming that the Sanitary District started special tests and experiment stations to determine the best methods of treating packinghouse wastes in 1912 or 1913, and continued to make those tests for three years, it is my opinion that that should afford reasonably adequate information as to the nature of the treatment required. I do not think it likely that the waste from the slaughter of hogs at the present time would be substantially different than the waste that obtained from 1912 to 1915." But on cross-examination he testified that he did not say that he "thought the character of the waste and the volume of the waste at Packingtown are the same as they were in 1917 when the investigation was made." He thought that he testified as to the character of the waste. He did not know whether any changes had been made in the process of manufacture at Packingtown. He said: "There may possibly have been changes made. The volume of the wastes might be different." He assumed that the Sanitary District, in deciding to build the plant, had settled the question. He added: "If they have no reliable information upon which to base the designing of the plant, the plant should not be designed until that information is obtained."

It seems that a reasonable time should be allowed for examination of the present condition of the stockyards' wastes. But in view of the experimentation heretofore had by the Sanitary District, and the information already acquired, it does not appear that the exigency is so grave, or the absence of knowledge so serious, as to justify postponing the plan and construction of the Southwest Side plant for an indefinite time. It seems to me that the Sanitary District should be able to obtain within a few months, at the most, whatever information is essential to enable it to proceed with the designing of this plant.

Time for designing the Southwest Side plant. For the defendants, Mr. Pearse testified that he "would allow from three to four years for the design of the pumping station, skimming tanks, Imhoff tanks, grit chambers and settling tanks; and when that is done, it is still necessary to put in certain collateral work to get them up." Mr. Eddy gave the general testimony already quoted as to the time required to complete the entire plant and one of his reasons was the time needed to develop a suitable presonnel in the engineering office of the Sanitary District for design. He thought "there might be a period of a year and a half to two years required before the design department is brought to a high standard of efficiency." Professor Gregory, who said that completely to design the Southwest plant would require from three to four years, had not made "any tentative layout" in estimating the time, but considered "the broad general proposition" of what, in his judgment, would be needed. It was his opinion that "to design the pumping station alone a year and a half, perhaps more, would be required before the contract could be let;" that it would take six months as a minimum to design the skimming tanks; it "might take a year or more to design the Imhoffs"; six to nine months to design grit chambers and screens," and then he "would not necessarily be ready to let the contract for them;" "it might take a couple of years to design the aeration tanks", and "a year and a half to design the blower house;" it "probably would take a year to design the sludge beds."

For the complainants, Mr. Howson estimated (*supra*, p. 41) that "the design of the major units, either Imhoff tanks or aeration tanks" could be completed "in approximately six months time;" that "the other plans could be going along concurrently and the entire design could be completed in a year and a half. This design program", he said, "would permit the uninterrupted continuation of construction work from the date when construction was begun on the first unit." He did not contemplate that all the designing work would be done at the Sanitary District's office, but that it would be done under three organizations, one, that of the Sanitary District, and the other two, those of consulting engineering offices. Mr. Gascoigne testified (*supra*, p. 43) that complete design for one of the larger plants could be made in a year and a half. He figured that in the case of a major contract, such as that of the aeration tanks and sludge settling tanks, six months would be necessary for the design. His estimate was on the assumption that two of the larger works would be designed by outside engineering organizations. In his estimate of six years and a half for completion of the plant, he allowed one year and a half for what was necessary up to the time of letting contracts. Mr. Townsend testified that "the two major construction items, the Southwest Side plant and the aeration plant for the West Side plant could be designed in six months." He said that "the entire work of designing the Southwest plant, together with the remaining designing work of all the other plants could be completed in one and a half years."

It is apparent that the time required for the designing of the Southwest Side plant will depend to a considerable extent on the assistance of outside consulting engineering offices. This does not appear to be an impracticable or unusual course as the services of sanitary engineers employed as experts in this case have similarly been utilized by municipalities. The evidence shows that the city of New York has recently contracted with Fuller & McClintock for the complete design of a system of sewage treatment works of the activated sludge type to be located on Ward's Island, and it appears that the firm of Pearse, Greeley & Hansen, of which Mr. Pearse, the sanitary engineer of the Sanitary District, is the head, has undertaken to prepare for Fuller & McClintock the plans for the aeration tanks at the Ward's Island plant. Mr. Howson and Mr. Gascoigne testified that the employment of consulting engineers to design two plants would not increase the cost. The time necessary for designing in advance of physical construction might also depend to some extent on the policy adopted, that is, whether there should be complete plans and specifications for the entire plant and a letting of a contract to one contractor for the whole, or whether there should be designs of certain major units at the start so that the work of physical construction should progress while designs for other portions were being made. The testimony of the building experts (*infra*, p. 58) as to the time of physical construction proceeded on the assumption of one contract for the whole plant. This might expedite the actual construction by avoiding possible interferences of different contractors with one another, although it might lengthen the time for preparing the plans and specifications.

Taking bids and awarding contracts. It is undisputed that after designs are completed, and plans and specifications prepared, time must be allowed for advertising for bids and for the requisite action before contracts are awarded. Defendants' expert Mr. Howson said that approximately two months would be needed for this purpose and Mr. Gascoigne allowed about two months for the receiving of bids and another month for the awarding of contracts.

Conclusion as to time for preliminary steps, preparation of plans and specifications and public letting.

Taking the entire evidence into consideration in relation to the construction of the Southwest Side Treatment Plant, and with proper regard to requirements as to the public letting of municipal contracts, I conclude that two years and six months would be a reasonable time to allow for the necessary preliminary steps, for preparing plans and specifications and for advertising and passing upon bids.

Time required for the physical construction of the Southwest Side plant.

Two building experts were called for the Complainants and one for the defendants.

Complainants' building experts. Herbert P. Linnell, engineer, employed by Foundation Company of America, was graduated in 1894 from the Worcester Polytechnic Institute and was employed in general engineering work until 1906, when he became office engineer of the Atlantic, Gulf & Pacific Company of New York. From 1908 to 1918, he was chief engineer and vice-president of that Company at Manila, Philippine Islands, and constructed over seventy-five per cent. of the large engineering works of the Islands. He maintained and operated structural steel shops, machine shops and foundries, for the construction of buildings, bridges, etc. Some of the principal work was in the construction of the harbor works at Manila, piers, sea walls, water works and sewers, including about two hundred bridges and piers, etc. with the United States Army Engineers and United States Navy. The witness estimated that he executed about $40,000,000 worth of that work. In 1918, he became District Plant Engineer for the United States Shipping Board Emergency Fleet Corporation in charge of the fifth district. From 1919 to 1926, he was practically in retirement, but acted in a consulting capacity for private corporations. Since 1926, he has been with the Foundation Company of America, investigating and reporting on new projects, principally in Central and South America, and at times acting as consulting engineer for the Company's clients.

The Foundation Company is engaged in extensive operations in Europe and South America as well as in the United States. During the last two years a great deal of the work of the witness has been in Central and South America, including one case for an English syndicate desiring port works on the Pacific Coast in Guatemala, for which the witness made all the engineering investigations. Prior to that the witness had been in Venezuela twice and with other engineers under his direction he had made complete surveys and designed a sewer system for Caracas. He has recently returned from Yucatan where for five months he was investigating conditions and designing the port works at Progresso. Between trips to Central and South America, he had investigated contracts for a new water works tunnel at Detroit and made estimates for large buildings in that city. The witness has never constructed anything in Chicago and has not had any personal supervision of any construction work in that city. Except for the examination of the work in connection with the West Side Sewage Treatment plant, he has never made any examination of work in Chicago with reference to making estimates. In connection with the present work, he investigated reports obtained from the Chicago office of the Foundation Company with respect to labor conditions in Chicago. The witness also stated that he had never had anything actively to do with the construction of sewage treatment plants.

The Foundation Company was retained by complainants to examine into the program of the Sanitary District. The witness had examined the North Side plant, the site of the West Side plant and had also seen the proposed site of the Southwest Side plant. Estimates of quantities for the North Side, Calumet, West Side and Southwest Side plants were furnished him by the defendants' sanitary expert Mr. Howson who had received them from Mr. Pearse. He also had received from the Sanitary District a proposed lay-out of the Southwest Side plant. He had devoted twelve to fourteen hours a day for seven or eight days to the study of the Sanitary District project.

Mr. Linnell testified that assuming that the quantities were correct and that plans were available, he was of the opinion that it would take four years from the award of the contract to complete the Southwest Side plant. He had prepared a graphic exhibit, showing the time for the completion of the works, which was received in evidence. This plan gave the different items going into the Southwest Side plant and the number of months, with horizontal lines indicating the start and finish of each operation in the construction program. He also had prepared a graph showing the principal items of the equipment necessary for the construction and also the length of time that the particular parts of the equipment would be in operation.

It was the opinion of Mr. Linnell that assuming that different contractors had the contracts for the different plants —the Southwest Side, extensions to the North Side, the Calumet and the West Side—the several contracts could be carried on concurrently, that is, the physical construction; any interference that might occur in obtaining equipment might delay the work two or three months. With respect to detailed plans and specifications, the witness said that there were "no absolute details that have been worked out to the exact arrangement of such things as reinforcing bars and the exact type of trim of buildings, and such details as that". The witness "could not bid a cost on the plans and specifications as furnished him." He would not dare to venture a firm proposal, which would involve the magnitude of this controlling factor, because he did not have sufficient detail to determine his costs.

In arriving at his opinion, which he called his "firm opinion", that the plant could be built in four years, he stated that he took into consideration availability of material and labor, and the time necessary for procuring plant and equipment. For shutdowns in winter and storm conditions, he provided practically twenty per cent. of twelve months or roughly two and a half months. He believed that the actual time in which the work could be done would be three or three and a quarter years. He stated that the four year limit included layoffs due to seasons, inclement weather; he gave no consideration to the five and a half day week that prevails in Chicago. All contingencies, "due to inclement weather, winter weather, the five and a half day week and contingencies of a construction job" would be included in the twenty per cent. which he had allowed. He had not heard of a proposed rule providing for a five day week in Chicago, and he would not take that into consideration in arriving at the time of construction; that in his opinion would not make a difference in the computation of time but might affect the cost.

The difficulty in obtaining the proper type of first class mechanics due to inaccessibility of plant location had no weight at all in his view. He simply determined that the labor was available. He gave no thought to local transportation facilities for men; that did not enter into the question; he said the question of labor getting to the site was not usually considered; he did not consider whether labor resided near the place of construction unless the work was located in an outlying district; it was never considered in a city; all employees managed to get to the point where they earned their wages. He had not considered the question of housing labor in Chicago. He allowed no time for delays that might occur in obtaining contractors' plant and equipment; he had obtained direct quotations of time on principal elements of work and took these quotations as being from responsible firms and that they would deliver as agreed. He knew of no delays due to non-reception of material or equipment that would be serious to a contractor of experience. The seriousness of delay would depend entirely on what was delayed; he considered that deliveries would come as required. He did not take into consideration the possibility of the delay of construction due to revision of designs made necessary by unforeseen soil conditions; he assumed that the estimate of quantities furnished him was correct; he took into consideration the possibility of subsoil conditions necessitating piling foundations but that would not necessarily mean delay in time; it might mean another operation. He did not consider any allowance for possible delay caused by rejections of material or equipment after delivery; there was very little delay caused in this manner; he did not consider at all the likelihood of delay in receipt of material and equipment due to tie-up of railroads by strikes or flood conditions; if that occurred and delayed the work, it would extend the time. His time study was based on one contractor having the entire job. He would sublet his equipment; might sublet pile driving and excavation, but nothing of any large size. He did not take into consideration the possibility of delay due to failure or inability of sub-contractors to perform; he did not consider sub-contractors at all. The fact that the law requires the Sanitary District to advertise and let to lowest responsible bidder did not enter into his computation. His estimate of the time started with the award of the contract.

Mr. Linnell also stated that no one could foresee the matter of strikes, whether in Chicago or elsewhere; that that was never taken into consideration in preparing a bid; that there was usually a clause in the specifications, and contract, allowing for an increase of time for delays beyond the contractor's control. There were many contingencies which might cause delays, other than strikes; a protection clause of that kind was almost necessary and was probably insisted upon by every contractor. He believed that if he ~~had~~ absolute specifications the maximum time for completion would be three and a half years. Actual detailed plans and specifications might make a difference of six months in his computation, but he did not think they would require a longer time than four years. He assumed that the Southwest Side plant would be substantially the same as the North and West Side plants. His time estimate included the turning of the completed plant over to the owner for acceptance and operation. The ordinary time for testing would not extend over a month. If the Sanitary District's specifications required more difficult or longer tests that would have to be considered. He gave no consideration to final test other than ordinary test.

The other building expert called by the complainants was W. J. Hunkin, a contractor of Cleveland, Ohio. He has been in the contracting business about forty-five years. He has built breakwaters, piers, railroads, power houses, locks, blast furnaces, steel mills, office buildings, etc. He is now building the Arlington Memorial Bridge at Washington under a contract for about two million dollars; also the War Memorial at Indianapolis at about the same cost; also the Masonic Cathedral at Indianapolis. He constructed the Corrigan-McKinney Steel Plant at Cleveland.

Mr. Hunkin visited the West Side Sewage Treatment plant at Chicago, inspected the work there, and saw the site for the Southwest Side plant without examining it. He had the Sanitary District's estimate of quantities and also the plan for the proposed layout of the Southwest Side works which the Sanitary District had prepared. He had familiarized himself with labor conditions in Chicago, and determined the feasibility of obtaining the necessary materials. He had received the estimate of quantities about two weeks before he testified and had been "up day and night at it since he had it".

Mr. Hunkin testified that it was his opinion that the Southwest Side sewage treatment plant could be completed within fifteen hundred calendar days. The construction of that plant could go on concurrently with the construction of the other plants and the building of the intercepting sewers. He thought that he was liberal in fixing the time. He took into consideration a job which he had just completed costing about $11,000,000,—the Electric Illuminating Company's Power Plant at Avon, Ohio. With respect to labor and climatic conditions he observed that "the work at Avon was right on the Lake." He gave consideration to the fact that Chicago was a union labor city. He observed that "if it has got anything on Cleveland, he would like to see it. Cleveland is terrible." He had also considered seasonal conditions at Chicago.

In estimating fifteen hundred calendar days, he allowed two hundred and fifty days for Sundays and holidays in the four years, two hundred days for lost time during the winter months and one hundred days for lost time during bad weather. In his fifteen hundred calendar days he had thus included five hundred and fifty days in which no work would be done. He believed that all the projects, including sewers, could be completed within nine hundred and fifty working days. The sewers were not included in his estimate of fifteen hundred calendar days which he had figured for the building of the Southwest Side plant. He did include in his estimate the time necessary to complete the West Side project now under construction. He estimated that this period of fifteen hundred calendar days would begin on the day that the contract was awarded. It made no difference in his calculation when the work was started.

Defendants' building expert. The witness called by the defendants was John C. Ruettinger, general manager of the John Griffiths & Sons Company of Chicago which built the North Side Sewage Treatment plant for the Sanitary District. He was 57 years of age, and prior to his employment with the John Griffiths & Sons Company had been building superintendent for ten years, and general manager for another ten years, of the William Grace Company. In that capacity he made the estimates, prepared the bids, and superintended the construction of a large number of important buildings in Chicago. He then became building superintendent with the John Griffiths & Sons Company, and after five years with that Company he was made general manager and had held the latter position for the last fourteen years. In the latter employment he had figured the plans and specifications, arranged the bids, and supervised the building, among others, of the Hotel Sherman, Mandel Brothers store building, the Federal Reserve Bank Building ($10,000,000), the Temple Building, the Morrison Hotel, all in Chicago; also he had in his similar charge the caisson foundations, the general excavation, the general superstructure, and most of the steel therefor, all the stone work, all the interior work, and all the train sheds, amounting to practically the entire work on the Union Station at Chicago (the work of his company amounting to $10,000,000), and many other buildings. He is now working (representing his company in the same way) on the new Merchandise Mart for Marshall Field & Company and the Chicago Civic Opera Building occupying an entire block, and his company is about to erect a forty-seven story building on the site of the old Tacoma Building in Chicago. He also put in caisson foundations and did the excavation work on the Daily News Building, the foundations reaching to rock, a little more than a hundred feet deep.

Mr. Ruettinger testified that his company had built everything in connection with the North Side Sewage Treatment plant, except the operating galleries and certain relatively small contracts which had been let to competitors on lower bids. His company had the building of the aeration and settlement tanks, the general excavation and concrete work, and had constructed the pump and blower house, the administration building, etc., the contracts amounting to about $14,000,000. His company had bid on the first section of the West Side Treatment plant but unsuccessfully. Mr. Ruettinger had examined the estimates of quantities and the proposed layout of the Southwest Side plant, which had been furnished by the Sanitary District (the same estimates as those which formed the basis of the testimony of the complainants' building experts, Linnell and Hunkin). He had also examined Mr. Linnell's progress charts.

Mr. Ruettinger subjected these charts and Mr. Linnell's estimates of time and proposed methods of work to a detailed criticism. The witness also gave his own opinion as to the progress that would be possible in constructing the plant and the time to be allowed for completion. He figured on one hundred and seventy-one working days in a year as being available for excavating in open areas and pouring concrete for the tank construction. He said that this computation was arrived at

> "by deducting four winter months" (December to March inclusive), "the Sundays in the remaining months, two days for rain in each working month, the half holidays on Saturdays and the regular holidays, making a total deduction of 194 days, which allows for no unusual conditions such as extraordinary rain, breakdown in transportation, strikes or jurisdictional disputes."

Mr. Ruettinger testified that if it were assumed that he would receive the contract to build the entire plant on January 1, 1930, it could be completed about October 1, 1937, a period of seven calendar years and nine months. In this estimate, Mr. Ruettinger said that he made no allowance for such contingencies "as strikes, tie-up in materials, breakdowns in transportation, breakdowns in any of the operating machinery, delays in operation of cableways because of accident or breakdown, any loss of time due to inaccessibility of the site, possible shortage of labor during the World's Fair in Chicago, or jurisdictional disputes between trade unions, but have assumed one hundred per cent efficiency, working continuously and without cessation''; and he stated that the contingencies mentioned would probably require at least six months allowance to cover them. He also assumed in estimating that the plant could be completed and ready for operation about October 1, 1937, if he received the contract on January 1, 1930, that complete plans, specifications and details were provided at the beginning of the work, and said that any delays arising from changes in plans, or from bad foundations, or from the necessity of creating pile foundations, would have to be added to the time estimated.

Conclusion as to the time for physical construction of the Southwest Side plant. While neither of the building experts called by the complainants had experience in the construction of sewage treatment works, it does not appear that, from the standpoint of physical construction, such works involve building operations which would lie outside the range of the expert knowledge of contractors of wide experience in the erection of large structures, manufacturing plants and public works. The extensive experience which the complainants' witnesses had in such enterprises would undoubtedly qualify them to undertake the building of the proposed sewage treatment works and to form an expert judgment as to the time necessary for their construction. Nor is there ground for concluding that there are such differences between the conditions as to labor and other requirements in Chicago, and conditions obtaining in large American cities, as seriously to affect the weight of the opinions of the complainants' witnesses. As to climatic conditions, it does not appear that those at Chicago and

Cleveland, for example, would be greatly dissimilar. It may also be observed that all the building experts were manifestly looking at the question from the standpoint of contractors and were not considering strikes, or what are called "jurisdictional disputes" of labor, or such unforeseen contingencies beyond a contractor's control as would normally be covered by a protection clause in his contract.

One matter stands out prominently and accounts in considerable measure for the disparity in the estimates of time. That is the calculation of the number of working days in a calendar year. For the complainants, Mr. Linnell, in his estimate of four years for construction, allowed twenty per cent, or roughly two and a half months, for shutdowns in winter and storm conditions. Mr. Hunkin, in his estimate of fifteen hundred calendar days, assumed that there would be nine hundred and fifty working days in that period; that is, that there would be only five hundred and fifty days without work. Mr. Ruettinger, on the other hand, in his period of seven calendar years and nine months, figured on only one hundred and seventy-one working days in a year as permitting the prosecution of a very large part of the work which would consist of excavation and pouring concrete. On an assumption of available working days similar to the assumptions made by the other building experts, Mr. Ruettinger's estimate of seven calendar years and nine months would be considerably reduced. Mr. Hunkin's estimate of working days was largely based on his experience in places situated on Lake Erie,—Cleveland and Avon. It seems to me that Mr. Ruettinger is too liberal in his deductions for lost time. He is not only opposed by the testimony of the other contractors, but the complainants have also introduced in evidence monthly estimate sheets relating to the construction of the North Side plant and indicating the progress of excavation and other outdoor work during the winter months (Complainants' Exhibits 278, 280, 281).

The other differences in the estimates of time, on the part of the building experts, relate to many technical details of construction which it would be impracticable to attempt to review in this report. They concern the time required to obtain and erect cableways so as to begin work, the rate of pour of the concrete for the tanks with cableways, and the question of the concurrent construction of different parts of the plant such as tanks and buildings. It is manifest that such matters easily permit of variations in calculations relating to a vast plant, the construction of which from any point of view must extend over several years. While Mr. Ruettinger is severely critical of Mr. Linnell's estimates of time for the different building operations, the complainants subject Mr. Ruettinger's testimony to a close analysis and vigorous attack. In reaching a conclusion, the criterion to be applied is of controlling importance. Common experience shows that works of magnitude, especially public works, admit of many delays which are not demonstrably due to neglect and that much depends on the vigor with which the work is pressed. Much time can be saved or lost in large building operations according to the attitude which is taken as to the importance of early completion. In the present case, the Court has already laid down the requirement that the work shall proceed "with all reasonable expedition". With this established criterion in mind, and after a careful examination of the testimony and exhibits, I have reached the conclusion that the estimate of seven calendar years and nine months for the physical construction of the Southwest Side Treatment Works is against the weight of the evidence. I think, however, that the period of four years, or four years and thirty-nine days (1,500 calendar days) for such construction is too short to be laid down as a definite requirement. It is not supported even by all of complainants' witnesses. Mr. Gascoigne allowed four years for construction, but thought it well to add six to twelve months for "tuning up, getting things into shape and for contingencies that nobody can tell about in advance", thus making an allowance, from the time of the letting of the contract, of four years and six months to five years. Mr. Townsend allowed five years for construction.

The requirement to be laid down, while demanding expedition, should be reasonable in all respects. It should not fix what could be considered to be the shortest conceivable time under highly favorable conditions of work, but should have regard to what may fairly be expected under average conditions without unjustified delay. The evidence shows that in works of this description allowance must be made for the tests and final adjustments which are necessary to full operation. It makes clear that bare physical construction even to the point of starting the operation of the plant does not necessarily mean a completed plant in the sense that its readiness to serve at its estimated full capacity can safely be counted upon. My conclusion on all the evidence is that a reasonable allowance of time for the physical construction of the Southwest Side Treatment Plant, including tuning up, so that it would be ready for complete operation, would be a period of five and a half calendar years.

Conclusion as to the time required for completion of the Southwest Side plant.

Taking the time required for the preliminary steps that is, acquisition of site and preliminary studies, for preparation of plans and specifications for the securing of and passing upon bids, and for physical construction and tuning up, I conclude that the Southwest Side Sewage Treatment Plant, separately considered and assuming available funds, could be completed within eight calendar years.

Considerations affecting the time for the completion of the entire program for the sewage treatment works.

In addition to the question of the time required for the completion of the sewage treatment works, separately considered, is that of the feasibility of concurrent operations in constructing the different plants.

The difficulties of securing a satisfactory degree of efficiency in municipal administration, and of making haste in the prosecution of public works, cannot be overlooked in any municipal program. But these difficulties count for less in connection with technical bureaus, or expert staffs, than on the political side of administration. In the present instance, the actual construction will presumably be had under contracts made with competent private organizations which are available to carry through enterprises of this magnitude in the same manner as though they were initiated by private enterprise. There should be no loss of time incidental to the supervision of the execution of such contracts, and it is in the preliminary steps, in studies and designs, in the preparation of plans and specifications, that time might be lost through deficiencies in bureau organization and equipment. But this work would belong to an expert engineering staff and it is not regarded as unreasonable to require that the Sanitary District should, if it has not already done so, equip itself with the technical assistance suitable and adequate to meet the exigency.

As already pointed out, the complainants' witnesses in their estimate of time for completing the entire program of the Sanitary District have assumed that the designing of the various works would be done by three organizations, one of which would be the Sanitary District and the others would be provided by consulting engineering offices, a procedure which it is said would not increase the cost while it would expedite the work. Although I have concluded that a longer period should be allowed than that estimated by these witnesses for the complainants, I am satisfied that to complete the designs, and prepare the plans and specifications even within the period so allowed, it will probably be necessary for the Sanitary District to obtain the assistance of the staffs of consulting engineering offices. But I see no reason why this should not be done, or why a longer time should be allowed merely for the purpose of dispensing with such available aid. I regard it as practicable, and as required by the demand of this Court for reasonable expedition, that the work on the various projects of the Sanitary District program should proceed concurrently.

Financial considerations. The complainants' witnesses have proceeded on the assumption that no delay whatever would be caused by lack of funds or the effort to procure them. In opposing the estimates of these witnesses, the defendants have stressed with special emphasis the heavy burden of expense that will be placed upon the Sanitary District and the legal limitations upon its borrowing power. Mr. Pearse testified that he "had to take the yardstick of dollars," that is, in considering the program in its broad aspects, in order to measure the time of accomplishment. In the statement of its sewage treatment program up to 1945 (Defendants' Exhibit 1387) the Sanitary District estimated the entire cost of completion (including $4,000,000 for control works (*supra,* p. 11), at $176,166,000. This was for contemplated outlays after December 31, 1928. On account of lack of funds, little work was done from that date to the end of September, 1929, so that these estimates are substantially those of future expenditures. Mr. Pearse testified that these estimates were based upon the contract prices prevailing in Chicago territory during the last five or six years. Referring to comparisons with earlier estimates, he said:

> "Defendants' Exhibit 1122, being a report of the Engineering Board of Review, shows the estimated cost of the sewage treatment plants at $130,000,000 (1924). At the former hearings I showed the total cost according to estimates made then, after December 31, 1924, for sewage disposal program to be $157,000,000, and that estimate was for complete treatment and was comparable with the $130,000,000 estimate of the Board of Review in 1924. The estimates of $157,000,-

000 in 1926 or 1927 were based upon complete metering.

". . . Since the Board of Review made this estimate, we have expended $51,000,000 on the sewage treatment program.

"Defendants' Exhibit 1387, offered at this hearing, estimates a further cost for complete program to be $176,000,000. Adding to that the $51,000,000, makes a total of $227,000,000. The total figures there are estimates, but the program is not co-extensive with the Board of Review program. The $176,000,000 program includes the $4,000,000 for a gate" (controlling works) "which was not in the Board of Review estimate. The Board of Review included $3,000,000 for Corn Products Refining Company" (wastes) "so these two outlays just about offset one another. The Board of Review estimate for a 17 foot sewer is $155.00 per linear foot. Our present estimate for 17 foot sewer is $255.00 a foot. The $155.00 represented the Board of Review's best judgment, I suppose. The Board of Review estimated the 15 foot sewer at $130.00, and the estimate under Defendants' Exhibit 1387 is $200.00 per linear foot, . . . The Board of Review estimated the 9 foot sewer at $75.00 a foot on the West Side and I used the figure in my estimate of $150.00 per foot. However, we have attempted in making the estimates to set the price according to the character of the work as we can best estimate it. So you will find different prices for same size of sewer. . . .

"The Board of Review estimated a 17 foot sewer for the Southwest Side at $160.00 per foot, and I have estimated a sewer of the same size and the same place at $242.00 a foot. An 18 foot sewer for the West Side Plant was estimated by the Board of Review at $170.00 a foot, while I have estimated a sewer 17 feet 6 inches in the same place at $255.00 a foot. It is my opinion that the Board of Review underestimated the sewers. There has been some increase in labor rates since 1924.

"I believe from the reported prices that I have heard in the City Hall that we have estimated more than is claimed to be the construction cost for constructing the tunnels in clay, than it cost the City of Chicago for tunnels 165 feet underground in rock. The Sanitary District is building its tunnels by contract in clay with the use of timbering, which is a different matter in construction from building like tunnels in solid rock. I want to convey the impression that insofar as we are able to compare the costs, that is, on the data that is available, and it is not official from the city, but it is what I hear and not what I know, that it is cheaper to build those rock tunnels on the figures given out than to build the sewers in the clay by contract as we have to do. I regarded the rock tunnel work done by the city as a different kind of work. I estimated what the work would cost under the conditions with which we have to do it, by contract.

* * * * * * *

"As to the cost of sewer construction under the program shown in Exhibit 1387, so far as the Southwest Side interceptor proper is concerned, we are using practically the same cost for the same lengths and sizes as we did when I testified in 1927. As to the West Side interceptors, as such, there has been an increase because of the fact that we found that on letting contract number 1 and contract number 2 of the West Side sewer, that the bids received (and there were nine bids in one case and seven in another), indicated that the prices that we were receiving for that kind of work were higher than our former estimates. In so far as we have tried to estimate this work on the prices that we have reason to expect in this territory, we felt that we were justified in increasing those base prices, and that is the reason for any increases on such sewer construction costs. The prices actually used in the estimate for the works mentioned in Defendants' Exhibit 1387, are based upon actual experience in the letting of contracts for similar work by the Sanitary District."

Mr. Eddy testified that he had made a study as to the reasonableness of the estimates of cost of the various items set forth in Defendants' Exhibit 1387, and it was his opinion that they were reasonable and that "the estimates are applicable to the conditions under which the work has to be done here."

The defendants' building expert who testified as to the time for the completion of the Southwest Side Treatment Plant (*supra,* p. 64) did not testify as to estimates of cost.

The complainants state that they do not consider costs a material issue, but that they do consider the defendants' estimates to be "grossly excessive". On this re-reference, the complainants did not introduce independent testimony as to the cost of the program for sewage treatment, but they refer to the estimates of their witnesses on the original reference in this suit. Mr. Howson then testified that, assuming universal metering of the water supply of Chicago, he had estimated that "the reasonable cost for the necessary works for providing complete treatment of all the sewage of the Sanitary District of Chicago through either activated plants or sprinkling filter plants for 1945 conditions would be approximately $76,000,000"; that "the practical elimination of the Corn Products waste", and other proposed changes, would reduce this total to approximately $73,000,000; and that he estimated the cost of complete sewage disposal to serve 1955 conditions at $82,000,000; all these figures being in addition to contracts let prior to January 1, 1925. Mr. Gascoigne on the original reference estimated that the necessary expenditures (exclusive of those made prior to January 1, 1925) to provide complete treatment of the sewage of the Sanitary District to serve 1955 conditions would be $82,250,000.

The complainants especially emphasize the disparity between the present estimates of the defendants, which counting the amount already expended for construction ($51,000,000) reach a total of $227,000,000, and the amount estimated by the Engineering Board of Review in 1924 ($130,000,000), and the estimates presented by the defendants on the original reference, 1926-1927, which amounted to

$157,000,000 (*supra,* p. 72). While the assumptions in these various estimates as to particular works are not identical, there is a marked increase in the estimated cost of corresponding items and the evidence indicates that the present estimates of the Sanitary District may be regarded as generous.

The defendants urge that the total contemplated outlays have a highly important bearing upon the time to be allowed for completing their program because of the limitation on the amount which under the law can be expended annually. With respect to past experience, it appears by the testimony of Mr. Pearse that in the four years, 1925 to 1928, inclusive, the Sanitary District expended $51,000,000 for construction. According to the testimony of Mr. Ramey on the original reference there was construction work by the Sanitary District to the amount of $14,000,000 in 1925 and about $11,500,000 in 1926, including dredging, bridges, etc. Mr. Pearse said that in 1927, the Sanitary District expended $15,000,000 in construction work.

It is pointed out by the defendants that the Sanitary District is a municipal corporation, distinct from the other municipal entities functioning within Cook County, and is limited by the Constitution of the State (Sec. 12, Art. 9) which provides that no municipal corporation "shall be allowed to become indebted in any manner or for any purpose, to an amount, including existing indebtedness, in the aggregate exceeding five per cent. on the value of the taxable property therein, to be ascertained by the last assessment for State and County taxes previous to the incurring of such indebtedness."

From the testimony on the re-reference (March, 1929) it appears that the total assesed valuation (said to be on a basis of 100%) of the property within the Sanitary District for the year 1927, was $4,735,115,222, or at what is stated to be the "equalized value of property 1927," $4,597,395,603, which gave a debt incurring capacity at five per cent. of $229,869,780, as of March 25, 1929. The outstanding bonds at that time were $108,501,000 and contract liabilities (including judgments) which it is said must be counted against the debt limit under the Illinois law (*Schnell v. City of Rock Island,* 232 Ill. 89) amounted to $46,128,224.44, leaving an unexercised debt incurring capacity on March 25, 1929 of $75,241,555.56. On this basis, the Sanitary District through Mr. Ramey, its assistant chief engineer, submitted a calculation as to the number of bonds which might be issued by the Sanitary District, say for twelve or fifteen years, for construction work. His computations show that the District could issue continuously about $15,000,000 of bonds per year. Mr. Ramey testified:

> "I have taken the total bonding capacity of the Sanitary District as 5% of the latest assessed valuation, making a total of approximately $230,000,000. The outstanding bonds at the present time are $108,500,000, leaving a surplus of $121,500,000. Deducting the amount due each year on the present bonds outstanding, I assume that we issue $15,000,000 of bonds each year, redeem those at the rate of 5% in each of the future years, get a total of bonds that are to be redeemed each year by adding the redemptions on present outstanding bonds to the redemptions on future bond issues which are to be issued each year at the rate of $15,000,000 a year; then subtracting the total redemptions in any one year from the total issue in any one year, which is $15,000,000 in this computation, I get a figure which I can add to the present outstanding bonds. As long as my resulting figure remains below my bonding capacity, I can issue bonds at the rate assumed, I increase the bonding capacity $2,500,000 each year, assuming that the assessed valuation will increase at the rate of $50,000,000 per year. This calculation is made in strict accordance with the exhibit which we offered in 1927, but is made on a different basis because at that time we did not have the bonding capacity of 5% of the assessed valuation, and the assessed valuation was lower. The bonding ca-

> pacity was 4% of the then assessed valuation, which was half of the real valuation. Today the assessed valuation is 100% of the actual valuation, and our bonding capacity is 5% of that."

Mr. Ramey testified that he made allowances for the amount of the outstanding contract obligations of the Sanitary District as well as its bonded indebtedness.

It was also urged by the defendants that a citizen and property-owner in Cook County, in addition to paying taxes for the work of the Sanitary District, is also paying his portion of the assessments levied by the State, by the City of Chicago, by the County itself, and by a large number of taxing agencies existing within this area, and is thus subject to a heavy tax burden. Evidence was also given as to the assessed valuation of property in the City of Chicago and the amount of the city's debt limit and its unexercised debt incurring power. Counsel offered to prove estimates in relation to the improvements contemplated by the Chicago Planning Commission, a branch of the city government, consisting of persons prominent in the affairs of Chicago. The Commission was created in 1909 and many improvements have already been undertaken in accordance with its recommendations. Counsel offered to prove the estimates of contemplated improvements relating to the South Park District, the Lincoln Park District, adequate landing fields for aircraft, including the estimated cost of the lake front landing, and various proposed street improvements and the construction of superhighways to relieve traffic congestion. It was estimated, according to the offer of proof, that the cost of projects recommended by the Chicago Planning Commission which it was hoped might be undertaken within the next ten or fifteen years would require the issue by governmental agencies, other than the city itself, of approximately $141,000,000 of bonds. It was evident that the consideration of these various projects would involve an examination of details with respect to each, estimates of cost, relative importance and time required, necessitating a large number of collateral inquiries into which I did not feel at liberty to enter under the order of re-reference. It is apparent that in a great and growing city there is a constant demand for important improvements, but the issue before me is a more limited one. The application of the City of Chicago to be made a party to these suits had been denied by this Court, and as I read its opinion directing this re-reference the Court did not intend that contemplated improvements within the City of Chicago should be permited to stand in the way of the obligation with respect to sewage disposal to which the Court found the Sanitary District to be subject. Accordingly, the testimony with respect to the projects of the Chicago Planning Commission, as disclosed in the offer of proof, was excluded.

It is observed in the brief of the counsel for the Sanitary District that the abandonment or curtailment of other public improvements by Cook County, the City of Chicago, Park Boards and other agencies, would not add a single dollar to either the tax levying or bond issuing powers of the Sanitary District; that is, that while the general tax burden is manifestly affected by these various public enterprises, the debt incurring capacity of the Sanitary District under the constitution and statutes of Illinois stands upon its own footing. On Mr. Ramey's estimate of the availability of $15,000,000 a year for additional indebtedness of the Sanitary District, it would be nearly twelve years before the total amount of expenditures as estimated ($176,166,000) on the sewage disposal program of the Sanitary District could be covered. Counsel pointed to the extreme difficulty of amending the constitution of Illinois and also of obtaining necessary legislation to facilitate the issue of bonds by the Sanitary District. It is not to be assumed, however, that the people of the State of Illinois would not take whatever proceedings might be necessary to equip the Sanitary District with adequate authority to discharge its obligations under the decree of this Court.

If a period of nine years were allowed for the completion of the program of the Sanitary District, less than $20,000,000 a year would be required to cover the entire present estimate of $176,166,000 (including controlling works). Even at the rate of Mr. Ramey's estimate of $15,000,000 a year, there could be made available in that period a total of $135,000,000 which, taking into consideration the amount already expended for construction work, as testified, ($51,000,000) would make a total outlay of $186,000,000, which is $29,000,000 more than the estimated cost of the sewage disposal program for complete treatment ($157,000,000) as outlined by the defendants on the original reference on the basis of contemplated expenditures after December 31, 1924 (*supra*, p. 72).

In its opinion this Court was explicit in its statement that the Sanitary District authorities had "much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future", and that therefore they could "not now complain if an immediately heavy burden is placed upon the District because of their attitude and course." In view of this deliberate judgment of this Court, it does not seem to me that, assuming that with available funds the sewage disposal program could be carried to completion within eight years, there should be a further delay of four years merely because of the difference in the annual outlay that might be required in comparison with the annual expenditures of recent years (*supra*, p. 76). I am of the opinion that if an additional period of one year were allowed for the completion of the Southwest Side plant, making the entire period nine years, it would be as liberal a concession to the difficulties of the situation as the opinion of this Court can be deemed to justify.

General Conclusion.

I conclude, therefore, taking the time required for the completion of each of the sewage treatment works, separately considered, and the circumstances which affect the completion of the Sanitary District's program as a whole, that a reasonable time to be allowed to the Sanitary District for completing the Southwest Side Sewage Treatment Plant, and thus for carrying out the entire program for sewage treatment, would be nine calendar years from January 1, 1930, that is, until December 31, 1938.

Ancillary structures.

Controlling works. The foregoing does not embrace a statement of the evidence with respect to the importance and time required for the construction of controlling works in order to prevent a reversal of the Chicago River at times of storm (*infra*, pp. 105-117). In order to install such works in the navigable waterway, as proposed by defendants, it would be necessary to obtain the permission of the Secretary of War, upon the recommendation of the Chief of Engineers, as provided in Section 10 of the Act of March 3, 1899, 30 Stat. 1151, U. S. C. Tit. 33, Sec. 403. There seems to be no serious dispute as to the time that would be required to build such works. Mr. Eddy, for the defendants, testified that he thought "it would take at least two and possibly three years". Mr. Howson figured on their installation by December 31, 1932. In their proposed findings, the defendants have provided that the Sanitary District shall immediately submit plans to the Chief of Engineers or his representative for such works to be constructed at or near the mouth of the Chicago River, or at or near the northern or eastern terminus of the Main Drainage Canal, and that they shall be completed and in operation within a period of two years subsequent to the date of the Secretary of War's authorization under the statute.

Water purification or filtration plants. Whether or not water purification works should be constructed will depend upon the disposition of the effluent from the sewage treatment works. The construction of such works is not included in the Sanitary District's program, but is embraced in the program presented by the complainants (Complainants' Exhibit 238). The complainants, however, propose that this matter be left to the discretion of the defendants.

It was Mr. Howson's opinion that Chicago should install efficient filtration works for the entire water supply. He thought that such works could be designed in about one year's time and constructed in an additional four years. But it should be noted that Mr. Howson also testified on the original reference that filtration must be predicated upon metering if it is to be economically designed and done; that through sectionalization of the city for metering and the progressive design and construction of filtration plants for full metering in the various sections, the entire city can be placed under meter control; and that water supply and filtration plants could be constructed within about ten years from the date of the government permit. The witness was referring to the permit of 1925 in giving this testimony in 1926-1927. Colonel Schulz testified on the re-reference that to comply with the condition of the 1925 permit as to metering, the City of Chicago should have installed about 41,500 meters per year up to 1935, the end of the ten year period. But that there had been only a total of 29,945 meters installed up to the end of 1928.

Mr. Joseph W. Ellms, an expert in water purification matters, testified that "assuming the funds to be available four or five years would be a reasonable period of time for the design and construction of the water filtration plants." The evidence warrants the conclusion that, aside from the question of metering, water filtration works, if the defendants decided to build them, could be completed within a period of five calendar years.

As to the cost of such plants, Mr. Howson gave an estimate on the original reference, based upon an assumption of complete metering, of $30,000,000. Mr. Ellms at the same hearing testified that the reasonable cost would be "anywhere from $35,000,000 to $40,000,000." The defendants' witnesses on the original hearing testified that the cost of water purification plants would be from $50,000,000 to $60,000,000.

This estimate for water purification plants was apart from the estimated cost of a super-tunnel which it was said might be built in the vicinity of Wilmette, four and a half miles off shore and approximately twenty miles from the mouth of the Chicago River, for the purpose of replacing the present water intakes of Chicago; this Mr. Howson estimated would cost about $40,000,000 and would take from five to eight years to construct. The defendants' witnesses estimated the cost of such a tunnel to be about $70,000,000.

Third. *The reductions in the diversion of water from Lake Michigan which are practicable pending the completion of the sewage disposal works.*

The defendants' position. (a) The defendants urge that it is not the function of the Court to determine what reductions may be made in the diversion during the period of construction or what the amount of the diversion shall be when the sewage treatment plants are in full operation. It is said that as navigable waters, and navigation, will be affected by the amount and quantity of the diversion, the determination of these questions lies with the political department of the Government and, under the Act of Congress of March 3, 1899, is subject to the action to be taken by the Secretary of War on the recommendation of the Chief of Engineers. It is the defendants' position that the opinion of the Court in this case does not indicate that the Court expects the Master to make any determination of these questions, but that he is merely to determine what practical measures may be adopted to dispose of the sewage and the time necessary for carrying such measures into effect.

This Court, in its opinion in these cases, recognized the authority of the Secretary of War in relation to the diversion at Chicago. It was said that the construction of Section 10 of the Act of March 3, 1899, "was settled by this Court in the decision of the first Chicago Drainage Canal case in 266 U. S. 405, 429" (278 U. S. p. 414). By its decree in that case, the Court enforced the limitation of the former permit of the Secretary of War fixing the amount of the diversion. The Court in its opinion in the present suits also recognized the authority of the Secretary of War to issue the temporary and conditional permit of March 3, 1925, in view of the exigency then existing and in the interest of navigation and its protection. That permit runs until December 31, 1929. This Court, however, stated that "the normal power" of the Secretary of War is "to maintain the navigable capacity of Lake Michigan and not to restrict it or destroy it by diversions", and that beyond the quantity, said to be negligible, that would be necessary to keep up navigation in the Chicago River as a part of the Port of Chicago, "the validity of the Secretary's permit derives its support entirely from the situation produced by the Sanitary District in violation of the complainants' rights; and but for that support complainants might properly press for an immediate shutting down by injunction of the diversion, save any small part needed to maintain navigation in the river." The Court expressed the opinion that the complainants are entitled to a decree "which will be effective in bringing that violation and the unwarranted part of the diversion to an end." In keeping, however, with the principles upon which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, the Court said that its decree "should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction." (278 U. S. 418, 419.)

In view of these expressions, and as the Master was directed to make a report of his conclusions and recommendations for a decree, it would seem to be clear that the consideration of practicable reductions in the diversion pending the completion of the sewage disposal works is necessarily embraced within the terms of the re-reference.

(b) The defendants, further, point out that since the hearings on the original reference (1926-1927) the levels of Lake Michigan, and of the other Great Lakes, have risen, and the defendants urge that the necessity for immediate reduction in the diversion no longer exists.

The change in lake levels cannot be taken to modify the decision of this Court with respect to the legal rights of the complainants in relation to the diversion, or as to the nature of the ultimate relief to be awarded. The evidence, however, was received in order that the Court may have the facts before it in considering the provisions of its decree.

In the former report, I made findings as to the mean annual levels of Lake Michigan above mean tidewater at New York from the year 1860 to 1925.* It was found that since

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*"It will be observed that the mean level above tidewater was as high as 582.68 feet in the year 1860; that, after a fall to as low as 580.59 in 1872, it returned to 582.61 in 1876; and after another fall, rose in 1886 to 582.96. It then fell so that, for the year 1899, the year before the opening of the drainage canal, the mean level was 580.32, or 2.36 feet, a little over 28 inches, lower than the mean level of 1860, and 2.64 feet, or over 31½ inches lower than the mean level for the year 1886.

"In the years 1900 to 1905, the mean level was between 580 and 581, the lowest being 580.21 feet in 1902, and the highest being 580.98 feet in 1905. Thus in 1905, the mean level of Lake Michigan was nearly 8 inches higher than for the year 1899.

"After 1905, the mean level slightly rose, and then fell in 1909 to 580.50 feet, which was still about two inches higher than the level of 1899. There followed a lowering of the mean level to 580.15 in 1910, and to 579.60 in 1911, but this was restored to 580.68 in 1913, and after another fall, the level came back to 580.35 in 1916, approximately the same mean level as that of 1899. It then rose as high as 581.40 feet in 1918, falling to 580.56 in 1920, which was still higher than the mean level of 1899. Since then, there has been a decided drop; so that in 1924, the mean level was 579.09 feet and for 1925 it was 578.24, showing a fall in the mean level from 1920, to the end of 1925 of over 27 inches." (*Report of Special Master*, November 23, 1927.)

1920 there had been a decided drop; that in 1924, the mean level was 579.09 feet, and in 1925, it was 578.24 feet. The evidence on the re-reference shows that the lowering continued in 1926. The mean level for that year was 578.14 feet. In 1927, there was a rise so that the mean level was 578.96 feet. The range in 1928 was from 578.72 feet in January to 580.63 feet in December, the mean level for the year being 579.92 feet, or approximately twenty-one inches higher than that of 1926. In 1929, there was a decided rise until the highest point shown (that is the last record appearing on the United States Lake Survey Chart, in evidence) was 582.4 feet in July, 1929, or approximately three feet and nine inches higher than at the corresponding time in 1926.

The levels of Lake Huron and Lake Michigan are the same. Lake Erie and Lake Ontario, during the period above described, exhibited a corresponding relative rise in levels.

It was testified (March 28, 1929) that the control gates at the outlet of Lake Superior were opened in the fall of 1928 in order artificially to reduce the level of that lake and that these controlling works "have been operated wide open since October, 1928". The United States Lake Survey chart shows a rise in the level of Lake Superior to 603.4 feet in October, 1928, the highest point reached since 1916; thereafter there was a fall to 602.4 feet in February, 1929, after which the level of Lake Superior rose until it reached 602.85 feet in July, 1929.

(c) The defendants also insist that while, "with the construction of controlling works, certain amounts of reduction" (of the diversion)) "may be accomplished when certain units of the program are placed in operation," the extent of that reduction cannot now be definitely determined. That determination, they say, should be made at the times the different important units of the works go into operation. And it is said, further, that, if the Court undertakes to fix the amount of the diversion, it should provide the means for a careful study and investigation of the conditions that will exist as works are installed during the construction period as well as at the end of that period.

Mr. Eddy's testimony supported this view. But, subject to that qualification, he gave his best judgment as to the extent of practicable reductions. He testified that "there should be no reduction in the diversion until there is an absolute barrier against the discharge of storm water into Lake Michigan, which would mean the date of completion of controlling works in the Chicago River or at the head of the Drainage Canal." If controlling works were in operation, he thought that, exclusive of pumpage, there could be a reduction for January 1, 1930, from 8,500 c. f. s. to 6,500 c. f. s. "upon the assumption that the Calumet plant is in operation, and it now is, providing sedimentation and a small trickling filter; that the West Side plant for sedimentation to serve about 1,000,000 is in operation; that the North Side plant is in complete operation." Assuming that it would take two years to install the controlling works, his estimate of a diversion of 6,500 c. f. s., on the basis above stated, "would be applicable to January 1, 1932." The next date he set for reduction of the diversion was January 1, 1936, upon his estimate of the time required for the progress of the construction of the treatment plants (*supra*, p. 37). On that date he thought the flow could be further reduced from 6,500 c. f. s. to 4,500 c. f. s. The next stage, he said, would naturally be when complete treatment was provided (*infra*, p. 130).

The complainants' position with respect to the reduction of the diversion.

The complainants in their program submit the following schedule for the reduction of the diversion following the statement already quoted (*supra*, p. 18) as to the sewage treatment works and time for completion (Complainants' Exhibit 238):

"A. Diversion (Excl. water consumption) with Control Works built by December 31, 1932, can be as follows:

	c. f. s.	*Date*
(1) Present Diversion	8500	now
(2) Diversion reduced to	6500	12/31/1929
(3) " " "	5000	12/31/1932
(4) " " "	3000	12/31/1933
(5) " " "	0*	12/31/1935

*i. e., no flow at Lockport.

B. Without control works diversion can be reduced to 6500 c. f. s. plus sewage on December 31, 1929, and to zero flow at Lockport on December 31, 1935."

Mr. Howson, in presenting this program, testified:

> "There could be a reduction in the diversion as of December 31, 1929, to 6500 c. f. s. plus the domestic pumpage, which would be a reduction of the present 8500 c. f. s. direct diversion to 6500 c. f. s. I believe there could be no further reduction in the flow until complete treatment is in effect on December 31, 1935, unless control works are installed as a part of the program, or unless hydraulic testimony should establish that a lower flow than 6500 c. f. s. would prevent reversals of the Chicago River which is the critical thing prior to the completion of the program. The diversion can be reduced in proportion to the organic load removed, up to the point to where reversals can be controlled by the facilities available, at Lockport or through new works.
>
> "Assuming that the reversals are controlled either at Lockport, or by new controlling works subsequently to December 31, 1929, the diversion could be reduced to 5000 c. f. s. plus pumpage on December 31, 1932, and to 3000 c. f. s. plus pumpage on December 31, 1933. All of the preceding figures are in addition to pumpage. On December 31, 1935, when the program I have out-

lined will be completed, the entire flow at Lockport can be cut off."

Mr. Gascoigne testified:

> "By December 31, 1929, the diversion can be reduced to 6500 c. f. s. in addition to the pumpage or used water supply. By December 31, 1935, no flow at Lockport is necessary if this program is carried out and completed. The foregoing reductions are not dependent upon the construction of controlling works. If controlling works were constructed and placed in operation so as to prevent any reversals, it would be practical to reduce the diversion subsequent to December 31, 1929, and prior to the cessation of all flow on December 31, 1935, in accordance with the organic load removed from the River by the additional treatment of sewage at the various treatment plant sites. I have not computed the practical reductions on that basis between December 31, 1929, and the termination of all flow on December 31, 1935."

Mr. Townsend testified that he had not made any estimate of reduction of the diversion in cubic feet per second at any time prior to the completion of the program. But he said:

> "It would be practical from time to time, during the course of the construction of the program outlined by me" (*supra*, p. 22) "to reduce the amount of lake water diversion. On and after December 31, 1929, the present rate of lake water diversion may be decreased. The extent of that decrease either would be proportionate to the reduction of the organic load removed by sewage treatment plants at that time, or would be limited by the extent to which the reduction could be made without causing reversals of the Chicago River. Either factor may be the controlling factor, depending upon the hydraulics of the river."

Testimony of Major General Jadwin, Chief of Engineers. In anticipation of the hearing under the order of re-reference, I informed the Chief of Engineers of my appointment and of the date of the hearing, and made the following request:

> "At the time above stated, I should like to have testimony from you, or from the District Engineer at Chicago, or other officer of the War Department competent to testify, with respect to the proceedings that have been taken by the Sanitary District of Chicago under the permit of March 3, 1925, with respect to the installation of sewage disposal plants and other measures for which the permit provides; also as to the extent of the diversion by the Sanitary District of the waters from Lake Michigan at the present time.
>
> "I should also like to have your testimony, or that of a competent officer of the War Department, with regard to the extent of the flow from Lake Michigan, if any, that would be necessary to maintain navigation in the Chicago river, in the event that all diversion for the purpose of taking care of the sewage of the Sanitary District were discontinued."

In response, General Jadwin presented Colonel Schulz, who testified with respect to compliance with the conditions of the permit of March 3, 1925 (*supra,* p. 5). General Jadwin then made a formal statement upon the question of diversion. Preliminarily, he said that but for these hearings the War Department would have got in touch with the representatives of both sides and have given them full opportunity to bring forward their respective points, and then the Department would have prepared its opinion; but the Department was very familiar with the general fundamentals of the case, and he had had the advantage of the opinion of a number of his officers who were present at the hearing, and he had prepared a tentative answer to the question; that he had in mind nothing which might arise to cause a change in it, but that he would like to be free to advise the Master of a change in the Department's position, if any reason were found therefor. No such change has been suggested. General Jadwin's statement was as follows:

> "1. With the accomplishment of sewage purification expected before December 31, 1929, a diversion of 7250 c. f. s. is believed necessary to maintain tolerable conditions of navigation in the Chicago River. With the progressive increase in sewage purification this amount may be decreased to an ultimate minimum of 5000 c. f. s., including water supply, or to such other flow as may be determined by the Secretary of War, on the recommendation of the Chief of Engineers to meet the requirements of through navigation on the Chicago River and on projects authorized by Congress from time to time.
>
> "2. In explaining this answer it seems advisable to define certain terms in order to avoid misunderstandings as to the sense in which they are used. The term 'Chicago River' is taken to embrace the main stem of the stream and its navigable branches and also the Calumet River and its navigable branches, since the latter stand in the same relation to the Sanitary District and the interests of navigation as does the Chicago River. The term 'Flow from Lake Michigan' or 'Diversion' in its most general aspect, includes three elements; first, the water flowing or pumped from the lake directed into the Chicago River and its branches, and passing through the Sanitary District's canal to the Illinois watershed; second, the run-off of the watersheds of the Chicago and Calumet Rivers, which is diverted from its natural course toward Lake Michigan and enters the Sanitary canal largely through the city sewers; and third, the water pumped from the lake for domestic use and passing into the Sanitary canal as sewage or as effluent from sewage treatment plants. As used by the War Department, the term 'Diversion'

is the flow diverted by the Sanitary District exclusive of the water drawn by the City of Chicago for water supply purposes and entering the Chicago River as sewage. It is determined by deducting from the total flow out of the Drainage Canal at Lockport the amount pumped by the City into its water mains. As so computed, the Diversion includes the run-off of the Chicago and Calumet drainage area.

"3. The introduction of deposits of sewage into the Chicago River would, without dilution, render it so foul and putrid as to materially impair its navigable condition and capacity through its deterrent effect on the navigators and on those engaged in loading and unloading the vessels. This statement is based on the effect on navigation and with the intention of keeping this effect separate from the effect on the important question of sanitation of Chicago. The sanitary conditions essential for working conditions for those engaged in navigation should be substantially the same as for the residents on shore.

"With the accomplishment of sewage treatment expected to be effected by the Sanitary District before December 31, 1929, a total diversion, in excess of sewage, amounting to 7250 c. f. s., will be requisite to dilute the sewage and carry it away to an extent sufficient to render the Chicago and Calumet Rivers suitable for navigation. Even with the attainment of the maximum practical treatment of all sewage, some circulation of water will be necessary to keep the condition of the waters tolerable for navigation. The effluent from sewage treatment plants is not pure water, and the added refuse from ships and streets, together with unavoidable accumulations of oil, requires more water for flushing than is available from the natural run-off, which the urban development has in large part intercepted and turned into sewers. When the ultimate practicable treatment of sewage is accomplished, it is believed that the needs of navigation in the Chicago and Calumet Rivers proper may be found not to exceed a flow of clear water from the lake averaging

1500 c. f. s., augmented by the natural run-off of the Chicago and Calumet River watersheds and the effluents from the treatment plants. This would give an average annual flow of about 3200 c. f. s. at Lockport. This diversion would create a current on the principal river channels of from ¼ to ⅓ foot per second, and would be sufficient to renew the average water content of the main portions of the Chicago River in about two days. Unless the total diversion be considerably greater than 3200 c. f. s., the progressive putrefaction of the polluted water would become offensive, to a degree detrimental to navigation, because of the longer time required for its passage through the drainage canal to the navigable waters of the Des Plaines River, and the upper reaches of the Illinois River.

"4. Although the term 'Navigation on the Chicago River' may be applied in a very restricted sense, it is not believed that a complete answer in the matter of diversion at Chicago can be given without regard to the physical relation which exists between the Port of Chicago and the great Inland Waterway System made up of the Mississippi, Ohio, Missouri and Illinois Rivers and their navigable tributaries and the traditional policy of Congress in developing and improving waterways to meet the increasing needs of commerce. It has, therefore, become a more pressing matter to provide for the actual connection of the inland waterway system with the Great Lakes. The Engineer Department, in reporting on the Illinois River project made reference to the work being done upstream by the State of Illinois and also that by the Sanitary District. This work partook of the nature of local co-operation. The Federal project for the Chicago River connects the South Branch and the Sanitary Canal with Lake Michigan.

"The river and harbor act of 1927 which directed the existing project for the Illinois River specified that it did not authorize a diversion of water. The project directed by Congress provided specifically for a channel with a depth of 9 feet without specifying the manner in which this depth should be obtained. The report before Congress when the project was adopted provided for alternative plans, varying in cost with the amount of diversion, the cost generally increasing as the diversion decreased. The plans were designed to provide a channel of the requisite cross-section with diversions of varying amounts between 1,000 and 10,000 c. f. s. With the lesser flows the depth would be secured by dams and locks, with the greater flows by open channel dredging. A review of the project has since been directed by Congress.

"Questions have arisen as to possible changes that may be necessary in the project to handle navigation in the future.

"There has not been as yet an official determination by the Engineer Department, of its recommendation as to the best type of improvement of the Illinois River.

"That is in response to the call from Congress.

"It is therefore seen that it is not practicable to state at this time what the amount of diversion is that may be needed in the Chicago River to meet the requirements of navigation in the broad sense. It may be that the proper proviso would be flexible and enable the United States to secure the fullest benefits of the navigation possibilities of the inland river system of waterways in connection with the Great Lakes water system, when, and if such increases are indicated. Besides providing water necessary for adequate depths and widths of channels another requisite for navigation of the Illinois River is that the water should not be unreasonably offensive. This matter has been studied by sanitary engineers employed by this Department. They made an elaborate study and advised that 4167 c. f. s. total flow measured at Lockport was the minimum total diversion necessary with the activated sludge method of sewage purification and with a 90% metering to prevent the occurrence of a nuisance in the Illinois and Des Plaines rivers and to permit fish life therein. There may be some room for argument as to this standard, but it seems certain that with too little water, the water will be so foul as to be a menace to the health of the workers upon vessels and at terminals. Certainly it is not possible to specify at this time the precise amount of water required to keep the waterway in a reasonably acceptable condition for navigation many years hence, with the growth of the city, changes in the sanitary art, and other developments not yet foreseen. The diversion eventually required can only be stated in round figures. To allow for contingencies, I have placed the eventual amount at 5,000 c. f. s. measured at Lockport.

"It therefore appears that the diversion required for navigation in the Chicago River proper may not be the controlling factor in fixing the ultimate diversion, but that the need of an Inland Waterway System when determined and defined by Congress, or, under its authority, by the Chief of Engineers and the Secretary of War, may prove to be greater than those for navigation in the Chicago River itself.

"In other words, although local navigation on the Chicago River may be safeguarded by a total diversion of about 3200 c. f. s. measured at Lockport, the through navigation between Chicago and the Mississippi system will require about 5000 c. f. s. to keep the water in the channels south of Chicago in acceptable condition with an as yet undetermined but possibly greater flow required for the maintenance of adequate channel depths and widths.

"STORM WATER RUN-OFF.

"The amounts of the diversion stated in this answer are average annual diversions. The temporary diversions of a much greater flow to prevent sewage contaminated water from a storm water run-off of the Chicago and Calumet watersheds from reaching Lake Michigan will not affect in any sensible degree the levels of the Great Lakes and should be contemplated in the decree. The control works necessary to prevent the reversal of flow with the small annual diversion recommended are under study by the Department and will be presented at a later date.

"No consideration of the ultimate diversion to be permitted is complete without mentioning the proposed compensation works in the Great Lakes.

"This department originally instituted the proceedings looking to the curtailment of the diversion of water by the Sanitary District to the end that navigation on the Great Lakes and on the St. Lawrence might be protected. It remains fully alive to the importance of safeguarding this navigation. The diversion regarded as necessary for purposes of navigation will reduce by one-half the lowering of the levels of the lakes, and this remaining effect on them can be cured by the construction of suitable compensating works. A moderate diversion will best meet the needs of navigation of the country as a whole."

Questions to be determined. There are thus three questions involved in determining the reductions in diversion that may be practicable pending the completion of the sewage treatment works: (1) What reduction may immediately, or shortly, be had; (2) whether any further reductions can properly be required without the installation of new controlling works; and, (3) if such works are found to be necessary, what reductions may be had after they have been provided.

1. The complainants' witnesses testified that there may be a reduction as of December 31, 1929, to 6,500 c. f. s., in addition to pumpage. This was based on their assumption as to the completion of the pumping station, and the consequent full operation, of the North Side treatment plant, and the completion of the two batteries of Imhoff tanks together with the skimming tanks, grit chamber and pumping station, of the West Side treatment plant. Mr. Eddy, for the defendants, made a similar assumption as to the operation of the treatment works, in his testimony as to a reduction to 6,500 c. f. s. General Jadwin in his state-

ment as to a reduction to 7,250 c. f. s. also contemplated "the accomplishment of sewage purification expected before December 31, 1929."

The work which was expected to be finished by December 31, 1929, has been delayed, and in their proposed findings the complainants have fixed April 1, 1930, as the date for the reduction to 6,500 c. f. s. The most recent testimony is that the North Side treatment plant will be in full operation by April 1 or May 1, 1930, and the defendants' proposed findings put July 1, 1930, for the full operation of this plant and for the completion of the second battery of tanks at the West Side plant. It thus appears that the discussion as to the proposed reduction to 6,500 c. f. s. or to 7,250 c. f. s., may be taken to refer to a date not later than July 1, 1930.

Both the 6,500 c. f. s. proposed by the complainants, and the 7,250 c. f. s. suggested by General Jadwin, are comparable to the 8,500 c. f. s. mean annual diversion prescribed by the permit of March 3, 1925. In making the recommendation which underlay that permit the Chief of Engineers then in office contemplated a reduction of the diversion to 7,250 c. f. s. by December 31, 1929. That recommendation stated:

> "5. It is estimated that the construction of sewage treatment plants for a population of 1,200,000 will permit a reduction in the necessary diversion from Lake Michigan of about 1,250 cubic feet per second. In other words, such construction would permit a reduction in the authorized diversion, by December 31, 1929, to about 7,250 cubic feet per second. As stated above (paragraph 4), it is probable that a still more rapid rate of reduction of diversion may be practicable thereafter."

General Jadwin's present estimate is precisely in accord with the foregoing, and appears to be a general estimate on the basis of what would naturally be expected rather than on any new or independent, scientific determination of the extent of the sewage purification. In explanation of his estimate, General Jadwin testified:

> "The diversion is going on now, has been going on under the permit that was issued in 1925 and provided for 8,500 c. f. s. as being the proper amount needed for that purpose, 8,500 plus the water supply. It provided for a progressive reduction at the rate of 250 c. f. s., that would bring it to 7,250 c. f. s. at the end of this year. I understand from the Division Engineer that the program is being carried out substantially as prescribed, and I start with that amount. That is, as near as—from any evidence that I have, that is the amount that is now needed.
>
> "When we were preparing the project for the improvement of the Illinois River, this question came up. Congress asked us to report on the diversion necessary for that. We first had the study made by the District Engineer. At that time General Taylor was Chief of Engineers, and Major Putnam was the District Engineer. Major Putnam studied it very carefully. And General Taylor authorized him to employ a firm of expert sanitary engineers to assist him in the matter. The Department approved the appointment of Alvord, Burdick & Howson, who were expert people, competent and disinterested. They made a very careful study which has been before us and has been taken into consideration by my assistants in their progressive study of the diversion.
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> "In determining that amount of diversion, I considered the amount of water needed for the navigation of the river below, and for the preservation of sanitary conditions there as well as the Port of Chicago, not from the standpoint of taking care of the health of Chicago, but from the standpoint of navigation. People on board boats need substantially the same protection, that is, their protection is the same as the people in the city. There is quite a running parallel in there for a long distance, then they are separated.

"In answer to the question whether the conclusion as to a diversion of 7,250 c. f. s., in addition to pumpage, was based in part upon what I thought necessary for the maintenance of navigation and the health of the navigator in the lower streams as well as in the Chicago Port, my thought is that we determine it in the way that I told you, practically, but I think an analysis will show that it does contemplate taking care of the navigation in the upper Illinois, in view of the fact that through navigation on the Chicago River must pass through that place, and if the navigators are not protected there it would hamper the navigation on the Chicago River. The protection of fish life in the lower river came in in the Alvord, Burdick & Howson report. But my statement did not contemplate that for the purpose of protecting fish. They used that as a measure of suitability of water for navigation. The extent of the diversion which I say is necessary is not for the sake of the fish, but is for the sake of the navigators.

"In determining this amount of 7,250 c. f. s., I have in mind that it was contemplated by the program under which they were working, and of which the District Engineer kept us advised, and that part of the sewage was purified and part was not. I did not analyze what proportion of the sewage was purified. I had those figures and they were mentioned. I didn't check or analyze it. I took the 7,250 as being about the status that the works would naturally be expected to be going at at the end of the year."

It is evident that General Jadwin was considering the nuisance factor in relation to navigation and not simply the question of depths, or current, or other matters relating to navigation irrespective of conditions produced by the inflow of sewage. General Jadwin said that he did not profess to be a sanitary engineer; he based his estimate largely on the studies of other officers, and they had the advice of the firm of sanitary engineers to whom he referred in his testimony. He said that "We got our view from Messrs. Alvord, Burdick & Howson. We paid them to give us an independent sanitary study and opinion and we have not seen anything to cause us to make a further study;" he was willing to make a further study, if it was desired, but he added—"We are following the lead of Messrs. Alvord, Burdick & Howson on those sanitary matters."

This firm was employed in January, 1925, and made their report to the War Department in April of that year. Their report shows that their study was directed to answers to certain questions, which included the determination of a pollution standard for the Drainage Canal for stated annual diversions from Lake Michigan, this standard being described as "the lowest that will prevent the occurrence of nuisance in the Des Plaines and the Illinois River, and will permit a thriving fish life therein." Mr. Howson, of that firm, who signed the report and had an important part in its preparation, testified to its correctness and that the standard to which it referred had been given to him by the War Department. He said that "a standard for water which requires conditions which will permit the maintenance of a thriving fish life, and one which requires the absence of nuisance are not at all the same. Fish life is a much higher standard. A standard which requires the maintenance of a thriving fish life is not one ordinarily adopted or accepted to satisfy health requirements or to prevent interference with navigation." Mr. Howson testified, as already stated, that on the assumption of the work expected to be completed by December 31, 1929 the direct diversion from Lake Michigan could be reduced to 6,500 c. f. s. plus pumpage.

This estimate finds support in the evidence as to the experience of former years. It was found on the original reference that the average direct diversion in 1925, was 6,940 c. f. s. and, in 1926, 6,888 c. f. s., the conditions then making impracticable a larger diversion. Mr. Ramey testified that the average direct diversion in 1927 was 6,985

c. f. s. It thus appears that an average annual direct diversion of 7,250 c. f. s. would be greater than that which actually obtained in the years 1925 to 1927, inclusive, while a reduction to 6,500 c. f. s. would make the average direct diversion only about 500 c. f. s. less than that of those years. Colonel Schulz testified that he considered the conditions "quite offensive to navigation at the present time" and that, in 1925 and 1926, navigation was going on but the condition was offensive; the river was covered with scum. Mr. Ramey (assistant chief engineer of the Sanitary District) testified on the original reference, referring to the average flow in 1926, with a direct diversion of 6,888 c. f. s., that that flow was perfectly satisfactory so far as the water supply was concerned. He said:

> "Of the 6,888 second-feet of the abstraction for 1926, what witness has termed direct abstraction from Lake Michigan, probably about 5,000 second-feet came in through the Chicago River. Witness thinks about 72% of the water diverted from Lake Michigan comes through the main river. The Sanitary District had no difficulty with the water supply during 1926 while it was maintaining this 5,000 second-feet through the Chicago River. Witness does not know that there was any particular difficulty in 1926. That flow was perfectly satisfactory so far as protecting the water supply coupled with the flow we took from the Lake through the Calumet River. That made conditions satisfactory for the year 1926."

The estimate of Mr. Eddy, the defendant's sanitary expert, was (*supra*, p. 87) that on the conditions expected on January 1, 1930, there could be a reduction of the diversion from 8,500 c. f. s. to 6,500 c. f. s., provided only that controlling works had been established in the Chicago River, or at the head of the Drainage Canal, to prevent the discharge of storm water into the Lake. Assuming that it would take two years to install these works, he said that his estimate of a diversion of 6,500 c. f. s. would be applicable to January 1, 1932. The clear inference is that with respect to conditions in the river itself and in the Drainage Canal, that is, assuming the prevention of reversals of the river, the reduction of the direct diversion to 6,500 c. f. s. would be feasible on the completion of the sewage treatment work as estimated for January 1, 1930. And it would seem from the evidence that the completion of the North Side treatment plant and of the two batteries of the West Side treatment plant should permit a reduction of 500 c. f. s. in the mean annual direct diversion, so far as the conditions in the river and Drainage Canal are concerned.

Evidence has been introduced to show the quantity of run-off in the Chicago River watershed, that is, the frequencies of different amounts of run-off. On the original reference Mr. Ramey gave the amounts of storm run-off, and their frequency, according to his estimate of 1923 based on 1922 conditions. According to that estimate, the run-off from the drainage area of the Chicago River

> "exceeds 4167 c. f. s. from 7 to 8 times per year
> exceeds 5000 c. f. s. from 5 to 6 times per year
> exceeds 7500 c. f. s. from 3 to 4 times per year
> exceeds 9500 c. f. s. about one time per year."

It was then stated by Mr. Ramey that, as the built up sections of the District increased, the sewered area and the run-off rate would increase. On this re-reference, Mr. Ramey has presented a new calculation of run-off based on conditions of 1929 as follows:

> "2,000 second feet will run off from 55 to 60 times a year; 3,000 second feet will run off from 30 to 35 times a year; 4,167 second feet will run off from 18 to 22 times per year; 5,000 second feet will run off from 12 to 15 times per year; 6,000 second feet from 8 to 10 times per year; 7,000 second feet from 6 to 7 times a year; 7,500 second feet from 5 to 6 times per year;

> 8,000 second feet from 4 to 5 times per year; 9,000 second feet from 3 to 4 times per year; 10,000 second feet from 2 to 3 times per year; 13,000 second feet, about once per year."

As to new controlling works to prevent reversals of the river, General Jadwin at first stated that if there was a large diversion it was doubtful whether such works would be needed; that with a very small diversion the necessity becomes more pressing; that he did not know whether they were necessary with a diversion of 7,250 c. f. s. and that of 5,000 later; that the matter was under discussion. Subsequently, after full consideration in the War Department, General Jadwin made a formal statement on the subject of controlling works.* He then said that with average annual diversions greater than about 6,000 c. f. s. controlling works placed near the head of the Drainage Canal, that is, at or near its northern or eastern terminus, would add but little to the effectiveness already obtained by the control at Lockport, the western terminus of the main channel of the Drainage Canal, where the present control is maintained by sluice gates and dams. He said, further, that controlling works located at the mouth of the Chicago River would involve a serious interference with navigation; that a control gate there located would not be necessary until the diversion was "so low as to require its frequent operation", and, under such conditions, the closure of the river by the gate would be an unwarranted obstruction, and that if an effective control at the mouth of the river consisted of a lock with sluices, it would cause such delay and inconvenience that it would merit approval only as a last resort. General Jadwin's conclusion was that the question of the control of both the Chicago River and the Calumet River were capable of practical solution, probably without any further control works, with a total annual average diversion of 5,000 c. f. s.

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*This is given in full (*infra*, pp. 108-116).

The contemplated direct diversion is exclusive of "pumpage", that is, "of the water drawn by the City of Chicago for water supply purposes and entering the Chicago River as sewage." The average pumpage for 1925 was 1,338 c. f. s.; for 1926, 1,395 c. f. s.; for 1927, 1,421 c. f. s.; for 1928, 1,565 c. f. s. The total flow at Lockport including pumpage would be about 8,000 c. f. s. on the basis of a direct diversion of 6,500 c. f. s. It was found on the original reference that the average annual total flow at Lockport did not exceed 8,000 c. f. s. until 1916; that for the years 1915 to 1919 the average was 8,417 c. f. s. and for the years 1920 to 1924, 8,674 c. f. s. The average total flow at Lockport in 1925 was 8,278 c. f. s., in 1926, 8,283 c. f. s. and in 1927, 8,450 c. f. s. It rose to 10,010 c. f. s. in 1928. But an average annual total flow at Lockport on a basis of 6,500 c. f. s. for direct diversion and 1,500 c. f. s. for domestic pumpage, or a total of 8,000 c. f. s., would be within 450 c. f. s. of the highest mean total flow for any year of the three years 1925 to 1927.

It should be noted that the reduction to 6,500 c. f. s., as compared with the present 8,500 c. f. s. direct diversion, refers to the mean annual direct diversion. As General Jadwin testified: "The temporary diversions of a much greater flow to prevent sewage contaminated water from a storm water run-off of the Chicago and Calumet watersheds from reaching Lake Michigan will not affect in any sensible degree the levels of the Great Lakes and should be contemplated in the decree". Such a temporary diversion was authorized in the permit of March 3, 1925, which provided for an "instantaneous maximum" diversion of not to exceed 11,000 c. f. s. while fixing 8,500 c. f. s. as the "annual average."

The evidence before me sustains the conclusion that a reduction (on the completion of the North Side treatment plant and of the two batteries of the West Side plant) of the mean annual direct diversion to 6,500 c. f. s., which would not preclude greater temporary diversions to apply in emergencies including storm conditions, would afford sufficient protection both for navigation and the water supply of the City.

2. The next question is whether there should be further reductions of the diversion pending the completion of the sewage treatment program and without the installation of controlling works.

There was a reference to such works in the permit of the Secretary of War of March 3, 1925, which provided as one of its conditions:

> "6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929."

In 1927, the Sanitary District submitted plans for controlling works, but these have not been acted upon by the War Department. Colonel Schulz testified (March 25, 1929) on this point:

> "Condition 6. The Sanitary District has submitted plans for controlling works at the mouth of the Chicago River to prevent the discharge of the Chicago River into the Lake at times of heavy storm. The matter has been studied in the Office of the Chief of Engineers. The matter is now before the Department. These controlling works cannot be completed and ready for operation by July 1, 1929. The works can be completed in about two years after the plans are approved."

Colonel Schulz said that he did not know why these plans for the controlling works had not been approved but that they were for works at the mouth of the river; that they were "not waiting for any move on the part of the Sanitary District. The plans are in Washington."

On the original reference, the complainants introduced the testimony of Brig. Gen. William L. Sibert, in order to show that control gates could be constructed at Western Avenue or at the mouth of the Chicago River so as to provide a quicker control of the flow and prevent reversals of the river, and it was contended that such control would obviate objections to the reduction of the diversion. On this re-reference, the defendants proposed, as an integral part of their program, the construction of controlling works (Defendants' Exhibit 1387, *supra,* p. 11).

The complainants' sanitary experts have not testified that these controlling works would not be needed. On the contrary, Mr. Howson, who prepared complainants' program, predicated the estimate therein for the further reductions of the diversion, after the initial reduction to 6,500 c. f. s., plus pumpage, on "control works built by December 31, 1932". And the tabular representation of that program (Complainants' Exhibit 238, *supra,* p. 88) did not provide for any reduction, after the initial one, in the absence of control works, until the entire program had been completed. Mr. Howson in his testimony stated (*supra,* p. 88) that he believed that "there could be no further reduction in the flow until complete treatment is in effect on December 31, 1935" (that being the date he fixed for completion of the entire sewage treatment works) "unless control works are installed as a part of the program, or unless hydraulic testimony should establish that a lower flow than 6,500 c. f. s. would prevent reversals of the Chicago River which is the critical thing prior to the completion of the program".

The complainants in their brief have summarized the state of the record on this point by saying:

> "It is agreed that the practicability of these further reductions" (after the initial reduction to 6,500 c. f. s., plus pumpage) "during the construction of the program depends upon whether controlling works are installed to prevent the reversal of the Chicago River in time of storm or whether the hydraulics of the Chicago River and Drainage Canal will permit the prevention of reversal of the River with controlling works at Lockport. The witnesses for both sides agree that subsequent to December 31, 1929, no progressive reductions may be had in the diversion beyond the point where substantial reversals of the Chicago River are prevented."

Mr. Howson himself did not testify as to the adequacy of the Lockport control for this purpose. Nor did the other sanitary experts called by the complainants give such testimony. As to the hydraulics of the river and canal, the complainants introduced the testimony of Horace W. King, professor of hydraulic engineering at the University of Michigan. There was also testimony for the defendants by Mr. Ramey and by Sherman M. Woodward, professor of mechanics and hydraulics at the University of Iowa. The evidence on this subject is highly technical; it was presented with much detail on examination and cross-examination, and it is impracticable to attempt to review it in this report. My conclusion is that there is no adequate basis, so far as the testimony on the hydraulics of the river and canal is concerned, for a finding that pending the completion of the sewage treatment program it would be proper to require a further reduction of the annual average direct diversion below 6,500 c. f. s. without the installation of new controlling works.

General Jadwin's statement on controlling works. General Jadwin's formal statement on this subject, which he said had been prepared in cooperation with his associates, and which included an answer to the question put by complainants' counsel as to the works which would be required under hypothetical diversions ranging from storm water flow only to a diversion of from 1,000 c. f. s. to 7,000 c. f. s., is as follows:

> "The conclusion as to the general question is that the need for further control works is not yet established.
>
> "Control works are not necessary in the interests of navigation. However and wherever constructed they would impose some delay and inconvenience upon navigation. Their purpose is to prevent the discharge of polluted water from the river into the lake where it would menace the city water supply and beaches. From the navigation standpoint, if conditions of diversion and sewage purification are so adjusted as to maintain tolerable conditions in the river, there is no reason to fear that the occasional storm discharge of untreated sewage into the lake will render conditions there intolerable for navigation.
>
> "The requirement in the present permit that control works be designed and installed appears to have been based on the contention advanced by the Sanitary District that low diversions, without control works, would result in great damage to the city water supply and beaches because of storm reversals, and on the premise that control works could be designed which would effectively prevent such reversals without serious detriment to navigation.
>
> "From the standpoint of the protection of the water supply, it may be noted that the complete prevention of any reversal of flow into the lake is not now accomplished and is not essential. As the sewage purification progresses, the temporary amount of outflow which can be tolerated will increase. As the diversion is decreased, the difficulty of preventing considerable outflows will also increase. It is not now considered possible to fix the exact limit of diversion at which the present control at Lockport will become unsatisfactory. Recent experience with a reduced diversion to prevent

flood damage in the Illinois River indicates, however, that after the sewage purification has reached the practicable standard of efficiency, the present Lockport control may be found satisfactory with a total diversion as low as 5,000 c. f. s., annual average, and might possibly be satisfactory with a lower diversion.

"It is the present attitude of the Chief of Engineers, therefore, that the United States should not require the construction of controlling works, but that the Department will consider any application for the approval of plans of controlling works, to be constructed by the Sanitary District or other agency, and may be expected to approve these plans if the works are shown to be necessary, to be effective, and to be the minimum detriment to navigation.

"The question of control works is therefore a sanitary matter for solution by the Chicago Sanitary District or the City of Chicago. For the information of the Master, an explanation of the causes of reversal of flow in the river and of the effect of control works that have been considered, is presented in order to afford data as to works appropriate to various hypothetical diversions.

"The discussion does not modify in any respect the statement heretofore made that an average diversion of 5,000 c. f. s. will be necessary to maintain navigation in the Illinois River, as contemplated by existing authority of Congress and under the plan of improvement now under way.

"The hypothetical case that he has been requested to consider are as follows:

"That there is no diversion except the storm water.

"That there is a diversion of 1, 2, 3, 4, 5, 6, or 7 thousand cubic feet per second.

"The term used in the question—'To prevent the discharge of storm water' is interpreted by counsel for the complainants as meaning that there shall be no more or greater flow of storm water into the Lake than would necessarily be occasioned by the limiting capacity of the channel without control works during rains or while the storm water run-off continues after the rain ceases.

"Answer.

"The answer to hypothetical questions is summarized as follows: As stated above, no control works are needed in the interest of navigation. If it be deemed necessary to exclude storm flow from the river to the Lake as a means of protecting the water supply, controllable sluices and a lock might be installed near the head of the Sanitary Canal or near the mouth of the river with results as follows:

"*Location Near Head of Canal.*

"(a) With average diversions greater than about 6,000 c. f. s., this control would add but little to the effectiveness already obtained by the control at Lockport.

"(b) With diversions between 6,000 c. f. s. and 1,000 c. f. s., the works would facilitate the diversion of storm flow, but the control of the effluent and other river contaminations would decrease as the diversion was decreased.

"(c) With gates normally closed (zero diversion), the intermittent discharge necessary to control flood water alone would probably amount to an average of 1,000 c. f. s.

"(d) Due to the limited capacity of the drainage canal, there would be some reversal regardless of the diversion.

"(e) The works would impede through navigation.

"*Location Near the Mouth of the River.*

"(a) An essential part of the plan is to keep flood heights down and thus keep the normal river level below that of the lake. This will, impose a serious handicap upon both through and local navigation.

"(b) The control would require an average diversion at least as great as the inflow into the river, estimated at 1,500 c. f. s. to 2,500 c. f. s., which is less than required to prevent nuisance to navigation.

"(c) The system would positively prevent reversals with all diversions exceeding the above minimum.

"(d) The lowered water level in the river would require additional dredging in the interest of navigation.

"*Effect on Navigation.*

"With either of these systems, navigation of the Illinois River as contemplated in the existing project will be impracticable unless the basic diversion is fixed at or above 5,000 c. f. s.

"*Causes and Frequency of Reversals.*

"Reversals of flow which carry water into the lake may be caused by storm water run-off in the Chicago River or by short period fluctuations of lake level. Storms are of relatively infrequent occurrence, but when they occur, their effect is superimposed upon those of the lake fluctuations. The latter are almost continuous but have no regularity or fixed period of recurrence.

"With the normal flow in the river created by any particular diversion, it is conceivable that a storm might cause a serious reversal if it occurred in conjunction with a falling lake. Whereas the same storm might cause no reversal if combined with a rising lake. Such conditions render it impracticable to calculate with precision the number and duration of reversals which might be expected under a given condition as long as the entrance to the river remains open.

"Under a diversion substantially equal to the capacity of the canal, the number of reversals observed at the mouth of the river has been as follows:

"***Total Average Diversion at Lockport.*** **(Includes water pumped for domestic use.)**

1923	8,348	1 reversal
1924	9,465	8 reversals
1925	8,277	No record
1926	8,286	6 reversals
1927	8,450	13 reversals
1928	10,010	10 reversals

"The average number of reversals was 7.6 per year and the average duration 45 minutes.

"The efficacy of the Lockport control for a diversion of about 5,000 c. f. s. is indicated by observations made from March 17th to 31st, 1929, when the flow was reduced on account of floods in the Illinois.

"During this interval there were reversals almost daily, and upon one day there were 12 reversals. A 3.12 inch rain on March 31st was met by increasing the average diversion at Lockport, to 8,600 c. f. s. for the day, and the duration of the reversal was held down to 70 minutes. Upon the other days the numerous reversals were caused primarily by lake fluctuations. Such reversals cannot be controlled by synchronous variation of flow at Lockport or at any other location in the drainage canal, but these reversals carry no considerable quantity of polluted water into the lake.

"Types and Location of Works.

"Two types of control works merit consideration. One is a lock and sluices near the head of the Sanitary Canal about 7½ miles from the mouth of the river. The purpose of the sluices is to afford a better control over the flow in the main stem of the river than is afforded by the present control works at Lockport, 34 and 36 miles from the mouth. The second type includes works in the main stem of the river to positively bar reversals.

"Control Works at Sanitary Canal.

"Control works at the head of the Sanitary Canal would not be effective until the diversion had been so reduced that it could be carried through the Sanitary Canal at a substantially lower level than at present, permitting the creation of a substantial and effective head at these sluices. Without attempting to check the various computations that have been made as to the time required for an increased discharge at the control works to become effective in influencing the flow at the mouth of the river, it is sufficient to note that these computations range from 15 minutes to an hour, as compared with an observed period of 6 to 8 hours with control at Lockport. With the shorter time interval, the control of flood discharges would, for a given diversion, be better than with the gates at Lockport, but it would be impossible to prevent reversals due to short period lake fluctuations, and the difficulty of controlling flood discharges would increase with the decrease of diversion. It would not be possible to divert flood water only, because with each operation of the control a large volume of water stored in the river and in the canal above Lockport would have to be released down the Illinois. As the diversion is decreased, the frequency of operation of the works would be increased to take care of the many small storms which would pass off without reversal or control under high diversions, but which would require control under the low diversion. If any effort were made to control the reversals due to lake fluctuations, the number of operations with the consequent waste of water would be correspondingly increased. With such works, the low limit of diversion which might be attained would depend upon the number and character of reversals which could be tolerated. The total annual diversion certainly could not be held as low as the storm water flow of the river without causing a continuous flow from the river into the lake in normal times, with frequent discharge of storm water into the lake.

"With average diversions of less than 3,000 or 4,000 c. f. s. and the continued discharge of effluent into the river, there would be a practically continuous alternation of inflow and outflow between the river and the lake. This condition would result in sewage laden storm water being carried into the lake after practically every storm large enough to flood the sewers, unless the control gates were kept open after each storm long enough to discharge the polluted contents of the river into the drainage canal. The amount of water necessary to discharge the storm water pollution cannot be calculated, but is roughly estimated at not less than 1,000 c. f. s. annual average under the assumption of a zero normal flow at the gates, which are here assumed to be closed except in time of storm. Such minimum flow in the Sanitary Canal would create nuisance conditions intolerable to navigation.

"With this minimum expenditure of water, the system would leave the discharge of effluent from the river into the lake completely uncontrolled. With this expenditure increased by normal diversions of 1, 2, 3, 4, or 5 thousand cubic feet per second, control of the effluent would be possible in degree varying with the diversion. With diversions greater than 5 or 6 thousand c. f. s. these works would be practically without effect in increasing the control now possible by manipulating the works at Lockport.

"*Works at Mouth of River.*

"The second type of control works includes those at the mouth of the Chicago River to positively prevent reversal of flow. The early plans contemplated a gate which could be swung across the river to prevent reversals. Aside from the problem of the design of a gate structure of the magnitude required, it is apparent that such a gate is not necessary until the diversion is so low as to require its frequent operation, and that under such conditions the closure of the river to navigation by the gate would be an unwarranted obstruction to navigation. Moreover, the rise in the river from the run-off of a severe storm, with the gate closed, might be excessive.

"An effective control at the mouth of the river would consist of a lock with sluices, the sluices being operated to admit such direct diversion of clear water from the lake as may be found necessary for navigation. While the construction of these works without obstructing navigation during the construction period would offer difficulties, it could be accomplished by the acquisition of sufficient upland, at high cost, to afford the necessary space. The normal level of the river would be held by means of the Lockport gates at so low an elevation that a storm inflow would not raise the river elevation to an objectionable height. Available evidence indicates that if the river were normally held at or slightly below the low water level of 1925, its maximum levels due to storm water run-off would not exceed those due to high lake levels with an open entrance.

"These works would force every vessel entering the river from the lake to pass through the lock. With the opening of the inland waterway for efficient barge transportation from Chicago to the Mississippi River System, the number of vessels will be greatly increased. While there would be some compensating advantage, in that the low level of the river would increase the head room under the various bridges, the delay and inconvenience to navigation imposed by the passage through the lock would be such that these works would merit approval only as a last resort, after it had been shown that no other means would serve the required purpose.

"These works at the mouth of the river would necessarily entail the diversion of all water entering the river, i. e., sewage, sewage effluent and run-off from the drainage area. Depending upon the growth of the city, prevention of water waste, etc., the minimum diversion physically possible by these works is estimated at from 1,500 to 2,500 c. f. s. Such a deficiency of flow in the Sanitary Canal would result in a nuisance seriously interfering with through navigation.

"*Summary.*

"None of the control works that have been considered can be operated to prevent the discharge of storm water into the lake without also diverting considerable amounts of water other than storm water.

"The efficacy of works at the head of the Sanitary Canal depends, like the present control at Lockport, on human foresight and skill. With these works, the minimum amount of water which it would be necessary to send down the canal in intermittent surges to prevent most of the storm water from entering the lake would average, for the year, probably about 1,000 c. f. s.; but with so small a diversion, the water supply would be polluted by sewage effluent. The minimum diversion at which this pollution would be tolerable is not certain.

"Effective control works at the mouth of the river require the diversion from the lake of all sewage and sewage effluent amounting to a minimum of from 1,500 to 2,500 c. f. s. They would be effective at any larger diversion, to control reversals, but a serious nuisance factor would still exist in the lower ranges.

"*Calumet River.*

"This discussion has been directed to the specific question of control works for the Chicago River. It does not include the related question of satisfactory control of the Calumet River. Both questions are capable, however, of practical solution, probably without any further control works, with a total annual average diversion of 5,000 c. f. s.

"*Practical Solution.*

"In view of these circumstances, the practical solution, in witness' opinion is to systematically reduce the contaminations and the total diversion, observing the results obtained by the best operation of the present control at Lockport, and accumulating data on the behavior of the flow with this progressively decreasing diversion. This procedure will demonstrate in ample time whether any control works are necessary, and will furnish a correct basis for their design."

General Jadwin's conclusion as to the practicability of a total annual average diversion of 5,000 c. f. s., without any further control works, is not understood to be a definite, much less a final, determination, but rather a tentative conclusion awaiting confirmation as the result of experimentation. Nor is his statement deemed to import a decision that the location of controlling works at or near the head of the Drainage Canal would constitute such an obstruction to navigation as to be held unreasonable in the circumstances. This location is approximately seven miles from the mouth of the Chicago River and Major Putnam testified on the rereference that such works could be so operated as not to hamper the interests of navigation materially. Through navigation to the Illinois River would have to pass through a lock or locks at Lockport and the additional controlling works at the head of the canal would not seem to involve any burden that could not readily be borne in such navigation. It in no way detracts from the full credit to be given to General Jadwin's important statement to say that its tentative nature, and the postponement of the determination of the question as to the necessity of controlling works, may be deemed to have relation to the possibility of the eventual, permanent allowance of a total diversion of as much as 5,000 c. f. s., and the demonstration in actual experience on that basis that new controlling works would not be needed. On all the evidence, it does not seem to me that an absolute requirement would be justified at this time for a reduction in the diversion below 6,500 c. f. s. pending the completion of the sewage treatment works and without new controlling works.

It is evident that if such a further reduction were required, without provision for controlling works, there would be a serious, and not demonstrably unjustified, apprehension as to the pollution of the water supply of the City of Chicago by reversals in times of storm. As the Sanitary District itself has proposed to avoid this danger by the construction of controlling works, and as the sanitary experts, even those of the complainants, have not been ready to testify to the feasibility of further reductions of the diversion without the installation of such works, that is, pending the completion of the sewage treatment program, I am of the opinion that such further reduction should not be required unless permission is given to install controlling works and they are constructed in accordance with plans approved by the Secretary of War under the statute.

3. The complainants in their program (Exhibit 238, *supra*, p. 88) provide for a reduction of the diversion "with Control Works built by December 31, 1932, to 5,000 c. f. s. on December 31, 1932, and to 3,000 c. f. s. on December 31, 1933, both amounts being in addition to pumpage." The complainants' program provides for no further reduction until the sewage treatment works are completed and in operation. The complainants ask for findings accordingly. The defendants concede that with the installation of controlling works there may be certain reductions in the diversion as units of the program are placed in operation, but that the amount of such reductions cannot now be determined definitely. It seems to me, however, to be quite clear from the evidence that if controlling works were installed at or near the head of the Drainage Canal it would then be practicable to reduce the diversion to 5,000 c. f. s. in addition to pumpage.

The question of a further reduction, pending the completion of the sewage treatment program, to 3,000 c. f. s. in addition to pumpage, presents greater difficulty, at least with respect to the time at which such a reduction could be effected. This estimated reduction is based on Mr. Howson's testimony, as neither Mr. Gascoigne nor Mr. Townsend, sanitary experts for the complainants, attempted to make any definite calculation of the amount of the reductions in c. f. s. that might be possible as the organic load was removed from the river by additional sewage treatment, between the initial reduction which they fixed for December 31, 1929, and the completion of the entire program for sewage treatment. Mr. Howson estimated that on December 31, 1933, not only would the extension of the Calumet treatment works have been finished and also the sedimentation tanks of the Southwest Side plant, but that the West Side plant would be in full operation. Mr. Gascoigne fixes December 31, 1934 for the completion of the West Side plant.

In my findings as to the enlargement of the Calumet plant (*supra*, p. 46), I concluded that it could be completed by December 31, 1933, and I see no reason why the West Side treatment plant should not be in operation for complete treatment by December 31, 1935. It may then be practicable to reduce the diversion to 3,000 c. f. s. in addition to pumpage. But, after the reduction of the diversion to 5,000 c. f. s., made possible by the progress of the sewage treatment and the installation of controlling works to prevent reversals in the Chicago River, there is slender basis for any estimate approaching exactness of any further reduction of the diversion which can be had prior to the completion of the entire sewage treatment program. Mr. Howson alone, of all the sanitary experts, presents a calculation of a reduction of the diversion to 3,000 c. f. s., and I do not think that this estimate, although it may prove to be accurate, affords a sufficient basis for a present absolute requirement for a reduction to that particular amount.

As already stated, the complainants do not ask for a reduction below 3,000 c. f. s. (in addition to pumpage) until the entire sewage treatment program has been completed.

In my judgment, the reductions in the diversion below 5,000 c. f. s., in addition to pumpage, which may be possible before the completion of the sewage treatment program can properly be determined only by appropriate investigation from time to time as the work of sewage treatment progresses. In this way not only may the propriety of a reduction to 3,000 c. f. s. as proposed by complainants be satisfactorily checked, but it may appear that even further reductions in the diversion may be effected before the sewage treatment works are entirely completed.

Fourth. *The extent of the diversion, if any, that will be necessary for the purpose of maintaining navigation in the Chicago River as a part of the Port of Chicago, after the proposed sewage disposal works are in full operation.*

Pumpage. The complainants ask that all flow at Lockport be enjoined from the date fixed for the completion of the sewage treatment works. This would mean not only the entire cessation of the diversion by the Sanitary District, in the sense in which that term is used by the War Department, but also the termination of the discharge at Lockport of the pumpage, that is, of the water taken by the City of Chicago from Lake Michigan and entering the Chicago River and the Drainage Canal as sewage.

So far as this pumpage is concerned, the question is merely incidental to that relating to the diversion by the Sanitary District. These bills were brought to restrain the abstraction of water from Lake Michigan by the Sanitary District, not to challenge the right of the City of Chicago to take water from the Lake for its water supply. Nor can the bills be regarded as presenting a cause of action based on the charge that the City of Chicago was taking more water from the Lake for appropriate domestic uses than it was entitled to take. The City of Chicago was not made a party to these suits, its entry as a party has been successfully resisted by the complainants, and whatever may be the effect of the procedings against the State of Illinois, as the responsible creator and governor of the municipal corporation, that State has not been called upon to answer on the theory that the mere taking of water by the city for the ordinary uses of its inhabitants constituted an actionable wrong. In its opinion, this Court described these bills as brought "for an injunction against the State of Illinois and the Sanitary District of Chicago from continuing to withdraw 8,500 cubic feet of water a second from Lake Michigan at Chicago" (278 U. S. 367, 399). This amount of 8,500 c. f. s. is the diversion by the

Sanitary District allowed by the permit of March 3, 1925, exclusive of pumpage.

Furthermore, it is not regarded as open to serious question that the City of Chicago, under authority of the State, has the riparian right to take water from Lake Michigan for the ordinary uses of its inhabitants. That would not be, *per se,* an unreasonable use. And if it were sought to prevent an abuse of that right through the taking of an unreasonable amount, it would be necessary to present that issue in an appropriate manner. (*City of Canton* v. *Shock,* 66 Ohio State, 19; *Minneapolis Mill Co.* v. *Board etc. of St. Paul,* 56 Minn. 485; *City of Philadelphia* v. *Collins,* 68 Pa. 106; *City of Auburn* v. *Union Water Power Co.,* 90 Maine, 576; *Barre Water Co.* v. *Carnes,* 65 Vt. 626; *Fisk* v. *Hartford,* 70 Conn. 720.)

If the City of Chicago is entitled to take its water supply from Lake Michigan for the ordinary and reasonable uses of its inhabitants, it cannot be said that the State or the City is subject to any established rule of law which requires it to turn into the Lake what is no longer water but sewage or the effluent of sewage treatment plants. If there were a way of destroying the sewage or sewage effluent altogether, or evaporating it, it does not appear that the State or the City would violate any right of the complainants in doing so (*Fisk* v. *Hartford,* 69 Conn. 375). The question in these suits concerns the diversion by the Sanitary District and not the pumpage independently considered.

But, as there is no means known at present of otherwise disposing of the effluent from the sewage treatment plants, when the sewage disposal program has been fully carried out, it is asumed that the effluent must be turned into the Drainage Canal and Chicago River, thence to be discharged at Lockport, the western terminus of the Canal, or be carried into Lake Michigan. The question of the disposition of the effluent from the sewage treatment plants thus demands consideration in connection with the award of relief as to the diversion by the Sanitary District.

Under the opinion of this Court in the present suits, the question of the allowance of a diversion of water from Lake Michigan in the interest of a waterway to the Mississippi is not deemed to be open to consideration. The Court found that Congress had not acted directly so as to authorize the diversion in question, and the Court referred to the declaration of Congress in the Rivers and Harbors Act of January 21, 1927 (44 Stat. 1013), providing for the improvement of the channel of the Illinois River, that nothing in the Act should be construed as authorizing any diversion of water from Lake Michigan. Accordingly, in dealing with the claims of the States intervening herein on the side of Illinois, the Court said that "They really seek affirmatively to preserve the diversion from Lake Michigan in the interest of such navigation" (of the Mississippi) "and interstate commerce though they have made no express prayer therefor. In our view of the permit of March 3, 1925, and in the absence of direct authority from Congress for a waterway from Lake Michigan to the Mississippi, they show no rightful interest in the maintenance of the diversion" (278 U. S. 367, 420).

Since the Act of 1927, it does not appear that there has been any authorization of the diversion by Congress. It is pointed out by the defendants, however, that the Drainage Canal is actually connected with what is called the Illinois Waterway (which is under improvement by the State of Illinois under the authority of a permit of the Secretary of War) and that there is now through navigation. This navigation appears to be at present of slight volume and importance, consisting of pleasure craft, but such as it is it would be cut off by a complete stoppage of flow at Lockport. As to the present situation, General Jadwin said in his testimony:

"There is very light draft present navigation from the Chicago River to the Illinois waterway coming in in two ways. It comes in through the Hennepin Canal and the Illinois River and one through the Sanitary District Canal. There is a very light draft. Congress has authorized to deepen our part of that to nine feet to meet with this deeper channel which the State of Illinois is now putting in. They are spending a large sum of money in building five large locks. We are already at work on that. I have recently entered into a contract, or Col. Weeks has, with my approval, in accordance with the Act of Congress, for dredging 1,316,960 cubic yards in the lower 20 miles of the Illinois River; for dredging 822,000 yards in the section from there up to LaGrange; dredging 1,383,000 cubic yards in the section up to Peoria, and the specifications are about ready for issue for dredging 1,680,872 cubic yards of dirt and 119,000 cubic yards of rock from Peoria up to Utica. The State of Illinois is in the midst of its expenditures for the improvement, which largely runs along where the Des Plaines River is. That has already been authorized and is a thing which we can finish our part of in about two years. We are simply trailing the State on it. I have a general authority from the Secretary of War to make allotments out of the large appropriation. The work is actually going on. Supposing that it is a depth of nine feet, and all flow from the Lake was ended, the physical consequences with respect to the portion which is now being improved under authority of Congress would be to decrease the navigational dimensions very much. You would not have a nine-foot channel after all this work was done. To get that nine foot channel without any of that water, you would have to add three locks. Colonel Pillsbury reminds me that even then we would not have enough water for lockage. We would have to have about 1,000 cubic feet for lockage if the three extra locks were built. That would, however, not take care of the nuisance factor, and we would have to build the extra locks. It would require

1,000 feet in addition to the water in the Illinois-Des Plaines watershed to take care of the lockage on a slack water system. 1,000 feet of diversion from an outside source would be required to take care of the waterway. Congress said when they authorized this project, that they did not authorize diversion, but Congress had a scale of prices before it for getting nine feet with various flows, running from one to ten thousand, and it authorized the sum of money, three million and something, the maximum limit we could go to, and that maximum limit would call for a diversion of about 4,500 average c. f. s. Congress did not run the sum up to the larger sum that would have taken care of it with the 1,000, although Congress had that larger sum before them. Congress had the report and adopted it with certain figures. Congress has since called for a revision of that report and we are now working on the revision.

"Generally, in the spring there is sufficient water in the Illinois River for lockage. It is during the time of the greatest rain, of course. The lowest flow is in the summer. There is little navigation in the winter. The river freezes down as far as Peoria."

The complainants put in evidence the Report of the Board of Engineers of Rivers and Harbors, under date of April 7, 1928, transmitted by the Chief of Engineers to the Committee on Rivers and Harbors of the House of Representatives on May 11, 1928, containing the following statements as to the Drainage Canal and the Illinois waterway:

> "The flow of the canal is maintained by the intake of water from Lake Michigan, mainly via the Chicago River, but partly via the Sag Canal. The flow is controlled at the outlet at Lockport. The flow is authorized by a revocable permit from the Secretary of War, dated March 3, 1925. However, since this is a lake-level canal, no discharge is actually necessary for its use for navigation as distinct from sanitary uses, except for the lockages at Lockport.

"No comment by the board upon this portion of the waterways is required and no Federal expenditures are in prospect.

"7. The Illinois State Waterway is connected with the Drainage Canal by locks at Lockport. Below Lockport the improvement is by the canalization of the Des Plaines River from Lockport to its junction with the Kankakee River (17 miles) and thence of the Illinois River to Starved Rock, Utica (43 miles). The waterway is being built by the State of Illinois, by authority of a permit of the Secretary of War dated March 4, 1920.

"The ruling bottom widths except at the locks, is 200 feet and the ruling depth will be 9 feet when in earth and 10 feet when in rock. The canal will contain five locks each 600 feet long, 110 feet wide and 14 feet deep over the miter sill" (description follows).

* * * * * * *

"The lock at Starved Rock is one mile above Utica. The State expects to arrange for the alteration or removal of all bridges along the State portion of the waterway. The State now expects to complete construction in 1931. . . .

"According to estimates of State engineers the canal system will require a flow from the Drainage Canal of 1,500 cubic foot-seconds for maximum lockages. In House Document No. 1374 (par. 19) an estimate of 1,000 cubic foot-seconds was made for the least flow necessary for lockages from Lake Michigan to the Illinois River. This board believes that figure is correct if based on a canal designed to save water. The State of Illinois estimates its present necessities at 50 lockages of 30 cubic foot-seconds each. This board does not believe in the possibility of such a large number of lockages at Lockport, but after considering questions of seepage and evaporation and the needs of the Illinois-Michigan Canal, has concluded that the figure of 1,500 cubic foot-seconds is on the whole reasonable."

It is to be noted that this Report of the Board of Engineers indicates that from 1,000 c. f. s. to 1,500 c. f. s. would be adequate for lockages from Lake Michigan to the Illinois River. It does not appear that this Report has been acted upon by Congress, or that the situation has changed so far as the legal aspect of the present questions is concerned, since this Court gave its opinion in these suits.

Conditions in the Chicago River.

In considering the needs of navigation, this Court limited its statement to the requirements of navigation in the Chicago River as a part of the Port of Chicago. The Court said:

> "It may be that some flow from the Lake is necessary to keep up navigation in the Chicago River, which really is part of the Port of Chicago, but that amount is negligible as compared with 8,500 second feet now being diverted" (278 U. S. 367, 418).

And again the Court said:

> "In increasing the diversion from 4,167 cubic feet a second to 8,500, the Sanitary District defied the authority of the National Government resting in the Secretary of War. And in so far as the prior diversion was not for the purposes of maintaining navigation in the Chicago River it was without any legal basis, because made for an inadmissible purpose" (*id.* p. 420).

So far as depths are concerned, it appears that no diversion of the water from Lake Michigan is required for purposes of navigation in the Chicago River, and there is testimony that without a flow at Lockport there would be an improvement with respect to the current in the river.

There is still the question as to the conditions which will exist in relation to navigation in the Chicago River as a part of the Port of Chicago, because of the introduction of the effluent from the sewage treatment works and the untreated sewage carried into the river at times of storm, after the proposed program as substantially approved by the complainants, so far as sewage treatment is concerned, has been completed. That pollution caused by the introduction of sewage has relation to the interests of navigation was recognized by this Court in the case of *New York* v. *New Jersey,* 256 U. S. 296, 397, 398, cited by the Court in referring to the exigency which confronted the Secretary of War when he gave the permit of March 3, 1925 (278 U. S. p. 418). The fact that at that time the Sanitary District had been derelict, and that the present question relates to the conditions which will exist after the sewage has been treated so far as practicable from the standpoint of sanitary engineering knowledge, can not be deemed to change the conception of the interests of navigation or the need of their appropriate protection.

The characteristics and effect of the effluent that will issue from the sewage treatment plants when in full operation have been estimated variously by the witnesses. I have not thought it necessary or advisable to call other sanitary experts of my own selection, as in view of the large number of eminent sanitary experts in one way or another already related to the controversy, it would seem to be futile to seek other experts of the requisite independence and qualifications, and it has seemed that the introduction of the testimony of additional experts would probably have merely the effect of making them, their qualifications and opinions, the subject of attack without affording any more satisfactory basis of judgment than the expert testimony which the parties themselves have submitted.

For the complainants, Mr. Howson testified that assuming the completion of the program outlined by him and summarized in Complainants' Exhibit 238 (*supra,* p. 18), and with no flow at Lockport, a situation would result which would be satisfactory from the viewpoints both of public health and navigation in the Chicago River as part of the Great Lakes-St. Lawrence system; that "there would not be any visible suspended particles recognizable as of sewage origin in the Chicago River, coming from the sewage treatment plants;" that conditions in the river would then be greatly superior in that respect to those now obtaining; that "there would not be any odors arising from the waters of the river due to the putrefaction of the organic matter contained in the sewage effluent"; that "there would not be any grease, oil or sewage material on the surface of the river due to the flow from the sewage treatment plants," which would also be a material improvement over present conditions; that the water of the river would not be offensive or injurious to the health of passengers or persons employed on vessels or docks.

Mr. Howson also stated that assuming a mean annual flow of 1,000 c. f. s. at Lockport for navigation purposes, the completion of the program he had summarized in Exhibit 238 (*supra*) "would provide a practical method for the disposal of the sewage of the Sanitary District without detriment to the Chicago water supply and without creating any nuisance to navigation in the Chicago and Illinois Rivers."

The testimony of Mr. Gascoigne and Mr. Townsend on these questions was substantially to the same effect as that of Mr. Howson.

H. C. Inches, Great Lakes' captain, who has navigated the Chicago River for many years, testified for the complainants that prior to 1900 he did not experience any difficulty in navigating the river because of the presence of sewage; that since the opening of the Drainage Canal there has been a great deal of trouble and additional expense in handling ships because of current; that the current continued to create difficulty up to 1928; that the sewage in the river did not interfere with navigation. He thought the current in the Chicago River was from two to two and a half miles an hour, more or less. Colonel Curtis McD.

Townsend (Corps of Engineers, U. S. A., retired) who had had considerable experience in relation to rivers and harbors, also testified for the complainants that no water would be needed to maintain a channel for navigation in the Chicago River in case all diversion for the purpose of taking care of the sewage of the Sanitary District were discontinued; that if the flow at Lockport were cut off the conditions of navigation on the river would be improved. He said that he had never seen any injurious effect on navigators by reason of sewage in water; that when in charge of the District of Columbia sewer department, he had found that his men who were working on sewers were as healthy as anyone else; that he himself had been through miles of sewers, breathing a sewer atmosphere, and did not know of its having had any effect on him personally. The complainants also called General Charles E. Keller (retired) who had for about four and a half years as District Engineer officer been in charge of all harbors on the east side of Lake Michigan. He gave his opinion "that the presence or absence of pollution has nothing whatever to do with commerce or the extent of commerce;" that no flow whatever at Lockport would be necessary to maintain navigation in the Chicago River in the event of the termination of the diversion to take care of sewage; that the termination of all flow at Lockport would increase the navigable depths in the Drainage Canal and the Chicago River and that the diminution of the current would be favorable to navigation.

For the defendants, Mr. Eddy testified that "the discharge of the effluent of the completed sewage treatment plants into the Lake would be detrimental to navigation. The effluent would be devoid of oxygen, black and offensive much of the time. It would tend to discolor light-colored paint on boats. It would be offensive to people riding on boats and having to work on the vessels and along the wharves. This condition would gradually decrease in intensity as the distance from the mouth of the river increased, due to the dilution and oxidation which would take place in the waters of the Lake"; and he said that for this conclusion he was assuming that the storm water would be discharged to the Des Plaines River, and that the effluent from purification works in dry weather would flow into the Lake.

Mr. Eddy testified further, that if the effluents from the sewage treatment plants were discharged through the Drainage Canal and the Des Plaines River, there would still be required some water from the Lake in order to maintain the standard which he deemed to be necessary for navigation in the waters of the Port of Chicago. He said on this point:

> "This volume of water will, or should be varied in accordance with seasonal conditions. In the winter time putrefaction is not likely to take place. Storm discharges will take place occasionally and it will be advisable to draw some water to flush them along. But I estimate that that will be a relatively small volume.
>
> "The other extreme will come during warm weather, when I estimate that from 3,000 to perhaps 4,500 second feet will be necessary, dependent upon the temperature and upon the storm discharges. I think an annual average diversion of lake water in addition to the volume discharged from the sewers and the treatment plants of 2,000 c. f. s. will be sufficient to maintain the waters suitable for navigation. This is predicated, however, upon the assumption that controlling works be provided which will prevent a back flow into the lake during storm.
>
> ". . . That is, that 2,000 second feet would represent the annual average diversion of lake water to maintain clean water for navigation purposes, which is exclusive of the Chicago pumpage. It is also exclusive of the rain-water run-off, and such water as is drawn from the ground or other sources for industrial

> purposes, which is probably a large amount. That contemplates that at no time should there be any discharge of any storm water or sewage effluent or any other thing from the Chicago River into Lake Michigan. It also contemplates that there will be a certain amount of water flowing from the Calumet River watershed through the Calumet Sag Channel, and a certain amount of water flowing in the Calumet River will be discharged to the Sag Channel and thence to Lockport.
>
> "It contemplates drawing water from the Little Calumet River, from the Lake at the Little Calumet River, or the Calumet River water itself; from the Lake at the mouth of the Chicago River, the easterly end; and from the Lake at Wilmette, so that there will be a flow continuously through the North Shore channel and the North Branch through the Chicago River and the main Drainage Canal and through the Calumet-Sag channel, all three discharges coming together and passing out at Lockport.
>
> "I am not certain that I stated that it contemplates also that the flow will be increased for short periods, at or immediately after storms in order to keep a substantial flow to wash out and clean out the channels as best may be.
>
> "The annual average diversion, then, would be inclusive of all these amounts; that is, of these three amounts that I have spoken of, 2,000 cubic feet per second, in addition to the sewage and overflow runoff.
>
> "The 2,000 second feet is to be taken directly from the Lake, which is comparable to the 8,500 second feet, exclusive of Chicago pumpage, mentioned in the permit of March 3, 1925."

Mr. Eddy also said that in his estimate of 2,000 c. f. s. he took into consideration the conditions of navigation in the Port of Chicago only and not the requirements of navigation in the Des Plaines or Illinois Rivers. He stated that the estimate was "based upon the population as of 1945"; the diversion was "equivalent to one-third of a cubic foot per second, per thousand persons, based upon the human population, and the industrial wastes equivalent population." He thought that one-third of a cubic foot per second was a "better figure to use in considering a long period in the future than 2,000 c. f. s., which is based upon specific conditions assumed for 1945."

Dr. Mohlman, for the defendants, (*supra,* p. 30) testified:

> "I have made many studies of what the oxygen demand of these effluents would be, and I have also given consideration to other factors besides the question of the requirements of the effluents themselves. The complicated factor that makes it impossible for me to judge what the conditions will be in the future, with complete treatment, is that we do not know what the effect of storm water discharge, carrying sewage, will have on these streams. My opinion of the effect of such storm water deposits is that they will form septic deposits in the river; that the oxygen will disappear except for a short distance below the activated sludge effluents, and that the condition of the channels will be objectionable. There will be deposits of septic sludge and conditions of pollution that will be highly offensive. That is in the absence of any diluting water from the Lake.
>
> "There would be a small amount of dissolved oxygen immediately below the discharge of the treatment plant effluents, but in the absence of diluting water, the water would be devoid of oxygen, and there would be objectionable conditions, without any flushing or diluting water."

With respect to the storm water overflow, carrying with it untreated sewage, Mr. Townsend, one of the complainants' experts, being asked on cross-examination as to conditions in Milwaukee with which he was familiar (*supra,* p. 22) testified as to these, and also as to the conditions which may be expected at Chicago when the program for sewage treatment is completed. He said (referring to Milwaukee):

> "I have no figures with me upon which I can state the proportion of the sewage in storm flow passing into the river or the Lake through the old outfalls at rain and thaw periods. There are overflows at the foot of a majority of the streets which pass directly into the three rivers, carrying raw sewage. However, the worst of the polluting material from the streets and deposits in the sewers is taken into the intercepting sewer. Afterwards the sewage diluted with storm flow passes directly into the river.
>
> "I made no tests to determine the correctness of the statement as to the worst of the sewage going into the plant, except that we have found through operation that on the crest of a great many storms the material received is unusually foul. Lots of that goes directly into the Lake or river through these outfalls."

Referring to the Chicago situation, he said:

> ". . . Assuming the program proposed in Complainants' Exhibit 238 be fully carried out, from the time of its completion the raw water from which the water supply is derived will become progressively worse in quality because of the increased volume of treated sewage and of storm overflow to be discharged into Lake Michigan with the increase in the growth of the City of Chicago. As the city increases in population, there will be more effluent and more sewage flowing untreated into the Lake at storm time."

In order to take the effluent from the sewage treatment plants away from the Drainage Canal and the Chicago River, the complainants have suggested that outfall sewers or tunnels might be constructed which would lead from the sewage treatment plants directly into Lake Michigan. It is to be noted, however, that there has been no criticism of the sites selected for the sewage treatment works; indeed, the only criticism has been that the proposed site for the Southwest Side plant has not already been acquired. The North Side plant adjoins the North Branch of the Chicago River about ten miles north of its confluence with the South Branch. The large West Side and Southwest Side plants adjoin the main channel of the Drainage Canal several miles west of the head of the Canal at Robey street, a point on the West Fork of the South Branch of the Chicago River about six miles from Lake Michigan. The construction of outfall sewers or tunnels to take the effluents from the sewage treatment plants directly into Lake Michigan would mean the construction of sewers or tunnels from the West Side plant and the Southwest Side plant several miles across the City of Chicago to points on the Lake. This is said by complainants' witnesses to be practicable. But Mr. Howson, the complainants' leading sanitary expert, also said that he meant that he could physically do it if he set out to do it. He did not mean that it was practicable in the sense that he would recommend doing it as an available means for the city in disposing of its sewage at this time. And Mr. Townsend, another of complainants' sanitary experts, stated that this would still leave the storm water problem. He said: "The construction and operation of tunnels directly from the sewage disposal plants at Chicago to the Lake for the purpose of carrying the effluent would still leave the storm water problem; and sewage would go into the river and lake with storm water. The effluent would be discharged directly into the Lake."

Another suggestion which has been made by the complainants is that, assuming that the effluent from the sewage treatment plants flowed into the Drainage Canal and the Chicago River, it would be practicable by means of existing pumping stations to pump water to flush the navigable channels of the Drainage Canal and the Chicago and Calumet Rivers "so that such flushing water would mingle with the effluents of the sewage disposal plants and proceed out into the Lake with no flow at Lockport." It was thus suggested that circulating water might be pumped into these channels of the Sanitary District at the rate of 1,000 c. f. s. at Wilmette, 2,000 c. f. s. at 39th Street, and 2,000 c. f. s. through the Calumet Sag. Mr. Howson said that if this program were completed the resulting conditions would support fish life. This, however, raises the question as to the conditions which would exist at or near the mouth of the Chicago River. Mr. Townsend said: "If the Chicago River and its branches were flushed by means of pumps at Wilmette, Calumet and 39th Street, any filth in these rivers would be carried to the Lake more quickly because that would increase the velocity."

Dr. Mohlman for the defendants testified on this point that while the introduction into the Drainage Canal and the Chicago River of circulating water as proposed "would provide conditions in the canal system, including the channels of the Chicago River and its branches, which would not be highly objectionable", the "constant flushing of this volume of water, plus the content of the channels into the Lake, would ruin the bathing beaches and make them completely unsafe," and that "it would contaminate the water supply and be in marked contrast to the present condition". He referred to all bathing beaches within a radius of five miles of the mouth of the Chicago River.

General Jadwin expressed the opinion that when the sewage treatment program had been completed, a diversion of a certain amount of lake water would still be necessary for purposes of navigation in the Chicago River. He said that "the effluent from sewage treatment plants is not pure water, and added refuse from ships and streets, together with unavoidable accumulations of oil, requires more water for flushing than is available from the natural run-off, which the urban development has in large part intercepted and turned into sewers." His conclusion (aside from considerations of the Des Plaines and Illinois Rivers and the possibilities of future demands dependent upon action by Congress) was: "When the ultimate practicable treatment of sewage is accomplished, it is believed that the needs of navigation in the Chicago and Calumet Rivers proper may be found not to exceed a flow of clear water from the Lake averaging 1,500 c. f. s., augmented by the natural run-off of the Chicago and Calumet River watersheds and the effluents from the treatment plants" (*supra*, pp. 92, 93).

The difficulties of prediction inhere in the attempt to estimate results on such a vast and wholly unprecedented scale of sewage treatment as that involved in the disposal of the sewage of a population now estimated at over 3,500,000, with an additional population equivalent of industrial wastes of 1,500,000, and an estimated total of human population and population equivalent of industrial wastes of 6,800,000 in 1945. The experience of very much smaller communities affords little aid in determining the effect of this enormous volume of effluent from the sewage treatment works, and the storm water run-off containing untreated sewage, flowing into the channels of the Drainage Canal and the Chicago River. If the flow at Lockport were entirely stopped, the result would be, as Colonel Townsend, testifying for the complainants, said, "that the only water from the Lake would be that which comes in as the Lake rises and falls." In that case, with the water held at Lockport, there would be "absolutely no slope in the river and its connections." The large sewage treatment works—the West Side and the Southwest Side plants—adjoining the Drainage Canal will pour their effluents into the canal, and if there is no flow at Lockport, these effluents will pass directly into the Chicago River. It is found that one hundred per cent. purification of the sewage taken to the treatment works is not practicable with present knowledge. The expected degree of purification is found to be a minimum of eighty-five per cent. and it is probable that it will be ninety per cent. or more (*supra*, p.

28). This means that an amount not exactly determinable, which may be less than ten per cent. or possibly as high as fifteen per cent., of the sewage will not have been purified and will be represented in the effluent. While the residual organic matter in the effluent may be very different from an equal percentage of the raw sewage as a potential source of nuisance, it is far from demonstrated, in my judgment, that with all flow stopped at Lockport, the concentration of such a vast volume of effluent as will flow from the proposed sewage plants, together with the untreated sewage and wastes carried with the storm flow into the limited channels of the Drainage Canal and Chicago River will not create conditions in these channels seriously detrimental to navigation.

The complainants ask that the decree provide that on and after the date fixed for the completion of the sewage treatment program, that the State of Illinois, the Sanitary District, and all persons acting under the authority of either, be ordered to refrain from so polluting the Chicago River, and the auxiliary navigable channels of the Sanitary District, by the discharge of sewage or otherwise as to create an obstruction to or interference with navigation or navigable capacity. It seems to me that the best way, and the reasonably sure way, of accomplishing this result is to permit an outflow from the Drainage Canal at Lockport. The suggestion that outfall sewers or tunnels might be built to take the effluents directly to Lake Michigan has been made in a general way, but the evidence is by no means convincing that it would be a reasonable requirement to compel the Sanitary District or the city to build such sewers or tunnels to take the effluents from the sewage treatment plants across the city to the Lake (*supra*, p. 134). The problem of the storm flow would still remain and would be especially serious in view of the volume which may be expected in the run-off of this large area with its great and growing population. The pumping of circulating water into the Drainage Canal and the Chicago and

Calumet Rivers would, as pointed out in the testimony (*supra*, p. 135) carry whatever filth there would be in these rivers to the Lake more rapidly. It is not clear that this course would be compatible with the interests of navigation in the Chicago harbor, and that there would be a serious danger of contaminating the water supply and of creating offensive conditions at the bathing beaches of the city is quite evident. As to the water supply, it is urged that water filtration plants should be constructed. The fact remains that the effluents from the sewage treatment plants and the storm water must go somewhere, and if they are taken away from the Lake and discharged through the canal at Lockport, both the danger to the water supply will be removed and conditions suitable to navigation can be maintained.

But if the effluent from the sewage treatment plants and the storm water are to be discharged through the Drainage Canal at Lockport, it is well established that some flow from the Lake will be required. This it appears should not be less than a mean annual diversion of 1,000 c. f. s., in addition to pumpage; and it does not at present appear that it is necessary that the diversion should exceed a mean annual amount of 1,500 c. f. s., in addition to pumpage.

My conclusion is that, so far as the question can be determined at this time, the interests of navigation in the Chicago River as a part of the Port of Chicago, when the above described sewage treatment program has been carried out, will require that the flow of the Drainage Canal be discharged at Lockport, and that for this purpose there will be necessary a diversion of water from Lake Michigan of an annual average of not less than 1,000 c. f. s. and that it would be safer to allow a mean annual diversion of 1,500 c. f. s., in addition to pumpage. Provision should be made for further examination, after the sewage treatment plants have been completed, and the effect of the effluent therefrom with the storm water flow on the navigable channels has been observed, to the end that the question of any further or other relief may have appropriate consideration in the light of actual conditions.

This disposition is believed to be in accord with the equitable principles which appropriately govern the exercise of the jurisdiction to determine controversies between States, a jurisdiction which is unfettered by technicalities and in the last analysis is for the purpose of establishing substantial justice. In the present instance, equitable considerations are those applicable with appropriate regard to the substantial rights of the complainants, as determined by this Court, after the Sanitary District has carried out the above described comprehensive program for sewage treatment. The injury sustained by the complainants is through the lowering of the levels of the Great Lakes in consequence of the diversion, and it is the substance of that injury which demands consideration in formulating the provisions of the decree.

In my former report it was found that it was possible to determine with approximate accuracy the full extent of a particular diversion of water from the Great Lakes; that a diversion did not operate to cause a continuous and never-ending lowering of levels, but that within practical limits, under present conditions, an approximate equilibrium would be reached within a period of time which could be calculated, after which the effect of the diversion would cease to increase. Accordingly, it was determined that the full effect of a mean annual diversion of 8,500 c. f. s. of water from Lake Michigan at Chicago, through the Drainage Canal of the Sanitary District, was to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; the levels of Lakes Erie and Ontario approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the above mentioned lakes, to the same extent respectively. It was also found that if the diversion at Chicago were ended, assuming that other diversions from the Great Lakes remained the same, the mean levels of the lakes and rivers affected by the Chicago diversion would be raised in the course of several years (about five years in the case of Lakes Michigan and Huron and about one year in the case of Lakes Erie and Ontario) to the same extent as they had been lowered, respectively, by that diversion.

On a similar calculation, the entire effect of a mean annual diversion of 1,000 c. f. s. by the Sanitary District would be a lowering of Lakes Michigan and Huron approximately seven-tenths of an inch, and of a mean annual diversion of 1,500 c. f. s., approximately one inch, at mean lake levels.

Assuming that a mean annual diversion of 8,500 c. f. s. would effect a lowering of six inches, a cessation of the diversion of water by the Sanitary District beyond the annual average of 1,500 c. f. s., that is, a cessation of 7,000 c. f. s. of the diversion of the 8,500 c. f. s. at present allowed, would have the effect of raising the levels of Lakes Michigan and Huron to the same extent as they were lowered by that diversion except by the amount of about one inch.

It can hardly be maintained that a diversion not exceeding an annual average of 1,500 c. f. s. would produce such a substantial injury to the complainants, when the fluctuations of lake levels due to other causes than diversions are considered, as to preclude attention to the serious consequences which may result from a failure to maintain suitable conditions in the interest of navigation in case all flow at Lockport should be terminated. In my opinion such an extreme requirement, after the Sanitary District has provided for sewage treatment so far as practicable, should await more exact knowledge as to its effect.

Summary.

My conclusions are:

(1) That the completion of the North Side, West Side, Calumet, and Southwest Side Sewage Treatment Works, above described, with their appurtenances and the necessary intercepting sewers, and the efficient operation of these plants, will afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes of all the area comprised within the Sanitary District of Chicago, and also, in times of storm, of approximately 150% of the ordinary dry weather flow of sewage and wastes; that in the actual operation of these plants it may appear that a greater amount of the storm flow can be treated at least in part.

(2) That what is described as "complete treatment" of the sewage taken to the sewage treatment works (that is, apart from the excess storm flow which remains untreated) does not amount to 100% purification; that with efficient operation the proposed sewage treatment plants should attain not less than an annual average of 85% purification of the sewage treated, and that it is probable that the degree of purification will be 90% or more.

(3) That the remainder of the storm flow, in excess of the volume treated in the sewage treatment plants will pass into the Chicago River and its branches, and into the canals of the Sanitary District, and any storm flow so passed into the river, its branches and the canals, at storm times will contain sewage and wastes which have not been treated by the sewage treatment works.

(4) That the time that should be allowed for the completion of the sewage treatment works above described is as follows:

(a) That the North Side Sewage Treatment Works, with appurtenances, should be completed on or before July 1, 1930;

(b) That the Calumet Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1933;

(c) That Batteries A and B of the Imhoff tanks of the West Side Sewage Treatment Works should be completed on or before July 1, 1930.

(d) That the West Side Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1935;

(e) That the Southwest Side Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1938;

(f) That the necessary intercepting sewers pertaining to the above described sewage treatment works should be completed within the time allowed for the completion of the sewage treatment works, respectively.

(g) That in the foregoing estimate allowance is made for ordinary contingencies, but not for strikes or other occurrences beyond the control of the Sanitary District or its contractors.

(5) That the diversion by the Sanitary District of water from Lake Michigan should be reduced on July 1, 1930, to an annual average diversion of 6,500 c. f. s., in addition to domestic pumpage.

(6) That subject to the approval of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to the applicable statute, controlling works should be constructed by the Sanitary District for the purpose of preventing reversals of the Chicago River at times of

storm and the introduction of storm flow into Lake Michigan; that for this purpose the Sanitary District should immediately submit plans for such works to the Chief of Engineers of the War Department; and that such controlling works should be constructed by the Sanitary District within two years after receiving the authorization of the Secretary of War.

(7) That when such controlling works have been constructed, the diversion by the Sanitary District of water from Lake Michigan should not exceed the annual average of 5,000 c. f. s. in addition to domestic pumpage.

(8) That there should be provision in the decree for an appropriate examination of results from time to time as the work of sewage treatment progresses to the end that there may be such further reduction of the diversion by the Sanitary District as may be found to be feasible pending the completion of the sewage treatment works.

(9) That, after the installation of controlling works as above provided, and on the completion of all the sewage treatment works above described, and in the absence of competent action by Congress in relation to navigation lawfully imposing a different requirement, the diversion by the Sanitary District of water from Lake Michigan should not exceed an annual average of 1,500 c. f. s. in addition to domestic pumpage.

(10) That by the term "diversion" in the foregoing conclusions is meant the flow diverted by the Sanitary District exclusive of the water drawn by the City of Chicago for water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. Such diversion is determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its

water mains and, as so computed, it includes the run-off of the Chicago and Calumet drainage area.

(11) That provision should be made in the decree for an examination of results after the completion of the sewage treatment works so that there may be such further or other relief in respect to the diversion of water from Lake Michigan as may be found to be feasible.

Recommendations as to the decree.

In their proposed findings both parties include provisions with respect to the times of completion of the sewage treatment works. The defendants, however, suggest that the Court should merely find the works necessary to be installed, in order practicably to dispose of the sewage of Chicago, and that then the constituted administrative agencies of the Government, the Chief of Engineers and the Secretary of War, may act. It is suggested that the Court should not enter a mandatory or coercive form of decree; that if the Court declares what works shall be installed and the time within which they should be completed, it must be assumed that out of respect to the Court the State of Illinois and the Sanitary District will perform what the findings conclude they should do, unless obstacles arise which make such compliance impossible; and that the Court should retain jurisdiction until the works are installed and in operation.

The Court will undoubtedly give to this suggestion the consideration which is thought to be appropriate. As its opinion, pursuant to which the order of re-reference was made, is understood to contemplate directions as to the diminishing of the diversion, these directions will properly be found in the decree. But, as such provisions will necessarily depend upon the times fixed for the completion of the sewage treatment works, and as the terms of the decree will follow the findings, as finally confirmed or modified by the Court in this respect, it would not be a matter of substance to exclude from the decree provisions as to the times of completion. Accordingly, they are included in the form of decree proposed.

It is recommended that the Court should retain jurisdiction as there are questions which it is impossible to dispose of at this time in full justice to the parties; as, for example, with respect to the extent to which the diversion of water from Lake Michigan by the Sanitary District may be reduced below 5,000 c. f. s., in addition to pumpage, after the installation of controlling works in the Chicago River and pending the completion of the sewage treatment works, and also with respect to any further or other provisions as to the diversion which may be found to be appropriate after the sewage treatment works have been completed and the results of their operation with respect to the effluent and the condition of the navigable waters have been observed. As construction work will be conducted on a large scale for several years, and unforeseen contingencies may arise, it would also seem to be important that there should be opportunity for the parties to come before the Court at any time to obtain such further directions as the facts may warrant.

To the end that the rights of all parties may be protected, there should be some measure of supervision as the contemplated work progresses. If it is deemed to be impracticable, in view of the long period involved, to appoint a commissioner for this purpose, provision may be made in the decree for the filing at stated periods by the Sanitary District of reports as to the progress of the work, on the coming in of which either party may make application to the Court for such action as may seem to be suitable. It is suggested that the Sanitary District should file semi-annual reports with the Clerk of this Court.

On the basis of the conclusions above stated, and in accordance with the direction of the order of re-reference, the following proposed form of decree is submitted. No recommendation is made as to costs.

Proposed form of decree.

(After formal parts and confirmation or modification of findings):

1. That the defendant Sanitary District of Chicago complete and place in full operation the North Side Sewage Treatment Plant and Batteries A and B of the Imhoff tanks at the West Side Sewage Treatment Plant (as outlined in the program proposed by the Sanitary District of Chicago) on or before July 1, 1930.

2. That the defendant Sanitary District of Chicago continue the operation of the Calumet sedimentation sewage disposal plant.

3. That the defendant Sanitary District of Chicago complete and place in full operation the Calumet Sewage Treatment Plant (as outlined in the program proposed by the Sanitary District of Chicago) on or before December 31, 1933.

4. That the defendant Sanitary District of Chicago complete and place in full operation the West Side Sewage Treatment Plant (as outlined in the program proposed by the Sanitary District of Chicago) on or before December 31, 1935.

5. That the defendant Sanitary District of Chicago complete and place in full operation the Southwest Side Sewage Treatment Plant (as outlined in the program proposed by the Sanitary District of Chicago) on or before December 31, 1938.

6. That the foregoing requirements as to times of completion include allowances for ordinary contingencies but not for strikes or other occurrences beyond the control of the Sanitary District or its contractors.

7. That on and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 c. f. s. in addition to domestic pumpage.

8. That subject to the approval of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to the applicable statute, controlling works shall be constructed by the Sanitary District of Chicago for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan; that for this purpose the Sanitary District of Chicago shall forthwith submit plans for such works to the Chief of Engineers of the War Department; and that such controlling works shall be completed and placed in full operation by the Sanitary District of Chicago within two years after receiving the authorization of the Secretary of War.

9. That when such controlling works have been constructed and placed in operation, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 5,000 c. f. s. in addition to domestic pumpage.

10. That after the installation of controlling works as above provided, and on the completion of all the sewage treatment works as outlined in the program proposed by the Sanitary District of Chicago, and in the absence of

competent action by Congress in relation to navigation lawfully imposing a different requirement, the defendants the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 1,500 c. f. s. in addition to domestic pumpage.

11. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area.

12. That the defendant the Sanitary District of Chicago shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

13. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply

to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

14. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy.

Respectfully submitted,

Charles E. Hughes,
Special Master.

vg 7-11-12

FILED
DEC 17 1929
CHARLES ELMORE CROPL
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1929.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.

No. ~~1~~ 6
Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

No. ~~11~~ 10
Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

No. ~~12~~ 11
Original.

REPORT OF TESTIMONY AND EXHIBITS RECEIVED BY THE SPECIAL MASTER ON RE-REFERENCE.

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IN THE

SUPREME COURT OF THE UNITED STATES.

October Term, 1929.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants, *vs.* State of Illinois and Sanitary District of Chicago, Defendants. State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.	No. 7 Original.
State of Michigan, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 11 Original.
State of New York, Complainant, *vs.* State of Illinois and Sanitary District of Chicago, Defendants.	No. 12 Original.

REPORT OF TESTIMONY AND EXHIBITS RECEIVED BY THE SPECIAL MASTER ON RE-REFERENCE.

To the Supreme Court of the United States:

I hereby certify that the testimony and exhibits, consisting of sixteen volumes of transcript, pages 9778 to 12,606, inclusive, with index, and exhibits consisting of Special Master's Exhibits A, B and C, Complainants' Exhibits Nos.

231 to 298, inclusive, and Defendants' Exhibits Nos. 1384 to 1476, inclusive, constitute the testimony and exhibits received by me as Special Master in the above-entitled suits, under the order of this Court of January 14, 1929; and I hereby report said testimony and exhibits by filing the same with the Clerk of this Court.

CHARLES E. HUGHES,
Special Master.

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CHARLES ELMORE

IN THE

Supreme Court of the United States

OCTOBER TERM, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~7~~, 6
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. ~~11~~, 10
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. ~~12~~, 11
Original.

NOTICE, MOTION AND SUGGESTIONS BY DEFENDANTS FOR REASSIGNMENT OF THE ABOVE CAUSES FOR HEARING FROM THE HEAD OF THE CALL FOR FEBRUARY 24, 1930, TO THE HEAD OF THE CALL FOR APRIL 7, 1930.

GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

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IN THE

Supreme Court of the United States

October Term, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS,
Intervening Defendants.

No. 7, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12, Original.

NOTICE, MOTION AND SUGGESTIONS BY DEFENDANTS FOR REASSIGNMENT OF THE ABOVE CAUSES FOR HEARING FROM THE HEAD OF THE CALL FOR FEBRUARY 24, 1930, TO THE HEAD OF THE CALL FOR APRIL 7, 1930.

Notice.

To Honorable John W. Reynolds,
Attorney General of Wisconsin,
Honorable Herman L. Ekern,
Special Assistant Attorney General of Wisconsin,

Honorable Raymond T. Jackson,
Special Assistant Attorney General of Wisconsin,
Honorable Herbert H. Naujoks,
Assistant Attorney General of Wisconsin,
Honorable G. A. Youngquist,
Attorney General of Minnesota,
Honorable Gilbert Bettman,
Attorney General of Ohio,
Honorable Newton D. Baker,
Special Assistant Attorney General of Ohio,
Honorable Cyrus E. Wood,
Attorney General of Pennsylvania,
Honorable Thomas E. Taylor,
Deputy Attorney General of Pennsylvania,
Honorable Wilber M. Brucker,
Attorney General of Michigan,
Honorable Hamilton Ward,
Attorney General of New York,
Honorable Albert J. Danaher,
Assistant Attorney General of New York:

The defendants, the State of Illinois and The Sanitary District of Chicago, will on Monday, January 27, 1930, at the opening of Court, present to the Court the following motion, and ask that an order be entered by the Court as in said motion requested:

Motion.

The defendants, the State of Illinois and The Sanitary District of Chicago, hereby move that the order of January 6, 1930, providing that the respective parties may file on or before February 3, 1930, any exceptions or objections they may have to the "Report of the Special Master on Re-reference," filed herein on, to wit, December 17, 1929, and directing the Clerk, in the event exceptions are filed, to set the said cases for hearing upon such exceptions at the head of the call for February 24, 1930, be amended in the following manner, to wit:

That said causes be reassigned and set for hearing upon any exceptions that may be filed by the respective parties hereto (on or before February 3, 1930), at the head of the call for April 7, 1930; and that counsel for the respective parties to said causes shall jointly prepare and file with the Clerk of the Court on or before twenty-five days following the said 3rd day of February, 1930, a condensation or joint abstract covering those portions of the record and evidence submitted and reported by the Special Master that may be required for the Court to appropriately consider any exceptions or objections filed by any or all the parties to said report of the Special Master on re-reference; and that thereupon, within twenty-five days after the said joint abstract or condensation of the record is filed with the Clerk of the Court, the respective parties may file with the Clerk of the Court their respective briefs, with proper proof of service of such briefs upon opposing counsel.

Suggestions.

In support of the foregoing motion, the said defendants suggest the following:

(1) The defendants propose, and defendants' counsel are advised that complainants propose, to file exceptions or objections to said Master's report within the time required by said order of January 6, 1930. Counsel are also advised that such exceptions will require reference to and examination of portions of the record or transcript of evidence, including exhibits filed with the Clerk and reported by the Master with his said report. The record is exceedingly voluminous and has not been

printed. In order that the Court may have in convenient form the portions of the evidence as disclosed by the record, necessary for it to appropriately dispose of such objections and exceptions, a condensation or joint abstract embracing such portions of the record as may be material to the consideration of such exceptions, must be prepared and filed by counsel for all parties. The time intervening between the date of filing the exceptions and the 24th of February when the case is set for hearing, is not sufficient for the preparation of such necessary joint abstract or condensation and for the printing of same by the Clerk.

(2) The said time does not permit preparation of briefs by counsel for complainants and defendants, and thereupon the exchange of briefs at a reasonable time before the date of hearing.

(3) The above motion for an order modifying the order of January 6, 1930, providing for the reassignment of the said causes for hearing to the later date, for the preparation of a condensation or joint abstract of the record and for the filing and exchange of briefs of the respective parties within the times therein stated, will permit the orderly preparation of the necessary record and briefs for the convenient consideration by the Court of the matters which may be raised by the various exceptions that may be filed.

(4) The reassignment of said causes will not effect any delay in the carrying out of the program outlined in the Master's report for the construction of sewage treatment or disposal works with all due and reasonable speed as provided by said Master's report, because The Sanitary District is proceeding and will proceed with the construction of said sewage disposal works with all the speed possible and with all the speed recommended by

said report. The reduction in diversion, asked by the complainants during the present year and recommended by the said Special Master's report, is provided for by the permit of the Secretary of War (pending the entry of a decree herein and to expire on the effective date of such decree), issued at the expiration date of the March 3, 1925, permit, to wit, December 31, 1929. Thus, all the reduction in diversion asked by the complainants during this year and recommended by the Master, will take place as provided by said Secretary of War permit of December 31, 1929, and complainants have not asked, nor does the said Special Master's report provide, for any further reduction in diversion for about two years after December 31, 1930.

Respectfully submitted,

OSCAR E. CARLSTROM,
Attorney General, The State of Illinois, Defendant.

WALTER E. BEEBE,
Attorney, The Sanitary District of Chicago, Defendant.

GEORGE F. BARRETT,
EDMUND D. ADCOCK,
Solicitors for Defendant, The Sanitary District of Chicago.

JAMES M. BECK,
JOHN W. DAVIS,
JAMES HAMILTON LEWIS,
LOUIS J. BEHAN,
Of Counsel for Defendant, The Sanitary District of Chicago.

WILLIAM P. SIDLEY,
CORNELIUS LYNDE,
Representing The Association of Commerce of Chicago,
Of Counsel for Defendant, The Sanitary District of Chicago.

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CHARLES ELMORE CRO

In the Supreme Court of the United States

OCTOBER TERM, 1929

No. 7, ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO AND STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants;

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS, INTERVENING DEFENDANTS.

No. 11, ORIGINAL.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12, ORIGINAL.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

COMPLAINANTS' EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER ON RE-REFERENCE.

The [illegible] Legal Printing Co., Cincinnati, O.

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In the Supreme Court of the United States

OCTOBER TERM, 1929

No. 7, ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA,
STATE OF OHIO AND STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT
OF CHICAGO,
Defendants;

STATE OF MISSOURI, STATE OF KENTUCKY,
STATE OF TENNESSEE, STATE OF LOUISIANA,
STATE OF MISSISSIPPI, AND STATE OF
ARKANSAS, INTERVENING DEFENDANTS.

No. 11, ORIGINAL.

STATE OF MICHIGAN,
Complainant,
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STATE OF ILLINOIS AND SANITARY DISTRICT
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STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT
OF CHICAGO,
Defendants.

COMPLAINANTS EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER ON RE-REFERENCE.

In the Supreme Court of the United States

OCTOBER TERM, 1929

No. 7, ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA,
STATE OF OHIO AND STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT
OF CHICAGO,
Defendants;
STATE OF MISSOURI, STATE OF KENTUCKY,
STATE OF TENNESSEE, STATE OF LOUISIANA,
STATE OF MISSISSIPPI, AND STATE OF
ARKANSAS, INTERVENING DEFENDANTS.

No. 11, ORIGINAL.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT
OF CHICAGO,
Defendants.

NO. 12, ORIGINAL.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT
OF CHICAGO,
Defendants.

COMPLAINANTS EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER ON RE-REFERENCE.

Complainants in the above entitled Original Causes Nos. 7, 11 and 12, October Term, 1929, jointly and severally except to the findings of fact made and filed by the Special Master on the Re-Reference in these causes, to the failure or refusal of the Special Master to make and file findings of fact requested by said complainants on such Re-Reference, to the conclusions of law made and filed by the Special Master on said Re-Reference, to the recommendations for a decree made and filed by the Special Master on said Re-Reference and to the failure of the Special Master to make and file conclusions of law and recommendations for a decree requested by said complainants in the following particulars, to-wit:

EXCEPTIONS TO FINDINGS OF FACT.

I.

Complainants and each of them except to the conclusion or finding of fact, appearing in duplicate on pages 34-35 (under designation of First, Conclusion (1)) and on page 141 (under the designation of Summary Conclusions (1)) of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(1) That the completion of the North Side, West Side Calumet, and Southwest Side Sewage Treatment Works, above described, with their appurtenances and the necessary intercepting sewers, and the efficient operation of these plants, will afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes of all the area comprised within the Sanitary District of Chicago, and also, in times of storm, of approximately 150% of the ordinary dry weather flow of sewage and wastes; that in the actual operation of these plants it may appear that a greater amount of the storm flow can be treated at least in part."

because said finding of fact (measured by the Master's interpretation of the relief which may be predicated upon such a program), is incomplete and not responsive to the order of Re-Reference of this Court dated January 14, 1929, in that said finding of fact does not provide a program for "the disposition of the sewage" of the Sanitary District of Chicago, "through other means than lake diversion," as required by said order of re-reference, but merely provides a program for the treatment of the sewage of the Sanitary District of Chicago by artificial processes without regard to whether other or additional structures are necessary to provide a program for "the disposition of the sewage through other means than lake diversion," and because if the Special Master were of the opinion that this program of works for the artificial treatment of the sew[illegible] of the Sanitary District of Chicago, unsupported by any auxiliary structures or measures, would not permit of the disposition of the sewage of the Sanitary District of Chicago without diversion, then, and in that event and in order to comply with the order of re-reference in this case, the Special Master should have found and included in said finding of fact and in his recommended program for "the disposition of the sewage" of the Sanitary District "through other means than lake diversion," a finding that the construction of water filtration works for all the domestic water supply of the City of Chicago, the extension of the waterworks intakes, the construction of a new water intake remote from the mouth of the Chicago River, the chlorination of the effluent of the sewage disposal plants, the construction of a separate system of sanitary sewers, the construction of outfall sewers or tunnels from the respective sewage disposal plants so as to divert the effluent wholly from the Chicago River and its auxiliary channels and/or the utilization of existing pumping stations or construction of new pumping stations to provide circulating water for the Chicago River and its auxiliary channels constitute (as to such of the foregoing works, structures and operations as he deemed essential) part or parts of a practical program for "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion," that the construction, installation or operation of any or all of the foregoing structures or measures is practical, that any or all of said structures can be built and completed before December 31, 1938, and that the defendants be required to construct and place in operation any or all of said structures deemed essential to a practical program for "the disposition of the sewage" of the Sanitary District, "through other means than lake diversion" before December 31, 1938.

As ancillary to and in support of the foregoing exception, complainants and each of them take the following detailed exceptions to findings contained in the Master's Report:

I-A.

Complainants and each of them except to that portion of finding of fact First (3), appearing on page 23 of the Report of the Special Master, which reads as follows, to-wit:

> "The evidence does not, in my judgment, furnish a basis for a finding that enlargements are necessary in the sewage disposal plants as proposed in the program of the Sanitary District. The complainants state that the changes they propose in these plants relate to their operation. Mr. Howson said that his proposed modification would 'somewhat improve' the program, but that the modification was 'not essential.' Mr. Gascoigne assumed that the change he proposed 'would require no enlargement of the plants proposed to be built.' Mr. Townsand said that no enlargement would be required, 'but merely a different utilization of the preliminary treatment plant.' "

because, insofar as said finding of fact finds or implies any concession by complainants that the defendants should not be required to enlarge the sewage disposal plants as proposed in the program of the Sanitary District, and/or to so operate them as to give at least preliminary treatment to all storm water overflows up to the capacity of the intercepting sewers (4000 c.f.s.), if such enlargement of the disposal plants or the treatment of such a volume of the storm water overflows be, in the opinion of the court, necessary to permit the disposition of the sewage of the Sanitary District by other means than lake diversion, said finding of fact is not supported by any competent evidence and is contrary to all the competent evidence in this case; and because, if the Special Master deemed or found that enlargements are necessary in the sewage disposal plants, and/or that their operation so as to provide at least preliminary treatment for all of the storm water overflows up to the capacity of the intercepting sewers is necessary to provide for or permit "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion," then, and in that event, he should have found and included in said finding of fact that the enlargement of the sewage disposal plants as proposed in the program of the Sanitary District, and/or the operation of the sewage disposal plants so as to provide at least partial treatment for all of the storm water overflows up to the capacity of the intercepting sewers is part of a practical program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, and he should have incorporated the enlargement of said sewage disposal plants and/or their operation so as to provide at least preliminary treatment of all of the storm water overflows up to the capacity of intercepting sewers as part of his recommended program "for the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion" in accordance with the mandate of this Court bearing date of January 14, 1929. *Wisconsin et al. vs. Illinois et al.*, 278 U. S. 367.

I-B.

Complainants and each of them except to that portion of finding of fact FIRST (3) appearing on page 24 of the Report of the Special Master, which reads as follows, to-wit:

> "The complainants have not proposed the installation of a separate system of sanitary sewers. When the defendants presented testimony as to their estimates of the extremely heavy, and in their view prohibitive, cost that would be involved in that undertaking (estimated by William R. Matthews, engineer of the Bureau of Sewers of Chicago at over $400,000,000) counsel for complainants stated that complainants' program does not provide for any such sewer system; that the defendants had not advanced any program involving the construction of a separate sewer system for Chicago nor had the complainants. * * * As the suggested change does not appear to be regarded as an essential feature, its feasibility may be left to be determined in the course of the actual operations."

because, insofar as said finding of fact finds or implies any concession by complainants that the defendants should not be required to construct a separate system of sanitary sewers if such a system be, in the opinion of the court, necessary to provide for or permit the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, said finding of fact is not supported by any competent evidence and is contrary to all the competent evidence in this case; and because, if the Special Master deemed or found that the construction of a separate system of sanitary sewers is necessary to provide for or permit "the disposition of the sewage" of the Sanitary

District "through other means than lake diversion," then, and in that event, he should have found and included in said finding of fact that the construction of a separate system of sanitary sewers is practicable, that the testimony of the complainants was that a separate system of sanitary sewers could be constructed for Chicago at a cost of from $158,000,000 to $171,000,000, and that the construction of such a separate system of sanitary sewers is part of a practical program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion; and he should have incorporated the construction of such a separate system of sanitary sewers in and made the construction of such a system of sanitary sewers a part of his recommended program for "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion" in accordance with the mandate of this Court bearing date of January 14, 1929.

I-C.

Complainants and each of them except to that portion of finding of fact First (3), appearing on pages 24-25 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The complainants, however, state that the program they propose does materially differ from the one presented by the Sanitary District in two respects. The first is that the program of the Sanitary District contemplates a continued diversion of a certain amount of lake water, while the complainants propose that there shall be no diversion whatever or any flow at Lockport after the completion of the program. But this difference between the two programs does not relate to the character of the sewage treatment works, as such, but to the disposition of the effluent, a question which will be examined later. The second differ-

> ence is that the program presented by the complainants provides for the installation of water purification works for all the domestic water supply of the City of Chicago. But the complainants recognize that the construction of such works is not a part of the program for the treatment of the sewage of the Sanitary District and in the findings of fact which the complainants have requested it is stated that, since the construction of water filtration plants is not an indispensable element in the practical disposal of the sewage by means other than lake diversion, the construction of such water purification works should be left to the discretion of the defendants. It also appears that the design and construction of water filtration plants for the City of Chicago is under the jurisdiction of that city which has not been made a party to this suit. Thus, what are stated in the complainants' brief to be the two material differences between the two programs do not relate to the sewage treatment works."

because, insofar as said finding of fact finds or implies any concession by the complainants that the State of Illinois should not be required to install water purification works for all of the domestic water supply of the City of Chicago, if this Court should consider the installation of water filtration works necessary to provide for or permit the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, and insofar as the Special Master found, directly or by implication, that the construction of water filtration works for the domestic water supply of Chicago should be left to the discretion of the defendants regardless of whether the construction of such water filtration works is necessary to provide a practical program for "the disposition of the sewage" of the Sanitary District "through other means than lake diversion," or insofar as the Special Master found, directly or by implication, that the omission of water filtration works from this program by the defendants could be made the basis of any abridgement of the rights of the complainants to have this diversion terminated, said finding is unsupported by any competent evidence, contrary to all the competent evidence and erroneous as a matter of law; and because if the Special Master deemed or found that water filtration works are necessary to provide for or permit "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion," then, and in that event, he should have found and included in said finding of fact that the construction of water filtration works for the domestic water supply of Chicago is practicable and that the construction of such water filtration works is part of a practical program for "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion," and he should have incorporated the construction of such water filtration works in and made the construction of such water filtration works a part of his recommended program for "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion" in accordance with the mandate of this Court bearing date of January 14th, 1929.

I-D.

Complainants and each of them except to that portion of finding of fact FIRST (3), appearing on page 25 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The complainants also say that while 'they consider any additions to or modifications of their program, summarized in Exhibit 238, to be wholly unnecessary,' they have pointed out that 'there are several variations which might be incorporated in that program, if Chicago desired to improve the present standard or quality of its water supply, or entertained any honest doubt as to the efficacy of this program from the public health standpoint. These variations

> are the extension of the present intakes' (for the water supply), 'the substitution of a new intake off the North Shore in the vicinity of Wilmette, chlorination of the sewage effluent and/or the installation of control works at the junction of the drainage canal and the Chicago River.' The complainants say that they do not urge any of these modifications and in their proposed findings they state that the 'construction or installation of any such additional works or structures should be left to the discretion of the defendants.' "

because, insofar as it finds or implies any concession by the complainants that the defendants should not be required to make such variations in the program if this Court should be of the opinion that such variations in the program are necessary to provide for or permit the disposal of the sewage of the Sanitary District of Chicago by other means than lake diversion, it is not supported by any evidence, is contrary to all the evidence and is erroneous as a matter of law; and because, if the Special Master deemed or found that such variations in the program, or any of them, were necessary to provide for the disposal of the sewage of the Sanitary District by other means than lake diversion, then, and in that event, he should have found that such variations in the program and each of them is practicable, that such variations in the program proposed by the Sanitary District (or such one or ones of such variations as he found to be essential) are parts of a practical program for the disposition of the sewage of the Sanitary District by other means than lake diversion, and that such variations in the program proposed by the Sanitary District could all be made or effected by December 31, 1938, and he should have incorporated all of such variations in the program proposed by the Sanitary District, or such ones of them as he deemed essential, in and made them a part or parts of his recommended program for the disposition of the sewage of the Sanitary District by other means than lake dive[illegible]on, in accordance with the mandate of this Court bearing date of January 14, 1929.

I-E.

Complainants and each of them except to that portion of finding of fact Third (2), appearing on page 106 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The complainants' sanitary experts have not testified that these controlling works would not be needed."

because, insofar as it finds or implies that complainants' sanitary experts, or any of them, testified directly or by inference that such controlling works are necessary to permit or would affect the practicability of terminating all flow at Lockport after the completion of complainants' program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, said finding of fact is unsupported by any competent evidence and contrary to all of the evidence in this case; and because, insofar as said finding of fact finds or implies that the installation of controlling works is necessary to provide for or permit the disposition of the sewage of the Sanitary District by other means than lake diversion, or that the installation of such controlling works is an essential part of a practical program for the disposition of the sewage of the Sanitary District without diversion, such finding is unsupported by any competent evidence and contrary to all of the competent evidence in this case; and because, insofar as said finding implies that complainants' right to terminate the diversion is dependent upon the construction of controlling works, it is erroneous as a matter of law.

I-F.

Complainants and each of them except to that portion of finding of fact FOURTH, appearing on page 137 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The suggestion that outfall sewers or tunnels might be built to take the effluents directly to Lake Michigan has been made in a general way, but the evidence is by no means convincing that it would be a reasonable requirement to compel the Sanitary District or the city to build such sewers or tunnels to take the effluents from the sewage treatment plants across the city to the Lake (*supra*, p. 134). The problem of the storm flow would still remain and would be especially serious in view of the volume which may be expected in the run-off of this large area with its great and growing population."

because said finding of fact is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case; and because, if the Special Master deemed or found that the diversion of the effluents of the sewage disposal plants from the Chicago River and its branches is necessary to provide for or permit the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, then, and in that event, he should have found and included in said finding of fact that the construction of such outfall sewers or tunnels is practical, that such outfall sewers or tunnels can be built and placed in operation before December 31, 1938, and that the construction of such outfall sewers or tunnels is part of a practical program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion; and he should have incorporated the construction of such outfall sewers or tunnels in and made the construction of such sewers or tunnels a part of his recommended program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion in accordance with the mandate of this Court bearing date of January 14, 1929.

I-G.

Complainants and each of them except to that portion of finding of fact FOURTH, appearing on pages 137-138 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The pumping of circulating water into the Drainage Canal and the Chicago and Calumet Rivers would, as pointed out in the testimony (*Supra*, p. 135) carry whatever filth there would be in these rivers to the Lake more rapidly. It is not clear that this course would be compatible with the interests of navigation in the Chicago harbor, and that there would be a serious danger of contaminating the water supply and of creating offensive conditions at the bathing beaches of the city is quite evident."

because said finding of fact is immaterial, because insofar as said finding of fact finds or implies that the pumping of circulating water would create any interference with navigation in the Chicago Harbor, it is not supported by any competent evidence in this case, and is contrary to all competent evidence in this case; and because, insofar as said finding of fact purports to find that the pumping of circulating water would endanger the public water supply, said finding is immaterial, not supported by any competent evidence in the case and contrary to all the competent evidence in the case; and because, if the Special Master deemed said finding material or if this Court should be of the opinion that said finding of fact in said respect is material, then, and in that event, the Special Master should have found that the installation of water filtration works for the domestic water supply of the City of Chicago, the extension of the waterworks intakes, the construction of a new water intake and/or the chlorination of the effluents of the sewage disposal plants would provide a full and complete safeguard for the public health; and because, insofar as said finding of fact finds, implies or concludes as a matter of law that any diversion in his case may be allowed for sanitary purposes, it is erroneous as a matter of law.

II.

Complainants and each of them except to the finding of fact designated as Summary Conclusion No. (9), appearing on page 143 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(9) That, after the installation of controlling works as above provided, and on the completion of all the sewage treatment works above described, and in the absence of competent action by Congress in relation to navigation lawfully imposing a different requirement, the diversion by the Sanitary District of water from Lake Michigan should not exceed an annual average of 1,500 c.f.s. in addition to domestic pumpage."

because, (1) insofar as said finding finds or implies, either as a finding of fact or a conclusion of law, that the Congress has the power to authorize any diversion from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed under the circumstances of this case as against and without the consent of the complainant States, it is erroneous as a matter of law; (2) and because, insofar as said finding of fact finds or implies that controlling works are an essential part of a practical program for the disposition of the sewage of the Sanitary District by other means than lake diversion, said finding of fact is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case; (3) and because, insofar as said finding of fact finds or implies or concludes as a matter of law that the Sanitary Canal is a part of the navigable waters of the United States and subject to the jurisdiction of the Secretary of War so as to require his authorization or consent for the construction of controlling works therein, said finding or conclusion is not supported by any competent evidence in this case, is contrary to all the competent evidence in this case and is erroneous as a matter of law; (4) and because, insofar as said finding either as a finding of fact or conclusion of law, finds, concludes or implies that controlling works are an essential part of a practical program for the disposition of the sewage of the Sanitary District by other means than Lake diversion, and that the authorization, consent or approval of the Secretary of War is necessary to their installation or erection, the effect of said finding, conclusion or implication is to delegate or leave to the Secretary of War the determination of when, or whether at all, the relief which complainants were awarded by the decision of this Court dated January 14, 1929, shall be effective, of when, or whether at all, the rights which this Court adjudged in these complainants shall be secured to them and to transfer the functions of this Court in the adjudication of this cause to the Secretary of War; (5) and because to the extent that said finding of fact finds or implies that any diversion of water from Lake Michigan or flow of water at Lockport is necessary to maintain navigation in the Chicago River as part of the Port of Chicago, said finding is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case; (6) because said finding of fact assumes that the defendants are entitled to divert the domestic pumpage of the City of Chicago contrary to law and in disregard of the rights of these complainants; (7) and because to the extent that said finding of fact finds as a fact or concludes as a matter of law that the defendants are entitled to divert said domestic pumpage, it is not supported by any competent evidence in this case, is contrary to all the competent evidence in this case, and is erroneous as a matter of law; (8) and because the effect of said finding that the defendants are entitled to divert the domestic pumpage in addition to 1500 c.f.s. is to fix no definite limit upon the diversion at Lockport but to permit the defendants to divert any quantity of water which they may be willing to pump and may desire to utilize on the Mississippi side of the Continental Divide for sanitary, water power or other purposes in addition to 1500 c.f.s; (9) and because to the extent that said finding of fact finds or implies as a fact or concludes as a matter of law that any flow at Lockport is necessary or legally admissible to maintain navigation in the Chicago River as a part of the Port of Chicago, said finding of fact or conclusion of law is not supported by any competent evidence in this case, is contrary to all the evidence in this case and is erroneous as a matter of law; (10) and because the Special Master should have found as a fact and concluded as a matter of law that on and after the completion of the sewage treatment works described in his Summary Conclusions numbered 1 and 4, appearing on pages 141 and 142 of the Report of the Special Master on Re-Reference, no flow or diversion from the Great Lakes-St. Lawrence Watershed (whether described as effluents, domestic pumpage, direct abstraction from the Lake or otherwise) should be maintained by the Sanitary District of Chicago.

As ancillary to and in support of the foregoing exception, complainants and each of them take the following detailed exceptions to findings contained in the Master's Report:

II-A.

Complainants and each of them except to finding of fact designated as Summary Conclusion No. (6), appearing on pages 142-143 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> (6) That subject to the approval of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to the applicable statute, controlling works should be constructed by the Sanitary District for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan; that for this purpose the Sanitary District should immediately submit plans for such works to the Chief of Engineers of the War Department; and that such controlling works should be constructed by the Sanitary District within two years after receiving the authorization of the Secretary of War.

because, insofar as said finding of fact finds or implies that controlling works are an essential part of a practical program for the disposition of the sewage of the Sanitary District by other means than lake diversion, such finding is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case; because, insofar as said finding of fact finds or implies as a fact or concludes as a matter of law that the Drainage Canal is part of the navigable waters of the United States so as to be subject to the jurisdiction of the Secretary of War and to require his authorization and consent for the installation of controlling works therein, said finding of fact is not supported by any competent evidence in this case, is contrary to all competent evidence in this case and is erroneous as a matter of law, and because the effect of said finding of fact or conclusion of law is to delegate or leave to the discretion of the Secretary of War the determination of when, or whether at all, the relief which complainants were awarded by the decision of this Court in this case dated January 14, 1929, shall be effective and of when or whether at all the rights which this Court adjudged in these complainants shall be secured to them.

II-B.

Complainants and each of them except to the finding of fact designated as Summary Conclusion No. (7), appearing on page 143 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(7) That when such controlling works have been constructed, the diversion by the Sanitary District of water from Lake Michigan should not exceed the annual average of 5,000 c.f.s. in addition to domestic pumpage."

for the reasons which are set forth in detail in the preceding exception designated as II-A.

II-C.

Complainants and each of them except to that portion of finding of fact FOURTH, appearing on page 120 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "So far as this pumpage is concerned, the question is merely incidental to that relating to the diversion by the Sanitary District. These bills were brought to restrain the abstraction of water from Lake Michigan by the Sanitary district, not to challenge the right of the City of Chicago to take water from the Lake for its water supply. Nor can the bills be regarded as presenting a cause of action based on the charge that the City of Chicago was taking more water from the Lake for appropriate domestic uses than it was entitled to take. The City of Chicago was not made a party to these suits, its entry as a party has been successfully resisted by the complainants, and whatever may be the effect of the proceedings against the State of Illinois, as the responsible creator and governor of the municipal corporation, that State has not been called upon to answer on the theory that the mere taking of water by the city for the ordinary uses of its inhabitants constituted an actionable wrong."

because, insofar as said finding of fact finds or implies that the City of Chicago diverts its domestic pumpage in any manner or degree whatsoever, such finding is unsupported by any evidence and is contrary to all the competent evidence in this case; because the Master should have found that the domestic pumpage is diverted solely by the Sanitary District; and because insofar as said finding of fact finds or implies or concludes as a matter of law that the right of the Sanitary District of Chicago to divert the domestic pumpage of the City of Chicago is not challenged by the complainants in these suits, such finding or conclusion is not supported by any evidence and is contrary to all the evidence in this case and is erroneous as a matter of law.

II-D.

Complainants and each of them except to that portion of finding of fact FOURTH, on page 121 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "Furthermore it is not regarded as open to serious question that the City of Chicago, under authority of the State, has the riparian right to take water from Lake Michigan for the ordinary uses of its inhabitants. That would not be, *per se*, an unreasonable use. And if it were sought to prevent an abuse of that right through the taking of an unreasonable amount, it would be necessary to present that issue in an appropriate manner."

because, insofar as said finding of fact finds or implies or concludes as a matter of law that this suit between States is not an appropriate proceeding to prevent an abuse of the riparian right, if any, of the City of Chicago, as an agency of the State of Illinois, to take water from Lake Michigan, said finding or conclusion is not supported by any evidence, is contrary to all the evidence in this case and is erroneous as a matter of law; because said finding is immaterial in that said domestic pumpage is not diverted by the City of Chicago but is diverted solely by the Sanitary District of Chicago; and because if this Court should be of the opinion that said finding is material, and that it is supported by the evidence, then, and in that event, the Special Master should have found and included in said finding of fact that the City of Chicago does in fact pump an unreasonable and excessive amount of water of which over one-half is wasted.

II-E.

7.

Complainants and each of them except to that portion of finding of fact FOURTH, appearing on page 121 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "If the City of Chicago is entitled to take its water supply from Lake Michigan, for the ordinary and reasonable uses of its inhabitants, it cannot be said that the State or the City is subject to any established rule of law which requires it to turn into the Lake what is no longer water but sewage or the effluent of sewage treatment plants. If there were a way of destroying the sewage or sewage effluent altogether, or evaporating it, it does not appear that the State or the City would violate any right of the complainants in doing so (*Fisk v. Hartford*, 69 Conn. 375). The question in these suits concerns the diversion by the Sanitary District and not the pumpage independently considered."

because, insofar as said finding of fact finds or implies or concludes as a matter of law that the domestic pumpage of a city after it reaches a point where some solid substances or particles are carried in suspension is no longer water, but a manufactured product, such finding or conclusion is not supported by any evidence in this case, is contrary to all the evidence in this case and is erroneous as a matter of law; and because, insofar as said finding of fact finds or implies or concludes as a matter of law that a State may authorize a municipality to take its domestic water supply from a lake or river without returning said water after it has made a reasonable use thereof, as a matter of riparian rights, under circumstances which make such State legislation effective extra-territorially to the damage of other States, such finding or conclusion is not supported by any evidence in this case, is contrary to all the evidence in this case and is erroneous as a matter of law; and because, insofar as said finding of fact finds or implies or concludes as a matter of law that the issue in these suits does not concern the whole of the diversion by the Sanitary District but only concerns that part of the diversion which flows by gravity as distinguished from that part of the diversion which is pumped, such finding or conclusion is not supported by any competent evidence in this case, is contrary to all the competent evidence in this case and is erroneous as a matter of law.

II-F.

Complainants and each of them except to that portion of finding of fact Fourth, appearing on pages 121-122 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "But, as there is no means known at present of otherwise disposing of the effluent from the sewage treatment plants, when the sewage disposal program has been fully carried out, it is assumed that the effluent must be turned into the Drainage Canal and Chicago River, thence to be discharged at Lockport, the western terminus of the Canal, or be carried into Lake Michigan. The question of the disposition of the effluent from the sewage treatment plants thus demands consideration in connection with the award of relief as to the diversion by the Sanitary District."

because, insofar as said finding of fact finds that there is no means known at present of otherwise disposing of the effluent from the sewage treatment plants than discharging it into the Drainage Canal and Chicago River, said finding of fact is not supported by any evidence in this case and is contrary to all the competent evidence in this case in that it is clearly practicable under the evidence in this case to discharge the effluent through outfall sewers or tunnels to remote places in Lake Michigan and wholly divert them from the Chicago River and the Drainage Canal; and because, insofar as said finding of fact finds as a fact or concludes as a matter of law that the disposition of the effluent from the sewage treatment plants controls, limits or abridges the relief to which complainants are entitled under the decision of January 14, 1929, said finding or conclusion is not supported by any competent evidence, is contrary to all the competent evidence in this case and is erroneous as a matter of law.

II-G.

Complainants and each of them except to that portion of finding of fact FOURTH, on page 122 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "It is pointed out by the defendants, however, that the Drainage Canal is actually connected with what is called the Illinois Waterway (which is under improvement by the State of Illinois under the authority of a permit of the Secretary of War) and that there is now through navigation. This navigation appears to be at present of slight volume and importance, consisting of pleasure craft, but such as it is it would be cut off by a complete stoppage of flow at Lockport."

because, insofar as said finding of fact implies or finds or concludes as a matter of law that the Illinois Waterway is being constructed under authority from the Secretary of War, or that the Secretary of War would have jurisdiction to authorize the construction of said Waterway, or that the Congress would have power to authorize any diversion from the Great Lakes-St. Lawrence Watershed for such a Waterway without the consent of the complainant states, such finding or conclusion is not supported by any evidence in this case, is contrary to all evidence in this case and is erroneous as a matter of law.

II-H.

Complainants and each of them except to that portion of finding of fact FOURTH, appearing on pages 126-127 of the report of the Special Master made and filed herein, which reads as follows, to-wit:

> "There is still the question as to the conditions which will exist in relation to navigation in the Chicago River as a part of the Port of Chicago, because of the introduction of the effluent from the sewage treatment works and the untreated sewage carried into the river at times of storm, after the proposed program as substantially approved by the complainants, so far as sewage treatment is concerned has been completed. That pollution caused by the introduction of sewage has relation to the interests of navigation was recognized by this Court in the case of *New York v. New Jersey*, 256 U. S. 296, 397, 398, cited by the Court in referring to the exigency which confronted the Secretary of War when he gave the permit of March 3, 1925 (278 U. S., p. 418). The fact that at that time the Sanitary District had been derelict, and that the present question relates to the conditions which will exist after the sewage has been treated so far as practicable from the standpoint of sanitary engineering knowledge, can not be deemed to change the conception of the interests of navigation or the need of their appropriate protection."

because, insofar as said finding finds or implies as a fact or concludes as a matter of law that the discharge of liquid sewage or the effluent of sewage treatment plants into any of the navigable waters of the United States constitutes an interference with or obstruction to navigation or an obstruction of navigable capacity, said finding or conclusion is not supported by any competent evidence in this case, is contrary to all competent evidence in this case and is erroneous as a matter of law; and because, insofar as said finding of fact finds as a fact or concludes as a matter of law that if the discharge of the effluent from the sewage treatment works and the discharge of the storm water overflow into the Chicago River were injurious to navigation, the defendants would not be required to remedy that condition by pumping circulating water, by discharging the effluent elsewhere through outfall sewers and/or constructing a separate system of sanitary sewers instead of attempting to found a right to divert water to the damage of the complainant states upon conditions thus created by the defendants, such finding or conclusion is not supported by any competent evidence, is contrary to all competent evidence and is erroneous as a matter of fact.

II-I.

Complainants and each of them except to finding of fact First, Conclusion (3), appearing on page 35 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(3) That the remainder of the storm flow, in excess of the volume treated in the sewage treatment plants, will pass into the Chicago River and its branches, and into the canals of the Sanitary District, and any storm flow so passed into the river, its branches and the canals, will contain sewage and wastes which have not been treated by the sewage treatment works."

because said finding of fact is immaterial and because if this court should be of the opinion that said finding is material, then, and in that event, the Master should have found that any untreated sewage and waste passing into the Chicago River and its auxiliary channels with storm water overflow will be diluted with an immense volume of water and innocuous, and that the degree of such dilution and its effect on navigation, if any, will be the same whether the storm water overflow flows westward through the Chicago River toward Lockport, or flows eastward through the Chicago River toward Lake Michigan.

II-J.

Complainants and each of them except to that portion of finding of fact Fourth, appearing on page 137 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "While the residual organic matter in the effluent may be very different from an equal percentage of the raw sewage as a potential source of nuisance, it is far from demonstrated, in my judgment, that with all flow stopped at Lockport, the concentration of such a vast volume of effluent as will flow from the proposed sewage plants together with the untreated sewage and wastes carried with the storm flow into the limited channels of the Drainage Canal and Chicago River will not create conditions in these channels seriously detrimental to navigation."

because said finding of fact is not supported by the competent evidence in this case and is contrary to all the competent evidence in this case; because if the Special Master were of the opinion that said finding of fact was supported by competent evidence in this case, then, and in that event, he should have found and included in said finding of fact a finding that it was practicable and feasible to prevent any possibility of interference with navigation in said channels either by discharging the effluent of the sewage treatment plants through outfall tunnels directly into the Lake, or by pumping circulating water through the various channels of the District and/or by construction of a separate system of sanitary sewers; because said finding of fact erroneously assumes that the burden of proof was upon the complainants to show that under the program proposed by the defendants, no conditions would be created which would be detrimental to navigation, without diversion, whereas in law the burden was upon the defendants to establish such facts, if they existed, as an equitable defense *pro tanto* to the rights of the complainants as declared by this Court in its decision of January 14, 1929.

II-K.

As ancillary to and in support of their exception No. II, complainants and each of them renew their ancillary exceptions under Exception I, designated respectively as Exceptions No. I-F and No. I-G.

II-L.

Complainants and each of them except to that portion of finding of fact FOURTH, appearing on page 138 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "But if the effluent from the sewage treatment plants and the storm water are to be discharged through the Drainage Canal at Lockport, it is well established that some flow from the Lake will be required. This it appears should not be less than a mean annual diversion of 1,000 c.f.s., in addition to pumpage; and it does not at present appear that it is necessary that the diversion should exceed a mean annual amount of 1,500 c.f.s., in addition to pumpage.
>
> My conclusion is that, so far as the question can be determined at this time, the interests of navigation in the Chicago River as a part of the Port of Chicago,

> when the above described sewage treatment program has been carried out, will require that the flow of the Drainage Canal be discharged at Lockport, and that for this purpose there will be necessary a diversion of water from Lake Michigan of an annual average of not less than 1,000 c.f.s., and that it would be safer to allow a mean annual diversion of 1,500 c.f.s., in addition to pumpage."

because, insofar as said finding of fact finds as a fact, or concludes as a matter of law, that it is necessary, or legally admissible in the interests of navigation in the Chicago River as part of the Port of Chicago to discharge the effluent of the sewage treatment works and the storm water through the Drainage Canal at Lockport without the consent of the complainant states, said finding and conclusion is not supported by the competent evidence in this case, is contrary to all the competent evidence in this case, and is erroneous as a matter of law; and because insofar as said finding of fact finds as a fact, or concludes as a matter of law, that any flow at Lockport, (whether described as effluent, domestic pumpage, direct abstraction from the lake, or otherwise) is required or is legally admissible in the interests of navigation in the Chicago River as part of the Port of Chicago, such finding or conclusion is not supported by the competent evidence in this case, is contrary to all the competent evidence in this case, and is erroneous as a matter of law; and because said finding is immaterial in that it fails to state whether any flow is necessary to *maintain* navigation in the Chicago River as a part of the Port of Chicago; and because the effect of said finding or conclusion is to permit the defendants to divert as much water from the Great Lakes-St. Lawrence watershed in addition to 1,000 or 1,500 c.f.s. as said defendants are willing or may desire to pump and utilize for sanitary, water power, or other purposes on the Mississippi side of the Continental Divide.

II-M.

Complainants, and each of them, except to the finding of fact designated as Summary Conclusion No. (10) appearing on pages 143-144 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(10) That by the term 'diversion' in the foregoing conclusions is meant the flow diverted by the Sanitary District exclusive of the water drawn by the City of Chicago for water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. Such diversion is determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and, as so computed, it includes the run-off of the Chicago and Calumet drainage area."

because, insofar as said finding of fact finds or implies as a fact, or concludes as a matter of law, that the diversion which has been made and is being made by the Sanitary District and/or that the diversion which is the subject of these suits does not include the whole of the flow which has been and is being maintained by the Sanitary District at Lockport, but that a substantial part of the flow so maintained by the Sanitary District shall be arbitrarily treated as non-existent, because the City of Chicago pumps but does not divert a certain quantity of water for domestic purposes, said finding or conclusion is not supported by any competent evidence in this case, is contrary to all the competent evidence in this case, and is erroneous as a matter of law; and because, insofar as said finding of fact finds, or implies as a fact, or concludes as a matter of law, that (to the extent that the domestic pumpage of the City of Chicago, after reasonable use by said municipality, mingles with and constitutes an undistinguishable part of the diversion or flow maintained by the Sanitary District at Lockport) such domestic pumpage is not part of the diversion or flow maintained by the Sanitary District, such finding or conclusion is not supported by any competent evidence in this case, is contrary to all of the competent evidence in this case, and is erroneous as a matter of law; and because the effect of such purported definition of the term "diversion" is to permit the defendants to divert any quantity of water which they may be willing or desire to pump and utilize for sanitary, water power, or other purposes on the Mississippi side of the Continental Divide.

II-N.

The complainants, and each of them, except to the finding of fact designated as Summary Conclusion No. 11, appearing on page 144 of the Report of the Special Master made and filed herein, which reads as follows, to wit:

> "(11) That provision should be made in the decree for an examination of results after the completion of the sewage treatment works so that there may be such further or other relief in respect to the diversion of water from Lake Michigan as may be found to be feasible."

because, insofar as said finding finds or implies as a fact or concludes as a matter of law that any diversion or flow at Lockport may be maintained by the defendants as against these complainant states after the completion of the practical program for the disposition of the sewage of the Sanitary District without diversion, such finding or conclusion is not supported by the competent evidence in this case, is contrary to all the competent evidence in this case, and is erroneous as a matter of law.

III.

Complainants and each of them except to the finding of fact or conclusion of law appearing in the Summary at page 145 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "No recommendation is made as to costs."

because the Special Master should have found or concluded as a matter of law that the complainants are entitled to have and recover from the Sanitary District of Chicago and the State of Illinois their costs and disbursements herein, and that the fees of the Special Master, as fixed and allowed by this Court, should be taxed against the defendants, the Sanitary District of Chicago and the State of Illinois, as part of the costs herein.

EXCEPTIONS TO FAILURE OR REFUSAL OF SPECIAL MASTER TO GRANT FINDINGS OF FACT REQUESTED BY OR ON BEHALF OF COMPLAINANTS.

IV.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant complainants' requested finding of fact No. 6, appearing on page 5-6 of Complainants Requested Findings of Fact, which reads as follows, to-wit:

> "While the completion of said sewage disposal plants, with chlorination only of the domestic water supply as presently practiced, will undoubtedly provide as good a water supply as presently obtains and one which is adequate to safeguard the public health, the construction of water filtration plants for the filtration of the entire domestic water supply of Chicago would be a further factor of safety or protection to the public health and would unquestionably provide a safe public water supply. In the present state of the art a comprehensive and scientifically sound program for the sanitation of Chicago should include the construction of water filtration works for the domestic water supply. Since the construction of water filtration plants is not an indispensable element in the practical disposal

of the sewage of the Sanitary District of Chicago by means other than Lake diversion, the construction of such water purification works should be left to the discretion of the defendants.

V.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant complainants' requested finding of fact No. 9, appearing on page 7 of Complainants Requested Findings of Fact, which reads as follows, to-wit:

> "If Chicago desires to improve the present standard or quality of its water supply, or to provide any additional factors of safety in the case of a breakdown in any of the plants for the disposal of the sewage by artificial processes, it would be practicable to extend the present water intakes farther into the Lake, to substitute a new water intake off the North Shore about 20 miles from the mouth of the Chicago River in the vicinity of Wilmette, to chlorinate the effluents from the sewage disposal plants and/or install controlling works at the junction of the Drainage Canal and the Chicago River, which would permit almost immediate diversion from the Lake in the case of an emergency. None of the foregoing variations in the program for the practical disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion is essential. The construction or installation of any such additional works or structures should be left to the discretion of the defendants."

VI.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant complainants' requested finding of fact No. 13, appearing on page 8 of Complainants Requested Findings of Fact, which reads as follows, to-wit:

> "Upon the completion of this program of practical measures for the disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion, no diversion of flow at Lockport will be necessary to maintain navigation upon the Chicago River as part of the Port of Chicago. Navigable depths will be increased and no nuisance will be created which will obstruct or interfere with navigation."

VII.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant complainants' requested finding of fact No. 14, appearing on pages 8-9 of Complainants Requested Findings of Fact, which reads as follows, to-wit:

> "Upon the completion of this program of practical measures for the disposal of sewage of the Sanitary District of Chicago by means other than Lake diversion, it is practicable to flush the navigable channels of the Chicago and Calumet Rivers together with the auxiliary channels by pumping circulating water through the North Branch by means of the existing pumping station near Wilmette, by pumping water into the South fork of the Chicago River or into the Chicago Drainage Canal by means of the existing pumping station at 39th Street and by pumping water through the Calumet-Sag Channel so that such flushing water would mingle with the effluents of the sewage disposal plants and proceed out into the Lake with no flow at Lockport. While this procedure is not necessary it is entirely practicable and would afford an adequate factor of safety, if desired, for the prevention of any possibility of interference with navigation in these channels."

VIII.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant complainants' requested finding of fact No. 15, appearing on page

9 of Complainants Requested Findings of Fact, which reads as follows, to-wit:

> "With the completion of this program of practical measures for the disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion, it is practicable to discharge the effluents of all of the sewage disposal plants involved in this program through outfall sewers or tunnels directly into Lake Michigan so as to wholly remove the said effluents from the Chicago River and its branches and auxiliary channels in the Sanitary District of Chicago. While such procedure is not necessary, it is entirely practicable and affords an adequate factor of safety, if desired, for the prevention of any possibility of interference with navigation in said waters."

IX.

Complainants and each of them except to the failure or refusal of the Special Master to find or grant that portion of complainants' requested finding of fact No. 16, appearing on pages 9-10 of Complainants Requested Findings of Fact, which reads as follows, to-wit:

> "During the period of construction of the practical measures involved in this program for the disposition of the sewage of the Sanitary District of Chicago by means other than Lake diversion, the following progressive reductions will be practical:
>
> * * * * *
>
> 4. A complete cessation of all diversion or flow (including the domestic pumpage) at Lockport on December 31, 1935." (Dec. 31, 1938.)

except as to the specific date on which such final cessation of any flow at Lockport should be effective, no exception being taken to the date fixed by the Special Master for the completion of the program, which date is set forth in parentheses following the foregoing quotation from complainants' requested finding of fact No. 16.

EXCEPTIONS TO FAILURE OR REFUSAL OF SPECIAL MASTER TO GRANT COMPLAINANTS' REQUESTED CONCLUSIONS OF LAW.

X.

Complainants and each of them except to the failure or refusal of the Special Master appointed herein to grant that portion of complainants' requested conclusion of law No. (2) appearing on page 10 of Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That the decree in the above entitled cases should require the Defendants * * * to cease all flow or diversion at Lockport by December 31, 1935." (December 31, 1938)

except as to the specific date on which such final cessation of any flow at Lockport should be effective, no exception being taken as to the date fixed by the Special Master for the completion of the program and which date has been set forth in parentheses following the foregoing quotation of Complainants' Requested Conclusion of Law, No. (2).

XI.

Complainants and each of them except to the failure or refusal of the Special Master appointed herein to grant complainants' requested conclusion of law No. (7) appearing on pages 11-12 of Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That the discharge of liquid sewage or street wash into any of the navigable waters of the United States does not constitute an obstruction to or interference with navigation or impairment of navigable capacity as a matter of Law."

XII.

Complainants and each of them except to the failure or refusal of the Special Master appointed herein, to grant complainants' requested conclusion of law No. 8 appearing on page 12 of Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That the discharge by the Defendants of the domestic pumpage of the City of Chicago and/or the run off of the Chicago and Calumet basins, which are naturally tributary to Lake Michigan, constitute an illegal diversion from the Great Lakes-St. Lawrence watershed to the Mississippi watershed."

XIII.

Complainants and each of them except to the failure or refusal of the Special Master appointed herein, to grant complainants' requested conclusion of law No. 9, appearing on page 12 of Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That upon the completion of the program of practical measures for the disposition of the sewage of the Sanitary District of Chicago by other means than Lake diversion, no diversion or flow at Lockport from the Great Lakes-St. Lawrence watershed may be lawfully maintained by the defendants, either in interest of the sanitation of Chicago or for the maintenance of navigation on the Chicago River as part of the Port of Chicago."

XIV.

Complainants and each of them except to the failure or refusal of the Special Master appointed herein, to grant complainants' requested conclusion of law No. 12, appearing on page 13 of the Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That defendants should be required by the terms of the decree to provide for the discharge of effluents from the sewage disposal plants involved in the practical program for the disposal of the sewage by other means than Lake diversion, by such methods as will remove all of said effluents from the Chicago River and the navigable channels of the Sanitary District of Chicago and provide for the discharge of such effluents into Lake Michigan or elsewhere in such manner and at such places as will not create any obstruction to or interference with navigation on or the navigable capacity of any of the navigable waters of the United States."

XV.

Complainants and each of them except to the failure or refusal of the Special Master appointed herein to grant that portion of complainants' requested conclusion of law No. 13 appearing on pages 13-14 of Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That the complainants are entitled to a decree in the above entitled cases enjoining the State of Illinois and the Sanitary District of Chicago, their employees, agents, attorneys and servants * * * from diverting any water or maintaining any flow through the controlling works at Lockport subsequent to December 31, 1935." (December 31, 1938)

except as to the specific date on which such final cessation of any flow at Lockport should be effective, no exception being taken as to the date fixed by the Special Master for the completion of the program, which date has been set forth in parentheses following the foregoing quotation of complainants' requested conclusion of law, No. 13.

XVI.

Complainants and each of them jointly and severally hereby tender in lieu of the requested form of decree filed with the Special Master (which requested form of decree contains certain provisions as to time of completion and other matters different than the findings of the Special Master and to which complainants have taken no exceptions) a remodelled form of decree to carry out the exceptions herein taken to the Report of the Special Master, which remodelled form of decree is as follows:

COMPLAINANTS' REQUESTED FORM OF DECREE

(after formal parts and modifications of findings.)

1. The Court finds that there are practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than lake diversion, and that the adoption, completion and operation of such practical measures, will make it practicable to terminate all flow at Lockport (whether described as domestic pumpage, effluents of sewage treatment plants, direct abstraction from the lake, or otherwise) from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, with due regard for the maintenance of navigation in the Chicago River as part of the Port of Chicago.

2. The Court finds that practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than Lake diversion can be so far completed and placed in operation on or before July 1, 1930, as to make it practicable (with due regard for the sanitary emergency and for the maintenance of navigation in the Chicago River as part of the Port of Chicago) to reduce the diversion or flow at Lockport to an annual average not exceeding 6500 c.f.s. in addition to domestic pumpage.

3. The Court finds that on and after July 1, 1930, the diversion or flow from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, which is maintained at Lockport by the Sanitary District of Chicago, should be reduced to an annual average not exceeding 6500 c.f.s. in addition to domestic pumpage.

4. The Court finds that practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than lake diversion can be so far completed and placed in operation on or before December 31, 1935 as to make it practicable (with due regard for the sanitary emergency and for the maintenance of navigation in the Chicago River as part of the Port of Chicago) to reduce the diversion or flow from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, which is maintained at Lockport by the Sanitary District of Chicago, to an annual average not exceeding 5000 c.f.s. in addition to domestic pumpage.

5. The Court finds that on and after December 31, 1935, the diversion or flow from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, which is maintained at Lockport by the Sanitary District of Chicago, should be reduced to an annual average not exceeding 5000 c.f.s. in addition to the domestic pumpage.

6. The Court finds that all practical measures necessary wholly to provide for the disposition of all of the sewage of the Sanitary District of Chicago through other means than lake diversion and to permit the termination of all flow at Lockport (whether described as domestic pumpage, effluents of sewage treatment plants, direct abstraction from the lake, or otherwise) from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, with due regard for the maintenance of navigation in the Chicago River as part of the Port of Chicago, can be wholly com-

pleted and placed in full operation on or before December 31, 1938.

7. The Court finds that on and after December 31, 1938, all flow from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed at Lockport (whether described as domestic pumpage, effluents of sewage treatment plants, direct abstraction from the lake, or otherwise) should be terminated.

Now, Therefore, It Is Ordered, Adjudged and Decreed:

1. That on or before July 1, 1930, the defendants so far complete and place in operation practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than lake diversion as will make it practicable (with due regard for the maintenance of navigation in the Chicago River as part of the Port of Chicago) to reduce the diversion or flow, which the Sanitary District maintains at Lockport, to an annual average not exceeding 6500 c.f.s. in addition to domestic pumpage.

2. That on or before December 31, 1935, the defendants so far complete and place in operation practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than Lake diversion as will make it practicable (with due regard for the maintenance of navigation in the Chicago River as part of the Port of Chicago) to reduce the diversion or flow which the Sanitary District maintains at Lockport to an annual average not exceeding 5000 c.f.s. in addition to domestic pumpage.

3. That on or before December 31, 1938, the defendants complete and place in full operation all practical measures necessary wholly to provide for the disposition of all of the sewage of the Sanitary District of Chicago through other means than lake diversion and to permit the termina-

tion of all flow at Lockport (whether described as domestic pumpage, effluents from sewage disposal plants, direct abstraction from the lake, or otherwise) from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed.

4. That on and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence System or Watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 c.f.s. in addition to domestic pumpage.

5. That on and after December 31, 1935, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any or all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from diverting or abstracting any of the waters of the Great Lakes-St. Lawrence System or Watershed through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency in excess of 5000 c.f.s. in addition to domestic pumpage.

6. That on and after December 31, 1938, the defendants, State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any or all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from diverting or abstracting any of the waters of the Great Lakes-St. Lawrence System or Watershed or maintaining any flow there-

from into the Mississippi Watershed (whether described as domestic pumpage, effluents of sewage treatment plants, direct abstraction from the Lake, or otherwise) through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency.

7. That on and after December 31, 1938, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any and all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from discharging sewage or the effluent of sewage disposal plants at such place or places and/or in such manner or by such methods as to so pollute the Chicago River and the auxiliary navigable channels of the Sanitary District of Chicago or any other of the navigable waters of the United States to such an extent as to create an obstruction to or interference with navigation or the navigable capacity of any of the navigable waters of the United States.

8. That, pending the completion of the practical measures for the disposition of the sewage through other means than lake diversion, the defendants, the Sanitary District of Chicago and the State of Illinois, shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago and the progress made on all other structures or measures necessary to provide for the disposition of the sewage of the Sanitary District through other means than lake diversion, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in oper-

ation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

9. That the complainants have and recover from the Sanitary District of Chicago and the State of Illinois their costs and disbursements herein to be taxed and noted at the foot of this decree, including the fees of the Special Master hereby fixed at .... Dollars.

BY THE COURT:

....

Clerk of the Supreme Court of United States of America.

Respectfully submitted,

JOHN W. REYNOLDS,
Attorney General of Wisconsin.

HERMAN L. EKERN,
Special Assistant Attorney General of Wisconsin.

RAYMOND T. JACKSON,
Special Assistant Attorney General of Wisconsin.

HERBERT H. NAUJOKS,
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HENRY N. BENSON,
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Assistant Attorney General of New York.

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FEB 3
CHARLES ELMOR

IN THE

Supreme Court of the United States

OCTOBER TERM, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~7~~, Original. 6

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. ~~11~~, Original. 10

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. ~~12~~, Original. 11

EXCEPTIONS AND OBJECTIONS OF DEFENDANTS THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO TO THE "REPORT OF THE SPECIAL MASTER ON RE-REFERENCE" FILED DECEMBER 17, 1929.

GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

66

IN THE

Supreme Court of the United States

October Term, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS,
Intervening Defendants.

No. 7,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11,
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12,
Original.

EXCEPTIONS AND OBJECTIONS OF DEFENDANTS THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO TO THE "REPORT OF THE SPECIAL MASTER ON RE-REFERENCE" FILED DECEMBER 17, 1929.

The defendants, the State of Illinois and The Sanitary District of Chicago, object and except to the Report of the Special Master on Re-reference, filed December 17, 1929, in the following particulars and manner:

Exception Number 1: Defendants except to conclusions 4, 5, 6, 7, 8, 9, 10 and 11, as set forth on pages 141 to 144, inclusive, of the Special Master's Report.

Exception Number 2: Defendants except to the proposed form of decree as set forth on pages 146, 147, 148 and 149 of the said Special Master's Report.

Exception Number 3: Defendants except to the findings and recommendations of the Special Master because he failed to give due consideration to the fact or facts that since the offering of the evidence upon which the Special Master's original report was made, and since the date of the filing of said report, towit, November 23, 1927, upon which the Court's opinion and order of January 14, 1929, was rendered and made, the surface elevations of Lakes Michigan and Huron have risen from the then level, approximately three feet nine inches, Erie and Ontario during the said period exhibiting a corresponding relative rise in level, and that consequently interference to navigation and interference with complainants' riparian and other interests due to the diversion at Chicago from Lake Michigan to the amount fixed by the March 3, 1925, permit, do not now prevail, but on the contrary the said high lake levels have caused and are now causing and will cause damage to complainants' riparian interests, to docks, wharves, piers and other like structures, and, (according to complainants' contention as to the effect of the Chicago diversion upon lake levels), the damage caused would have been greater had such diversion not existed, and, therefore, such damage will be greater if said diversion is reduced.

Exception Number 4: In view of said high lake levels now existing and which will continue to exist for some indefinite time, the Special Master should not have given weight to his conclusion (Special Master's Report, 80) that the Court intended by its opinion of January 14, 1929, to impose upon the Sanitary District "an immediately heavy burden" in connection with the installation of the sewage disposal works, in fixing the construction period or periods for each and all of said works; and the Special Master should have disregarded his said conclusion as to the imposition of "an immediately heavy burden" in the installation of said works, in view of said circumstances, and should have fixed much longer construction period or periods for each and all of said works, giving reasonable weight and consideration to the high lake level conditions.

Exception Number 5: Defendants except to the time fixed by the Special Master in his said report for the completion of the different sewage treatment works, and to the time fixed for the completion of all of said works, whereas the Special Master should have found the date of completion for the Southwest Side Sewage Treatment Works (as to that portion of the works to settle sewage) January 1, 1936; Calumet Sewage Treatment Works complete January 1, 1936; West Side Sewage Treatment Works complete January 1, 1941; Southwest Side Sewage Treatment Works complete January 1, 1943; all of said works complete and in practicably efficient operation January 1, 1945.

Exception Number 6: The Special Master, in fixing the time for completion of the different sewage disposal works and for the completion and placing in operation of all of said works, failed to give due consideration to necessary delays incident to carrying on a number of construction projects at the same time by one organization, and to acquiring sites for plants and rights of way through condemnation, and to delays necessarily arising in a municipal corporation raising and providing moneys as and when they are needed for construction work, because of the requirement that bond issues shall be approved by vote of the people and because of the technicalities necessarily attendant upon providing funds from year to year under budgets which must be adopted pursuant to statutory requirements.

Exception Number 7: The Special Master failed to conclude that the fixing of the amount of diversion in the interest of navigation and its protection at the end of the construction period when all said sewage disposal works are in operation is the function of the Secretary of War on recommendation of the Chief of Engineers under the Rivers and Harbors Act of Congress of March 3, 1899, and particularly Section 10 thereof; and that for the Judicial Branch to determine the amount of such diversion would invade the jurisdiction of the Legislative and Administrative Branches of the Government contrary to the Constitution, and particularly Article I, Section 1, Article II, Section 1, and Article III, Section 1, thereof.

Exception Number 8: Defendants except to those portions of the Special Master's findings, conclusions and recommendations as to form of decree which relate to the fixing by the Court by its decree of the amount of diversion at the end of said construction period in the interest of navigation and its protection.

Exception Number 9: Defendants except to those portions of the Special Master's findings, conclusions and recommendations as to form of decree which relate to the fixing by the decree of the Court of the amount or amounts of diversion from time to time during the period of construction when the different units of the sewage treatment works go into operation; whereas the Special Master should have found that the amounts of such diversion from time to time when the said important units of said sewage treatment works go into operation should be determined and fixed by the Secretary of War on the recommendation of the Chief of Engineers in the interest of navigation and its protection.

Exception Number 10: The Special Master failed to find and conclude that the proper maintenance of that navigation in the Chicago River which passes through and along the Illinois River and/or Illinois and Michigan Canal, navigable waters of the United States, requires the diversion, after all the sewage disposal works are installed, of sufficient water from Lake Michigan to maintain the waters of said Illinois River and Illinois and Michigan Canal in a reasonably acceptable condition for navigation. (Special Master's Report, 94.)

Exception Number 11: The Special Master failed to find and conclude that after the installation of all of said sewage disposal works the annual average discharge from the Drainage Canal at Lockport (including diversion of water direct from the Lake by the Sanitary District and effluent from sewage disposal works and rainfall runoff of the Chicago and Calumet Rivers watersheds), to maintain reasonably acceptable conditions for navigation in said Illinois and Michigan Canal and Illinois River, navigable waters of the United States, was and is substantially five thousand cubic feet per second. (Special Master's Report, 94-95.)

Exception Number 12: The defendants except to the conclusion of the Special Master that after all said sewage disposal works are installed and placed in operation, only fifteen hundred cubic second feet mean annual diversion, in addition to domestic pumpage, will be required in the interest of navigation in the Chicago River as a part of the Port of Chicago, (considering only that navigation which plies in and about the Port of Chicago and the various waters thereof and enters the Chicago River from Lake Michigan or passes from the Chicago River into Lake Michigan), in that the Special Master failed to find and conclude that at least two thousand cubic feet per second mean annual average, in addition to domestic pumpage, or one-third of one cubic foot per second for each one thousand of the population of the Sanitary District and industrial waste equivalent population, will be required in the interest of navigation under said conditions. (Special Master's Report, 131-132.)

Exception Number 13: The Special Master should have found that it is impracticable at this time to determine the amount of diversion that may be required at the end of the construction period and at various times during the construction period when the important units of the construction program go into operation in the interest of navigation and its protection, and that the Court should provide by its decree for the determination of such amounts at such times, or that the determination of such amounts at such times should be made by the Secretary of War upon the recommendation of the Chief of Engineers.

Respectfully submitted,

OSCAR E. CARLSTROM,
Attorney General. The State of Illinois, Defendant.

WALTER E. BEEBE,
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CHARLES

IN THE

Supreme Court of the United States

OCTOBER TERM, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS, *Intervening Defendants.*	~~No. 7,~~ 6 Original.
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, *Defendants.*	~~No. 11,~~ 10 Original.
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, *Defendants.*	~~No. 12,~~ 11 Original.

JOINT ABSTRACT OF RECORD FOR HEARING UPON EXCEPTIONS TO THE SPECIAL MASTER'S REPORT ON RE-REFERENCE.

FILED FEBRUARY 20, 1930.

GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA, *Complainants*, *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, *Defendants*. STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS, *Intervening Defendants*.	No. 7, Original.
STATE OF MICHIGAN, *Complainant*, *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, *Defendants*.	No. 11, Original.
STATE OF NEW YORK, *Complainant*, *vs.* STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, *Defendants*.	No. 12, Original.

JOINT ABSTRACT OF RECORD FOR HEARING UPON EXCEPTIONS TO THE SPECIAL MASTER'S REPORT ON RE-REFERENCE.

FILED FEBRUARY 20, 1930.

1930
THE GUNTHORP-WARREN PRINTING COMPANY
CHICAGO

FOREWORD.

This Joint Abstract of portions of record, submitted by counsel for all parties, is designed to embrace material not sufficiently appearing in the Special Master's Report on Re-reference, filed December 17, 1929, in the Special Master's Report on Original Reference, filed November 23, 1927, or in the Joint Abstract filed herein January 24, 1928, and it is intended for use on the hearing on exceptions to the Special Master's Report on Rereference.

It is understood that counsel may refer, in their briefs or in their argument, to portions of the record that may be inadvertently omitted from this Joint Abstract.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS,
Intervening Defendants.

No. 7, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 11, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12, Original.

JOINT ABSTRACT ON RE-REFERENCE.

CHICAGO, ILLINOIS, March 25, 1929.

Page of Record.

Defendants' counsel suggested that the Special Master and complainants' counsel and experts visit the North

Side Sewage Disposal Works under operation, and the West Side Sewage Disposal Works under construction. To this suggestion the Master and complainants agreed. Accordingly, the Master and counsel and expert witnesses for both parties visited said plants during the afternoon of March 25, 1929.

9787 **Major General Edgar B. Jadwin**, called by the Special Master, Chief of Engineers of United States Army, testified:

The questions put by the Master to the Chief of Engineers as shown by the Master's letter of February 22, 1929, and the Chief of Engineers' answers thereto, appear at pages 90 to 96 of the Special Master's Report on Rereference.

Cross-Examination by Attorney General Ward of New York.

I have been Chief of Engineers since June, 1926. I 10017 have never had charge of the Chicago District as District Engineer nor as Division Engineer. The investigations made which resulted in the testimony I gave yesterday, were through consultation with subordinates, rather than through any personal inquiry, largely. I have personal contact with certain phases of the problem by virtue of being senior member of the American Section of the Joint St. Lawrence Board, and the question was up before the Board; but the bulk of the data that I have gotten has come from my assistants or through them.

I am not a sanitary engineer, and have passed very little upon sanitary problems. I have had charge of a 10018 large amount of work, and there has been some sanitary work come up in connection with that. But it has not been of as complicated a character as the one under consideration. In France I had general charge of the construction of service supply, which included the wharves, channels, railroad construction, construction and modification of hospitals. Along with that there came more or less water supply construction, and a little sewage disposal, but it was done on the simplest possible plan with the idea or thought that the war would not last long and we were not building for permanency. None of that work involved the amount of pollution in large running streams that might become objectionable or might carry disease to the inhabitants. The answer I gave was intended to be the answer to the question put in the last paragraph of the Master's letter.

10022 Without any reference to sewage in the river, how much water is required for navigation, is a mighty serious question, and I would like to take a little time with my officers in preparing an answer to that. Several questions come in there, and several hypotheses, which we will probably take up. One is whether you block off the Chicago River and consider it merely as an arm of Lake Michigan, or whether you take into consideration the fact that Congress has already authorized the improvement of the Illinois, and the only way they can get the water is through the Chicago River, and whether we are to consider that there will be possibly other conditions, and I would rather not answer it extempora-
10023 neously. I will be very glad to give you an answer after I have worked over it, but we usually work over those things in that way. I should give my opinion after consulting the District and Division Engineer and the Board of Engineers. I have them here, and am perfectly willing to do that.

The Master: General Jadwin is here not as an ordinary expert. He is Chief of Engineers of the War Department and naturally he feels his answers to those questions are with a sense of official responsibility in advising me and the Supreme Court of the mature opinion of the War Department. He feels that he should not be required to give an answer on an important question without having opportunity to consider the matter carefully. It is not at all the case of an ordinary expert on cross-examination as to his qualifications. He is the Chief of Engineers of the United States Army.

Mr. Ward: It is difficult for me to cross-examine the
10024 gentleman and also his advisers.

The Master: You can have any officer whose opinion appears to be underlying that of the General, at any time.

General Jadwin (continuing): I testified that under the present conditions the diversion required to make the flow of water in the river sufficiently healthful for sailors and men on vessels, was 7,250 c. f. s., plus the water supply, and I included in that answer the Calumet system, and I do not in my own mind divide the amount of diversion between that required by the Calumet system and the Chicago River. As to the process of reasoning by which I reached the figure of 7,250 cubic feet per
10025 second, the diversion is going on now and has been going on under a permit issued in 1925, and provided for 8,500 cubic feet a second as being the proper amount needed for that purpose; that is, 8,500 plus the water supply. It provided for a progressive reduction at a rate of 250 cubic feet per second, which would bring it to 7,250 cubic feet per second at the end of this year. I understand from the Division Engineer that the program is being carried out substantially as prescribed, so I start with that amount. From any evidence that I have, that is the amount that is now needed.

You ask me whether my conclusion is based upon san-

itary knowledge and reasoning or upon the amount that is now being used or may be used under the permit. When we were preparing the project for the improvement of the Illinois River, this question came up. Congress asked us to report on the diversion necessary for that. We first had the study made by the District Engineer. At that time General Taylor was Chief of Engi-
10026 neers, and Major Putnam was the District Engineer. Major Putnam studied it carefully. General Taylor authorized him to employ a firm of expert sanitary engineers to assist him in the matter, Alvord, Burdick & Howson, and they were expert people competent and disinterested. They made a very careful study which has been before us and taken into consideration by my assistants in their progressive study of the diversion.

In determining that amount of diversion, I took into consideration the amount of water needed for navigation of the river below, and for the preservation of sanitary conditions there as well as the Port of Chicago, from the standpoint of navigation, but did not consider the standpoint of taking care of the health of Chicago. People on board boats need substantially the same protection as the people in the city. There is quite a running parallel in there for a long distance. Then they are sep-
10027 arated. Whether in reaching the conclusion that a diversion of 7,250 cubic second feet, in addition to the pumpage, was based in part upon what I thought was necessary for the maintenance of navigation and the health of the navigator in the lower streams, as well as the Chicago Port, I think an analysis will show that it does contemplate taking care of the navigation in the upper Illinois, in view of the fact and from this point of view, that through navigation on the Chicago River must pass through that place, and if the navigators are not
10028 protected there, it would hamper the navigation on the Chicago River.

As to whether the statement contained in my answer to the question in the Master's letter, contemplated also protection of fish life in the lower river, that fish life came in the Alvord, Burdick & Howson Report. My statement did not contemplate that for the purpose of protecting fish. The sanitary engineers used that as a measure of suitability of water for navigation. I mentioned that in my report.

As to the extent of this diversion which I say is necessary, being based in part upon the protection of fish life in the Illinois River, the diversion is not for the sake of fish but for the sake of navigators. The sanitary engineers used that in their report as a basis of measure.

In my determination of the amount of 7,250 c. f. s., I had in mind that part of the sewage would be purified and part would not, as was contemplated by the program under which the Sanitary District was working and of which the District Engineer kept the Department advised. In reaching that figure of 7,250, I did not analyze what proportion of the sewage would be purified. I had those figures and they were mentioned. I did not check or analyze them.

10029 I took 7,250 c. f. s. as being about the status that the works would naturally be expected to be at the end of this year.

10030 My recollection is that the program called for 85 per cent purification. I think that might be considered what was in my mind. My understanding is that the experts figure 4,167 as being the amount under certain conditions. I took 5,000 c. f. s. for reasons that I undertook to set forth in my answer. It is difficult to take a thing of that kind so closely as to say 4,167 c. f. s. It seemed to me that the question of the rate of the growth of the city and of the fact that the metering program is not being lived up to, should be taken into consideration.

The rate of growth of the city and the posible changes in the amount of industrial waste, and various other contingencies that we could not foresee exactly, would be added to the result, and would result in a larger amount
10031 being needed rather than a smaller. I added a little less than 20 per cent, being the round figure of 5,000 c. f. s. I had another matter in mind. They are taking there now this 8,500 plus 1,000, which makes about 10,000 and we are cutting the amount down to approximately half, including the water supply. That is a very big change. It has to come down progressively year by year, but before we get there, unless the rate of development has changed from the present rate, many years will have elapsed, and many of these conditions which cannot now be specified exactly will have developed themselves. Therefore, it may be necessary when that time comes, or whatever develops, we may have to change the amount. And the phraseology that I used was intended to be such that if the Master adopted it, or adopted that idea, and the Supreme Court adopted it, there would be a flexible clause in there, so that the amount might be determined as conditions develop. If it is found to be more than needed, it could be reduced; if it was found to be less than they required, it could be increased. I was further influenced by the fact that if we should put too small an amount and the Federal Government should require the city or the Sanitary District to go to the expense of putting in machinery to get along with a smaller
10032 amount, and then found later they would have to have a larger amount, we might have put the Federal Government in the position of having required an unreasonable expenditure of money.

10033 So far as assuming the failure of Chicago to meter its water would be continued or would be cured in reaching my estimate of 5,000 c. f. s., it is our thought that it shall be cured. I believe that Chicago will come to metering, but if they do not, they will be deprived of that much water for other purposes.

I considered in fixing the figure of 5,000 c. f. s., gates or locks in the river to prevent the back-up of the water of the Chicago River into the Lake. Whether there should or should not be locks and gates, did not have any effect on my conclusion as to 5,000 feet per second, but I would like to answer that a little more fully, if I may.
10034 The question of the location of works of that kind is a controversial one, of a technical character. The location may depend upon the amount of diversion. If there is a very large diversion it is doubtful whether you need those works. If a very small one, the necessity becomes more pressing. The manner in which they operate will vary. The works spoken of yesterday would probably operate the best under a small diversion. After
10035 the Master and the Court have determined the amount of diversion, then my thought is that this question of gates could be taken up and solved technically. It will then be easily determinable. The gates are in the present permit. That condition should be continued. Whether
10036 or not they should be put in there at 7,250 c. f. s., I don't know. I don't know whether the gates are necessary with a diversion of 7,250 c. f. s. and that of 5,000 later. That is under discussion at the present time. The District Engineer has prepared plans which were forwarded from the District Engineer through the Division Engineer. I have not seen the report, but will take it up and be glad to report upon it. As to my having given consideration in my testimony to whether my conclusions were with or without gates or locks, they considered that gate question fully in other connections, but that gate question is to come right along and to be studied and is now in process of being studied.

In considering the amounts of diversion, I included the question of navigation on the Great Lakes as well as the interests involved in the Chicago River and the lower waters. Navigation on the Great Lakes was the primary thing that started the Department to consider this question.
10037 As to whether my statement that I considered the interests of navigation on the Great Lakes in discussing this diversion of 7,200 feet now and 5,000 feet later, was in connection with my idea that the interests of navigation should be protected, not by stopping diversion here, but by putting compensation works elsewhere in the Great Lakes, I felt that it was necessary to be complete and to be sure that I was responsive to the questions in the Master's letter. I was on the St. Lawrence Board and the question came up of how navigation should be protected with diversions of different amounts. You can protect the interests of navigation on Lakes Michigan, Huron, Erie and Ontario, at Lake Erie, by
10038 works of that kind. You can make a raise that is exactly equal to the fall that is due to the diversion. The reason that the diversion was objectionable to the people on those Lakes was that it was causing a lowering of lake level, and therefore shallower channels. That is one way of doing it, and it seemed to me it was proper that it should go into that general consideration. It is a relatively inexpensive way if there were no other questions involved. There are other questions involved which I do not know should be discussed here or not.

Further Cross-Examination by Mr. Jackson for Complainants.

10039 If the controlling works were shut down at Lockport, there would be greater available depth for navigation in the Chicago River than now obtains, and no place where the depths would be less than now obtains. In de-

termining the quantity of water necessary for navigation in the Chicago River, the nuisance factor and the quantity of water for flotation are two questions involved, but it seemed to me that the nuisance one was the determining one in this case, so far as the Chicago River is concerned. Of course we would have to have enough water to float vessels. If you consider merely the question of depths or quantity of water for flotation of ships, you are barring out quite a large part. If you close it off, you will bar off navigation coming up from the water-
10040 way. They cannot navigate the Chicago River if they do not get there. Boats could come into the Chicago River from the Lake anyway. Disregarding the question of boats coming into the Chicago River from the Illinois River or passing from the Chicago River into the Illinois River, and considering only the question of depths of water in the Chicago River for the flotation of ships, the cessation of the diversion would not affect the depth of water there, on a cross-section, or flotation element, but it takes boats to make navigation as well as channels, and that is what we are working on now. I have recently let contracts on this Illinois River Project authorized by Congress, which will make it possible for boats to come through and navigate the Chicago River for a depth of 9 feet.

10041 Outside of the question of the increased rate of deposit which could be taken care of by dredging, the question of whether you would need any water for navigation directly from Lake Michigan so far as the use of the Chicago River by shipping on the Great Lakes, etc., is concerned, is merely a nuisance question. I am not an expert in the field of nuisances, in the sanitary sense. but certain of these matters come over my desk. My predecessor employed these expert sanitary engineers for advice on the question, and it passed through our district and division engineers. That does not make us sanitary experts.

10042 I am not quite sure whether there was any nuisance condition inimical to navigation on the Chicago River, as such, during the seasons of 1925 and 1926. But I think there was complaint. But I am not sure. I could get that quickly from my District Engineer who was preparing to testify as to the physical and historical conditions.

Col. Schultz, who was in the room, District Engineer, was asked the question as to whether conditions in the river were inimical to navigation for those years, and he said:

> "I considered the conditions quite offensive to navigation at the present time. In 1925 and 1926 navigation was going on but it was offensive. The river was covered with scum. No self-respecting person would ride on the river if they could avoid it. They did it because conditions demanded it."

General Jadwin (continuing): Complainants' Exhibit 10043 1 entitled "Diversion of Water from Lake Michigan, 1923," pages 59 and 60, states:

> "As far as navigation on the Chicago River and the Drainage Canal is concerned, if the flow at Lockport were entirely throttled and the power house gates closed, so as to permit no diversion from Lake Michigan, conditions would be decidedly improved."

I do not think that is entirely correct. I do not find that this is signed. It is apparently a summation for use and information. I do not think the statement is 10044 quite right in the way we are looking at it now, but from what that man had in mind in writing that, it is probably correct. He had something different in mind from what I had in mind. I think he had in mind that shutting off the sewage from getting down there, there would be no offense from sewage. I have in mind that if you shut off the connection, you shut off the navigation already authorized by Congress, which we are doing under the existing project.

As to whether Major Putnam had in mind that if the diversion were shut off the current would be decreased in the Chicago River and the river would be more easily navigated, I thought that Major Putnam had in mind that he would not let anything go down there. I took the statement in the exhibit to mean that he was going to put the Illinois River strictly on its own, with its own water.

10048 The amount of diversion in 1925 and 1926 was less than 7,250 c. f. s. I do not think any part of sewage treatment plants were in operation in 1925 and 1926. I do not know what part of the sewage of Chicago was treated on a 100 per cent equivalent basis in 1925 and 1926.

10049 If the program is carried out by the Sanitary District by December 31, 1929, sewage will be receiving complete treatment on the equivalent of 100 per cent basis of
10050 approximately 1,300,000 population. My understanding is that there is needed this amount, 7,250 c. f. s., plus pumpage, to make the waters reasonably satisfactry for navigation at the end of this year, and I base that largely on the testimony and reports of Col. Weeks and other officers who have studied it.

"Q. Now, when you come to your 5,000 figure at the end of complete treatment, General, you are again dealing solely with a nuisance factor as far as navigation on the Chicago River physically is concerned; are you not?

A. I think that— My recollection is that if the nuisance factor is taken care of, that the flotation conditions will be there, sir.

The Special Master: What was that answer?

A. If the nuisance factor is taken care of, sir, the flotation conditions will be all right, also."

If there is no diversion from the Lake that involves the assumption about blocking off the river at Lockport.

10051 As to ignoring my policy with respect to the Illinois River I am not bringing in my policy but I think I must recognize the policy of Congress.

"Q. I wish you would tell me as a scientific man what the fact is. If the policy of Congress controls, the Court will tell us that.

A. Then may I ask your question? To repeat the question, sir?

Q. When complete treatment at all the plants in Chicago has been attained, you will not need any diversion as far as the flotation question is concerned in the Chicago River?

A. I don't get that absolutely clearly. I think you would, Mr. Attorney General. I don't— My mind is not— I am not quite sure I grasp the question you are putting, but if I do, you would need some for flotation.

Mr. Jackson: Q. For what purpose?

A. Well, because water will be going out and going down the Canal and down the Illinois River.

Q. Well, I am assuming there is not any going down there, General.

A. Well, I think the fact is that there is. We are

10052 carrying out that project now.

Q. But will you just take my assumption and answer on the basis of the assumption that there is not any going down there?

A. If there is none going down, if you block that off completely, then you do not need water, additional water for flotation."

There is a very light draft present navigation from Lake Michigan to the Mississippi. It comes in through the Hennepin Canal and the Illinois River and through the Sanitary Canal. Congress has authorized the deep-

ening of the Illinois to 9 feet to meet with this deeper channel which the State of Illinois is now putting in. They are spending a large sum in building five large
10053 locks. We are already at work on that. I have recently entered into a contract, or Col. Weeks has with my approval, in accordance with the Act of Congress, for dredging 1,316,960 cubic yards in the lower 20 miles of the Illinois; for dredging 822,000 yards in the section from there up to LaGrange; dredging 1,383,000 cubic yards in the section up to Peoria, and the specifications are about ready for issue for dredging 1,680,872 cubic yards of dirt and 119,000 cubic yards of rock from Peoria up to Utica. The State of Illinois is in the midst of its improvement, largely along where the DesPlaines River is. That has already been authorized and is a thing which we can finish on our part in about two years. We are simply trailing the state on it. I have a general authority from the Secretary of War to make allotments out of the large appropriation. The work is actually going on and is going to be completed. If the improvement for navigation in the Illinois River as provided were completed, the shutting off of the flow or discharge to the DesPlaines River would decrease the navigational dimensions intended in the river, very much. You would not have a nine-foot channel after all this work was
10055 done. To get that nine foot channel without any of that water, you would have to add three locks and even then we would not have enough water for lockage. We would have to have about 1,000 cubic feet for lockage discharged from the Sanitary Canal into the DesPlaines River. That would, however, not take care of the nuisance factor, and we would have to build the extra locks. That is, it would require 1,000 feet in addition to the water in the Illinois-DesPlaines Watershed to take care of the waterway. That is from an outside source. Con-

gress said when they authorized this project, that they did not authorize diversion, but Congress had a scale of prices before it for getting nine feet with various flows, running from one to ten thousand, and it authorized the sum of money, three million and something, the maximum limit we could go, and that maximum limit would call for, as I remember it, a diversion of about 4,500
10057 average c. f. s. Congress did not run the sum up to the larger sum that would have taken care of it with the 1,000, although as I remember it, Congress had that larger sum before them. Congress had the report of the Chief of Engineers and adopted it with certain figures. Congress has since called for a revision of that report and we are now working on the revision.

Generally, in the spring there is sufficient water in the Illinois River for lockage. The lowest flow is in the summer. As to whether there is little or no navigation
10058 in the winter, the river freezes as far as Peoria. I don't know how much further it freezes.

As to my being familiar with the nature of the effluent of these complete treatment plants with reference to containing residual oxygen, I have seen the effluent, but I am not a sanitary expert.

I do not agree with the statement made by Mr. Pearse before the Rivers and Harbors Committee of the 68th Congress, First Session, 1924, appearing at page 1640, reaffirmed at page 5423 of the record, as follows:

> "The biological processes, such as sprinkling filters, or activated sludge, when properly operated, produce a high-grade effluent, requiring no dilution, in which fish can live. The effluent, further, will create no nuisance, and can be turned into a water
> 10059 course, even though dry, without fear of consequences. Such a process removes about 80 to 90 per cent of the bacteria. However, where bacterial removal is desired, sterilizing agents must be employed."

My reason for not so agreeing is that we got our view from Messrs. Alvord, Burdick & Howson, whom we paid for an independent sanitary study and opinion, and we have not seen anything to cause us to make a further study. If their conclusions are seriously questioned and the Master wishes a further study, we would be glad to have it done, but we are following the lead of Messrs. Alvord, Burdick & Howson on those sanitary matters.

I do not remember whether we instructed Alvord, Burdick & Howson to report upon a standard which would permit a thriving fish life in the upper Illinois River. My understanding was that they took that as one of the standards of knowing that the water was pure. I don't know whether that was the instruction of
10060 the Department. It was given before I became Chief of Engineers. As to thriving fish life being necessary for navigation,-fish are not essential to the navigators. As to whether the standard which will permit a thriving fish life and the standard which will prevent any objectionable nuisance are the same, I understood that the standard for thriving fish life was as low as could be gone to be sure that water did not have so much foul matter in it as to become putrid and unreasonably offensive to navigation. I did not understand that it was so there would be enough surplus oxygen in the water to support a thriving fish life, rather than that there should be no
10061 nuisance. I gathered that that was just a gauge. If the water supported fish life, it would be safe for navigators.

Neither now nor when all the treatment plants are completed, will there be any diversion necessary as a matter of providing adequate depths, is not true on the Chicago River, because you are losing sight of this au-
10062 thorized project of Congress. I was directed by the Special Master to answer, ignoring the Illinois Water-

way and limiting myself for the moment to the Chicago River. It is true that neither now nor when all the treatment plants are completed, will there be any diversion necessary as a matter of providing adequate depths in the Chicago River. That is correct referring simply to depths of the Chicago River. But if you mean simply depths in the Chicago River, it is true. If you limit your navigation to the Chicago River and accept the thought of barring out of it that navigation which I think should come through there, then the sole problem is what dilution, if any, will be requred for the effluents of complete treatment plants to prevent an active nuisance in the Chicago River as far as the Chicago River is concerned. I think it is correct that as to the quantity of dilution water from the Lake, if any, which is necessary when complete treatment plants are in operation, in order to prevent any active nuisance, I am not an expert and am not able to advise. But I used a sanitary engineer in getting information for that, and straight up through my
10064 District and Division Engineers. I don't know whether it would be possible to pump water from the Lake into the upper end of these streams at Wilmette, etc., to obtain dilution to prevent nuisance to navigation, but I will look that up and answer you later, conferring with the officers in my Department.

10067 But a question like the determination of the location of control works might take us several months to answer.

Inquiries by Special Master.

We cannot be ready with an answer to that question of the location of control works at this session.

The position of the control gates to prevent storm water from entering into the Lake under the conditions that have been described, would depend on the extent of the diversion, which location would be determined after it is determined what diversion, if any, is to be allowed.

That consideration did not enter at all into the estimates of 3,200 or 5,000 cubic feet per second under the conditions prescribed.

Before I can be prepared to say where I want control gates to prevent storm water going into the Lake, the diversion should be prescribed.

10068 I should desire time to formulate an answer as to where I would consider it appropriate from the standpoint of the War Department to have the control works, on various hypotheses. If I knew what the Master's decision was to be, or the Court's decision, I could go on that figure. Otherwise the only thing I could do would be to take care of a number of figures.

A good deal has been said in the course of my examination this morning as to my estimate in the ultimate requirement of a diversion of 5,000 c. f. s. I have stated heretofore in my testimony the premises I made in reaching my estimate of the ultimate requirement of a 10069 diversion, but if I considered the needs of the Chicago River proper and local navigation on the Chicago River proper, exclusively, then a total diversion of 3,200 c. f. s. measured at Lockport would be enough, and the 3,200 feet includes pumpage at about 1,600 cubic feet per second, which would leave on that basis, considering the total flow at Lockport and the safe-guarding of the Chicago River proper, a diversion of about 1,600 c. f. s. as compared with 8,500 c. f. s. under the present permit. 10070 That is, I assumed that the 1,500 c. f. s., augmented by the natural run-off of the Calumet and Chicago watersheds, would give this average flow of 3,200 c. f. s. at Lockport which included everything.

I heard brought out yesterday a very high per capita here for pumping. My thought is to fix the amount, and there is quite a question in there. Then, if they do not come to a reasonable amount of metering, they would

suffer in dilution. I simply show a basis of comparison taking the safe-guarding of navigation in the Chicago River proper and the total flow at Lockport. The 3,200
10071 c. f. s. per second on that basis is the total which has to be compared with 8,500 c. f. s., plus Chicago pumpage, or a total of approximately 10,000 c. f. s. The 3,200 is compared with the 10,000 c. f. s., and if you take 1,600 off of one and 1,600 off of the other, then you have 1,600 as compared with 8,500.

10206 The instructions to me were that I was to prepare answers to several questions which yesterday required more time for study. The first is the answer to a question which appears at pages 10063 and 10064 of the record,—whether 1,000 cubic feet per second of lake water pumped into the North Branch, and 2,000 cubic feet of water pumped into the South Branch, permitted to mingle with the effluent and proceed out into the lake, would prevent any nuisance to navigation.

10207 The answer is, it would prevent a nuisance to navigation in the Chicago River, provided it were introduced into the branches and their forks at the heads of navigation; that sewage treatment is approximately 85 per cent complete, and that a gate or other barrier be placed to prevent back-flow from the Sanitary Canal of the undiluted effluent from the plants discharging into the Canal.

The other question that I was to answer is found on pages 10019 and 10020. The question was reshaped by General Ward. As reshaped, the question is:

> "Disregarding any sewage or pollution in the stream, how much diversion is necessary to maintain navigation in the Chicago River?"

The answer to that question is no diversion would be necessary for local navigation on the Chicago River, but an as yet undetermined amount, somewhere between

1,000 and 10,000 cubic feet per second, would have to be passed for through navigation between Chicago and the Illinois River and for navigation on the Illinois River.

10214 In stating that the amount of diversion was undetermined and might be anywhere from 1,000 cubic feet to 10,000 cubic feet, I meant that it was undetermined because Congress had not yet definitely prescribed a plan of improvement. Congress had before it from the Chief of Engineers a number of alternatives, about twenty, with the cost for each work. The price was indicated. Congress directed us to get a channel 9 feet deep and 200 feet wide, at a cost of not to exceed certain minimum, three and a half million. That three and a half million excluded certain of these alternatives, but left us free to use our best judgment in the selection of the others.

10215 The one which we thought was the best, and the one on which we are working, it was estimated would cost very close to the three and a half million dollars. That called for removing the two state dams and for getting this channel, with a diversion of approximately 4,167 c. f. s. That we are now working upon. The dams have been secured from the State, and we have opened them up so that navigation is going there. We are spending considerable money on that line. However, it was explained to Congress that if the diversion were determined at anything from 1,000 to 10,000, the plan could be adapted to that. If less than 4,167 c. f. s. diversion were determined, the plan could be adapted to it so far as water for flotation is concerned. It would be necessary, however, to restore one or both of those state dams and would not give us what we consider to be reasonably free, easy and unobstructed navigation. Each of the dams is an objection, a delay to the passage of boats.

Since January 21, 1927, Congress has directed us to make a review of that project, and certain matters have 10216 been urged and are known to be desired. We are to make a report and recommendations. Congress has not finally determined beyond the fact of authorizing and directing us to go ahead with the three and a half million dollars work which is being done.

The Special Master stated, in response to an inquiry of complainants' counsel, that he did not understand that the statement by the witness opened up again the question as to whether there has been any authorization by Congress for any diversion in the Illinois River.

10218 *Cross-Examination by Mr. Adcock for Defendants.*

With reference to the answer to the question appearing at page 10,063 and 10,064 of the record, my understanding is that the effluent from several of the plants is to be discharged into the Canal proper, and if we pump water beyond, as has been suggested by counsel for the other side, with the idea of pushing the flow that is in the South Fork out into the Lake, it would similarly push water down the Canal if there were not a barrier put there, and, similarly, if there were not a barrier put there, the effluent which comes into the Canal, which is larger than that to come in in the North Branch, it would work back, and it would get to be almost purely undiluted effluent, and it would interfere with the proposition that he set up. Under my assumption, the effluent discharged west of the barrier would be discharged by means of the Sanitary Canal into the DesPlaines River. It would accumulate and have to work its way down into 10219 the DesPlaines, assisted by the rainfall in the Illinois and DesPlaines basins. Most of those plants, when the system is completed, as I understand it, do not empty into either the Chicago River proper or the North or South Branch. One plant at least, that is, the West Side, and the other, empty largely into the Sanitary Canal or the South Fork of the Chicago River. There are a number of maps there that will illustrate that.

I would think that it would kill all navigation to have 10220 the effluent that would be discharged from these different plants, flow on into the Chicago River and to the Lake; that is, navigation would not be, according to the wording and spirit of the law, reasonable, free, easy and unobstructed. That is the thing we feel navigation is entitled to, in accordance with the spirit of the law, and this would not be so. It is my understanding that 1,000 and 2,000 c. f. s. that Mr. Jackson has proposed, would take care of what came into the Chicago River and its branches, so far as they were concerned.

10221 I had to put that barrier in to shut off that effluent. Similarly, I make no answer at all as to the effect of the water supply in Lake Michigan. I think that 1,000 and 2,000 c. f. s. would take care of it in the South Fork and North Fork of the Main River, which is primarily the effluent from the North Side Plant.

Further Cross-Examination by Mr. Jackson for Complainants.

10222 If part of the effluent was discharged into the Drainage Canal and permitted to run the other way, navigation would be killed. I don't know the comparison of the quantity of suspended solids in the effluent of an activated sludge plant with the quantity of suspended solids in ordinary river water. Taking the Wisconsin River 10223 near its mouth, I don't know how they would compare. I am not sure it would be clearer as far as vision goes. I don't know the comparison of suspended solids. There is a very large amount of solids in the Mississippi at times; also the Wisconsin. However, it is not as dirty a river as the Mississippi. I don't know specifically.

As to the St. Louis River at Duluth, I don't know. I imagine that would have less, but am not sure. I mean suspended solids.

10224 I cannot say from fishing in any of these rivers that they are not freer or that they have more solids than the effluent of an activated slulge plant, partly because I have not fished on many of them, and particularly I have not fished on the Illinois River where the effluent is. But I could get you the figures on the amount of sediment presented by those different rivers. It is my understanding that the effluent from activated sludge plant is not stable. As to its containing available oxygen, nitrates or nitrates, you are getting into details of sanitary en-
10225 gineering, and I would prefer to get a sanitary engineer for that. But it is my understanding that such effluent needs water to dilute it so it will be gotten out of the way.

With reference to the statement appearing at page 229 of Complainants' Exhibit 233 for identification, as follows:

> "Almost as clear as drinking water and quite as harmless as it finally leaves the plant through an outlet and into and through an artificial channel which discharges into the Chicago River",

I do not understand that the effluent from activated sludge plant is as harmless. That is what I get from my people.

My understanding is that this effluent needs a considerable amount of water to get it out safely. It is my understanding that the effluent from an activated sludge plant is detectable. I have seen very little of it, but what
10227 I have seen was none too attractive to me. It did not have an odor that attracted me to it. I had the impression that there was a slight odor that was not pleasing

to me. I have seen very few activated sludge plants, but
my recollection is that it was not entirely pleasant. I
think very much more expert or exact testimony would be
10228 obtained from some one else. I am basing my conclusions
on the understanding that this 85 per cent material
needs considerable amount of water, and that it has to
have a certain amount of time to work out. It is only
85 per cent, and it does not get to where it works itself
out in the ordinary air until it gets down to about Peoria,
and it is my understanding from my assistants that
that is the way it will be. The matter came up in the
10229 conference and several voiced that view. It was discussed
in our conference around the board, and it seemed
to be the general accepted opinion. I think Colonel
Schulz was one who voiced that view, and Colonel Pillsbury
was another one of them. It is my understanding
that the effluent of an activated sludge plant is not stable.
As to having given any consideration to how long the
effluent would retain the characteristics of stability that
it did have after its discharge my understanding was that
10230 the effluent ought to be worked out of the South Branch
in something like two days, and it ought to have water in
it, enough to carry it down to about Peoria in about five
days, until it got air enough to clear it up. I do not have
the figures as to the amount of effluent that would be discharged
10231 directly into the Drainage Canal. The amount
of water that I consider necessary to add to the effluent
was 5,000 cubic feet per second, including the water that
is pumped. The amount of the effluent will probably be
somewhat variable, depending upon the amount of water
that is pumped. At present there is a high amount. I
don't know whether the stability of an effluent depends
upon two things; one, the oxygen demand of the effluent,
and, second, whether there is a sufficient amount of
available oxygen to satisfy it. As to how I can then de-

termine whether this sort of effluent is putrescible or will form a nuisance, I got my figures largely from my con-
10232 ferees. While none were sanitary experts, I had the report of the sanitary engineers to whom I referred before, and have a copy of that report. With reference to how I arrived at the figure of 5,000 c. f. s. as necessary to preserve stable conditions, if I do not know what the oxygen demand of the effluent was, or the quantity of available oxygen in the effluent to satisfy that demand, or what oxygen would arise from aeration of the flow of the effluent, I explained to the court yesterday in reply to a question of General Ward, that I obtained that 5,000 c. f. s. by adding a factor of safety to 4,167 c. f. s., and
10233 this 4,167 c. f. s. was worked out quite carefully by the sanitary engineers who were employed to find that amount for us, and to find it in a disinterested way. With reference to that figure being the amount that would sustain a thriving fish life, it is my understanding that that is the amount that is necessary to make navigation reasonably free, easy and unobstructed; that the people on the boats are entitled to have easy, free and unobstructed water to travel on, and in some way, between the district engineer and the sanitary engineers, they brought in the matter of water that would support thriving fish life, to fulfill the conditions of safety for navigation. With reference to its being my understanding that a standard of water conditions which would support a thriving fish life and that a standard of water conditions which would produce no nuisance, are the same, it is my understanding that they took the standard of water to support a thriving fish life as a test for water which would be safe and secure for navigators. We are anxious to have these waters safe for navigators, and we do not feel that they should be forced to come in and take a chance on the question of life and death, as to whether or not a given

stream is safe for them to travel on, and this figure was reported to the District Engineer by these gentlemen,
10234 who were paid a good round sum to work that out. The District Engineer reported to us and it passed through the Board, and we based our recommendation on it. I don't know of my own knowledge whether or not a standard which will permit thriving fish life and a standard which means merely the absence of a nuisance, constitutes the same thing. If it is found that navigation will be reasonably free, safe and unobstructed and still fish could not navigate up it, it would probably meet our conditions.

10238 Storm water overflows into the harbors of other cities on the Great Lakes. That is, it flows into the rivers tributary and then goes through such rivers out to the
10239 lake and through the harbor. I have heard it said by my assistants that navigation in some of the other harbors on the Great Lakes is not satisfactory; that the water is in an objectionable condition in some of them. If you wish the details about any one of them, I should be glad to put on one of my assistants who has had that particular harbor under his jurisdiction. Col. Schultz, who is the Division Engineer for the entire Lakes, and who lives at Cleveland, is here. Col. Jones, also, who was formerly District Engineer at Buffalo. My understanding is that the water is particularly bad here at Chicago because it has in it this large amount of sewage, a larger amount than we have at other places where the storm water and sewage flows into the Lake.

"Q. You do not think that if the sewage here was treated to the point—given complete treatment—to the highest known stage of the art, there would be any more sewage in the river than there would be at Cleveland, before treatment, or at Buffalo, do you?

A. I do not know how much there is at Cleveland or at Buffalo. But I have gentlemen here who have been stationed at those places. And I do know that it has been a source of concern here, and that they have wanted extra water to keep it from going into the lake and interfering with the water supply.

Q. Navigators have not been interested in that, have they?

A. My understanding is that it has been to prevent the water supply being polluted out in the Lake.

10241 I would like to ask my Division Engineer as to whether navigators in the Chicago River have complained of current in the river and have not complained of pollution. Col. Schultz is here, and I can get the information from him right now, if you want.

10242 *Special Master interrogates Gen. Jadwin.*

I stated that a certain amount of the effluent would go into the Chicago River and certain other parts would go into the Sanitary Canal. I regard the Sanitary Canal as beginning at Robey Street and continuing to Lockport. There is a continuous flow from the Chicago River right through the Sanitary Canal at present. If the flow were stopped by preventing any water from going down, say at Lockport, then there would be a continuous flow from the Sanitary Canal into the river under the present conditions without any gate. The distinction between the Sanitary Canal and the river with respect to the part of the effluent that went into the river and the part that went into the canal and the difference it makes, entered into it in this way. Mr. Jackson was supposing pumping water into the upper end of the North Branch, and then at a point on the South Branch near the upper end, and I switched that in view of the spirit of the question, and assumed a certain amount of water, and the question would that keep the Chicago River pure, and I said that

it would in my opinion, provided several things, one of which was to put a barrier where the river now joins the Canal so the Canal with its large amount of effluent could not work back into the river. The water in the Canal, largely effluent, would then be flowing through the gates at Lockport. There would be a slow flow largely
10244 effluent, and continuous. It would have also such rainfall as occurred in the territory, in addition. The contemplated barrier at the entrance to the Canal at Robey Street was merely a fiction that Mr. Jackson had of the Chicago River being by itself. If you did not have such a barrier and the physical conditions remained as they are now, but you provided for the stoppage of the diversion entirely and the flow of the effluent, whether received in the canal or the river, into the lake, then you would have to pump in sufficient water in order to take care of that effluent coming down from the canal into the river.

The answer to the question as to the amount of water which should be pumped in in order to provide conditions that would be satisfactory to navigation, did not include taking care of the entire effluent that would reach the
10246 river in that way from the Canal. I answered the question on a hypothesis relating solely to the river, and on the assumption that there is a barrier between there
10247 and down the river. My understanding, however, is that if you arrange it so that all the effluent got into the river right close to it and put this amount of water up above it so that the water would follow it out into the Lake, it would keep the Chicago River reasonably free, easy and unobstructed. And when I say "above it," I mean somewhere so that all of it came out towards the Lake, if you wanted to do that. The limiting point would be where the last one of these effluents came into the Canal. If the water were pumped in at that point, it

10248 would take care of the effluent so far as the river is concerned. Then it would go out into the Lake, and that is entirely another question, as I understand it.

Further Cross-Examination by Mr. Jackson for Complainants.

Whether 2,000 second feet could be introduced through the Calumet Sag Channel to the Drainage Canal and out the river, I have not differentiated in the amounts between the Calumet and the Sag, but in some way I understand you want to put this water where the last effluent comes in.

There is one pumping station at the upper end of the North Channel; one at 39th Street; then there is the Calumet Sag Channel, which comes through and joins with the Drainage Canal. Whether you could circulate water through the Calumet Sag Channel and out again, raises a question as to the carrying capacity of the Calumet Sag, and the length. I see no reason why you could not send through the Calumet Sag Channel the amount it would carry. You could in some way get up there by some 10250 adequate channel. If the capacity of the Calumet Sag is 2,000, you would have a total pumpage of 5,000 second feet from the three sources, 2,000 at 39th Street and 1,000 at Wilmette. I would have to check as to whether the introduction of that water into the Chicago River 10251 would permit a thriving fish life. It is my impression that you could provide in that way the amount that the sanitary engineers said was necessary, but I give that answer subject to possible correction.

The Master asked whether counsel for either complainants or defendants desired to examine either Col. Schultz or Col. Pillsbury who were in attendance, and counsel for both stated they did not.

11292 Washington, April 19, 1929—10:00 o'clock A. M.

Maj. Gen. Edgar B. Jadwin, resumed:

Direct Examination.

General Jadwin's answer as to controlling works, which questions wer put to him when he testified in March, 1929, appears in the Master's Report in full, pages 108 to 116, inclusive.

Cross-Examination by Attorney General Ward of New York.

The statement that I have given was prepared in co-operation with my associates. In making this statement we have considered that the sewage or the effluent went into the river. I have assumed that Chicago will continue to
11311 discharge its sewage into the DesPlaines River. I have given no consideration, so far as this statement is concerned, to what the condition of the Chicago River would be if Chicago carried its sewage elsewhere. In my mind a little thought to that question has been given, but not very much. If Chicago did not empty its sewage or the effluent thereof into the Chicago River, none of this nuisance would necessarily come about, and we would have simply what water was needed for navigation. It would
11312 be more than lockage. It would be the amount that we needed to keep up the flotation of the boats down through the authorized project. If the sewage or effluent were not discharged into the Chicago River and you were willing to exclude from the Chicago River the navigation thereon under authorized projects which would come up there from the Illinois River and Mississippi System, no diversion would be necessary to maintain navigation in the watershed of Lake Michigan. But it is my under-

standing that we considered the navigation projects already authorized by Congress. If Chicago did not dump its sewage into these rivers, no diversion would be necessary for the navigation of the Chicago and Calumet Rivers, excepting the navigation connected with the Illi-
11314 nois River. If navigation connected with the Illinois River is cut out, there would be eliminated a large part of the navigation that we are looking forward to under the present authorization by Congress. Eliminating that navigation, no diversion would be required except for the nuisance factor of the sewage.

There is a lock at Lockport through which vessels are locked. I think it is 14 feet in depth and 600 feet
11324 long, 110 feet wide. A very small amount of water is necessary for each lock. The total amount for lockage would depend on the total number of vessels that you would have. I would have to check back as to whether 100 or 200 cubic feet per second would handle all the vessels.

Further Cross-Examination by Mr. Jackson for Complainants.

11407 There has been no act of Congress other than what was disclosed at Chicago, in response to the questions asked by the Special Master. The last act of Congress is the one that authorized this expenditure on the Illi-
11408 nois River up to $3,500,000.

Referring to Senate Document No. 130, 69th Congress, 1st Session, whether it was the report pursuant to which the appropriation or authorization of the $3,500,000 was placed in the bill, is a little hard to answer. That report was made at that time, but it does not tell the entire story. There was a prior report just immediately prior to that which was a full report and had in it the report of the Board of Engineers. This is Docu-

ment 4, 69th Congress, 1st Session, being Complainants' Exhibit 18. That report made certain recommendations.
11409 Congress usually when it adopts a project refers to it by the number of the document so that we will know that a specific project is adopted. In this case it did not give the number of the document, but it appropriated not to exceed $3,500,000 for the Illinois River, with a view to securing a channel 9 feet deep and 200 feet wide, so that it makes it a little hard to say that Congress did follow that report. The sum of $3,500,000 is mentioned, but they did not refer to that paper as they usually do when they want to adopt a project as recommended by the Department.

Page 3 of Complainants' Exhibit 18 shows a table and a method of developing a 9-foot channel with 200 feet width, with any flow from 1,000 mean annual average up to 10,000. Under one plan the required channel could be obtained with a mean annual diversion of 1,000 second feet, and that could be obtained for an expenditure of $2,666,000. The third paragraph of the report of
11410 Gen. Taylor contained in Senate Document 130, 69th Congress, 1st Session, is as follows:

> "The Board states that if it is felt that the former recommendation of the board might be interpreted as fixing any permanent diversion, a solution may be found in changing the recommendation so as to propose that a project for a channel 9 feet by 200 feet be adopted, and that the department be definitely authorized, not only to provide it for existing conditions of low water flow, but also, and without further reference to Congress, to continue to provide it, by suitable changes in the works of improvement, if the low-water flow be reduced within the limits contemplated by the table on page 3 of House Committee Document 4, Sixty-ninth Congress, first session. The estimates in that table assume that the works corresponding to a given estimate are undertaken *ab initio*. On that basis a lim-

> iting authorization figure would be $2,666,000, the estimated cost of providing the channel by canalization with the least flow contemplated in the table.
> 11411 If, however, the low-water flow should be reduced by successive steps, and at each step certain works had to be provided appropriate to the then existing flow, the necessity might arise for modifying some part of the work in a manner which would somewhat increase the ultimate cost. The amount of such increase can not be accurately estimated, since it is unknown at what rate and by what steps the flow may hereafter be reduced; but it is estimated that the cost under such conditions might reach $3,000,000, or $3,500,000."

It was not, exclusively, pursuant to that recommendation above stated from that report that the figure of $3,500,000 was placed in the Rivers and Harbors Bill of 1927. General Taylor specified $3,500,000 to cover one contingency. Congress put a limit of $3,500,000 but did not follow the practice of referring to this paper by number as it usually does when it wants to adopt the project recommended by the Chief of Engineers.

11413 Complainant's Exhibit 249, being Senate Document No. 130, 69th Congress, 1st Session, received.

I did not testify yesterday in any sense as a sanitary expert with reference to municipal water supplies.

Referring to my statement in what is denominated as Paragraph B of my testimony, concerning the location of control works near the river mouth, appearing on page 11298 of the transcript, where I say that a diversion of 1,500 to 2,500 c. f. s., would be less than would be required to prevent nuisance to navigation, I assumed that that amount would be made up of effluent from sewage disposal plants and runoff water. I understood that the effluent from the sewage disposal plants would be offensive to and a great nuisance to navigation. I am not sure
11415 whether I ever saw the effluent of an activated sludge

disposal plant. I don't know much about it. I have a clear idea in my mind that it needs the addition of a given amount of water under such conditions to take care of the effluents and make it so that it ceases to be an unreasonable nuisance and obstruction to navigation when it gets down the Canal and down the Illinois River. That was determined for us by our experts and reported by our District Engineer, and we have been accepting that so far.

11416 The effluent is some 85 per cent purified, and the 15 per cent impurities are the things that bring about the objectionable conditions. I have gone down the river when the water was so cold that we wore overcoats, and it was a very offensive place to be. I have not seen the Illinois River with nothing but effluent in it. For the de-
11417 tail of what the objectionable characteristics are in sewage effluent that obstructs navigation, I will have to refer you to the report of Alvord, Burdick & Howson. I am accepting the fact that it will be, unless there is that much water with it, that it becomes an unreasonable obstruction to navigation.

As to the basis of any judgment of my own, we have a man, a District Engineer in Chicago, who at the time this matter was handled was Major Putnam, and he was directed to report on the matter of the project referred to us by Congress. He came to the conclusion that to make a satisfactory report it would be necessary to take into consideration the disposal of the sewage. He felt that he should have an expert for that, and hired with the authority of my predecessors, Alvord, Burdick & Howson, whom
11418 we considered to be able and disinterested experts, and they recommended to him that under the conditions which they specified, the expected growth of population and the probable efficacy of the sewage disposal plant, it would need a certain amount of water, about 4,167 cubic feet, to

make the sanitary conditions reasonable. Major Putnam concurred in that report and we have assumed that amount to be proper and have had no reason for changing it so far. As to that being the sole basis of any judgment I have with respect to nuisance, I have the further point that if it is a nuisance to the people of Chicago living along the banks, it would probably be a greater nuisance to the people traveling on boats, because they are closer to the water. As to whether that gives me any basis on which to form a judgment, if I do not know whether there is going to be a nuisance to the people living along the banks after the works have been accomplished, my opinion is based solely on those reports, and
11419 I am giving it as an official position. So far as information goes, my opinion is based solely upon this report of the sanitary engineers I have mentioned. Nothing has since been brought to our attention to cause us to make any further study that would look to any change. As far as any positive facts are concerned, my opinions depend upon the reports of Major Putnam and Alvord, Burdick & Howson. Major Putnam was not a sanitary expert, but he was our representative and he is presumed to have kept quite close touch with these people that he hired, and probably to have gotten further into the sub-
11420 ject there than we did here. The report was on the basis of not having a nuisance, abolishing a nuisance and also a thriving fish life. The report states as follows:

> "This standard to be the lowest that will prevent the occurrance of nuisance in the Des Plaines and Illinois Rivers, and will permit a thriving fish life therein."

I do not know definitely that to permit a thriving fish life, there should be retained a residual of three parts per million of dissolved oxygen. I have heard that figure given. I don't know that in a good activated sludge effluent there is twenty parts per million available dissolved oxygen, of which fourteen is in the form of nitrates and six in the form of dissolved oxygen. I have seen that statement, but I cannot certify to its being exactly correct.

As to whether only three parts out of the twenty parts per million of available oxygen in such an effluent are available to support fish life, while twenty parts are available to prevent nuisance, I can state all I know in a word. Therefore I refer to page 26 of Major Putnam's report, Document 4, Complainants' Exhibit 18, as follows:

> "The consulting engineers are of the opinion that no appreciable nuisance will result if the following standard is maintained: Liquid discharged by the Drainage Canal, as evidenced by the average of representative samples taken for any 30 consecutive days, shall (a) be practically free from solid deposits in two hours; (b) shall contain not less than three parts per million of oxygen, and enough to equal or exceed the biochemical oxygen demand of said liquid
> 11422 for five days, when incubated at 20 degrees C.
>
> Whether adherence to this standard will produce exactly the results desired or not is unknown, but in view of the present extremely unsatisfactory conditions prevailing, with upward of 4,000 cubic yards of settleable solids being dumped into the Illinois each day, and with periods of several months each year with no oxygen whatever present in the effluents, there is no question but what conditions will be improved materially.
>
> It should be understood that other sources of pollution are tributary to the Illinois River, and that with no contamination whatever from the Sanitary District of Chicago, conditions in the Illinois will not be satisfactory until the rest of the communities now discharging their sewage in the System carry out satisfactory sewage treatment programs of their own. It so happens that the adoption of a standard that no appreciable nuisance will result, carries with it the restoration of conditions that will permit fish life to thrive."

This statement was made by Major Putnam making a report to us after having the report of Alvord, Burdick & Howson, and after working with them. That
11423 is the most exact information I have. I don't think the Major claims to be a sanitary expert, but I think by virtue of his being on that District he has gotten further into it and knows more about it, or did when he wrote that, than we know personally. He had the full advantage of the advice of these experts to whom he was giving a good fee to give him disinterested information, and I haven't found anything contrary to that so far. I have not made any investigation since that time. There is nothing in the report which they submitted to him contrary to that. I made no assumption as to whether there would be visible suspended sewage in the effluent. As to whether I considered there would be any nuisance from that standpoint, I am relying on the reports made by our experts as to the amount of water that is needed to take that effluent, whatever it is, coming out of that plant, assuming it has 85% purification, and get it so it will not be an unreasonable nui-
11424. sance. In reaching my conclusion with reference to nuisance to navigation, I did not consider whether there would be visible suspended particles in the water or effluents. I have some little thought on that, but I am not a sanitary engineer, and I followed the report. It is my understanding that the principal way in which the nuisance would arise would be from putrid odors. As to whether my judgment that there would be nuisance to navigation is based upon the assumption that the effluent of a sewage disposal plant would give off offensive odors, I believe that these effluents will give off, under certain conditions, offensive odors, but I am basing my view as to it being a nuisance on the report of these experts as han-

dled through one officer who represented us in the matter. 11425 As to whether the things which I considered to give rise to the obstruction to navigation was my assumption that there would be offensive odors arising from the sewage effluent, I imagine it would be the same things that would make it objectionable to the people on land and perhaps in a somewhat higher degree because navigators are closer to the water. What they are trying to do is to get the whole nuisance down to a condition where it will not be unreasonable. As to the basis of my judgment that these effluents would create a nuisance and obstruction to navigation, it is the fact that it is held to be unsanitary, according to this report, for the people of Chicago, and it would certainly be a little more so for the people on boats. We paid these people to study it for us and to make a report and we are offering it in good faith. As to whether my judgment was based on the assumption that there would be an odor obstructive to navigation, I imagine the odor would be there, but we hung to this report where these people found that it would make conditions unsanitary for the City of Chicago. If it would be unsanitary for Chicago, it would be more so for our people on the boats. Whatever that may be, whether something gets in the water or something in the air, I do maintain that we must have for navigation as 11427 sanitary conditions as the people on shore have. As to whether I mean that there should be no odor, I mean that there should not be anything that unreasonably interferes with navigation. Unsanitary conditions interferes with navigation; that is, the unsanitary conditions that will result if you do not dilute that effluent to a certain extent which the experts have prescribed. As to whether I think the effluent will give off an odor, I understand (I am not a sanitary engineer) that after the effluent has had several days to work, if not properly diluted it will make unsanitary conditions. I imagine that it will give off an odor and some gas that would not be healthful for people to breathe. I am not an expert on that, but if you want me to and if the Master wishes to, we will hire some expert to get a formal report for you in a regular way on that.

11428 "Q. No, I do not want to bother you, General. I would just like to get at the basis of your judgment, so I may better understand what you mean by interfering with navigation.

A. I think I have given that to you, Mr. Jackson. I do not want to claim a knowledge of any more of it than I do, and I do claim to have the right of determining our position on that. If it is unsanitary for people on shore in Chicago, it is probably equally so or more so for people on boats."

Our experts said it had to be diluted to a certain extent or it would be unsanitary to people on shore at different
11428 places. As the effluent goes down the river, after several days it would probably be worse farther down. That is what I am told. All I know is what I am given in
11429 this report. The only thing I have with reference to the effluent from a nuisance standpoint is, and I am very positive in the view, that we must have sanitary conditions in the water. I am not a sanitary engineer.

"Q. You do not pretend to know what the character of that effluent would be, from the standpoint of visible matter, from the standpoint of floating material, from the standpoint of odor, or from the standpoint of any other sanitary test, do you?

A. I know some little about it, but not very much, and I would prefer not to put what little I know out compared with the formal report which has been made out with great care and which we paid for.

Q. If you want to claim that you have some independent knowledge,—I am not talking about this book—some independent knowledge of your own, as a basis for stating there would be a nuisance arising from the sewage effluent, from the standpoint of visible suspended material, from the standpoint of odor, from the standpoint of floating material, or any other standpoint you want to mention, then I want you to tell me what your independent knowledge is.

A. I have no desire to make any claim at all, Mr. Jackson, other than I have made.

Q. Then you are basing anything you say upon this report, are you?

A. On the report of the experts we hired to study it for us."

11430 I am basing what I say upon this report. Sewage goes into the harbors at practically every place on the lake.

As to when I first discovered that it was necessary to have water which was not polluted by sewage or sewage effluent in the way or to the extent that I have been informed by this report in order to navigate a ship it came
11431 to my mind as clearly as it has come and as I have endeavored to express it, finally and fully, in connection with the preparation for this case. I had knowledge before that some waters were offensive to navigators. My attention was directed seriously to the fact that there was
11432 an amount that should not be exceeded, in connection with this report of Major Putnam, and I have become more specifically interested in the thing in connection with the answers to questions that have been asked in

this trial. I do not realize that there would be no comparison between the polluted condition of the Chicago River which has obtained under the jurisdiction of the War Department for the last thirty years; and what would obtain if complete sewage treatment were installed at Chicago with no diversion. My understanding is that with complete sewage treatment and no diversion, the pollution in the Chicago River would be lessened. I have
11433 not seen the pictures that were introduced in evidence of the pollution in the Chicago River. I never have been on the Manchester Ship Canal. It is one of the important canals of the world. I do not know whether the water in that canal is composed entirely of the flow from sewage works at Manchester with treatment of only 33⅓%. I understand there has been successful naviga-
11434 tion there. I said the controlling works at or near the northern terminus of the Sanitary Canal would impede through navigation. It would be one more lock and
11435 would probably delay a boat there a half hour, 30 to 40 minutes. The navigation contemplated there under the project is about 9,000,000 tons; so a half hour's delay would be quite a serious matter. There are 50 locks on the Ohio River and 15 on the Monongahela, but the bulk of navigation comes in the lower half of that river and goes through not to exceed seven of them. However, the largest and most successful river navigation in the United States is on the Monongahela. As to whether one less lock would increase the quantity of navigation, it would save whatever delay that amounts to, reducing the cost
11436 of transportation, which would in turn affect the cost of the product.

11437 Referring to Defendants' Exhibit 1406, being an airplane picture of Chicago, there is a black appearance.

I don't know of my own knowledge, but if there was sewage effluent from activated sludge plants only, I would imagine that the dark portions showing the river on the picture would be lighter, and if you get this amount of water in there, then it will be better for navigation. I 11438 don't understand that the effluent from activated sewage purification plants is dark like this.

"Mr. Jackson: Assuming that it is perfectly clear.

The Special Master: And sparkling.

Mr. Jackson: And sparkling is right. Odorless, I was going to say.

The Witness: I think it is, but I am not sure about it.

By Mr. Jackson:

Q. If we assume that it is—

A. Assume that it is clear, yes.

Q. And non-putrescible, it would be greatly superior for navigation to the condition that you have in Chicago now, would it not?

A. I am not sure about that. Do you not get into the question of quantity there? If you get a larger amount of that and do not dilute it properly, and hold it for several days, my understanding is that it gets pretty bad."

Assuming that the effluent from an activated sludge plant is clear, odorless and contains no suspended matter, and also stays odorless indefinitely, I do not see that it would be an objection to navigation. If it simply cannot do any harm, then it cannot do any harm, but it is my understanding that there is still material in the effluent that may become obnoxious.

Cross-Examination by Mr. Adcock for Defendants.

11441 In Document Number 4, page 3, Complainants' Ex-
hibit 18, there is one assumption where there is an ex-
penditure provided for of $3,465,000 for the improvement
of the Illinois with a diversion instantaneous maximum
of 6,050 cubic feet per second and an annual diversion of
4,167 second feet, an open channel improvement. In mak-
ing my answer to Mr. Jackson's question as to the proj-
ect now provided for by Congress, I considered that Con-
gress left it up to us to determine the best plan for get-
ting a channel 9 feet by 200, provided that we were not
to expend more than $3,500,000. I considered that plan
among others when the plan we were working on was
11443 adopted. I did not select that one as being the one
that I thought was best for us to take.

I am referred to paragraph 4 of Document 130, 69th Congress, 1st Session, which follows paragraph 3 I mentioned in the cross examination by Mr. Jackson. This paragraph is as follows:

> "4. The following recommendation, embodying the above proposal, is accordingly submitted:
>
> 'The board recommends modification of the exist-
> ing project for the Illinois River so as to provide a
> channel with least dimensions of 9 feet in depth at
> the low water and 200 feet in width, from the mouth
> to Utica. Under present conditions of low water
> flow, the provision of such a channel, by dredging and
> by the partial removal of the two State dams and
> the retention and minor alteration of the two Fed-
> eral locks and dams, is estimated to cost $1,350,000,
> with $126,000 annually for maintenance. Future re-
> 11444 duction in the flow would involve additional expendi-
> tures. It is understood that Congress, if it approves
> this recommendation, will thereby have authorized
> the department to undertake any works covered by
> the estimates in the table on page 3 of House Docu-
> ment 4, Sixty-ninth Congress, first session, which

> may be necessary in the future to provide a channel of the dimensions specified, and will have authorized the necessary expenditures therefor, up to a limiting total for new work of about $3,500,000. The above recommendation is subject to the following conditions: That the State of Illinois transfers to the United States, without cost, all rights and titles in the two State-owned dams on the Illinois River; that local interests furnish the United States without cost all necessary areas for the economical disposal of material dredged in creating and maintaining the channel: Provided further, That no work on the Illinois River shall be carried out according to the project herein outlined, with the existing or any subsequent diversions, until the Secretary of War and the Chief of Engineers shall have received satisfactory assurances that local interests will at the same time provide an equal depth for through navigation in the Illinois waterway.' "

11445 I took that paragraph into consideration in answering Mr. Jackson's question, but that was not the determining point. However, we did endeavor when we were selecting the projects, in accordance with the authority of Congress, to consider practically everything that we had reported to Congress on the subject. That gave us a great variety of projects, and we considered that the best one for us to adopt under that authority was neither the one that Mr. Jackson has mentioned nor the one that you have listed, but it is fairly similar to it. It is not far removed from the one that you have listed, namely, the one that I mentioned first. It is the one substantially shown on page 3 of Document 4, 69th Congress, 1st Session, 10th item, State dams out, instantaneous maximum diversion Lockport cubic feet per second 6,050, average annual diversion at Lockport cubic feet per seconly 4,167. We consider further that that is not expected to cost the full $3,500,000; that the Department would be

11446 free to modify that plan if it thought best, provided it did not exceed the expenditure of $3,500,000.

11447 That project includes in general the retention of the Campsville and LaGrange locks and the removal or opening up of the Copperas Creek and Henry Dams, and a considerable amount of excavation. We are leaving the Campsville and LaGrange locks substantially as they are. We have already opened the Copperas Creek and the Henry Lock. We have already made I think it is four large contracts for excavating, as contemplated by the project. The work is proceeding under some or all of those contracts.

"Mr. Jackson: If I correctly understand, we are not trying the issue as to whether there is any contention of subsequent authorization of Congress for any diversion in the Illinois River.

The Special Master: No, I don't understand that there is any subsequent authorization—just one of the acts of 1927. Am I right about that?

Witness: You are right, yes, sir, as I understand it."

11448 Defendants' Exhibit 1413 received in evidence, being Document Number 417, 69th Congress, 1st Session, H. R., entitled "Pollution Affecting Navigation or Commerce on Navigable Waters."

It was submitted on June 4, 1926, to the Committee on Rivers and Harbors by the Chief of Engineers, and was made pursuant to Section 9 of what is known as the Oil Pollution Act of Congress. Section 9 is as follows:

11450 "Sec. 9. That the Secretary (of War) is authorized and directed to make such investigation as may be necessary to ascertain what polluting substances are being deposited into the navigable waters of the United States, or into non-navigable waters connecting with navigable waters, to such an extent as

> to endanger or interfere with navigation or commerce upon such navigable waters or the fisheries therein; and with a view to ascertaining the sources of such pollutions and by what means they are deposited; and the Secretary shall report the results of his investigation to the Congress not later than two years after the passage of this act, together with such recommendations for remedial legislation as he deems advisable: Provided, That funds appropriated for examinations, surveys, and contingencies of rivers and harbors may be applied to paying the cost of this investigation, and, to adequately provide therefor, the additional sum of not to exceed $50,000 is hereby authorized to be appropriated for examinations, surveys, and contingencies of rivers and harbors."

In the first part of the report there is the following statement:

> "Polluting substances which are being deposited directly or indirectly into the navigable waters of the United States or into non-navigable waters connected therewith, may be divided into two general classes: (A) Domestic sewage; (B) Industrial wastes."

On page 11 of the report there is a table entitled "Navigable Waters of the United States and Non-Navigable Waters connecting therewith into which Polluting Substances are being Deposited to such an Extent as to Endanger or Interfere with Navigation, Commerce or Fisheries." The table is divided into different columns. The first column gives the city or locality, second is entitled "Waterway," the next one is entitled "Principal Sources of Pollution," the next one is entitled "Effect on Commerce or Navigation," the next one is entitled "Effect on Fisheries." The table shows 127 harbors or waterways, of which all are polluted either with domestic sewage, industrial wastes of various kinds or both. The column headed "Effect on Commerce and Navigation" does not indicate any effect from such pollution on commerce or navigation in 102 of these harbors or waterways. The nature and extent of the interference on commerce or navigation on the other 25 harbors or waterways, are shown in the following excerpts from said table;

Locality	Waterway.	Principal Sources of Pollution.	Effect on Commerce or Navigation.
New York City, Harbor and Bay	Lower Hudson River, East River, Harlem River, Bronx River, Gowanus Creek, Newtown Creek, New York Bay (upper and lower) and Flushing Bay	Domestic sewage; industrial wastes of many kinds from factories, chemical plants, gas plants, ship repair yards, oil from storage plants, refineries, distribution plants and shipping (739 million gallons of sewage per day and 48,500,000 gallons trade wastes per day in 1920).	Sewage sludge causes shoaling of creeks, bays and slips. Is removed by the municipal agencies. Pleasure boating interfered with. Oil creates potential fire hazard.
New York Harbor	Kill Van Kull and Arthur Kill	Domestic sewage; industrial wastes from oil refineries, asphalt and chemical plants.	Pleasure boating eliminated. Oil creates extra fire hazard.
New York Harbor	Newark Bay, N. J.	Domestic sewage; industrial wastes, oil tar, etc.	Pleasure boating curtailed.
"	Hackensack River, N. J. and tributaries	Domestic sewage; industrial wastes from oil refineries, gas plants, pulp mills, soap factories, etc.	Pleasure boating curtailed. Oil creates a potential fire hazard.
"	Passaic River, N. J., and tributaries	Domestic sewage; industrial wastes of many kinds, particularly oil and tar wastes.	Pleasure boating curtailed. Oil creates a potential fire hazard.
"	Elizabeth River, N. J.	Domestic sewage; industrial wastes from gas plants, asphalt plants, etc.	Pleasure boating eliminated.
"	Rahway River, N. J.	Domestic sewage, industrial wastes, oil, tar, asphalt, chemicals.	Pleasure boating curtailed. Oil creates extra fire hazard.
"	Raritan River and Bay, N. J.	Domestic sewage, industrial wastes, oil, acids, dyes, etc.	Pleasure boating interfered with.
Keyport, N. J.	Keyport Harbor, N. J.	Domestic sewage, industrial wastes from Raritan Bay.	Pleasure boating curtailed.
Philadelphia, Pa. to mouth	Schuylkill River	Industrial wastes, oil and tar.	Fire hazard to shipping.
Above Philadelphia	Schuylkill River and tributaries	Domestic sewage, industrial wastes—culm acid mine drainage.	Culm deposits cause shoaling. Dredging done by private canal companies.

Pittsburgh, Pa. to Portsmouth, Ohio	Ohio River	Industrial wastes from mine drainage, washeries, steel mills, creameries and tanneries.	
Pittsburgh, Pa.	Upper Ohio River, lower Allegheny River, Monongahela River, Youghiogheny River and tributaries	Domestic sewage. Industrial wastes from metal trades, coal mines, oil wells and refineries, paper mills and tanneries.	Injurious to metal hulls, boilers and metal navigation structures.
Akron and Cleveland, Ohio	Cuyahoga River	Domestic sewage; industrial wastes from packing houses, steel mills, tanneries, asphalt plants, chemical plants, paint factories, oil refineries and rubber reclaiming plants.	Oil endangers shipping in Cleveland Harbor.
Detroit and Dearborn, Mich.	Rouge River, Mich.	Domestic sewage, industrial wastes of many kinds.	Deposits cause shoaling which interferes with commerce unless removed.
Gary, Ind., and vicinity.	Calumet River, Little Calumet, Grand Calumet and tributaries	Domestic sewage, industrial wastes from steel mills, chemical plants, refineries, gas plants, etc. (Total 493,520,000 gallons per day.)	Causes shoaling; interferes with pleasure boating.
Chicago and vicinity	Lake Michigan	Domestic sewage; industrial wastes of various kinds (198,850,000 gallons per day).	Causes shoaling in Calumet and Indiana Harbors; deposits removed periodically by local authorities.
Chicago, Ill.	Chicago River and branches	Domestic sewage; industrial wastes from packing houses, tanneries, chemical plants, metal trades, gas plants, etc. (total 727,765,000 gallons per day).	Sewage sludge causes shoaling which necessitates dredging periodically.
Northern Illinois	Illinois River, Ill.	Domestic sewage, industrial wastes of many kinds (total from sources on Illinois River 61,106,2[illegible] gallons per day; total including tributaries, 1,448,5[illegible],700 gallons per day).	Some shoaling caused by deposits; pleasure boating interfered with.
Joliet and Northeastern Illinois	DesPlaines River, Ill., and tributaries	Domestic sewage, industrial wastes (total from sources on DesPlaines River, 11,228,000 gallons per day; total discharging into DesPlaines River from all sources 1,336,346,500 gallons per day).	Pleasure boating interfered with

11472-h Page 23 of said report contains the following:

> "The subject of pollution of waterways is one that is engaging the active attention of State and municipal governments throughout the United States. The investigation clearly indicates an awakened interest and an earnest desire to meet and overcome a condition which through lack of adequate control in the past has been permitted to exist and grow until public opinion has become generally aroused."

Page 24 contains the following:

> "2. The pollution of waterways affects not only the fisheries therein but also the public health, sports, and various forms of outdoor recreation. The waters are used by the general public for domestic, commercial, industrial, recreational, and other purposes. 11472-i They have been used for the disposal of domestic and industrial wastes since the settlement and industrial development of the United States began. What constitutes the highest and most economic use of a waterway aside from its use as a public highway of commerce is a problem the solution of which involves a study of local conditions and the proper adjustment of the various conflicting interests of the locality. The growth and industrial development of a locality may depend upon the use of its streams for economical disposition of its domestic and industrial wastes; and should the pollution of streams in such a locality be prohibited, the future development of the section might be seriously impaired. As a general rule the value of the products of the fisheries is small as compared to the total value of the products of all the industries which use the waters for other purposes. The problem therefore resolves itself into a determination of the use of each waterway which will result in the greatest benefit to the community. It is believed that should the Federal Government undertake the control of pollution generally there might be a tendency on the part of State and local authorities to relax their efforts to study the problem and to enforce local laws, with the result that the entire problem would be left to the Federal Government, which would be confronted with the ne- 11472-j cessity for providing a large organization to cope with the many local problems which would arise."

On page 26 there is the following statement from said report:

"3. In general the injuries caused by polluting substances in non-tidal waters do not, ~~except~~ in the Pittsburgh area, directly affect commerce or navigation in the sense of making more difficult or expensive the movement of water carriers, the handling and transshipment of freight, or the creation, operation, and maintenance of navigable channels. The direct injury resulting from pollution in nontidal waters is rather to the public health, to fish, and other wild life, animal and vegetable, and to outdoor forms of recreation, such as bathing and boating, together with the land and property values which depend thereon.

"4. Water-borne commerce and navigation may be held to be indirectly affected on this latter basis, for in a sense they are affected by almost any important activity of the public.

"From the point of view of the indirect effects of pollution on commerce and navigation arising from the direct effect on the public health, fisheries, and recreational activities. I am not prepared to state whether Federal legislation is justified on the basis of the interstate commerce clause of the Constitution, this being a matter of legal construction. I do consider that the pollution of non-tidal waterways is a matter of interest and concern to the body politic and should be dealt with in some manner by the Nation, by the States, by municipalities, or by public opinion.

"5. Oil pollution directly endangers commerce and navigation at some of the larger seaports and one of the lake ports by reason of fire hazard resulting from the accumulation of oily discharges on the surface of the water and on wooden wharves, piers, etc. It fouls boats and equipment. The Federal Government has already asserted an interest in this kind of pollution by the enactment of the oil pollution act, 1924. However, that act applies only to the discharge of oil from oil-burning or oil-carrying vessels.

"8. While at present there appears to be only

one port on the Great Lakes in which oil pollution is sufficient to endanger commerce, nevertheless, due to the importance and extent of this commerce and the probable increase in the number of oil-burning and oil-cargo vessels, oil refineries and terminals, pollution from this source may increase unless con-
11472-l trolled."

On page 25 the said report contains the following statement:

"B. COMMERCE AND NAVIGATION

"1. The direct injuries resulting to commerce and navigation from the discharge of polluting substances into the navigable waters of the United States, or into their non-navigable tributaries, are in general restricted to:

"(a) Chemical action on steel hulls, or other parts of vessels, and upon the metal parts of locks, dams, or other navigation structures. This is due to acids from mine drainage and washery wastes, and from the effluent of industrial plants engaged in the manufacture of steel and steel products. Serious injury from this source appears to be restricted to the vicinity of Pittsburgh.

"(b) Sewage sludge and other substances in suspension may cause the shoaling of channels in overpolluted and restricted waterways. These deposits are as a general rule satisfactorily removed by local agencies responsible for the pollution, before interference with commerce or navigation.

"(c) The creation of a fire hazard by oily discharges.

11472-m "This appears to be limited at the present time to tidal waterways in the vicinity of New York, Philadelphia, and Galveston, and to the Great Lakes Harbor at Cleveland."

Document 4, Complainants' Exhibit 18, contains the following statement:

"13. The question turns essentially on the phrase 'capable of treating the sewage.' The question is, what degree of treatment is to be considered satis-

factory? The discharge from any form of sewage-disposal works capable of application to a great city like Chicago is an undesirable addition to a river; that is, it will decrease the purity of the river water. Depending on both the form of treatment adopted and the flow of the river, the effect may in the general case be anything from a very slight taint-
11472-n ing of the water, quickly disappearing to a gross and even dangerous nuisance. It is wholly a matter of degree.

"14. To give any specific answer, therefore, the department was forced to assume some arbitrary standard. That followed was one which would assure that there should be no appreciable nuisance in the Illinois or DesPlaines River due to Chicago sewage. Based on this assumption, a report was obtained from a firm of expert sanitary engineers, which estimates certain sewage treatment works necessary with certain diversions to produce the required result; these figures, and some additional ones, are submitted by the district engineer. If the works should be made somewhat less efficient or the diversion decreased, or both, some nuisance would presumably develop. How much nuisance, defined as above, the authorities are prepared to tolerate is a matter beyond the knowledge or purview of the board. It is also to be noted that, even with Chicago's sewage satisfactorily handled, there would still be a material nuisance in the river due to other sources of pollution.

"15. It appears that treatment for a 1945 population to give the desired degree of purity can be handled by a suitable combination of the activated sludge method, Imhoff tanks, and trickling filters for di-
11472-o versions as great as or greater than 4,167 second-feet (annual average). For a diversion somewhat less than 4,167 second-feet (the exact figure has not been determined) it would become necessary to have recourse to sand filtration. Treatment can thus be provided for diversions at least as low as 1,000 second-feet. For zero diversion it would be necessary to deliver the effluent into Lake Michigan. The district engineer's report contains cost estimates for

the various methods. The cost increases rather slowly as the diversion decreases to the point (somewhere below 4,167 second-feet) where sand filtration becomes necessary, then it increases more rapidly."

* * *

"34. It is evident that any program of sewage treatment should look to restoration of better conditions in the DesPlaines and upper Illinois River. Almost universally, public sentiment is rapidly forming against further pollution of streams and is going to require the removal of most of it as soon as practicable. For this reason, in planning the necessary works for the Sanitary District of Chicago, it was felt wise to assume that a material improvement of conditions in these streams would be one of the objects to be attained, and accordingly an investigation was directed along the lines of determining a reasonable pollution standard.

11472-p "35. The consulting engineers are of the opinion that no appreciable nuisance will result if the following standard is maintained:

> 'The liquid discharged by the drainage canal, as evidenced by the average of representative samples taken for any 30 consecutive days, shall (a) be practically free from solids deposited in two hours; (b) shall contain not less than three parts per million of oxygen and enough to equal or exceed the biochemical oxygen demand of said liquid for five days when incubated at 20 degrees C.'

"Whether adherence to this standard will produce exactly the results desired or not is unknown, but in view of the present extremely unsatisfactory conditions prevailing with upward of 4,000 cubic yards of settleable solids being dumped into the Illinois each day, and with periods of several months each year with no oxygen whatever present in the effluent, there is no question but what conditions will be improved materially. It should be understood that other sources of pollution are contributory to the Illinois River, and that with no contamination whatever from the Sanitary District of Chicago conditions in the Illinois will not be satisfactory until the rest of the communities now discharging their sewage into the system carry out satisfactory sewage treatment 11472-q programs of their own. It so happens that the adoption of a standard that no appreciable nuisance will result carries with it the restoration of conditions which will permit fish life to thrive.

* * *

"38. The consulting engineers are of the opinion that no methods of sewage treatment known to be practicable will maintain the pollution standard unimpaired if the gross average flow at Lockport is as low as 2,000 cubic feet per second. The combined oxygen demand on the effluents from plants providing the most complete practicable treatment known is considerably in excess of the supply available in 2,000 cubic feet per second. For small-scale operations, sand filtration has been known to provide practically 100 per cent treatment, but the consulting engineers doubt the efficacy of this method on as extensive a basis as would be required for Chicago's sewage, particularly with practically no diluting water available as a factor of safety."

* * *

"46. The results of this study are decidedly contrary to a continued diversion of 10,000 cubic feet per second. On the other hand, they do not favor programs of reduction which result in final diversions as low as 3,000 cublic feet per second or lower (annual averages). The conclusions drawn indicate 11472-r that the resources of the Nation, capital, fuel, and labor, will be conserved to the best advantage by reducing the gross annual average diversion to 4,167 cubic feet per second, or thereabouts, by the year 1935, and maintaining it at that point thereafter."

* * *

"56. An annual average diversion of 4,167 cubic feet per second involves no difficulties in the way of provision of adequate sewage treatment at Chicago. Average diversions materially less than this amount will require the adoption of sand filtration on a large scale, or disposal of effluents in Lake Michigan, either of which methods might not prove successful."

General Jadwin, continuing:

11472-r *Cross-Examination by Mr. Adcock for Defendants.*

I read this from Document 4, Complainants' Exhibit 18, 6,050 c.f.s. continuous diversion and 4,167 c.f.s., as if I were saying something on a par with the physical features of the project and with the cost. I don't consider that these figures are formally adopted in the same way 11472-s that I do feel we are authorized to construct the works, and our selection of them I understand to be perfectly definite, legal and proper. It does follow, however, that there is a larger diversion than this amount coming now, and the question as to what water should be diverted is not acute from the point of view of a navigation project there in that sense. Congress did say positively that it was not adopting any diversion that precluded us from establishing as a legal diversion 4,167 or any other legal diversion, but it did leave us, subject, of course, to further action of Congress, or subject to the decree of the Supreme Court or any court that would have jurisdiction, to let an amount of water go down there under permit, or if not a formal permit, to an amount that would produce 9-foot navigation, until and unless it is definitely changed by order of the Court or Congress. If we are barred from that by the Supreme Court, that would be one thing. We could not change the amount, the exceptional amount that would fit into that project properly, until there is some order of Congress. Congress is perfectly free to make it anything it wants to above or below, provided they give us money to change the works accordingly. We have so constructed the works to bring 11472-t about practically a minimum of cost if there is a change. If Congress wants to make it smaller, they can add locks. The two locks with dams now are old and inefficient. If they want to have a larger diversion they can have us remove the Campsville and LaGrange locks. If Congress wants a smaller diversion, it would probably accomplish it by adopting a project which would order us to build more locks and dams. Part of the channel is canalized, and part is an open flow, which would practically result in turning all or almost all of it to get the lowest diversion, into an entirely canalized channel.

I was asked if I was familiar with Document 417, being the report on pollution of navigable waters. In answer I said that I am aware of its existence, as I was in the chain of command when it was prepared. I know there is such a paper and I have known some parts of it, certain phases of it were before me when it was being prepared; but I have not all of it thoroughly in mind at
11472-u present. It has been a long time since I have seen it. It was prepared when Gen. Taylor was Chief of Engineers and I was Assistant Chief.

As to the action taken by the Chief of Engineers in connection with the sewage pollution of New York Bay by the Passaic Valley Sewerage Commissioners in 1910, with reference to the purification of the sewage so that it would not be offensive to navigation when discharged into the New York Bay, I haven't the details of that in mind, but I do know of such a case. I know something about it and I think on one occasion subsequent to that I acted in the chain of command on some of the details of the work at the outlet. My understanding is that there was a case of this kind and that it was finally settled by the introduction or the establishment of works which made the output so that it was deemed at the time it would be unobjectionable, but I would ask that not very much stress be laid on that without giving me opportunity to verify it from the record. It seems to be questionable.

It was my understanding that this 85% purification under the program left the residual of 15% of organic matter which would substantially represent the raw sew- 11472-v age of 15% of the population treated by these purification plants. That is, it purified it 85% and left the equivalent of 15% of the material in there.

I do not know of my own knowledge whether the sewage purification works at storm times take only a volume equal to 150% of the ordinary sewage flow and whether the balance spills untreated into the channels of the Chicago River or of the Canals of the Sanitary District. I think I have heard a statement made by one of my assistants to that general effect, but I do not recall the percentage, whether it was the 150 that you speak of. I think I recall that one of my assistants advised me that there was a part of the raw sewage dumped into the river on such occasions.

The following is from paragraph marked "B" of my testimony yesterday:

11473 "With diversions between 6,000 c.f.s. and 1,000 c.f.s., the works would facilitate the diversion of storm flow, but the control of the effluent and other river contaminations would decrease as the diversion was decreased."

means:

"What we mean by that is that, as the diversion is decreased, the ratio of the effluent to the pure water is relatively increased. The more diversion we have, the better the effluent is handled. The less fresh diversion we take, the higher the percentge of effluent there is."

At another place yesterday I made the following statement:

"With average diversions of less than 3,000 or 4,000 c.f.s. and the continued discharge of effluent into the river, there would be a practically continuous alternation of inflow and outflow between the river and the Lake."

"This condition would result in sewage-laden storm water being carried into the Lake after prac-

> tically every storm large enough to flood the sewers, unless the control gates were kept open after each storm long enough to discharge the polluted contents of the river into the Drainage Canal."

I meant in the foregoing statement that for a flow of zero or 1,000 or 2,000 second feet annual average at Lockport, it would be necessary after each storm to take water from the Lake in order to discharge the polluted water into the channels. Otherwise it would work in and out.

11475 "Q. And that would be objectionable to navigation?

A. I do not think that I have said that, Mr. Adcock.

Q. Well, I will withdraw that.

A. We were answering that question and trying to give the physical conditions without going into the question of whether that amount.

Q. (Interposing) If you did not go into that, I will not ask you about it.

A. All right."

I have made no calculation as to the amount of water that would be required to be withdrawn from the Lake to displace that storm water after the storm had ceased, 11476 to prevent that alternation, but I have already indicated that it is almost impracticable to prevent that alternation with any of those small diversions. You have to go up, as I remember it, to something like 6,000 c.f.s. or more.

When I stated yesterday:

> "None of the control works that have been considered can be operated to prevent the discharge of storm water into the lake without also diverting considerable amounts of water other than storm water,"

in speaking of "none of the control works," I included both the control works that might be built at the mouth of the Chicago River and those that might be built at the northern terminus of the Canal.

In using the words:

"considerable amounts of water other than storm water," 11477 I intended to embrace in that expression sewage effluent. There would also be required water from the lake to push this other water along.

Re-cross Examination by Mr. Jackson.

With no flow at Lockport, and control works at the northern terminus of the canal, the effluent would go into the lake except in time of storm or immediately before or after. The entire discharge would probably amount to 1,000 c.f.s.

Complainants' Exhibit 249, about which General Jadwin was interrogated on cross-examination, being Report of Board of Engineers for Rivers and Harbors, June 16, 1926, is as follows:

COMP. EX. 249.

SENATE

60TH CONGRESS
1st Session

DOCUMENT
No. 130

REPORT OF BOARD OF ENGINEERS FOR RIVERS AND HARBORS

LETTER FROM THE CHIEF OF ENGINEERS, IN RESPONSE TO A LETTER OF THE CHAIRMAN OF AND A RESOLUTION OF THE COMMITTEE ON COMMERCE DATED JUNE 14, 1926, SUBMITTING A REVIEW OF ITS REPORT PUBLISHED IN RIVERS AND HARBORS COMMITTEE DOCUMENT NO. 4, SIXTY-NINTH CONGRESS, FIRST SESSION.

JUNE 16 (calendar day, JUNE 17, 1926.—Referred to the Committee on Commerce and ordered to be printed.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEER,
WASHINGTON, June 16, 1926.

Hon. W. L. Jones,
Chairman Committee on Commerce,
United States Senate.

MY DEAR SENATOR: 1. Referrring to letter of the chairman of the Committee on Commerce of the

United States Senate, dated June 14, 1926, inclosing a copy of a resolution of the committee dated June 14, 1926, requesting the Board of Engineers for Rivers and Harbors to review its report, published in Rivers and Harbors Committee Document No. 4, Sixty-ninth Congress, first session, with a view to clarifying its recommendations, I inclose herewith the report of the board, dated June 15, 1926, in response thereto.

2. The board states that it was not its intention to commit the Government in any way regarding the legality or permanency of the existing diversion. It calls attention to the specific statement in paragraph 22 of its report printed in House Document No. 4, "that it would be premature definitely to fix the diversion at this time."

3. The board states that if it is felt that the former recommendation of the board might be interpreted as fixing any permanent diversion, a solution may be found in changing the recommendation so as to propose that a project for a channel 9 feet by 200 feet be adopted, and that the department be definitely authorized, not only to provide it for existing conditions of low water flow, but also, and without further reference to Congress, to continue to provide it, by suitable changes in the works of improvement, if the low-water flow be reduced within the limits contemplated by the table on page 3 of House Committee Document 4, Sixty-ninth Congress, first session. The estimates in that table assume that the works corresponding to a given estimate are undertaken *ab initio*. On that basis a limiting authorization figure would be $2,666,000, the estimated cost of providing the channel by canalization with the least flow contemplated in the table. If, however, the low-water flow should be reduced by successive steps, and at each step certain works had to be provided appropriate to the then existing flow, the necessity might arise for modifying some part of the work in a manner which would somewhat increase the ultimate cost. The amount of such increase cannot be accurately estimated, since it is unknown at what rate and by what steps the flow may hereafter be re-

duced; but it is estimated that the cost under such conditions might reach $3,000,000 or $3,500,000.

4. The following recommendation, embodying the above proposal, is accordingly submitted:

The board recommends modification of the existing project for the Illinois River so as to provide a channel with least dimensions of 9 feet in depth at low water and 200 feet in width, from the mouth to Utica. Under present conditions of low water flow, the provision of such a channel, by dredging and by the partial removal of the two State dams and the retention and minor alteration of the two Federal locks and dams, is estimated to cost $1,350,000 with $126,000 annually for maintenance. Future reduction in the flow would involve additional expenditures. It is understood that Congress, if it approves this recommendation, will hereby have authorized the department to undertake any works covered by the estimates in the table on page 3 of House Document 4, Sixty-ninth Congress, first session, which may be necessary in the future to provide a channel of the dimensions specified, and will have authorized the necessary expenditures therefor, up to a limiting total for new work of about $3,500,000. The above recommendation is subject to the following conditions: That the State of Illinois transfers to the United States, without cost, all rights and titles in the two State-owned dams on the Illinois River; that local interests furnish the United States without cost all necessary areas for the economical disposal of material dredged in creating and maintaining the channel: *Provided further,* That no work on the Illinois River shall be carried out according to the project herein outlined, with the existing or any subsequent diversions, until the Secretary of War and the Chief of Engineers shall have received satisfactory assurances that local interests will at the same time provide an equal depth for through navigation in the Illinois waterway.

5. After due consideration of the above mentioned report, I concur with the board.

H. Taylor,
Major General, Chief of Engineers.

War Department,
The Board of Engineers for Rivers and Harbors,
Washington, D. C., June 15, 1926.

Subject: Illinois River.

To: The Chief of Engineers, United States Army.

1. This report is submitted in response to the following resolution, adopted June 14, 1926:

Resolved by the Committee on Commerce of the United States Senate, That the Board of Engineers for Rivers and Harbors be, and hereby is, authorized and requested to review its report, published in Rivers and Harbors Committee Document No. 4, Sixty-ninth Congress, first session, with a view to clarifying its recommendation.

2. The letter of the chairman of the Committee on Commerce, transmitting the above resolution, contained the following paragraph:

It is the understanding of this committee that in submitting its report, the Board of Engineers for Rivers and Harbors did not intend to make any recommendations which would have any bearing upon the question of diversion and if such be the case, it would be well if the board could so revise its report as, to make this matter clear beyond question.

3. It was not the intent of the board, in its recommendation contained in its previous report, to commit the Government in any way regarding the legality or permanency of the existing diversion. It recommended certain work in the Illinois River, estimated at $1,350,000 to obtain a channel 9 feet by 200 feet from Grafton to Utica, and pointed out that, if existing conditions were changed, corresponding changes in the cost of providing the channel would result. The board submitted a series of preliminary estimates based upon various assumed diversions, from 1,000 cubic feet per second to 10,000 cubic feet per second (annual average measured at Lockport). It compared these estimates, with the resultant national benefits which it appeared would arise from a through 9-foot channel from Chicago to Grafton, and found that the cost of the navigation project was reasonable on any of the bases investigated.

4. The board also referred to the various interests affected by diversion of water from Lake Michigan. It found that these were important, and in some cases conflicting, and that all the data were not at hand accurately to evaluate them. It therefore gave its view (par. 22) "that it would be premature definitely to fix the diversion at this time."

5. If it is felt that the former recommendation of the board might be interpreted as fixing any permanent diversion, a solution may be found in changing the recommendation so as to propose that a project for a channel 9 feet by 200 feet be adopted, and that the department be definitely authorized, not only to provide it for existing conditions of low-water flow, but also, and without further reference to Congress, to continue to provide it, by suitable changes in the works of improvement, if the low-water flow be reduced within the limits contemplated by the table on page 3 of House Committee Document 4, Sixty-ninth Congress, first session. The estimates in that table assume that the works corresponding to a given estimate are undertaken *ab initio.* On that basis a limiting authorization figure would be $2,666,000, the estimated cost of providing the channel by canalization with the least flow contemplated in the table. If, however, the low-water flow should be reduced by successive steps, and at each step certain works had to be provided appropriate to the then existing flow, the necessity might arise for modifying some parts of the work in a manner which would somewhat increase the ultimate cost. The amount of such increase cannot be accurately estimated, since it is unknown at what rate and by what steps the flow may hereafter be reduced; but it is estimated that the cost under such conditions might reach $3,000,000 or $3,500,000.

6. The following recommendation, embodying the above proposal, is accordingly submitted:

The board recommends modification of the existing project for the Illinois River so as to provide a channel with least dimensions of 9 feet in depth at low water and 200 feet in width, from the mouth to Utica. Under present conditions of low-water flow, the provision of such a channel, by dredging and by the partial removal of the two State dams and the retention and minor alteration of the two Federal locks and dams, is estimated to cost $1,350,000 with $126,000 annually for maintenance. Future reduction in the flow would involve additional expenditures. It is understood that Congress, if it approves this recommendation, will thereby have authorized the department to undertake any works covered by the estimates in the table on page 3 of House Document 4, Sixty-ninth Congress, first session, which may be necessary in the future to provide a channel of the dimensions specified, and will have authorized the necessary expenditures therefor, up to a limiting total for new work of about $3,500,000. The above recommendation is subject to the following conditions: That the State of Illinois transfers to the United States, without cost, all rights and titles in the two State-owned dams on the Illinois River; that local interests furnish the United States without cost all necessary areas for the economical disposal of material dredged in creating and maintaining the channel; provided further, that no work on the Illinois River shall be carried out according to the project herein outlined, with the existing or any subsequent diversions, until the Secretary of War and the Chief of Engineers shall have received satisfactory assurances that local interests will at the same time provide an equal depth for through navigation in the Illinois waterway.

For the board:

EDGAR JADWIN,
Brigadier General, Corps of Engineers,
Senior Members of the Board.

Pursuant to conference between counsel and the Special Master, it was agreed that the defendants on the re-reference should proceed initially with the offering of evidence and testimony.

Thereupon the program of the Sanitary District for sewage treatment works was presented by various witnesses substantially as set forth in the Master's Report on Re-reference at pages 6 to 17, both inclusive.

The program of defendants as testified to by witnesses and appearing in exhibits will not be repeated in this abstract, but only such portions of the testimony and evidence will appear as are required for consideration of the exceptions filed by both parties.

Where the qualifications of witnesses have been stated sufficiently by the Master in his Report on Re-reference, they will not be repeated in this abstract.

March 1929—at Chicago.

Langdon Pearse, on behalf of Defendants:

Chief Sanitary Engineeer of Sanitary District of Chicago. Testified in former hearings in 1927.

9860 This program that I have outlined is somewhat more extensive than that outlined in 1926, by the addition of a large number of intercepting sewers required by the change in policy of consolidation, by the addition of certain collateral intercepting sewers, in an endeavor to pick up all the sewage practically possible, in order to follow out, as the engineers understood it, the instructions of the Supreme Court. Thus some sewers have been provided which we had heretofore considered might be omitted for many years to come, which additional sewers relieve small areas and small parts of the river such as the slips and other light areas of sewage that would go into them from small sewers. These additional interceptors will cost several millions of dollars which were not originally contemplated and would probably have been omitted with a larger diversion.

9873 The purpose of the installation and placing in operation of various treatment plants, is to provide what we call complete treatment of the sewage and industrial wastes originating in the Sanitary District of Chicago and entering its waterways; that is, the greatest practical degree of treatment. The works when installed will not provide 100 per cent purification of the sewage. 100 per
9874 cent purification is not practical. Practical degree of purification is 85 per cent. At times on monthly averages it may be 90 or even 92 per cent for activated sludge process.

The interceptors in general are planned along the lines indicated of bringing to the plants the dry flow, with the addition of storm water of 50 per cent to 60 per cent.

9890 According to defendants' program, the effluent of the North Side Works will go into the North Shore Channel immediately east of the plant; of the West Side Works will be into the Main Channel West of 52d Avenue; the Southwest Side Plant into the Main Channel almost directly south of the West Side Works; and of the Calumet Works, into the Calumet Sag Channel at a point just west of the controlling works at Blue Island, its eastern terminus.

9891 By effluent, I mean the sewage after it has undergone the treatment provided in the plants, whether it be tanks and trickling filters or activated sludge process. It is the liquid that comes from the plants and is discharged into the channel. Sludge is a term defined as the solids separated out from the sewage in the treatment processes. It is a mixture of solids and water, varying in consistency from the activated sludge, which may have 98 to 99% of moisture; to the Imhoff tank sludge that may be of 83 to 87% of moisture, probably nearer 87 than the lower figure.

The sludges contain both mineral and organic matter. The organic matter in the activated sludge will be higher in nitrogen than with the Imhoff tanks. That is the reason why in our Southwest Side Plant we have included a plant for the preparation of activated sludge for its sale as fertilizer, to take advantage of the higher nitrogen content of that portion of the total sludge of the
9892 District.

The sludge in some instances is to be disposed of on land, for which the Sanitary District has reserved an area west of the West Side Works and immediately north of the Main Channel. That area lies between the DesPlaines River and the Channel, and is largely unsuitable for other purposes. It is rocky and rough. The area consists of about 900 acres. We do not expect to dispose of it with the moisture content that it has when it comes from the tanks.

The sludge will be flowed out of the underbodies of the tanks and pumped by an air ejector to the drying beds, where it will be exposed from one to two weeks, drying down to 45 to 60% of moisture, and then it will be stripped from the beds and loaded into dump cars and taken away.

9893 This sludge is of a porous material, resembling somewhat loam in the garden, with a certain amount of peaty characteristics, and the material can be dumped in piles of upwards of 20 feet deep and handled by a dragline at the side of the dump, and eventually will consolidate.

The Calumet sludge will continue to be dumped for some time at the north end of the property where the plant is located, but it will be necessary ultimately to provide other areas.

This program contemplates the discharge of all these effluents with the storm water down the rivers and channels of the Sanitary District, ultimately to reach the DesPlaines River just above Joliet, and then pass to the Illinois and Mississippi Rivers, and I assume that in
9894 laying out this program there would be controlling works of some type placed at the mouth of the Chicago River or near the northern terminus of the Main Drainage Canal, to prevent any discharge of sewage or effluent from the sewage works, or storm water into Lake Michigan from the Chicago River.

When I have spoken of 85% treatment, there is a balance of 15% which represents what the treatment has been unable to reach of the organic matter. Some of it may be finely divided colloidal matter of various compositions, and would represent also in a general way the raw sewage of a population equal to 15% of the total population from which the effluent is derived. This statement is based upon a test of the reduction of the biological oxygen demand.

9895 I hesitate to express a definite opinion as to the exact reductions that can be made in the diversions of water from Lake Michigan during the period of construction because of the size of the problem and the unknown features concerning the effect on the waterways of the residual suspended matter that may come from the plants in the 15% purification that cannot be reached; the overflows from the sewers and oil and other matter that may reach the river from different sources. I believe such reductions should be predicated upon the work as accomplished when the treatment works are completed and put into operation, and that a period of observation and definite reduction can then be determined.

The period of completion of the works is a subject now of judgment, and the effect of the works when completed likewise, to such a degree that I feel that a direct opinion is very speculative.

9896 In the operation of the works, while data are available to tell what the probable effect will be of this sewage reaching it, the question will come in the result of the effluent on the waterways of the District and the setting forth of the residual flows that must be allowed to take care of those effluents. That will differ in actual accomplishment, in winter and in summer, according to the condition of the seasons, each year, and will differ in the plants to some extent themselves. And it will differ with the number of storms each year.

Cross Examination by Mr. Jackson.

9899 The program which I have proposed is based on the discharge of the effluents and storm water into the Mississippi River watershed, and such diversion of lake water in addition thereto as might be necessary to keep up a standard suitable for the purposes of navigation in the Port of Chicago. If the sewage effluent is to be put into the Lake, there would have to be added, in my opinion,
9900 extensive chlorination of all these effluents, and if the storm water discharge is to go into the Lake also at all times, as well as sewage effluents, there immediately comes up as part of the problem, whether it be done by the District or the city or some other agency, the protection of the water supply, the changes in tunnels, the operating of filters, and other matters, in order to make the result as a whole of the same degree of effectiveness to the community as we have attained, or contemplate, as regards sewage treatment and the protection of the water supply.

9903 There are those two alternatives available in the sense that they are alternative plans for the disposal of the sewage of the Sanitary District. I do not personally regard them as equally effective because I believe that the first plan for discharge of the sewage treated, and storm water in addition, into the Mississippi Valley watershed, is more effective in protecting the water supply, bathing beaches and the other uses of the water along the front of the City of Chicago.

If, however, that was not permitted, then the discharge of the effluents and storm water would go into the Lake, and as such it is an alternative plan. It will, however, in my opinion, destroy the use of certain bathing beaches. It is quite likely to cause foul conditions in the so-called Harbor of Chicago off Grant Park and cause other local disturbances of that character which do not arise in the other plan. Further, it necessitates the expenditure of a
9904 greater sum of money by the community.

I think that the water supply for the city will eventually be filtered, regardless of whether the sewage is diverted from the lake or not; but if the sewage be not diverted from the lake, the filtration works would probably have to be more extensive and necessarily more complete, because of that factor of added pollution which would have to be taken care of in their design.

If the metering of the water produces a reduction in the use of the water, the metering of the water would make a saving to the city both in the cost of operating the present water works and in the cost of any proposed filters. My opinion is that the metering will reduce the water consumption. It will undoubtedy reduce the consumption in certain quarters of the city and that will be beneficial in reducing operating expenses.

Nothing passes through the sewage treatment plants but sewage from the area tributary. In my opinion, the plan that I have outlined for sewage treatment up to 1945, is the best plan that can be devised to take care of all the sewage of the population, whether the effluent goes to the Mississippi watershed or whether it goes to the Lake.

If the effluent goes to the Lake, it is important to consider what should be done then for the purpose of purifying the water for drinking purposes.

9909 The first element in the problem is the full treatment of the sewage.

I cannot say that if the total domestic water supply of Chicago were metered so as to reduce the water consumption per capital to 160 gallons stabilized, how much that would reduce the normal dry weather flow of the Sewage Disposal Plants in c.f.s., because I have never made the calculation and would not attempt to. It would probably reduce the flow per capita to the plants. Exactly how much is a hard matter offhand to estimate
10166 without study of all the factors involved. It would be necessary to relate the effect of the water supply to
10167 other flows that come into the sewers, and which of those vary, on each of the projects, and I would not care to express an opinion other than that I have indicated, that the flows will be reduced. I do not think it is entirely fair to assume a ratio of reduction from 220 to 160 per capita, because that would depend on what other elements are in each of those sewers as increasing the amount of water, and other factors that come in. The water supply is somewhat varying. I do not carry in my head the proportion for these different parts. That is why I will have to calculate the amount of the reduction coming to the plants, assuming a reduction of water consumption from 220 to 160 gallons per day. I have not applied the design con-
10169 dition of 220 gallons per day water supply, but the estimate of the sewage flow was in the design at the plants. That is the reason I have been explaining to you that if you desired the information, I would be glad

to make a calculation based on the data on which the designs are made. I told you that one of the plants was designed in this program for 250 gallons per capita daily sewage flow.

To determine the relation of the sewage flow per capita to the per capita consumption of water, it would be necessary to get the basis of the design in order to see what we had allowed on that particular area for the water.

10170 If the water supply were metered, and assuming that the plants are designed now to treat 850 c.f.s. of the storm flow above the dry weather flow, the metering of this water supply would permit a greater amount of the storm flow to be treated. How much, I have not computed.

10171 It is not entirely true that there would have to be a rain with a runoff in excess of 1,000 or 1,200 second feet, assuming metering, before there would be any storm water overflows, because that will depend on the actual volume traveling in the sewer at different seasons of the year. In so far as the capacity is available in the sewer to carry the storm water, there will be no overflow. The intercepters will take more than the plants, as of 1945. I have not made any calculation of how much less dry weather flow we would have if there were complete metering. We have made stud-
10172 ies on various assumptions of what might happen, assuming various gallonage that might occur, and we are still trying to get at the probability of what gallonage will occur.

10281 The distance between the northern and southern limits if the Sanitary District is approximately 36 miles. The width of the territory of the Sanitary District is about 15 miles. You may have in this area a rainfall which will cause an overflow from the sewers into the river

and might not at the same time have rainfall which would cause overflow of all the different outlets throughout the area of the Sanitary District. The extent of storms over the whole area is subject to variation. I have come to the office in the morning from my home where we have had a smart storm upon the North Shore in Winnetka,
10282 and found that men living on the South Side reported no rain.

Harrison P. Eddy, recalled, for Defendants.

(A Sanitary Engineering Expert, testified on former hearings in 1927.)

9911 *Direct Examination by Mr. Adcock.*

9930 There should be no reduction in the diversion until there is an absolute barrier against the discharge of storm water into Lake Michigan, which would mean the date of completion of controlling works in the Chicago
9931 River or at the head of the Drainage Canal. Whether or not there can be early reduction of the diversion or a reduction in the diversion during the period of construction, depends upon what shall be the criterion. The conditions at the present time are by no means sanitary, either in the canal or down the river. If the basis be that there should be no improvement in those conditions due to diversion of water, in other words, that the sanitary conditions be maintained in status quo, then it might be possible to make a reduction in diversion in proportion to the population, and the population equivalent of industrial wastes for which treatment is provided from time to time.

9932 I do not believe it is practicable at this time, before these works are completed and in operation, to determine the exact amount of reduction that should be made from time to time as the different units in this program of construction are put in operation. Neither is it practicable to specify definitely with relation to the time of completion as by dates, because that is an indeterminate thing. It would be possible to specify a reduction in accordance with the population provided for in treatment plants as and when completed. In reaching the above conclusion as to the reduction during the period of construction, I am taking into consideration the interests of public health and the maintenance of navigation.

9933 With complete treatment of all the sewage, the quantity of water required to provide waters in the Port of Chicago suitable and attractive to navigation, is a very difficult and impossible thing to estimate with accuracy. It can be determined from time to time after the works have been put in operation. And in my judgment it would be wise to have that determined from time to time by a properly authorized and qualified person. That is, some
9934 person appointed by the court who has had experience and who can observe the operation for a reasonable time and from his observation conclude what actually should be done.

The discharge of the effluent from the various works to be completed under the program into the Lake, would be detrimental to navigation. The effluent would be devoid of oxygen, black and offensive much of the time. It would tend to discolor light-colored paint on boats. It would be offensive to people riding on boats and having to work on the vessels and along the wharves. This condition would gradually decrease in intensity as the distance from the mouth of the river increased, due to the dilution and oxidation which would take place in
9935 the waters of the Lake. And in reaching the above conclusion, I assumed that the storm water would be discharged to the DesPlaines River, and that the effluent

from purification works in dry weather time would flow into the Lake.

10294 I have made a study as to the standard that water should be in order that it may be reasonably free, easy and unobstructed, so far as navigation is concerned. I have studied the Canal system of the Sanitary District, the waters into which the effluents from the treatment plants and the storm discharges will flow. I have made some estimates of the velocity of flow at different points; the time taken for the water to flow from the treatment plants to various other points. I have taken into consideration the temperature and the dissolved oxygen of the lake water if used or diverted for purposes of making the effluents and the waters in the Canal system suitable for navigation. I have considered the conditions which surround such waters in a community of this kind, the use of the waters and the application of the conditions to navigation. I have drafted several conditions which seem to me to be or represent a reasonable standard for these waters for navigation.

10295 The *first* is that the water should be practically free from visible suspended particles of sewage matter coming from sewage treatment plants.

2, the water should be practically free from oil, grease, color and suspended matter.

3, the water should not be obnoxious or offensive to, or injuriously affect the health of passengers and persons employed on vessels or other property used in connection with navigation.

4, the water should not create odors of putrefaction of organic matter.

5, the water should not be of such composition as to result in an excessive growth of water plants.

6, the water should not cause discoloration of paint on, or otherwise injure, vessels and equipment or other property employed in connection with navigation.

7, the water should contain at least three parts per million of dissolved oxygen.

10296 My reasons for each one of those elements mentioned are:

10296-A With respect to visible suspended sewage matter coming from treatment plants, my thought in that is that there should be nothing coming from the treatment plants which would be recognizable as of sewage origin to give offense to sight; that the suspended matter should not be present in such form as to be noticeable or visible in the waters, which would mean that large deposits of suspended matters might result from the presence of such matter in the water.

With respect to freedom from oil, grease, color and suspended matter, my reason for the reference to oil is partly because of its effect upon the paint and the appearance of vessels, partly on account of the odor, and partly on account of the danger of fire.

It is more or less common to have oil discharged on to waters in harbors and waters frequented by large numbers of boats or vessels in a port of this kind. There have been serious fires, and in my judgment the conditions here ought to be such as to preclude that possibility in so far as practicable.

Grease on the surface of the water is objectionable. It is certain to reach the water at certain times from dis-
10297 charges of storm flow. I do not think it will reach the waters with the effluents from the treatment plants so as to be objectionable, but it is unsightly; it collects on boats and on piers. It decomposes and causes more or less odor.

Suspended matter should be practically absent in the sense of being present in such quantities as to form objectionable deposits which would create a great demand for dissolved oxygen.

Suspended matter must be discharged into the waters from the plants and also from the sewers at time of storm overflow. But in my judgment they should not be present in sufficient quantity to cause serious deposits. They will cause some deposits.

I should have said in connection with oil that oil is certain to come from shipping itself, from the runoff over the surface of the ground as well as from storm discharges.

With reference to the third point, the waters should not be obnoxious or offensive to, or injuriously affect the health of passengers and persons employed upon vessels. Men are obliged to work on the vessels. They are obliged to work on piers, in slips, and any offensive or obnoxious condition will be objectionable to them and will in my judgment affect the general problem of navi-
10298 gation. Passengers are not invited to embark and disembark under conditions of obnoxious and offensive odors. I think the waters would not be attractive to navigation under those conditions.

The waters should not create odors of putrefaction of organic matter. That is somewhat similar to the previous point, but applies more particularly to the actual decomposition of the organic matter which will exhaust the dissolved oxygen and create the offensive and obnoxious odors to which I have referred, which may also come in a measure from grease and oil which reaches the waterways.

The waters should not be of such composition as to result in an excessive growth of water plants. In my judgment it is going to be very important to so operate these treatment plants as not to produce conditions which will encourage a prolific growth of water plants. It is possible to operate plants of either type, either the activated sludge or the trickling filter, in such a way as to turn out effluents with very large quantities of nitrates present. Those nitrates are the source of plant food and the plants grow in enormous quantities. They die after a short period. They decompose in much the same manner as any other organic matter, and tend to deplete the supply of dissolved oxygen.

10299 It is, therefore, in my judgment advisable to so operate the plants as to produce a minimum of nitrates. This applies particularly, of course, to the warmer season of the year. During the winter, spring and the late fall that is not material. But during the warmer season of the year, from the first of June perhaps until the end of October, the nitrates should be kept just as low as is practically possible.

The water should not cause discoloration of paint on or otherwise injure vessels and equipment or other property employed in connection with navigation.

It is a more or less common experience in navigable waters which are seriously polluted to have hydrogen sulphide produced by the decomposition of organic matter, and paint, light colored paint on vessels and other property turned dark color or even black under some conditions. I consider that that would be a detriment to navigation.

The water should contain at least three parts per million of dissolved oxygen.

There must be dissolved oxygen if there are not to be putrefactive and offensive and obnoxious conditions. Under some conditions I would expect it would be advisable
10300 to have a larger portion than three parts per million,

but under these conditions I am assuming that the volume of water drawn from the lake can be varied more or less from time to time and that three parts per million of dissolved oxygen, which represents only thirty per cent of the saturation value of the water during the warm season is a sufficient margin of safety and is no more than is necessary to assure satisfactory conditions.

The sewage effluents will contain some relatively finely divided suspended matter. This is spoken of as floc. It looks like very small particles of sponge as it is seen in the settling tanks after aeration at the activated sludge plants. Such matter, although every provision practicable is made for its removal in the tanks, does escape in substantial quantities in the aggregate. These matters will tend to settle in the waterways by coalescing, forming larger particles, by being carried into quiet water where there is opportunity for sedimentation. They will become attracted to structures like piles, piers, and constitute a sediment on the sides and on the bottom which will draw upon the supply of dissolved oxygen in the waters themselves.

10301 The effluents from the plants will contain dissolved oxygen. I should assume during warm weather that possibly five parts per million would be present in the effluent, but this material which I speak of, although it seems very small as is expressed in parts per million, and a very small proportion of that originally present, yet in the aggregate from a community of this size, it is an enormous production of suspended matter, for the decomposition of which oxygen must be supplied if putrefactive conditions are to be avoided.

The nitrates in this effluent cause the growth of algae and other water plants. They should be kept as low as possible, and the plants can be efficiently operated so as to avoid a large proportion of nitrates. Assuming

10302 efficient operation, the nitrates could be kept between one-half of one part and perhaps one and one-half parts with an average during the warm season of about one part or less of nitrates. Any proportion of nitrates will accelerate the growths of water plants. A low proportion of nitrates such as I have suggested will tend to minimize that difficulty. On the other land, with that low nitrate, the reduction in the original organic matter in the sewage will not be quite as great, and some oxygen will be required to prevent putrefactive conditions under that method of operation. But in my judgment that will produce the least demand for oxygen from water, if any be available by diversion from the lake.

In the event the effluents from these sewage purification plants provided for under the Sanitary District program are discharged through the Canal and the Des-Plaines River, there will be required some water from the lake in order to maintain the standard which I have suggested as necessary for navigation in the waters of the Port of Chicago.

10303 This volume of water will, or should be varied in accordance with seasonal conditions. In the winter time putrefaction is not likely to take place. Storm discharges will take place occasionally and it will be advisable to draw some water to flush them along. But I estimate that that will be a relatively small volume.

The other extreme will come during warm weather, when I estimate that from 3,000 to perhaps 4,500 second feet will be necessary, dependent upon the temperature and upon the storm discharges. I think an annual average diversion of lake water in addition to the volume discharged from the sewers and the treatment plants of 2,000 cubic feet per second will be sufficient to maintain the waters suitable for navigation. This is predicated, however, upon the assumption that controlling works be provided which will prevent a back flow into the lake during storm.

The 2,000 cubic feet per second I mentioned would be from the lake and exclusive of the effluent which came from the treatment plants. That is, that 2,000 second
10304 feet would represent the annual average diversion of lake water to maintain clean water for navigation purposes, which is exclusive of the Chicago pumpage. It is also exclusive of the rain-water runoff, and such water as is drawn from the ground or other sources for industrial purposes, which is probably a large amount. That contemplates that at no time should there be any discharge of any storm water or sewage effluent or any other thing from the Chicago River into Lake Michigan. It also contemplates that there will be a certain amount of water flowing from the Calumet River watershed through the Calumet Sag Channel, and a certain amount of water flowing in the Calumet River will be discharged to the Sag Channel and thence to Lockport.
10305 It contemplates drawing water from the Little Calumet River, from the lake at the Little Calumet River, or the Calumet River water itself; from the lake at the mouth of the Chicago River, the easterly end; and from the lake at Wilmette, so that there will be a flow continuously through the North Shore channel and the North Branch through the Chicago River and the main Drainage Canal and through the Calumet-Sag channel, all three discharges coming together and passing out at Lockport.

I am not certain that I stated that it contemplates also that the flow will be increased for short periods at or immediately after storms in order to keep a substantial flow to wash out and clean out the channels as best may be.

The annual average diversion, then, would be inclusive of all these amounts; that is, of these three amounts that I have spoken of, 2,000 cubic feet per second, in addition to the sewage and overflow runoff.

10307 The 2,000 second feet is to be taken directly from the lake, which is comparable to the 8,500 second feet, exclusive of Chicago pumpage, mentioned in the permit of March 3, 1925.

10308 I explained in my earlier testimony that the volume of water now being abstracted is not adequate to preserve, or to provide sanitary conditions; and that this series of quantities which I am about to give is predicated simply on a proportionate reduction from the present 8500 cubic feet per second, in accordance with the progress in the program of sewage treatment.

The first reduction I suggest for Jan. 1, 1930 is upon the assumption that the Calumet plant is in operation, and it now is, providing sedimentation, and a small trickling filter; that the West Side plant for sedimentation, to serve about 1,000,000 is in operation; that the North Side plant is in complete operation; and under those conditions in 1930 the reduction would be from 8500 c.f.s to 6500 c.f.s.

10309 The next date I have set is January first, 1936 which is the date for complete treatment at the Calumet plant. At the West Side plant there will be, then, sedimentation for the entire tributary population; that is all the sewage which is produced and which ought to go to that plant is receiving treatment by sedimentation. The North Side plant will provide complete treatment for the entire tributary population. The Southwest Side plant will provide sedimentation for all of the sewage of that district, produced within that district. At that time I think the flow could be reduced to 4500 c.f.s. The next stage would naturally be when the flow dropped—when

complete treatment is provided. There might be a small drop, a decrease for a very short time, between the completion of the West Side plant, and the Southwest Side
10310 plant. I have not figured that.

The entire program should be completed by the end of 1944, in which time I am allowing two years for unexpected and unforeseeable delays. I have actually set down the figures as closing at the end of 1942. My estimates and figures are based on controlling works being in place to prevent back-flow into the lake. It would
10311 be necessary to have those controlling works installed as soon as the amount of diversion was less than would be required to protect the lake from the storm flow. The figures I have given are based solely upon the progress of the treatment of the sewage. The flow ought not to
10312 be reduced until the controlling works are in, which applies to January 1, 1930, and I do not think it is possible to install the controlling works by that time. If there are no controlling works, then on January 1, 1930, the present amount of 8,500 c.f.s. diversion is necessary. That amount will be required to prevent reversal of flow into the lake. I should think it would take at least two and possibly three years to install controlling works. The work of building the treatment plants will go on at the same time. Assuming that controlling works were installed, and that it took two years to install them, my estimate of a diversion of 6,500 c.f.s. on the basis I have
10313 stated, would be applicable to January 1, 1932. If the reductions I have mentioned were made, the conditions in the river would be maintained substantially as they are now. The diversions I have mentioned would not be sufficient to cause an improvement in conditions down the river.

In naming the 2,000 c.f.s. to be diverted from the lake as necessary when this construction program is completed and in operation, I took into consideration the conditions of navigation in the Port of Chicago only. I did not take into consideration what additional water might be required to maintain conditions suitable for navigation in the DesPlaines or Illinois Rivers or the waterways of those rivers. As to that subject I testified in 1927.

10314 May I amplify my answer on the question of the ultimate quantity of water? I did not state: I think, that that 2,000 c.f.s. is based upon the population as of 1945. Taking that into conisderation, the diversion is equivalent to one-third of a cubic foot per second, per thousand persons, based upon the human population, and the industrial-wastes equivalent population. I think one-third of a cubic foot per second is a better figure to use in considering a long period in the future than 2,000 c.f.s., which is based upon specific conditions assumed for 1945.

It is my judgment that it would be better to fix the amount of reduction after these different works are put in and there has been an opportunity to observe the effect of the operation.

I have made the best estimate that I can; but there are so many undetermined and undeterminable factors in the problem that I think it would be wise, if practicable, to allow that to be determined after the works are in operation.

Cross Examination by Mr. Jackson.

I don't know that the standard of quality of water for navigation that I stated as required in the Port of Chicago obtains in any other harbor on the Great Lakes. There is navigation there, but I don't know whether the
10318 navigation is free, easy and unobstructed. If the standard which I set up for the quality of water for naviga-

tion is adopted as the standard, I don't know that navigation in any harbor of the United States on the Great Lakes is not free, easy and unobstructed. I don't know that all harbors on the Great Lakes are subject to the vicissitudes of storm water overflows and runoffs. I do know, however, that some of them have storm water discharges into them. I should think in Detroit that storm water overflows are discharged and dumped into some one else's river and carried away from the port or harbor. It is also true of Buffalo that the storm discharges go into a river and the water carries it away from the harbor. The storm water from Detroit is diverted from the watershed very efficiently and effectively, being carried in a swift river of about 2½ feet per second velocity. Detroit is in the watershed of the Detroit River. 10319

10428 **Horace P. Ramey,** recalled, for Defendants.

Direct Examination by Mr. Adcock.

I am assistant chief engineer of the Sanitary District, which is the same position I occupied when I testified last in 1927.

Plans were first submitted for controlling works at the mouth of the Chicago River to the War Department in November, 1927. I testified on January 13, 1927 (Rec. 3642) that at that time plans had been submitted.

10434 I have made calculations of the average rainwater runoff of the Chicago River Drainage Area in a state of nature, and what it would be if the City of Chicago were not here. The natural runoff for the Chicago River Drainage Area is about 193 c.f.s. annual average. I applied the increase of 14 per cent to the square mile in the Chicago River Watershed that are sewered, giving us an increase of 63 c.f.s., or a total of 256 c.f.s. as 10436 of today, average annual. Sometimes the runoff would be up as high as 10,000 or 12,000 c.f.s., quick runoff depending on the intensity of the rainfall. I have made a calculation of the rain water runoff of the Little Calumet River that would be diverted to the Calumet Sag Channel under the program of the Sanitary District with reference to providing for complete purification of sewage in that region, and the discharge of the effluent and storm waters. The runoff in a state of nature under such conditions of the tributary Little Calumet River Watershed is 273 c.f.s. average yearly. Under present conditions such runoff would be 287 c.f.s.

Defendants' Exhibit 1397.

The pumpage of the Chicago Waterworks System in 1854 was .91 c.f.s. and increased yearly to 465 c.f.s. in 1899. The pumpage for the years 1900 to 1926, both inclusive, is shown by the Master's Original Report, pages 22-23. The pumpage for the years 1927, 1928 and 1929 was 1421, 1565 and 1625* c.f.s., respectively.

10491 *Cross Examination by Mr. Jackson.*

10497 The capacity of the Calumet Sag Channel is 2,000 second feet.

The capacity of the Wilmette Pumping Plant is 1,000
10498 second feet. The 39th Street Pumping Station was designed for a capacity of 2,000 c.f.s. lake water. Those pumps, however, have not been operated in some years. With the lake at zero and flood over the whole area, the capacity of the Main Channel above the Sag is 8,000 c.f.s.

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*NOTE: Domestic pumpage for Villages and Towns within Sanitary District not obtaining water supply through the Chicago Waterworks, about 6[illegible] c. f. s. additional.

10513 **Major R. W. Putnam,** for Defendants.

Direct Examination by Mr. Adcock.

Reside at Riverside, Illinois; am consulting engineer in connection with river and harbor and other maritime engineering works; was educated at the United States Military Academy at West Point, graduating into the Corps of Engineers. After two years instruction at the United States Army Engineers School at Washington, 10514 D. C., in river and harbor and other engineering works, I had military experience in the Corps of Engineers in this country and abroad, up to 1921, when I became United States District Engineer at Chicago, and so remained until 1926. From the summer of 1926, for the next year and a half, I was engaged by the Commercial Club of Chicago in a survey of the water transportation in the Chicago region, with a view to working out a plan for future terminal arrangements to take care of the growing traffic by water in this district. Since that time have been in private consulting practice in connection with harbor construction, intakes, dredging, harbor planning, etc. Have been in the Engineer Corps since 1913, when I graduated from the Military Academy. I was 10515 United States Engineer at Chicago when the permit of March 3, 1925, was issued. I made studies of navigation conditions at Chicago. I made a report for the Commercial Club with reference to harbor conditions.

If controlling works are located in the Drainage Canal or the Chicago River between the mouth of the Chicago River and some point in the Drainage Canal east of Crawford Avenue, I believe they can be so operated as not to 10516 hamper the interests of navigation materially. That storm water may be kept out of Lake Michigan providing there was a flow at other times towards the DesPlaines River through the Drainage Canal.

I am basing my conclusions on the present conditions of navigation, that is, between the mouth of the Chicago River and the Chicago Drainage Canal near Crawford Avenue, and also upon my views as to the future situation with respect to the development of water transportation on that branch of the group of waterways here as related to port development there or elsewhere.

10518 The question of transportation on the Chicago River or any portion thereof is complicated by the fact that it is a part of a system of harbors, canals, and rivers at the southern end of Lake Michigan, which can not be considered separately, or individually, in any problem such as transportation, but must be considered collectively when we wish to evalulate the effect of any such proposition as is contemplated in controlling works on commerce.

In the study prepared for the Commercial Club of Chicago, I considered the present and future navigation problem as it was affected by or would affect the lake front harbors in this vicinity, from Racine, Wisconsin, on the north, to Michigan City, Indiana, on the east, including the lake front harbors in between those points of which there are nine, Racine, Kenosha, Waukegan, Chicago, South Chicago, Indiana Harbor, Buffington, Gary and Michigan City.

Several of the harbors referred to are interconnected by rivers and canals, thus forming a complete system of port facilities, which, as I stated before, must be considered collectively in matters relating generally to navigation conditions in this vicinity, or specifically as to navigation on any portion thereof.

The Chicago harbor, for instance, is utilized by lake
10519 steamers carrying largely package freight and passengers. It is at the mouth of the Chicago river, which

has been improved by the United States Government, and is also used by lake steamers carrying freight and passengers, the navigation on the Chicago river being carried on by lake steamers carrying all classes of freight, and the Chicago river also being navigated, with its river and canal connections.

The Chicago river in turn leads into the Drainage Canal, which reaches to the navigable waters of the Des-Plaines and the upper Illinois.

South Chicago and Calumet Harbor are located at the southern limits of Chicago, within the city limits of Chicago, and are improved and maintained by the United States for the accommodation of ships serving the large industries located there, and actually is the more important harbor development in the Chicago region as measured in terms of tons, received and shipped, some 10 million to 15 million tons of commerce being shipped and received in that section.

The Calumet river for a distance of six miles has been improved by the United States, and at the end of this improvement we find the Forks of the Grand Calumet, or the junction of the Grand Calumet river with the Little Calumet river, both of which are considered navigable waters of the United States, the Grand Calumet 10520 river having been improved as far as the city of Hammond, some years ago.

The Little Calumet is now navigable in fact between the end of the Government improvement, some six miles inland, to Blue Island, where the Sag Canal is intersected, and with that Sag Canal we have connection with the Drainage Canal, forming a belt system of connecting waterways between the Chicago harbor and the Calumet harbor.

About six miles to the southeast of the Calumet harbor is the Federal improvement known as Indiana Harbor, an artificial port development, consisting of a breakwater, anchorage basin, and canal, serving large industries located on the banks of the canal, and at the mouth of the canal.

This development ranks second in importance of those in the Chicago region, and its commerce is rapidly growing.

The inner end of the Indiana Harbor canal has a connection with the Grand Calumet river, which, as I stated previously, also joins the Little Calumet river, and through the Little Calumet the interior system of belt canals previously referred to.

It is apparent that the system is quite complex, and yet very related and complete.

The published commercial statistics show that the 10521 combined water-borne commerce of the seven public harbors varies between 15 and 20 million tons annually, with a value of 300 million to 400 million dollars. The passenger traffic for these public harbors amounts to about 1,400,000 annually, and showing over a million passengers arriving and departing from the terminals in the city of Chicago.

Gary and Buffington are private harbor developments, and their commerce is composed largely of ore and limestone, and is of considerable importance so far as the tonnage movement is concerned.

In addition, there is an intra-belt movement on the Drainage Canal, and in the Chicago river, amounting to from 500,000 to 600,000 tons annually. This is composed of petroleum products from the Texas Refinery on the Drainage Canal, and shipped to different places on the Chicago river. It is composed of stone for building and material purposes, and some package trade that is lightered back and forth.

This commerce does not get to the lake front, but is confined to the Chicago river.

In round numbers, allowing for such divergence as might occur, the total freight—water-borne traffic in the Chicago region at the present time varies from about 20 million tons to 25 million tons annually, with a value of between $400,000,000 and $500,000,000.

10525 I would consider the port of Chicago as consisting of those navigable waters which are so connected physically and so inter-related commercially and industrially as to form a complete unit from a transportation point of view, water transportation point of view. To be specific, that would include Waukegan harbor, Chicago harbor, Chicago river and its branches, the Chicago Drainage Canal, the upper Desplaines river, the Sag Canal, the Calumet river and its branches, the Indiana Harbor canal and Indiana Harbor, Gary and Buffington Harbor.

The zone known as a unit for industrial and commercial transportation, is the Chicago metropolitan district, or the Chicago region. It includes Waukegan on the
10526 north, Joliet on the west and Gary on the east. These points are all connected by the Outer Belt Line and offer equal transportation from a rail point of view, which has its bearing on the question of water transportation. Within this area the switching rates are uniform.

10527 If all discharge to the DesPlaines River ceased now, a situation would be produced in the Chicago River and its branches, the mouth of the Chicago River, the waters of Lake Michigan adjacent thereto, the waters connected with the port in South Chicago, unfavorable and detrimental to navigation.

10528 In the first place, take the Chicago harbor. Most of the passenger traffic, all of the passenger traffic is handled by passenger boats either at the Municipal Pier on the lake front or the mouth of the Chicago River just east of the Michigan Boulevard bridge.

Passenger traffic on lake steamers out of Chicago is entirely or almost entirely of a recreational nature. That makes it peculiarly susceptible to unfavorable conditions such as rough weather, or under the assumption, unsanitary conditions, unsightly or unsavory situations in the water, and the pollution resulting from immediate shut-off of water into the Desplaines River would, in my estimation, be reflected in a very marked decrease in passenger transportation.

Now, these passenger transportation boats are also package freight carriers, and any effect on one portion of the business of the combination boat will be reflected
10529 in the total advantage of the boat operators and the operations involved, and in such way will unquestionably, in my mind, interfere with the package freight business.

Then, still assuming the present conditions, as I take it, we would have, in my estimation, effects which occur from pollution that would tend to increase the wages of those engaged in construction of harbor works, construction of piers, affecting labor and the wages of crews, tugs and harbor craft operating continuously in those waters.

I believe that the present shutting down of flow into the Desplaines River would result in sufficient sludge content to interfere seriously with the operation of vessels as regards their boilers and feed water systems and condensing equipment and so on, and might possibly
10530 result in serious conditions in the mechanical operations of the boats as a consequence thereof.

Assuming that by the year 1940, 1941, 1942 or 1945 all of the sewage waste within the limits of the Sanitary

District were treated to 85% purity, and that the 15% residual would be the same practically as raw sewage of a population representing 15% of the total population served by the treatment works, that the population of the Sanitary District with its industrial equivalent would be 6,500,000, that the effluent from these sewage purification works would flow into the lake at all times, together with storm flow and raw sewage that might be discharged from the sewers during storms, I think we would have the same adverse effects as far as naviga-
10531 tion is concerned, including oil pollution in addition. By oil pollution I refer to the quantities of oil in the Chicago River resulting from leakage from oil-burning boats, Diesel engine boats and tank barges and every possible source, which would create a fire hazard of considerable importance. The effect would be along the lines I have mentioned with respect to stopping the flow at the present time. In other words, briefly, the nuisance factor would affect passenger transportation and the wages of operators of boats, labor engaged in har-
10532 bor works, and so on.

A flow of less than 4,000 second feet in the river and Drainage Canal to the DesPlaines will affect adversely the future coal movement in these waterways. The consumption of coal by the plants of the Commonwealth Edison Company, being the principal user of coal, is entirely dependent upon their size, which in turn is limited by the amount of water in the Chicago River available for condensing purposes.

10535 There is only pleasure craft now that would be shut off from passing from the Chicago River to the Sanitary Canal into the DesPlaines River if there were no discharge to the DesPlaines River. There would be no means of getting the pleasure craft into the DesPlaines

without water. Each time that you lock a boat through, it would take that amount of water out. That would not be enough to change the flow back from the lake.
10536 As far as present navigation is concerned, on the present Illinois River, the low water flow is ample for lock-
10537 age. The depths would be sufficient with the discharge
10538 to the DesPlaines cut off. There would be insuffcient depths in the Illinois River below Utica with the diversion cut off, that is, for flotation of the navigation now
10539 operating. The natural low water flow is somewhat in the neighborhood of 400 second feet or thereabouts. That spread over the bottom of the bed of the river does not give a depth of 6 feet or more which the present
10540 boats require. The present commerce on the Illinois River below Utica consists of pleasure commerce, pleasure boats, and also boats using that river for commercial purposes.

10542 *Cross Examination by Mr. Jackson.*

The Chicago and Calumet Harbors are connected through the Chicago River, Chicago Drainage Canal, Sag Canal, the Little Calumet River and the Calumet River. A small vessel would not go around by the lake. A large
10543 one would. You would have to have pretty nearly a row-boat to go around the other way.

The following from page 40 of Complainants' Exhibit 18, Document Number 469, is a correct statement:

> "There are 12 movable bridges over this improved part of the Calumet River. The narrowest bridge draw is 60½ feet in width, and as there are five draws narrower than 90 feet in width barge floats could not operate to advantage except in single column. In view of the existence of fixed bridges with available head room of 16½ feet over the Sag channel neither river towboats nor standard channel cargo barges of the Mississippi River type could get

into the Calumet River, except by way of the Chicago River and Lake Michigan, so that their use is practically out of the question now."

10544 and that statement is true so far as the standard general cargo barges of the Mississippi River type and towboats are concerned.

In 1927 there was no commerce between the Calumet Harbor and the Chicago River by way of the Calumet Sag Channel. That is true of 1928.

Indiana Harbor is interconnected with the Chicago and Calumet Harbors by way of the Indiana Harbor Canal to the Grand Calumet River. The westerly part of the Indiana Harbor Canal has been turned back by the Gov-
10546 ernment and its improvements abandoned. I have described all of the harbors which are physically interconnected by interior waterways, and there is no commerce between them.

Chicago sewage has no appreciable effect upon navigation of the harbor at Gary, Indiana. The same is true of the harbors of Buffington, Indiana Harbor and Waukegan so far as involves the waters, but not the ships. This sewage affects the commerce between those ports and the Chicago River but not the waters in the
10547 harbors mentioned. There is no commerce between Gary and Chicago River at present, and consequently there is no effect upon present commerce. The difference in the relationship so far as water navigation is concerned between Chicago and Waukegan and the relationship between Waukegan, Racine and Kenosha, is a matter of railroad service as connected with the port operation. The relations between the ports are affected
10548 by sewage in the Chicago River. There is lake commerce movement between Waukegan and Chicago, such as package freight and passengers; probably 20,000 and 30,000 tons per year of package freight. Sewage in the

Chicago River affects the operation of boats on those
10549 waters, regardless of where they come from or where they go. About 2½ million tons a year of the commerce from Waukegan to Gary in all of these ports is carried on the Chicago River. I have a definite recollection as to this up to 1926. My approximation was based on a recollection of a 5-year period. In this 2½ million tons of freight I am including traffic that comes to the lake front but does not enter the river. I have not the figure for the river itself for that is not reported separately.

I know of no case of any disease contracted by a boat passenger or employee from navigating water contain-
10550 ing sewage plant effuent. I don't know that the wages
10551 of seamen or other persons are higher on "Bubbly Creek" than elsewhere. The wages of dock hands at the Municipal Pier are not less than those on the river.

I would not say that the traffic on the Chicago River steadily and sharply declined from the date of the opening of the Drainage Canal for many years, substantially in the same ratio as the quantity of water taken from the
10552 lake increased. The traffic did not decline for several years after the Drainage Canal was opened, when there was some other cause which brought that about. Not to my knowledge has the enticing condition of the Chicago River been a controlling factor in the amount of navigation on the river from 1890 to date. I think it would be a factor in the future.

I understand that sewage at Milwaukee was formerly all discharged untreated into the river there, and that in the last year or two it was carried at normal times to
10553 a sewage disposal plant. The wages of the river men at Milwaukee have not decreased since that time. I did not find that there was a marked increase in navigation and traffic in the Milwaukee River after sewage was

taken out of it. I did not investigate the phase of the question as to whether there was trouble to vessels navigating the Port of Milwaukee due to the discharge of the effuent all in one spot at Jones Islands at the Milwaukee Harbor entrance. It might have given me broader information.

There is some pleasure boat traffic down at Utica. The condition of the river at Utica has been bad, from a pollution standpoint. The pleasure boating, such as
10554 there is, at Utica, is entirely through traffic. There is no other way for these pleasure boats to go from Lake Michigan to the Mississippi except by way of these polluted waterways. Therefore it is a case of necessity, so far as they are concerned.

10555 I have not figured at all any length in the neighborhood of the mouth of the Chicago River to which the present or future pollution would extend, but I don't think there is much doubt but that the question of length is entirely one which would show that the distance in the Illinois River would be longer than the distance of the pollution in the mouth of the Chicago River. I do not think the reduction of 2,000 c. f. s. diversion would
10556 have any effect on navigation on the Chicago River. I don't think the reduction of 3,000 c. f. s. would have much effect. I will qualify that statement, however, by an exception as regards storm flow.

The following statement from Complainants' Exhibit
10557 18, page 21, is correct:

> "As far as the requirements of navigation are concerned, no additional flow is necessary from Lake Michigan during flood stages on the Illinois River other than required for lockages at Lockport, and not any is necessary during the winter months when the season is closed to navigation."

That statement applies, of course, to the Illinois River.

The following statement from page 37, Complainants' Exhibit 1, November 1, 1923, is correct:

> "There has been practically no current in the river * * * in its original condition. As a result, navigation was comparatively simple where ample depth and width of channel existed. The introduction of current in the river by the Sanitary District has been a distinct disadvantage. While current may not exceed one and one half miles per hour, there are places and times where currents of three and four miles an hour have been observed.
>
> "Sometimes a large vessel gets caught in one side of the draw of a swing bridge, and becomes un-
> 10558 manageable as a result of the current. Vessels have been known to collide with each other or with the fenders of bridges or dock walls. For the same reason there is a damage of an indefinite valuation which is directly chargeable against the Sanitary District."

The following statement from Complainants' Exhibit 1, pages 59 and 60, is correct:

> "As far as the navigation of the Chicago River and the Drainage Canal is concerned, if the flow at Lockport were entirely throttled, and the powerhouse gates closed, so as to permit no diversion from Lake Michigan, conditions would be decidedly improved. The current which now averages one and a half miles per hour in some bridge draws is as high as four, and would be practically eliminated, making navigation therefore simpler, and especially for the larger vessels, whose passage through a narrow drawbridge is apt to increase the current materially."

There was no Federal project for navigation between
10559 LaSalle and Utica up to 1927. I don't know whether work has actually been done or not on that stretch. The work has been authorized.

10560 The pleasure boat traffic at Utica would be subject to a degree of pollution. I think a layman would be able to detect it. Pollution would discourage that traffic,

which would be reflected in an actual decrease. If the diversion were reduced the depths would be less at Utica but not sufficiently less to affect pleasure boats. I am referring to the reduction of 2,000 second feet in diversion that is, from 8500 to 6500 second feet. The reduction of 2,000 second feet would not affect the traffic right at Utica, because it utilizes the Illinois and Michigan Canal; but if you are referring to the traffic going by Utica, the effect of such a reduction would be in the lessening of depth in the Illinois River after you leave the Illinois and Michigan Canal. 4½ feet is the present depth of water in the Illinois and Michigan Canal. That has not obtained con-
10562 tinuously for the last five years. The reduction of 2,000 second feet in the present diversion would have a tendency to decrease the passenger boat traffic at Utica. I don't know whether there was less tarffic in 1925 and 1926 when the total flow at Lockport was 8250 c.f.s. than there was this last year. When you say I haven't anything to base my opinion on, I state that I have, as a person who has actually navigated this water in pleasure boat craft, and I have had my own personal reaction in reference to that. I navigated these waters in
10563 1923. A reduction of 2,000 c.f.s. would put the conditions back to what they were in 1923, 1924 and 1925, when diversions were lower than they are now.

The lock at Lockport has been operated for yachts-
10564 men, pleasure boat people, who desired to make the through trip. I don't know how many times it was operated. I would say not over 100 or 200 times a year. I doubt whether there were that many. These are gasoline launches. The draft was not six feet. A 6-foot launch could not get through there.

I know of eight operations of oil burning boats worthy of mention, operated on the Chicago River. The boats as I remember them are—Carson, Pirie, Scott operates

10565 a Diesel tug; constant daily service. Great Lakes Dredge & Dock operates three or possibly four Diesel tugs, large size. The United States Government operates three or four vessels burning oil. The construction Materials Company has a large Diesel electric barge in operation. The Manitowoc Portland Cement Company has a Diesel-driven cement boat making regular stops at this port, and there is a boat just launched that will be down here shortly that will also ply these waters, utilizing Diesel engines.

The following harbors on the Great Lakes are free from any sewage or sewage effluent in the navigating channels: Duluth, Superior, Ashland, Wisconsin, and Manitowoc, Wisconsin, Calcide, Michigan, possibly Fairport, Ohio. These can be classed as comparatively free
10566 from pollution. I don't say that the City of Manitowoc does not discharge into the river, but I do say that the pollution there is small. I am speaking in a comparative sense. The river is large enough to take
10567 good sized vessels. The river at Manitowoc has been improved. The level of these artificially improved rivers or harbors depends on the level of the lake. I don't know of any major harbor where the sewage is not discharged into the river or harbor. It is not my opinion that if that condition had not obtained, navigation and total commerce on the Great Lakes would be greater than it is now. Sewage of Duluth and Superior goes into the harbor, but the situation is comparatively insignificant. The population of Duluth and Superior is around 125,000. I don't know just what the flow of the St. Louis River is. I would not say it was very large. I am not familiar with the currents in that body of water. It is pretty extensive and has two entrances and is a rather complicated situation.

Redirect Examination by Mr. Adcock.

10569 In referring to the effect of pollution of navigable waters by sewage or other wastes, and the effect upon wages of that condition, I had reference to what I consider as rather a difficult situation in Chicago, as concerns the operation of vessels. Seamen are very thoroughly organized and quite alert to take advantage of conditions which will tend to better their pleas or demands for increased wages. If we decrease the attractiveness of the work, making the men work under comparatively offensive conditions, this would be reflected in the increase in wages or in a decrease in the class of personnel involved, either of which reflects into the cost
10570 of operation of vessels. Reducing hazards of navigation upon the lake has an effect upon the wages of seamen. It affects the attractiveness and would affect the class of personnel or the wages, in my estimation.

The removal of pollution of navigable waters, so far as possible, whether they are here at Chicago or at Cleveland or at other places, would create better conditions. Likewise, the building or placing of lighthouses or buoys at points on the lake, helps navigation and reduces the hazard. Yet it would be difficult to evaluate exactly how much the installation and operation of a particular lighthouse or buoy would affect navigation.

As United States Engineer at Chicago, I had occasion to enforce Section 13 of the Rivers and Harbors Act of
10571 1899 with reference to the placing of refuse in navigable waters. As United States Engineer at Chicago in 1925 or so, I had occasion to make a report under a resolution or act of Congress of 1924 with reference to pollution of navigable waters,

If there were reduction in diversion here at Chicago, the pollution of the Chicago River and Branches and

Canal and lower rivers would be greater. To that extent
it would have an effect upon navigation. I didn't have
10572 in mind any large reduction in the diversion before
the controlling works were completed and in operation.
A reduction in the flow between 2,000 and 3,000 second
feet might bring about conditions making the installation
of controlling works desirable so far as navigation
is concerned, and to that I am only referring, as I have
in mind the effect of storm flow. I am not taking into
consideration the question of public health.

10573 With reference to the quotation from pages 59 and
60, Complainants' Exhibit 1, I was referring to the case
of maneuverability of ships. I did not refer to the question
of pollution or nuisance conditions as affecting navigation.
I was referring also in Complainants' Exhibit
1, page 37, to the current which was created by the diversion.

The paragraph quoted by Mr. Jackson on cross examination
is a part of a whole page of discussion in that
10574 report of effects of changes of the Sanitary District
on navigation conditions in the Chicago River. The
10575 paragraph immediately below that one starts out "The
Sanitary District has improved conditions on the river."

The upper ends, or lower ends, whichever way you want
to put it, the extreme ends of the south fork were in process
of being filled up while I was District Engineer. Bubbly
Creek was at the west end of the south fork, or was
part of the west arm of the south fork. I was never in
10576 Chicago when Bubbly Creek was in full operation, and
never experienced any smell from it.

The waters of the lake along the shore at Chicago are used for various purposes by boats and craft of different kinds navigating them. There are many pleasure craft, yachts and launches plying about those waters from one yacht harbor or launch harbor to another, and from one port to another. The United States Government has a life saving station at the mouth of the Chicago Harbor, a lighthouse depot there and an engineer depot.

The Little Calumet River dredging was finished within the last year or so. Prior to that time no boats of any
10577 particular draft could pass through it. Both as regards draft and width, boats having 12 feet draft may pass through the Little Calumet. They have had headroom to a limited extent. Clearance of bridges over the Calumet Sag Channel is 16½ feet, which is as great a clearance as exists in bridges over the Chicago River, which clearance we generally call the legal clearance in Chicago. There are quite a number of boats which pass along the Chicago River without the necessity of having the bridges raised or moved. There are many boats that may now pass along the Calumet Sag Channel or the Chicago River and its branches, and navigate without interference from bridge clearances. Boats may be
10578 designed for that purpose. There is a boat being completed right now that will be operating through that this coming year. Many industries are located along the canal and the different branches of the Chicago River that require water transportation.

Re-cross Examination by Mr. Jackson.

I do not thing the hazard to seamen in navigating the Chicago River since the opening of the Drainage Canal has been greater by danger of currents pushing them on bridge piers, than by the possibility of being overcome by offensive smell. We had complaints in regard to occasional brushing against bridges or knocking into a bridge fender, or something of that character. It was the difficulty of navigating in that current. I never have known
10579 a seaman inquiring whether there was sewage dis-

charged in the harbors between which the vessels were going to ply on which he applied for employment.

Defendants, Exhibit 1399.

Be It Ordained by the Board of Trustees of the Sanitary District of Chicago as Follows:

Section 1. The Sanitary District of Chicago does hereby offer and agree to pay its share of the cost of regulating or compensating works to restore the levels or compensate for the lowering of the Great Lakes System of Waterways if and when constructed, due to any diversion of water from Lake Michigan By The Sanitary District of Chicago which may now or hereafter be determined by competent authority.

Section 2. The Sanitary District of Chicago hereby offers and agrees to furnish a guarantee that it will pay its share of the cost of performing the work specified in Section 1 of this ordinance, in such form and in such amount, and under such terms and conditions as the Supreme Court of the United States may determine.

Passed Mch. 15, 1929.

Defendants' Exhibit 1400, being paragraph 74 of the Cities and Villages Act of Illinois:

10585

Defendants' Exhibit 1400.

"The City or Village Government shall have jurisdiction upon all waters within or bordering on the same, to the extent of three miles beyond the limits of a city or village, but not to exceed the limits of the state."

The following is a condensation of the testimony and evidence offered by complainants on re-reference so far as deemed necessary to supplement the statement of complainants' program and evidence in the Master's report on re-reference and so far as deemed necessary to a consideration of the exceptions filed by both parties:

Washington, D. C., Monday April 15, 1929.

L. R. Howson, recalled for Complainants:

Sanitary engineering expert. Testified in prior 1927 hearings.

10648 From a study and consideration of the Chicago sewage disposal and water supply problems, I have arrived at a conclusion as to what would be a practical program for the disposal of the sewage of the Sanitary District by means other than lake diversion in a manner which would
10649 not be detrimental to the Chicago water supply.

(Details of Complainants' program are stated in Master's Report, 18-20.)

10656 This program does not contemplate any flow at Lockport after its completion. The completion of this program, with no flow at Lockport, would provide a practicable method for the disposal of the sewage of the Sanitary District by means other than lake diversion without detriment to the Chicago water supply. There are modifications or additions to this program which would
10657 be practical, particularly with reference to the water supply. It would be practicable to abandon the intakes that are close to the mouth of the river and move those to a more remote location; or it would be possible to even stop the use of all four of the present intakes and build one large intake at a remote location, if that were thought desirable somewhat along the lines of what was termed

a super-intake in testimony presented here before. That would be a very material improvement over the present standard of the existing water supply for Chicago. Such an addition as a new water intake or super-intake is not necessary to prevent detriment to the present water sup-
10658 ply. It would be practical to construct such a new intake if the city of Chicago desired to do so.

I have made estimates of the reduction of the quantity of diversion which would be practical from time to time during the course of carrying out of this program for substitution of another means of sewage disposal without lake diversion, which I have outlined. There could be a reduction in the diversion as of December 31, 1929, to 6500 c. f. s. plus the domestic pumpage, which would be a reduction of the present 8,500 c. f. s. direct diversion to 6,500 c. f. s.

10659 I believe there could be no further reduction in the flow until complete treatment is in effect on December 31, 1935, unless control works are installed as a part of the program, or unless hydraulic testimony should establish that a lower flow than 6,500 c. f. s. would prevent reversals of the Chicago River which is the critical thing prior to the completion of the program. The diversion can be reduced in proportion to the organic load removed, up to the point to where reversals can be controlled by the facilities available at Lockport or through new works.

Assuming that the reversals are controlled either at Lockport or by new controlling works subsequently to December 31, 1929, the diversion could be reduced to 5,000 c. f. s. plus pumpage on December 31, 1932 and to 3,000
10660 c. f. s. plus pumpage on December 31, 1933. All of the preceding figures are in addition to pumpage. On December 31, 1935, when the program which I have outlined will be completed, the entire flow at Lockport can be cut off.

In reaching my conclusions that with the completion of the program which I have outlined, it will be practical to terminate the flow at Lockport, I considered the effect both upon the public health and navigation in the Chicago River as part of the Great Lakes-St. Lawrence system. The completion of this program will produce a situation which will be satisfactory from both viewpoints.

Assuming the completion of the program that I have outlined and as summarized in Exhibit 238, and no flow at Lockport, there would not be any visible or visual suspended particles recognizable as of sewage origin in
10663 the Chicago River coming from the sewage treatment plants. The conditions which would then obtain would be greatly superior in that respect to the conditions now obtaining in the Chicago River.

Assuming the completion of the program outlined by me and summarized on Exhibit 238, with no flow at Lockport, there would not be any odors arising from the waters of the Chicago River due to the putrefaction of the organic matter contained in the sewage effluent.

Assuming completion of the program outlined by me and summarized on Exhibit 238, with no flow at Lockport, there would not be any grease, oil or sewage material on the surface of the Chicago River due to the flow from the sewage treatment plants. In that respect the conditions in the Chicago River would be materially improved
10664 over the conditions now obtained.

Assuming the completion of the program which I have outlined and summarized on Exhibit 238, the waters of the Chicago River would not be offensive or injurious to the health of passengers or persons employed on vessels or persons working on the docks.

Assuming the completion of the program which I have outlined and summarized on Exhibit 238, with no flow at Lockport, the condition of the waters of the Chicago

River would not be such as to result in an excessive growth of water plants. The growth of water plants can be practically controlled where waters do produce them. If they should appear, they can be controlled.

About 3 parts per million of dissolved oxygen are required to maintain a thriving fish life. A standard for water which requires conditions that will permit the maintenance of a thriving fish life and one which requires the absence of nuisance are not at all the same. The fish life 10665 is a much higher standard. A standard which requires the maintenance of a thriving fish life is not one which is ordinarily adopted or accepted to satisfy health requirements or to prevent interference with navigation.

Assuming the completion of the program outlined by me and summarized in Exhibit 238, with no flow at Lockport, there is a practical method of providing circulating water in the Chicago River and its branches if it were so desired. Circulating water can be introduced into the existing channels through the Wilmette station, which is at the north end of the North Shore channel, and where about 1,000 cubic feet per second capacity is now available; it can be introduced through the 39th Street Station, or can be introduced by building a new circulation station on the Calumet Sag. By building that station water could be circulated through the Calumet Sag, the Drainage Canal and out through the mouth of the Chicago River.

10666 It would be possible to provide for the discharge of the effluent of the West Side and Southwest Side plants at a point in the South Branch between the 39th Street pumping station and the mouth of the Chicago River. That would involve the construction of a tunnel to carry the effluents of the West and Southwest Side plants from the plant locations near 52nd Avenue and the Drainage Canal, up the canal to a point between the 39th Street Station outlet and the Lake.

If circulating water were pumped at the rate of 1,000 second feet at Wilmette and 2,000 second feet at 39th Street, and 2,000 through the Calumet Sag, and this program were completed, the resulting conditions would support fish life. There has not been any fish life in the Chi-
10667 cago River, Drainage Canal or upper Illinois for a great many years other than right at the mouth of the Chicago River where Lake fish may come in. There have been none in the Drainage Canal or Upper Illinois River in general for approximately 100 miles.

The effluent of a modern activated sludge plant is stable, odorless and clear. The effluent of a modern activated sludge plant discharged into an open channel, without dilution, will remain stable indefinitely. There is a variation in this program which I have outlined and summarized on Exhibit 238, which would prevent the discharge of the effluent of the sewage treatment plants into the Chicago River or its branches. It is possible to build an outlet tunnel direct from the North Side plant to the Lake, and similarly one from the West and Southwest Side plants to the Lake and thus divert those effluents
10668 from the River. This diversion through tunnels would entirely remove all of the effluents from the Chicago River and its branches. It would be practical to construct outfall sewers which would accomplish that purpose, but I think it wholly unnecessary. I mean that I could phys-
10669 ically do it if I set out to do it. I did not mean that it was practicable in the sense that I would recommend doing it as an available means for the city in disposing of its sewage at this time.

Assuming a mean annual flow of 1,000 c. f. s. at Lock-
10670 port for navigation purposes, the completion of the program, outlined by me and summarized on Exhibit 238, would provide a practical method for the disposal of the sewage of the Sanitary District of Chicago without det-

riment to the Chicago water supply and without creating any nuisance to navigation in the Chicago and Illinois Rivers.

Assuming a diversion or flow of lockage water, not exceeding a mean annual average of 1,000 c. f. s. at Lockport, the completion of this program would still provide a practical method for disposal of the sewage at Chicago from the standpoint of the interests of navigation and of public health.

Assuming that there were provided a mean annual flow of 1,000 c. f. s. at Lockport for navigation purposes, that would not require any modification of the program summarized in Exhibit 238, other than the final flow on its completion. It would not affect the estimates of time required for completion or the reductions in the quantity of diversion which would be practical during the course of such construction. The only effect would be that the final flow would be 1,000 c. f. s. instead of zero at Lockport.

10672 If the Chicago water supply were completely metered, the quantity of the sewage effluent of the Sanitary District would be approximately 1,000 c. f. s. in 1935.

Assuming the completion of the program outlined by me and the installation and operation of control gates so as to divert all storm water overflow, but with no diversion or flow other than at times of storm such a program would practically provide for the disposal of the sewage of the Sanitary District of Chicago without detriment to the water supply or the navigation of the Chicago River as a part of the Great Lakes-St. Lawrence system from a nuisance standpoint.

0673 Assuming the completion of the sewage disposal program which was outlined by the Sanitary District engineers at the Chicago hearing, which contemplates the diversion of the effluents of the sewage disposal plants and the diversion of all storm water overflow into the Des Plaines and Illinois Rivers, it would not be necessary to add any quantity of diluting water from the Lake to protect the public health or to prevent a nuisance to navigation in the Chicago River as part of the Great Lakes-St. Lawrence system.

Assuming the completion of the program that was outlined by the Sanitary District engineers at the Chicago hearing in March, the installation of locks or control gates at the mouth of the Chicago River and also at the mouth of the Calumet River so as to separate the Lake from the drainage basins to which the Chicago sewage and effluent is tributary and so as to provide for the diversion of the domestic pumpage and storm water overflow without any diluting water from the Lake, the resulting conditions would safeguard the public health and prevent any nuisance to navigation in the Chicago River or in the lower river. 10674

Assuming the completion of the program outlined by the Sanitary District engineers of Chicago, but with no diluting water added from the Lake, a condition of nuisance would not develop in the Drainage Canal or in the lower rivers from the sewage effluent or the storm water overflows.

Cross-Examination by Mr. Adcock.

I am familiar with the proposed intercepting sewer systems and treatment plants of the Sanitary District and know that the Chicago sewers are a combined system. When there is a storm flow greater than the sewage capacity of the treatment plants, the treatment plants would be unable to take more than a part of that flow. The balance of the flow would be overflowed into the channels of the Chicago River system either at the various sewer outlets along the line of the interceptor or at the prelimi-

nary plant, depending upon the extent to which the flow
11280 is intercepted by the main interceptors. Assuming that there was more flow than the plant could handle, the point of discharge of the surplus still depends upon the capacity of both the plant and the interceptors. The plant as a whole cannot handle the capacity of an interceptor but there are parts of the plant that can handle it or be made to so handle it. When the interceptor fills up and overflows, the excess over the capacity of the interceptor goes into the River.

Examination by Special Master.

I was one of the firm of engineers who gave the War Department the information with regard to the conditions on the Chicago River and what could be done to improve it. My firm is the one to which General Jadwin referred.

What purported to be a copy of this report bearing the legend "Bulletin 23, Disposal of the Sewage of the Sanitary District of Chicago, a report to the District Engineer, U. S. Engineering Office, Chicago, by Alvord, Burdick & Howson, Engineers" was marked "Master's Exhibit B" in evidence.

11285 I am familiar with this report. I worked on it continuously and a large part of it is my own dictation. Statements in the report so far as they are matters of fact are correct, and so far as they are matters of opinion, I believe they are sound.

Redirect Examination.

In "Master's Exhibit B" there is set up the standard of water which will support a thriving fish life. That is a standard which was given me by the War Department.
11286 The total capacity of the intercepting sewers as designed in the Sanitary District is about 4,000 c. f. s. That

would mean that a rainfall run-off of that quantity could
11287 be carried to the treatment works. On direct testimony I answered no direct question as to the amount that could be intercepted, but upon inquiry from the Master as to what variations in the program might be suggested, I stated that I would suggest, as a modification, the interception of a larger proportion of the storm flow than 150 per cent allowed in the Sanitary District estimates. I believe that the preliminary treatment ought to be given up to the capacity of the sewers.

SPECIAL MASTER'S EXHIBIT B—REPORT OF ALVORD, BURDICK & HOWSON, CONSULTING ENGINEERS, TO UNITED STATES DISTRICT ENGINEER AT CHICAGO, DATED APRIL 16, 1925.

The following are extracts from said report:

Pages 1-11:

"Part I.

INTRODUCTION, SUMMARY, AND CONCLUSIONS.

District Engineer,
U. S. Engineer Office,
337 S. Dearborn St.,
Chicago, Ill.

DEAR SIR:

Proceeding under our instructions of January 16, 1925, we have studied the problem of sewage disposal for the City of Chicago and vicinity, including more particularly that territory embraced within the Sanitary District of Chicago.

Our study has been particularly directed to answers for the following questions:

(a) Determination of a pollution standard for the Chicago Drainage Canal for each of the following average diversions from Lake Michigan;—2,000, 4,167, 6,000, 7,500, 8,500 and 10,000 cubic feet per second; this standard to be the lowest that will prevent the occurrence of nuisance in the Des Plaines and the Illinois River, and will permit a thriving fish life therein.

These diversions include the sewage flow of the Sanitary District; and they therefore represent the dry weather flow of the Drainage Canal at Lockport, approximately.

(b) Determination of the extent to which purification measures must be taken by the Sanitary District of Chicago for each of the flows specified above, in order that the pollution standard be maintained unimpaired.

(c) Determination of the most feasible method of treating the surplus pollution, and, for each flow specified, the cost of the necessary works and the operating costs thereof.

(d) The determination of the time that reasonably would be required to build the necessary works and place them in operation for each of the flows specified.

In the study of this matter the time at our disposal has not permitted original investigations. It has been possible only to view the present situation by inspection, and to study the large amount of data that has been accumulated by the Sanitary District of Chicago and other agencies, bearing directly upon the answers to the above questions. We have further brought to bear upon the study of the problem the experience of other cities regarding sewage disposal, insofar as information has been gained that would throw light upon the Chicago situation.

Upon the pages which follow we have stated the local problem in some detail, and we have discussed the various phases of it insofar as we believe is required for a general understanding of the problem, and our answers to the questions previously stated. For the benefit of those already somewhat familiar with this problem we will first briefly state our summarized findings and conclusions. We will follow this statement by a more detailed consideration of the problem, and a further statement of the conditions and the reasons leading to the conclusions stated.

SUMMARIZED CONCLUSIONS.

1st. *Present Disposal*:

The diversion of the Chicago sewage from Lake Michigan, resulting from the Drainage Canal and other causes, has effected a remarkable improvement in the death rate from water borne diseases. The sewage nuisance in the streams of the Chicago district has been reduced to a large extent.

This result has been accomplished, however, by transferring the bad conditions in Chicago to the Des Plaines and Illinois Rivers in which a crying nuisance has been created for more than one hundred miles; and by diverting large amounts of water from the Great Lakes, over strenuous objections from property owners claiming a right to the water diverted.

It is generally conceded that the present conditions should not be allowed to continue. The Sanitary District is already engaged upon remedial measures through which a large part of the sewage will be treated before discharge into the Drainage Canal.

2nd. *Population and Growth*:

In planning works for sewage disposal, it is necessary to consider the future population of the locality. It is not financially practicable to make expenditures now for a problematical future. It is necessary, however, to determine the future populations approximately and to adopt works capable of construction in units that may be increased in capacity from time to time as occasion requires, without destroying previous expenditures. Thus each dollar expended will provide a link in a complete chain of sewage disposal works.

We have examined the forecast of population as estimated by the Sanitary District of Chicago, and we believe it represents future probabilities as accurately as required for the above purpose. This estimate covering the population of the Sanitary district is as follows:

1920 census,	2,978,635
1930	3,710,000
1940	4,425,000
1950	5,140,000
1960	5,850,000
1970	6,580,000

In addition to the population in the Sanitary District, there is now (1925) a population of 180,000 in the northern Indiana cities bordering the lake and draining through the Calumet River. Under ordinary low flow conditions this drainage passes through the Sag Channel to the Main Drainage Channel and thus into the Illinois River.

The Sanitary District includes about eighty-five per cent of the total population in the greater Chicago region which includes Cook, Kane, DuPage, Lake and Will Counties in Ilinois, and Lake County in Indiana. The greater part of the outlying population has more or less effect upon the pollution of the lake and the nearby streams.

3rd. *Amount and Character of Sewage*:

The present discharge of the sewers within the Sanitary District is about 800 million gallons per day. This is equivalent to a river 100 feet wide and five feet deep flowing one and one-half miles per hour.

This sewage carries an organic load per capita greater than any other large city for which accurate figures have been available to us. This excessive load is partly due to a few great industries which produce an amount of pollution estimated by the Sanitary District to be the equivalent of about 1,500,000 people (1920).

4th. *Standard for Pollution*:

In the consideration of sewage treatment works that will be required under various drafts of dilution water from Lake Michigan, it has been necessary to fix a standard of maximum pollution for the Chicago Drainage Canal in order that reasonable sanitary conditions may be maintained in the Des Plaines and Illinois Rivers. We suggest the following as a reasonable standard:

> The liquid discharged by the Drainage Canal, as evidenced by the average of representative samples taken for any thirty consecutive days shall,
>
> (a) Be practically free from settleable solids deposited in two hours, and,
>
> (b) Shall contain dissolved oxygen equal to

or exceeding the biochemical oxygen demand of said liquid for five days when incubated at 20 degrees C.

(c) Shall contain not less than three parts per million or dissolved oxygen.

The treatment works hereinafter outlined in connection with specified dilutions from the lake will meet this standard in our opinion.

5th. *Protection of the Water Supply*:

Even under the heavy diversions from Lake Michigan in recent years and the generally favorable typhoid death rate, the quality of the water supply for Chicago has been far from satisfactory. This is due to the incidental pollution of the lake, periodic discharges from the Chicago and Calumet Rivers and other causes. Occasionally sporadic typhoid outbreaks have occurred attributable to the water. Safety is only secured by heavy dosages of liquid chlorine which are extremely objectionable to many people and which the Chicago authorities regard as closely approaching the maximum dosage tolerable.

Compared to the usual standards applicable to clean water, the water is dirty most of the time, and it is quite turbid more than ten per cent of the time. Even when comparatively clear it often contains microscopic animal organisms no doubt harmless, but very objectionable to many people.

The filtration of drinking water has been extensively practiced for more than twenty years. More than twenty million people are thus supplied in the United States. Many filtration plants handle a water polluted to a greater degree than Lake Michigan water would be under any diversions for dilution purposes considered in this report.

Chicago can secure pure clean water at all times by the filtration of its present supply. We regard this as the only means by which a satisfactory supply of water may be obtained, regardless of any practicable measures for sewage treatment or lake water diversions for dilution.

Filtration is considered as a pre-requisite to the adequate disposal of sewage in all projects considered in this report.

6th. *Metering of the Water Supply*:

At the present time ninety per cent of all water services in Chicago are served through so-called "flat rates." The pumpage of water is excessive, pressures are deficient, fire protection service is jeopardized and the costs of water supply, intercepting sewers and sewage disposal are greatly increased over what would be necessary if water waste were restricted.

Universal metering of the water services is urgent. Metering alone will

(a) Double the average pressure within the City of Chicago.

(b) Furnish *all* adequate water service where but twenty-five percent now enjoy it.

(c) Enable the present water service works with but minor extensions to serve the City for the next generation.

(d) Through the immense savings effected in deferred construction costs enable the City to install filtration works.

If universal metering of the Chicago Water Works is accomplished within the next ten years savings of from $200,000,000 to $225,000,000 will be effected prior to 1945. This amount is so great that in addition to financing the installation of meters and filtration works for the entire city, it would cover the cost of constructing the entire intercepting sewer and sewage disposal works required in the Chicago Sanitary District up to 1945 and leave a large surplus in addition.

The costs of sewage disposal are also influenced by the waste of water. If universal metering of the water works services is not undertaken, the estimated costs of the interceptors and sewage treatment works outlined in this report must be increased by an amount of from $42,000,000 to $53,000,000 depending upon the flow available for dilution and the types of plants required thereby.

7th. *Volume of Sewage*:

The total quantity of sewage to be treated in the Chicago District may be taken as approximately equal to the total water supply. This assumes that infiltration into the sewers will be offset by that part of the water supply used for sprinkling and other purposes which do not contribute to the sewage flow.

At the present time, due to water waste, the pumpage of water in the Chicago District is excessive. The dry weather flow of sewage is correspondingly much larger than it would be if the waste of water were curtailed.

The total volume of sewage under metered and unmetered conditions has been estimated based upon the assumption that a ten year period beginning in 1925 and terminating in 1935 will be required to install meters on all water services in the City of Chicago, and that when all services are metered the sewage per capita, including industrial and all other uses, will be approximately 160 gallons per day.

Under these assumptions the following table shows the estimated quantities for each five year period from 1925 to 1945.

Million Gallons Sewage Daily.

Year	Present Conditions of Metering	Universal Metering	
1925	877	....	
1930	1,054	777	(50% metered)
1935	1,243	662	
1940	1,437	711	
1945	1,629	769	

The installation of meters on all services will cause the sewage flow of 1945 under complete metering to be less than at the present time, when but ten percent of the services are metered.

8th. *Intercepting Sewers:*

The Sanitary District has adopted tunnels for its intercepting sewers. This appears to be a logical conclusion in view of congestion on the ground surface.

Intercepting sewers have been built or are under construction for all areas except the West Side and the Southwest Side. The intercepting sewers to serve these two areas will in general extend along both sides of the main channel and the north and south branches of the Chicago River beginning with Fullerton Avenue on the North Side and extending in a southwesterly direction to the site proposed for the West and Southwest Side plants along the Drainage Canal near Summit.

It is believed that with universal metering these intercepting sewers should be designed of such capacity that they will carry a flow equivalent to 375 gallons per capita per day. This is approximately two and one-third times the average flow as it is estimated to be after the installation of meters.

It is believed that a 35-year period (*i. e.* to 1960) is that for which the design of interceptors should be economically and practically made for sewers constructed in tunnel, capable of duplication in the future without excessive costs.

The 20 miles of intercepting sewers required for the West Side system have been estimated to cost $7,890,000.

The 15 miles of sewers required for the Southwest Side plant have been estimated to cost $4,495,700.

9th. *Sewage Disposal Costs in Other Cities*:

Construction and operating costs of sewage pumping stations and treatment works in other cities were compared with similar costs incurred by the Sanitary District of Chicago in certain works already built.

In making this comparison consideration has been given to the price basis when the work was done and the unit costs for labor and materials in the cities compared. We deduce the following conclusions from the comparison:

(a) Recent intercepting sewer contract costs in Chicago have been substantially double those secured in other cities under like construction conditions.

(b) The Calumet Imhoff tank plant, constructed by the Sanitary District of Chicago (after being credited with the reasonable cost of an experimental sprinkling filter and activated sludge plant), cost approximately three times the average of tank plants of similar type in other cities.

(c) The Des Plaines activated sludge plant of the Sanitary District of Chicago cost approximately three times the average cost of similar plants in Milwaukee and Indianapolis.

(d) The cost of operating the Calumet Imhoff tank plant (after being credited with the reasonable cost of operating a small sprinkling filter and a small activated sludge plant), is approximately four times that of operating similar plants in other cities when compared on the basis of cost per million gallons treated or ten times the average based on cost per capita served.

(e) The cost of operating the Des Plaines activated sludge plant of the Sanitary District of Chicago is from eight to ten times that estimated to be necessary for the operation of the activated sludge plant at Milwaukee.

(f) The cost of operating the 39th St., Lawrence Avenue and Calumet pumping stations of the Sanitary District of Chicago is approximately three times as great per unit of work performed as that of other stations of similar size and type in other cities.

10th. *Basis of Cost Estimates*:

All estimates of cost of construction and operation used herein are predicated upon labor and material prices prevailing in the Chicago District in the early part of 1925. The estimates are further based upon the average efficiency which it is practicable to secure in public enterprises of similar nature; no better and no worse than conditions recently prevailing in Detroit, Cleveland and Milwaukee.

11th. *Types of Treatment Works*:

At the present time the Des Plaines activated sludge plant and the Calumet Imhoff tank plant are in operation. The Sanitary District is also definitely committed to the construction of an activated sludge plant at the North Side plant, the construction of which is about one-third completed.

All of the estimates herein made for all amounts of flow considered are based upon the Sanitary District's program of adding sprinkling filters at the Calumet plant, and of building a sprinkling filter plant at the Corn Products Plant and an activated sludge plant at the Stockyards. The variations in degree of treatment required with the several flows considered, are all secured herein by applying different treatment processes to the West and Southwest Side plants.

All estimates of cost herein are in addition to contracts now let and under construction on the North Side intercepting sewers and that part of the North Side disposal plant for which contracts have thus far been let.

In our opinion the sites for prosposed sewage disposal works are well chosen.

12th. *Additional Works Required with* 10,000 *Cubic Feet Per Second Flow*:

A flow in the channel of 10,000 cubic feet per second will necessitate in addition to the sewage disposal works now constructed or under contract, preliminary or tank treatment of the sewage at the West Side plant and complete tank and sprinkling filter treatment for the Southwest Side.

The cost of additional purification works including intercepting sewers required with a total flow of 10,000 cubic feet per second is estimated at $57,415,240 to 1935 and $64,692,700 to 1945.

The cost of operation of all pumping stations and sewage disposal plants with a flow of 10,000 cubic feet per second is estimated at $4,364,000 in 1935 and $5,004,800 in 1945.

13th. *Required Works with* 4,167 *Cubic Feet Per Second Flow*:

With a smaller amount of diluting water, complete secondary treatment of the sewages at both the West and Southwest Side plants would be necessary. Tanks and sprinkling filter treatment would not be sufficient by 1945. Activated sludge treatment is required to meet the 1945 conditions with but 4,167 c. f. s. flow available.

The estimated cost of all interceptors and disposal plants required with the flow of 4,167 cubic feet per second is $69,213,500 for 1935 conditions, and $76,583,300 for 1945 conditions.

We estimate the cost of operating all sewage pumping stations and sewage disposal plants necessary with the flow of 4,167 cubic feet per second at $5,163,100 in 1935 and $5,817,600 in 1945.

14th. *Required Works with* 2,000 *Cubic Feet Per Second Flow*:

With a flow as small as 2,000 cubic feet per second there is no practicable way of meeting the pollution standard herein suggested.

15th. *Required Works with* 7,500 *Cubic Feet Per Second Flow*:

The 7,500 cubic feet per second flow requires that a complete sprinkling filter plant be built at the West Side and tanks at the Southwest Side. This will suffice up to as late as 1947 after which filters will be required at the Southwest plant also. The estimated cost of constructing all plants under this flow is $61,477,920 in 1935, and $67,926,100 in 1945.

The annual cost of operating all pumping stations and disposal plants is estimated at $4,530,400 in 1935 and $5,137,000 in 1945.

16th. *Required Works with* 8,500 *Cubic Feet Per Second Flow*:

The required works with 8,500 cubic feet per second flow would be the same as those required for 10,000 cubic feet per second flow. The construction and operating cost would be the same as those outlined under the project in paragraph above.

17th. *Review of Expenditures Under Various Diversions*:

The expenditures for construction and operation of the treatment works required for 1935 and 1945 conditions with flows varying from 2,000 to 10,000 cubic feet per second are shown in Table 1.

Increasing the flow from 4,167 to 10,000 cubic feet per second saves but sixteen and one-half per cent in the expenditures required for sewage treatment, and but fourteen and one-half per cent in the annual operating costs.

18th. *Suggestion for Stockyards Wastes*:

The Sanitary District program contemplates a separate sprinkling filter plant at Argo and a separate activated sludge plant for the Stockyards wastes. Other cities in which the packinghouse waste per capita contributing sewage is as great as that at Chicago have found it practicable to treat this waste, mixed with the domestic sewage, at either sprinkling filter or activated sludge plants. At Chicago the Southwest Side intercepter passes almost directly by the Stockyards, which suggests the farther practicability of combining this concentrated waste, after the removal of the coarse solids, with the domestic sewage before treatment.

If treatment of the Stockyards waste, mixed with the sewage of the West and Southwest Side, is practicable on stone filters, there will result a saving in construction cost of from $2,300,000 to $3,500,000. There will also result a saving in annual cost of operation of $350,000 per year, even after crediting an income of $360,000 per year from the sale of the sludge from the activated sludge plant. This annual saving capitalized at four per cent adds a further sum of $8,500,000, making the total capitalized saving between $10,800,000 and $12,000,000.

The rates of flow for dilution purposes, as stated in this report, are the estimated rates required un-

TABLE 1

EXPENDITURES REQUIRED FOR SEWAGE DISPOSAL WORKS, IN ADDITION TO WORKS NOW BUILT OR UNDER CONSTRUCTION, WITH VARIOUS FLOWS IN THE DRAINAGE CANAL.

	Flow in Cubic Feet per Second.				
1935 Conditions	4167	6000	7500	8500	10,000
Cost of Operation..........	5,163,100	5,432,400	4,530,400	4,364,000	4,364,000
Cost of Construction.......	$69,213,520	$68,726,620	$61,477,920	$57,415,240	$57,415,240
1945 Conditions					
Cost of Construction.......	76,583,300	76,740,100	67,926,100	64,692,700	64,692,700
Cost of Operation.......... (excl. fixed chgs.)	5,817,600	6,194,000	5,137,000	5,004,800	5,004,800
Adequate until	1950	1970	1945	1945	1960

NOTES:

1. All of above costs include full costs of Stock Yards and Argo plants.
2. All of above costs are based upon separate plant for Stock Yards.
3. Stock Yards plant operating costs are credited with revenue from dewatered sludge at $10.00 per ton.
4. Flow of 2000 c.f.s. inadequate for practicable treatment of Chicago wastes.

der warm weather conditions at which time the rate of diversion would necessarily be greatest. It is a fact that considerably smaller rates of diversion will be required in the cooler months of the year. Riparian owners on the Great Lakes and other parties interested are chiefly concerned with the average yearly diversion. It is believed to be proper therefore in the operation of the Drainage Canal to vary the draft of diversion water from month to month dependent upon conditions. The ability to do this will provide a large factor of safety for maintaining good conditions in the effuent channels and downstream rivers.

We have made no allowance for the fact that more or less sewage from the Indiana-Calumet region now containing 180,000 people, now reaches the Sag Canal in a more or less unpurified state. This situation must ultimately be solved by adequate purification works for this region, and a specific alowance for dilution water if the sewage continues to flow via the Illinois River.

The conclusions in this report are predicated on keeping the Drainage Canal reasonably clean of organic settlings by dredging. Very little will be required in this regard after purification works are built, and after the present deposits are removed. Several years may be required before existing sludge deposits in the Illinois River are completely eliminated.

We have given no consideration to the development of water power. We have neither included the costs thereof, nor credited benefits. Where power is required in the operations of pumping and sewage disposal we have estimated the cost thereof on the basis of electric power purchased from the Commonwealth Edison Company at their published rates.

Upon the pages which follow we have discussed the matters above treated in further detail."

Pages 12-16:

"Part II.

PRESENT DISPOSAL OF SEWAGE AND DEFICIENCES.

Chicago, and the industrial region surrounding it, occupies the Southwestern shore of Lake Michigan. The ground is comparatively low. The greater part of it lies less than 20 feet above Lake Michigan. This entire region formerly drained naturally into the lake through the Chicago and Calumet Rivers. That locality now constituting the western suburban area, however, is tributary to the Des Plaines River, which parallels the lake shore about ten miles inland, the water of which are tributary to the Mississippi river system through the Illinois River.

More than three million people now occupy this territory. It is conservatively estimated that the population will double within the next thirty years. The present flow of sewage is about 800 million gallons per day. This is equivalent to a river 100 feet wide and five feet deep flowing one and one-half miles per hour.

The shore line of Lake Michigan from Gary on the south to Waukegan upon the north is about seventy-five (75) miles in length. More than half of it is densely populated. Much of it is occupied by industries. The northern one-third of it is residential in character.

Development of Sewers.

Sewers were built as required, draining immediately to the nearest water outlet. The earliest settlement of considerable size, was located at the mouth of the Chicago river. In this locality all sewers drain directly into the river or into its north or south branch. As the population extended northward and southward, sewers were built discharging directly into the Lake. When sewers became necessary in the region adjoining the Calumet River, sewers were built discharging directly into this stream.

The construction of sewers in Chicago was begun in 1856. At this time the population was about 80,000. Thereafter the growth of the city was very rapid. The mileage of sewers kept pace with the population for in many localities the habitation was not practicable until sewers had been built.

Early Disposal of Sewage.

Sewers discharging into the Chicago River and branches ultimately reached the lake except for a small amount, which from the earliest use of sewers, reached the old Illinois and Michigan canal by pumping, and thus passed to the Des Plaines and Illinois Rivers.

Illinois and Michigan Canal.

The Illinois and Michigan canal was completed in 1848. It parallels the Drainage Canal a few hundred feet to the south. Its water supply was obtained partly by gravity from the Calumet River and partly by water pumped from the south branch of the Chicago River. From time to time the pumping works were increased in capacity, which temporarily tended to improve the foul conditions in the Chicago River, and to divert some of the sewage from the lake.

Water Supply.

The water supply for the City of Chicago and for all its suburbs bordering the lake is taken from Lake Michigan. Public Water Works for Chicago began operation in 1856. Water was taken from the lake at the foot of Chicago Avenue about one mile north of the mouth of the Chicago River. As the occupied area of the city grew it became necessary to construct additional Water Works' intakes, and as the pollution from the sewers was constantly increasing, the intake cribs were progressively located farther from the shore.

At the present time the city is supplied through six cribs varying from two to four miles distant from the shore line.

In the years of rapid municipal growth up to 1890, the sanitary conditions in the outlet streams, particularly the Chicago River and it branches, became progressively worse. Comparatively great accumulations of filth were washed into the lake, and occasionally reached the Water Works' intakes. This resulted in the general prevalence of typhoid fever, and occasional epidemics.

Drainage Canal.

We will not recite here all the steps that were taken to bring about an improvement in the sanitary conditions. These matters, while of general interest, are recited elsewhere, and bear only indirectly upon this problem. The most important step taken toward improving conditions was the passage of the State law creating the Sanitary District of Chicago and empowering it to construct the Chicago Sanitary Ship Canal, May 29th, 1889.

The Drainage Canal is twenty-eight miles long from the Chicago River at Robey Street to the Controlling Works at Lockport. It creates a reversal of the flow of the Chicago River, and in addition it draws in certain quantities of water from Lake Michigan, depending upon its controlled rate of flow. The flow is controlled at the foot of the Canal. This work was started in 1892 and completed January 2, 1900. The flow capacity of the main channel is approximately 10,000 cubic feet per second.

In 1907 the canal was extended beyond Lockport, a distance of about four miles to concentrate an available fall of about thirty-four feet, and utilize the same in the development of a water power in dropping the canal flow down to the level of the Des Plaines River. Since the completion of this power plant it has generally formed the means for regulating the flow of the Drainage Canal, although the flow can also be regulated at the Controlling Works, four miles upstream.

In connection with the utilization of the main drainage canal it was necessary to improve the Chicago River in order to permit the desired flow without interfering with navigation. The river was widened and deepened at various places between the years 1897 and 1920. In 1910 the north shore channel was completed connecting the north branch of the Chicago River with Lake Michigan at Wilmette. At this place a pumping station was built operating at about three feet head. This canal and pumping station serves the purpose of pumping fresh water into the head of the north branch of the Chicago River, thus improving the sanitary conditions therein, resulting from the large amount of sewage received. This channel is eight miles in length and has a capacity of 1,000 cubic feet per second.

The Calumet Sag channel taps the little Calumet River at Blue Island diverting the water thereof westerly and joining the main drainage canal at Sag. This canal was completed in 1922. It has a length of sixteen miles and a capacity of 2,000 second feet.

Intercepting Sewers.

With the opening of the Drainage Canal January 2, 1900, all sewage discharging into the Chicago River and branches was diverted to the Illinois River. There remained, however, a considerable amount of sewage which reached the lake, through the sewers discharging directly therein. To stop this pollution a system of intercepting sewers along the lake shore was planned and built by the City of Chicago.

All sewage entering the lake, between the Chicago River on the north and 87th St. on the south, is now intercepted by a main sewer on Stony Island Avenue running north from 83rd St. and thence following Cornell Avenue and the shore of Lake Michigan to 39th St. At this place the 39th St. Pumping station lifts the sewage to the twenty foot sewer running west on 39th St., entering the south branch of the Chicago River. This station is also equipped with pumps to take dilution water directly from the lake for the purpose of keeping the south fork of the river clean. Plans are now under way to extend the 39th St. sewer so that it will enter the drainage canal at Western Avenue near 31st St. This will obviate the necessity for dilution water in the south branch of the river. The southern part of the Stony Island Avenue district is pumped into the Stony Island Avenue sewer by pumping station constructed and operated by the City of Chicago at 73rd St. and Stony Island Avenue.

The South Side intercepting sewer was completed in 1907.

The North Side sewers entering the lake were intercepted by the construction of sewers paralleling the lake shore running north to Lawrence Avenue, and from Howard Avenue running south to Lawrence Avenue. At Lawrence and Racine Avenue a pumping station was constructed, discharging the sewage westward into the north branch of the Chicago River. This station is also equipped with pumps to draw dilution water from Lake Michigan for the purpose of improving the character of the water in the north branch of the Chicago River.

A similar system of intercepting sewers north of Howard Avenue lead to the Evanston pumping station at Orrington Avenue and Lake Street, which intercepts the remainder of the lakeward flowing sewers south of Wilmette and discharges the sewage into the north shore channel.

All sewage originating in the Sanitary District north of Wilmette is intercepted by a system of sewers terminating at the north shore channel and Sheridan Road. The Wilmette pumping station, located at this point, is equipped with pumps to draw dilution water from the lake for the purpose of maintaining cleanly conditions in the north shore channel and the north branch of the Chicago River.

The North Side intercepters, within the City of Chicago, became effective in 1908. The intercepting sewer system north of Wilmette became effective in 1916. The Evanston sewer and pumping station was completed in 1921.

Calumet Region.

Sewage within the City of Chicago, south of 87th Street, has heretofore been discharged directly into the Calumet River, and considerable of it still reaches the river. This will very shortly be corrected by the completion of the Calumet intercepting sewer and the pumping station at 95th Street and the Calumet pumping station at Indiana Avenue and 125th St. With the completion of these sewers all sewage south of 87th St. will be pumped into the Calumet Sag Channel after treatment, and delivered to the Chicago Drainage Canal at Sag.

The Sag Canal does not reverse the Calumet River system at all times, the flood flow of this stream greatly exceeding the capacity of the Sag Canal. Periodic discharges from the Calumet River have been a serious menace to the water supplies, particularly those near the mouth of the Calumet. This menace will continue to a greater or less extent."

* * *

Pages 16-18:

"*Diluting Water.*

"It was the original idea in the construction of the Drainage Canal that the sewage of the Sanitary District would be diluted by mixing with a sufficient amount of fresh water from Lake Michigan to render the mixture innocuous, and to assist in the natural purification of the sewage in its transit through the Drainage Canal and the river system below same.

Table 2 shows the average flow at the outlet of the Drainage Canal for each year since the canal was opened in 1900. This flow was limited in the early years by the ability to get the water through the Chicago River. Within the past ten years the flows have been more nearly up to the pollution requirements of the population served, but they have never been adequate to properly care for the sewage and trade wastes. The table also shows the estimated amounts of flow required by the State law creating the Sanitary District, under which a minimum dilution of three and one-third second feet per thousand people was required.

The above flows include the sewage, as well as the diversion, for dilution purposes. Water for both purposes is taken from the lake. The present liquid volume of the Chicago sewage is approximately 1200 second feet or about twelve per cent of a total diversion of 10,000 second feet.

Additional Dilution.

Immediately after passing the controlling works at Lockport the Drainage Canal water joins the natural flow of the Des Plaines River. The flow of this stream during the late summer and fall is usually negligible. Large flows of fresh water are, however, brought in during the flood seasons.

Below Joliet the principal tributary is the Kankakee River, which joins the Des Plaines forming the Illinois River. The next principal tributary is the Fox.

The net effect of all these streams and other minor tributaries coming in above Peoria is indicated on Figure 2, which shows graphically the flow of the Illinois River at Peoria, and the flow of the Chicago Drainage Canal since the latter was opened in 1900. During the past ten years the flow of the Drainage Canal at Lockport has generally ranged between 8,000 and 9,000 second feeet. During the two dryest months in the year the additional flow coming in above Peoria has usually ranged between ten and twenty per cent of the Drainage Canal flow. During the remainder of the typical year this additional inflow has been considerably more, possibly averaging as much as a fifty per cent addition of fresh water. During several months of nearly every year the additional water coming in has been fully equal to the flow of the Drainage Canal. In certain months of heavy flow it has been four to five times as great as the Drainage Canal flow. During the year 1924, which was a year of sustained natural flow in the Illinois river, the tributaries above Peoria brought in a flow of fresh water fully equal to the Drainage Canal flow throughout the year up to and including September.

Sewage Treatment Works.

Realizing the inadequacy of dilution as a permanent solution for the Chicago sewage problem, the Sanitary District some years ago began experimentation and the preparation of plans for sewage disposal works to supplement the dilution project."

* * *

(The report here describes the different treatment projects as shown by testimony and by Master's Report of Nov. 23, 1927.)

Pages 20-21:

"*Industrial Wastes Treatment Projects.*

A very important part of the organic load contained in the Chicago sewage is contributed by certain industries, particularly the packing industries located near the head of the Drainage Canal. Also the Corn Products Company located at Argo on the Drainage Canal and near the western city limits.

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The Packing Town wastes and the Corn Products wastes are derived from comparatively small areas respectively. The wastes are highly concentrated and require special treatment. Thorough studies have been made in co-operation with the industries."

* * *

Pages 21-23:

"*Effectiveness of Disposal Operations.*

The diversion of the sewage from Lake Michigan has been followed by a remarkable reduction in typhoid fever in the City of Chicago. A number of other matters have contributed to this improvement, including the chlorination of the water supply which was begun in 1912, the pasteurization of milk begun in 1910, and also no doubt other important causes outside of the Chicago district, which have been instrumental in very greatly reducing the typhoid death rates throughout the United States. Table 3 shows these facts in tabular form.

Condition of the Lake.

Lake Michigan is still badly polluted in the Indiana Calumet region, from the Indiana cities and the periodic discharge of sewage from the southern part of Chicago, a part of which still reaches the Lake. There have also been periodic, but relatively infrequent sewage discharges from the Chicago river due to flow reversals caused by floods. Minor pollution still reaches the lake from the suburban towns north of the Sanitary District. This pollution is comparatively small, and will probably become less with improved conditions in the North Shore Sanitary District, embracing certain suburban towns north of the Cook County line.

Particularly at times of great storms the sanitary condition of the water at the Chicago intakes is very bad. This subject will be discussed hereinafter.

River Conditions.

During recent years the main channel of the Chicago River through the heart of the city, while not seriously objectionable, nearly always contains evidence of floating sewage. Conditions in the north

TABLE 3.

ANNUAL TYPHOID FEVER MORTALITIES IN CHICAGO PER 100,000 POPULATION.

From Report of Engineering Board of Review, and Supplemented.

Years	Typhoid Fever Mortality	Per Cent of Total Mortality	Remarks
1867	73.3	3.45	
1868	79.3	3.34	
1869	65.3	2.82	
1870	87.4	3.66	
1871	61.0	2.92	
1872	142.6	5.16	
1873	71.6	2.85	
1874	53.4	2.63	
1875	51.7	2.62	
1876	41.2	1.96	
1877	37.0	1.98	
1878	33.4	1.97	
1879	42.3	2.41	
1880	34.0	1.63	
1881	105.2	4.03	
1882	82.4	3.49	
1883	62.2	3.12	
1884	56.2	2.84	
1885	74.6	3.98	
1886	68.6	3.53	
1887	50.3	2.48	
1888	46.7	2.38	
1889	48.4	2.67	
1890	91.6	4.61	
1891	173.8	7.20	
1892	124.1	5.68	
1893	53.5	2.47	
1894	37.5	2.06	
1895	37.9	2.14	
1896	52.6	3.23	
1897	2[illegible].3	2.00	
1898	40.8	2.79	
1899	27.2	1.73	
1900	19.8	1.35	Opening of Drainage Canal
1901	29.1	2.09	
1902	44.5	3.03	
1903	31.8	2.[illegible]3	
1904	19.6	1.42	
1905	16.9	1.21	
1906	18.5	1.27	Opening South Side Intercepters
1907	18.2	1.16	Completion South Side Intercepters
1908	15.8	1.09	Opening North Side Intercepters
1909	12.6	0.87	
1910	13.7	0.90	Pasteurization of Milk
1911	10.7	0.74	Completion North Shore Intercepters
1912	7.6	0.51	Chlorination of Water Started
1913	10.6	0.71	
1914	6.9	0.49	
1915	5.3	0.37	
1916	5.1	0.35	
1917	1.6	0.11	Complete Chlorination of Water
1918	1.4	0.08	
1919	1.2	0.09	Completion Evanston Intercepters
1920	1.1	0.09	
1921	1.1	0.09	Completion Calumet Intercepters
1922	1.1	0.10	
1923	1.9	0.16	
1924	1.5	0.13"	

branch of the Chicago River generally range from bad to fair, depending upon the extent of operation of the dilution pumps. The south branch of the river to the head of the Drainage Canal increases in foulness as the additional sewers join the stream. The Drainage Canal throughout its length, as would be expected, always bears evidence of the heavy sewage load carried. Odors on the banks are usually noticeable, but conditions only become very foul during the summer and early fall months.

At Lockport dissolved oxygen is normally exhausted during the warm weather season. A similar condition prevails generally throughout the Illinois River to the head of Peoria lake about ninety-six miles below Lockport. Within this reach of the

Pages 25-26:

"streams conditions vary, as to the presence or absence of oxygen and the prevalence of putrefactive odors. For ten years or more the natural life of the river, animal and vegetable, has been destroyed. No life is present except sewage organisms. The water is not suitable for bathing and is disagreeable for users of pleasure craft.

During certain seasons objectionable conditions and the destruction of the natural water life has occurred as far south as Peoria. The wet season of 1924 has materially improved the conditions in Peoria Lake.

Conditions in the Des Plaines and Illinois Rivers, below Lockport, have been aggravated by large quantities of sewage sludge which passes down the river during the colder months of the year, comparatively in an undecomposed state, which tends to add materially to the demand on the oxygen contained in the water during the summer months, when decomposition reaches a maximum. This sewage sludge has accumulated to great depths behind dams and in other places where the current is slack during the twenty-five years that the Drainage Canal has been operating. Conditions are becoming worse with the increasing organic load discharged by the Chicago sewage and the Chicago industrial wastes.

Incidentally the river receives additional pollution although comparatively of small amount from the cities between Joliet and Peoria. At Peoria and Pekin important additional industrial wastes are added to the river. Up to the present time this pollution has been small as compared to the Chicago load.

It has been recognized, by all concerned, that the existing conditions on the Illinois River should not be permanently tolerated. For some time it has been realized that unless corrective measures are applied promptly, these conditions will become materially worse with the further growth of the Chicago region.

The Chicago sewage problem will not be solved until the water supply of the Chicago district is adequately protected, and the streams receiving sewage are restored to a condition of reasonable cleanliness.

Analytical Studies.

The most accurate picture of the sanitary conditions in the Des Plaines and Illinois Rivers, below the outlet of the Chicago Drainage Canal, is furnished by the comprehensive study of the U. S. Public Health Service, covering fourteen months beginning July 1, 1921, and ending August 31, 1922. A complete report of this investigation has not yet been printed. There has been furnished to us, however, a series of tabulations, summarizing the principal results.

It was the purpose of this investigation to determine the extent of pollution, the character of the water at various places within the streams and the factors that particularly affect the decomposition of the organic matters discharged therein. Twenty-seven sampling stations were established between Lockport and the mouth of the Illinois River. Samples were collected daily, or, at certain points triweekly, from mid-depth of the stream. At the stations between Lockport and Shanahan, the latter place just above the mouth of the Kankakee, samples were collected from the center of the stream. At all stations below Shanahan samples were taken at three points from the cross section. Samples were carefully taken, iced and promptly transported to the nearest laboratory. Examination of samples was made in all cases in less than three hours. The average time was much shorter. The report of the preliminary examination states: 'Due to fluctuations in the sewage strength from night to day at the outlet of the Sanitary canal, and to the variation in flow caused by opening and closing of the gates at the power plant above Joliet, it is probable that the results of analyses recorded in the tables which follow do not represent exactly the average condition throughout the day of the water at the sampling point.'

The tabular data, accompanying the preliminary report, is too bulky to present in full. We summarize the principal features of it on Figures 5 to 8 inclusive. We show upon these diagrams the average dissolved oxygen for each month during the investigation at each of the sampling points. Also the five day bio-chemical oxygen demand for the same places and times. These determinations represent the character of the water from the pollution and nuisance standpoints. The bio-chemical oxygen demand is representative of the amount of organic pollution carried. The dissolved oxygen represents the possibility of local nuisance and the practicability of existence of the natural water life of the stream. Both determinations considered progressively downstream indicate the degree of improvement in the sanitary character of the water flowing."

* * *

Pages 37, 38:

"*Future Effect of Water-Way Improvement.*

When the Illinois water-way is built some changes will be brought about in the river conditions, principally between Lockport and LaSalle. In this reach of the Des Plaines and Illinois Rivers it is proposed to improve the same on the basis of slack water navigation. To accomplish this purpose dams will be constructed at Brandon Road, Dresden Island, Marseilles and Starved Rock. The pond created by each of these dams will extend to the foot of the next dam up-stream.

At the present time the water occupies a period of about thirty-seven hours in its passage from Brandon bridge to LaSalle. Except for the pond created by the present Marseilles dam the current is rapid and conditions are favorable for the absorption of atmospheric oxygen.

After the construction of the water-way based on present plans, contemplating a flow of about 10,000 second feet, the time of travel between Joliet and LaSalle will be increased to about 66 hours. The water surface area in this reach of the stream is about 10.5 square miles at the present time. The dams will increase it to about thirteen square miles.

Below LaSalle the flow of water is much less rapid. Six and one-half days is at present required for it to flow from LaSalle to Peoria. The total time of flow from Joliet to the mouth of the Illinois River is about thirteen days at summer stages with present flows.

With the improved water-way assuming a flow of 10,000 second feet conditions below LaSalle will not be greatly changed. Proposed plans contemplate water surface elevations which differ not greatly from those prevailing at present. With this flow, however, the existing dams will probably be taken out.

Thus the net result of the construction of the water-way will be practically to double the time of travel from Joliet to LaSalle, and to increase the area of water surface about twenty-five per cent. Below LaSalle conditions will remain about as at present.

Conditions with Smaller Diversions.

If the diversion of water from Lake Michigan is very much below 10,000 second feet the plan for the Illinois water-way will probably require the retention of the present dams below LaSalle. Above LaSalle the dams contemplated under a 10,000 second foot flow would probable be unchanged, and the existing areas would not be greatly altered as compared to the larger flow. The time of travel, however, would be increased approximately in an average ratio to the quantity of water flowing.

Rough approximations of the time of travel, assuming various quantities flowing in the stream would be as follows:

TIME OF TRAVEL IN DAYS.

	Joliet to LaSalle	LaSalle to mouth of Illinois River
10,000 feet per second.......	2.7	14.5
8,500 " " "	3.2	17
7,500 " " "	3.6	19
4,167 " " "	6.4	35
2,000 " " "	13	73

It is believed that the net effect of the construction of the water-way will be to introduce into the Illinois River a series of four ponds above LaSalle, which may be expected to have a similar effect to that now produced in Lake Peoria. It is believed that the net effect upon the stream under present pollution and diversion conditions would be to throw the 'dead line' now existing near Peoria Lake much further upstream."

Pages 39-41:

"Part III.

POPULATION AND GROWTH.

Chicago has grown from a frontier trading post to the third city of the world within a period of ninety years. It is the commercial and transportation center of the largest and richest agricultural community on this continent. Its position is such, as regards lines of communication, that it will continue to be the hub of interior America. Its future development must inevitably follow the development of a vast interior region, the limits of growth for which cannot be predicted.

In planning sewage disposal works for this great industrial center, it obviously will be wise to plan for a larger future growth. It is not financially practicable, however, nor is it wise to build very far in advance of immediate requirements. It is practicable, however, to plan for future growth, and to build upon a unit system so that units may be built a little in advance of need. If the plan is wisely made each unit so built will be permanently useful. It will constitute a link in a future chain of sewage disposal works. Thus each dollar invested will be a permanent investment. If the growth is more rapid than anticipated, units can be added more rapidly, and assessed valuations will be available to meet the necessary charges. If growth is less rapid than is anticipated, works constructed from year to year will be useful for a longer time.

Population—Sanitary District:

The Sanitary District of Chicago includes fifty-two towns and villages lying within Cook County, Illinois. The population by 1920 census was 2,978,635, of which 2,701,705 or ninety-one per cent was resident within the corporate limits of the City of Chicago. Table 5 is a statement of the population within the present boundaries of the Sanitary District in the census 1900 to 1920 inclusive. Within this period the population of the district increased sixty-seven per cent. The outlying towns and villages practically trebled in population during the two decades.

Greater Chicago Region:

Since 1900 municipal growth has extended beyond the Illinois border line into Northern Indiana, in which a great industrial region is developing, served by numerous main lines of railroad and new lake harbors, which have been built at Gary and East Chicago. Improved labor conditions in the outlying localities, adjacent to Chicago, have favored the location of certain industries, on the borders of the city limits, and in certain cities outside of Cook County. The greater Chicago region, as defined by U. S. census, includes Cook, Kane, DuPage, Lake and Will Counties in Illinois and Lake County in Indiana. The total population of this region was 3,521,789 in 1920. It had increased seventy-five per cent in two decades following 1900. Table 6 shows the population within this region for each county for the last three census years. As will be noted the Sanitary District of Chicago includes approximately eighty-five per cent of the total population of the greater Chicago region.

TABLE 5.

POPULATION OF CITIES AND VILLAGES IN THE SANITARY DISTRICT OF CHICAGO.

Name	Population 1900	Population 1910	Population 1920
Bellwood (village)	....	943	1,881
Berwyn (city)	....	5,841	14,150
Blue Island (city)	6,114	8,042	11,424
Broadview (village)	....	....	430
Brookfield (village)	1,111	2,186	3,589
Burnham (village)	....	328	795
Burr Oak (village)	....	....	1,237
Chicago (city)	1,698,575	2,185,283	2,701,705
Cicero (town)	16,310	14,557	44,995
DesPlaines (village)	1,666	2,348	3,451
Dolton (village)	1,229	1,869	2,076
Elmwood Park (village)	....	....	1,380
Evanston (city)	18,721	25,668	37,234
Evergreen Park (village)	445	424	705
Forest Park (village)	4,085	6,594	10.768
Franklin Park (village)	483	683	914
Glencoe (village)	1,020	1,899	3,381
Glenview (village)	....	652	760
Harvey (city)	5,395	7,227	9,216
Cook County	....	....	127
Hinsdale (village) (DuPage County)	2,578	2,451	3,975
Kenilworth (village)	336	881	1,188
LaGrange (village)	3,969	5,282	6,526
LaGrange Park (village)	730	1,131	1,684
Lyons (village)	951	1,483	2,564
Maywood (village)	4,532	8,033	12,072
Melrose Park (village)	2,592	4.806	7,147
Morton Grove (village)	564	830	1,079
Mount Greenwood (village)	190	276	1,441
Niles (village)	514	569	1,258
Niles Center (village)	529	568	763
Northbrook (Schermerville) (village)	..	..	554
North Riverside (village)	..	..	..
Norwood Park (township)	3,447	5,251	6,897
Oak Park (village)	..	19,444	39,858
Park Ridge (city)	1,340	2,009	3,383
Phoenix (village)	..	679	1,933
Posen (village)	..	343	947
Riverdale (village)	558	917	1,166
River Forest (village)	1,539	2,456	4,358
River Grove (village)	333	418	484
Riverside (inc. N. Riverside) (village)	1,551	1,702	2,532
Riverview (village)	406	312	334
Robbins (village)	..	..	431
Schiller Park (village)	..	..	390
South Holland (portion village)	766	1,065	1,247
Stickney (village)	..	..	550
Summit (village)	547	949	4,019
Tessville (village	..	359	355
Western Springs (village)	662	905	1,258
West Hammond (Calumet City) (city)	2,935	4,948	7,492
Wilmette (village)	2,300	4,943	7,814
Winnetka (village)	1,833	3,168	6,694
Total population	1,788,278	2,338,278	2,978,635
Total population, excluding Chicago	89,703	152,995	276,930

TABLE 6.

POPULATION OF THE CHICAGO METROPOLITAN DISTRICT.

County	1900 Census	1910 Census	1920 Census
Cook	1,838,735	2,405,233	3,053,017
Kane	78,792	91,862	99,499
DuPage	28,196	33,432	42,120
Lake	34,504	55,058	74,285
Will	74,764	84,371	92,911
Lake (Ind.)	37,892	82,864	159,957
Total	2,092,883	2,752,820	3,521,789"

Pages 48, 49:

"Part IV.

AMOUNT AND QUALITY OF SEWAGE.

In a study of the sewage problem of any community, a knowledge of the volume and quality of the sewage is of primary importance.

With respect to quality, sewages are often classified as domestic and industrial, and the use of these terms is generally intended to convey the idea that domestic sewage is that resulting from strictly domestic or household operations, while industrial sewage is that resulting from manufacturing or industrial operations.

A strictly domestic sewage consists of the waterborne wastes resulting from household operations in the laundry, kitchen, bathroom, and toilet, and the qualitative character of such wastes is substantially the same in any community where the habits of life of the people do not differ materially. Sewage of a strictly domestic character is rarely encountered in large cities, as most, if not all, of our large cities have more or less varied industries, which produce waterborne wastes differing in quality from strictly domestic sewage. The character and extent of industrial operations consequently are largely responsible for any wide differences in quality which may be found in the sewages of various cities.

Measurement of Load:

Various analytical determinations are made today to give expression to the quality or composition of sewage, such as total nitrogen, free ammonia, suspended solids, settleable solids, oxygen absorbed from permanganate, stability value, biochemical oxygen demand, etc., and in the discussion of the quality of sewage, the only analytical value which will be used for the present will be that secured by the biochemical oxygen demand test.

The biochemical exygen demand test consists of incubating a known volume of sewage with known volumes of pure water containing a known supply of oxygen in solution, and observing the rate at which the oxygen is exhausted, also, the total amount of oxygen required to effect a complete combustion of the putrescible matter in the sewage. The incubation is carried out at a constant temperature, usually twenty degrees C., and for a sufficient number of days to accomplish a practically complete destruction of the readily oxidizable material in the sewage. This test attempts to show what happens in the way of oxygen depletion in a stream of pure water when it is polluted with sewage.

It has long been known that streams are able to affect a destruction of putrescible matter and after doing so to recover their original purity. When sewage is discharged into a stream of water there begins a drama with three actors, namely putrescible matter, bacteria and oxygen. Bacteria and oxygen combine to destroy putrescible matter, and if the bacteria have an ample supply of oxygen, putrescible matter is destroyed in a quiet and orderly manner, but if the supply of oxygen is inadequate, the drama may develop into a tragedy, and although the bacteria will eventually triumph, the stream will suffer considerably from the experience.

The problem then is one of oxygen supply, if sewage destruction is to be accomplished without offense, and there are a number of factors which govern the supply of and demand for oxygen in a polluted stream of water. One second foot of pure water at a temperature of 32° F. is saturated when it carries 79 pounds of oxygen in solution in a twenty-four hour period, whereas at a temperature of 86° F., it is saturated when it carries 41 pounds of oxygen in solution. On the other hand, the activity of the bacteria which destroy the putrescible matter, is almost

"TABLE 12.

SHOWING ESTIMATED DAILY OXYGEN LOAD OF SEWAGE OF SANITARY DISTRICT OF CHICAGO

Year	Polluting Element	Daily Polluting Units	Pounds of Oxygen Required Per Day Per Polluting Unit on Basis of Oxygen Demand Value for			Pounds of Oxygen Required Per Day for Polluting Element on Basis of Oxygen Demand Value for		
			5 Days	10 Days	20 Days	5 Days	10 Days	20 Days
1925	Human Population*	3,355,000	0.182	0.240	0.267	611,000	805,000	896,000
	Stock Yards Waste	33.5 M.G.	5650	7500	8330	189,000	251,000	279,000
	Corn Products Waste	15.0 M.G.	3750	5000	5670	56,000	75,000	85,000
	Totals					856,000	1,131,000	1,260,000
1930	Human Population*	3,710,000	0.182	0.240	0.267	675,000	890,000	990,000
	Stock Yards Waste	35 M.G.	5650	7500	8330	198,000	262,000	292,000
	Corn Products Waste	16 M.G.	3750	5000	5670	60,000	80,000	91,000
	Totals					933,000	1,232,000	1,373,000
19[illegible]5	Human Population*	4,070,000	0.182	0.240	0.267	741,000	977,000	1,087,000
	Stock Yards Waste	36.5 M.G.	5650	7500	8330	206,000	274,000	354,000
	Corn Products Waste	17.5 M.G.	3750	5000	5670	66,000	87,000	99,000
	Totals					1,013,000	1,338,000	1,540,000
1940	Human Population*	4,425,000	0.182	0.240	0.267	805,000	1,062,000	1,181,000
	Stock Yards Waste	38.2 M.G.	5650	7500	8330	216,000	286,000	318,000
	Corn Products Waste	18.2 M.G.	3750	5000	5670	68,000	91,000	103,000
	Totals					1,089,000	1,439,000	1,602,000
1945	Human Population*	4,785,000	0.182	0.240	0.267	871,000	1,148,000	1,278,000
	Stock Yards Waste	40 M.G.	5650	7500	8330	226,000	300,000	333,000
	Corn Products Waste	19 M.G.	3750	5000	5670	71,000	95,000	108,000
	Totals					1,168,000	1,543,000	1,719,000

*Includes Minor Industrial Wastes."

nil at 32 degrees F., whereas at 86 degrees F., they are exceedingly active. It is thus apparent that in cold weather there is a large oxygen content in the water and a low rate of demand, whereas in warm weather there is a low oxygen content in the water and a high rate of demand."

* * *

Page 63:

"In view of such evidence as has been available and on the basis of the observed behavior of mixtures of sewage and clean water which have been shown to have reasonably definite general average rates of demand for oxygen, it is considered that a supply of dilution water having an initial oxygen content equal to the total 5-day oxygen demand load of the Sanitary District will be sufficient and satisfactory.

For the above reasons, and for the reasons more fully stated in Part V and Part VI, we conclude that the 5-day biochemical oxygen demand of the sewage, and purification plant effluents, will furnish the most useful criterion of organic load."

Page 64:

"Part V.

STANDARD OF MAXIMUM POLLUTION.

It is desirable that a standard should be fixed to measure the effectiveness of means to be taken to prevent excessive pollution of the rivers below Joliet. This standard should be applicable whether the protective measures consist of dilution from Lake Michigan, sewage treatment works, or both. It will be most desirably and conveniently applied at the foot of the Drainage Canal. A test must cover a period sufficiently long to represent conditions which might create a nuisance, to eliminate unavoidable errors in sampling, and to average up ordinary variations that might be caused by excessive discharge from the storm sewers.

It is regarded as essential that the standard should exclude settleable suspended matters of an organic character; otherwise deposits in the stream below Lockport, in the colder weather, will tend to rob the stream of oxygen in summer, thus producing undesirable conditions, the magnitude of which is not subject to prediction.

Subject to the above requirement, it is believed to be practicable to prescribe an oxygen content and an organic load, which, aided by reaeration and added dilution from streams below Lockport, will permit of satisfactory stream conditions at all places on the Illinois and Des Plaines Rivers, including freedom from nuisance, conditions tolerable for fishes in the Des Plaines and Upper Illinois, and such as to permit a thriving fish life in the lower Illinois.

Limitations of Standard:

In fixing a standard to be used as a governing basis for the pollution of the Illinois River, both now and hereafter, there are two considerations that should be set forth clearly in the beginning:

1st. It is economically impractical to expect that the Illinois River should be returned to a condition such as exists in streams which receive no pollution at all; *i. e.,* to a condition of pristine purity.

2nd. The existence of any appreciable amount of settleable putrescible material in the drainage course is apt to upset all efforts which are aimed at the maintenance of proper stream conditions through sewage treatment and regulated diversion."

* * *

Pages 71-78:

Reaeration:

"It is our belief that there will be enough reaeration to prevent a serious depletion of oxygen in the Drainage Canal if the recommended standard of pollution is adhered to.

When the mixed lake water and sewage reaches Lockport, in summer, the purifying action of the lake water is finished. The oxygen content of the liquid is practically zero. Nevertheless in its further flow to Chillicothe, the total organic units, passing that point in a given time, are greatly reduced through agencies other than Lake Michigan water. This, notwithstanding the fact that the normal load in the summer season is greatly augmented by river bottom deposits which have remained in refrigeration during the colder months.

An analysis of the studies of the U. S. P. H. Service for the month of August, 1922, indicate that the purifying agencies acting below Lockport and above Chillicothe, from sources other than Lake Michigan, are more potent in total than the total diluting water from Lake Michigan. These purifying agencies may include sedimentation, putrefaction, and oxidation. In our opinion oxidation is the chief factor. This opinion is reinforced by the fact that between Chillicothe and Peoria (in Peoria Lake) a distance of sixteen miles, the recovery of oxygen units in the water is nearly as great as was obtained in total diversions from Lake Michigan.

In addition to the natural agencies there are artificial agencies that may be called into action if needed to increase reaeration; namely, the fall at Lockport, and the available fall at the several state dams when the Illinois waterway is built. Several studies of the river indicate a marked recovery in oxygen at the Marseilles dam where much of the water is wasted over the dam. At Lockport it nearly all passes through the water wheels of the Sanitary District, with practically no oxygen gain at present.

Thus in our opinion reaeration even of still water is a most important agency of purification.

Dilution in Other Cities:

Attention is further invited to Table 15 which shows the dilution water available for several American cities which discharge untreated sewage into the streams along which they are located. The data contained in this table simply shows what has been allowed to exist as a permissible pollution and probably the conditions created therefrom in the several streams have varied from satisfactory to doubtful.

The recommended standard contained in this report (eliminating for the moment the matter of settleable solids) is that 5.9 cubic feet per second per 1000 human population will be required to properly dispose of the entire untreated sewage of the Sanitary District of Chicago during the warm weather season of the year.

TABLE 15.

DILUTION WATER AVAILABLE FOR SOME AMERICAN CITIES THAT HAVE NO SEWAGE TREATMENT.

	City	Name of River	Population Tributary 1920	Drainage Area Sq. Miles	Estimated Dry Weat Flow in C.F.S.		
					Total	Per Sq. Mi. Drainage Area	100 Tri
1	Cincinnati	Ohio	681,000	76,320	6,490	0.085	
2	Grand Rapids	Grand	171,000	4,900	1,433	0.292	
3	Iowa City	Iowa	17,000	3,140	128	0.041	
4	Lansing	Grand	57,000		265		
5	Washington	Potomac	541,000	12,555	2,300	0.182	
6	Minneapolis & St. Paul	Mississippi	680,000	35,700	1,600	0.045	
7	Dayton	Gt. Miami	210,000	2,598	342	0.131	
8	Pittsburgh	Ohio	1,216,000	19,020	1,670	0.088	
9	Des Moines	Des Moines	126,000		164		
10	Youngstown	Mahoning	287,000	958	167	0.175	
	Sums		3,986,000	154,233	15,150		
	Means					*0.095	
	Mean, No. 10 Omitted						

*Nos. 4 and 9 omitted.

Dilution After Purification:

We show in Table 16 a list of cities in which more or less complete purification has been adopted, together with the amount of diluting water that is available in dry weather to mix with the purified effluent in the stream below the purification works. The dilution is expressed in cubic feet per second per thousand of population based on the 1920 census.

It will be observed that in several instances the stream goes dry.

The numerical average dilution is .58 second feet per thousand people. The weighted average is .42 second feet per thousand people. Attention is called to the fact that as these cities grow the dilution ratio must become less, for in all cases, so far as known, there is no practicable means by which the dry weather flow of the stream will be increased.

As compared to the above figures the standard recommended in this report and the recommended purification works contemplate dilutions as follows: These dilutions are expressed in second feet of diluting water per thousand people as of the year 1935,

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TABLE 16.

DILUTION OF TREATED SEWAGE IN VARIOUS CITIES OF THE UNITED STATES.

City	Population 1920	Stream	Drainage Area sq. mi.	Estimated dry Weather Flow C.F.S.	Estimated dry Weather Flow C.F.S. Per 1000 Pop.	Method of Treatment
1. Akron, Ohio	208,435	Little Cuyahoga	..	76	0.36	Imhoff Tanks and Sprinkling Filters.
2. Calvert, Texas	2,099	Tidwell Creek	..	0	0.0	Separation Tanks, Sprinkling, Final Settling.
3. Fitchburg, Mass	41,029	N. Br. Nashua	62	25	0.61	Imhoff Tanks, Sprinkling Filters, Secondary Tanks.
4. Lincoln, Neb	54,948	Salt Creek	..	64	1.16	Separate Sludge Digestion, Sprinking Filters.
5. Madison, Wis	38,378	Yahara	235	35	0.92	Separate Sludge Digestion Sprinkling Filters.
6. Sherman, Texas	15,031	Town, Br.	..	0	0	Activated Sludge.
7. Champaign & Urbana	33,780	Salt Fork	75	0–2.6	0-.08	Imhoff Tanks and Sprinkling Filters.
8. Columbus, Ohio	260,338 *	Scioto	1,666	30–50	0.12-0.19	Imhoff Taks and Trickling Filters.
9. Decatur, Ill	43,818	Sangamon	862	0	0	Imhoff Tanks, Sprinkling Filters, Secondary Settling Tanks.
10. Oklahoma City	91,295	N. Canadian	..	0	0	Tanks and Trickling Filters.
11. Dallas, Texas	184,515 *	Trinity	5,950	130	0.71	Imhoff Tanks.
12. Austin, Texas	34,876	Colorado	37,000	130	3.72	Imhoff Tanks.
13. Ashland, Ohio	9,249	Jerome Fork	..	3	0.33	Tanks and Sand Filters.
14. Delaware, Ohio	8,756	Olentangy	..	4	0.46	Tanks and Contact Filters.
15. Fostoria, Ohio	9,987	Portage Creek	35	3	0.30	Screens, Storage Reservoirs, Sand Filters.
16. London, Ohio	4,080	Oak Run	..	3	0.73	Tanks, Contact Filters.
17. Mansfield, Ohio	27,824	Rocky Fork	32	5	0.18	Tanks, Contact Filters.
18. Plain City, Ohio	1,330	Big Darby Creek	268	3	2.28	Tanks, Contact Filters.
19. Shelby, Ohio	5,578	Black Fork Creek	40	2	0.36	Tanks, Intermittant Filters.
20. Westerville, Ohio	2,480	Alum Creek	150	2	0.81	Tanks, Contact Filters.
21. Crystal Lake, Ill	2,249	(Creek)	4	0	0.0	Tanks and Sand Filters.
22. Lexington, Ky	41,524	Town Br.	..	1.5	0.037	Imhoff Tanks, Trickling Filter.
23. Houston, Texas	138,276	Brays Bayou	155	5	0.036	Activated Sludge.
Numerical Ave	....	....	..	..	0.58	
Weighted Ave	....	....	..	..	0.423	

*Population of City and adjoining territory U. S. Census of 1920.

when recommended sewage works have been completed, and ten years thereafter.

With total diversion including dilution water and sewage of	In Year 1935	In Year 1945
4,167 second feet	.65	.5
6,000 second feet	1.1	.9
7,500 second feet	1.5	1.2
8,500 second feet	1.7	1.4
10,000 second feet	2.1	1.7

These figures when compared with the data shown in Table 16 tend to indicate that a liberal amount of dilution is provided by the recommended standard for pollution and the recommended works for purification. It would appear that if this dilution is not sufficient, then the satisfactory disposal of sewage in many of our inland cities is impossible.

Pollution and Fishes:

It is evidently desirable that our streams insofar as possible should be sufficiently pure to permit the continuance of the natural water life thereof, including the fishes. This matter is particularly important in Illinois River which has been the best fish stream in the Middle West. For many years it has supported a commercial fishery with a catch ranging from ten million to twenty-three million pounds per year. About seventy-five per cent of the catch has been the so-called coarser fishes such as Carp and Buffalo. The so-called game fishes have been present in large numbers, and the Illinois River has been the playground of the game fisherman, and is so at present in its lower reaches. Of recent years the commercial catch has materially declined due in part to causes other than sewage pollution.

Inorganic Wastes:

In certain parts of the country inorganic wastes are produced by industries that have poisoned the fishes and entirely destroyed them throughout long stretches of streams. Numerous industrial wastes are poisonous to fishes when present in certain amounts.

Upon the Illinois River, so far as we know, the inorganic pollution has not reached amounts to be seriously detrimental to fishes.

Organic Pollution:

Certain of the coarser fishes may live and possibly thrive in waters more or less heavily sewage polluted. There is, however, a limit to the suspended organic matters present in waters in which fishes may maintain healthy conditions. All the fishes and the attendant train of water life necessary for their existence are killed, if the air supply in the water is reduced to zero for a sufficient period. This exhaustion of air may result from the decomposition of organic matters.

With a reduction in the dissolved oxygen carried by a stream, the more sensitive fishes, and ultimately all the fishes endeavor to get away. If escape is impossible they die. Some of the so-called coarser fishes may tolerate for a time, conditions in which oxygen is practically exhausted from the water, due to their power to take, store, and use a certain amount of atmospheric oxygen. Other fishes do not have this ability.

During the winter of 1924-5, ice conditions on the Illinois River reduced the dissolved oxygen to figures as low as from .4 to 1.8 parts per million. Under conditions such as this all kinds of fish taken from nets under the ice were found to be dead. At another place where the water contained 2.5 parts per million of dissolved oxygen, only Carp, Buffalo, and Gars were taken alive, all in a stupid condition. In another part of the stream where the oxygen content was 5.4 to 5.8, all fish were found in good condition under the ice.

It is believed that the above figures typify minimum conditions under which the fishes may survive. They probably require more favorable conditions than this throughout most of the year, in order to propagate and thrive.

A study of the graphs and tables of pollution on the Des Plaines and Illinois Rivers herein-elsewhere shown, coupled with a knowledge of the places where fishes may now be found, throw some light upon limits of pollution.

Fishing conditions below Peoria in general are good. Above Peoria fishes are practically extinct except as follows: In seasons of low flow from the tributary streams, the dead line has moved downstream to Peoria and unfavorable conditions have been noted as far south as Havana. In seasons of maximum flow from the tributaries, the dead line moved upstream. It is understood that the 1925 season finds fishes in Peoria Lake, from which they have been largely or entirely absent for several years. This is probably due to the heavy summer flows in 1924.

The study of the river seems to indicate that where the dissolved oxygen exceeds the five-day demand of the organic matter in summer, and considerably exceeds it throughout the remainder of the year that fish may thrive providing that the minimum dissolved oxygen at any time is three parts per million of more.

In the works which we have suggested for sewage treatment at Chicago under various rates of dilution, and the standard herein-elsewhere set down for the liquid discharged by the Drainage Canal at Lockport, we believe that satisfactory fish conditions will be maintained throughout the greater part of the Illinois River. We believe that conditions will permit the coarser fishes to live at all places from Joliet to the Mississippi.

Recommended Standard:

After reviewing all the data which has been available relative to the past conditions which have prevailed in the Illinois River below Lockport, in addition to the studies which have been made and which indicate the sanitary quality of the waters of the streams which are tributary to the Illinois; and, with the purpose in view of seeking a reasonable degree of cleanness in the Illinois River below the terminus of the drainage canal; and, in the belief that the maintenance of such condition is not prohibitive in cost or unduly difficult of attainment; the following standards of maximum pollution are proposed:

The liquid discharged by the Drainage Canal, as evidenced by the average of representative samples taken for any thirty consecutive days shall:

(a) Be practically free from settleable solids deposited in two hours and

(b) Shall contain dissolved oxygen equal to, or exceeding, the biochemical oxygen demand of said liquid for five days when incubated at twenty degrees Centigrade.

(c) Shall contain not less than three parts per million of dissolved oxygen.

In connection with the second standard relating to the oxygen balance, it is expected that there will be times when a condition of extreme refrigeration will exist in the waters of the canal which may result in a five-day oxygen demand value in excess of the dissolved oxygen content, but it is considered that, with an absence of settleable, putrescible solids in the water and the probability of the presence also of an ample supply of dissolved oxygen, a violation of this standard under these conditions will not be detrimental to the maintenance of proper stream conditions in the Illinois River below the terminus of the Drainage Canal.

It is also suggested in connection with the application of these standards of permissible pollution that sewage treatment devices should not be expected to register maximum efficiency at all times, and that occasionally conditions will arise which will temporarily reduce their efficiency until proper corrective measures can be applied. Fallibility is characteristic of all things human, so that these standards are to be considered, as a rule, with occasional justifiable and unavoidable exceptions."

Pages 79-84:

"Part VI.

REQUIRED DEGREE OF PURIFICATION WITH VARIOUS DILUTIONS.

Our instructions require that we should report upon the purification works necessary under each of several diversions from Lake Michigan; namely

2,000, 4,167, 6,000, 7,500, 8,500, and 10,000 cubic feet per second.

We have been instructed to consider these quantities as stated to be total diversions from the lake, including the water contained in the sewage plus the water used for diluting purposes. Thus practically speaking, the total diversions is equivalent to the dry weather flow discharged at the mouth of the Drainage Canal near Lockport.

Water for Dilution:

For the purpose of this study the amount of water available for dilution in the critical period of the year, July and August, is considered to be the total diversion less the liquid volume of sewage of the Sanitary District. In this computation it will be assumed that the sewage liquid is substantially the same as that which was analyzed in determining the total organic load of the Sanitary District as summarized in Part IV of this report.

In the estimates for purification works hereinafter made, the above total diversions from the lake are considered as constant from year to year. The organic load of the city as shown in Table 12 of Part IV must grow from year to year. Experience indicates that during the hot weather months the sewage has been delivered at the sewer outlets in a condition practically devoid of oxygen. Within ordinary variations in the supply of water per capita, this will probably continue to be the fact. Therefore, with a constant total diversion from the lake and an increase in organic load which is delivered at the sewer mouths devoid of oxygen, the available diluting water will progressively decrease with the growth of the city, and the effectiveness of works for purification must progressively increase as time goes on.

Organic Load and Dilution:

The organic content of sewage for practical purposes must be determined at the point of delivery of the sewers. At this point in warm weather more or less oxidation has already taken place. The analysis represents the organic content of that particular sewage which has passed through a certain history as regards amount of dilution and in other respects. If the water supply per capita has been less, the analysis would have shown a sewage somewhat stronger in organic load per capita, for less oxidation would have taken place enroute to the sewer outlet. If the water supply per capita had been greater, the analysis would have shown less organic matter per capita, or more dissolved oxygen in the sewage, possibly both.

It is believed that when considering such variations in the use of water per capita as may occur in Chicago, it will be immateriel whether the organic wastes of the city are diluted by water taken into the sewers through the faucet or by water mixed with the sewage at the sewer outlet. It is our opinion, therefore, that it will be logical and proper to take the organic load of the District at the time when the analyses were made; to take the liquid volume of the sewage existing at the time when the analyses were made; to assume that all sewage is delivered to the stream devoid of oxygen; to assume that the liquid volume of the sewage will increase in proportion to the increase in the organic load, namely, that the consumption of water per capita remains constant; and that the available diluting water will be the total diversion less the liquid sewage computed upon the basis as above.

The Sanitary District has made a careful estimate of the total liquid load as of the year 1920 at 758 million gallons. This is equivalent to 253 gallons per capita. We have used the round number 250 gallons per capita in computing Table 17, which shows the total net dilution water available between 1925 and 1945 under the various specified total diversions from 2,000 to 10,000 second feet. The table also shows the available oxygen in the dilution water. These figures are used in Parts XIII, XIV, and XV of this report.

Necessary Purification Plant Efficiencies:

In selecting the type of treatment best adapted to supplement various rates of dilution, it is useful to estimate the average rate of purification that would be required to produce a satisfactory effluent. Upon the following pages we describe the method of calculation, and tabulate the principal results.

The degree of purification of the combined wastes of the Sanitary District of Chicago which must be accomplished in order to make certain specified diversions effective in maintaining proper conditions in the rivers which receive the discharge of the Drainage Canal, is determined on the basis of the daily oxygen required by the entire liquid-borne wastes of the District, and the supply of oxygen furnished daily by any given diversion of lake water.

TABLE 17.

ESTIMATED 'NET DILUTION WATER' WITH VARIOUS 'TOTAL DIVERSIONS' AND OXYGEN AVAILABLE FOR DILUTION IN JULY AND AUGUST.

Year	1925	1930	1935	1940	1945
Estimated volume of sewage delivered to stream devoid of oxygen—sec. ft.	1280	1410	1530	1650	1770
With 2000 sec. ft. Constant Diversion					
Net water for dilution sec. ft.	720	590	470	350	230
Available oxygen lbs. per day	31000	25400	20200	15000	9900
With 4167 sec. ft. Constant Diversion					
Net water for dilution sec. ft.	2887	2757	2637	2517	2397
Available oxygen lbs. per day	124000	118400	113200	108000	103000
With 6000 sec. ft. Constant Diversion					
Net water for dilution sec. ft.	4720	4590	4470	4350	4230
Available oxygen lbs. per day	203000	197000	192000	187000	182000
With 7500 sec. ft. Constant Diversion					
Net water for dilution sec. ft.	6220	6090	5970	5850	5730
Available oxygen lbs. per day	268000	262000	257000	252000	246000
With 8500 sec. ft. Constant Diversion					
Net water for dilution sec. ft.	7220	7090	6970	6850	6730
Available oxygen lbs. per day	310000	305000	300000	294500	289000
With 10000 sec. ft. Constant Diversion					
Net water for dilution sec. ft.	8720	8590	8470	8350	8230
Available oxygen lbs. per day	375000	370000	365000	360000	354000

The basic data for the first part of this computation is recorded in Part IV, Table 12, in which is shown the total oxygen required per day, separately and collectively, by the three polluting elements contributing to the load. This same table also shows the total daily oxygen loads of the entire district for the year 1925, and for five-year intervals to 1945.

One second foot of lake water per day during the warm months of the year (July and August) will supply forty-three pounds of oxygen, and the second feet of lake water required per day during July and August wil be as shown in the first portion of Table 18.

TABLE 18.

SHOWING DAILY OXYGEN LOADS AND DILUTION WATER REQUIREMENTS FOR POLLUTING UNITS.

Polluting Element	Polluting Unit	Pounds Oxygen Supplied During July and August Per Sec. Ft. Per Day by Diluting Water	Pounds Oxygen Required Per Day Per Polluting Unit on Basis of Oxygen Demand For			Second Feet Required Per Day During July and August Per Polluting Unit on Basis of Oxygen Demand For		
			5 Days	10 Days	20 Days	5 Days	10 Days	20 Days
Human Population	1000 Pop.	43	182	240	267	4.23	5.58	6.21
Stock Yards Waste	1 Mil. Gals.	43	5650	7500	8330	131	174	194
Corn Products Waste	1 Mil. Gals.	43	3750	5000	5670	87	116	132

TABLE 19.

SHOWING TOTAL DAILY DILUTION REQUIREMENTS AND PURIFICATION REQUIRED FOR SPECIFIED DIVERSIONS.

	Second Feet Required Per Day During July and August on Basis of Oxygen Demand For			Purification Required on Basis of Following Daily Diversions in Second Feet and for Oxygen Demand Values of 5 Days, 10 Days and 20 Days. (Expressed in Per Cent)																	
	5	10	20	5 Days						10 Days						20 Days					
Year	Days	Days	Days	2000	4167	6000	7500	8500	10000	2000	4167	6000	7500	8500	10000	2000	4167	6000	7500	8500	10000
1925	19,900	26,300	29,300	96.4	85.5	76.3	68.7	63.7	56.2	97.3	89.0	82.0	76.3	72.6	66.8	97.5	90.1	83.9	78.8	75.4	70.2
1930	21,700	28,600	31,900	97.3	87.2	78.8	70.5	67.3	60.4	97.9	90.3	83.9	78.7	75.2	70.0	98.1	91.3	85.6	80.9	77.8	73.1
1935	23,600	31,100	35,800	98.0	88.8	76.8	74.7	70.5	74.0	98.5	91.5	85.6	80.8	77.6	72.8	98.7	92.6	87.5	83.3	80.5	76.3
1940	25,300	33,400	37,200	98.6	90.0	83.2	76.9	72.9	67.0	98.9	92.5	87.0	82.5	79.5	75.0	99.1	93.2	88.3	84.3	81.6	77.6
1945	27,100	35,900	40,000	99.1	91.1	84.4	78.9	75.2	69.6	99.6	93.3	88.5	84.0	78.5	77.1	99.4	94.0	89.4	85.7	83.2	79.4

Taking, for instance, the second feet per day required for the year 1925, Table 12 of Part IV shows the total daily oxygen requirement on the five-day demand basis to be 856,000 pounds, consequently, 856,000 pounds divided by forty-three pounds gives 19,900 as the second feet required per day for untreated sewage.

Table 18 shows the daily oxygen loads for the polluting unit of each polluting element; also the second feet of water required per day during July and August for each polluting unit. These months were selected for use because they represent the critical period of the year both as regards oxygen supply and demand.

If it is desired to determine the pounds of oxygen available in one second foot of lake water per day, the result is secured by multiplying as follows:

Parts per million of dissolved oxygen in water × 0.646 M. G. in one second foot per day × 8.33 pounds per gallon, or parts per million of dissolved oxygen in water × 5.4.

The factor 5.4 is the product of 0.646 × 8.33 and is a constant.

Table 19 shows the second feet required per day during July and August for five-year periods from 1925 to 1945, and for five, ten and twenty-day oxygen demand values. The five-day demand is sixty-eight per cent of the twenty-day demand and the ten-day demand is ninety per cent of the twenty-day value. It is assumed in this computation that the strength of the polluting unit of each polluting element will remain the same during the period of time involved.

The second section of Table 19 shows the purification, expressed in per cent, required for gross diversions of 2,000, 4,167, 7,500 8,500 and 10,000 second feet per day and for oxygen demand values of five, ten and twenty days.

The computation showing the percentage of purification required, is simply one of subtraction and division, and may be illustrated by taking the first value in the table; viz., 96.4 which is arrived at as follows:

19,900 second feet —(2,000 second feet — 1,280 second feet) divided by 19,900 or 96.4%.

The percentage values in this table are carried to the first place beyond the decimal; however, this is not intended to imply that this degree of refinement should be followed in the use of these values as they constitute simply a record of a mathematical computation.

With these data in hand and a knowledge of practicable plant efficiencies, it is possible to select the types of treatment works that would produce required results.

Seasonal Variations:

All the computations hereinabove made refer to the critical season of the year, namely, the warm months of July and August. In the winter time each unit of lake water will carry about double the amount of oxygen available during the critical period. Furthermore, oxidation takes place at a slower rate during the cooler months of the year and the sewage is thus afforded the opportunity to travel further downstream, to be subjected to additional aeration and to be mixed with additional tributary waters.

For all these reasons, it is undoubtedly practicable to regulate the diversion from the lake in accordance with the needs of the situation existing from month to month. All the interests affected by diversion of water from the lake are concerned only with an average diversion. There appears to be no reason why it will not be entirely practicable to materially increase the flow herein estimated for the warm months of the year should occasion arise, and to save the water thus taken during other months of the year, thus staying within a stipulated average diversion.

Factor of Safety:

It must be admitted that it is not practicable to compute exactly the amount of diluting water that necessarily must be added to the sewage in order to obviate nuisance and to permit a thriving fish life. It is desirable that there should be a factor of safety to provide against error. In our opinion, it will be wise to adopt as the average diversion with various degrees of purification the amounts herein set down as required in the months of July and August, and to use the additional water available in the cooler months of the year as a factor of safety, thus permitting some increase of the dilution in the hot months to cover,

(a) The possibility of less reaeration in the lower river than herein contemplated.

(b) Washings from the sewers in storm that may be necessarily by-passed from the sewage purification plants.

(c) The accidental depletion in the oxygen in the lower river through the sudden death of green plant growths.

(d) Some degree of inferiority in the diluting water entering through the Sag Canal and other minor drafts on the oxygen supply not specifically considered herein.

Additional Oxygen:

No specific consideration has been given to additional oxygen that may be furnished by the effluent from the sprinkling filter plants and the activated sludge plants. This oxygen will be in addition to that obtained from the lake and from the other sources mentioned.

At the present time practically no aeration is obtained at Lockport in dropping the water from the Drainage Canal into the Des Plaines River in passing through the water wheels. It would probably be possible to add from one to two parts per million to the sewage by an overfall especially designed for aeration. This possibility will occur at all of the dams hereinafter constructed for navigation purposes on the Illinois River except where the water may be used for power purposes."

Page 85:

"Part VII.

PROTECTION OF THE WATER SUPPLY.

It must be a part of any scheme for sewage disposal that the water supply should be protected against any possibility of sewage contamination. Unless this is accomplished sewage disposal fails in its principal requirement.

This matter is particularly important to municipalities located on the shores of the Great Lakes. In all of these cities the lakes constitute the only practicable means for municipal water supply. In many instances the lakes are the only practicable means for sewage discharge.

In the Chicago region the means has been provided through the drainage canal, by which the great majority of all impurities are diverted from Lake Michigan. As will be pointed out, certain sources of pollution still remain, and will continue to exist, regardless of any improvements in the Sanitary canal. These sources of pollution are sufficiently great to seriously menace the water supply, unless adequate precautions are taken to guard against them.

Lake Shore Line:

The south end of Lake Michigan is relatively shallow. On the Chicago water front the distance outward for twenty-five feet depth varies generally from half a mile to a mile. The four-mile crib at Chicago stands in thirty-six feet of water. The depth of water is five and eight feet less at the other intake cribs, located at lesser distances from shore. Opposite the mouth of the Chicago River a depth of fifty feet is attained only at seven miles from the shore. Opposite the mouth of the Calumet River the same depth is only attained nine miles out. Opposite Gary the lake is deeper; fifty feet is attained at a distance of four miles from shore.

At the shore line there is a fringe of sand generally varying from ten feet more or less, at Chicago, to about fifty feet in the vicinity of Gary. This sand is a superficial deposit upon a bed of blue clay. The sand layer generaly disappears within a mile or two from shore, and the coating is scattering and thin at this distance out."

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Pages 86, 87:

"*Intakes and Pollution Sources*:

The distance of the Chicago Water Works' cribs from the mouth of the Chicago River, and Calumet River respectively are as follows:

	Miles from Chicago River Mouth	Miles from Calumet River Mouth
Wilson Ave. Crib	5.2	16
Carter Harrison Crib	2.3	12.7
Chicago Ave. Crib	1.3	12.2
Four Mile Crib	3	9.3
Hyde Park & E. F. Dunn Cribs	8	3.7

About six miles southeast of the Calumet River mouth, the Indiana Harbor canal is located, which taps the Grand Calumet River and discharges more or less sewage into the lake. Between these two points lie the Water Works' intakes of Whiting and Hammond, Indiana. The East Chicago intake is close to the shore, and only a short distance from the Indiana Harbor canal. The Gary intake is one and one-half miles from shore, six miles east of the Indiana Harbor canal and twelve miles from the Calumet River, measured in a direct line.

Sources of Pollution:

From the mouth of the Calumet River, north to the Cook County line, the sewers are now diverted from the lake. North of the Cook County line the towns between Highland Park and Waukegan sewer into the lake, except a small population in Highland Park which sewers inland toward the Skokie Marsh. Most of this sewage reaches the lake in a raw state at present. A portion of it is partially purified. These cities are members of the North Shore Sanitary District, intended to prevent excessive pollution of the lake. Conditions in this locality will probably be somewhat improved hereafter.

Indiana Towns:

The Indiana towns from the State line eastward, including Gary, now contain a population of 180,000. These towns are growing very rapidly. They are the sites of some of the largest industries in the Chicago region. Grand Calumet River is the main sewer of this region. Considerable sewage from the shore population in Hammond and Whiting, and from several industries, discharges directly to the lake. The entire City of Gary, and the greater part of the sewage in East Chicago and Hammond drains inland and only reaches the lake through the outlets of the Calumet.

Calumet River:

Attention is invited to the Grand Calumet and Little Calumet Rivers, and their relation to Lake Calumet, the outlet of the two streams into Lake Michigan, and the location of the Calumet Sag Channel. The Sag Channel is now designed for 2,000 second feet. At certain seasons of the year this is sufficient to take the sewage of the Chicago Sanitary District reaching it and the entire flows of the Grand and Little Calumet Rivers. In seasons of flood the Sag Channel is very insufficient to take the flow of these streams."

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Page 87:

"A large flood on these streams will undoubtedly wash great quantities of filth into Lake Michigan. The Calumet cities are beginning to study the question of sewage purification. Conditions in the future will no doubt be improved. No practicable means for sewage purfication will place these streams in condition where their waters may be periodically flushed into the water supply of the region even occasionally, with safety to the water supplies."

* * *

Pages 89-92:

"*Water Level Changes*:

Thus the Calumet Rivers and Lake are constantly 'breathing' in and out, toward and from Lake Michigan, depending principally upon the direction and velocity of the winds. In severe storms there are also very important barometric changes causing lake level fluctuations of several feet, bringing out heavy discharges for periods of many hours.

No doubt a similar condition exists where the Indiana Harbor canal taps the Grand Calumet River. This is a wide and deep harbor; only a small difference in head, an inch or less, is required for the interchange of water between the river and Lake Michigan. The sewage of Gary is supplmented by a large amount of condensing water from the steel mills. A rapid flow is produced in the upper Grand Calumet. The final disposition of this sewage laden water depends upon the stream cross-sections, and the relative elevations of the moment as between the Calumet Rivers and Lake Michigan.

Chance Pollution from Chicago River:

Prior to the construction of the drainage canal, conditions at the mouth of the Chicago River were somewhat similar to those previously described as prevailing in the Calumet region. The floods of the Chicago River have not been accurately measured. It has been estimated that the discharge capacity of the storm water sewers in Chicago makes it possible to produce a flood of about 11,000 second feet. Possibly it may be questioned whether this is so at the present time. If it is not true today it probably will be true as the city becomes improved to a greater extent than at present. With the drainage canal in operation at the rates of flow, which have prevailed during the past ten years, there is little danger of a material amount of flood water reaching Lake Michigan. There have been a few occasions, however, for a short time when a lakeward flow has been noticed following great rain storms. With lesser flows in the drainage canal these occasions would become more frequent and of longer duration.

At the present time lakeward flows of water would be very detrimental to the Chicago water supply. With the general adoption of sewage purification works, and the consequent cleaning up of the Chicago River, the dangers resulting from a lakeward flow of water would be diminished but there would still be a potential danger to the water supply. The purification of the sewage would not be a determining factor in the matter further than to diminish the quantity of filth that might be washed into the lake by flow reversal.

Travel of Pollution in the Lake:

The question as to the travel of pollution in the waters of Lake Michigan has been studied very thoroughly upon several occasions covering the Chicago water front, the water front opposite the Chicago north shore suburban towns and further north along the lake at Racine and Milwaukee. The results of these studies indicate similar conditions wherever sewage contamination reaches the lake and variable winds and waves are available for dispersion. The net results from these studies are well summed up by Major W. V. Judson in his paper on current in Lake Michigan, (first report Lake Michigan Water Commission, page 67).

> 'In my opinion the currents of Lake Michigan are so irregular in character that nothing would be gained worth the cost if attempt were made to obtain classified further data of a general nature. If it is a question of protecting the water supply of any particular locality, in any event, special study would have to be made inasmuch as the lake currents, available as they are, are much influenced by local conditions.
>
> We do know, and perhaps it is enough for the purposes of this commission, that occasional currents of considerable velocity, say several miles per hour, may be expected to arrive from almost any direction at any point reasonably near either shore of the lake. It is, therefore, apparent that in a general case if the waters of the lake are polluted by the discharge into it of large quantities of sewage, then, practical localities in the lake, even twenty or thirty miles distant from the point of entrance to the sewage, are not safe places in which to derive water for domestic use.'

Numerous special investigations of lake water condition, and the practical experience in the operation of the water works intakes, all indicate that in any particular place reasonably adjacent to the lake shore the quality of the water varies between extremely wide limits, including water almost sterile for considerable periods of time, the usual prevalence of moderately heavy pollution, depending upon the locality, with occasional gross pollutions, regardless of locality within practicable reach of a water works inlet.

Turbidity:

In drawing a continuous supply for the water works, it is necessary to locate the intake not closer than two or three thousand feet from the shore, in order to prevent ingress of sand and stoppages from anchor ice. A large supply must necessarily be taken further from the shore. The Chicago intakes are located from two to four miles outward.

Upon the west shore of Lake Michigan there are long periods of the summer season when the prevailing winds are from the west and southwest. At such times the surface water is blown out into the lake and is replaced by a return current along the lake bottom. At such times as this an exceptionally clear and pure water may be drawn from an intake located at or below mid depth, in twenty-five to forty feet depth.

Severe storms usually occur with an east or northeast wind. The surface water is blown in toward the shore, breakers are formed in the shallow water, the dirty sand and accumulated sludge adjoining the shore are stirred up and the water is returned lakeward as an undertow. The filth is, however, more or less intermixed, from bottom to top of water, in depths under fifty feet. At such times as this no clean or pure water can be obtained; the degree of the turbidity and extent of pollution depends principally upon the severity of the storm and somewhat upon its direction.

Wind conditions varying between the two extremes, which have been mentioned above, produce water conditions varying between the extremes of quality previously mentioned. There are certain conditions in storms when pollution may travel with great rapidity to a Water Works intake. The situation is much like the dissipation of smoke from a tall chimney. In relatively calm weather it may disappear within a short distance from the chimney. Under a current of wind it may stream out in one direction, traveling for miles. Pollution in a lake may travel in similar manner.

Present Condition of the Water Supply:

About two-thirds of the time the water drawn from the Chicago cribs is clear. It is often quite pure for short periods. However, its sanitary character cannot be depended upon from hour to hour. For a considerable portion of time at all the intake cribs it is distinctly bad. It can only be safely used after heavy doses of liquid chlorine. The required dosage has increased of recent years. Occasionally the Health Department has advocated boiling. The water as delivered to consumers is often decidedly turbid for weeks at a time.

The net result from a sanitary standpoint from the water as chlorinated has been very good, although there have been times when it has been suspected of producing typhoid fever in local instances, apparently due to chance pollution. To a large number of people the taste imparted to the water through the chlorine dosage is extremely objectionable. The demand is becoming stronger from year to year for a water free from the chlorine taste."

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Page 96:

"*Filtration*:

All objection to the present water supply can be eliminated by mechanical filtration, which is practical to apply to the Chicago water supply at a comparatively moderate expense. Filtration will give the citizens of Chicago pure clean water all the time, eliminating all possibility of danger from the chance pollutions of the lake. A number of cities upon the Great Lakes have already installed filtration works, including several of the smaller cities in the Chicago region, also including the cities of Detroit, Cleveland, Lorain, Erie and Niagara Falls. In several cases highly polluted waters are rendered entirely satisfactory for domestic consumption.

Polluted Waters Treated:

At several places on the Great Lakes, lake water is safely filtered after receiving the sewage of the city supplied through intakes removed only a comparatively short distance from the sewage outlets. Cleveland is an example of this type. At Cleveland the water is taken within 19,000 feet from sewer inlets receiving only partially purified sewage.

Upon the Ohio River, city after city, from Pittsburgh to Cairo, takes its water supply from the river, returning the sewage again to the stream, the water being again and again used by the cities downstream after filtration. Table 22 shows a list of these cities with approximately distances measured by river, from sewage outlet to water works intake.

Although it has been felt desirable, and is proper in all cases in the water supply of cities, to select as pure a source as possible even when filtration is resorted to, it has been necessary in some cases to filter more or less grossly polluted water. The results from the sanitary standpoint can safely be said to have exceeded expectations wherever filtration has been resorted to."

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Page 100:

"*Conclusion Regarding Filtration*:

Chicago is entitled to a clean water, safe from a Sanitary standpoint 365 days per year. This standard is generally demanded throughout the United States. It is only a question of time when it will be demanded in Chicago.

In our opinion filtration will insure a pure clean water for Chicago at all times, under any diversion through the drainage canal exceeding 2,000 second feet. It is our belief that no amount of diversion up to the present capacity of the Chicago drainage canal will insure safe water for Chicago without filtration. We believe this is true regardless of any practicable measures that may be taken for sewage purification. We believe it is the only adequate safeguard for the Chicago water supply."

Page 101:

"Part VIII.

Savings Effected by Metering."

* * *

Pages 112, 113:

"*Effect of Metering Upon Protection of Health*:

Few sanitary engineers will dispute the assertion that $36,000,000 spent for meters and filtration plants will do more to protect the people of Chicago from water-borne diseases than will an equal or larger amount spent for sewage disposal works.

It has been estimated that with a diversion of but 4167 c. f. s. there would be from seven to eight reversals of flow with discharge of sewage into the lake each year (see memorandum concerning drainage and sewage conditions at Chicago, Sanitary District, December, 1923). It is believed to be a safe assertion that seven or eight reversals with filtration would be much less hazardous than the one to four reversals now occurring.

Filtration is the first line of defense against water-borne disease. Its results are positive, continuous and effectual. It has repeatedly demonstrated its ability to safeguard the public health.

Filtration is only practicable at Chicago if universal metering is adopted. Its cost, together with large additional savings, can be recovered by metering. Metering is, therefore urgent to:

(*a*) Protect health against water-borne disease.

(*b*) Enable the water plant to furnish adequate service and pressure.

(*c*) Prevent wasteful expenditures for the waterworks.

(*d*) Prevent wasteful expenditures for intercepting sewers and sewage disposal works."

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Page 114:

"Part IX.

VOLUME OF SEWAGE.

The volume of sewage liquid to be treated is dependent upon:

1st. Tributary population.

2nd. The total water use, and

3rd. Infiltration.

So far as the sewage contributed by the domestic population of the Chicago Sanitary District is concerned, practically the entire amount will be collected in the five major sewage disposal plants; viz. The Des Plaines, Calumet, North Side, West Side and Southwest Side. The distribution of the population for the present and for each five year period up to 1945, is shown on Table 27.

It will be noted that the total population tributary to these five major plants is somewhat less than the total population of the district as estimated in Part III, and as shown in this table. It is estimated that approximately 105,000 people residing in the district are not tributary to any one of these five plants at the present time, and that it is probable, due to the rapid expansion of the suburban area, that this number will gradually increase and reach approximately 300,000 people by 1945. The sewage originating from this population must either be treated by outlying plants or by pumping to one of the major plants."

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Page 119:

"Part X.

FUTURE INTERCEPTING SEWER CONSTRUCTION.

At the present time there are approximately 150 sewer outlets emptying into the Chicago River and the Drainage Canal. The outlets on the North Branch as far south as Fullerton Avenue are all to be intercepted by the North Side intercepting sewers for which contracts have already been let. These intercepters serve the North Side treatment works. The present outlets from Fullerton Ave. South and West along the river and main Drainage Canal as far as the village of Summit, are yet to be intercepted and the dry weather flow carried to the proposed West and Southwest Side disposal plants to be located in the vicinity of Summit.

All but about thirty-five miles of the total length of intercepters required have already been built. Of this thirty-five miles, twenty miles will be required to collect the sewage and carry it to the West Side plant and fifteen miles will be required for the Southwest Side plant.

Basis of Intercepter Design:

A glance at the map, Figure 3, shows the routes of the proposed West and Southwest Side intercepting sewers. In general they parallel the river and the Drainage Canal, extending along both sides of these channels from Fullerton Ave. on the North Side, southerly to the main channel where they are joined by intercepters laid from the lake westerly, thence through the highly congested central district and along the Drainage Canal to the vicinity of Summit.

In most of this length the congestion is such as to almost preclude open cut methods of construction. The Sanitary District has accordingly adopted tunnel methods of construction, for which the heavy clay soil of this district is admirably adapted. The tunnels are in general at shallow depths below the street surface.

Other cities such as Milwaukee, Detroit and Cleveland are using tunnel rather than open cut methods quite largely. On paved streets in Milwaukee it has been found economical to use tunnels in constructing pipe sewers as small as ten inches or twelve inches in diameter.

With the conditions prevailing in Chicago, the adoption of tunneling rather than open cut methods will probably be economical, and will greatly reduce inconvenience to the public."

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Pages 128-133:

"Part XI.

METHODS OF SEWAGE DISPOSAL AND PRACTICABLE EFFICIENCIES.

Why Sewage is Treated:

The water-borne wastes of a city are given the general designation of sewage; however, in recent years the tendency has been to restrict the meaning of the word sewage to those wastes produced by household activities and to designate other water-borne impurities as industrial wastes. In this discussion the word sewage will be used as inclusive of both domestic and industrial water-borne wastes.

Sewage is composed of more than ninety-nine per cent of water and less than one per cent of soluble, colloidal, and solid constituents. These latter constituents, in turn, are partly inert or stable and partly organic or unstable. The unstable constituents of sewage are those which create sight and smell nuisances in overtaxed watercourses, and these unstable constituents may be rendered partially or wholly innocuous or inert by subjecting them to proper processes of treatment.

The destruction of the unstable constituents of sewage is a bacterial function which may be carried out in a watercourse or in treatment works in which satisfactory conditions are provided for bacterial activity. The processes by which unstable sewage constituents are destroyed in a stream are the same as those which result in their destruction in treatment works.

An important condition governing the bacterial destruction of sewage is that of oxygen supply, and in general, it may be said that in the presence of an ample supply of oxygen the process of destruction will proceed to completion in an inoffensive manner, and that in the absence of an ample supply of oxygen, the process of destruction will result in the production of offensive odors. In other words, aerobic conditions favor inoffensive destruction, whereas anaerobic conditions favor offensive destruction.

A somewhat analogous comparison is that of the operation of a steam boiler plant. When the furnace is properly operated, no smoke comes from the stack, but when the air supply is not properly adjusted, large volumes of smoke or unburned carbon come from the stack. A proper adjustment of the operaof the furnace eliminates the smoke nuisance, whereas an ample supply of oxygen will go far toward eliminating the smell nuisance in the bacterial destruction of sewage.

How Sewage is Treated:

The various agencies involved in the treatment of sewage may in a general way be classified as physical, chemical, bacteriological, and biological, none of which alone would suffice. The physical agencies are those of screening, sedimentation, aeration, diffusion, filtration, evaporation, etc. The chemical agencies are those involved in coagulation, sterilization, and in the mineralization of certain nitrified products. The bacteriological agencies are those in which the various species of bacteria are the active agents in putrefaction, fermentation, nitrification, and denitrification. The biological agencies are those in which low forms of animal and vegetable life destroy certain constituents of the sewage.

In the various methods of sewage treatment in use today practically all of the above agencies are involved to a greater or less degree. Sewage treatment methods in use today may be classified, in a general way, as follows: screening, sedimentation, sludge treatment, oxidation, filtration and sterilization.

Screening:

As practiced in the United States today, the screening of sewage may be classified on the basis of coarse and fine separation. Coarse screens (two to four inch clear opening) have a negligible value as a purifying process and serve simple to remove coarse solids which might obstruct passageways of pumps or be unsightly in treatment tanks or in a stream. Screens of this character usually remain in a stationary inclined position in the pathway of the incoming sewage and may be cleaned in position or lifted for cleaning.

Fine screens ordinarily have a clear opening of one eighth of an inch or less and usually rotate through the sewage stream. Most of them are power-driven and are provided with self-cleaning mechanism. The work accomplished by the fine screen is intermediate between that accomplished by coarse screening and very rapid sedimentation. The fine screen probably accomplishes less in proportion to its first cost and operating cost than do other methods of sewage treatment, except under certain conditions where fine screens are particularly adaptable.

Sedimentation:

The treatment of sewage by sedimentation has for its object the reduction of the strength of the sewage by the removal of the settleable solids. This is accomplished by passing the liquor through tanks at a very low velocity, which condition is conducive to a settling out of a portion of the solid constituents.

There are two general types of sedimentation tanks in use today; viz., those with one-story and those with two-stories. The one-story tanks are further divided into three classes, viz., those with large capacity for the sludge deposits which are removed at infrequent intervals, those with small capacity for the sludge deposits which are removed at frequent intervals, and those which are provided with a rotating and scraping mechanism for continuous sludge removal.

In the first type of one-story tank the incoming sewage is constantly in contact with actively decomposing sludge for considerable periods of time, and it becomes infected with the products resulting from the decomposition of the sludge. In this type of tank the sedimentation and sludge digestion functions are not separated.

In the second type of one-story tank, the injurious effect of the non-separation of the two functions is greatly reduced by frequent removal of the deposited sludge, while in the third type of one-story tank the separation of these functions is practically complete due to the continuous removal of the deposited solids.

In the two-story type of tank the separation of the two functions is accomplished by having a lower story for sludge reception and digestion and an upper story for sedimentation. The upper and lower stories are so constructed that by an arrangement of sloping bottoms, communicating slots, baffles, and gas vents, the deposited solids enter the lower compartment automatically and the digestion process may proceed without interfering with the sedimentation process and without infecting the incoming sewage. The two processes thus proceed harmoniously, but sludge withdrawals must be made at proper intervals. In many of the installations of this type, more or less serious trouble from foaming at the gas vents has been experienced and corrective measures to date have only been partially successful.

Sludge Treatment:

Solids removed from sewage by the sedimentation process are usually designated as sludge, which, in composition, consists of from ninety to ninety-eight per cent water, and from two to ten per cent of dry solids.

The treatment and final disposal of sludge is one of the most troublesome problems of sewage disposal. As sludge increases in moisture content, the volume produced per million gallons of sewage treated increases very rapidly. If the volume of sludge produced per million gallons of sewage be taken at 1.0 when the moisture content is eighty-five per cent, the approximate volumes for higher moisture content would be as follows: For ninety per cent sludge 1.5, for ninety-five per cent sludge, 3.0, and for ninety-eight per cent sludge 7.5; consequently those processes of sewage treatment which produce sludge of high moisture content, impose the burden of a treatment of large bulk per unit of dry solid content.

There are four general methods of sludge treatment in use today, viz., 1st, lagooning on land, 2nd, pumping into scows and disposing of it by discharging it into deep water at sea, 3rd, partially dewatering it on specially constructed sand filters, after which it may be used to fill waste places or spread on farm land and plowed in, 4th, partial or complete dewatering by pressing, centrifuging, or drying, after which it may be used as a fertilizer, or for filling in waste places.

The disposal of sludge at sea is obviously a method of limited availability. A high degree of dewatering of sewage sludge through the use of presses, centrifuges, and driers, with the intention of producing a marketable fertilizer, has as yet to be demonstrated as a feasible undertaking. The city of Milwaukee, after a thorough and painstaking study of sludge dewatering processes and the fertilizing value of sludge produced by the activated sludge method of sewage treatment, definitely committed itself to the production of fertilizer sludge and now has a very complete dewatering plant well under construction.

The treatment of sludge by methods Nos. 1 and 3 has been practiced most extensively in the United States with varying degrees of success. The chief difficulty which has attended the use of these methods of sludge treatment has arisen by reason of the fact that inadequate disposal areas have been provided.

Oxidation:

There are four methods of sewage treatment which might be termed 'finishing processes,' and which result in varying degrees of stabilization of the soluble, colloidal and solid constituents of the sewage. In each of the four methods of treatment, the several constitutents of the sewage are changed from an unstable to a stable condition largely by bacterial activities.

The four methods of securing a finishing treatment of sewage are the sand fileter, the contact bed, the tricking filter, and activated sludge. These four methods of treatment vary widely in capacity per unit of area, and taking the capacity of the sand filter per acre of area as 1.0, the relative capacities of the other methods of treatment per acre of area are approximately as follows: Contact beds, 7.0, trickling filters, 20.0, and activated sludge, 150.0.

The sand filter when properly designed, constructed, and operated produces an effluent which is clear and sparkling, practically free of suspended matter, very low in bacterial content, highly nitrified, and with an oxygen demand which is so low as to obviate any dilution requirements in a stream. Treatment of the sewage of the Sanitary District of Chicago by sand filters preceded by clarification in settling tanks would require at the present time not less than 8,000 acres.

The contact bed is an oxidizing device and consists of a square or rectangular tank filled with coarse broken stone or other suitable material of varying depth and operated ordinarily on a fill-and-draw plan. The effluent from which the contact bed is ordinarily not clear or well nitrified, has a comparatively high bacterial count, and an oxygen demand which requires some dilution for stability. Not less than 1,200 acres would be required to treat the sewage of the Sanitary District of Chicago for the year 1925, in addition to clarification in settling tanks.

The trickling filter is an oxidizing device similar to the contact bed in general construction but differing in the method of dosing. The tricking filter is dosed by a system of distribution pipes operated under a head and terminating with open spray nozzles properly located and spaced to give uniform distribution over the entire surface. The sewage is sprayed into the air and falls on the broken stone or other filtering medium through which it trickles to the underdrains which carry it away. The cycle of operation consists of a short dosing period, followed by a short resting period. Trickling filters which are properly designed, constructed and operated will produce effluents having a substantial total bacterial count, a varying suspended matter content, a marked reduction in oxygen demand, and often with a balanced oxygen relation if the applied sewage is not particularly strong. Not less than 400 acres of sprinkling filters would be required to treat the sewage of the Sanitary District of Chicago for the year 1925, in addition to a previous clarification in settling tanks.

The activated sludge process is a comparatively recent modification of older processes, and might be termed an accelerated bacterial treatment in water. The only sizable plants of this character in operation in the U. S. today are the two municipal plants at Houston, Texas. The literature describing the results of the experimental studies which have been made of this process is quite voluminous. Experimental plants of this character, which have been operated on both large and small scales, have given very promising results, and enough confidence in the process has arisen to justify its adoption for several very large installations.

The principal operations in this method of treatment are coarse screening, grit removal, fine screening, aeration in tanks, sedimentation, sludge aeration, return of a portion of the activated sludge to the aeration tanks, and treatment and disposal of the excess sludge.

The final effluents from this method of treatment as produced experimentally and by a small number of municipally operated plants have resembled sand filter effluents with the exception that they have ordinarily not been so completely nitrified. The production of an effluent which will not need dilution falls within the scope of the possibilities of this method of treatment. The degree to which sewage may be rendered stable by this method of treatment is capable of some adjustment. This method of treatment is one in which careful and experienced supervision is especially desirable.

Sterilization:

It is possible to effect a removal of from ninety to ninety-five per cent of the total number of bacteria in sewage by treatment with a sterlizing agent. The efficacy of sterilization will be governed by the size of dose, the comminution of the solids of the sewage, the distribution of the sterilizing agent, and the thoroughness and sufficiency of the contact of the sterilizing agent with the sewage.

Experience with the sterilization of sewage to date seems to indicate beyond doubt that it can be relied upon only to provide a lessening of the burden of water purification where a contact exists.

Sterilization destroys bacteria but effects no marked reduction in the organic load, consequently the sterilization of sewage has no marked effect on stream dilution requirements."

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Pages 137-144:

"*Sedimentation and Sand Filtration:*

The treatment of sewage by sedimentation and sand filtration in the United States today is, with one exception, limited to small municipalities and institutions. Numerous small plants of this character are in service today but definite information relative to rates of treatment and operating results is very scarce.

The largest sewage sand filter plant in the U. S. today is the municipal plant at Worcester, Mass., where, during the year 1923, 64.7 acres of sand filters were operated at an average daily yield of 55,000 gallons. A portion of the sewage of Worcester is treated by sand filtration by reason of the fact that natural sand areas are available.

The average results secured at Worcester, during 1923, by the sand filtration treatment were as follows:

Reduction in total albuminoid ammonia,	89%.
Reduction in total suspended solids,	100%.
Reduction in total oxygen consumed,	90%.

These average results represent a very high degree of treatment, with probably a negative dilution requirement.

Sedimentation and Sprinkling Filters:

The sprinkling filter, almost without exception, is dosed with clarified sewage and the effluent from the filter is often given a final clarification before being discharged into a watercourse. The improvement effected by tanks and sprinkling filters with and without final sedimentation is shown in Table 32.

An inspection of this table will show that of the total amount of suspended solids removed by tanks and sprinkling filters, eighty-five per cent is removed by the tanks and fifteen per cent by the filters. In the reduction of the oxygen demand by tanks and filters, the results in Table 32 show that of the total reduction, forty-five per cent comes from the tank treatment and fifty-five per cent from the sprinkling filter treatment. If the two Atlanta and the Baltimore results are eliminated, the ratio is for tanks forty per cent and for sprinkling filters sixty per cent.

A further inspection of this table will show that the reduction in oxygen demand in parts per million by tanks, with Baltimore results excluded, will vary, on the basis of average results, from thirty to sixty parts and that the reduction in oxygen demand by sprinkling filters, with the Atlanta results excluded, will vary, on the basis of average results, from seventy to ninety parts. The reduction by combined treatment in tanks, sprinkling filters, and final settling basins, with the Atlanta results excluded, will vary, on the basis of average results, from ninety to 135 parts. From a study of the best results obtainable, and as recorded in Table 32, a reasonable expectancy from tanks, sprinkling filters and final settling basins is as follows:

Removal of total suspended solids, 75% average result.

Reduction in oxygen demand, 85% average result.

Reduction in oxygen demand in p.p.m., 130 average result.

Data relative to the reduction in the number of bacteria by this method of treatment is limited to the total counts which have been made at the Baltimore sewage works for a number of years. Average values for a period of nine years from 1912 to 1920, inclusive, at the Baltimore sewage works are as follows:

Reduction in the total count on plain agar,	67%
Reduction in acid forming bacteria,	90%

TABLE 32.

SHOWING IMPROVEMENTS EFFECTED BY TANKS AND SPRINKLING FILTERS WITH AND WITHOUT FINAL SEDIMENTATION.

	Location		By Tanks	By Sprinklers	By Basins	By All
Total Suspended Solids Removal in % of Total	Atlanta	(B)	37	23	..	60
	Atlanta	(B)	70	13	..	83
	Columbus	(B)	55	10	..	65
	Fitchburg	(A)	79	4	3	86
	Lexington	(A)	60	16	5	71
	Baltimore	(A)	56	6	16	78
Oxygen Demand Reduction in % of Total	Atlanta	(B)	63	31	..	94
	Atlanta	(B)	62	31	..	93
	Columbus	(B)	25	55	..	80
	Fitchburg	(A)	38	49	..	87
	Lexington	(A)	40	49		89
	Baltimore	(A)	3	67	10	80
Reduction in Oxygen Demand in p. p. m.	Atlanta	(B)	32	16	..	48
	Atlanta	(B)	39	19	..	58
	Baltimore	(A)	4	76	11	91
	Columbus	(B)	39	87	..	126
	Lexington	(A)	57	71		128
	Fitchburg	(A)	59	75	inc.	133

(A) Tanks, sprinkling filters and final settling basins.
(B) Tanks, and sprinkling filters.

Sedimentation and Contact Beds:

Accurate operating results for tanks and contact beds are very limited; however, in Table 33 are shown the analytical data secured by the U. S. Public Health Service from a ten to twelve days' study of the Alliance, Ohio and Canton, Ohio, sewage works which employ this method of treatment. The average results from these two plants show that the improvement effected by this method of treatment was as follows:

Reduction in total suspended solids,	85%.
Reduction in oxygen consumed,	71%.
Reduction in oxygen demand,	80%.

The contact beds of these two plants treat between 600,000 and 700,000 gallons per acre per day, which is about one-third of the volume that can be treated satisfactorily by a sprinkling filter per acre per day.

Activated Sludge:

It is difficult to set a standard of practical efficiency for the activated sludge treatment of sewage without relying considerably on results secured by numerous experimental installations. Little doubt exists today as to the soundness of the principles involved, but some doubt does exist relative to the methods and appliances proposed for carrying out these principles. Machinery plays a greater part in this method of sewage treatment than in any other method in common use; also a very extensive air distribution system must be used, which comprises valves, pipes of many sizes, and in all cases final air outlets which are extremely small. The coefficient of dependability of some features of this process may be said to be somewhat uncertain; however, the several features of this process have been very carefully investigated by so many competent chemists and engineers and their conclusions have been so well founded that its adoption as a practical method of sewage treatment seems to be based on sound judgment.

In Table 33 will be found analytical data secured from a ten to twelve-day study of the north side and south side plants at Houston, Texas, analytical

TABLE 33.

SHOWING IMPROVEMENT IN SEWAGE EFFECTED BY SEVERAL PROCESSES.

Method of Treatment	Location of Works	Year	Period Covered	Total Suspended Solids P. P. M.			Settleable Solids Cu. Cm. Per Litre			Oxygen Consumed 30 Minute Boil			Biochemical Oxygen Demand Parts Per Million				
				Influent	Effluent	% Removed	Influent	Effluent	% Removed	Influent	Effluent	% Removed	Influent	Effluent	% Removed	Temp. Inc. Degrees C.	Days Incubated
Activated Sludge	Houston, North Side	1922 1923	2 Years	310	32	90							140	10	93		5
	South Side	1922 1923	2 Years	166	8	95											5
	Houston, North Side	1920	12 Days	200	17	93	2.5			45	10	78	115	11	90	20+	5
	South Side	1920	10 Days	226	7	97	2.1			38	6	84	112	7	94	20+	5
	San Marcos, Texas	1920	10 Days	110	3	97	2.2			29	85	71	67	16	76	20+	5
	Sherman, Texas	1920	11 Days	264	76	71	5.0	3.4	32	64	32	50	202	40	80	20+	5
	Des Plaines**	1922 1924	23 Mos.	160	38	77											
Tanks-Sprinkling Filters	Atlanta, Int. Cr.	1920	11 Days	106	42	60	2.4	Tr.	100—	35	10	71	62	4	93	20+	5
	Atlanta, Peach. Cr.	1915	1 Year	140	44	68											
		1920	11 Days	226	38	83	2.5	Tr.	100—	35	7	80	52	4	92	20+	5
	Baltimore	1913 1915	2¼ Years	125	58	54											
		1920	12 Days	159	41	74	2.9	Tr.	100—	43	12	72	120	8	93	20+	5
	Columbus	1912 1920	9 Years	177	39	78							114	23	80	27	1
		1920	11 Days	206	81	55	3.1	1.0	67	63	28	56	190	49	74	20+	5
	Fitchburg	1909 1924	16 Years	229	80	65							205	37	82	37	1
		1920	11 Days	297	42	86	2.7	Tr.	100—	65	16	75	154	21	85	20+	5
	Lexington	1919 1923	5 Years	222	35	89				139	52	63					
		1920	9 Days	166	48	71	2.4	Tr.	100—	32	10	69	144	16	89	20+	5
	Lincoln	1924	1 Year	299	131	56	3.3	1.1	67								
	Reading	1920	10 Days	145	31	78	2.0	Tr.	100—	45	14	69	118	15	87	20+	5
Tanks Contact Beds	Alliance, O.	1920	12 Days	152	17	89	2.0	Tr.	100—	38	11	71	92	20	78	20+	5
	Canton, O.	1920	10 Days	261	41	81	5.3	Tr.	100—	61	8	71	213	37	82	20+	5

**Sanitary District of Chicago.

results secured from a two years' operation of the same plants, analytical results of a ten to eleven-day study of the plants at San Marcos, and Sherman, Texas; also results of twenty-three months of operation of the Des Plaines River plant of the Sanitary District of Chicago. The Des Plaines plant has been operated on a combined routine and experimental basis, consequently the results are probably not such as might be secured if it had been operated with a single purpose in view.

Omitting from consideration the results from the Des Plaines and Sherman, Texas, plants, the results recorded in Table 33 indicate an improvement from this method of treatment as follows:

Removal of suspended solids,	94%
Reduction in oxygen consumed,	81%
Reduction in oxygen demand,	92%

The north side and south side plants at Houston, Texas, treat approximately six million and one and one-half million gallons per day, respectively. The San Marcos, Texas, plant treats approximately 200,000 gallons of sewage per day.

The use of the activated sludge process for the treatment of packing and stockyards sewage has been tested experimentally by the Sanitary District of Chicago, and the improvement effected, as based on data recorded on pages 47 and 134 of the Report on Industrial Wastes from the Stockyards and Packingtown in Chicago, Vol. 2, 1921, San. Dist. of Chicago, is as follows:

Removal of total suspended solids,	91%.
Reduction of oxygen demand,	96%.
Reduction of organic nitrogen,	83%.

Warm Weather Efficiencies:

In view of the fact that during warm weather there is an acceleration of bacterial activities both in polluted streams and in bacterial processes of sewage treatment, it is evident that dilution requirements in a stream during warm weather are at the maximum, and, for the same reason, it would seem that the efficiency of sewage treatment would be higher wherever bacterial processes are involved.

TABLE 33—Continued.

SHOWING IMPROVEMENT IN SEWAGE EFFECTED BY SEVERAL PROCESSES.

	Location of Works	Year	Period Covered	Organic Nitrogen Parts per Million			Dissolved Oxygen Parts Per Million		Nitrogen As $NO_2 + NO_3$ P. P. M.		Chlorine, P. P. M.	Ether Soluble Matter P. P. M.	Alkalinity, P. P. M.	Contributing Population	Average Daily Vol. Treated in M. G.
				Influent	Effluent	% Remove	Influent	Effluent	Influent	Effluent					
Activated Sludge	Houston, North Side	1922 1923	2 Years	......	......	......	0.0	4.1	0.0	3.5	......	......	......	......	5.16
	South Side	1922 1923	3 Years	......	......	......	......	......	0.0	10.6	......	......	......	......	1.58
	Houston, North Side	1920	12 Days	......	......	......	0.2	5.2	......	4.6	136	39	270	80,000	6.00+
	South Side	1920	10 Days	......	......	......	0.8	7.4	......	6.0	101	36	304	20,000	1.50+
	San Marcos, Texas	1920	10 Days	......	......	......	2.8	7.6	......	8.8	83	18	306	2,500	0.20+
	Sherman, Texas	1920	11 Days				2.5	6.2	......	1.2	129	69	415	......	0.33+
	Des Plaines**	1922 1924	23 Mos.	8.05	2.22	72	......	......	......	8.5	......	......	......	......	......
Tanks-Sprinkling Filters	Atlanta, Int. Cr.	1920	11 Days	......	......	......	0.0	5.4	......	3.1	93	104	77		
		1915	1 Year	......	3.6	......	......	......	......	5.6	......	......	......	50,000	......
	Atlanta, Peach. Cr.	1920	11 Days	......	......	......	0.0	5.7	......	2.1	86	83	68	......	......
	Baltimore	1913 1915	2½ Years	......	2.9	......	......	......	......	6.3	......	......	......	80,000	......
		1920	12 Days	......	......	......	0.2	5.2	......	4.2	86	40	136	......	......
	Columbus	1912 1920	9 Years	......	......	......	......	......	......	6.8	......	......	......	......	......
		1920	11 Days	......	......	......	1.7	4.8	......	0.6	113	100	211	......	......
	Fitchburg	1909 1924	16 Years	......	......	......	......	......	......	4.0	......	......	......	......	......
		1920	11 Days	......	......	......	0.3	7.9	......	6.1	70	63	97	......	......
	Lexington	1919 1923	5 Years	*1.75	1.49	69	......	......	0.9	8.5	61	......	......	......	......
		1920	9 Days	......	......	......	0.1	5.2	......	......	89	58	196	......	......
	Lincoln	1924	1 Year	......	......	......	......	......	......	......	......	......	......	......	......
	Reading	1920	10 Days	......	......	......	......	3.7	......	5.1	105	25	164	......	......
Tanks Contact Beds	Alliance, O.	1920	12 Days	......	......	......	3.0	5.7	......	2.8	47	37	184	......	......
	Canton, O.	1920	10 Days	......	......	......	0.5	0.7	......	0.3	79	62	342	......	......

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*Albuminoid Ammonia.

**Sanitary District of Chicago.

A study of the average monthly efficiencies at the Baltimore works for a period of nine years, the sand filtration treatment at Worcester, Mass., for 1923, and the Columbus works for the year 1913, indicate that the average efficiency for June, July, August and September is above the average efficiency for the year in the following amounts:

Baltimore, four per cent; Worcester, three per cent; Columbus, three per cent.

An average efficiency for the warm weather months of the year, of three per cent above the average annual efficiency is a reasonable assumption for sand filter, contact bed, sprinkling filter and activated sludge treatment.

Conclusion on Efficiency:

In consideration of treatment works for the largest sewage disposal plant in the world, we believe we are warranted in expecting the best of operating results. We conclude that it will be practicable to secure the following net efficiencies in the proposed Sanitary District plants, in the warm or critical season of the year, expressed in percentage of the biochemical oxygen demand removed from the sewage compared to sewage as delivered before treatment.

Tankage,	35%
Tanks and Sprinkling Filters,	88%
Activated sludge on Domestic Sewage,	92%.
Activated sludge on Stock Yards waste,	95%.

Applicability of Other Means of Sewage Disposal:

The subject of sewage disposal for Chicago would not be complete without consideration of certain means for sewage disposal that have been extensively used abroad but which are not considered to be adapted to the local situation at Chicago, particularly when taking into consideration the expenditures that the Sanitary District has already made. We believe it will be useful, briefly to outline these methods of disposal and to show why it would not be practicable or economical to adopt them.

Broad Irrigation:

The oldest method of sewage purification is the disposal of the sewage upon farm or garden land, commonly called Broad Irrigation. The sewages of Berlin and Paris are thus treated, and the method has been extensively used in Germany, France and England.

Inapplicable to Chicago Conditions:

If Broad Irrigation should be adopted for Chicago, about 60,000 acres or ninety-three square miles, would be required under the average rate of application to land as practiced in England, where, in general, available land contains more or less clay.

If sandy lands could be found, similar to that available for sewage disposal at Berlin, about 25,000 acres or thirty-nine square miles, would be required. It is believed that no such large areas are available, without carrying the sewage a long distance from Chicago.

No surface soils of a sandy nature are available nearer to Chicago than the east line of Gary, which is approximately forty miles distant from the Chicago loop district. A sufficient area could probably be found east of Gary, but the land is very rough and large expenditures in grading, or in pumping, would be required to make it useful.

A sewer about twenty-five feet in diameter would be required to accommodate the present total sewage of the Sanitary District. This sewer would cost about $1,500,000 per mile. Approximate estimates indicate that the initial investment in an outlet sewer and pumping works alone would exceed the cost of the intercepting sewers and the more modern methods of sewage disposal, for which we have previously estimated the costs. In addition it would be necessary to purchase the lands and put them into condition to receive sewage.

Site Below Joliet:

Before the drainage canal was built the suggestion was made to carry the Chicago sewage through a tunnel and dispose of it by gravity upon lands adjacent to the Des Plaines River below Joliet. This might have been possible with the quantities of sewage produced by Chicago thirty or forty years ago.

At the present time it would not be possible to find an acreage sufficiently large to treat the sewage by Broad Irrigation, delivering the sewage by gravity flow. Lands might be found to which the sewage could be pumped.

The land at this location is of a sandy and gravelly nature. It would probably be well adapted to sewage farming. Rough estimates indicate that the cost of development, including tunnel and pumping, would not be less than the figures previously given covering sewage farming on the lands east of Gary. Therefore the costs would materially exceed the costs of works, herein elsewhere estimated.

Broad Irrigation Not Practicable:

There are other and more important reasons why broad irrigation would not be applicable.

(a) Sewage farming is viewed with disfavor by American health authorities, as dangerous to public health.

(b) Climatic conditions are much less favorable in this region than in Western Europe by reason of the severe winters.

(c) The American public is less tolerant of local nuisances than the European public, and is less inclined to properly maintain its sewage works. A sewage farm would be an intolerable nuisance unless well operated.

Other Disposal Methods:

We have herein elsewhere mentioned contact beds and sand filters as means for secondary purification, which have been more or less extensively used by small cities and large public institutions. Either of these methods, by reason of the large areas required, would necessitate large expenditures for intercepting sewers to carry the sewage to more or less distant and remote locations. We believe that the relative areas required, as stated elsewhere in this report, are sufficient to indicate their higher cost as compared to the methods of sewage purification upon which we have prepared detailed estimates."

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Page 174:

"Part XIV.

REQUIRED WORKS WITH 4167 CUBIC FEET PER SECOND FLOW.

With 4167 cubic feet per second total flow in the Drainage Canal there would be available during the summer months of July and August approximately 113,200 pounds per day of oxygen in 1935 and 103,000 pounds per day in 1945. Of this total it has been shown in Part XIII that approximately 33,415 pounds in 1935 and 39,790 pounds in 1945 would be required to care for the effluent of the Des Plaines, Calumet, North Side, Argo and Stockyards plants. There would therefore be available from the flow of 4167 c. f. s. approximately 79,785 pounds of oxygen per day in 1935 and 63,210 pounds in 1945 to care for the effluents from the West and Southwest Side treatment plants.

The total oxygen requirement of the sewage reaching these plants in 1935 and 1945 is estimated as follows:

	1935	1945
West Side Plant	326,000#	349,000#
Southwest Side Plant	206,500	241,000
Totals	532,500	590,000

These totals are seven to nine times the oxygen available from the 4167 c. f. s. flow after the other plant effluent requirements have been satisfied.

The type of treatment adopted therefore must be such that it will reduce the bio-chemical oxygen demand in 1935 by approximately eighty-five per cent and in 1945 by approximately eighty-nine and one-half per cent. The two most practicable methods of accomplishing this reduction are by tank-sprinkling filter plants and by activated sludge treatment."

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Page 180:

"Part XV.

REQUIRED WORKS WITH MISCELLANEOUS FLOWS.

In addition to the channel flows of 10,000 c. f. s.

and 4,167 c. f. s. discussed in detail in Parts XIII and XIV, respectively, we have made studies of the requirements and the costs of sewage disposal with flows of 2,000, 6,000, 7,500, and 8,500 c. f. s.

Required Works with 2,000 *C. F. S. Flow:*

With 2,000 c. f. s. flow there would be available during the months of July and August approximately 20,200 pounds of oxygen per day in 1935, and 10,000 pounds per day in 1945. As hereinbefore shown, the oxygen requirements for the effluent of the Des Plaines, Calumet, North Side, Corn Products and Stockyards plants are 33,415 pounds of oxygen in 1935 and 39,790 in 1945.

Inasmuch as the effluents from the above plants require more oxygen even at the present time than is available in the 2,000 c. f. s. total flow in the channel, it is obvious that there is no practicable means of meeting the requirements of the pollution standard hereinbefore outlined with so small a flow in the channel.

Many cities are so located that standards less adequate are necessarily adopted; however, a pollution standard which provides for a thriving fish life in Illinois River cannot practicably be complied with when the total flow in the Drainage Canal is as low as 2,000 c. f. s.''

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Pages 193-195:

''*Summarization of the Construction Period Reasonably Required:*

It would be our opinion that five years' time, under average construction conditions, would be a reasonable minimum estimate of the time required to design and build the interceptors and sewage treatment plants at the costs herein outlined. Even with the most unfavorable construction conditions, the contingency of labor troubles, and similar delays, we can see no reason why the period should exceed eight to ten years.

All of the above is predicated upon the ability of the Sanitary District to finance the program within the construction period.

TABLE 50.

CONSTRUCTION PROGRAM ON LARGE PUBLIC WORKS.

Description	Approximate Cost	Start of Work or Date of Contract	Date of Completion	Period or Construction	Approximate Length	Ave. Exp. per Year in Period
Sanitary District Work:						
Main channel*	$29,700,000	1892	1900	7 yrs.		4,200,000
Calumet-Sag Channel	14,000,000	1911	1922	11 yrs.		1,300,000
North Shore Channel	4,100,000	1907	1910	3 yrs.		1,400,000
Calumet Treatment Works	6,125,000	1902	1922	2 yrs.		3,000,000
North Side Treatment Works	5,900,000	1923	1926**	3½ yrs.		1,700,000
Calumet Pumping Station	1,500,000	1918	1921	3 yrs.		500,000
Calumet Power Plant	1,165,000	1919	1922	3 yrs.		600,000
Evanston Pumping Station	512,000	1918	1921	3 yrs.		170,000
North Shore Sewer (1)	690,000	1913	1916	3 yrs.	7 mi.	230,000
Evanston Sewer	1,252,000	1916	1919	3 yrs.		400,000
North Side Intercepting Sewers						
Section 1	1,998,000	1921	1922	1 yr.	4 mi.	1,998,000
Section 3	2,625,000	1924	1926**	2 yrs.	1.8 mi.	1,300,000
Section 4	2,111,000	1924	1926**	2 yrs.	1.6 mi.	1,000,000
Section 5	1,498,000	1924	1926**	2 yrs.	1.5 mi.	750,000
Section 6	874,000	1924	1926**	2 yrs.	1.1 mi.	440,000
Chicago Produce Market	17,000,000	1925	1925	6 mo.		34,000,000
Union Station (Chicago) (2)	60,000,000	1916	1925	9 yrs.		6,660,000
Greater N. Y. Water Supply	176,000,000	1907	1917	10 yrs.		17,600,000
Milwaukee Sewage Disposal Plant	8,167,000	1918	1925	7 yrs		1,160,000
Milwaukee Intercepting Sewer	5,622,000	1915	1923	8 yrs.	33 mi.	700,000
Tulsa Water Supply	6,800,000	1922	1924	2 yrs.		3,400,000
Detroit Filtration Plant (3)	5,480,000	1920	1923	3 yrs.		1,800,000

*Includes cost of Main Channel and Des Plaines River Improvement but not main channel extension.

**Date of completion in contract.

(1) Sewers Built in Tunnel.

(2) Cost of Station only. Does not include cost of terminal arrangements. Total $95,000,000.

(3) Does not include cost of Pump Stations."

EXTRACTS FROM COMPLAINANTS' EXHIBIT NUMBER 18—HOUSE DOCUMENT NUMBER 4, 69TH CONGRESS, 1ST SESSION.

COMPLAINANTS' EXHIBIT 18.

Pages 1-2:

"LETTER
From the
CHIEF OF ENGINEERS, UNITED STATES ARMY
Transmitting
Report of the Board of Engineers for Rivers and Harbors on Illinois River, Ill.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, March 29, 1926.

HON. S. WALLACE DEMPSEY,
Chairman Committee on
Rivers and Harbors,
House of Representatives.

MY DEAR MR. DEMPSEY: 1. Referring to letter of the chairman of the Committee on Rivers and Harbors of the House of Representatives, dated April 17, 1924, inclosing a copy of a resolution of the committee dated April 14, 1924, requesting the Board of Engineers for Rivers and Harbors to review the reports submitted in House Document No. 1374, Sixty-first Congress, third session, and No. 50, Sixty-first Congress, first session, and in Rivers and Harbors Committee Documents No. 2, Sixty-seventh Congress, first session, and No. 7, Sixty-seventh Congress, second session, with a view to ascertaining and reporting the costs of constructing channels, each 200 feet wide and of 7, 8, and 9 feet in depth, respectively, in the Illinois River, Ill., between Utica and the mouth, including separate estimates for each of the aforesaid channels upon the basis of assumed diversions of water from Lake Michigan through the Illinois River of 2,000, 4,167, 7,500, 8,500, and 10,000 second-feet, respectively; also with a view to recommending such depth and width and channel in said river which would be most suitable for navigation purposes, the quantity of diversion from Lake Michigan necessary for navigation purposes in said recommended channel; and to report when, assuming all funds for such purpose available, the Sanitary District of Chicago can have in operation sewage treatment plants capable of treating the sewage with the amount of water recommended as necessary for navigation in such recommended channel, I enclose herewith the report of the board, dated March 23, 1926."

• • •

Pages 2-3:

"Question 1. What is the estimated cost of channels each 200 feet wide and of depth of 7, 8, and 9 feet, from Utica to the mouth of the Illinois River, on the basis of assumed diversions of water from Lake Michigan of 2,000, 4,167, 7,500, 8,500 and 10,000 second-feet?

4. The board, in paragraph 7 of its report, discusses in some detail the definition of diversion, its essential characteristics, and the effect of its amount, control, and fluctuations on a navigation plan. These points must be carefully studied to make the problem clear.

5. For any of the three depths referred to in the resolution, the river can be improved by two or more of at least four different methods, viz.: (1) complete canalization, using five locks and dams; (2) partial canalization, using the four existing locks and dams; (3) partial canalization, using the two existing Federal locks and dams and partially removing the two State dams; and (4) open-channel improvement, involving partial removal of all four dams. The district engineer submits estimates on all the cases involved. The division engineer and the board concur in his estimates, subject to the qualifications contained in paragraph 7(e) of the board's report. The following condensed table shows costs for a 9-foot channel:

Method of improvement	Instantaneous maximum diversion Lockport, cubic feet per second	Annual average diversion Lockport, cubic feet per second	Cost, thousands of dollars[1] First cost	Maintenance and operation	Annual charge (maintenance and operation plus 4 per cent first cost)
Complete canalization[2]	1,650	1,000	2,666	226	[2] 333
Partial canalization (State dams out)			5,133	210	415
Complete canalization[2]	3,300	2,000	2,619	216	[2] 321
Partial canalization (State dams out)			5,108	171	375
Open channel			6,050	105	347
Partial canalization (present dams retained[2]	4,580	3,000	1,914	191	[2] 268
Partial canalization (State dams out)			3,697	147	295
Open channel			4,482	97	277
Partial canalization (present dams retained)	6,050	4,167	1,383	180	235
Partial canalization (State dams out)[2]			2,262	133	[2] 224
Open channel			3,465	89	277
Partial canalization (present dams retained)	7,050	5,000	1,264	178	229
Partial canalization (State dams out)			1,789	130	202
Open channel			2,365	87	[2] 182
Partial canalization (present dams retained)	8,250	6,000	1,141	168	214
Partial canalization (State dams out)			1,349	126	180
Open channel[2]			1,925	80	[2] 157
Partial canalization (State dams out)	10,050	7,500	942	122	160
Open channel[2]			1,540	76	[2] 138
Partial canalization (State dams out)[2]	11,250	8,500	171	114	[2] 121
Open channel			1,320	70	123
Partial canalization (State dams out)	13,050	10,000	171	105	112
Open channel[2]			990	63	[2] 102

[1] On the assumption that the flow is regulated primarily in the interests of navigation.

[2] Indicates method which, considering, first, maintenance and operation costs, is cheapest, in terms of Federal money expended, for the given diversion."

Page 4:

"9. The board points out that the question turns essentially on an arbitrary definition of the degree of purity which is to be required in the waters into which the sewage effluent discharges and the point on the drainage canal or the Illinois River where this degree of purity is to be required. The arbitrary assumption made by the department for the purpose of this report was such that there should be no appreciable nuisance in the Illinois or Des Plaines Rivers due to Chicago Sewage."

* * *

Page 7:

"War Department,
Board of Engineers for Rivers and Harbors,
Washington, D. C., March 23, 1926.

Subject: Illinois River, Ill.

To: The Chief of Engineers, United States Army.

1. This report is submitted in response to the following resolution, dated April 14, 1924:

Resolved by the Committee on Rivers and Harbors of the House of Representatives: That the Board of Engineers for Rivers and Harbors created under section 3 of the river and harbor act approved June 13, 1902, be, and it hereby is, requested to review the reports submitted in House Documents Numbered 1374, sixty-first Congress, third session, and 50, Sixty-first Congress, first session, and in Rivers and Harbors Committee Documents Numbered 2, Sixty-seventh Congress, first session, and 7, Sixty-seventh Congress, second session, with a view to ascertaining and reporting the costs of constructing channels, each 200 feet wide, and of 7, 8, and 9 feet in depth, respectively, in the Illinois River, Ill., between Utica and the mouth, including separate estimates for each of the aforesaid channels upon the basis of assumed diversions of water from Lake Michigan through the Illinois River of 2,000, 4,167, 7,500, 8,500, and 10,000 second-feet, respectively; also with a view to recommending such depth and width of channel in said river which would be most suitable for navigation purposes, the quantity of diversion from Lake Michigan necessary for navigation purposes in said recommended channel; and to report when, assuming all funds for such purpose available, the Sanitary District of Chicago can have in operation sewage-treatment plants capable of treating the sewage with the amount of water recommended as necessary for navigation in such recommended channel."

* * *

Pages 12-13:

"Question 4. How much time would be required by the Sanitary District of Chicago to have in operation sewage treatment plants capable of treating sewage with the amount of water recommended as necessary for navigation in such recommended channel?

13. The question turns essentially on the phrase 'capable of treating the sewage.' The question is, what degree of treatment is to be considered satisfactory? The discharge from any form of sewage-disposal works capable of application to a great city like Chicago is an undesirable addition to a river; that is, it will decrease the purity of the river water. Depending on both the form of treatment adopted and the flow of the river, the effect may in the general case be anything from a very slight tainting of the water, quickly disappearing, to a gross and even dangerous nuisance. It is wholly a matter of degree.

14. To give any specific answer, therefore, the department was forced to assume some arbitrary standard. That followed was one which would assure that there should be no appreciable nuisance in the Illinois or Des Plaines River due to Chicago sewage. Based on this assumption, a report was obtained from a firm of expert sanitary engineers, which estimates certain sewage treatment works necessary with certain diversions to produce the required result; these figures, and some additional ones, are submitted by the district engineer. If the works should be made somewhat less efficient or the diversion decreased, or both, some nuisance would presumably develop. How much nuisance,

defined as above, the authorities are prepared to tolerate is a matter beyond the knowledge or purview of the board. It is also to be noted that, even with Chicago's sewage satisfactorily handled, there would still be a material nuisance in the river due to other sources of pollution.

15. It appears that treatment for a 1945 population to give the desired degree of purity can be handled by a suitable combination of the activated sludge method, Imhoff tanks, and trickling filters for diversions as great as or greater than 4,167 second-feet (annual average). For a diversion somewhat less than 4,167 second-feet (the exact figure has not been determined) it would become necessary to have recourse to sand filtration. Treatment can thus be provided for diversions at least as low as 1,000 second-feet. For zero diversion it would be necessary to deliver the effluent into Lake Michigan. The district engineer's report contains cost estimates for the various methods. The cost increases rather slowly as the diversion decreases to the point (somewhere below 4,167 second-feet) where sand filtration becomes necessary, then it increases more rapidly.

16. The question asked is, What time is required to construct the necessary works. The district engineer's estimate is seven years for any method not involving sand filtration or disposal in the lake; *i. e.*, methods practicable for diversions down to about 4,000 cubic feet per second or perhaps somewhat lower; and 10 years for any method involving these. This estimate is based primarily on a reasonable time to make plans and a reasonable rate of expenditure of the sums involved. The division engineer concurs. The board also concurs, and submits this estimate in reply to the fourth question, with the qualification that it is necessarily only an approximation."

* * *

Page 18:

"UNITED STATES ENGINEER OFFICE,
Chicago, Ill., March 3, 1926.

From: The district engineer.

To: The Chief of Engineers, United States Army, Washington."

* * *

Pages 25-27:

"SEWAGE DISPOSAL AT CHICAGO.

30. The last question raised by the resolution is: 'Assuming all funds for such purpose available, when can the Sanitary District of Chicago have in operation sewage-treatment plants capable of treating the sewage with the amount of water recommended as necessary for navigation in such recommended channel?' reference being made to the previous request for a determination of the amount of water necessary for navigation purposes in what was considered to be the most suitable channel in the Illinois River.

31. If the duration of a construction period for an undertaking as large as providing sewage treatment for most of the sewage from the Sanitary District of Chicago is to be estimated with any accuracy, fairly reliable information is necessary as to the best methods to follow, the extent and character of the major operations involved, and the difficulties likely to be encountered which might delay construction. This really is equivalent to an engineering study with a view to preparing a complete sewage-treatment program, including costs of construction and operation of the major facilities to be provided.

32. As a study of this character involved specialized engineering knowledge not immediately available to this office, authority was obtained to employ consulting engineers, and the firm of Alvord, Burdick & Howson, of Chicago, was retained for the purpose. The complete report of this firm is included in this report as Appendix D.

33. The consulting engineers were requested to report on the following:

(*a*) Determination of a pollution standard for the effluent from the Chicago Drainage Canal; this standard to be the lowest that will prevent the occurrence of nuisance in the Des Plaines and Illinois Rivers and will permit a thriving fish life therein.

(*b*) Determination of the extent to which purification measures must be taken by the Sanitary District of Chicago for each of the following average flows in the Chicago Drainage Canal: 2,000, 4,167, 6,000, 7,500, 8,500, and 10,000 cubic feet per second.

(*c*) Determination of the most feasible method of treating the surplus pollution, and, for each flow specified, the cost of the necessary works and the operating costs thereof.

(*d*) Determination of the time that reasonably would be required to build the necessary works for each of the flows specified.

34. It is evident that any program of sewage treatment should look to restoration of better conditions in the Des Plaines and upper Illinois Rivers. Almost universally, public sentiment is rapidly forming against further pollution of streams and is going to require the removal of most of it as soon as practicable. For this reason, in planning the necessary works for the Sanitary District of Chicago, it was felt wise to assume that a material improvement of conditions in these streams would be one of the objects to be attained, and accordingly an investigation was directed along the lines of determining a reasonable pollution standard.

35. The consulting engineers are of the opinion that no appreciable nuisance will result if the following standard is maintained:

The liquid discharged by the drainage canal, as evidenced by the average of representative samples taken for any 30 consecutive days, shall (*a*) be practically free from solids deposited in two hours; (*b*) shall contain not less than three parts per million of oxygen and enough to equal to exceed the biochemical oxygen demand for said liquid for five days when incubated at 20° C.

Whether adherence to this standard will produce exactly the results desired or not is unknown, but in view of the present extremely unsatisfactory conditions prevailing with upward of 4,000 cubic yards of settleable solids being dumped into the Illinois each day, and with periods of several months each year with no oxygen whatever present in the effluent, there is no question but what conditions will be improved materially. It should be understood that other sources of pollution are contributory to the Illinois River, and that with no contamination whatever from the Sanitary District of Chicago conditions in the Illinois will not be satisfactory until the rest of the communities now discharging their sewage into the system carry out satisfactory sewage treatment programs of their own. It so happens that the adoption of a standard that no appreciable nuisance will result carries with it the restoration of conditions which will permit fish life to thrive.

37. The next questions asked the consulting engineers have to do with the determination of the methods, extent, and costs of sewage treatment applicable for each of the flows in the canal. The following summarizes their findings as regards construction costs for 1935 capacities:

Annual average flow at Lockport	Cubic feet per second			
	4,167	6,000	7,500	8,500 and 10,000
Cost of construction of sewage-treatment works	$69,213,520	$68,726,620	$61,477,920	$57,415,240

38. The consulting engineers are of the opinion that no methods of sewage treatment known to be practicable will maintain the pollution standard unimpaired if the gross average flow at Lockport is as low as 2,000 cubic feet per second. The combined oxygen demand of the effluents from plants providing the most complete practicable treatment

known is considerably in excess of the supply available in 2,000 cubic feet per second. For small-scale operations, sand filtration has been known to provide practically 100 per cent treatment, but the consulting engineers doubt the efficacy of this method on as extensive a basis as would be required for Chicago's sewage, particularly with practically no diluting water available as a factor of safety.

39. For very low diversions it would be possible to conduct the effluents from the sewage-treatment plants through tunnels to an outfall located far out into the lake, remote from the water supply intakes. The advisability of such a procedure is doubtful, in view of the large population involved at Chicago, and the costs would be excessive."

* * *

Page 28:

"EFFECT OF PROPOSED DIVERSION ON CONSERVATION OF NATIONAL RESOURCES.

44. The improvement recommended in the previous paragraphs calls for an appropriation by Congress not only of funds from the National Treasury to defray the costs of construction, maintenance, and operation of the project but also of water from Lake Michigan, a national resource of limited extent, which is of immediate value to navigation on the Great Lakes and of potential value to water-power interests. It is a comparatively simple matter to judge whether the expenditure of funds is justified; it is more difficult to decide how far to go in the utilization of a limited natural resource which has economic values from several points of view.

45. To assist in the decision of this more difficult problem, this report includes as Appendix E a study of the economics of the diversion of water from Lake Michigan. The effect of each of eight different programs of water diversion is evaluated up to the year 1950, taking into consideration the more important economic factors involved, such as navigation, water power, sanitation, and riparian damages.

46. The results of this study are decidedly contrary to a continued diversion of 10,000 cubic feet

per second. On the other hand, they do not favor programs of reduction which result in final diversions as low as 3,000 cubic feet per second or lower (annual averages). The conclusions drawn indicate that the resources of the Nation, capital, fuel, and labor, will be conserved to the best advantage by reducing the gross annual average diversion to 4,167 cubic feet per second, or thereabouts, by the year 1935, and maintaining it at that point thereafter.

47. Apparently the appropriation of water recommended for the improvement of the Illinois River will not be adverse to the interests of conservation of national resources."

* * *

Pages 242-244:

"119. For average diversions below 4,167 cubic feet per second or thereabouts, a very serious damage, to an interest which might be classed as 'riparian,' comes as the result of the reduction in amount of water available for condensing purposes for the large central electric power stations operated by the Commonwealth Edison Co., and its affiliates. The Fisk-Quarry Street group of stations on the Chicago River now utilizes 1,250 cubic feet per second for that purpose; the Crawford Avenue Station now under construction on the main drainage canal, and partly in operation, will require 2,000 cubic feet per second; so that it can be seen that if the flow is reduced materially the requirements of these plants may equal or exceed the entire flow available.

120. To preclude any interference with navigation on the river and canal by this use of water for condensing purposes, the amount used should not exceed one-half of the total flow available; hence, if the flow is materially reduced, the capacity of the stations will be limited and the number of stations and the unit cost of each will be increased.

121. To determine the approximate effect of this condition, in the way of limiting the capacity of existing stations and the size of those proposed, it is first desirable to indicate roughly the distribution of the total flow as it passes through the various intakes

from Lake Michigan, as this distribution will have considerable effect on the availability of water for condensing purposes, at any particular power plant location. A tentative arrangement is indicated in Table 29 which follows:

TABLE 29.

APPROXIMATE DISTRIBUTION OF FLOW FOR LOW DIVERSIONS.

(Flow in cubic feet per second.)

Gross flow at Lockport	Sag Channel	North Branch Chicago River	South Branch Chicago River	Main drainage canal to Summit	DesPlaines River at Joliet
1,000	0	300	300	300	1,500
2,000	0	700	1,100	1,100	2,500
3,000	500	700	1,400	1,600	3,500
4,167	800	700	1,900	2,467	4,667

122. Based on the foregoing distribution of flow through the various intakes and upon information from the power companies as to present and future requirements, the effects of limiting the gross flow at Lockport to 3,000, 2,000, and 1,000 cubic feet per second have been computed in Table 30:

TABLE 30.

DAMAGE TO CHICAGO POWER INTERESTS BY REDUCTION IN FLOW THROUGH DRAINAGE CANAL.

Gross flow at Lockport (cubic feet per second)	Station	Flow at station (cubic feet per second)	Flow available for condensing (cubic feet per second)	Capacity in kilowatts					
				Present	Future	As limited by flow	Amounts affected Present	Amounts affected Future	Amounts affected Total
1,000	Northwest.......	300	150	165,000	205,000	45,000	120,000	40,000	160,000
	Fisk-Quarry.....	300	150	314,000	444,000	45,000	269,000	130,000	399,000
	Crawford........	300	150	235,000	800,000	60,000	175,000	565,000	740,000
	Calumet.........	200	100	187,000	210,000	30,000	157,000	23,000	180,000
	Ridgeland.......	300	150	0	1,000,000	60,000	0	940,000	940,000
	Joliet...........	1,500	750	50,000	1,000,000	300,000	0	700,000	700,000
	Total effect....	..	..	..	..	..	721,000	2,398,000	3,119,000
2,000	Northwest.......	700	350	165,000	205,000	105,000	60,000	40,000	100,000
	Fisk-Quarry.....	1,100	550	314,000	444,000	165,000	149,000	130,000	279,000
	Crawford........	1,100	550	235,000	800,000	220,000	15,000	565,000	580,000
	Calumet.........	200	100	187,000	210,000	30,000	157,000	23,000	180,000
	Ridgeland.......	1,100	550	0	1,000,000	220,000	0	780,000	780,000
	Joliet...........	2,500	1,250	50,000	1,000,000	500,000	0	500,000	500,000
	Total effect....	..	..	..	..	..	381,000	2,038,000	2,419,000
3,000	Northwest.......	700	350	165,000	205,000	105,000	60,000	40,000	100,000
	Fisk-Quarry.....	1,900	950	314,000	444,000	285,000	29,000	130,000	159,000
	Crawford........	1,900	950	235,000	800,000	380,000	0	420,000	420,000
	Calumet.........	600	300	187,000	210,000	90,000	97,000	23,000	120,000
	Ridgeland.......	1,900	950	0	1,000,000	380,000	0	620,000	620,000
	Joliet...........	3,500	1,750	50,000	1,000,000	700,000	0	300,000	300,000
	Total effect....	..	..	..	..	..	186,000	1,533,000	1,719,000

123. None of the programs for reductions in flow through the main drainage canal under consideration in this study contemplate a limit as low as an annual average of 3,000 cubic feet per second before the year 1940. Hence, the effects of such a reduction should be applied to conditions as they are likely to exist then. As the program for expansion of the local power system contemplates the completion of all of the stations listed in Table ...., before 1950, the full amount of the loss will be in evidence by that time. By 1940 this will equal the losses due to limiting the capacity of existing installations plus those due to the restrictions placed upon new construction up to that time. Based upon the expansion program of the utility companies, the total kilowatt capacity affected adversely by reductions in flow in 1940, 1945, and 1950, will be taken as follows:

Cubic feet per second	1940 Kilowatts	1945 Kilowatts	1950 Kilowatts
1,000	2,000,000	2,500,000	3,119,000
2,000	1,500,000	1,950,000	2,419,000
3,000	1,000,000	1,350,000	1,719,000

124. It is rather difficult to evaluate the effects resulting from these reductions in water available for condensing purposes. If the reductions took place at once, the loss would amount to the full cost of replacing the capacity destroyed by new installations elsewhere, but as they probably will not occur for some time, it is possible that depreciation and obsolescence will operate to reduce the amount of this loss and put it on a par with the effect on new construction.

125. If the flow is limited to 1,000 cubic feet per second for instance, the capacity at any one power plant site may not be greater than 200,000 kilowatts, below the point of discharge of the west and southwest side sewage treatment plants, and not greater than 45,000 kilowatts east of this point. As a result the required total capacity of 3,659,000 kilowatts, would have to be obtained by adding a comparatively large number of small generating stations whose in-

dividual requirements for condensing water were within the prescribed limits. A marked increase in first cost would result, plus another increase in operating costs. Unquestionably the combined effect would be a capitalized increase in cost of between $30 and $50 per kilowatt capacity affected depending upon the extent of the decrease in flow. The results, on this basis, would be as indicated below:

TABLE 31.

EVALUATION OF CHICAGO POWER LOSSES.

Gross flow at Lockport (cubic feet per second)	Increased cost per kilowatt	1940	1945	1950
1,000	$50	$100,000,000	$125,000,000	$155,950,000
2,000	40	60,000,000	78,000,000	96,760,000
3,000	30	30,000,000	40,500,000	51,570,000

126. As in the case of computing costs of sewage treatment systems for the lower diversions, the values thus computed for the power losses should not be taken as anything more than educated guesses of what the results might be. These values are merely indicative of the seriousness of the situation from the particular point of view involved."

* * *

Geo. B. Gascoigne, recalled on re-reference for Complainants. Sanitary Engineering expert, testified in prior 1927 hearing.

Direct Examination by Mr. Jackson.

Since the previous hearing I have visited the North Side and West Side sewage treatment works of the Sanitary District. I have kept in touch with this problem and the developments there; and, since about the first or middle of March of this year, have given detailed consideration to this problem. From my study and consid-

eration of the Chicago problem I have reached a conclusion as to what would be a practical, workable program for the disposal of the sewage of the Sanitary District of Chicago by means other than lake diversion without
10682 detriment to the water supply. This program consists of completely treating the sewage of the Chicago Sanitary District and filtering the water supply.

The sewage portion of the program consists of completing the North Side Works by installation of the pumping station which is necessary to make tributary to this plant the population which it can serve. It includes the completion of the pumping station, skimming tank, grit chambers, the two batteries of Imhoff tanks, and the sludge beds at the West Side Plant and the extension of the treatment at that plant by the activated sludge process with the necessary appurtenant pumping stations, power buildings, sludge beds, and the like.

At the South West Side site there should be installed an Imhoff tank activated sludge type of works. At the Calumet site there should be installed additional Imhoff tanks and either trickling filters or activation to provide oxidation or secondary treatment. The program also includes all intercepting sewers that are necessary to discharge sewage at each of these sites.

10683 With respect to the water supply the program calls for filtration of the entire water supply of the District in modern and efficiently operated filtration plants.

This program does not contemplate any flow at Lockport after its completion. The completion of this program with no flow at Lockport will provide a practical method for the disposal of the sewage of the Sanitary District of Chicago by means other than diversion without detriment to the Chicago water supply, and without producing conditions which will interfere with or cause a nuisance to navigation in the Chicago River.

Some modifications of or additions to this program would be practical, such as chlorination of the effluent from the sewage plants, extending the existing water intakes, or providing a new source of water supply for Chicago at some point opposite the northerly portion of
10690 the District in the vicinity of Wilmette. None of these modifications would be necessary to prevent detriment to the water supply.

It is practical to obtain a reduction of practically 100 per cent in bacteria by chlorination of the effluent of sewage disposal plants.

I have made estimates of the reductions in the diversion which would be practicable from time to time during the course of construction of this program. By December 31, 1929, the diversion can be reduced to 6,500 cubic feet per second in addition to the pumpage or used water
10691 supply. By December 31, 1935, no flow at Lockport is necessary if this program is carried out and completed.

10692 The foregoing reductions are not dependent upon the construction of controlling works.

If controlling works were constructed and placed in operation so as to prevent any reversals, it would be practical to reduce the diversion subsequent to December 31, 1929, and prior to the cessation of all flow on December 31, 1935, in accordance with the organic load removed from the River, by the additional treatment of sewage at the various treatment plant sites. I have not computed the practical reductions on that basis between December 31, 1929, and the termination of all flow on December 31, 1935. The basis of these reductions in diversion is in accordance with the reduction in the organic load placed
10693 upon the Chicago River and its branches. The estimates of reduction in the diversion are based upon maintaining conditions as they are, or improving them. My conclusions as to the reductions which would be practical,

take into consideration both the public health and navigation in the Chicago River as part of the Great Lakes-St. Lawrence system. The completion of this program will produce a satisfactory condition from both viewpoints.

Assuming the completion of the program outlined by me and no flow at Lockport, there will not be any visible supended particles recognizable as of sewage origin in
10694 the Chicago River coming from the sewage treatment plants. The conditions in the Chicago River in that respect will be improved with the completion of this program.

Assuming the completion of the program outlined by me and no flow at Lockport, there will not be any odors arising from the waters of the Chicago River due to putrefaction of the organic matter contained in the sewage effluents.

Assuming the completion of the program outlined by me and no flow at Lockport, there will not be any grease, oil, color or suspended matter on the surface of the Chicago River due to the flow from the sewage treatment plants. In that respect the conditions in the Chicago River after the completion of this program will be better than the conditions which now obtain.

Assuming the completion of the program outlined by me and no flow at Lockport, the waters of the Chicago River will not be offensive or injurious to the health
10695 of passengers or persons employed on vessels or persons employed on docks.

Assuming the completion of the program outlined by me and no flow at Lockport, the condition of the water of the Chicago River River will not be such as to result in an extensive growth of water plants.

A standard for water which requires conditions that will maintain a thriving fish life and a standard for water which requires absence of nuisance are not the same. The standard requiring a thriving fish life is higher.

The standard for thriving fish life is satisfactory for navigation but might not necessarily be satisfactory for health purposes. I have in mind that it might require a higher standard, or additional requirements beyond sim-
10696 ply dissolved oxygen, for health purposes, speaking from the standpoint of drinking water. It is different, considered from the standpoint of nuisance in the stream. The thriving fish-life standard is higher than either the standard required for no nuisance or for navigation. By the nuisance standard I mean as far as health is concerned; not for drinking water purposes, but for the purpose of living along and navigating over the waters.

Assuming the completion of the program outlined by me and no flow at Lockport there is a practical method of providing circulating water in the Chicago River if it were desired. That is the same method of pumpage described by the witness Howson.

It would be practical, but not necessary, to construct
10697 a sewer to discharge the effluents of the South and Southwest Side Plants into the South Branch of the Chicago River between the 39th Street Pumping Station and the mouth of the River. It is practical to pump circulating water through the Calumet-Sag Canal.

The effluent of a modern activated sludge plant discharged into an open channel is stable, odorless and clear. The effluent of a modern activated sludge plant discharged into an open tank will remain stable indefinitely.

There is a method whereby the effluents from the sewage disposal plants can be removed from the Chicago River and its branches. That method is by constructing
10698 sewers out to the Lake, as was described by the witness Howson. If there were any necessity to do so for the protection of navigation that would be practical. In my opinion it is not necessary.

Assuming the completion of the program outlined by me and the installation and operation of controlling works so as to divert all storm water overflow, but with no diversion or flow other than at times of storm, this program would practically provide for disposal of the sewage of the City of Chicago without detriment to the water supply or to navigation on the Chicago River as a part of the Great Lakes-St. Lawrence system.

Assuming the completion of the sewage disposal program outlined by the Sanitary District engineers, which contemplates diversion of effluents of such sewage disposal plants, and the diversion of storm water overflows into the Des Plaines and Illinois Rivers, it would not be necessary to add any quantity of dilution water from the
10699 Lake to protect public health or to prevent a nuisance to navigation in the Chicago River as part of the Great Lakes-St. Lawrence system.

Assuming the completion of the program proposed by the Sanitary District Engineers, except that there would be no diversion of dilution water from the Lake, nuisance conditions would not result in the Drainage Canal or the lower river from the sewage effluent and excess storm water, if that program should be modified so that it would take large amounts of storm water as suggested in my program.

Assuming that there would be a mean annual diversion of 1,000 second feet at Lockport for navigation purposes, that would not modify or affect the program outlined by
10700 me other than to prevent an absolute cessation of diversion on its completion. Such a flow for navigation purposes would not modify my estimate of time of construction or the effectiveness of the program in protecting public health and navigation on the Chicago River, nor would the effectiveness of the program or the time required for construction be modified if lockage water not in excess of 1,000 second feet were taken.

Each tank of a unit of aeration or Imhoff tanks does not require a separate detailed design. When one of a group or unit of Imhoff tanks for a particular plant has been designed it is largely a matter of multiplication of units because the design remains the same.

Cross-Examination by Mr. Adcock.

I testified on direct examination that certain treatment 11262 could be made of from two to three times the average sewage flow instead of 50 per cent of the average flow as proposed by the Sanitary District at time of storm. I further stated that this could be done without any enlargement whatever and with the present facilities at the North Side Plant or at the West Side Plant after the completion of the program. Assuming that the channels, gates and weirs and meters in the West Side Plant have been designed and are built to carry a maximum flow equal to 1½ times the average sewage flow, and that the flow through the plant is by gravity, I do not know whether it would require enlarging of all these structures if the flow to be passed through the plant is to be made equal to two or three times the average flow. If it were necessary to enlarge those structures my answer made to the question on direct examination would be incorrect.

11263 I did not make any investigations of the hyraulic loads and elevations in that plant to determine whether certain treatments could be given to two or three times the average flow at storm times. I do not know through what conduit at the North Side Treatment Works the excess flow from the preliminary settling tanks would be passed in order to discharge it into the North Shore Channel, assuming that two or three times the average sewage flow were put through that plant at storm times. As to the possibility of doing so, if there is no conduit through which to discharge such excess, if it could not be done, it can not be done.

If storm water flows into the River, it would exert an oxygen demand. The heavier organic matter would settle
11264 out into the canal and river system if it were discharged into the river at storm times.

I stated a little while ago that there would be organic matter discharged, if it was so. If this organic matter should be discharged in the winter and should stay there in the summer, it might exert an oxygen demand on the overlying liquid. I do not know whether there would be putrefaction.

Under Complainant's Exhibit 238, I understand that if controlling works were installed, both the effluents from the plants and storm overflows would be discharged down
11264-11266 the Des Plaines River during periods of storm.

If flushing water were provided in the Cuyahoga River at Cleveland at dry weather times, so that the water would be pumped into the River and flow toward the Lake, it would have the effect of carrying the pollution in the Cuy-
11266-11267 ahoga River more quickly to the Lake. With flushing there would be more bacteria carried out into
11267-11268 the Lake with the sewage.

Darwin W. Townsend, for Complainants, on Re-reference. Sanitary Engineering Expert.

Direct Examination by Mr. Jackson.

In addition to the contact through the preliminary report on the North Side sludge disposal plant at Chicago, I am generally familiar with the sewage disposal and water supply at Chicago. Since being retained as a consultant in this case, I have given detailed study to the Chicago problem and have arrived at a conclusion as to

what would be a practical program for the disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion and without detriment to the
10709 Chicago water supply. Such a program consists in completely purifying the sewage of the City of Chicago in the most efficient manner and the filtration of the entire water supply. This program includes the completion of the North Branch sewage pumping station which will permit the utilization of the North Side sewage plant to its full capacity; the completion of the West Side plant now under construction; the design, construction and placing in operation of the proposed Southwest Side plant and such additions to the existing Calumet plant as may be necessary to completely purify the sewage from the Calumet District. This program contemplates complete treatment which should be accomplished by following the West Side tanks now proposed and under construction with activated sludge tanks, aeration and sedimentation; the construction of a complete activated sludge plant at the Southwest side and the completion of the Calumet plant as an Imhoff tanks trickling filter plant.
10710 This program involves the filtration ot the entire water supply by appliances of the most efficient type with no extension of the present water intakes.

This program does not contemplate any flow at Lockport after its completion and would provide a practical method for the disposal of the sewage of the Sanitary District of Chicago with no flow at Lockport and without detriment to the Chicago water supply.

It would be practical from time to time, during the course of construction of the program outlined by me,
10716 to reduce the amount of lake water diversion. On and after December 31, 1929, the present rate of lake water diversion may be decreased. The extent of that decrease either would be proportionate to the reduction of the

organic load removed by sewage treatment plants at that time, or would be limited by the extent to which the reduction could be made without causing reversals of the Chicago River. Either factor may be the controlling factor, depending upon the hydraulics of the River. I have not made any estimate of reduction in c. f. s. at any time prior to the completion of the program. My opinion as to the practicability of reduction is based upon a standard of maintaining the *status quo* at least. My opinion that reduction would be practical takes into consideration the effect on the public health and navigation of the Chicago River as part of the Great Lakes-St. Lawrence
10717 system. The completion of this program, with no flow at Lockport, would provide satisfactory conditions from both standpoints.

Assuming the completion of the program outlined by me which contemplated no flow at Lockport, there would not be any visible suspended particles recognizable as of sewage origin in the Chicago River coming from the sewage treatment plants. The conditions in that respect would be superior to the conditions which now obtain in the Chicago River.

Assuming the completion of the program outlined by
10718 me which contemplates no flow at Lockport, there would not be any odors arising from the waters of the Chicago River due to putrefaction of the organic matter contained in the sewage effluent.

Assuming the completion of the program outlined by me which contemplates no flow at Lockport, there would not be any grease, oil or floating material on the surface of the Chicago River due to the flow from the sewage treatment plants. In that respect conditions would be improved over the conditions now obtaining in the Chicago River.

Assuming the completion of the program outlined by me, which contemplates no flow at Lockport, the waters of the Chicago River would not be offensive or injurious to the health of passengers or persons employed on vessels or persons employed on docks.

Assuming completion of the program outlined by me
10719 the condition of the waters of the Chicago River would not be such as to result in excessive growth of water plants.

A standard for water which requires the maintenance of a thriving fish life is not the same as the standard which requires the absence of nuisance. The standard for water which requires the maintenance of a thriving fish life is not one which is ordinarily adopted and accepted to satisfy public health requirements from the standpoint of nuisance or to prevent interference to navigation.

10720 Assuming completion of the program outlined by me, which contemplates no flow at Lockport, it is practicable to provide circulating water for the Chicago River, if so desired. Circulating water if so desired could be pumped into the canals and river through the existing station at the north end of the North Shore Channel, where equipment is now installed to the capacity of 1,000 c. f. s., and by providing pumping equipment at the Calumet for pumping circulating water through the Sag Channel into the Drainage Canal.

The effluent of an activated sludge plant is stable, odorless, clear and sparkling. The effluent of an activated sludge plant discharged into an open tank will remain
10721 stable indefinitely. This program could be varied so as to entirely remove the effluent from the Chicago River and its branches by diverting the effluent from all of the four plants directly through underground tunnels in an easterly direction into the Lake. If that were necessary

to protect navigation in the Chicago River and its branches, it is practicable. I consider it unnecessary.

When I stated that upon the completion of the last of the sewage plants in 1935, all flow at Lockport could be terminated, I assumed that then the water filtration plants would be completed. If they were not completed, it would be necessary to have controlling works after the completion of the sewage treatment program to prevent reversals in the Chicago River.

Assuming the completion of the program outlined by me, and the installation and operation of controlling gates so as to divert all storm water overflow, but with no diversion or flow other than at times of storm, this program would practically provide for the disposal of the sewage of the Sanitary District of Chicago without detriment to the water supply or to navigation on the Chicago River as part of the Great Lakes-St. Lawrence system from a nuisance standpoint.

Assuming the completion of the sewage disposal program outlined by the Sanitary District engineers at the
10723 March hearings, that is, complete treatment plants (activated sludge except at Calumet where there would be sprinkling filters), and diversion of the effluent and storm water run-off, it would not be necessary to add any quantity of diluting water from the lake in order to protect the public health or to prevent a nuisance to navigation in the Chicago River as part of the Great Lakes-St. Lawrence system.

There is always oxygen available in the effluent of a properly operated activated sludge plant.

Assuming the completion of the program outlined by the Sanitary District Engineers of Chicago but with no diversion of diluting water from the lake, conditions of nuisance would not develop on the Drainage Canal or in the lower rivers from the sewage effluent and storm water.

Assuming that there should be a mean annual diversion of 1,000 c. f. s. at Lockport for navigation purposes, that would not affect or require any modification of the
10726 program proposed by me. It would not affect my estimate of time of construction or the efficiency of the program in protecting the public health and preventing nuisance to navigation.

The Milwaukee Sewage Disposal plant was designed to and is serving a population of 640,000. The Milwau-
10940 kee plant also has an industrial load equivalent to a population of approximately 200,000. Measuring the size of the Milwaukee plant on the same basis as was suggested at Chicago, it is a plant for a population of 840,000. That method of measuring the size of a sewage disposal plant has not been followed in Milwaukee.

Cross Examination by Mr. Adcock.

From 1914 until 1917 I was employed in the capacity of chief draftsman and chief designer for the Milwaukee Sewerage Commission. Designs and plans were prepared by me, or under my direction for the
10964 sewage testing or experimental station for the city of Milwaukee. At that time the testing station was considered necessary from the standpoint of determining the character of sewage disposal to be used by the city. That plant consisted of the sewage treatment units recognized at that particular time, Imhoff tanks, trickling filters, chemical precipitation tanks, sludge tank and all the sewage handling accessories consisting of pumps, screens, etc. These experiments in Milwaukee were carried on to determine just which of the processes enumerated might be best adapted to the sanitary conditions

existing at Milwaukee. The Imhoff tank, sprinkling filters and secondary sedimentation process, the activated
10965 sludge process and the electrolitic process were tested out. A sewage experimental station was maintained until 1922 or late in 1921. A sewage testing or demonstration plant is still maintained at Milwaukee entirely separate from the practical plant but on a scale that is comparable with the original testing plant in size. The experimental work carried on from 1914 to 1917 was for
10966 the purpose of determining how best to treat sewage. The character of the sewage at Milwaukee and its various constituents were determined as part of the routine. Analyses of the sewage were made; the amount of industrial waste was determined at that time. That was necessary in order to determine the design of the plant. The demonstration station is maintained at Milwaukee now for the purpose of determining, in units of size which are easy to handle and manipulate, how the efficiency of a
10967 large plant can be further improved. If other processes of a different character were introduced in the art, it
10968 would be tested out there, if it had not been tested previously elsewhere, for the purpose of learning how it would operate at Milwaukee.

10969 Experiments were commenced in Milwaukee in 1914 and the operation of the experimental plant continued until 1917. The last year of its existence the original testing station, as it was ultimately revamped from time to time, was operated for the purpose of determining how best to dewater the sewage sludge. A testing station was maintained after 1917 and is still maintained. Mr. Hatton reported to the sewerage commission with reference to the result of these tests. The sewerage commission obtained reports from consulting engineers. Mr. Eddy was engaged by the commission to review the experimental work which had been carried on in connection

10970 with the activated sludge process up to that time. I do not recall when Mr. Harrison P. Eddy was employed but his report was made around about 1917. I do not recall any other consulting engineers having been engaged with Mr. Eddy. My recollection is that Mr. Eddy was retained as consulting engineer until designs for the aeration and sedimentation tanks were completed late in 1921.

I designed the plant at Milwaukee and was responsible to Mr. Hatton as Chief Engineer for the designs of the project. My work in designing the plant was done under the direction of Mr. Hatton. Mr. Eddy was consulted with reference to the design of parts of the plant.
10974 Mr. Eddy reviewed and studied the work which had been conducted in the sewage testing station, prepared a report and recommended that further tests be conducted to enable him to form his conclusion as to the adaptability of the process to the work to be done. Mr. Eddy recommended that comparative aeration tests be continued in tanks running parallel 10 or 15 feet in depth. Mr. Eddy reviewed plans of the aeration and sedimentation tanks. His suggestions were pursued and he approved the plans as finally adopted. Mr. Eddy and I were in agreement at the time the plans were completed. I was in responsible charge of the design of the activated sludge plant at Milwaukee.

I have followed in a general way the work which Chicago has done in so far as the design and placing in
10977 operation of the disposal plants are concerned, having previously been interested in the original report on the North Side plant.

10978 I knew that the Sanitary District was carrying on experimental work and made two visits to the old 39th Street station when it was in operation in 1914 and 1915 during the time that Milwaukee was interested in sewage experimental stations. I understood that the experimental work was being carried on for the same purpose as the experimental work at Milwaukee.

I am familiar with the design of the North Side sewage disposal plant at Chicago and the functions that it is expected to perform. I visited the North Side plant once
10979 since it has been in operation which was about a week ago. I visited the West Side plant on the same day. On this inspection trip I started from downtown Chicago about 1:30 P. M. and first visited the West Side plant in company with Messrs. Allen Hazen, of New York,
10980 J. W. Ellms, a witness here, and Mr. L. R. Howson. I spent about half or three-quarters of an hour at the West Side plant. I did not walk over the Imhoff tank construction but saw the construction work in progress from the roof of the pumping station. I did not go over the portion of the Imhoff tanks which is practically completed, nor to the grit chamber, the meter house or sludge drying beds. I inspected the pump house and went up on the roof of that building and thereafter left the plant.

10981 My familiarity with the Chicago harbor is very general having never made any investigations of any part of it for any particular purpose or ridden upon it. I have never been on the Chicago River or any of its branches, on the North Shore channel or on the Drainage Canal. I
10982 observed the controlling works at Lockport from the outside in 1924. I was driving from Ottawa to Chicago
10983 but am unable to recall whether I was on the main road at the time. Construction work was in progress in the vicinity of Lockport and I had dinner in the construction camp with the superintendent whom I knew. That was the only time I had seen the Lockport controlling works. I do not know anything about the Calumet harbor. I have observed the

Milwaukee harbor very frequently, especially in the vicinity of the sewage plant outlet. The outfall of the Milwaukee sewage plant is right alongside of the outlet of
10984 the three rivers making up the Milwaukee harbor.

I made no investigation of the size of the Southwest Side sewage plant of the Sanitary District, but understand that it is to be designed for a daily capacity of 300 million gallons daily and is to be of the activated sludge type.

10985 I understood that the size of the different units in this plant had already been determined or figured out by the Sanitary District. I obtained these figures in conference with Messrs. Howson, Gascoigne, Ellms and Hazen during the last week. I started to arrange some data which I thought might be wanted with reference to the Chicago situation about 2 weeks ago and have been active in it since a week ago to-day. I was employed
10986 about 2 weeks ago.

I had a number of conferences with the gentlemen mentioned at Cleveland beginning last Friday morning, April 12th. Mr. Hazen was there. I conferred with these gentlemen Friday, Saturday and Sunday when I started for Washington. Further conferences were had on the
10987 train. Mr. Howson was present. Mr. Howson, Mr. Hazen and I reached Cleveland on Friday morning.

At the Milwaukee plant the normal flow is about 82 million gallons per day. During times of storm the flow through the coarse screens, grit chambers and fine screens is at the rate of approximately 250 million gallons per day. Through the aeration and sedimentation tanks the flow during the storms is confined to 30 million gallons per day,—that is during storms and thaw run-off.
11022 That is a little better than 25 per cent of the ordinary capacity of the aeration part of the plant.

The construction and operation of tunnels directly from the sewage disposal plants at Chicago to the lake for the purpose of carrying the effluent would still leave the storm water problem; and sewage would go into the river and lake with storm water. The effluent would be discharged directly into the lake.

If the Chicago River and its branches were flushed by 11026 means of pumps at Wilmette, Calumet and 39th Street, any filth in these rivers would be carried to the lake more quickly because that would increase the velocity.

Redirect Examination.

When work was started on the sewage problem at Milwaukee, the activated sludge process was in its infancy. The problem of designing and constructing an activated sludge plant to-day would not be comparable to the problem that was presented to a sanitary engineer in 1914.

Assuming that the large sanitary organization of the Sanitary District of Chicago commenced to study the methods of the disposal of the sewage of the Sanitary District by artificial processes in 1911, it would be possible to have a reasonably adequate amount of data on the problem by 1929.

11028 Assuming that the Sanitary District organization started special tests and experiments to determine the best methods of treating packing house wastes in 1912 or 1913 and continued to make those tests for 3 years, that should afford reasonably adequate data as to the nature of the treatment required. It is not likely that the waste from the slaughter of hogs at the present time would be substantially different from the waste that obtained from 1912 to 1915.

Recross Examination by Mr. Adcock.

I think that the character of the waste at Packingtown is the same as in 1917 when the investigation was made. I do not know whether any changes in process have been made in the manufacture of the products at Packing-
11033 town. Possibly there may have been changes made. The volume of the waste might be different. I assumed that the Sanitary District in deciding to build the Southwest Side plant had settled the matter of whether the character of the waste is the same now as in 1917. I understood that the Sanitary District proposed to build. Assuming that
11034 the Sanitary District has no reliable information upon which to base the design of that plant, the plant should not be designed until that information is obtained.

By reducing the normal capacity of the Milwaukee treatment plant from 85 million gallons daily to only 30 million gallons daily in time of storm overflow, the normal efficiency of the plant, considering just the aeration and sedimentation tanks and not the plant as a whole, is reduced to about 35 per cent. The reason for that reduction at Milwaukee is that a standard for the fertilizer material produced has been established. The Milwaukee plant agrees to furnish users with a fertilizer material containing from 6½ to 7 per cent of nitrogen. During the storm flow a good deal of grit and silt and clay is carried in the diluted sewage and finds its way
11035 into the aeration tanks, unites with the sludge being aerated; and in the resulting fertilizer there is an excess
11036 of ash and a decrease of the nitrogen content. This is done in order to make the fertilizer better. A better price is obtained for the fertilizer if people know it has not this mineral matter in it.

BY SPECIAL MASTER.

From the standpoint of sewage treatment, there is not any reason why the plant should not run to full efficiency in time of storm.

Further Cross-Examination.

If the plant were to run to full capacity during time of storm, about 85 million gallons daily would be taken through the aeration tanks.

The Milwaukee crib or water supply intake is about 5 miles in a straight line northeast from the mouth of the
11037 Milwaukee River. At times during the spring usually there is a short period when boiling the water is encouraged. The health commissioner issues bulletins with reference to the boiling of the water.

By Special Master.

The Milwaukee water supply is not filtered. It is chlorinated with no filtration.

Further Cross-Examination.

Chlorination is practiced all the time.

Redirect Examination.

The preliminary tanks at Milwaukee are so-called grit chambers. They are not Imhoff tanks but just straight precipitation tanks. The Imhoff tank has a much greater
11038 detention period than the grit chambers. The grit chambers merely precipitate the inorganic matter or grits. The Imhoff tank precipitates suspended solids other than inorganic matter. With Imhoff tanks before the aeration tanks, there is more of the organic matter removed before the sewage gets to the aeration tank

than with the type of tank used at Milwaukee. Packing house wastes are treated at Milwaukee.

By Special Master.

11039 There are no controlling works at Milwaukee.

Recross Examination.

There is no means at Milwaukee by which the sewage effluent or storm water carrying sewage could be removed from the water supply.

Joseph W. Ellms, recalled.

Direct Examination by Mr. Jackson.

Sanitary and Water Purification Expert.

Testified in prior 1927 hearings.

10727 In my previous testimony I stated that my experience was limited to the design and construction of the Cleveland filtration plant and my experience in water supply. Since the previous hearings, I have had charge of the operation of the water filtration plants and sewage disposal plants at Cleveland.

I have given study to the question of water supply on the Great Lakes with particular reference to Chicago. Since the decision of the Supreme Court in January in this case, I have given particular attention to the Chicago problem. The program for the disposal of the
10728 Sanitary District sewage by means other than lake diversion outlined on Exhibit 238 is a practical, workable program.

I specialize in water supply, but I am familiar with modern sewage disposal treatment in its relation to water supply problems. I understand what is involved in the program on Exhibit 238 with respect to sewage disposal, so far as it is related to the water supply program.

Assuming the completion of this program as outlined in Exhibit 238 and no flow at Lockport, the Chicago water supply will be better than at present.

As to any additions to or modifications of the program shown on Exhibit 238, that would be practical, though 10731 unnecessary, in my opinion. There might be an extension of some of the tunnels which would draw water from farther out in the lake. There might be a substitution of one new intake with tunnels to a single filtration plant in the vicinity of Wilmette, but these are not absolutely necessary for the completion of the program. These additions, such as the extensions of the present intakes, or the substitution of a new intake off the North Shore in the vicinity of Wilmette would constitute an improvement of the present standard or quality of the Chicago water supply. The program appearing on Exhibit 238 will maintain or improve the present standard or quality of Chicago's water supply, but it would be perfectly practicable to build a new intake off the North Shore, if it were desired to use a higher standard for the Chi- 10732 cago water supply. If the city of Chicago decided to construct a new intake off the North Shore in the vicinity of Wilmette, a single filtration plant would be all that would be required.

In my previous testimony I made an estimate of the cost of such a single water filtration plant. There has not been any change in conditions since that time, that would materially affect my estimates. If there has been any change, I think it would be on the side of a decrease in the cost.

Assuming the completion of the sewage treatment program, which is ou ined on Exhibit 238, the construction

10733 of the water filtration plants at the present intakes and no extension of the intakes, and assuming no flow at Lockport, the resulting conditions in the Chicago River would not be injurious to or create any nuisance to navigation.

Assuming the completion of the sewage treatment program outlined in Exhibit 238, the installation of water filtration plants at the present intakes without any extension thereof and a mean annual flow of 1,000 c. f. s. at Lockport for navigation purposes, the Chicago water supply would be as good as at present.

Cross-Examination by Mr. Adcock.

I was not present at the Chicago hearings in March.
10766 Subsequently to the opinion that was rendered in this case on January 14, 1929, by the Supreme Court, I started work on this matter in preparation for testifying about a month ago.

10767 I am familiar with the works that have been constructed by the Sanitary District for sewage disposal. I am also familiar with the program which the Sanitary District has submitted here for future construction work and disposal of the sewage of Chicago or artificially treating it. I visited the North Side plant and the West Side plant; and I have seen the site of the Southwest Side plant. The works constructed or to be constructed, as proposed by the Sanitary District under this program, are, from the standpoint of present knowledge of the art of sanitary engineering, the best possible works to be constructed from any practicable standpoint to completely treat the sewage arising within the District. Even though that program is completely carried out, there will be some matter of sewage origin at times in the Chicago River and its branches which has not received treatment. This matter or substance would not be visible. I understand that the storm flow will carry more or less sewage, but it will be very much diluted.

10769 Lake Michigan is the present water supply of Chicago.

Assuming the completion of the program as outlined by the Sanitary District Engineers, assuming that the sewage effluent is discharged into the Lake at dry weather times, assuming the diversion of the storm water overflow and sewage effluent at times of storms, and assuming
10770 no water filtration works, the quality of the water
10771 would not be as good as it is now coming through the intakes for chlorination. In other words, the Lake Michigan water would be affected by the sewage effluent. If the sewage effluent passes into the lake without any filtration of the water taken for the water supply, I would con-
10722 sider it harmful. My answer on direct examination is based on water filtration in addition to complete sanitary treatment.

10896 Assuming that the effluent of the sewage treatment plant flowed into the lake in dry weather and that at time of storm the storm flow is diverted by controlling works at Lockport into the Des Plaines River, I have not made any computation on the maximum load of B. Coli that would have to be handled by the water filtration plant.

I have taken into consideration the effect of the operation of controlling works at the North end of the Drainage Canal. I understood that these controlling works were to be operated at storm times so as to cause the discharge of all the sewage effluent and all the storm water into the Des Plaines River from the Sanitary Canal in times of storm. From a sanitary standpoint, having consideration for a water supply and conditions of navigation in the Chicago River, I understood that the storm period when the controlling works would so operate would
10897 be from 4 to 5 hours. It would be necessary to put these

controlling works in operation some hours before the storm commenced. It would be necessary to keep the controlling works in operation as stated during the period
10898 of the storm. I understood the purpose of the operation of these controlling works to be to keep the storm water flow out of the lake, and also any other substance that was in the Chicago River or its branches at that time. That was in order to keep the filth or pollution out of the lake due to the storm and to discharge it to the Des Plaines River. It would be necessary to keep these controlling
10899 works in operation after the storm only for such length of time as the storm flow was in operation,—that is, as long as the flood flow continued, until it was back into a normal flow. That is, not necessarily back to a dry weather flow but to an average flow that would take away the principal portion of the flood water. That is, it would be necessary to keep the controlling works in operation as long as there was any storm water passing from the
10900 sewers directly into the river and that did not go through the sewage purification plants. It would be necessary to keep those controlling works in operation for sometime after that in order to remove from the Chicago River and its branches and from the canal the dirty, polluted water that had accumulated there during the period of the storm and the flow due to the storm.

I approve the program shown on Complainant's Exhibit 238. The carrying out of that program would not
10901 prevent the fact of purified sewage effluents appearing in the river, because the river is to take the discharge of this purified sewage effluent from the treatment works and carry them to the lake.

The storm flow and any other substances that were in the rivers would be carried to the Des Plaines River if it were assumed that the controlling works were operated for that purpose.

I have seen the report issued by the Municipal Research Bureau of Cleveland entitled "The Report upon Correlation of Water Purification and Sewage Disposal in Cleveland," of March, 1926. At Cleveland a portion of the 10908 sewage is treated in Imhoff tanks at one plant, at another plant the floating matter is removed by screenings and grit chambers, and the third plant is an Imhoff tank and trickling filter plant. Cleveland has a combined sewer system the same as Chicago. At Cleveland about 30 million gallons of sewage a day are treated in the Imhoff tank plant, about 90 million gallons a day receive only wire grating and grit chamber treatment and the other plant is treating only a small amount of sewage at the present time. The first two plants mentioned were put in operation in 1923 and the last plant in 1928. There is a total of 120 million gallons of sewage treated at Cleveland per day. That represents 120 million gallons out of 125 million gallons of the measured sewage at these plants at 10909 the present time. Not all of the sewage passes into these plants. At the southerly plant not all of the trunk sewers are connected with the interceptor, and, therefore, not all is collected, nor is the low level district in the valley at the present time sewered and none of that sewage passes into the plant. It goes directly into the river. I estimate the total ordinary flow of sewage at Cleveland at probably 150 or 160 million gallons per day.

I know Mr. Leighton E. Carter, director of the Municipal Research Bureau of Cleveland. I remember the following statement in the foregoing report of March 26, to which I am referred, reading as follows:

> "The report would not be complete without an expression of appreciation to Mr. Wright, Director of Public Utilities, Mr. Ellms, Engineer of Water Purification and Sewage Disposal, and their associates, who have given freely of their time and energy and

who have so constantly demonstrated their earnestness."

10910 I am the Mr. Ellms referred to.

At page 31 of the foregoing report, the following appears:

> "A canvass of those with experience of lake front conditions discloses that deposits of faeces and other objectionable animal and vegetable wastes are common on the beach, especially after storms. Similar matter may usually be observed floating and decomposing on the water and matter with finer suspended material causing unpleasant odors. Oil and grease in sufficient quantities to befoul the beaches also are reported. Observations indicate that discharge of storm water from the interceptor system is most responsible for the coarse matter deposited. It is probably true that treatment of sewage now discharged into the river would not eliminate the oil nuisance, but it would put the city in a much better condition to discover and control the sources of such waste."

That is approximately a correct description of some
10911 of the conditions at Cleveland. I am not familiar with the report of the Municipal Research Bureau of Cleveland, entitled "A Study of the Financial Requirements of the City of Cleveland; Analysis of Operating Costs and Capital Improvements," dated May, 1928. The following statement appears at page 118 of the foregoing report:

> "A canvass of those with experience of lake front conditions discloses that deposits of faeces and other objectionable animal and vegetable wastes are common on the beaches, especially after storms. Such matter may be observed floating and decomposing in the water. Oil and grease in sufficient quantities to befoul the beaches also are reported. Observations indicate that discharge of storm water from the interceptor system is to a considerable extent responsible for the coarse material deposited."

That is substantially a description of conditions on certain of the beaches and certain portions of the lake front of Cleveland about the time that that report was made. Those conditions still exist.

Oil pollution in navigable waters may come from refineries, from sewage, or from wastes from garages. One source of pollution is the oil-burning boats on the lakes. That is probably a very great source of such pollution.
10913 In a river where there is oil or grease due to any of the causes mentioned, such oil or grease would be carried away with some current in the river. There would be less fire hazard as a result.

10916 I recognize the images which appear on Exhibits 1252, 1253, 1254 and 1255. They are photographs of the mouth of the Cuyahoga River at Cleveland. I see the dark shading and the light shading. The dark shading represents the turbid water of the Cuyahoga River,—that is not always a very dense black. That is the way it is photographed. That color extends out into the white part which is Lake Erie. The dark color gradually disappears
10917 to some extent as it travels. As to that picture representing the travel of the pollution of the Cuyahoga River as it is spilled into the lake at Cleveland, it is a very good picture of what happens as far as a picture can give it.

Counsel for Defendants produces Exhibit 1406 for identification, which purports to be an aerial photograph of the downtown portion of Chicago showing the Chicago
10918 River and the Lake, dated June 12, 1927. I observe the light shade which appears in the Chicago River coming up from the Lakes to the forks. That would appear to be the clear water as compared with the South Branch. The North Branch coming in at the junction shows a dark color. Exhibit 1406 for identification was received in evidence with the understanding that it was taken in June, 1927, prior to any sewage treatment.

10919 I qualified here as an expert chemist so far as it relates to water and purification. I do not know that I qualified with respect to sewage. I do not personally make sewage analyses for the City of Cleveland. They are made under my direction. I made sewage analyses a good many years ago. In a general way I know the constituents of sewage of a large city. I know something about the chemical processes that go on as the sewage congregates and is carried along. I know the processes that go on in the course of the treatment of
10920 sewage. There are all sorts of things that go into the sewage of the city, wastes of all kinds. As to the chemical or biological processes that go forward in the sewage itself, the decomposition of the organic matter, of course, begins almost immediately it becomes water-borne. The oxygen in the water is exhausted, and if no more oxygen exists or oxygen that can be derived from nitrates, putrefaction processes are set up. As to whether there is produced, then, a substance that is distinctive in the shape of sewage that is in the sewer, depends on how far those processes go. They may go to such a point as to produce hydrogen-sulphide, or other odors of like character, due to the breaking down of sulphate; but if the period in which it is deprived of oxygen is not too long, such reduction processes do not take place.
10921 As to the effect on nitrogen compounds and chlorides as the sewage passes through an activated sludge plant, I see no reason for any change in the chlorides. Nitrogen compounds may be reduced somewhat. The oxygen nitrate is oxidized to an ammonium nitrogen if sufficient oxygen is provided. In an activated sludge plant with a lot of oxygen present, it is oxidized and becomes nitrates. That organic nitrogen is left in the activated sludge effluent. The ammonium nitrogen is converted into nitrites, nitrates and nitric acid. Probably

10922 from 3 to 4 or 5 parts per million of nitrite is left in the effluent,—it might be 5 or 10 parts per million, depending on the amount of oxygen and air that is supplied. The ammonium nitrogen is all dissolved. The chlorides are always dissolved and pass through unchanged so far as I know. The mineralized constituents of the original polluted matter that are soluble in water will remain in the effluent as such. There is no way to dissolve the chlorides. The ammonia is converted into nitrous or nitric acid that is left in a dissolved condition
10923 in the effluent. Probably there is a certain amount of organic nitrogen which is not completely mineralized left in the effluent from a plant of that type. The number of parts per million of chlorides that are left in an activated sludge effluent depends on how many the sewage started with. Ordinary sewage varies very greatly. There might be as much as 30 to 50 parts per million. The concentration of chlorides in Lake Erie water is about 15 parts per million where the city of Cleveland draws its water supply. I do not know what it is in Lake Michigan. I presume that I made a determination at Milwaukee; I do not remember just now what the chlorides were. I think there would not be a very great difference
10924 between Lake Michigan and Lake Erie in that respect. There might be somewhat less in Lake Michigan. There is no possible way, other than by dilution, by which the concentration of chlorides in an activated sludge effluent may be reduced to the concentration of chlorides in Lake Michigan water. So long as chlorides dissolve they cannot be reduced except in the dilution of water which does not contain as much chloride. That is also true of the ammonia and nitrates in the activated sludge effluent so far as they are mineralized and become dissolved. That is also true with the chlorides.

10925 The sludge that comes from these plants is material

which contains considerable colloidal organic matter. It is heavier material which settles in tanks. The percentage of moisture in sludge that arises from an activated sludge plant and secondary settling basin, is 98 or 99 per cent. In a city like Chicago the volume of that sludge in a year would be very considerable. That is a waste which must be provided for in any treatment plant. The ef-
10926 fluent is another sort of waste.

Redirect Examination by Mr. Jackson.

Referring to Defendants' Exhibit 1406 purporting to be an aerial picture of downtown Chicago and showing the filthy conditions that have obtained in the North Branch and the South Branch of the Chicago River without any sewage treatment, for many years last past, after complete treatment has been put in effect at Chicago, these waters will be more attractive to navigation than those that are shown in the picture. After complete treatment has been put in there will not be any discoloration of the water as is shown in that picture.

My attention was directed to Defendants' Exhibits 1252 to 1255, inclusive, showing the black discoloration coming out of the Cuyahoga River at Cleveland. That
10927 river is navigated. My duties have frequently taken me to that river for observation. I have not seen any difficulties for navigators there by reason of the discoloration of the river. Both water intakes at Cleveland are in Lake Erie, about four miles directly opposite the mouth of the Cuyahoga River. The Cleveland filtration plants have produced water that has met the Treasury standard.

With the completion of the program that is summarized on Complainants' Exhibit 238, that is, complete treatment and filtration of the water supply at the pres-

10929 ent intakes, no controlling works and no flow at Lockport, the water supply will be as good as now.

In stating that time as necessary to permit a flow with controlling gates, I referred to how they would have to be operated in order to take off all the storm water.

Recross Examination by Mr. Adcock.

10932 Cleveland has two water filtration plants for the filtration of the entire water supply of the City of Cleveland and of the suburbs which buy water from the city. The water is treated with a small amount of chlorine after it is filtered. The water at Cleveland usually reaches the Treasury standard. Sometimes it falls off from it, but the average for the year or even the month.

10933 If it were desired to get a better water supply for Cleveland, there are one or two courses that might be pursued. The water might be pre-chlorinated prior to its passage through the coagulation and settling basins after it is received and before it passes through the filters, as well as chlorination after filtration. That is one simple and easy method by which a more polluted water could be handled. The filter plant would not be changed. The chlorination facility might be increased. It is a very small part of the plant and very small expense. If it were desired to make the supply still better, there is another method by which these present plants might be operated in which an excess of lime is used, which also, under caustic conditions, produces a water inimical to bacterial life. That might be another way to handle a very polluted water supply.

10934 The complete treatment of the sewage with any city on the Lake which is discharging sewage into the Lakes, is a part, one might say, of the program of providing a pure and potable water supply. With complete treatment of the sewage, there would be a certain amount of

storm water pollution which unavoidably would pass into the stream. The foregoing are not all the methods of improving the water supply. There are other methods which include doubling up on coagulation and doubling up on filtration. After all of these things have been done, if it is desired to provide a still better water supply, the only way would be to keep the sewage pollution out of the lake or move the intakes to some other point from where they were located. That is, to remove the intakes
10935 from the pollution passing in at those points.

There was no trouble at the Division Avenue filter plant in October, 1926, that I know of.

There is some trouble at Cleveland with reference to phenol tastes. That has happened at different times. The filter plant does not take that taste out of the water. The phenol taste comes from waste from by-product coke oven plants, located on the Cuyahoga River, some of which finds its way in very small quantities into the Cuyahoga River and out into the Lake. When this phenol comes in contact with the chlorine which is used for chlorinating the water, combination compounds are formed which are exceedingly tasty. That is what is known as a phenol waste taste.

F. H. Waring, recalled for Complainants:

A sanitary engineering expert, testified at prior 1927 hearings.

Direct Examination by Mr. Jackson.

11040 My present position is that of Chief Engineer of the Division of Sanitary Engineering, Ohio State Department of Health. That was my position when I testified before and has been my position at all times since then. In my official capacity, it is my duty to supervise the water supplies of the State with particular reference to the public health.

I have considered the program for the disposal of the sewage of Chicago by means other than lake diversion
11041 and without flow at Lockport, as outlined in Exhibit 238. It is the same, or similar to one of the programs which I considered in my testimony on the previous hearings.

Assuming the completion of the program as outlined in Exhibit 238, which contemplates no flow at Lockport, but provides complete treatment of the sewage to the highest practical extent and the installation of water purification works of a modern type for the filtration or treatment of the whole of the Chicago water supply, the Chicago water supply will be as safe to drink as at present. I have considered the question of whether there would be any practical additions to that program from the standpoint of water supply. There might be included the chlorination of the effluents of the complete sewage treatment plants; and also there might be extensions of
11042 the present waterworks intakes. Or there might be relocations of these intakes, abandoning one or more and locating these intakes off the North Shore, in the vicinity of Wilmette. If those additions or changes were made, the city water supply would be superior to the present supply.

H. C. Inches for Complainants.
A Lake Captain.

Direct Examination by Mr. Jackson.

10624 Reside at Lakewood, Ohio. Captain of Great Lakes
10625 vessel. Have sailed on Great Lakes about 30 years, serving in the capacities of lookout, quartermaster, sec-

ond mate, first mate and master or captain. Master or
captain for last four years. Navigated the Chicago
River during 30 years of service on the lakes. Navigated
the Chicago River before 1900.

I did not experience any difficulty in navigating the
Chicago River prior to 1900 by reason of the presence
of sewage in the River. I was aware of the opening of
10626 the Chicago Drainage Canal. Since the Drainage
Canal was opened in 1900 and the river reversed, there
has been a decided effect on navigation in the River. The
current has caused a great deal of trouble in handling
ships and additional expense. I was last in the Chicago
10628 River during October, 1928. The current in the River
continued to give trouble up to the last time when I was
in the Chicago River in 1928.

I have navigated the South Branch of the Chicago
River,—the last time in 1925. The difficulties from a navigation
standpoint which I experienced in the South
10629 Branch were from the current when coming around
the bends putting my boat over against one dock or another
and keeping me from making the swings. The sewage
in the River did not interfere with the navigation.

I laid my boat up all winter in the North Branch of the Chicago River in the fall of 1927. The condition of the water there did not injure my vessel in any way. I believe it was good for the iron. The grease and oil preserve it.

My experience in navigating the Chicago River and
its branches shows that if the diversion were cut off so
as to eliminate the current in the River, navigation would
10630 be very much cheaper and safer. With respect to navigation
being made cheaper, I refer to the use of tugs.
When I go into the Chicago River, I do not dare go into
the piers until there are two tugs there waiting,—one tug
is for the purpose of taking the tug line on the stern and

pulling the stern all the while we are in the current. It takes the combined efforts of the boat machinery and the tug to keep from going too fast and ramming the docks or other vessels.

In my experience I have never known of a boat being put in dry dock for the purpose of painting on the Lakes. I did not notice any effect of the sewage on the paint on my boat.

Cross-Examination.

10631 I operate the Steamer Saturn, hailing from Fairport,
Ohio, and having a length of 442 feet, a beam of 50 feet
and a depth of 28 feet. The vessel principally carries ore
and coal and plies between all ports of the Great Lakes,
such as Cleveland, Milwaukee, Gary and South Chicago.

I have been operating this boat as captain for 4 years.
10632 I did not operate any boat before as captain. I am 46
years old and started working on the lakes about 1896 or
1897, when I was about 15 years old, as watchman or lookout. I first worked on a small lumber steamer. I presume that was some easier to operate than a large
steamer. It was a comparatively small steamer about
10633 127 feet long. I was probably in the Chicago River 3
or 4 times prior to 1900. I did not see any boats stuck in
the bridge draws prior to 1900 or over tunnels. I do not
know what was the depth of the water at that time. I
couldn't say that I noticed any difference in the width
of the South Branch of the River between the time I
navigated the River in 1900 and the present time. I
have heard that the channel was deepened from 16 to 26
10634 feet during that period. I did not observe it. My boat
has been loaded as deep as 21 feet draft. With respect to
the possibility of having gotten into the Chicago River
with that vessel prior to 1900, if I didn't have the available draft, I would load to the draft that I had. I could

carry something with a draft limited to 16 feet, perhaps
10635 5,500 tons. Without a cargo, my vessel draws about 12
feet. The depth to which I load depends on the year.

There was a lot of grease and oil on my boat when I wintered it in the North Branch. I believe that is good for the boat. I have not had this boat in dry dock in the four years I have operated it.

One of the boats on which I went into the Chicago River prior to 1900 drew about 9 feet. I could not state the draft of the other boat. The boat on which I went
10636 into the Chicago River in 1896 was the Steamer Wyoming. I was about 15 years old. I am 46 now. I may have been about 13 years old then,—I do not just remember the first year. I was lookout. I was about 17 in 1900. It was about 1896 when I first visited the Chicago River. I cannot tell exactly the year. It was not as
10637 early as 1895. I have nothing to fix the date by exactly. I remember being there prior to 1900.

As to my willingness to navigate waters filled with waste and sewage going into ports, I would go where the boat would handle the easiest. That is my job and I would rather handle a boat in waste and filth than in the current. Sewage and waste in the waters do not make any difference in the handling of the ship.

10638 During the years I have been on the Lakes, the U. S. Government has done a good many things to remove hazards of navigation, such as erecting lighthouses and establishing buoys to make navigation easier, safer, and more convenient for the people employed on the boats for their operation.

My boat is owned by Pickands, Mather & Company. Bridge piers have been removed in the Chicago River
10639 since 1900, although not all of the center pier bridges have been removed. Bascule bridges have been put in place of those center pier bridges which have been

changed. The Company is a member of the Lake Carriers Association. I have not been sailing this year and I do not know what the depth will be. I have not heard a lot about high water doing damage at Detroit and
10640 Chicago. I have been up the South Fork of the South Branch of the Chicago River with this boat to Armour's elevator, B, near 35th Street. I have not been up the South Branch since. That was the only time with this 442 foot boat. Judging from other rivers where I know
10641 the current, I should judge that the current in the river was 2 to 2½ miles per hour, more or less.

Redirect Examination.

I remember when the Chicago River was reversed
10642 and the current started the other way. I regulate the draft or load of the boat according to the waters I intend to navigate. If proper preparations have been made in that respect, the draft does not make any difference so far as ease of navigation is concerned. I do not believe that there are many large vessels navigating the Chicago River now. I do not see them when I am there.

Recross Examination.

I do not know of any large vessels going into the Chi-
10643 cago River. I wintered this boat at Hedstroms Coal dock, called the North Avenue dock.

I remember reading when the Chicago River was reversed.

I load my boats to suit the depth of water. The small
10644 depth produces less earnings. One cannot carry as large a cargo at 16 foot depth as at 20 foot depth.

Redirect Examination.

I cannot say whether the larger lake freighters navigating the Lakes navigate the Chicago River. They can not with safety.

Colonel Curtis McD. Townsend for Complainants:

Direct Examination by Mr. Jackson.

11042 Colonel, Corps of Engineers United States Army, 11043 retired. Educated in the public schools of New York City, and at the College of the City of New York until my appointment as a cadet at West Point. Graduated from West Point; appointed second lieutenant in the Corps of Engineers. Continued in active service as a member of the Corps of Engineers for 40 years. Since my retirement, I have been employed by the Corps of Engineers about 5 years, making a total active service of approximately 45 years.

After my graduation I attended the School for Engi- 11044 neers at Willets Point. After completion of that course I was assigned to supervision of harbors on the Eastern shore of Maryland, the Appomattox River, and the improvement of Kanawha River. I was next assigned to duty as assistant to the Engineer Commissioner of the District of Columbia and had charge of the water and sewer supply of the District for several years.

I was then assigned as quartermaster at the post at Willets Point, Fort Totten, and installed a sewer and water supply system for that post. I then returned to duty at Washington on the construction of the reservoir which is now behind the Soldiers' Home and the tunnel connecting that reservoir with the reservoir in Georgetown. When that work was stopped, I was assigned to duty in Washington in constructing a 48-inch main extending from the Georgetown reservoir through R Street to connect with the reservoir back of the Soldiers' Home, and a 38-inch main on New Jersey Avenue to the Capitol.

On completion of that duty I was assigned as assist-

ant to the Mississippi River Commission in charge of improving the third district, which extends from the mouth of the White River to Vicksburg. After that I was placed in charge of the improvement of harbors on the East
11045 Shore of Lake Michigan. I was then placed in charge of the Upper Mississippi River and its improvement from St. Paul to the mouth of the Missouri.

I was then ordered to the Philippines in commnad of a battalion of engineers, and while there I was relieved from duty as battalion commander and appointed Chief Engineer of the military division, and had charge of the construction of the harbors on the Islands, including the building of a breakwater at Manila and the construction of wharves. On my return from the Philippines I was assigned as a member of the Board of Engineers for Rivers and Harbors. From that duty I went to Cleveland in charge of the improvement of the harbors along Lake Erie and in Ohio. I was then ordered to Detroit in charge of the construction of the works for improving the connecting waters of the Great Lakes, including the construction of the locks at Sault Ste. Marie, and the Livingston Channel below Detroit. For a short time while on this duty, I was Division Engineer in general supervision of the engineering works along the Great Lakes including the work at Chicago and along the Illinois River.

After this duty I was assigned to the Mississippi River Commission and appointed President of that Com-
11046 mission. I served as President of that Commission for about 10 years with the exception of fifteen months when I was on duty with troops in France. I was retired as President of the Mississippi River Commission after 40 years service, and then spent a year and a half in writing a textbook on River and Harbor Hydraulics for the use of the Engineering School at Fort Humphries.

Thence on my return from a six months' trip to Europe, I was assigned for about three years to the improvement of the mouth of the Mississippi River.

I served on numerous Boards in reference to the rivers connecting with the Mississippi. I was on two boards on improvement of the Illinois River; and, as a member of the Board of Engineers for Rivers and Harbors, I had to review the proceedings of a third board. I also had various duties which led me to investigate questions relating to the Chicago River when I was division engineer on the Great Lakes. I was called upon to re-
11047 port on the question of the reduction in levels which would be caused by the flow of 10,000 second feet down the River. I also had to investigate the influence of the flow in the Illinois River on the Upper Mississippi when I was in charge of that district. When I was president of the Mississipi River Commission I had to investigate the effect of the flow of the Illinois River on floods in the Mississippi River.

With respect to the flow from Lake Michigan, or at Lockport, that would be necessary to maintain navigation in the Chicago River, in the event that all diversion for the purpose of taking care of the sewage of the Sanitary
11048 District of Chicago were discontinued; the Chicago River alone has been developed for navigation to such an extent that it is now a mere inlet from the Lakes, and the height of water in the Chicago River is dependent, not on the flow of the Chicago River, but on the rise and fall of the Lakes. There would be no water needed to maintain such a channel or to maintain navigation on it. The only water from the Lakes would be that which comes in as the Lake rises and falls, and the navigation of that channel would be dependent entirely on the height that the Lake attains. Whenever the Lake is high, there will be certain navigation in the channel; as the Lake falls, navi-

gation in that channel will diminish just as much as the height of the Lake diminishes. The only flow that will
11049 affect navigation will be this variation which will result from a rise and fall in the Lake itself.

By the Special Master.

The witness is certainly assuming now that no water flows down from Lockport but that the water is there held. In that way there is absolutely no slope in the River and its connections.

Direct Examination Continued.

I knew of the opening of the Chicago Drainage Canal in
11050 connection with my work. If the flow at Lockport were cut off at the present time, so as to terminate the current that obtains in the Chicago River, the conditions of
11051 navigation on that River would be improved. There would be no current in the River and its impediment to navigation.

In my long experience in river and harbor work the question of whether sewage was discharged into the river or harbor would not be one consideration in planning an improvement.

Cross-Examination by Mr. Adcock.

11163 I retired from the army service in the vicinity of
11164 1920. I am not in active service now. I am on the retired list.

I have had no practical experience in connection with the construction and operation of works for the artificial treatment and disposal of sewage. My answer on direct examination did not have any relation whatever to the sewage question, that is with reference to whether the sewage was treated or untreated when it was discharged

into the Chicago River or the channels of the different canals or branches. I have no practical experience with reference to the extent to which sewage could be treated in the removal of suspended solids or solids that will de-
11165 posit in navigable channels but merely as a general practitioner. I am aware that the solids that will be deposited can be very materially reduced. Solids will be left that may settle in channels, to a slight extent. There would be a greater settlement of such solids than if there is a current. There will be more settlement with a slower current. With respect to there being a large settlement of solids if at times there was a heavy storm carrying a very large amount of settleable solids in the stream and then a subsidence of the storm and consequent slowing up of the stream gradually or perhaps very quickly to a very small current, there would be a large settlement under any possible conditions.

I do not appreciate that grease and oil may get on to
11166 navigable waters from any source and constitute an obstruction or impediment to navigation. I do not think that either grease or oil would impede navigation. My conception of navigation is navigating a river with boats. As to taking into consideration any question as to whether the waters might be unattractive to navigation due to pollution or refuse going into the Rivers, I have taken into no consideration whatever the picturesqueness of the water.

If there were no treatment of the sewage at Chicago and no discharge of any water to the Des Plaines River from the Drainage Canal, the condition of the Chicago River and the channels of the branches of the Chicago River and the Drainage Canal with reference to nuisance and odors coming from putrefaction of sewage would be similar to those which now exist in similar channels at Milwaukee, in the Rouge River at Detroit, at the Cleveland inner harbor, in the harbor at Buffalo, in Newton Creek, New York City, or where it formerly existed at Baltimore.

11167 I was last in Milwaukee and saw the Milwaukee River
11168 about 15 or 20 years ago. I was last in Cleveland and saw the Cuyahoga River when I was in charge of the work, probably over 20 years ago. Cleveland was not very small. It was a very large city. It was probably a city of 500,000. As to that being a rather small city, compared with the City of Chicago with some 3,300,000 inhabitants, if one computes it, it would be one-sixth the size. The sewage of Cleveland then was very much less than the sewage of the City of Chicago. The Cuyahoga River was in pretty bad shape then. The condition in
11169 the Chicago River would not necessarily be several times worse than the Cuyahoga River under those conditions. In saying, "not necessarily," I mean that it would be only a comparatively small part of the City of Chicago which drains into the Chicago River. A great part of the City of Chicago does not drain into the Chicago River. It drains off to the North sewers and to the South. South Chicago drains into the Calumet River. That sewage is drained into the Calumet-Sag Channel. The Calumet-Sag Channel connects with the main channel of the Sanitary District at Sag, Illinois.

11170 If there was no discharge into the Des Plaines River from the canal at Lockport, all that sewage would go into the Chicago River, but there would be the area or the volume of the two streams that would be contaminated. That would be the Calumet and the Chicago Rivers. The dry weather flow of the Calumet is rather insignificant. I do not know what it is. I think it is like the Chicago River. It would furnish no practical dilution for the sewage. Dry weather flow for the Chicago River is insignificant, and there would be practically no dilution

11171 there. I do not know the dry weather flow of the Cuyahoga River. I would assume that it was greater than the dry flow of the Chicago River, but I could not personally state.

The deposits from these settleable sewage discharges from the channels of the Chicago River and its branches would impede navigation to a limited extent. The great impediment to navigation in these streams comes not from the sewage proper but from the rainfall washing the area and depositing material through the catch basins, and these catch basins are not usually large enough, and the overflow goes into the River. The great reduction in the navigability of the various inlets arises more from that cause than from the sewage. Sand comes from that source, but it would not come from sewage. Floating trash might come from sewage, but there would not be sand or material which would diminish the depth
11172 of the river. Street wash is a very material question in reducing the flow of those inlets.

I was division engineer at one or two places about the Lakes. I was division engineer in charge of the Lakes. I had to supervise the enforcement of the '99 Rivers and Harbors Act. I am familiar with Section 13 of that Act which provides in substance that no refuse or materials of that character shall be discharged into the navigable waters of the United States.

I started work on my testimony in this case the day before yesterday.

11173 I have heard that General Jadwin has testified in this case. I am not sure that I have read the record of General Jadwin's testimony, but I have familiarized myself with what I believe to be a statement of General Jadwin's testimony which was furnished me. My attention is directed to portions of the statement which was read by General Jadwin at the Chicago hearings in response to an interrogatory as to what flow, if any, from Lake Michigan would be necessary to maintain navigation in the Chicago River, in the event that all diversion for the purpose of taking care of the sewage for the Sanitary District were discontinued. 11174-11178

For me to say that I agree or disagree with a statement so complicated as that, is almost an impossibility. I would have to read carefully the various items that are stated and answer, not categorically, Yes, or No, but what sections of that statement I was in favor of.

11180 I read from and comment upon the statement of General Jadwin as follows:

> (Reading) "The introduction of the deposits of sewage into the Chicago River would, without dilution, render it so foul and putrid as to materially impair its navigable condition."

The question of its being found putrid would, in my judgment, have nothing to do with its navigable condition. Navigation does not depend upon the condition of the water.

> (Reading further) "Through its deterrent effect on the navigators and on those engaged in loading and unloading vessels."

11181 I have never seen any injurious effect on navigators by sewage in water. I have never seen any injurious effects on roustabouts from the effect of sewage in water. In fact, when I was in charge here of the District of Columbia Sewer Department my men, who were working on the sewers, were as healthy as any other men. I have been through miles of sewers in this City, breathed the sewer atmosphere, and I do not know of its having had any effect on me personally from breathing absolute sewage in the sewer, so I do not agree with that statement. I did not like that work at all. It was intensely disagreeable. In fact, I would have to change my clothes an wash after being sweated with the sewage conditions. But it was essential for me to do it, and I can not say that it has had any effect on my health. I would not have done it, if I had not held it my duty, and a necessity. I would prefer to work in water that did not have such a polluted surface—water that was clean. 11182

(Reading further) "This statement is based on the effect on navigation, and with the intention of keeping this effect separate from the effect on the important question of the sanitation of Chicago."

That requires no comment.

(Reading further) "The sanitary conditions essential for working conditions for those engaged in navigation should be substantially the same as for the residents on shore."

That is certainly so, as far as its physical effect is concerned, as I have just stated.

(Reading further) "With the accomplishment of sewage treatment, expected to be effected by the Sanitary District before December 31, 1929, a total diversion in excess of sewage amounting to 7,250 cubic feet per second, will be requisite to dilute the sewage and carry it away to an extent sufficient to render the Chicago and Calumet Rivers suitable for navigation." 11183

I do not agree with the Chief of Engineers on that statement.

(Reading further) "Even with the attainment of the maximum practical treatment of all sewage, some circulation of water will be necessary to keep the condition of the water tolerable for navigation."

That is covered by my preceding statement. I would agree with the statement of keeping it tolerable for navigation under the provisions that I have just made, defining conditions. I do not agree that that is necessary to keep the condition of the waters tolerable for navigation, as the Chief of Engineers has stated. 7,250 feet are not necessary at all.

> (Reading) "The effluent from sewage treatment plants is not pure water, and the added refuse from ships and streets, together with unavoidable accumulation of oil requires more water for flushing than is available from the natural run-off which the urban
> 11184 development has, in large part, intercepted and turned into sewers."

With that I agree. The natural run-off would be as detrimental during storms, and even more so, than the sewage, and would be an essential element in the question of the navigation of the Chicago River, as it would be the material which would have to be dredged in the greatest quantity in order to maintain the navigation of the river.

> (Reading) "When the ultimate practical treatment of sewage is accomplished, it is believed that the needs of navigation in the Chicago and Calumet Rivers proper may be found not to exceed a flow of clear water from the Lake averaging 1,500 c.f.s., augmented by the natural run-off of the Chicago and Calumet River watersheds and the effluents from the treatment plants."

I agree that the flow of clear water from the Lake of 1500 c.f.s., need not be exceeded.

> (Reading further) "This would give an average annual flow of about 3200 cubic feet per second at Lockport. This diversion would create a current on the principal river channels of from one-quarter to one-third foot per second, and would be sufficient to
> 11185 renew the average water content of the main portions of the Chicago River in about two days."

I have not made a computation, but would assume that this is correct.

> (Reading) "Unless the total diversion be considerably greater than 3200 c.f.s., the progressive putrefaction of the polluted water would become offensive to a degree detrimental to navigation, be-

> cause of the longer time required for its passage through the Drainage Canal to the navigable waters of the Des Plaines River and the upper reaches of the Illinois River."

I do not agree that it would be offensive, to a degree detrimental to navigation. I agree with the statements, except as I have commented on them.

I do not recall that I ever had occasion to make a report to my superior officer or otherwise on the effect on navigation of the discharge of sewage or sewage effluents,
11186 or sewage storm waters in the rivers and harbors. The Engineering Corps and the Secretary of War have not had occasion to consider that question with regard to navigation. They have with regard to nuisances,—that is, nuisances in navigable waters. A great deal of time has been spent investigating, at different times, different nuisances, and I presume that I have submitted reports on the flow of oil in waters and things of that kind that have been investigated quite frequently. When I was at New Orleans, I assume that I submitted a report. I do not remember the report, but officers were called upon
11187 to investigate those matters. I do not remember any fire down about New Orleans due to oil on the water. I have always been afraid there would be, but I do not remember having any particular fire from that cause. Fire is liable to result from oil on water. A reasonable circulation of the water would lessen the danger, the length of time the oil was on the water; but, as a matter of fact the danger which I anticipated at New Orleans would be enormously increased by the current in the Mississippi River, because if the oil breaks loose above the docks at New Orleans the fire would be propagated down the river, and would sweep every dock along the front of that City. The oil would not be broken up if it escaped in sufficiently large quantities. Whether the par-

11188 ticles of oil would be separated in the current depends upon the amount of oil that is distributed in the water. The case to which I allude, and on which I had to submit a report, was the case of a vessel hitting a pier and spreading oil over the water, in which case I was very much afraid that if the oil should get on fire, it would set fire to the entire waterfront system of the City of New Orleans.

If there was no water coming from Lake Michigan into the Chicago River, the only discharge would be the natural flow of the River. Under the existing conditions the natural flow of the Chicago River goes down the Sanitary
11189 District Canal and then into the Des Plaines River. In answering the question on direct I did not take that into consideration. In my answer, when I stated that there would be no water flow, I did not understand that there would be a discharge to the Des Plaines River from the Drainage Canal. I assumed there would be no water flow. That is, it was on the assumption that there would be no discharge at all from the Drainage Canal to the Des Plaines River that I said it would require no water. Under those conditions there would be no discharge. The connection of the Drainage Canal for navigation at Lockport and Joliet is by a small state canal; but the works by the City of Chicago have not been completed to such an extent as to enable any navigation down the Des Plaines River. I have been over the waters upon which
11190 a boat would travel from the Chicago River to the Illinois and Mississippi Rivers.

As I understand it vessels would pass through the Drainage Canal from the Chicago River to Lockport, from thence pass through the lock into the upper basin of the Illinois and Michigan Canal at Joliet, from thence through another lock at Joliet, Dam No. 1, of the Illinois and Michigan Canal, and on by different locks, etc., to

the Illinois River at Utica. That is the proposed plan. That is not what exists at the present time. That is what is proposed as a project. At the present time the only connection the witness knows of is a small canal by the State of Illinois, which carries less than 4 feet of water. As to the old Illinois and Michigan Canal having been abandoned and replaced by the Sanitary Ship Canal of the Sanitary District of Chicago from Joliet to Chicago, its connection is by a 4-foot channel from the Sanitary Drainage Canal. That is the understanding of the wit-
11191 ness. The connection is at Joliet. From Joliet to Chicago the navigation is by way of the Sanitary Canal. I understand that a boat, in order to pass from the Chicago River to the Illinois and Mississippi Rivers would have to travel over the waters which have been mentioned. If there were no discharge of any water at any time from the Drainage Canal into the Des Plaines River, a boat could not go through the lock at the end of the Drainage Canal. It would be necessary to have a discharge to pass the lock. There would be no way of doing that with no flow.

As to whether it would be necessary to have some water pass from the Lake to the Chicago River, Drain-
11192 age Canal, and Des Plaines River in order to keep up present navigation on the Chicago River on the assumption that at present boats pass from the Chicago River to the Illinois River through the Drainage Canal and Illinois and Mississippi Canal, and *vice versa;* it would not be necessary to have any water because there is no navigation down there.

I have not visited that territory for some time. Assuming that there is present navigation, it would require the amount of water necessary to lock that existing navigation—that is, in order to keep up navigation in the Chicago River.

Redirect Examination.

Assuming that there is navigation passing from the 11193 Drainage Canal to the Illinois River the amount of water which may be needed for lockage in locking vessels from the Drainage Canal down the Illinois River, or the other way, has nothing to do with the physical navigation of the Chicago River. The passage of boats down the lock would have nothing to do with the passage of boats in the Canal above the lock.

Assuming that there is through navigation from the Drainage Canal down to the Illinois River, the quantity of water which would be necessary for lockage or any 11194 other purpose would be determined by the dimensions of the lock. For the purpose of water power the Sanitary District built a very high lift. There is a very high lift at Lockport and to fill the space at that lock the high lift would require very much more water than would be necessary in what is called a chain of locks. Lockage water which would be necessary there for any through navigation would be somewhere in the vicinity of 1,000 c. f. s. for a heavy navigation.

11195 Assuming that all the sewage of the Sanitary District of Chicago were treated so as to remove 85 per cent of the solids and organic matter; that the balance was in a fine suspended state in the effluent of the sewage plants; that there would be an overflow of the sewers in 11196 time of storm carrying rain water mixed with sewage, the proper method to maintain navigation in the Chicago River under such conditions would be to dredge out deposits in the river itself. The river has already been developed far beyond any dimensions which can be maintained by any currents which can be inaugurated in the river. The depths have now been enlarged. The stream is an insignificant stream for navigation purposes, and it has been necessary to dredge it to such depths that it is now merely a slip in the land, and if it is to be maintained it is necessary to dredge the material that is deposited from any source. The dredging of harbors is regularly done at various ports just to correct these very conditions. On the assumptions that were made the course of maintenance required at Chicago would be similar to that which would be used at Milwaukee, Cleveland, Buffalo, or Detroit.

Recross Examination.

11197 I believe that for the general status of the city it is beneficial to stop the odors which arise in these various slips, but do not consider that it would be essential to the navigation of those slips. To do so would be more attractive to the City. It would be more attractive to the navigator and to the people on the boats if they do not have to smell this sewage.

If the Chicago River were dammed at its mouth and the Drainage Canal were dammed so there could be no flow from the Drainage Canal to the Des Plaines, and if a system of drainage were built whereby all the sewage could be diverted from the Chicago River and its channels and branches, and the Chicago River and the channels
11198 were filled with water, an excellent condition for navigation in the Chicago River would not obtain. Physically, as far as the Chicago River and its channels are concerned, there would be an excellent condition for navigation in the River inside the dam. The navigation could not go out, and it could not come in.

The defendants then proceeded with the offering of further testimony on re-reference in April, 1929.

Ross A. Woodhull, for Defendants:
A Trustee of Sanitary District.

11483 *Direct Examination by Mr. Beebe.*

11484 Reside at Chicago; am one of the trustees of the Sanitary District; was installed first week in December, 1928; am Chairman of the Finance Committee of the Board of Trustees. It is my duty to preside over the meetings of the Finance Committee and to affix my signature to all payments made by the District, checks and warrants. The warrants bear also the signature of the clerk.

Am not now actively engaged in any private business. I was connected with a subsidiary, the Hydrox Company of Chicago, of the National Dairy Products Company. I had to do with the organization of the latter company as the plants that I operated under the name of Woodhull Ice Cream Company were acquired by the Hydrox Company just prior to the consolidation with the National Dairy Products Company. Since that time I have retired from active business. Prior to the time I was elected Trustee, I was in the City Council of Chicago for six terms, twelve years. I was on the Finance Committee of the City Council for ten and a half years. Was
11486 Chairman of the Finance Committee for four years during the Dever administration, and left the City Council when I was elected Trustee of the Sanitary District. My terms in the City Council were consecutive.

11491 When I became a member of the Board of Trustees of the Sanitary District, the old Board had passed an ordinance authorizing the sale of $27,000,000 of bonds. Under the law the deal had to be consummated, the sale of the bonds and the money had to be in the treasury of the

District before midnight of December 31, 1928, because after that date a referendum attached itself by an act of the Legislature and was necessary before any bonds could be sold by the District. The old board availed itself of the opportunity at the close of 1928 to issue bonds without a referendum. They would have been sold within the requirements of the statutes had it not been for the interference or the objection of a taxpayer in the court. The District was unable to deliver a certificate free from litigation, so the sale of the bonds was not completed. It was necessary for the District to either wait until the coming November of 1929, which would be the first opportunity we would have to get before the electorate of the Sanitary District, there being no machinery by which a special election could be called for the submission of a referendum. Having in mind the contractual obligations standing against the District for the work done in constructing plants, the work that must necessarily go forward as rapidly as possible, we went to the Legislature and asked them, in view of the decision of the Supreme Court and hearings to be held before your Honor, that time ought not to be lost, and asked that they lift the referendum clause, modify the legislation and give us the right to sell without a referendum bonds necessary to produce such money as would be necessary to complete the treatment plants in compliance with the permit under which we are operating. We realized that the disposition of the Trustees was not sufficient, but they had to demonstrate their ability. We felt it our duty to go to the Legislature and tell them the story of what we thought should be done. We introduced a bill known as Senate Bill Number 110, in which we asked to be given the right to issue bonds, such moneys to be used exclusively for such work as might be necessitated in the construction of the treatment of sewage in that program.

11493 Defendants' Exhibit 1414 is Senate Bill Number 110,
which is in the form drawn by the Sanitary District and
as originally introduced in the Senate. We went before
all the civic organizations, such as the Chicago Chamber
of Commerce, Association of Commerce, City Club of
Chicago, Women's City Club, and explained to them the
problem and the necessities, asking them to give us their
moral support by endorsing our legislation. The Association
of Commerce sent a delegation to Springfield and
appeared before the Senate Committees. The disposition
of the legislators was that there ought to be some
restriction and that they ought not to take off the referendum
feature except during the interim when there
would be no session of the Legislature. The bill was
later amended in the Senate and restricted the Sanitary
District in issuing bonds the first year $27,000,000 and
not to exceed $15,000,000 each year thereafter, for the
carrying on of this work. The bill was later amended,
restricting the bonds that might be issued without a referendum
to $40,000,000 as and when necessary during the
next two and a half years, which is Defendants' Exhibit
1416 and shows Senate Bill Number 110 as amended,
which passed the Senate. Senate Bill 110, Defendants'
11495 Exhibit 1414, as originally introduced, is in part as
follows:

> 11496 "After December 31, 1928, no such sanitary district
> shall issue bonds for any purpose or purposes,
> except for the purpose or purposes of constructing
> outlets, intercepting sewers, tunnels and conduits,
> 11497 treatment and disposal plants, pumping and other
> appurtenances necessary for the disposal of sewage
> and its produ[illegible] and water regulating works and
> sites necessary for the foregoing, for the purpose or
> purposes of complying with any direction or directions
> of the United States Government, or with the
> conditions and requirements of any permit now in
> force, or which may hereafter be issued to any sanitary
> district by the United States Government or the

> Secretary of War, or for the purpose or purposes of complying with any decree of any court of the United States, or any laws thereof, or any treaty between the United States Government and any other Government; and for the purpose of paying lawful claims against such sanitary district for damage to land or for damage to or destruction of other property, where such damage or destruction is caused or occasioned by such sanitary district, unless the proposition to issue such bonds shall have been first submitted to the legal voters of such sanitary district at a general election, or at any special election called for such purpose by the corporate authorities of such sanitary district, and shall have been approved by a majority of those voting upon the proposition."

11507 The Sanitary District did not suggest, procure or cause any of the amendments to the original bill. We endeavored to prevail upon the Legislature at every hearing and in every conference, to recognize that the decision of the Supreme Court was a definite and mandatory instruction, and that it was our duty to provide all necessary money to do whatever was necessary to do, and that in view of the fact that we could not at that time determine exactly what in the final analysis we would have to do, we did not want to be restricted and asked that the referendum feature be lifted for that reason. We did everything that we could do.

Edward A. Evers, for Defendants:
Naval Reserve Captain at Chicago.

11510 *Direct Examination by Mr. Behan.*

Fifty years old; reside Wilmette, Illinois; Naval Reserve Officer on active duty in United States Navy, in training Naval Reserve of Great Lakes District; am Captain in Naval Reserve in command of U. S. S. Wilmette;

11511 connected with Naval Reserve since 1897; entered as seaman in United States Navy; served in United States Navy from 1897 until after Spanish American War; after that went into Naval Reserve of Illinois; in that continuously ever since.

11512 Illinois Naval Reserve was organized in 1893; continued as State of Illinois Militia Organization until 1916; in 1916 Congress passed act creating United States Naval Reserve, and members of Illinois Naval Militia were transferred to United States Naval Reserve.

During World War, in command of Camp at Chicago on Lake Front, training men for service on sub-chasers and patrol boats; also had command of officers' material school, training men for duty as officers in Navy; also had charge of remodeling seven vessels taken over for service on salt water; remodeled six ships and they went into regular navy for transport and patrol duty; these activities were entirely work of Navy Department; have been on active duty ever since with Navy Department,
11513 training members of Naval Reserve on Great Lakes.

Naval Reserve at Chicago consists of 800 officers and men; occupies as Shore Headquarters at Chicago, remodeled vessel; at present time are constructing $500,000 new building there; located on filled in land at foot of Randolph Street about 1,200 feet south of mouth of Chicago River on line parallel with end of mouth of River; that approximate location since 1897; during
11514 World War, approximately 7,000 officers and seamen were prepared for service in Navy through our organization.

Members of Reserve required to drill one night each week; required to take 15 day tour each year on training ship; taught to sail, to handle motor boats, to dive in diving suit; we follow out navy program of training exactly.

11515 Members of Naval Reserve are paid by Federal Government for attendance on drills, and also for their 15 day tour each year.

Am in command of U. S. S. Wilmette; property of U. S. Navy; vessel 285 feet long, 40 feet beam, 2,200 ton displacement; 3 boilers, 2 triple expansion engines, 3,000 horsepower, carries average crew of 250 men; Wilmette in service since 1919; have been its Commander ever since that time; it is part of fleet of seven vessels on the Great Lakes.

11517 Navigated Wilmette on Chicago River and branches
11518 in fall of 1926 and spring of 1927, and from five to eight years prior to that; navigated north branch and main river as far as turning basin; docked Wilmette at turning basin at North Avenue; no difficulty of navigation so far as actual movement of vessel is concerned; lot of trouble with sludge in the water; our piping picked this stuff up readily; our condensers got quite a load of it; we had to take heads off and clean them; found it in
11519 our pumps; found it throughout fire mains and generally throughout all piping on ship; in spring of 1927 picked up very heavy coating of grease just above and below water line; after dry-docking we found all paint disappeared from bottom of ship after spending four months in turning basin;

Water supply for vessels of Great Lakes fleet while on cruise taken out of Lake Michigan, out of Lake Huron and out of Lake Superior whenever suitable;

Try to avoid taking water out of Lake Erie; never take any water out of Erie without distilling it; orders
11520 on Great Lakes Fleet not to use Lake Erie water for drinking purposes without distilling it.

In harbor of Cleveland almost every year on cruise; am familiar with water in harbor of Cleveland; there August last; we found the water decidedly dirty.

11521 Water so dirty that men not permitted to swim in it; not much odor noticeable from big ship, but in small boats, close down to water, we found very decided odor; that was in the harbor, right near the mouth of the river; inside the lake, the breakwater.

11522 We were in harbor of Milwaukee several times last year; last visit about August first, 1928; two bathing beaches at Milwaukee; most popular one at north end of harbor; north of Milwaukee River; have observed within last summer condition of water at that beach; we found water at beach was very dirty; Doctor decided that men
11523 had better not go in there; order issued to men of fleet that there was to be no swimming in Milwaukee harbor at that particular time.

Prevailing wind on Lake Michigan in summertime is southwest; southwest wind blows anything in flotation or suspension in the water to the bathing beaches.

Am familiar with use of Lake Michigan on Chicago
11524 front for recreation and bathing and swimming; used very extensively; am familiar with improvements now being made along water front of Chicago by two park boards; am member of Committee of Lake Michigan Yachting Association, which is to confer with park boards relative to improvements being suitable and proper for yachting and of extensive use by the people; use of water of Lake Michigan along Chicago Front has decidedly increased for recreation purposes last few years.

11525 *Cross-Examination by Mr. Ward.*

From my experience, Chicago has better water in front of its beaches than other cities.

Dr. W. A. Evans, recalled for Defendants:
Public Health expert.

Direct Examination by Mr. Lewis.

I testified before. Am still the historical writer on the subject of health and matters similar and cognate, for the Chicago Tribune and papers in its syndicate. Am
11526 now Emeritus Professor of Public Health in Northwestern University Medical School at Chicago. I was health officer of the City of Chicago for a term, and have been giving constant attention from time to time to different conditions and matters of health in that locality. I have information as to the general state of the water of Lake Michigan so far as it relates to seamen and sailors, in the matter of health. I have studied the reports on the prevalence of typhoid fever among the regular seamen, found in the annual reports of the
11527 United States Public Health Service and the annual reports of the Deputy Minister of Health of Canada, and as found in the Office of the Sanitary Engineer of the United States Public Health Service, located in Chicago. In 1908, when Commissioner of Health of Chicago, I organized the Lake Michigan Water Commission, and in the proceedings of that Commission in 1908 and 1909 we had discussions on the prevalence of typhoid fever among seamen inaugurated by papers by the Public Health Surgeons, Young and Cobb, then located in Chicago, and I have been somewhat in touch with the situation since that time. Young and Cobb were in the United States Public Health Service.

11528 The sources of information that I have examined with reference to prevalence of typhoid fever among seamen are in the main the annual reports of the Surgeon General
11530 eral of the United States Public Health Service and

the Deputy Minister of Health of Canada, supplemented by what I found in the Office of the District Engineer located in Chicago. That information shows that the typhoid rate among sailors and seamen on the Great Lakes is about twelve times as high as the typhoid rate among civilians at Chicago, Detroit, Cleveland, Milwaukee and other Great Lakes cities. In 1928 in the Marine Hospital of that district there were cared for sailors with typhoid fever from which we would calculate that the prevailing morbidity rate of typhoid fever among these seamen was about 6.0 per 100,000. That is, as compared with the prevailing rate among civilians in Chicago of about .5. The rate among Canadian seamen was higher than that among American seamen.

It is difficult to control the water supply of vessels on the Great Lakes. In 1921 the United States Public Health Service issued rules and regulations for interstate carriers, supplemented by other rules and regulations for vessels on the Lakes. Those rules provided that the passenger vessels would be required to take water from certified and approved places, unless they were equipped to treat that water in some way or other for the purpose of purification. The rules laid down the requirement that passenger vessels should be equipped with ultra-violet apparatus of approved type; that freight vessels should be equipped with distillation apparatus of approved type. That related to everything except a few vessels which have permission to chlorinate and one or two others with permission to treat the water with ozone. Vessels with crews of less than ten are not covered by these rules.

11532 In order to enforce the rules, the Government has a laboratory service, and a district engineering service. The laboratory service that they make use of is the laboratory service of the various health departments located around the Lakes. They inspect the vessels, to see that the installation of equipment complies with the rules. They have the water supplies taken from the vessels, to see how those water supplies—whether they comply with the rules for water used by interstate carriers.

They have not found it an easy matter to enforce these rules under the circumstances that prevail. The ships are advised to take water in mid-lake, and away from communities. They have found it difficult to enforce that advice. It is not a requirement; it is a request. The proof that they have found it difficult to enforce this with seamen is of several types. They have greatly improved the typhoid rates; they are considerably lower, the typhoid rates, among seamen, than they were some 21 years ago. But nevertheless, they are considerably higher than the typhoid rates among the civilian populations of the ports touched by these ships. There are a number of samples of water that run below the legal standard. Water as they find it on these vessels is rather higher than the percentage of samples of polluted water that are
11533 obtained in the several communities.

11534 Pages 99 to 102, inclusive, of Annual Report of the United States Public Health Service Treasury Department for year 1928, received in evidence as Defendants' Exhibit 1417.

At the top of page 100 of said exhibit there is a report on the cases of typhoid fever treated in the Marine Hospitals of the United States by years from 1915 to 1927, complete. 1928 is incomplete, but I have a table here making that data complete. The table was obtained from Mr. Frank R. Shaw, local representative of the Public Health Service at Chicago. The table sets forth the
11536 number of cases of typhoid fever in the United States marine hospitals for the years 1921 to 1928, by vessels and other data, and by months. The number of seamen

registered on vessels on the Great Lakes in 1928 was 17,760. On the basis of the number of cases of typhoid fever cared for in these marine hospitals, we have no way of keeping track of the cases that were not cared for in any way—gives us a rate of 6.44 for the year 1928. The number of seamen varies from about 18,000 to about 25,000 on the United States register on the Great Lakes.

11537 A very considerable percentage of typhoid is among the seamen in the engine room on ships. The fact that they take water overboard and drink water that has not been properly protected, is, I think, the largest factor in this undue prevalence of typhoid amongst seamen. The largest factor in producing typhoid is the result of water conditions. In 1928 the typhoid death rate among seamen was about twelve times as high as that of the civilian population of the City of Chicago. It was higher than that of the civilian population of any city located on the Great Lakes of which I have knowledge, and it has been so, so far as my information extends, back as far as 1908.

Pages 104 to 105 of the Public Health Service Report of the United States for the year 1927, Defendants' Exhibit 1418. Pages 106 to 107, inclusive, of the same Public Health Service Report received in evidence as Defendants' Exhibit 1419.

11539 Certain documents or tables obtained by the witness from Major Shaw, District Engineer of the United States Public Health Service at Chicago, received in evidence as Defendants' Exhibit 1420.

11544 Defendants' Exhibits 1421, 1422 and 1423, being pages 27 and 32 of the 1927 report, pages 51 and 53, 62, 64 and 65 of the 1926 report, pages 38, 39, 43 and 44 of the 1925 report of the Department of Health of the Dominion of Canada, respectively.

If Chicago's sewage should be sent into the Lake, it would increase the danger to sailors from typhoid fever.

11545 The Public Health Service is doing almost all that it can do in providing for the protection of the water supply on the vessels by treatement with ultra-violet or by distillation. They could do somewhat better if they had an increased inspection service or police service. If the sewage were kept out of the Lake or anything that is done to prevent the pollution of the Lake, will serve to decrease this danger. The water at the south end of the Lake, from 68th Street, Chicago, to the extreme south end of the lake, is a great deal worse polluted than is the water in any other part of the lake in the vicinity of Chicago,
11546 and wind streams of pollution and wind streams of phenol, tainted water, travel considerable distances to the north and in other directions from the mouth of the Calumet River at times. The more pollution that is put in at the mouth of the Calumet River, or elsewhere in our vicinity, the greater will be the hazard to the people who get their water supplies north thereof.

The most effective thing is to keep the pollution out of the lake by diversion, plus biologic treatment, wherever that is required. That is, sending the sewage down the Canal. In a measure biologic treatment would serve the place of diversion. It has very high merit. They both
11549 co-operate together.

I am acquainted with the bathing beaches at Chicago. I know something of the relation of bathing beaches to the spread of typhoid fever among the people using those beaches.

11552 My opinion is that we do not have so much typhoid fever from bathing in polluted water as there has been asserted in other places, I doubt as much as one per cent, or to exceed one per cent of the typhoid fever in the City of Chicago is from that source. I have here the typhoid cases occurring in Chicago between 1924 and 1928, in which it was thought by the Chicago Department

of Health, and they give it as their opinion, that these
cases in the main, except where exception is here to be
found, are the result of such bathing. This report of
11553 the Chicago Health Department, covering the years
from 1924 to 1928, states the result of the investigations
of the Chicago Department of Health as to sources of
cases of typhoid fever coming from bathing in polluted
water, not all of which is Lake Michigan. The facts are
set forth.

Assuming the sewage effluent at dry weather times to
flow into the lake, installation of pumps at the easterly
terminus of the Calumet Sag Channel, whereby 2,000
11555 second feet would be pumped from the Little Calumet
River and the Lake, into and through the Calumet Sag
Channel, which water would flow through the Main Channel
towards Chicago, West Fork and South Branch, which
would be augmented at the junction of the South Fork
and South Branch with 2,000 second feet pumped at 39th
Street through the conduit there to the South Fork, and
that this volume would flow on to the forks or junction
of the North and South Branch, where it would be augmented
by 1,000 second feet of lake water pumped at
Wilmette, and this volume, together with the sewage effluent
from the various purification plants, would flow
11556 into the Lake at the mouth of the Chicago River, it is
my judgment that there would be a different effect on
the navigation and uses of water for recreational purposes.
We would come presently to have a condition of
water in the lake opposite that district which would be
approximately the same as the conditions that now prevail
at the foot of Lake Michigan in the vicinity of the mouth
of the Calumet River and of the Indiana Harbor Canal.
The water in the vicinity of the mouth of the Chicago
River would be very heavily polluted, about as heavily
polluted as was found in an investigation of the water in

the vicinity of the Calumet River and the Indiana Harbor Canal, as set forth in Public Bulletin No. 170, Treasury Department, 1927, commonly referred to as the Crohurst-Veldee Report. I refer to pages 133 and 134. The particular portion referred to of that report is as follows:

11558 "The existing water intakes in Lake Michigan, north of the Dunne and Sixty-eighth Street cribs, appear to be beyond the zone of pollution from the Calumet district and are receiving water of such quality that it can be satisfactorily purified by artificial processes, excepting the supplies of Waukegan and Lake Forest. Although the pollution of these latter supplies is in no way chargeable to the Calumet district, and its discussion is beyond the scope of this report, the existing pollution in this area of the lake, north of the Sanitary District of Chicago, obviously demands attention and abatement.

If the use of the lake as a source of water supply for the urban population in the southern part of the City of Chicago and the Calumet district is to be continued, as seems inevitable, it is necessary in the interest of public health that the water supply intakes in this locality be protected. To remove the intakes beyond the zone of at least occasional pollution would require their extension very far into the lake, to a

11559 distance which is probably not practicable. Moreover, in the absence of any remedial measures, it is to be anticipated that the present zone of gross pollution would be extended, with the increase in population and development of the adjacent land area, thereby increasing the danger from intermittent contamination of the water from the extended intakes and of the water of other intakes. The obvious remedy for the present extremely unsatisfactory conditions, in the southern end of Lake Michigan, is abatement of the existing pollution from sewage and industrial wastes reaching the lake directly or through the Calumet River and Indiana Harbor Ship Canal. The choice of methods to achieve this end involves engineering and economic problems which it is not within the province of this report to discuss. There is no question, however, that abatement of the existing pollution is possible, notwithstanding the difficulties which it may present, and it is certain that the need is imperative."

The said report, entitled "Report of an Investigation of Pollution of Lake Michigan in the Vicinity of South Chicago and the Calumet and Indiana Harbors," received in evidence as Defendants' Exhibit 1424.

11560 Defendants' Exhibit 1425, being certain tables made up from pages 89 to 92 of the said Crohurst Veldee Report, Defendants' Exhibit 1424, received in evidence.

11564 Defendants' Exhibit 1426, certain charts made up from said tables, Defendants' Exhibit 1425.

On the assumptions with reference to discharge of effluent and storm water and the flushing of water from the lake into the Calumet Sag Channel and the channels of the Chicago River, there would result the discharge of harbor pollution, shore wash, effluent, and 2,000 feet of water diverted from the Calumet into the Lake at the mouth of the Chicago River, and would tend to bring about in the territory in that vicinity from Evanston to the Dunne Crib, the conditions which prevail in the vicinity of the mouth of the Calumet River.

11565 Certain manufacturing interests put phenol bodies into the water. There are several factories of that type located in the South Chicago territory. It has been noted with some degree of frequency that with the wind in the right direction, these phenol bodies are carried to the water intakes supplying the City of Chicago as far away as the Wilson crib, or a distance of at least ten to fifteen miles. That bears on the question of lake currents and the ability of wind currents on the lake to spread pollution from the point at which it is put into the lake to the intakes. There are no definite currents on the Great Lakes except those that result from wind action. When the wind blows steadily in one direction for a certain length of time, currents of water flow with the direction of the wind.

11568 *Cross-Examination by Mr. Ward.*

Typhoid vaccination, so far as the civilian population is concerned, has not changed the situation with reference to typhoid fever. Immediately after the World War it was thought that a considerable percentage of vaccinated soldiers returning were having influence on typhoid, but it is generally thought that influence no longer exists. Vaccination is practical and useful, particularly with military forces. We found it impossible to get much use of typhoid vaccination with civilian population. 11569 I never have heard of typhoid vaccination recommended by Federal or Canadian health authorities for seamen. I attributed the amount of typhoid fever not solely to the drinking water impregnated with germs. It is the principal cause. It has not happened in several years, but there are reports of epidemics of typhoid fever of a considerable number of a ship's company. I have seen the report of the Steamship Rochester of the Canadian 11570 Inland lines, carrying about 200 people from Rhode Island to the unveiling of the Perry Monument at Kelly Island in about 1912, when 40 of them came down with typhoid fever after leaving the vessel and within the prescribed time. You will find that in the report I have submitted. I don't know the cause of that epidemic. I would regard an adequate cause that the pumps and hoses which were used to take drinking water from the city mains to the vessel, were also used in drawing polluted water from the harbor for flushing purposes. I don't know that that practice is being used on the lake vessels. It has been discussed as one of the hazards to seamen. I don't know of any vessels that have duplicate pumps for the two different purposes. I have read vari-

ous reports where that has been complained of. If that was the practice, it would be a contributing part of the hazard of being a seaman. The rules governing danger of typhoid to seamen are very definite and prescribe that passenger vessels shall have apparatus for purifying the
11572 water of a type approved by the United States Public Health Service, and that vessels carrying freight shall be equipped with apparatus for distillation of a type approved by them.

11573 In addition, these reports that I have submitted show that they have been able to certify about 75 per cent of the vessels on the Great Lakes, from 75 to 80 per cent; a certain percentage has up to date escaped them. In addition thereto, they check the matter by periodic laboratory examination of the water supplies. They are aware of the fact that it is quite difficult, and the reports in evidence show that they are aware of the fact that it is difficult to enforce these rules, particularly amongst the seamen themselves.

There has been a quite marked diminution in typhoid among seamen in the last ten years.

11575 *Redirect Examination by Mr. Lewis.*

Defendants' Exhibit 1427 is as follows:

"TYPHOID FEVER DEATH RATE PER 100,000 POPULATION. CITIES OF MORE THAN 100,000 POPULATION IN GREAT LAKES REGION.

	1926-1928 Years.			
Cities	**1926**	**1927**	**1928**	**Average**
Chicago	**0.8**	**0.7**	**0.5**	**0.67**
Milwaukee	**1.4**	**0.9**	**0.7**	**1.00**
Detroit	**2.2**	**1.2**	**1.0**	**1.47**
Cleveland	**1.4**	**1.0**	**0.6**	**1.00**
Buffalo	**3.1**	**2.4**	**2.3**	**2.60**
Rochester	**4.0**	**1.2**	**0.9**	**2.03**
Hamilton	**0.0**	**0.0**	**0.0**	**0.0**
Toronto	**1.4**	**1.1**	**0.9**	**1.13**

To bring up to date the table on P. 137, Report of the Special Master."

11709 *Direct Examination by Mr. Lewis.*

Sailors become infected as other people do in a variety of ways, such as drinking polluted water, infected milk, eating polluted food, contact with carriers.

11711 The method required to protect water upon a ship is to provide those ships with water purification apparatus, which I have described, and to require them to take the water from approved sources. All that applies to vessels with ten or more crew. It does not apply to the others, nor to pleasure craft.

11712 The barriers that should be drawn around a body of water like Lake Michigan are, first—the sewage should not be put into the Lake, it should be diverted at Chicago down the Drainage Canal. The second barrier is purification. The water may be purified by replacement of the intakes, by treating the water with chlorine and by filtering it, or by several of these combined. Much depends upon the distance that the intakes are in the Lake and upon the direction and force of winds and the volume of pollution. The water at the intakes now is frequently moderately polluted even at the four mile intake. It has been necessary for twenty years to chlorinate the water. Sometimes the water has a phenol taste, due to certain industrial processes, coal-tar. At Chicago these wastes get into the Lake more in the Calumet region. The water is less appealing or attractive; otherwise it is harmless.

11714 *Cross-Examination by Mr. Jackson.*

I stated yesterday that the typhoid death rate of seamen was 6.24 or about 6.0. It is about 6. I cannot state how that death rate compares with the typhoid rate for all of the United States. I don't think it is lower than the rate for all the rural communities in the United

7

States. I am not willing to say that the typhoid of the United States exclusive of large cities is less than 6.0. I don't know.

11715 I don't think that the question is involved at all as to whether it is more healthful to be a sailor on the lakes than it is to live in the rural communities. The death rate varies in the different parts of the United States. In the State of Alabama, for instance, the typhoid rate is 13, and in the extreme southern states it is in that
11716 vicinity. The typhoid rate of Illinois and of the states contiguous is about 3 to 4. The rate of the districts around Lake Michigan is about half that of seamen on the lakes. To get into the far south, the rate is higher than it is amongst seamen.

I have no conclusion about the effect of seamen navigating the waterway from Chicago to the mouth of the Illinois River if sewage were turned into the narrow confines of that river. I don't know how many seamen there are there. I don't think they would drink any water out of that river. The water in Lake Michigan is much more attractive in taste and in appearance than that of the Illionis. I couldn't conceive of a sailor or
11717 anyone else voluntarily drinking water out of the Illinois. They habitually drink water out of the Lake. The rules and regulations of the Public Health Service provide that vessels can only take water from approved sources unless they are equipped with purifying apparatus of the types I mentioned. The report of the Sur-
11718 geon General shows that on the Great Lakes about 75 per cent to 80 per cent of the larger vessels in interstate commerce have been so inspected and so certified. About 20 to 25 per cent have not been.

It might be true that had one less person died of typhoid fever in Milwaukee in the year 1928, the death rate there would have been lower than that of Chicago for that year.

I didn't say that phenol waste was harmful. I referred to it as an index of the distance to which polluted water would spread and the fact that it would reach certain intakes.

Referring to Exhibit 1425 and 1426, I should say that the B. coli shown for the water at various points, indicates the condition of water along the lake front at those various places, and shows also the relative quality of the water along the lake front at the points at which they were taken. The B. coli readings for water at Hammond, Whiting and East Chicago were taken at the cribs or at the tunnel intakes. It is also true of Gary. The same is true of the Chicago intakes.
11720 Opposite Gary the pollution is less than East Chicago. At East Chicago there are 8,000 B. coli per 100 c.c. At Gary it is less than 1,000. The distance of the Gary intake from the shore line is approximately 8,000 feet. The East Chicago intake is 2400 feet. The
11721 old intake was 600; Whiting 1200; Hammond 5100. Gary shows about the same pollution as is shown at the 68th Street Crib in Chicago. The distance from shore of the intake is a factor of importance which should be taken into consideration in analyzing this chart, Defendants' Exhibit 1426. It would be a factor of error in any direct comparison. As to whether a test made 100 feet off shore in one place and another one four miles off shore in another place, would give any indication of the relative pollution opposite those points in the lake, I would say that it would, but as to whether they are completely comparable, I should say no. I don't think
11723 that if we went four miles off shore at Gary or East Chicago, Whiting or Hammond, we would have practically the same B. coli index that there is at Chicago at

the four mile crib. I could not say how high the pollution would be four miles off shore at Gary, but it would be very high. I think it would be over 100 B. coli per 100 c.c., and I think these charts show that. Some years ago I participated in the survey of the condition of lake water at considerable distances off shore some as far as four miles, and it is my recollection that the water is rather uniformly polluted four miles off shore and becomes quite heavily so with the wind in certain directions.

During the period of the examination shown by the
11725 Crohurst Report—June, July, August and September,
1925,—four miles off shore would put you beyond the contour line of 2 B. coli per 100 c.c. I don't believe there
was sewage treatment at Hammond when that report
was made. Whiting filters and treats its water. There
is no sewage treatment there and none at East Chicago or
at Gary. My understanding is that it goes into the Calumet River without treatment at both places. I could
11726 not answer as to what per cent of the time there was
reversal of the Calumet River. I do know that there is not infrequent reversal of flow of water in the Calumet River. I assumed that the 2,000 second feet of water that was to be pumped through the Sag under the flushing program, would be Calumet River water. The Calumet River opens into Indiana Harbor at the east end. The Grand Calumet River is more or less of a bayou, opening into the lake at both ends. The Indiana Harbor Canal water is worse than the Calumet River, the B. coli count being considerably higher The Indiana Harbor Canal is continuous with the upper reaches of the canal and a flow down the Calumet River would carry some part of the Indiana Harbor water down into the Calumet River. I didn't have pumping circulating water from the Lake in mind. I had in mind in connection with

the flushing program that the water in the Calumet River of the type which now flows through the Sag Channel, would be carried into the Chicago River and be dis-
11728 charged at the mouth into the Lake. Some part of the Indiana Harbor water would be drawn through the Calumet River. I did contemplate the circulation of the sewage of these Indiana cities untreated through the Calumet and Chicago Rivers. The water as it is in the Calumet River connecting with the Indiana Harbor would go through the Sag Channel under the plan proposed or, as I understood it was proposed, finally reaching the Chicago River, being discharged from the river into the Lake at the mouth of the Chicago River.

11729 *Redirect Examination by Mr. Lewis.*

The chart showing the contours and measurements is a record of an investigation made by the U. S. Public Health Service. They took water for the study whenever it could be done satisfactorily. My experience is that in very bad weather they are not able to take water, and of course that is usually the worst water, the times when the water is worst.

I am uncertain that there are any sailors on the Illinois River, but if there are any, the water supply of the boats is taken from the municipal supplies along the river. The Illinois River water is not used for domestic purposes by any community along the river, and people do not have the habit of drinking water from that river. The re-
11730 duction of typhoid fever among seamen on the lakes is almost altogether due to the result of the stringent regulations enforced by the United States with reference to use of water for domestic drinking purposes. The farther we go into the lake and the farther we go from the
11731 sources of pollution, the safer the water is. The mat-

ter of placing intakes, one, two or four miles out, as a means of protection, we have had a lot of experience with. It is to some degree, and a considerable degree, a protection, but at times as a means of protection it fails.
11732 Much depends upon the direction of wind currents. At times of storm the hazard is increased.

Horace P. Hamey, recalled:

Assistant Chief Engineer of Sanitary District.

11644 *Further Direct Examination by Mr. Beebe.*

I testified at the March hearings; have heard the testimony of the Sanitary District engineers in connection with the program for the artificial treatment of sewage. I heard described the method proposed for the discharge of the effluent and storm water to the Des Plaines River, with the provision that a certain amount of water be withdrawn from Lake Michigan to keep up navigation on the Chicago River.

I have had charge of the operation of the channels
11645 of the Sanitary District for the past 12 years, with special reference to the flow in those channels. I testified also at the hearing in January, 1927.

In August, 1927, I carried on experiments to determine the discharges and the amount of flow at various points of the Drainage Canal and Chicago River under various conditions, in collaboration with the Government engineers. We carried out a very comprehensive series of experiments on flow through the Chicago River and Main Drainage Canal, as well as the Calumet Sag Channel. About a month was consumed for these experiments, and some sixty men were employed.

We made experiments to determine conditions of steady flow, and we determined the slopes that would be

11646 required to produce a steady flow of various quantities, and once during this series of tests we established a steady flow of a small quantity. I have not the data right with me, but I believe it was something like 4,000. Perhaps it was a little higher. Then we suddenly increased the outflow at Lockport to a much higher flow, I believe 14,000, and observed the time that an increase would be produced in the flow at various points upstream, making observations at all points along the channel clear up to Lake Michigan.

The object of that particular test was to determine how long after a change had been made at Lockport the full effect of that change would have been felt in the Chicago River. This was to check certain similar tests that we had made February 22 and 23, 1914, March 8 and 9, 1914, and a test that we had made in November, 1925, for the same purpose.

The tests in February and March, 1914, were made by Sanitary District forces only, but the tests in November, 1925, and in August, 1927, were made in collaboration with the government engineers.

11647 I furnished Professor King, Mr. Howson and Mr. Sabin a series of discharge curves showing the results of these four special tests. I offered to furnish any of the basic data; that is, to let them look at any of the basic data. They accepted my average curves as correct. I should have said that they accepted these discharge curves, which discharge curves are exhibits in this case 1402, 1403, 1404 and 1405. Then I furnished them with certain average curves that I had drawn from these curves. From these discharge curves, certain average

11648 curves were drawn to show the time of change at various stations upstream.

I furnished them with an average curve for the Station Lemont, which was about 9½ miles upstream from

Lockport, where the change in flow had been made; at Lemont, because there were four tests, there were, of course, four curves showing the time that the change ~~had~~ occurred at Lemont. Those four curves were slightly different, and I had drawn an average for the station at Lemont to show the average result of these four tests. I furnished that curve; also an average curve for the next station upstream, which was at Willow Springs; also the curves with the average curve for Station Summit, still farther upstream. Another curve for all the observations we had made in the vicinity of Ashland Avenue. Also the curves and the average curve for all observations that we had made in the vicinity of the junction of the North and South Branches of the river.

11649 I have made studies of gates at Robey Street and at Western Avenue and at Kedzie Avenue. Now, between Robey Street and Kedzie Avenue the channel is divided; that is, the main drainage channel runs southwest from the South Branch of the Chicago River at Robey Street. At Robey Street the west fork of the Chicago River runs directly west for about a mile and a half and then there is a connection between the west fork of the Chicago River and the drainage channel at a point just east of Kedzie Avenue.

If controlling works were installed just west of Robey Street, or at Western Avenue, this west fork would still be open, and water could pass from above the controlling works to a point below the controlling works through this west fork. There is not much room at Western Avenue or at Robey Street; in fact, the State of Illinois is
11650 planning a terminal for the Illinois waterway at Robey Street. So I do not believe it is practicable to build controlling works east of Kedzie Avenue.

The West Fork of the South Branch west of Kedzie Avenue is not navigable, and Congress has so declared.

I have heard the testimony of Professor King. 2,750 cubic feet of water from Lake Michigan, exclusive of any water pumped for domestic use and storm flow, will be required to so operate controlling works at the northern terminus of the Sanitary District Canal so as to prevent the pollution of Lake Michigan waters due to such storm flow. In reaching the above conclusion, I have made the following assumptions:

11651 That sewage purification works outlined to be constructed by the Sanitary District for the complete purification of all sewage arising within the limits of the Sanitary District, which have been approved by complainants, are completed and put in operation; that controlling works are installed at some convenient place at or near the easterly end of the drainage canal, and that such works when operated will permit the discharge at dry weather times of the effluent from the said sewage purification works into Lake Michigan by way of the Chicago River, except as to the effluent from said sewage purification works serving that portion of the population of the Sanitary District in the area south of 87th Street, which will be discharged by the use of the present works into Lake Michigan by way of the Calumet and Little Calumet rivers; that the said controlling works when operated will also permit the discharge of all of that direct storm flow which cannot, or may not, be treated completely by said sewage purification works, to the Des Plaines River; that the purpose of said operation of the controlling works is to discharge to the Des Plaines River all effluent and storm flow reaching the channels of the Chicago River and the channels of the Sanitary
11652 District canals and the greater portion of the storm flow of the Little Calumet River in order to prevent the

pollution of the Lake Michigan waters due to such storm flow.

11653 The facts taken into consideration and the methods used to arrive at the conclusion as to the amount of water necessary to be withdrawn from Lake Michigan to accomplish the above mentioned purpose, are:

I have assumed that if controlling works were installed in the vicinity of Kedzie Avenue, they would need to be operated every time there was a storm on the Chicago River watershed, either actual or threatening; that it would take a certain discharge through these works for a certain length of time to establish a flow in the Chicago River sufficient to carry the storm run-off. I have assumed further that the controlling works would operate during the actual time of rainfall on the Chicago River watershed, and for a certain length of time after rain had ceased to fall, but was continuing to run into the river through the sewers.

Then I have assumed that since the Chicago River would be polluted from this storm run-off, it would be necessary to replace the volume of water in the river
11654 and other channels with an equal volume of clear lake water. There are in Chicago approximately 55 general rains per year of sufficient size to cause storm water overflow.

This has been determined by study of the rainfall records at the various rainfall stations in the Chicago area, and that has been testified to previously at these hearings.

In addition to the 55 general storms per year there are a number of heavy local storms affecting certain portions of the area. These are recorded at the various local rain gauging stations situated all the way from Evanston, Illinois, to Whiting, Indiana. Study of the records for recent years indicate that there are approximately 50 of these heavy local rains affecting some one or more of the rain gauging stations. To allow for the pollution caused by these local rains I have assumed that the controlling works would need to be operated 25 times per year, or for half those local rains. To allow for threatened rains, or rains too small to produce ~~an~~ overflow from the sewers, I have assumed that the controlling works would be operated ten times per year.

Summing up all these operations makes a total of 90
11655 times per year that the controlling works would be opened to prepare for storm flow conditions in the Chicago River. So far as within reason I have used figures as testified to by Professor King. I have assumed that the operation of the controlling works 90 times per year would require the opening of the gates and maintaining a flow through them for 40 minutes each time at an average rate of 14,000 second feet. The quantity of water discharged through these gates during these times of preparatory flow would average 87 second feet for a year. The same result would be obtained if the gates were opened so as to discharge an average of 9,333 second feet for one hour each time in preparing for a rain.

A study of the records indicates that the average period of rainfall for each rain that produces overflow from the sewers is 5.6 hours. Based on the best available data, I have assumed that the period of run-off for each storm subsequent to the cessation of rain will be three hours. This gives a total of 8.6 hours during which storm flow will pass through the controlling works for each rain. I have assumed that the flow would vary between 10,000 second feet and 6,000 second feet, or be an average of 8,000 second feet during the 80 periods per year of rainfall and subsequent run-off.

The volume of water passing through the controlling

11656 works at Kedzie Avenue during these periods is equivalent to an average of 522 cubic feet per second for one year.

In a similar way I have calculated the flow through the controlling works of the Calumet Sag Channel at Blue Island, except that because of the different character of the territory I have allowed an average time for run-off subsequent to rains of six hours in place of three, that I used in the Chicago River. During the period of flow preparing for rain, and of flow during actual rainfall, and flow during run-off period subsequent to rainfall, there has been required an average of 212 cubic feet per second for one year through the Calumet controlling works.

Then in order to clean up the channels after a rain it would be necessary to draw from the North Shore channel and North Branch all of the polluted water there from the storm; next to draw water from the main branch of the Chicago River and from the South Branch to Kedzie Avenue, the location of the controlling works, and then to draw all the polluted water out of the main channel to the Lockport controlling works, including the polluted water in the Calumet and Little Calumet Rivers and the Calumet Sag Channel. This would be done by pumping in 1,000 second feet into the North Shore Channel at Wilmette, which with the three hundred second feet of effluent from the North Side treatment plant
11657 would displace the storm water in the North Shore Channel and North Branch of the Chicago River in 30.7 hours. During this time a flow of 2,500 second feet would be maintained through the main river to insure against back flow into the Lake—and incidentally would replace any storm water that happened to be in the main river.

When the storm water has been displaced throughout the North Branch, the pumping at Wilmette will be stopped and the flow through the main river into the South Branch would be increased to 6,700 second feet for 6.7 hours, at the end of which time all the storm water in the South Branch down to the controlling works at Kedzie Avenue would have been displaced.

Of course, under this program there will be no way of displacing the storm water which has accumulated in the south fork of the South Branch, the west fork of the South Branch, or any of the various slips.

Then, in order to clean up the upper main channel between the Kedzie Avenue controlling works and the Sag, there would be required an average diversion of 3,090 second feet, plus 1,300 second feet of effluent from the North Side and West Side and Southwest Side treatment works, making a total of 4,390 second feet for a period of 19.7 hours. In that I have assumed that 1,000 second feet of effluent from the West Side and the Southwest 11658 Side plants would be introduced into the channel—into the South Branch—east of these Kedzie Avenue controlling works.

In order to displace the storm water which has accumulated in the Calumet River and Sag Channel it would be necessary to draw in from Lake Michigan 1,500 second feet for 41.7 hours; after this 12.4 hours would be required to displace the water in the Calumet Sag Channel, from the Blue Island controlling works, down to Sag, flowing 1,500 second feet from Lake Michigan, 325 second feet from the headwaters of the Little Calumet, and 175 second feet effluent from the Calumet treatment works, making a total of 2,000 second feet, which is the nominal capacity of the Calumet Sag Channel. After this the combined flow through the upper main channel, 4,390 second feet, plus 2,000 second feet through the Calumet Sag Channel, making a total of 6,390 second feet, would displace the volume in the main channel between Sag and Lockport controlling works in 9.7 hours.

The time required to displace the accumulated storm water in all the channels after a rain would therefore be approximately three days. Now, since there will be a certain amount of overlapping of storms, or storms following each other in less than three days, I have assumed, from the best data available, that after 80 storms
11659 the Chicago and Calumet Rivers, and the various canals, would have to be cleansed 60 times per year, and that with 60 times per year the complete operation of displacing all the storm water in the various channels which I have described, and in the manner I have described, will be carried out.

Now, to summarize: For 90 times of preparing for storms, for 80 times of actual rainfall and subsequent run-off, and for 60 times of displacing the volume in the various channels, would require an annual average discharge at Lockport to the Des Plaines River of approximately 4,100 second feet, composed of 2,750 second feet direct diversion from the waters of Lake Michigan, 550 second feet estimated annual average rainwater run-off of the Chicago River drainage area, plus a portion of the rainwater run-off of the Calumet River, and in addition approximately 800 second feet of sewage treatment plant effluent.

There is no way of flushing the slips and a portion of the West Fork of the South Branch. It is possible to flush the South Fork of the South Branch but not the slips.

11660 The slips and the west fork would, of course, contain storm water after a rain, and that storm water would be more or less polluted. Then, if a long dry period succeeded the rain, that water would surge into the channel at times when the South Branch was dropping, due to a drop in the Lake, and would surge back when the water surface in the South Branch raised. I assume that the pollution would get out of those slips from time to time.

In my calculations above outlined, I have assumed that save at times of flood run-off, the effluent from the sewage purification works would go into Lake Michigan.

To keep all effluents out of Lake Michigan, there would be required in addition to the 4,100 second feet flow at Lockport stated by me, some 500 or 600 second feet,
11661 on the assumption that the Lake would remain still, which would be the balance of the sewage treatment plant effluent not discharged to the Des Plaines River during flood run-off and during the period of flushing the storm flow out of the different channels, as I have above outlined. But I believe there would be required two or three times that much in order to be sure that you could maintain flow from the Lake and keep that effluent moving towards Lockport.

To keep all storm water and sewage effluent at storm times and at all other times from Lake Michigan, substantially and effectively, there would be required at least 5,000 second feet flow at Lockport.

11662 With 5,000 second feet there would be numbers of small reversals when the water that was in the main river would get into Lake Michigan.

The capacity of the Drainage Canal west of the Willow Springs Spillway, that is, the rock section, is considerably greater than the capacity in the earth section upstream or east from Willow Springs. The rock section capacity is about 14,000 second feet. That is its capacity with flow parallel to the bottom and at a certain depth of 24 feet, called the nominal capacity. The nominal capacity of the Canal east of the Spillway in
11663 the earth section is 10,000 second feet to Summit, and from Summit to Robey Street the nominal capacity is 8,000 second feet. That is the designed capacity.

11667-11676 Defendants' Exhibit 1434 is as follows:

"FLOW OVER WILLOW SPRINGS SPILLWAY—REVERSALS OF CHICAGO RIVER—MEAN FLOW AT LOCKPORT—RAINFALL—1926, 1927, 1928, 1929.

Date		Flow Main Channel C. F. S. Mean	Max.	Min.	Flow Over Willow Springs Spillway C. F. S.	Reversal Hours Min.	Rainfall Inches
1926							
Feb	24	7310			00		
	25	9570	11955	7415	0	1:40	0.70
Apr	9				265		
	10				800		
	11				800		
	12				745		
	13				405		
	14				160		
	15				5		
Jun	10	8690			0		
	11	9975	12080	7795	0	4:00	2.65
	12	9700			0		
	13	9905	12385	6940	0	4:05	1.96
Sep	14	8357			0		
	15	8215	9440	6065	0	0:08	0.99
	21	6685			0		
	22	6695	8715	5845	0	0:19	0.23
	23	8560	12537	6700	0	0:40	0.88
	26				135		
	27				105		
	28				5		
Nov	16				65		
	17				330		
	18				450		
	19				450		
	20				405		
	21				330		
	22				160		
	23				5		
1927							
Feb	5				10		
	6				90		
	7				190		
	8				150		
	9				70		
	10				30		
Apr	15	6730			0		
	16	9120	10985	7755	0	1:15	0.78
	17	6730			0		
	18	8315	11745	6465	0	0:50	0.53
	19	9740	11860	8270	15	2:25	0.70
	20				225		
	21				185		
	22				60		
May	8	6675			0		
	9	6840	9390	4595	0	1:13	0.58
	17	6245			0		
	18	7505	8720	6495	0	0:05	0.66
	19	6875			0		

Date		Flow Main Channel C. F. S Mean	Max.	Min.	Flow Over Willow Springs Spillway C. F. S.	Reversal Hours Min.	Rainfall Inches
	20	7175	11210	6415	0	0:54	0.42
	23	8105			0		
	24	11120	12280	5545	0	2:05	1.16
Jun	3	5845			0		
	4	8330	12365	6510	0	2:25	0.40
	19	6640			0		
	20	9295	17055	6720	0	2:45	2.34
	21	7800	10980	6665	0	2:20	1.32
	30	6495			0		
Jul	1	7370	10065	6370	0	0:40	0.28
	14	7640			0		
	15	8143	12055	7500	0	0:36	0.74
Sep	27	10555			0		
	28	11180	12625	10190	0	1:35	1.46
1928							
Apr	6				175		
	7				1010		
	9				1530		
	9				1835		
	10				760		
	11				430		
	12				125		
Jun	18	10070			0		
	19	11380	12215	8595	0	0:11	0.41
	23	10680			0		
	24	10640	14380	8650	0	1:35	1.98
July	1	9645			0		
	2	10410	12410	9850	105	0:30	1.64
	3	11180	15720	9740	175	1:15	1.56
	4	10400	12495	9660	1225	0:12	0.43
Jul	5				1750		
	6				1640		
	7				1240		
	8				520		
	9				95		
	20	9985			[illegible]		
	21	9960	10280	9555	0	0:15	0.61
Aug	3	10735			0		
	4	12110	12740	11505	0	0:20	0.79
	22	10185			0		
	23	11515	12675	9560	0	0:34	0.96
	28	10120			0		
	29	10945	12695	10025	0	0:45	1.47
Sep	13	10020			0		
	14	10590	12810	7410	0	0:10	0.98
Nov	18				165		
	19				830		
	20				890		
	21				570		
	22				240		
	23				45		
	24				2		
Dec	15				65		
	16				300		
	17				460		
	18				640		
	19				650		

	Flow Main Channel C. F. S.			Flow Over Willow Springs Spillway C. F. S.	Reversal Hours Min.	Rainfall Inches
Date	Mean	Max.	Min.			
20				465		
21				290		
22				210		
23				35		
1929						
Jan 21	9995			0		
22	11255	12740	9705	0	3:00- 3:55 pm 4:30- 4:40 5:04- 5:25 5:36- 6:05 6:10- 6:39 7:30- 8:05	1.01
Feb 28	10235			90		
Mar 1	10565			490		
2	11150			710		
3	11735			965		
4	11655			1465		
5	11675			1560		
6	11650			1480		
7	11685			1380		
8	11060			870		
9	10210			370		
10	10190			95		
11	10195			20		
12	10225			0		
13	10535			20		0.36
14	10125			210		Trace
15	9615	12520	6880	595	2:10- 2:32 pm 11:45-12 mid	1.41
16	8080	10835	5590	1105	12:00-12:10 am 12:50-12:55 2:00- 2:12 4:30- 4:38 7:18- 8:15 10:20-10:40 11:35-12:15 pm	0.15
17	8320			1465		0
18	7210	8530	6135	1280	3:25- 4:28 pm	0
19	5880			750		Trace
20	5550	5825	5380	335	3:05- 3:10 pm 3:30- 3:35	Trace
Mar 21	5000	5385	4935	35	1:25- 2:20 pm 10:15-10:30 11:32-11:41	.06
22	5435	8965	4925	0	12:04-12:15 am 1:08- 1:17 1:22- 2:01 10:50-11:20 2:30- 2:45 pm	.08
23	4950	5000	4925	0	5:45- 6:05 am 6:30- 6:45 7:45- 8:15 3:45- 4:00 pm 4:05- 4:18 5:15- 5:27 5:35- 5:43	.01

	Flow Main Channel C. F. S.			Flow Over Willow Springs Spillway C. F. S.	Reversal Hours Min.	Rainfall Inches
Date	Mean	Max.	Min.			
Mar 24	4965	5000	4925	0	8:05- 8:16 8:25- 9:00 am 5:20- 6:17 pm 9:02- 9:30	0
25	5525	11415	4925	0	4:07- 4:14 am 5:02- 5:08 6:29- 6:44 7:04- 7:29 8:40- 9:00 9:20- 9:25 10:35-10:55 12:25-10:45 pm 2:10- 2:30 3:40- 3:55 4:22- 4:38 4:50- 5:20	.02
26	4950	5000	4925	0	10:00-10:50 am 11:20-11:53 12:40-12:50 1:20- 1:40 3:10- 3:30 4:35- 4:55 5:55- 6:54 6:47- 7:20 7:45- 8:20 9:25-10:05 11:39-11:46	0
Mar 27	4965	5000	4925	0	1:08- 1:28 am 4:10- 4:25 5:50- 6:15 7:35- 8:00 8:55- 9:50 10:15-10:40 11:00-11:20 11:30-11:40 12:15-12:35 1:10- 1:30 2:15- 2:35	0
28	4995	5335	4925	0		0
29	4965	4995	4935	0		Trace
30	4975	5055	4925	0		0
31	8600	17970	4755	0	10:35-11:45 am	3.12"

Sherman M. Woodward, for Defendants:
An Hydraulic Engineer.

11684 *Direct Examination by Mr. Beebe.*

Reside Iowa City, Iowa; Professor of Mechanics and Hydraulics of the University of Iowa; attended Engineering School of Washington University, St. Louis, graduating in 1893 with degree of Master of Science; took their entire course in civil and mechanical engineering; at Harvard University for one year, studying advanced mathematics and advanced theoretical physics; degree of Master of Arts in 1896; since 1896 engaged either in teaching or in the active practice of various aspects of hydraulic engineering; have somewhat combined the two; from 1896 to 1905 was employed in the beginning, 11686 two or three summers, by City of St. Louis and by an electric railway company in various kinds of elemental engineering work; certain research investigations following the big St. Louis cyclone in 1896 to determine the effect of such cyclones on the water towers and other structures; made certain researches in connection with a testing laboratory they were then building; in fall of 1896 was at the University of Arizona, at Tucson, as Professor of Mathematics and Mechanics; there eight years, and in addition to teaching various branches of engineering and mathematics, carried on researches for the Agricultural Experiment Station in connection with irrigation, pumping water therefor and handling of irrigation water in ditches, and measuring devices for such water; assisted local representatives of 11687 the U. S. Geological Survey in making hydraulic measurements; in 1904 became Professor at the University of Iowa in engineering; there only one year; then accepted position with U. S. Government to investigate irrigation and drainage for agriculture; the investigations were scattered about the country; was assistant to the chief of the branch and acting chief in his absence at Washington; duties largely in visiting, inspecting and supervising field investigations, surveys and experimental studies, handling of water for irrigation work carried on in quite a number of western states such as Washington, Oregon, California, Arizona, New Mexico and Colorado, and some others; reports were made to the department of such investigations; directed the local men; one of my chief duties was to edit the reports for publication in the Washington office; had also something to do with drainage investigations and for that purpose worked in many of the eastern states, such as Virginia, South Carolina, Louisiana, Texas, Mississippi, Arkansas, Illinois, Ohio, Delaware. 1908 returned to the University of Iowa as Professor of Mechanics and Hydraulics, which I have held ever since.

During that time have been employed as consulting Engineer for specially difficult hydraulic work in connection with various engineering projects. From 1913 to 1920 was Consulting Engineer for the Miami Conservancy District, which is the legal name of the corporation that built the flood protection works in the Miami Valley centering around Dayton, Ohio. This is many times the largest of any local flood protection work that has ever been executed in this country. My responsibility was for all the hydraulic calculations. I did not make the construction estimates.

11690 After I left the Government, was employed on occasions as a special consultant to visit certain places by the local authorities in the lower Mississippi Valley; do not recall the names of all the districts; one time the Government asked me to go over into the Illinois Valley to prepare a report on pumping plants for drainage district. This report which I made was published. I was a member of the Engineering Board of Review of the Sanitary District in 1924-25.

At the University of Iowa we have the largest and best hydraulic laboratory in the country for a certain kind of hydraulic investigation, it being established while I was there and at my urgency. It has been under my control ever since and I have made particular investigation into hydraulic matters there. I carried out investigations in co-operation with the Department of Agriculture. This department has two permanent men stationed there, one there six years. They give all their
11691 time to this work and the Government bears part of the expense and the University furnishes the laboratory and certain help. The investigations are under my general directions, subject to the approval of the department officials at Washington.

11692 Am the author or joint author of the following publications:

"Flow Through Drain Tile" and "Pumpage Plants for Drainage Districts," published by the Department of Agriculture; and "The Hydraulic Jump & Back Water Curves," published by the Miami Conservancy District, being a mathematical treatment of certain hydraulic phenomena. The hydraulic jump, translation of the French name—was invented about a hundred years ago. It is a phenomenon that occurs when water moving swiftly strikes a certain sort of obstruction and is very suddenly changed in depth to a greater depth and it make a foaming and tumbling mass of water where the change takes place; like the boiling surf of the ocean.
11693 If you open a faucet and let it run into a smooth-bottom sink, with the outflow shut off, the jet of water coming down from the faucet strikes the bottom and spreads out in all directions on the bottom in a smooth thin

layer. When it gets over towards the sides of the sink and begin to fill the sink, a circle will be seen on the bottom of the sink around this jet of water, and as the sink fills up that rather conspicuous circle comes in slowly toward the jet and finally will reach the center. That little wave of water is a diminutive hydraulic jump.

In some of the great rivers there is a large hydraulic jump as much as 10 feet high, and it is very destructive to boats. It occurs below dams and is a matter that perhaps never had been thoroughly studied or explained or analyzed, I think, until this pamphlet was published. The Conservancy District published 2,500 copies which were sold. There has been another edition of the work. It is used as a textbook in my classes and has been used at other places. There has been a steady demand for the publication all over the world.

11694 There was also published a larger volume called "The Hydraulics of the Miami Conservancy District." It was prepared by me and published by the District and is sold. It discusses all of the important hydraulic problems in connection with the project. I was co-author of a bulletin published by the State University of Iowa entitled "Flow through Culverts." It is a report on the co-operative work of the United States Government. Am joint author of another work called "The Effect of Agricultural Drainage upon Flood Runoff," published by the American Society of Civil Engineers.

11695 The field covered by me in the twenty-two years as Professor of the University of Iowa, is various aspects of hydraulic engineering. I am a member of the American Society of Civil Engineers, American Society of Mechanical Engineers, American Association for the Advancement of Science, of which latter organization I am a fellow; also member of the Iowa Engineering Society, and other engineering clubs and societies.

Have been here during the hearings that have been conducted for the last two weeks; was present at the March hearings at Chicago; heard the testimony of Professor King and Horace P. Ramey; made certain mathe-
11696 matical and engineering investigations with reference to the discharges in the Chicago River in connection with run-off from floods, etc. Mr. Ramey and I have been working in collaboration.

I have made a calculation as to the quantity of water necessary to be withdrawn directly from Lake Michigan under the following assumptions: that the sewage purification works outlined to be constructed by the Sanitary District for the complete purification of all sewage arising within the limits of the Sanitary District, which have been approved by complainants, are completed and put in operation; that the controlling works are installed at some convenient place at or near
11697 the easterly end of the drainage canal, and that such works when operated will permit the discharge at dry weather time of the effluent from the said purification works into Lake Michigan by way of the Chicago River, except as to the effluent from sewage purification works serving that portion of the population of the Sanitary District in the area south of 87th Street, which will be discharged by the use of the present works into Lake Michigan by way of the Calumet and Little Calumet Rivers, and that said controlling works when operated will also permit the discharge of all of that part of the storm flow which cannot or may not be treated completely by said purification works to the Des Plaines River; and that the purpose of said operation of the controlling works is to discharge into the Des Plaines River all the effluent and storm flow reaching the chan-

nels of the Chicago River and the channels of the Sanitary District canals, and the greater portion of the storm flow of the Little Calumet River in order to prevent the pollution of the Lake Michigan waters due to such storm flows.

The quantity so calculated under those assumptions is 2739 cubic feet per second.

11699 In making these computations it is necessary, of course, to have particular values to use in the computations, and therefore I have used definite values of a considerable number, each one of which is largely a matter of judgment or opinion, combining various other data, and I have tried to carry out the computations consistently with those figures, carrying the numbers down to a single cubic foot per second, but I don't claim that the final answer is that precise, of course. That is a
11700 matter of convenience and consistency in the computations.

In going through all of the various items I have tried to follow consistently the point of view that I was saving water as much as possible; that is, in choosing average values, or what are called average values, I have tried to keep them in such a way that the result will be to keep the quantity just as low as it seems to me it can possibly be kept.

In computing the amount of water to go through the control gates, I used the number of times the control gates were to be opened as 90 times per year. That is based, to a large extent, upon the weather records at the U. S. Weather Bureau Station in Chicago and surrounding stations.

The 90 is made up of two figures, 80 times when there would be actually enough rain to produce storm overflow from the sewers, and ten times when the gates might be opened in preparation for a rain, and then the rain might

11701 not occur at all, or it might be so slight that there would not be any storm overflow.

I have assumed in general the most skillful operation of the gates that it seems to me it is possible to expect. Of course, these computations are based upon the actual past records, but the people operating the gates would not know in advance just how much rain is going to come or how intense it will be, and that accounts for the assumption of ten times the gates might be opened when the later developments would not indicate that they were needed, that they were necessarily open at those times.

This is all on a yearly basis. Now, the method of computing the discharge at the gates has been to divide it into four parts. The first part is called the preparatory flow, which is a very short time relatively, following the first opening of the gates. The second part is the flow during storms, which is a much longer time and larger quantity. The third part is the estimate of the storm overflow from the sewers after the rain has ceased falling. It is common to use a period of concentration for storm sewers in which it takes time—the time required for them to fill up to reach their maximum flow, and there will be a time after the rain ceases when they will be emptying and continuing to flow, which will be somewhat

11702 the same sort of time. That is the third division of time. The fourth division is the time necessary to wash out the polluted water in the channels so that the channels would be relatively pure, in a quiescent state, after the gates are shut. They would not be absolutely quiet, but the flow would be very small, on the assumption that the sewage effluent only is to go into the Lake.

Assuming 40 minutes for the length of each preparatory flow period and 90 times a year, adds up for the whole year to two and a half days of operation, or two and a half days of being open, totalling it for the year.

And taking the average rate of flow through the gates at Kedzie Avenue at 14,000, that would contain the sewage effluent at the same time, the sanitary sewage effluent, which is taken as 1,300 cubic feet per second for this calculation. That 1,300 is made up of 300 from the North Side plant and 1,000 from the West Side and Southwest Side plants, which is proposed to come into the canal just above the control gates. Of course then when the control gates are open, that effluent would flow through the gates. That leaves 12,700 cubic feet per second of water drawn from the Lake until—and it finally becomes partly the storm flow.

11703 The flow during storms—now, I would like to say, these storms will be of all kinds, some very small and some heavy. Some will last a long time and some will be brief in duration, and we have averaged the length of time as best we could from the data that could be obtained, and have an average length for each storm of 5.6 hours. It is assumed that the average rate of flow through the control gates for that time would be 8,000 cubic feet per second. That is, on this theory of operating the control gates during the preparatory period, the flow would have decreased from an original amount of 18,000 cubic feet per second down to 10,000 cubic feet per second. For many relatively small storms it would not be necessary to keep it steadily at 10,000 cubic feet per second, but it would be tapered off at varying amounts, depending upon the nature of the storm and the diversion in each case. On that account I have used 8,000 as the average.

Using 80 storms per year gives as the total length of time in a year that the gates would be opened during the rainfall period, 18½ days.

Now, it was assumed that the storm sewers would overflow into the river on the average for three hours after each storm, and that gives the total period in days for the year of ten days.

These three periods added up to 31 days in a year, 11704 and the total flow during that period averaged over the year, to get an average constant value for the whole year, is 609 cubic feet per second.

Now the time to flush out the channels—well, there was a similar calculation made for the Blue Island controlling works at the entrance to the Sag Channel. The times are exactly the same, except it was assumed in that case that the run-off after the storm would average six hours instead of three hours on the Chicago River. The reason for that is first, the Little Calumet drainage area is much larger; and secondly, it is not built up nearly so intensively, and the records we know, show that after a storm that river runs for a considerably longer time than the Chicago River.

The result obtained at the Blue Island controlling works for those same three periods of calculation is 212 cubic feet per second.

Now, the time to flush out the channels or to displace the polluted water was given somewhat in detail in Mr. Ramey's testimony, and mine is substantially identical. I can go through it again if there would be any use for it, but unless it is wanted I will just give the total.

11705 The total for the fourth period in that calculation is 1665 cubic feet per second. That figure includes the storm flow of the present lake water, because it passes through the gate together, and has not been computed here separately. The similar figure for the Sag Channel 796 cubic feet per second. When all those figures that I have given are totalled, I reach a total value of 3,282 cubic feet per second. That includes the storm runoff for the whole year. Then deducting 543, the amount of the total runoff in those two streams that have been submitted in evidence here in the exhibit, as I understand, gives the final result of 2,739.

11706 Four thousand eighty-four feet per second is my calculated value of the total flow at Lockport, which contains these figures as stated, with the sanitary sewage effluent from the treatment plant, during the period when those gates were open.

About the slips in the South Branch beyond the Drainage Channel and West Fork. There is no method of flushing that portion of the stream out.

11707 I have an estimate of the amount that will be necessary to keep all sewage effluent from the lake. That is made, as before, by assuming the highest degree of skill in operating gates, and I feel somewhat doubtful whether they can be operated that skillfully or not. But my figures are as follows: 3,716 cubic feet per second of fresh water from the Lake; 1,475 cubic feet per second of sanitary sewage effluent during the year; and 543 cubic feet per second of total run-off from the drainage, making a total after they pass the control works at Lockport of 5,734 cubic feet per second.

11732 *Further Direct Examination by Mr. Beebe.*

In one of the figures I gave in my direct examination I gave the quantity for flushing out the Calumet River and Sag Channel as 1,008 c. f. s. It should have been 796.

11870 *Cross Examination by Mr. Jackson.*

11872 I worked this problem out in collaboration with Mr. Ramey and my assumptions and conclusions are substantially the same. The figures likewise. We were trying to work out the problem in a practical way to accomplish the substantial diversion of the storm water by proper operation of the control gates. When the control

gates should go into operation with respect to the rainfall, would differ a good deal in different kinds of storms. I would say on the average it would begin a few minutes before very evident impending rainfall. I haven't had
11873 any definite figure in mind as to the quantity of rainfall that would be necessary before the control works should go into operation. In some cases they might be opened for a summer thunder-shower just on the appearance of very black clouds before it was known it was raining anywhere in the area. For a very slow winter rain they might not be opened until after the rain had started. The amount the storm water overflow would have to be before it would be necessary to divert it, is based on the assumption that as soon as there is storm water overflow, the gates would have to be opened and the current started in the other direction. The District has made many elaborate calculations for several years as to when there would be storm overflow; that is, as to quantity of rain. For a very sudden rain when .06 of an inch has fallen, storm water overflow begins. If it is a very slow rain, it does not begin until a larger quantity has fallen, because some of it runs off in the mean-
11874 time. An elaborate sliding scale has been used in the computation, and I went over that work very carefully and adopted it for my purposes. The runoff that .06 of an inch of rainfall would produce is 50 per cent or .03 of an inch. I have not calculated how much it would be in cubic feet per second. For the use I made of the figures I did not compute quantity in number of cubic feet. I considered the limiting factor .06 or .07 of an inch rain per hour. The runoff is just one-half. I did not reduce it to seconds feet. In the calculations the District has made they used the capacity of the intercepting sewers. I used the data that had been calculated in the office of
11875 the Sanitary District. I could easily calculate what

the runoff would be in cubic feet per second that would be produced by that rate of rainfall. I did not use the number of cubic feet per second in that particular calculation. I don't of my own knowledge know whether the factor is correct. I haven't in mind the total capacity of the intercepting sewers in the Sanitary District. I can look up the record. I knew those figures, but I did not use them in this calculation. I know at about
11877 what storm runoff the storm sewers begin to overflow. A runoff of .01 of an inch per hour is about the capacity, and any excess over that spills over but it takes a rainfall of about .03 of an inch to fill them up. .03 of an inch is a definite quantity, independent of time.

All these records, which are Weather Bureau records, are based on hourly measurements of the rate of rainfall, and therefore the rain that was assumed to be at a certain rate per hour. We used the .03 of an inch as being constant for an hour. That is, it would be .03 of an inch in depth on the ground. Most of it would be in the sewers. I don't know the area of Chicago above the Kedzie Avenue control works, and I did not use in my investigation what quantity of runoff would be produced in cubic feet per second, assuming that for one hour .03 of an inch of rain fell, and that all the rain that fell ran off. You ask me to assume that the area is 307 square miles, but in this storm runoff only the part inside the sewered part was used, which is about half of that 307 square miles. The upper end of that Chicago River Drainage Area runs away up north, and that has not been used in any important degree in this calculation; but the storm sewers are all down in the
11881 City of Chicago. It was used, however, in one place in getting the total annual runoff, but it did not come into computing with reference to the overflow of storm water. If you deduct 180 square miles, the total in cubic feet

per second would be about 3,456. I calculate that the runoff would be 50 per cent of the actual rain. I used the figure .06 of an inch actual rainfall, or .03 of an inch runoff. With .03 of an inch rainfall, the runoff would be
11884 about 1,700 second feet. That was not the point at which I concluded the control works would come into operation. It would come in at twice that much. Storm waters would begin to overflow when the rainfall is .06 of an inch in an hour and the runoff half of that. With .06 of an inch an hour rain, the runoff would be a little over 3,000 cubic feet per second. That would happen 50 to 60 times every year, and has happened that way for the last nine years based on the rainfall record at a single station, and it is not quite right to say that it always is .06 of an inch in one hour, because if it does not reach .06 of an inch the first hour, it exceeds .08 of an inch in the first two hours. That is just a sliding scale.
11885 Assuming the sewers are filled up and then begin to fill up, the storm overflow begins to occur if .08 is reached in two hours. You do not have to have 3,000 cubic feet per second before the control works are brought into operation. You could get an overflow with a smaller runoff if you take a two hour period. It is not because I think the capacity of our sewers is less than 3,000 second feet, but if you take a 2-hour interval you could have a smaller rate and fill them in a 2-hour interval. After the overflow begins they could carry only .01 of an inch runoff per hour. If the rain is not big enough to make
11886 that overflow, you would not get any. You do not have 3,000 second feet capacity in your interceptors. You only have about one-third of that. The intercepting sewer capacity in Chicago is much less than 1,300 or 1,400 second feet, probably about 1,000. There are two kinds of capacities, one is a carrying capacity after they are filled. That which we are now referring to is the car-

rying capacity. But they have a cubical content of capacity that has to be filled up before they carry as much as comes in, and it is this first filling up that I thought you were discussing at first where the 3,000 rate would exist for an hour in order to fill them up and get them full. The capacity that I was thinking of was that additional capacity for carrying storm overflow. Their capacity is over 2,000 cubic feet, of which about two-thirds is used for the ordinary dry weather sanitary sewage
11887 flow. Then they have an additional capacity of about 700 cubic feet per second, and it was that I had in mind as carrying this storm water. I was mistaken entirely in giving the other figure as the total capacity.

I have used in my calculations 2,000 as the capacity of the Chicago interceptors. If it was a fact that the capacity was 4,000 c. f. s., then I think my figures should be changed to correspond to 4,000 second feet.

11888 Assuming that treatment plants of Chicago are designed to treat an average flow of 1,716 c. f. s. and an excess capacity of 50 per cent, and that the intercepting sewers are large enough to carry the total capacity, I cannot tell how many overflows of untreated storm water there would be, because I have not made the calculations on that basis. It probably would reduce the number slightly, but it is very hard to tell how much because these rains usually are so large that whether you change that capacity much or not, you would still get overflow. For example, you get a fall of .21 or .25 of an inch in an hour and you would get the overflow whether you changed this or not. A good many rains come that way and everything would have to be examined in detail to count that number. I cannot state what would be the number of storm overflows, if metering of the Chicago water supply should reduce the sewage flow to 1,000 second feet. I did not take that into consideration. It would take quite a lot

of counting up from the records to answer that precisely. I cannot tell the number of times there would be overflow, assuming the capacity of the interceptors to be 4,000 c. f. s. and 1,000 c. f. s. sewage flow, and that three times the quantity of sewage flow passes through preliminary treatment tanks. I think that it would be necessary to have a runoff of about 3,000 cubic feet per second. I have not recently made and do not estimate how often
11889 there would be storm runoff of 3,000 second feet.

Referring to page 57 of Exhibit 1, Major Putnam Report on Diversion of Water from Lake Michigan, (November, 1923), where it is stated:

> "It has been estimated that rates of storm runoff from the drainage area of the Chicago River have the following frequency: 3,000 cubic feet per second ten to twelve times per year,"

if that statement is assumed to be correct, that would make a very material difference in the conclusions I stated yesterday. I did not make any investigation to determine whether that statement is correct. The amount of water would be nearly proportional to the number of overflows which brought controlling works into operation. If you had that small number of overflow, the figures would not be in proportion. For example, we took the time of displacing the polluted water in the river as three-fourths of the number of times a year that there were storm overflows on account of the fact that storms might overlap if they came frequently. If this happened only ten times a year, they would not overlap and you would not have quite a proportional reduction. It would be approxi-
11891 mately in that proportion. I tried to make this computation that would save the most water in the most practical way. I calculated an item for flow through the controlling works for 40 minutes 90 times a year to establish the flow in the Chicago River. The 40 minutes might

represent in each instance and it might not represent approximately the time before the rain started. There was added a 40 minute period before the beginning of each rainfall. The concentration period for rains means the time until you reach the highest rate of storm overflow,
11892 while if you are controlling this storm, the flow might vary where you would try to control it at the time the first part of the storm overflow began, which would be much less than 4½ hours. The overflow would begin pretty quickly in the case of a heavy storm down in the loop district. It could begin in 15 or 20 minutes in some cases. The runoff would be relatively small but it would be desirable to keep that from flowing toward the Lake. I haven't any way of saying definitely how much it would be. I would have to get out the storm sewer map and take a real case to make the calculation. It would be relatively
11893 small as compared with the larger figures. You get the beginning of the storm overflow long before the sewers are full. It would be relatively a small part of the total. I think it would be larger than 10 per cent. That 10 per cent would produce a very slight current, probably .1 of a foot a second, or less than that. It would take several hours for that current to reach the mouth of the Chicago River unless the current was already running that way.
11894 The South Branch under this assumption in this calculation was supposed to be carrying 1,000 cubic feet per second of sewage effluent toward the lake. That would cause a rate of about one-fourth of a foot a second, assuming 1,000 second feet of effluent, and 300 second feet of storm overflow going towards the lake. It would take several hours to move from the junction of the North and South Branch to the Lake; probably five hours; but there are storm sewers that enter into the Main Branch within a few hundred feet of the lake. My calculation was from the junction out to the Lake. After the con-

trolling gates are opened at Robey Street, a flow would be induced immediately away from the Lake at the gates. It would take between half an hour and an hour to get any very appreciable flow between the junction of the South and North Branches and the Lake. It would start probably in forty minutes. It would not start as quickly as the wave of acceleration could run to the Lake; no appreciable flow in that time. How long after the wave of acceleration reached the Lake would be required to start an appreciable flow, depends entirely upon the volume to be removed. I think it would take between a half and an hour for this velocity of a quarter of a foot or half a foot a second to be induced in the main part of the Chicago River after the gates were opened at the controlling works. Some flow would be established before the 10,000 second feet flow was established at the mouth
11897 of the Chicago River. If the operators could know the exact time that the rain begins at whatever place it begins first and know how hard it is raining, I think that the flow could be induced sufficiently to keep the storm water out, if you did not open the gates much before the rain. It would depend then upon how heavy the shower. A very heavy summer rain sometimes starts up very quickly and sometimes it does not. As I tried to say yesterday, my theory was on the basis of human operation, without advance knowledge and trying to play safe. The critical point would be the main part of the Chicago River. You would not get any flow in the main river for about 40 minutes after the gates were opened.
11898 My impression is that to have safe control, which means to try to have no reversals, then I think it would be necessary to begin to operate the controlling works a considerable time, perhaps not 40 minutes, but say 20 or 30 minutes, in some cases 40 minutes, before the rain actually begins.

11899 Assuming that a flow at the mouth of the Chicago River can be induced in 21 minutes from the time the controlling works are opened, and that there would be flow from the sewers in 15 or 20 minutes, I don't think there would be any danger of reversals by waiting until after the rain commenced, to operate the control works.
11901 But the wave of acceleration I regard as a surface phenomenon, like the wind wave on a body of water. I think that wave could travel to the mouth of the river even if the river were flowing in that direction all the time and were flowing after the wave reached there. For example, with a steady, dry weather sewage effluent flow of 1,000 c. f. s., or 1,300, toward the mouth of the river, you could produce this sudden water surface effect at the gate and have wave travel clear to the mouth of the river, and still the river would be flowing that way all the time and flow that way afterwards. So, in this assumption, it is a little doubtful to me, but as I understand the assumption,
11902 my answer is as I think he meant the assumption to be. The whole item as to the annual average amount of water that would be diverted in this 40 minute period is very small. I put it in largely because I was trying to conform to the testimony on the other side. If I had been starting the data I would have made it still a little smaller, but I was trying in the interest of simplicity to conform to what they have stated. I think that that item of 40 minutes could be reduced somewhat if it were compensated for in the next item which is where I would
11903 have done it. The next item provides for an average flow of 8,000 c. f. s., for 8.6 hours, 80 times a year. That total flow includes 1,300 c. f. s. of sewage effluent and 6,700 c. f. s. from the lake. Before the 8.6 hour period I had es-
11904 tablished the flow in the river during the 40 minute period. In some storms the amount would be larger than 8,000 second feet and in others smaller. The 8,000

is the average. I did not assume that the limiting capacity of the upper portion of the Drainage Canal was 8,000 cubic feet per second. However, if you did assume that the limiting capacity of the Drainage Canal was 8,000 second feet in its upper reaches, then it would be impossible to flow more than 8,000 second feet through the control works. Any excess beyond that under that assumption would have to go into the Lake, but I do not admit the assumption to be true at all. In this calculation I have not assumed a certain number of storms of a certain size. Under the assumptions which you have made the maximum capacity of the channel is 8,000 second feet. There would be relatively few storms that would flow 8,000 second feet. The 8,000 second feet, however, includes 1,300 of sewage effluent. There should be deducted 1,300 cubic feet, if you are using the figure as the storm flow diversion. I don't know the number of storms that equal or exceed the 6,700 cubic feet per second.

Referring to the following quotation from Complainants' Exhibit 1:

11906

> "3,000 cubic feet per second, ten to twelve times per year; 4,167 cubic feet per second seven to eight times per year; 5,000 cubic feet per second, five to six times per year; 7,500 cubic feet per second, three to four times per year; 9,500 cubic feet per second, two times in three years,"

the amount through the controlling works always exceeded the storm amounts by an amount that could not
11907
be determined because there is no way of measuring it. I am assuming that during that storm, except in rare cases, there would be some lake water being drawn in all the time, in order to be on the safe side. I didn't try to hit those figures at all. But assuming that there are only five or six times a year when the storm runoff in Chicago exceeds 5,000 cubic second feet, I think it fair to calculate 80 times the maximum flow through the con-

trolling works, because there are a lot of small storms which cannot be foretold. The number of storms that produce runoff are very much larger than those, and one can't tell in advance. If it were not necessary to start the gates until after the rain began, the 10 storms that did not materialize where the gates were opened in my calculation would be eliminated. There are a good many rains where there is no storm overflow, and these times when you might have opened your gate and the rain may
11908 have come and still it wouldn't have been necessary, because the rain was so slight it didn't produce an overflow. There are a great many such rains in Chicago every year; I don't know just how many.

11909 I continued to run 8,000 second feet for three hours after the rain ceased for each of the 80 storms. I would expect the runoff to decrease after the rain ceased. There would be a fall from the maximum concentration down to a point where it would be eliminated at the end of the estimated period. The average is three hours. I assumed, also, that there would be a certain quantity of the flow intercepted by the intercepting sewers. In my calculation I did not determine any definite quantity; assumed that a relatively small quantity would be intercepted in the intercepting sewers. I did not use the
11911 quantity, the numerical size of that. In some cases there would be a runoff or overflow for many hours, longer than three hours, after the storm ceased, and in some cases it would be quite short. To average the big storms and the small storms, the three hours was taken as the average length of time. The three hours was for the time of storm overflow. I didn't try to estimate the time of runoff after the rain ceased. There would always be a small flow for quite a while afterwards, of course, if the sewers were carrying more than usual,
11912 from one to three days, perhaps, for the runoff. At

the end of the three-hour period, if I assume that I am taking care of the maximum storm at the height of concentration, the overflow would have fallen considerably below that maximum. The storm overflow would have decreased to the point of what would be carried in the intercepting sewers without overflow at the end of the three hour period. 8,000 cubic feet per second is not the maxium capacity of the channel at all. The flow should be cut down as the storm water overflow tails out, subsequent to the time when the rain ceases. I have given credit to that in this estimate. The 8,000 second feet for three hours is used as an average. It might be a lot higher at the beginning of the three hour period. It might be as high as 10,000 second feet.

I didn't understand that Mr. Ramey testified yesterday that 8,000 second feet was the maximum capacity of the Main Channel in its upper reaches. Mr. Ramey
11916 stated what the nominal capacity was, which is different from actual capacity. With these control gates in and the water level kept many feet below the nominal grade line, the actual capacity is much larger, due to the fact that it has a steeper slope on the surface. From
11917 the point above Robey Street up to the Lake, there was an assumed capacity of 10,000 second feet, but I don't think that it is limited to that, and I am quite sure it can be more, from calculations I have made.

The level of the water in the Chicago River would be
11918 at all times higher than the level of the water in the Drainage Canal below the control gates. Below the control gates there is quite a different slope for these large quantities and down at Lockport the level might be 10 feet lower than it is in the Chicago River. It would be a hydraulic grade line from the Lake to Lockport, nearly uniform. There would be some change at the control gate. The flow after the control gates are opened would

11919 depend on the control gates at Lockport. They can be opened and lowered and make a larger flow. The limiting capacity in the upper part of the channel with control at Lockport is much more than 8,000 second feet. How much more has never been determined. I think it is well over 12,000, probably 14,000 or 15,000 second feet. The ultimate capacity of the canal with the gates at Lockport open wide, is somewhere in the neighborhood of 14,000 or 15,000 second feet. The nominal capacity was the figure used in the design where they would have the canal almost full as a ship canal. It does not mean very much, except as a figure used for comparison.

The capacity of the Main Drainage Canal in 1925 and 1926 was lowered a great deal because of the lowering
11921 of the lake level. When I said the ultimate capacity was much higher, it was on the assumption that you referred to the gate lowered so you could drain all the water and lower the level at Lockport. I did not assume that you were going to take the gates out entirely at Lockport. I did not assume any material difference in the operation of the old control at Lockport. If you
11922 are having storm flow coming in, it comes in lower down the channel. It does not all come from the Lake, and you gain quite an appreciable amount, it being very hard to say exactly how much, when this flow is coming in at various points. You gain something on the amount that can be passed through the head of the canal. If you can raise the water level at the head of the canal by a couple of feet, you would have more than the canal could carry. This established flow spoken of was on the theory that 10,000 second feet was coming in from the Lake and the level at the control gates was to drop down to about 3 feet below the level of Lake Michigan. If you had with the sewage effluent from the West Side Plant quite a lot of storm sewers spilling in sufficient water to

11923 the control gates, they might raise that level to the level of Lake Michigan. You immediately then gain three feet in head, tending to raise the level. I don't think it would pile up three feet, and if it piled up to the level of the Lake, you would not have anything coming in from the Lake. I don't think it is true at all that it would not make any difference whether you had any control gates or not. If you did not have the control gates there and you had this large amount coming in at that point, you
11924 would have it running into the Lake, or if you had not established a flow for a strong current.

I have considered for four or five years what the storm water concentration was in the Chicago River in maximum storm. It is a fair assumption, if you assume a maximum storm of 10,000 second feet runoff, there would be 2,000 coming in from the Calumet Sag Channel, and there would be less than 8,000 above the control works. My estimate is based upon assuming a maximum in the vicinity of these controlling works of around 12,000 cubic
11926 feet per second of storm runoff. On the biggest storm that we had there on Easter Day, the best calculation we could make showed over 12,000. The flow was raised at Lockport very much higher for short periods. The rain-
11927 fall was then over three inches. I don't remember how long prior to that there was over a three inch rainfall. One ought to give weight to the frequency of rainfalls, their intensity and runoff. The average that we took of 8,000 second feet was discussed. Different figures were used. We discussed them and I considered them a long while.
11928 That contains a little margin for diversion from the Lake as well as the largest storm water flow. I tried not to have very much margin—not over perhaps a thousand second feet. Under the assumption from the statement read from Major Putnam's Report Complainants' Exhibit 1—that there are not five or six rain runoffs in

Chicago in a year on an average that equal or exceed 5,000 second feet, the average of 8,000 second feet for eighty storms in each year would be greatly in error.

I figured another amount for initiating the flow through the Calumet River. I don't remember what the capacity of the long intercepting sewer in the Calumet District is.
11929 The storm water that is taken care of from the Calumet River is a very large amount separate from the effluent from the sewage treatment plant. The storm water is to be taken care of in the Calumet River or from the Little Calumet River, and from a certain part of the Grand Calumet. Some of the storm flow would come from Indiana cities.

Referring to the Little Calumet and Grand Calumet and Lake Calumet, the lower ends of these rivers are in Illinois and the upper ends are over in Indiana. There
11931 is a large area of that drainage area in Illinois and within the boundaries of the Sanitary District. I don't know just what the proportion is. I don't carry that in my head. But under your assumption I should think that there is a considerable part in Indiana. In my cal-
11932 culation I have treated it all as if it were Chicago sewage or overflow. I don't know whether the interceptors intercept all of those sewers going over to the Calumet Treatment Plant or not. So I cannot say whether there is storm water discharged from the sewers of the Sanitary District into the Calumet River eastward or lakeward of the controlling works at Blue Island. The upper ends of these rivers, both the Chicago and the Calu-
11933 met River, the runoff from the unsewered country in that region is an objectionable surface runoff. I have not tried to separate that part from the part that comes off from the city streets. I have assumed all of the natural runoff of those rivers was to be diverted. I had a figure to clean out part of these Indiana Rivers after

I had diverted the storm water above the Blue Island
Controlling Works. I assumed as fully as possible to
take care of any storm water overflow that arose in the
Calumet Rivers in Indiana or elsewhere. So far as sewage
is concerned, if all of the sewage were diverted westward
of the controlling works, that factor would be eliminated,
11934 but if storm water is objectionable and gets into
the Chicago region, it still has a detrimental value, whatever
that is. But I am not testifying as to whether it is
objectionable or not. I assume that after the subsidance
of a storm overflow, it would be necessary to wash out
all of these rivers. The North Branch and North Shore
11935 Channel I determined in volume capacity in cubic feet
without taking the dimensions of the width and depth. I
took that volume from the Sanitary District records. I
accepted that from the Sanitary District records and did
not calculate it myself. I did not examine the record to
find whether it would require a depth of 23 feet. In working
that out I worked that out in three separate items.
The North Channel is very much smaller than the North
Branch which does have a depth of 20 feet. I do not recall
how far up that depth extended, but it has been improved
for navigation up a considerable distance, and I
think it has been dredged up where the North Channel
comes into the North Branch. I don't know about navigation
on the channel, as I have never been on that channel
in a boat. I don't believe that I checked the figure.
I have used areas and dimensions more or less, but this
11937 particular figure I don't recall that I checked at all.
I think the sewers come in right close to the upper end
at the Wilmette Pumping Station. I assumed they came
in right at the end, so it had to be flushed. It would
not make much difference, as you would have to pump in
water anyway. I assumed they came in practically at

the end. It would not be polluted above where the sewage came in except that it might have been stirred up.

I have a figure of 6,700 c. f. s. for a number of hours to clean up the South Branch from the junction to the controlling works. If you had tapered off on your controlling works so as to keep the diversion a minimum,
11938 the river would be pretty largely storm water at the end of that time. I did not assume that the controlling works were discharging 8,000 second feet up to the end of the three hour period, but at the end of the three hour period would have been reduced down approximately perhaps to the amount of the flushing streams. At the
11939 start of the three hour period, it might be 10,000 second feet. Wouldn't do that in small storms, but it might be that much. It would average up to 8,000 second feet for the three hour period. I have taken figures for draining the canal between the controlling works and Lockport, which is not necessary, in so far as keeping storm water out of Lake Michigan is concerned. I took another figure for draining the Calumet Sag Channel from Blue Island down to the Main Canal. It is not so large as the other and it takes the same time as the other, which would not be essential so far as keeping storm water out of Lake Michigan is concerned. I don't think the South Branch would be in pretty good shape in the course of the flushing of the North Shore Channel, because the North Branch would be pretty badly polluted at time of storm, and of course this calculation regards the whole mass of water as though it were a solid slug that could be pushed ahead, and if that were all pushed
11940 down into the South Branch, that would all be in the South Branch, what had not already gone past the controlling works.

The flushing that I have outlined would not remove all the storm water, but I think reasonably so. I think

it is reasonably as close as one could calculate. I be-
11941 lieve my assumptions are fairly average minimum assumptions.

The records at the Chicago Weather Bureau Station
11942 show that at that single point 55 times a year there is enough rainfall to produce overflow of the sewers, at that point. That does not mean that all of those 55 at that point cover the whole city. The additional 25 is due to the fact that at the time when the Weather Bureau at a single point shows rain enough to produce overflow, we know also from the records of the surrounding weather bureau stations that they are having rainfall heavy enough to produce overflow at pretty nearly double, or pretty nearly an equal number of additional times. Fifty times is what we got from counting the records over three years. But those stations are 30 or 40 miles away, and I took half that number and added it to allow for this local variation, especially of summer thunderstorms that occur in one part and don't occur in others. The
11943 figure of 55 rains causing overflow, is based upon hourly readings for nine years at the Chicago Weather Bureau Station. That is .06 of an inch the first hour or .08 the first two hours or .10 in the first three. It is a sliding scale with a little correction from that.

With reference to these twenty-five storms, I would not expect to get the 10,000 second feet runoff from that. I would only have it on a part of the area, and the runoff would be smaller. It is impossible as a practical matter
11944 to get records of these local storms and know the rate at which rain is falling in different parts of this area. There are no observations that give that, no stations, and no way of keeping track of it. The controlling works will have to be operated on probabilities and trying to be safe. They will have to take water a little in excess of just what would be required if you knew the exact condi-

tions. I don't think it would be efficacious to determine
11945 overflows of the sewers from the current in the river, but if you wanted to determine them it would be better to put a man right there at the outlet of the sewer where he can see it. There isn't any easy way of getting any accurate measurement instantly of the flow in the river. A man standing on a bridge could tell the velocity somewhat, but it could change a good deal in a normal current without his being able to say very definitely about it. Gauges at the mouth of the river and at the control works would give an idea of the relative level; but during the dry weather time they will all be level except for oscillations that will always be occurring, according to testimony here, which will be very great in the last mile
11946 of that main river channel. These oscillations occur whether there is diversion or not. They prevent you from determining from watching, seeing just what the river is doing. It is feasible to gradually increase the flow through the controlling works and gradually decrease it as the flow in the river may concentrate or decrease. That is the object of moving the control works to the river mouth, so that you could get quick control.

Redirect Examination by Mr. Beebe.

With the controlling works at Kedzie Avenue instead of right at the mouth of the river, it is necessary to anticipate to a greater degree storms. The computations
11947 that I have made were based on public data of the United States Weather Bureau, and the rest of the data was from original data taken from the records in the office of the Sanitary District. I have been over the data of the Sanitary District at considerable length and studied it in considerable detail. So far as rainfall goes, that is based upon published records, and the method of

determining what quantity was delivered, is based upon the carrying capacities and the volumes contained in the intercepting sewers. Those data were used in my calculations as to the runoff when there was a rate of .06 inch rainfall per hour. The data in the Sanitary District was material that was used for several years there in their regular work in connection with design. I found that the methods used in making the calculations were correct from an engineering standpoint. The results of the calculations were correct. From the examination that I made of the Sanitary District data, the calculations and results obtained, I believed that data to be sufficiently reliable upon which to base the calculations and conclusions I have made here.

When I was on the Engineering Board of Review four and a half years ago, I was assigned as part of my study to this field of storm runoff and we had it under consideration for several months; so I was in general familiar with the situation. I did not use any of those data in
11949 this particular calculation but I began about five or six weeks ago to go over these data and spent a considerable part of my time on it. I did not consider it material in connection with the calculations I made to determine the amount of cubic feet per second of .06 of an inch rain in one hour over the entire area. I wanted to know what would happen over an area as big as is covered by one storm sewer. The number of storm sewers runs into the hundreds. They are combined sewers.
11950 There may be conditions which would raise the storm sewers in one locality and not another. There might be a storm overflow from a single sewer without having storm overflow from any others, in some light or very localized rain. There might be a comparatively heavy rain that would take in the sewers of a given area and not have anything to do with the sewers of another area, which

happens frequently in a large city like Chicago. The amount that the interceptors when built as a whole carry in volume is not material to the computation here. There is no important connection at all.

This nominal capacity as it was defined in the testimony here, specified that the water surface was to have
11951 a slope parallel to the bottom, that is, a very flat slope relatively. It is possible to make the slope very steep by lowering the water level at the gates at Lockport, and that increases the quantity carried very much. You cannot increase it without limit, but you can perhaps pretty nearly double it in part, probably not for the whole canal from the Lake down. The total amount that we have used in this calculation as the annual runoff from rain water of the Chicago River and Calumet River areas is 543 cubic feet per second. My calculation shows that the amount of lake water withdrawn from Lake Michigan during the period that is called the preparatory
11953 flow and the flow during storm, with subsequent storm overflow period, would be 278 cubic feet per second, as the sum of that for the Chicago River and the Calumet River stated as the annual average.

Recross Examination by Mr. Jackson.

11954 The gates at the lower end of the Canal at Lockport would be closed during the time of no flow. The controlling works would be higher when there was no flow through the control works than they would be with no controlling works and a flow of 5,000 second feet. I am mistaken about that. I think the gates would be higher at Lockport with 5,000 second feet flow than they would be with no flow through the controlling works at Robey Street, assuming 7-foot drop in the elevation of the water east of the controlling works and that west.

I don't think there would be any trouble in maintaining 10,000 cubic feet per second flow at Robey Street, but it
11955 might not have the same flow all the way down. The Canal would be filling up there for quite a long distance. I do not remember what the drop in the water level in the canal would be with normal capacity flow between the Lake and Lockport. I think the gauges would be
11956 lowered about three or four feet with 10,000 second feet flow at Lockport and 8,000 in this upper stretch of the Canal.

Defendants' Exhibit 1118 may be correct, as follows:

> "A slope ratio of one to six is assumed. Then under average conditions, with a limited flow of 4167 cubic feet per second, the total slope would be one foot to six feet for a flow of 10,000 cubic feet per second."

11958 The present gates go down I think 11 feet. Control is largely through the turbines. The gates are used in addition but a large amount goes through the turbines. Roughly, you would have to drop the gates to double the flow as the square of the flow, four times as much. It would be about 24 feet which would produce about 20,000 second feet flow. I know that the flow would never go to
11959 20,000 feet, but I never determined or tried to calculate just what the maximum would be. You might or might not have 8,000 second feet up above the Sag when we had 10,000 second feet at Lockport. It does not always happen that way.

I have gone over the figures of the 1927 test. I think the Sanitary District left the gates open as long as they could during those days just to see what would happen. It took a month or more, as I recall it. It never got to the point of having as high as 16,000 feet in the earth section. I don't think they got as high as 10,000 second
11960 feet. It would be necessary to have a lot more than

10,000 down below. I think you could draw up to 10,000
second feet. With the control at Robey Street you can
establish 10,000 c. f. s. very much quicker than with the
control at Lockport. The amount flowing would be differ-
11963 ent at different points along the river. My calculations
have been based upon the time when the effluent enters
the Canal and the sewage purification works are in oper-
ation, and a sanitary flow smaller than the present one.
It also contemplates that part of the time this effluent
would flow into Lake Michigan and whenever it rains, it
would flow the other way. This effluent would flow to-
wards the Des Plaines River a little over half the year;
for the Chicago River Drainage Area, about 198 days;
for the Calumet Area, 200 days.

ants at the Final September, 1929 Hearings on Re-reference:

Defendants' Exhibit 1435 is in part as follows:

CITY OF CHICAGO
BEACHES ATTENDANCE.

Years	79th St.	Walker (25th St.)	51st St.	Clarendon	Rainbow (75th St.)	Rogers Pk.	Oakdale	Ohio St.	Street Ends	Total
1906	128,235	184,050					165,765			478,050
1907	66,175	219,150					164,187			449,512
1908	152,115	270,087								442,202
1909	212,380	70,087								282,467
1910	64,131	85,370								149,501
1911	83,171	125,634								208,805
1912	128,236	165,434								293,670
1913	93,520	219,248						12,085		324,853
1914	111,565		47,392					152,708		311,665
1915	144,994		113,270	134,485						392,749
1916	126,583		111,421	132,967						370,971
1917	88,734		82,306	301,279	13,549					485,868
1918	103,669		82,186	323,656	60,072					569,583
1919	85,384		94,933	374,597	128,328	10,215			621,149	1,314,606
1920	62,675			171,432	126,581	22,137			264,934	647,759
1921	89,895			646,096	246,722	147,682			426,895	1,557,290
1922	78,966			520,677	179,421	121,311			297,930	1,198,305
1923	90,621			817,647	244,871	148,097			750,193	2,051,429
1924	76,423			479,850	142,346	101,781			536,070	1,336,470
1925	91,822			769,596	247,989	149,983			790,780	2,050,170
1926	93,984			1,948,388	249,782	151,484			711,480	3,155,118
1927	92,863			2,183,423	248,991	151,673			964,115	3,641,065
1928	284,705			2,240,519	1,061,289	440,170			643,516	4,670,199
*1929	211,900			466,148	958,811	149,040			537,605	2,323,504
Aug. 11, 1929	8,400			120,405	119,658	89,129			129,680	467,272

* Figures for June and July only.

Defendants' Exhibit 1436 is in part as follows:

SOUTH PARK COMMISSIONERS.
BEACHES ATTENDANCE.

Years	Calumet Park	Jackson Park	39th St.	25th St.	51st St.	31st St.	Total Paid Admissions	Other Bathers	Grand Total
1905	20,861						20,861	20,861	41,722
1906	37,863						37,863	37,863	75,726
1907	31,510						31,510	63,020	94,530
1908	52,629						52,629	104,258	156,887
1909	44,371						44,371	133,113	177,484
1910	42,307						42,307	126,921	169,228
1911	48,053						48,053	144,159	192,212
1912	55,768						55,768	167,304	223,072
1913	59,993	176,751	87,140				323,884	971,652	1,295,536
1914	68,431	122,855	89,724	55,349			336,359	1,009,077	1,345,436
1915	55,293	200,423	35,303	27,853			318,872	956,616	1,275,488
1916	96,534	196,610	107,286	68,325			468,755	1,406,265	1,875,020
1917	53,995	171,725	66,000	51,495			343,215	1,029,645	1,372,860
1918	94,190	193,385	68,725	57,761			414,061	1,242,183	1,656,244
1919	38,007	399,882	75,345	40,467			553,701	1,661,103	2,214,804
1920	28,996	213,383	58,033	20,196	28,104		348,712	1,046,136	1,394,848
1921	56,165	367,846	133,800	59,840	80,064		697,715	2,093,145	2,790,860
1922	69,690	326,898	75,140	42,133	64,154		578,015	1,734,045	2,312,060
1923	48,000	302,907		14,905	41,840		407,652	1,222,956	1,630,608
1924	58,672	305,336		34,128	31,342		429,478	1,288,434	1,717,912
1925	51,360	434,546		10,125	18,950		514,981	1,544,943	2,059,924
1926	64,200	384,223		14,250			462,673	1,388,019	1,850,692
1927	93,825	454,616		29,850			578,291	1,734,873	2,313,164
1928	40,300	377,363		44,450			462,113	1,386,339	1,848,452
*1929	47,475	203,431				25,765	276,671	830,013	1,106,684
Aug. 11, 1929	14,000	12,350				4,000	30,350	44,650	75,000

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* Attendance for June and July at Jackson Park and Calumet Park—July only at 31st St.

Defendants' Exhibit 1437 is in part as follows:

LINCOLN PARK COMMISSIONERS.
BEACHES ATTENDANCE.

Year	Diversey	Fullerton	Belmont Harbor	Oak St.	Waveland	Cornelia	Oakdale	Ohio St.	Total Estimated
1905....................									
1906....................									10,000
1907....................									12,000
1908....................									15,000
1909....................									20,000
1910....................									130,000
1911....................									200,000
1912....................									180,000
1913....................									176,000
1914....................									154,000
1915....................									196,000
1916....................									250,000
1917....................									230,000
1918....................									450,000
1919....................									496,000
1920....................									503,000
1921....................									792,000
1922....................	84,816	30,000		600,000					704,000
1923....................	97,867	30,000		700,000					714,876
1924....................	110,240	40,000		800,000					827,867
1925....................	100,000	35,000		900,000					950,240
1926....................	80,000	25,000	15,000	800,000					1,035,000
1927....................	100,000	28,000	20,000	1,000,000					920,000
1928....................	100,000	30,000	25,000	1,000,000					1,148,000
*1929....................	150,000	25,000	35,000	600,000					1,155,000
Aug. 11, 1929............	30,000	4,000	8,000	90,000					810,000
									132,000

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* Attendance for June and July at Diversey, Fullerton, Belmont Harbor and Oak Street Beaches.

Defendants' Exhibit 1438 is in part as follows:

NORTH SHORE PARK COMMISSIONERS.
BEACHES ATTENDANCE.

Year	Attendance
1919	20,000
1920	40,000
1921	200,000
1922	180,000
1923	450,000
1924	250,000
1925	455,299
1926	392,014
1927	370,000
1928	550,000
*1929	415,000
Aug. 11, 1929	8,000

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* Attendance for June and July.

Defendants' Exhibit 1439 is in part as follows:

CITY OF EVANSTON.
BEACHES ATTENDANCE.

Year	Attendance
1924	96,243
1925	149,995
1926	164,748
1927	526,238
1928	527,472
*1929	445,432
Aug. 11, 1929	18,466

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* From June 22nd to August 17th, inclusive.

Defendants' Exhibit 1440, which purports to be a tabulation from Exhibits 1435 to 1439, both inclusive, is as follows:

12409
to
12412

Copy of Defendants' Exhibit No. 1440

Sheet No. 1

THE SANITARY DISTRICT OF CHICAGO

Yearly Attendance at Bathing Beaches

Name of Municipality Operating Beach	Attendance Per Year									
	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
South Park Commissioners.......	41,722	75,726	94,530	156,887	177,484	169,228	192,212	223,072	1,295,536	1,345,436
City of Chicago	.....	478,050	449,512	442,202	282,467	149,501	208,805	293,670	324,853	311,665
Lincoln Park Commissioners.....	10,000	12,000	15,000	20,000	130,000	200,000	180,000	176,000	154,000	196,000
North Shore Park Comm.........	.....	......	......	......	......	......	......	......	....	....
City of Evanston................	.....	......	......	......	......	......	......	......	....	....
Total	51,722	565,776	559,042	619,089	589,951	518,729	581,017	692,742	1,774,389	1,853,101

12413
to
12416

Copy of Defendants' Exhibit No. 1440.

Sheet No. 2.

THE SANITARY DISTRICT OF CHICAGO

Yearly Attendance at Bathing Beaches

Name of Municipality Operating Beach	Attendance Per Year 1915	1916	1917	1918	1919	1920	1921	1922
South Park Commissioners.	1,275,488	1,875,020	....					2,312,060
City of Chicago..........	392,749	370,971	485,868	569,583	1,314,606	647,759	1,557,290	1,198,305
Lincoln Park Commissioners	250,000	230,000	450,000	496,000	503,000	792,000	704,000	714,876
North Shore Park Comm..	....	....	....	....	20,000	40,000	200,000	180,000
City of Evanston.........	....	....	....	....	....	....	....	....
Total	1,918,237	2,475,991	2,308,728	2,721,827	4,052,410	2,874,607	5,252,130	4,405,241

12417
to
12420

Copy of Defendants' Exhibit No. 1440.

Sheet 3.

THE SANITARY DISTRICT OF CHICAGO

Yearly Attendance at Bathing Beaches

Name of Municipality Operating Beach	Attendance Per Year						
	1923	1924	1925	1926	1927	1928	1929
South Park Commissioners	1,630,608	1,717,912	2,059,924	1,850,692	2,313,164	1,848,452	*1,106,684
City of Chicago	2,051,429	1,336,470	2,050,170	3,155,118	3,641,065	4,670,199	a2,333,504
Lincoln Park Commissioners	827,867	960,240	1,035,000	920,000	1,148,000	1,155,000	a 810,000
North Shore Park Commissioners	450,000	250,600	455,299	392,014	370,000	550,000	a 415,000
City of Evanston	....	96,243	149,995	164,748	526,238	527,472	b 445,432
Total	4,959,904	4,360,865	5,750,388	6,482,572	7,998,467	8,751,123	c5,100,620

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* June and July at Jackson Park and Calumet Park and July at 31st St.

a June and July only.

b June 22nd to August 17th incl.

c Part of year only.

Harold J. Knapp, for Defendants:

Direct Examination by Mr. Adcock.

12007 Reside at Cleveland, Ohio. Am physician in the service of the City of Cleveland; Director of Laboratories, Food and Drug Control. Am first assistant to the Health Commissioner of Cleveland. When the Health Commissioner is away, act as the Health Commissioner. I was subpoenaed here.

Epidemics of intestinal infection have been traced in the past to bathing in polluted water, circumstantially.

12008 "Circumstantially" means that in the investigation of an outbreak of communicable disease, all possible leads that might have caused the factors of an outbreak are considered, whether it be food supply, contact with known cases or carriers, or water supplies.

12013 Whenever there is any outbreak of typhoid, where
12014 water might be under suspicion, then it is the duty of my office to trace down, and, if possible, rule out or affirm the water supply, either bathing or drinking water.

There have been four or five cases circumstantially traced to water supplies.

I made investigations of the typhoid cases in the years 1924, 1925, 1926, 1927 and 1928 during the bathing season at Cleveland.

12015 During the years 1924 to 1928 all of the typhoid cases which occurred in the City of Cleveland were studied, those in which bathing might have been under suspicion, regardless of whether it was in the City of Cleveland or outside of the city—a certain large percentage of cases in our city are so-called non-resident cases. In the study of those cases there were a certain number in which the only lead led to bathing, whether it was in the city or out of the city. A certain percentage showed a condition which we called "no lead" or '"no lead cases," but in which bathing might have been a factor. So, they were grouped on a paper which was published this last summer,—two sets of figures—a certain number of cases which were listed on our epidemiological report were traced to bathing. Then in another column was stated "bathing under suspicion," meaning that some time during the incubation period of the disease the particular parties had been in bathing.

12016 In other words, I traced some of the cases to bathing, circumstantially. In other cases they were under suspicion as having contracted typhoid fever at bathing beaches.

Cross-Examination by Mr. Jackson.

In my investigations in the last five years I did not find any case of typhoid which I could say definitely was traceable to a publicly supervised bathing beach. I referred to cases, not deaths.

Redirect Examination by Mr. Adcock.

12017 Of course, it is true that our cases of typhoid fever were traced through circumstances.

I say in that article (referred to on direct):

> "It is hardly necessary to point out the relationship of water supply to communicable disease, other than to mention that epidemics of intestinal infections have been traced in the past to bathing in polluted waters."

I found, in 1924, out of 47 cases of typhoid fever during the bathing season of that year at Cleveland, four were traced to bathing, and eight were under suspicion as having come from bathing.

12019 I found in 1925, during the bathing season at Cleveland out of 29 cases, one I traced to bathing, and twelve were under suspicion.

For 1926, out of 48 cases at Cleveland, four were traced to bathing, and six were under suspicion.

In 1928, out of 32 cases at Cleveland, five were traced to bathing, and seven were under suspicion.

Traced to bathing doesn't mean the public bathing beaches maintained by the City of Cleveland. Bathing was regardless of the location, as I pointed out or endeavored to point out. It was taken into consideration whether it was a public bathing beach or whether it was a stream or sewer effluent; whether it was inside the City of Cleveland, or it may have been miles distant.

This season no bathing beaches at Cleveland have been 12020 closed on account of pollution; but people were warned not to bathe in Lake Erie.

Dr. F. W. Mohlman, for Defendants:
Director of Laboratories for Sanitary District.

Direct Examination by Mr. Adcock.

Reside at Chicago.

Have been director of laboratories for the Sanitary District of Chicago; for ten years in that position.

12021 Graduated from the University of Illinois in 1912, from the Department of Chemistry, with the degree of Bachelor of Science. I stayed at the University for graduate work in chemistry and allied subjects, and received the degree of Master of Science in 1914. I continued until 1916, when I received the degree of Doctor of Philosophy from the University of Illinois.

My major subjects during this graduate work were, first, sanitary chemistry; first minor, bacteriology, and second minor, sanitary engineering.

During this time while I was in the graduate school of the University, I was working as a chemist and bacteriologist with the State Water Survey of Illinois. We had charge at that time of the quality or the testing of the quality of water supplies throughout the state, and in my work I did the chemical and bacteriological analysis on the waters.

In my last year there, in 1916, I was in complete charge of the laboratory under the direction of Dr. Edward Bartow.

Early in 1917 I went to New Haven, Connecticut, where I took charge of an investigation into the treatment of the sewage of New Haven, under the general direction of Professor C. E. A. Winslow, of Yale University.

In those studies, which lasted somewhat over a year, we went into the question of the treatment of the sewage of New Haven, and rendered a report.

Following that, in 1918, I worked for the Connecticut
12022 State Department of Health and again took charge of the chemical and bacteriological investigation of the industrial wastes in Connecticut, and the condition of the polluted streams in that state.

In this work, we covered practically the entire state, making chemical and biological investigations.

In 1919 I came to the Sanitary District of Chicago as chief chemist, and have been in that position until the present date, with the title at the present time of Director of Laboratories. In the Sanitary District of Chicago I have under my direct supervision ten or twelve laboratories, where we do a very large volume of work, both chemical and bacteriological.

In all these laboratories there are approximately 25 chemists and bacteriologists located at various laboratories who are doing work under my direction; and in addition we have a large number of samplers and other assistants for this work.

When I came to the Sanitary District I had the experience gained in Connecticut and Illinois, and the problem of the Sanitary District which appealed to me, and which
12023 I studied most carefully, was the pollution of the Illinois River. From the first year of my entry into the Sanitary District personnel, I studied and made investigations of the Illinois River, during the summer of 1919, 1920, and 1921. These were not on a very comprehensive scale, but they gave me valuable information concerning the condition of the river.

Approximately five years ago I organized and started under way a very comprehensive study of the conditions of the Illinois River. In this work it was necessary to lay out a half dozen field laboratories and to arrange for collection of a large number of samples. In that work I had samples collected at intervals of one hour throughout the 24 hours at as many as 16 stations all the way down the river for a distance of 200 or more miles. In the past five years we have averaged at least fifty or sixty thousand determinations of dissolved oxygen on the Illinois River, a total for the five years of possibly three hundred thousand determinations. This has led me to know something about the Illinois River in connection with my own personal observation.

I also have made a very careful check on the condition of our Chicago River system by analyses taken at various points of the main channel and the dilution system.

12024 With regard to Lake Front work, we collect and analyze a large number of samples from the Lake Front of Chicago, extending from Gary to Waukegan, a distance of about sixty miles. As the samples are analyzed for bacterial content and B-coli, we have a very comprehensive schedule that enables us to keep track of the condition of these water supplies.

We make approximately fifteen thousand of these determinations each year. For the past five years there have been probably a total of 75,000 or more. As a result of this work I have become quite familiar with the Chicago condition.

12025 In the past summer of 1929 I carried on an investigation of the condition of the rivers, beaches, harbor and lake front at Milwaukee.

In laying out this study of Milwaukee conditions I found it desirable, in order to extend our knowledge, to include the whole system as it is now in operation; namely, the sanitary condition of the Milwaukee River System
12026 from the standpoint of the oxygen content of the waters; the conditions of whether or not the rivers were flushed; the contrasts in condition of these rivers and all factors that I could find that would give me knowledge of what the conditions would be under such a program of complete treatment of sewage and interception of sewage from the river system and discharge of a sewage effluent and of the river water into the Lake. This required, in addition to the river studies, a careful survey of the bacteriological conditions along the Lake front, and this, in turn, required a subdivision to determine what effect such a program had on the bathing beaches of Milwaukee, and, secondly, on the Lake front and the harbor conditions off the mouth of the Milwaukee River.

12027 Our investigation started early in June, 1929; in fact, late in May. I had samplers on the river, out in the Lake and along the beaches. The river samples were taken in approximately 22 trips, extending from May 28th to August 30th. The samples taken during these trips amounted to approximately 360, taken in these 22 trips; and these samples were taken from all parts of the Milwaukee River System, the navigable channels of this river system. Now, these, of course, were only the samples from the rivers. The samples from the Lake comprise approximately 400, as I recall it, and the samples from the beaches approximately 140. Somewhere around 900 samples altogether were taken.

12028 Flushing was under way during our investigations, because I saw the water coming into the rivers from the flushing tunnels myself, that is as to the Kinnickinnic and Milwaukee Rivers. There was no flushing of the Menominee River.

I attempted to estimate the amount of this flushing of the Milwaukee and Kinnickinnic Rivers by visits to the pumping stations that were in operation at the time, and also by having my assistants get what information they could regarding the amount and the time of flushing.

12029 I made an investigation to determine the relation of the conditions of flushing.

12030 I also made an investigation to determine the general trend of the drift of pollution in the lake at Milwaukee during that period.

I determined the B-coli index of water at the different bathing beaches in Lake Michigan along Milwaukee's Lake front.

I determined the dissolved oxygen content of the Menominee River where there is no flushing, and also the dissolved oxygen content of the water of the Kinnickinnic and the Milwaukee Rivers where there was flushing.

The Milwaukee River extends from the junction of the Kinnickinnic and Milwaukee Rivers to the lake. Of course, in all of these determinations I did not take all of these 900 samples personally, but I did take some of them personally, and I supervised carefully the collection, the place of collection, and the manner of collecting samples 12031 and the manner and methods for making the analyses for all of these samples.

All of this work was done under my direction by men who had been in the employ of the Sanitary District for some years, and they were competent.

I traversed these various rivers myself, and observed the conditions of the Menominee River on various occasions, as well as the conditions of the Kinnickinnic and the Milwaukee Rivers, and the main stem of the river on four occasions, and collected samples on those same occasions out of the 22 trips I believe I mentioned previously.

12032 On those occasions I observed the conditions of water with reference to odors and ebullition of gas and such things and the appearance of particles in the water, whether they were of sewage origin or not.

I observed everything that would lead me to form an opinion as to the sanitary condition of the entire water system.

Extending along the same period of time with the investigations that were made in Milwaukee, I arranged to have samples taken in Chicago from our beaches in as closely as possible the same manner in which the samples were taken in Milwaukee. I planned to have these samples taken on the same days, if possible, and by making the same analyses I drew comparisons as to the quality of the bathing beach waters in Milwaukee and Chicago.

In that connection I made an examination of a public health service report of the water off the Lake front at
12033 Chicago, which is a report of the U. S. Public Health Service and it gives the results of studies off the Chicago Lake front.

It is the Crohurst-Veldee report.

In my examination of the water at bathing beaches at

Chicago I determined the B-coli index of the water, the same as I did at Milwaukee.

By "B-coli index," I mean the number of B-coli per hundred cubic centimeters.

12034 I am familiar with the sewage treatment program which the Sanitary District has presented in this case, and also with the efficiency of such works.

I have been present at most of the hearings.

I have an opinion as to what the conditions would be at Chicago in the Chicago River and its branches and the canals of the Sanitary District if the effluents from these sewage purification works, and storm water, are discharged to the Des Plaines River from the main drainage channel and if there is no water diverted directly from the lake when these works are in operation under this Sanitary District program.

I have given a great deal of thought to this question of the discharge.

12035 I have made many studies of what the oxygen demand of these effluents would be, and I have also given consideration to other factors besides the question of the requirements of the effluents themselves. The complicated factor that makes it impossible for me to judge what the conditions will be in the future, with complete treatment, is that we do not know what the effect of storm water discharge, carrying sewage, will have on these streams. My opinion of the effect of such storm water solids is that they will form septic deposits in the river; that the oxygen will disappear except for a short distance below the activated sludge effluents, and that the condition of the channels will be objectionable. There will be deposits of septic sludge and a condition of pollution that will be highly offensive That is in the absence of any diluting water from the Lake.

In my opinion there would be no dissolved oxygen in

the waters of the Chicago River and its branches and the canal system, under the foregoing assumed conditions,
12036 except for a small amount of dissolved oxygen immediately below the discharge of the treatment plant effluents, but in the absence of diluting water, the water would be devoid of oxygen, and there would be objectionable conditions, without any flushing or diluting water.

12037 I have an opinion as to the volume of water that will be required to be taken directly from Lake Michigan under conditions of discharge of all effluents, storm flow and drainage to the Des Plaines River, in order to produce unobjectionable conditions in the Chicago River and the canal system, and provide the necessary dissolved oxygen.

My opinion is based to a considerable degree on these studies that I have made in Milwaukee this summer. As I said before, I have made many computations on this question of what water will be required, and all of the estimates have been based on the oxygen requirements of the effluents from the treatment works. I have not known what the effect of all other factors which enter into this will be. For example, we have deposits of solids in storm water discharge. I have not had any direct method of knowing what would be the effect of those solids in the river system, such as our Chicago system is. I have not
12038 been able to determine what would be the effect of flushing, if flushing were put into effect, toward the Lake. I have not been able to determine what other conditions would affect the sanitary condition of the Chicago system after our treatment plants are put in operation. But, having gained this knowledge of the effect of some of these other factors from my study in Milwaukee, I believe that a substantial volume of diluting water will be required after the sewage treatment program of the Sanitary District is completed. I base this to a considerable

extent upon what was found in Milwaukee through our studies this summer, of the effect of those solids.

I believe that any hard and fixed ratio of dilution set at the present time is subject to unavoidable contingencies that make it undesirable to determine the exact amount of water at the present time. I believe that the exact
12039 amount can only be determined on the basis of very complete surveys such as we have made at Milwaukee this summer, only on a much more extensive scale. I feel that there are so many unknown factors affecting future conditions, that the exact amount cannot be determined until we know more about these practical, unknowable factors which enter into the problem.

By "unobjectionable conditions" I mean conditions that will not allow the dissolved oxygen content to be depleted to zero; I mean conditions that will not allow black or septic condition of the river system; I mean conditions that will not permit evidence of sewage matter to be seen on the surface of the rivers.

The ebullition of gases occurs if solids are deposited in the river.

Assuming no discharge of any kind from the Drainage Canal to the Des Plaines River, the completion of the program of sewage treatment and the discharge of the effluents from these plants at the places I have described or that have been described in the evidence, and the addition of 2,000 cubic feet per second from the Calumet Sag
12040 Channel at its eastern terminus, 2,000 second feet from Lake Michigan to the South Fork of the South Branch of the Chicago River, 1,000 cubic second feet to the North Shore channel at its Wilmette terminus, I have an opinion as to what the condition of the water of the Chicago River and the Canal systems and the waters of Lake Michigan at and near Chicago's lake front will be.

The use of this volume of flushing water toward the

Lake under the conditions mentioned would provide conditions in the Canal System such that in my opinion the system, including the channels of the Chicago River and its branches, would not be highly objectionable. On the other hand,. the constant flushing of this volume of water, plus the content of the channels into the Lake, would ruin the bathing beaches and make them completely unsafe. I believe that it would contaminate the water supply and be in marked contrast to the present condition.

Based on my experience and my investigation that I have made and described, the B-coli indices at the various bathing beaches, I believe, contrasting our conditions with what I found at Milwaukee, would be a million or more. I have formed my opinion as to that point on the basis of what was found this summer at Milwaukee.

12042 That is a million B-coli per 100 cubic centimeters.

I refer to all bathing beaches within a radius of five miles of the mouth of the Chicago River.

12043 The term "stable," "stability," as applied to an effluent from a sewage treatment plant, refers to a chemical or bio-chemical determination which is made in a closed bottle in the presence of a dye, methylene blue. The disappearance of the blue color of this dye coincides with the disappearance of oxygen, both dissolved oxygen and oxygen present in nitrates. This is the extent of the stability test. It is expressed in either the number of days required for this disappearance or in the per cent of the relative stability based on a scale extending to approximately 100.

The presence of nitrates does not prevent in any degree the disappearance of dissolved oxygen from an activated sludge effluent. The dissolved oxygen will disappear before any nitrates are affected. The presence of nitrates in the liquid flowing over sludge deposits will not prevent the septic condition or the ebullition of gas from those sludge deposits.

The efficient operation of an activated sludge plant, all 12044 things considered, with regard to its discharge, comprises the production of a minimum amount of nitrate in the effluent, if the process can be controlled to that degree of accuracy.

The production of a large amount of nitrate requires either more air or larger tank capacity. In addition, it is undesirable to produce a high content of nitrate because of the stimulation of organic and aquatic growth. Therefore, all things considered, it is advisable to attempt to operate an activated sludge plant with a minimum production of nitrate.

In my investigations at Milwaukee I also observed the effluent from the activated sludge plant at Milwaukee on several occasions.

I have observed the effluent from various activated sludge plants.

The effluent from an activated sludge plant is not clear, sparkling and odorless.

12045 One of my assistants has here a sample from the Milwaukee plant.

Cross-Examination by Mr. Jackson.

Turbidity is one measure of clearness of a liquid.

12175 I estimate that a good activated sludge effluent which would be produced by the operation of a first class modern activated sludge plant might have a turbidity of 20.

It is not customary in the analysis of sewage effluents to test that. The maximum turbidity of the drinking water at Chicago in April, 1927, at the 68th Street station was 115 parts per million.

12177 The average was 50, and the minimum was 8. This was the month of April.

Q. Doctor, I have here a certified copy of a statement made by Harrison P. Eddy, before the Board of Estimates for the City of Milwaukee on November 12, 1919. I wish to read to you this statement from page 19. (Reading):

> "The activated sludge system will produce an effluent which is, speaking now in general terms, as good in appearance as the Lake water itself."

Do you agree with that statement of Mr. Eddy's?

A. He says that he is speaking in general terms, and in general terms it is as good in appearance as the Lake 12178 water is at times.

Q. Mr. Mohlman, I have here an article by Mr. Harrison P. Eddy in the issue of the "American City" for March, 1929, entitled, "North Toronto Activated Sludge Sewage Treatment Plant," and I read to you from page 125 as follows, after outlining the activated sludge treatment:

> "This process of treatment will remove from the sewage practically all of the suspended matter, turbidity, coloring, and upwards of 95 per cent of the bacteria."

A. The first statement, qualified by "practically," I agree with, because it is a general statement. My opinion is that the average reduction of bacteria will not be 95 per 12179 cent and also that this refers in general to bacteria, and not to B-coli, or any specific type of organism.

The term that he uses, bacteria, refers to the total number, and not to the B-coli. The B-coli is included; but the percentage of reduction might not be as large in the reduction of B-coli.

Referring again to the same article by Mr. Eddy, reading from page 126:

"The final effluents will be practically clear, colorless 12180 and odorless, and will be stable." I agree again with the general statement of "practically"; and with the statement that it is stable I agree, to the extent that I qualified the definition of "stability" yesterday, that is, the chemical determination as made in a closed bottle.

An official report made to the Board of Estimate and Apportionment of the city of New York by Mr. George W. Fuller, consulting engineer, dated April 30, 1928, at page 84 reads: "The activation process should be carried out by agitation of the sewage with activated sludge in tanks for a period of four to six hours, by means of compressed air. After passing through settling tanks, the sewage will become well purified and non-putrescible and freed of 95 to 98 per cent of its bacteria."

12181 I agree, to the extent that the definition of non-putrescibility would be qualified, again, by my definition of "stability;" second, that he refers to bacteria and not to B-coli. If you refer simply to the analysis of the sewage, we use the same term, of course. But if you refer to the disposal of an activated sludge effluent, I do not agree with the definition of putrescibility.

I do not agree that the B-coli reduction always exceeds the reduction in total number of bacteria.

12182 I think the percentage of reduction based on the total count will be higher than the percentage of reduction based on the B-coli count. I cannot say that B-coli are more resistant.

The resistance of typhoid fever germs depends on the conditions under which they are discharged. They are very highly resistant in some instances, and have caused epidemics by that very reason.

I have not made any test with reference to keeping them alive, but that is my knowledge of the work that has been done with the typhoid organism.

As to the report of the Division of Water Supply and
12183 Control, 1925, for the City of Chicago, page 460: "A study of the diagram will show that, contrary to common

opinion, the waters of the South Side beaches, with the exception of those at Calumet Park, are less contaminated by sewage organisms than those on the North Side. The reason for this is not clear, since the Lake front, in general, along the South Shore side is exposed at times to serious pollution from the Calumet River and the Illinois Steel Company plant. The waters at the extreme southerly beaches south of Jackson Park were often reported as noticeably discolored by some foreign matters; but even at these times the degree of sewage contamination, as shown by analyses was low.''

12184 That may be a correct statement as far as it goes.

It is correct with regard to the diagram that is shown there. I think that our own analyses indicate to the contrary, but not for 1929.

I have not the 1925 figures with me, and I cannot say for sure.

I would not want to testify that that statement is incorrect, but whether that actually represents the facts or not is another question.

12185 It is a statement of what they found, limited by the number of samples taken, the place where the samples were taken, and many other factors.

It appears that in 1925 the Calumet River was reversed and flowing into the Lake over 51 per cent of the time at the South Side, according to page 52 of the report of the Department of Public Works of the City of Chicago for 1927. I happen to know how the measurement was made, and I do not agree with it.

12187 Whenever the Calumet River flowed into the Lake in 1925 there was a proportion of raw sewage, not, of course, as we would define raw sewage, 100 per cent raw sewage, but only the raw sewage that was tributary to the Calumet River.

12188 In a good activated sludge effluent there is up to 5 parts per million of dissolved oxygen. We have operated our plant at Maywood and at Calumet with 5 parts of nitrate and nitrite.

12189 That represents potential oxygen around 14½ parts per million.

Redirect Examination by Mr. Adcock.

In an efficiently operated activated sludge plant, we have frequent analyses showing a B-coli index of 1,000,000.

The index always refers to 100 cc.

In my opinion there would be a greater percentage in reduction of all bacteria in this activated sludge process than there would be in the B-coli reduction.

The percentage reduction based on the total count is
12190 based on a far greater initial count than on the B-coli count; therefore the percentage reduction might be higher for the total count, but the actual number of B-coli might be greater in proportion because of the lower initial B-coli count.

At the present time the human sewage from the Illinois Steel Company is tributary to the Calumet Treatment Works.

Referring to the paragraph in that report (page 460, Report of the Division of Water Supply Control, Chicago, for 1925) modifying the portions read by Mr. Jackson, the Fullerton Avenue Beach is located on the west side of the inner lagoon. The waters are shallow and the beach is used entirely by children. At this point the lagoon is narrowed in passing under the bridge to the motor boat harbor entrance. On the east side of the
12191 lagoon, opposite the beach, there was a considerable gowth of sub-aqueous plants. The current of water through the lagoon depended largely on the direction of the wind, consequently circulation was not always good.

I think the enclosed location of that beach without circulation accounts for the relatively high count obtained.

Recross Examination by Mr. Jackson.

12192 The pollution from bathers, without circulation, is a heavy contributing factor in the Fullerton beach to which I have referred because it was enclosed.

I would say the average B-coli index of the activated sludge effluent is around 200,000.

12046 **Horace P. Ramey,** heretofore called for Defendants:

Direct Examination by Mr. Adcock.

12049 I have made a calculation from recent data in the possession of the Sanitary District as to the frequency of runoff of the Chicago River Drainage area, as to different amounts of water, during a year.

I have studied the record of rainfall in Chicago and runoff, and I have come to certain conclusions as to the quantity of runoff in the Chicago River watershed and in different amounts and the frequency with which they occur.

I estimate that 2,000 second feet will run off from 55 to 60 times a year.

12050 3,000 second feet will run off from 30 to 35 times a year; 4,167 second feet will run off from 15 to 22 times per year; 5,000 second feet will run-off from 12 to 15 times per year; 6,000 second feet, from 8 to 10 times per year; 7,000 second feet from 6 to 7 times per year; 7,500 second feet from 5 to 6 times per year; 8,000 second feet from 4 to 5 times per year; 9,000 second feet from 3 to 4 times per year; 10,000 second feet from 2 to 3 times per year; 13,000 second feet about once per year. That is based on conditions as of 1929.

In 1923, I made an estimate, similar to this present estimate, based on 1922 conditions. Those results appear in Defendants' Exhibit 1118, and in Complainants' Exhibit No. 1, which is the so-called Putnam report.

12051 In those statements in Defendants' Exhibit 1118 I gave the amounts of runoff, with their frequency, and I stated that, as the built up sections of the district—that is, by "district" I mean the watershed of the Chicago River—the built up sections of the district increase, the sewered area will increase and the runoff rate will increase; so I made a reservation in that.

That is stated in that memorandum; that is, Defendants' Exhibit 1118. And the study as of 1929 is based on present-day conditions, for more paving, more sewers, and, naturally, higher rates of runoff.

Of course, as the sewered area, the built up area, increases, there may be changes in the future.

Cross-Examination by Mr. Jackson

I have made estimates of the runoff at various sizes of the Chicago Drainage area in Exhibit 1118 in 1923. I do not recall whether I testified in 1927 with respect to that runoff.

12059 I have not made any study or analysis of this runoff since I made that study in 1923 up to this year. I made an analysis in 1923 and stated the figures as of that date. The next time I made an analysis of that was within the past two months.

In my statment I referred to records of rainfall and runoff in the Chicago Basin.

We have records of flow through the Chicago River and Main Drainage Canal, and it is by observing the action of the canal under certain conditions that I refer to.

I refer to records of flow through the canal when that flow all came off the Chicago River watershed.

I took a condition where the canal is flowing a certain
12060 quantity of water, say, 10,000 cubic second feet, in the upper reaches of the channel above Sag.

As to how I determined it was flowing 10,000 second
12061 feet there I might have something over 10,000 second feet flow at Lockport. I might have a record or estimate of the flow through the Calumet Sag channel, worked out at Blue Island. Assuming I have a certain quantity of flow in the Main Channel above Sag, I get a rain that falls on the Chicago River watershed and runs into the river, the river at the Lake becomes stagnant. That is, there is no current in either direction.

Those observations are made and reported. If the river at the Lake is stagnant, then it is proper to assume that all water that goes to make up the flow of the river further down comes from the runoff.

12062 It takes that water to get down to Lockport, various times. I am citing just one instance. We watch the action of the Canal during all of these rains, and particularly during the heavy rains, and it is from a study of the action of the Canal that I have made this conclusion.

The river might, and it might not, with a different distribution of flow, become stagnant between the junction of the North Branch and the Lake when there is a runoff of 6,400 second feet there, with a flow of 10,000 second feet on the whole watershed.

Perhaps I did testify that with a maximum runoff on the Chicago River watershed of 10,000 second feet, that 64 per cent of that runoff would come from the main channel, the North Branch, and a part of the Chicago River between the junction of the north branch and Drainage Canal.

12063 With 6,400 second flow there would not necessarily be a maximum storm. Ten thousand second feet is not necessarily a maximum storm that will fall on the Chicago

River watershed. What you have is a distribution of the water going to make up 10,000 second feet.

I have not changed my opinion. I used 10,000 second feet as a convenient figure.

A rainfall of something like—I haven't those figures right at hand, but I believe a rainfall as low as .06 inch would produce 2,000 second feet runoff.

I cannot say how long that rainfall would have to continue because there are so many varying conditions of soil——

Q. So that, as I understand you, without knowing what 12064 rainfall would produce 2,000 second feet runoff, or without knowing how long that intensity of rainfall would have to continue, you have estimated that there would be 2,000 second feet runoff from 55 to 60 times per year?

A. Yes. Knowing that there are from 55 to 60 rains per year, that will produce that much runoff on the average.

Q. But you do not know how large those rains would have to be, or how long they would have to continue?

A. Oh, yes; I have the records, but I haven't the details of those analyses at hand.

Q. Is the same thing true with respect to all these other runoffs with respect to which you have assumed to state the frequency—that is, you do not know how much rain would produce such runoff, or how long it would have to continue?

A. The length of time that the rain would have to continue does not affect the problem since this is a rate of runoff.

Q. You do not mean to testify, Mr. Ramey, that if you had a rainfall concentrated throughout the area of the Chicago River, of a certain concentration, that if that were to stop in ten minutes, for instance, it would produce the maximum runoff for that rainfall in the lower reaches of the river?

A. No; but if I had a rainfall of a certain rate of run-12065 off it would produce these figures. That is the assumption.

Q. If you had a certain rate of runoff for a long enough period of time?

A. Certainly.

Q. So as to concentrate it all in the lower river? I mean toward Lockport; is that correct?

A. Yes. That is the basis on which these observations were made. They were made when we had a rainfall lasting long enough to have a stated condition, extending clear from Lake Michigan at least down to the upper main channel.

Q. But you cannot tell us what they are, so that your accuracy can be tested by comparison with the Weather Bureau records?

A. Well, I cannot tell you offhand all the details of that computation.

Q. Now, I am asking you the details about just two factors.

By Mr. Adcock: Q. You have the record here, haven't you?

A. I have the records.

12066 Mr. Adcock: They are available for examination by the other side, if they want them.

By Mr. Jackson: Q. If you can do it without taking much time, just tell me what those two factors are that you used for each of these estimates.

A. I will have to get the runoff curve. I cannot answer that offhand.

Q. I do not mean the runoff curve. I want to know what rainfall you estimate and what intensity of rainfall; how many inches an hour, and how long that had to continue over the whole watershed to produce the results you have estimated. May I ask you what records you are referring to now?

A. I am referring to Defendants' Exhibit 1118.

Q. That is the previous estimates that you made?

A. Yes. A runoff of .03 inch an hour will produce about 2,000 second feet.

Q. Continuing how long?

A. I am giving you a rate.

Q. But a momentary runoff of .03 inch per hour would not give you that? 7.

A. It would give you a momentary runoff of 2,000 second feet.

12067 Q. That would concentrate in the lower Chicago River?

A. I am talking about rates. You are talking about the rate of rainfall and rate of runoff.

Q. Yes. How much rainfall do you say would be required to produce that runoff of .03 inch per hour?

A. Under some conditions a rainfall of about two and one-half times .03 inch would produce it.

Q. That is over the whole watershed at the same time?

A. Yes.

Q. As to these recent computations that you have made, you are now testifying from computations that you made in 1923, are you not?

A. Well, the runoff rate—the total area has not changed, so that the statement in 1923 that .05 inch per hour will runoff 2,947 second feet has not changed.

Q. But your result has changed since 1923?

A. Yes. Since 1923 the runoff rate has increased. That is, the condition of the watershed has changed. It is less pervious, so that we get more runoff from the same amount of rainfall now than we did in 1922. It is a more rapid runoff flow.

Q. But you have just stated your rate of runoff from your 1923 computations. Now tell me what rate you
12068 used for 1929 if it is different.

Q. What ratio of runoff did you use for the rainfall?

A. I used about 40 per cent runoff on the sewered areas and 26 per cent on the nonsewered areas.

Q. What did you use in 1923?

A. The same factors, but in 1923 there was a less proportion of sewered area than there is now, so that the 40 per cent rate would apply to a greater portion of the area today than it did in 1923.

The runoff is limited by the capacity of the sewers. The difference in the capacity of the sewers now and in 1927 I don't know, because I did not make any estimate of capacity in 1927, and as a matter of fact I have not made any estimate of the sewer capacity today. I base the general statement of runoff as to the high figures on observations in the action of the Canal when we were flowing these certain amounts.

12069 When I first observed, or had observed, the stagnant condition appearing in the upper Chicago River, the water that was then flowing through Lockport had passed in from the lake something like twenty-four hours before and there was no part of the rainfall, unless it be purely local, that was passing through the controlling works at Lockport.

It is also true that if there be a seiche, it may render the river stagnant or even partly reverse it for the time, without any rainfall.

12070 The record shows that there was no seiche affecting it. The lake was comparatively still. I can not show you in the records where it shows that.

These records are made when we know that the stagnant condition of the Chicago River at the Lake was the result of rainfall and no other cause.

I have a record of the Lake level, a continuous record, and I didn't take the particular times when there were seiches; I picked times when there were no seiches, because a change in Lake level would affect a study of what was happening in the river clear out.

12071 I have a continuous record of Lake levels near the mouth of the Chicago River, and I have a record of the direction of the current in the Chicago River at Dearborn Street, which is about half a mile inland.

Our observations of stagnation or reversal of the Chicago River are not all taken at Dearborn Street. There are certain reports made by the bridge-tender at Michigan Avenue.

But the records that I have introduced in evidence here as an exhibit of reversals are taken from Dearborn Street.

That is some .7 of a mile from the mouth of the river.

12072 They show the direction of the current. They show whether the current is towards the Lake or whether the current is inland, and whether there is any current at all, or whether there is no current.

I don't know how much additional paving has been done in Chicago since 1927.

Q. Well, how did you arrive at your conclusion that the number of times when a runoff of 3,000 second feet had occurred per year had increased from the ten or twelve times which you testified to on page 3365 of the record in 1927, to 35, as you testified to here today?

A. I would like to see that.

The Witness (after examining record): Apparently

12073 that is a statement of some figures that were in Exhibit 1, that were prepared by me, and apparently that is a statement that is in that report.

When I testified in 1927, I had not made any study of that situation since 1922.

In concluding that the frequency of 3,000 c.f.s. run-offs had tripled since 1923 calculations I did the increase in paved area.

These statements of runoff are all estimates; they cannot be stated definitely; I have stated them within certain ranges. I think they can be stated within certain ranges, but there isn't any absolute knowledge of it, because it is
12074 not susceptible of absolute determination.

I estimate that 2,000 second feet would run off from 55 to 60 times per year. I believe that the average ran something like three hours. I cannot give it to you for all of those as I have not it. The same is true of the 3,000, 4,000, 5,000, I said so many times per year. I did not endeavor to give you the length of those times. I
12082 was giving you a table of frequency, rather than a table of quantity or of volume.

I have just as much data about the length of these run-offs as I have of their frequency, but I did not work it out in that manner. I did not consider that a material factor as I was working for a certain rate. I assumed that the total run-off for a year of the Chicago Basin would be a little more than 200 second feet.

12083 This study is based on the rainfall record at one station.

I believe there are three different stations in the total time that I have used. One was on the Federal Building, and in late years we have used the University of Chicago station, but for a particular period there was just one station used.

I assumed that the run-off that was shown at that one station was practically simultaneously equivalent throughout the area of the Drainage Basin.

Redirect Examination by Mr. Adcock.

There is a gage operated near the mouth of the Chicago River, which automatically records, continuously records,

the elevation of Lake Michigan. In this study I used
12084 those gages at the mouth of the river and at Western Avenue and on down the channel to see that there was no great change in the flow in the channel; that is, the channel was not rising and was not falling.

The Government maintains a gage right outside the mouth of the Chicago River.

We have some of those government records. In the main, though, we have used our own records at the mouth of the river. But from time to time we have compared those records with the government records at the mouth of the river and, in general, they have checked.

12085 The recording gage maintained by the District at the mouth of the Chicago River is a different type of gage to the one that is maintained by the Government, but it produces the same result.

I have checked the records of that gage with a government gage.

The gage at the mouth of the Chicago River maintained by the Sanitary District records the elevation of the Lake from time to time.

The record made at Dearborn Street shows the time when the river is stagnant, or when it is flowing towards the Lake, or when it is flowing inland.

So that, by comparison of the time of that record with the record of the gage indicating the rise and fall of the surface of Lake Michigan, I can find out whether there is any seiche on the lake.

12086 I have assumed that if there is 10,000 second feet of water flowing in the main drainage canal from the Chicago River to Lockport, and if there should be a stagnant condition, that is, no flow in the Chicago River proper—that is, at Dearborn Street—then I assume that the flow from the place of stagnancy is due to run-off.

It will come in at various places in the river—some in the South branch, some in the North branch, some at the Stockyards slip, some in the canal down at Western Avenue. The same would be true with the flows of these various magnitudes.

And it is on the record indicating those stagnant conditions of the Chicago River at various times that our present study is made.

Recross Examination by Mr. Jackson.

12090 I did not get 2,000 second feet from a study of the high flow. I made a study of several storms to get the high points on the curve, and I used the water pumpage as the minimum run-off.

The water pumpage was included in the 2,000 second feet as part of the run-off and a part of the 2,000 second feet which is true of all run-off computations.

I am speaking of total run-off from the watershed; that is, through the sewers. I did not measure the velocity with a current meter.

Certain Acts of the General Assembly of Illinois appearing in published Statutes of Illinois, were offered and received in evidence and are not here set out, but it is understood that both parties may in their briefs and oral arguments refer to any of such acts as they appear in authentic or recognized publications.

Subject to objection as to materiality and relevancy, Defendants' Exhibits 1456 and 1457 were received in evidence. Exhibit 1456 is photographs or pictures of locations on the shores of the Great Lakes or connecting waters taken during the summer of 1929, about which testimony was offered by complainants' witnesses Henry De Graass, M. P. Sawyer, F. W. Atkins, E. M. Bunce, John B. Taylor and G. M. Dane, on prior 1926-27 hearings.

Exhibit 1457 is a plat showing the locations of the shore shown on the pictures or photographs.

Langdon Pearse, recalled, interrogated by the Master, among other things stated that the area of the site recommended by the Engineering Department of the Sanitary District and desired for the Southwest Side Treatment Plant, is 600 acres.

12421 COPY OF DEFENDANT'S EXHIBIT NO. 1448.

U. S. LAKE SURVEY NOTICE TO MARINERS,
DETROIT, MICH.

March Lake Levels

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of March as follows:

Lakes	*Feet above mean sea level*
Superior	602.49
Michigan-Huron	580.66
Se. Clair	575.63
Erie	572.47
Ontario	246.15

Lake Superior is 0.03 foot higher than in February (since 1860 the March level has averaged 0.10 foot lower than February); it is 0.76 foot higher than the March stage of a year ago, 1.19 feet above the average stage of March of the last ten years, 0.17 foot above the high stage of March, 1917, and 2.30 feet above the low stage of March, 1926.

Lakes Michigan-Huron are 0.10 foot higher than in February (since 1860 the March level has averaged 0.18 foot higher than February); they are 1.70 feet higher than the March stage of a year ago, 1.56 feet above the average stage of March of the last ten years, 2.29 feet below the high stage of March, 1886, and 3.12 feet above the low stage of March, 1926. 12422

Based on past records the monthly mean level for April is likely to be about 580.9 and not less than 580.4.

Lake Erie is 0.38 foot higher than in February (since 1860 the March level has averaged 0.18 foot higher than February); it is 1.02 feet higher than the March stage of a year ago, 1.21 feet above the average stage of March of the last ten years, 1.38 feet below the high stage of March, 1887, and 2.45 feet above the low stage of March, 1926. Based on past records the monthly mean level for April is likely to be about 573.0 and not less than 572.3.

Lake Ontario is 0.22 foot higher than in February (since 1860 the March level has averaged 0.26 foot higher than February); it is 0.18 foot higher than the March stage of a year ago, 0.89 foot above the average stage of March of the last ten years, 1.66 feet below the high stage of March, 1886, and 2.01 feet above the low stage of March, 1926. Based on past records the monthly mean level for April is likely to be about 246.7 and not less than 245.9.

12423 COPY OF DEFENDANT'S EXHIBIT 1449.

U. S. LAKE SURVEY NOTICE TO MARINERS
DETROIT, MICH., MAY 2, 1929.

April Lake Levels

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of April as follows:

Lakes	*Feet above mean sea level*
Superior	602.60
Michigan-Huron	581.39
St. Clair	576.34
Erie	573.56
Ontario	247.28

Lake Superior is 0.11 foot higher than in March (since 1860 the April level has averaged 0.06 foot higher than March); it is 0.75 foot higher than the April stage of a year ago, 1.21 feet above the average stage of April for the last ten years, 0.09 foot below the high stage of April, 1860 and 2.50 feet above the low stage of April, 1926.

Lakes Michigan-Huron are 0.73 foot higher than in March (since 1860 the April level has averaged 0.20 foot higher than March); they are 1.87 feet higher than the April stage of a year ago, 1.95 feet above the average stage of April of the last ten years, 1.84 feet below the high stage of April, 1886, 12424 and 3.57 feet above the low stage of April, 1926. Based on past records the monthly mean level for May is likely to be about 581.7 and not less than 581.4.

Lake Erie is 1.09 feet higher than in March (since 1860 the April level has averaged 0.54 foot higher than March); it is 1.77 feet higher than the April stage of a year ago, 1.69 feet above the average stage of April of the last ten years, 0.62 foot below the high stage of April, 1862, and 2.75 feet above the low stage of April, 1926. Based on past records the monthly mean level for May is likely to be about 573.9 and not less than 573.4.

Lake Ontario is 1.13 feet higher than in March (since 1860 the April level has averaged 0.59 foot higher than March); it is 0.86 foot higher than the April stage of a year ago, 1.48 feet above the average stage of April of the last ten years, 1.15 feet below the high stage of April, 1886, and 2.44 feet above the low stage of April, 1872. Based on past records the monthly mean level for May is likely to be about 247.5 and not less than 247.0.

12425 COPY OF DEFENDANTS' EXHIBIT NO. 1450.

U. S. LAKE SURVEY NOTICE TO MARINERS

May Lake Levels

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of May as follows:

Lakes	*Feet above mean sea level*
Superior	602.62
Michigan-Huron	582.01
St. Clair	576.92
Erie	574.28
Ontario	248.27

Lake Superior is 0.02 foot higher than in April (since 1860 the May level has averaged 0.31 foot higher than April); it is 0.47 foot higher than the May stage of a year ago, 0.99 foot above the average stage of May of the last ten years, 0.43 foot below the high stage of May, 1861, and 2.44 feet above the low stage of May, 1926.

Lakes Michigan-Huron are 0.62 foot higher than in April (since 1860 the May level has averaged 0.30 foot higher than in April); they are 2.07 feet higher than the May stage of a year ago, 2.25 feet above the average stage of May of the last ten years, 1.51 feet below the high stage of May, 1886, and 3.85 feet above the low stage of May, 1926. They are higher than any monthly mean level since September, 1888,
12426 but are only slightly above the stage of June, 1918. Based on past records the monthly mean level for June is likely to be about 582.2 and not less than 582.0.

Lake Erie is 0.72 foot higher than in April (since 1860 the May level has averaged 0.34 foot higher than April); it is 2.21 feet higher than the May stage of a year ago, 2.05 feet above the average stage of May of the last ten years, 0.14 foot below the high stage of May, 1862, and 3.11 feet above the low stage of May, 1926. It is higher than any monthly mean level since July, 1876. Based on past records the monthly mean level for June is likely to be about 574.5 and not less than 574.1.

Lake Ontario is 0.99 foot higher than in April (since 1860 the May level has averaged 0.34 foot higher than April); it is 1.66 feet higher than the May stage of a year ago, 2.13 feet above the average stage of May of the last ten years, 0.68 foot below the high stage of May, 1870, and 3.31 feet above the low stage of May, 1872. Based on past records the monthly mean level for June is likely to be about 248.4 and not less than 247.9.

12427

COPY OF DEFENDANTS' EXHIBIT NO. 1451.

U. S. LAKE SURVEY NOTICE TO MARINERS

DETROIT, MICH., JULY 3, 1929.

June Lake Levels

The United States Lake Survey reports the following approximate mean stages of the Great Lakes for the month of June, determined from daily readings of staff gages.

Lakes	*Feet above mean sea level*
Superior	602.72
Michigan-Huron	582.22
St. Clair	576.94
Erie	574.27
Ontario	248.46

Lake Superior is 0.10 foot higher than in May (since 1860 the June level has averaged 0.28 foot higher than May); it is 0.26 foot higher than the June stage of a year ago, 0.83 foot above the average stage of June of the last ten years, 0.71 foot below the high stage of June, 1876 and 1916, and 2.22 feet above the low stage of June, 1926.

Lakes Michigan-Huron are 0.21 foot higher than in May (since 1860 the June level has averaged 0.23 foot higher than May); they are 2.08 feet higher than the June stage of a year ago, 2.30 feet above the average stage of June of the last ten years, 1.39 feet
12428 below the high stage of June, 1886, and 3.81 feet above the low stage of June, 1926. Based on past records the monthly mean level for July is likely to be about 582.3 and not less than 582.0.

Lake Erie is 0.01 foot lower than in May (since 1860 the June level has averaged 0.18 foot higher than May); it is 1.88 feet higher than the June stage of a year ago, 1.93 feet above the average stage of June of the last ten years, 0.25 foot below the high stage of June, 1876, and 3.09 feet above the low stage of June, 1925. Based on past records the monthly mean level for July is likely to be about 574.2 and not less than 573.9.

Lake Ontario is 0.19 foot higher than in May (since 1860 the June level has averaged 0.14 foot higher than May); it is 1.87 feet higher than the June stage of a year ago, 2.21 feet above the average stage of June of the last ten years, 0.17 foot below the high stage of June, 1870 and 3.57 feet above the low stage of June, 1895. Based on past records the monthly mean level for July is likely to be about 248.4 and not less than 248.1.

12429 COPY OF DEFENDANT'S EXHIBIT NO. 1452.

U. S. LAKE SURVEY NOTICE TO MARINERS

DETROIT, MICH., AUGUST 3, 1929.

July Lake Levels.

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of July as follows:

Lakes	*Feet above mean sea level*
Superior	602.93
Michigan-Huron	582.33
St. Clair	577.03
Erie	574.12
Ontario	248.36

Lake Superior is 0.21 foot higher than in June (since 1860 the July level has averaged 0.21 foot higher than June); it is 0.08 foot higher than the July stage of a year ago, 0.80 foot above the average stage of July of the last ten years, 0.89 foot below the high stage of July, 1876, and 2.07 feet above the low stage of July, 1926.

Lakes Michigan-Huron are 0.11 foot higher than in June (since 1860 the July level has averaged 0.07 foot higher than June); they are 1.90 feet higher than the July stage of a year ago, 2.33 feet above the average stage of July of the last ten years, 1.25 feet below the high stage of July, 1876, and 3.79 feet above the low stage of July, 1925 and 1926. Based on past records the monthly mean level for August is likely to be about 582.3 and not less than 582.0. 12430

Lake Erie is 0.15 foot lower than in June (since 1860 the July level has averaged 0.03 foot lower than June); it is 1.45 feet higher than the July stage of a year ago, 1.80 feet above the average stage of July of the last ten years, 0.29 feet below the high stage of July, 1876, and 3.00 feet above the low stage of July, 1925. Based on past records the monthly mean level for August is likely to be about 574.0 and not less than 573.6.

Lake Ontario is 0.10 foot lower than in June (since 1860 the July level has averaged 0.04 foot lower than June); it is 1.63 feet higher than the July stage of a year ago, 2.17 feet above the average stage of July of the last ten years, 0.36 foot below the high stage of July, 1862, and 3.77 feet above the low stage of July, 1895. Based on past records the monthly mean level for August is likely to be about 248.1 and not less than 247.7.

12431 Copy of Defendants' Exhibit No. 1453.

U. S. Lake Survey Notice to Mariners

Detroit, Mich., September 4, 1929.

August Lake Levels.

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of August as follows:

Lakes	*Feet above mean sea level*
Superior	602.93
Michigan-Huron	582.18
St. Clair	576.79
Erie	573.81
Ontario	248.00

Lake Superior is at the same level as in July (since 1860 the August level has averaged 0.11 foot higher than July); it is 0.08 foot lower than the August stage of a year ago, 0.68 foot above the average stage of August of the last ten years, 1.00 foot below the high stage of August, 1876, and 1.91 feet above the low stage of August, 1926.

Lakes Michigan-Huron are 0.15 foot lower than in

July (since 1860 the August level has averaged 0.05 foot lower than July); they are 1.64 feet higher than the August stage of a year ago; 2.24 feet above the average stage of August of the last ten years, 1.33 feet below the high stage of August, 1876, and 3.74 feet above the low stage of August, 1925. Based on
12432 past records the monthly mean level for September is likely to be about 582.0 and not less than 581.5.

Lake Erie is 0.31 foot lower than in July (since 1860 the August level has averaged 0.18 foot lower than July); it is 1.23 feet higher than the August stage of a year ago, 1.66 feet above the average stage of August of the last ten years, 0.30 foot below the high stage of August, 1876, and 2.73 feet above the low stage of August, 1925. Based on past records the monthly mean level for September is likely to be about 573.6 and not less than 573.3.

Lake Ontario is 0.36 foot lower than in July (since 1860 the August level has averaged 0.30 foot lower than July); it is 1.36 feet higher than the August stage of a year ago, 2.08 feet above the average stage of August of the last ten years, 0.26 foot below the high stage of August, 1862, and 3.65 feet above the low stage of August, 1895 and 1925. Based on past records the monthly mean level for September is likely to be about 247.6 and not less than 247.2.

William R. Matthews, for Defendants:

Direct Examination by Mr. Lynde.

12469 I reside at 2322 Commonwealth Avenue, Chicago. I am engineer of the Bureau of Sewers of the City of Chicago. I have been employed by the City of Chicago since 1903 and for a period of about 26 years. My first employment was in the Board of Local Improvements in the Division of Sidewalk construction. For about a year's time I served as an inspector of sidewalk construction and then for a year as a rodman in the sidewalk department. I was then certified as a junior engineer

into the Sewer Division of the Board of Local Improvements, as the result of a competitive examination. For about a year or a year and a half I was engaged as junior engineer on the construction of sewers, mostly on one single large system of sewers built in the southern part
12470 of Chicago. Later I was assigned to the Intercepting Sewer Bureau, which was a special organization which had been set up to build the intercepting sewers of Chicago which was built as a part of the Drainage Canal and general diversion scheme. During that time I was largely engaged on the Lawrence Avenue intercepting sewer, on the Lake section. There was also some incidental work to connecting up some of the parts of the system that had been completed and were ready for operation. Later, and perhaps about 1908, I was transferred to the Bureau of Sewers of the Department of Public Works and I have been in that Bureau since that time. For the first four or five years I was an assistant engineer and later was made engineer for the Bureau with the title "Assistant Engineer in Charge." I have been engineer for the Bureau perhaps 15 years. My duties and responsibilities include the design, construction and inspection of sewers in the City of Chicago; the examination for approval of changes and additions to the sewer systems made for the City of Chicago.

12471 The Bureau of Sewers examines for approval the plans of all sewers and sewer changes for the entire city. The work includes an inspection of for acceptance all of the sewers built in the City of Chicago; also all investigations of engineering matters pertaining to the maintenance of a large system of sewers in a great city. This has included surveys for floods in various parts of the city; included the preparation of tentative plans for relief systems of sewers and similar work. In the last ten years I have made surveys and prepared tentative plans for sewers for the larger part of the area of the City of Chicago.

I prepared an estimate of the cost of construction at the present time of a separate system of sanitary sewers
12472 in the City of Chicago and commenced work on this about three months ago.

12480 This estimate, in my opinion, is the probable minimum cost of providing a system of sanitary sewers for the City of Chicago. The present sewer system is a combined system, one system of sewers for the removal of both the sanitary sewage and the storm water. If a separate system be required for Chicago, the present system may be used as a storm system. It would then be necessary to install a sanitary system to serve all the frontage streets of the city. In addition the drainage systems in each building would require the necessary changes to give a separate system to each.

In general, these sanitary sewers would consist of a number of systems leading to and discharging into the intercepting sewers, and treatment plants now being built or planned by the Sanitary District of Chicago, each system serving a drainage district. I am reading from the statement on page 2 in the estimate. This system would
12481 consist of main, of submain, and of branch or service sewers. The drainage districts would vary in size and shape. Some systems would drain perhaps about one square mile and other perhaps twenty. That is, we might have one district that would be perhaps only half a mile from an available interceptor; we would have another area that would be ten or twelve or fifteen miles away from the nearest interceptor. So that we would have small districts and large districts. Some systems would drain perhaps one square mile, and others perhaps twenty.

12482 A typical district might be one five miles long and two miles wide, and the cost of a system for such an area will be the basis for this estimate.

This typical district would consist of a main sewer running through the middle, with sub-mains at right angles and at every half mile. Service sewers would branch from the sub-mains to serve every frontage street. This plan I believe to be in general an economical arrangement. That is the arrangement that I would recommend if I were called upon as an engineer in a matter of that kind.

It must be kept in mind that the general arrangement would vary much in the different districts. This typical district would be the method that I would adopt in draining the larger areas. Generally speaking, in arriving at my estimate, I have taken an area 5 miles by 2 miles, or 10 square miles, and figured out the cost for the various items that go into the costs that you arrive at, and thus arrive at a square mile unit figure.

I have arrived at a unit cost per square mile for mains, 12483 for sub-mains and for service sewers. It is necessary to provide for a definite flow in order to determine the capacities of the various parts of the system. There will be considerable variation in the unit flows to be provided for in the various districts. For example, in Chicago, in the Loop district the rate of flow out of that district might be ten times the ordinary average rate in areas of other characteristics, but for the purpose of this estimate I have provided for a flow of .02 cubic foot per second per acre. That flow would be equivalent to 240 gallons per day for 5,000,000 people on 200 square miles, which is the approximate area of the City of Chicago.

I cite on page 2 under my estimate three different items in reference to this flow matter.

12484 It is a consideration of those three items among others that led me to use the unit which I adopted. The third page is a drawing of the typical system that I have mentioned. The upper portion of the drawing shows a district 5 miles long and 2 miles wide with a main through the center and a sub-main branching every half mile. The lower portion is an enlargement of a single sub-main with sewers in the intersecting streets for service, also a statement of grades and quantities. The first blueprint is a typical cross-section of a sewer in tunnel. This particular sewer is a circular sewer lined with concrete. In the lower table are the quantities in such a sewer.

The next sheet gives the unit costs for such sewers in tunnels.

The sheet following is a typical cross-section of a tunnel in which a tile pipe has been laid.

12485 The sub-main sewers must, of necessity, be largely in tunnel. It is not possible, of course, to mine a tunnel that will contain pipes from 8 inches to 27 inches in diameter. It is necessary to build a tunnel of sufficient size to work in.

It is not possible, or at least not economical, to built the sub-mains in open cuts. That is, from the top down. It could be done in some cases, but it would cost more money, because of the depth at which they have to be laid, and surface conditions.

The next blue-print shows unit costs for tile pipe laid in tunnel. The page marked "6" shows, in the upper portion a statement as to the design of the system. The mains are designed for velocities of 3 feet per second; the sub-mains for veloctics of 2½ feet per second; and the
12486 service sewers for a velocity of 2 feet per second. Those slopes are fixed to give reasonable self-cleansing velocities in the sewer, and to give minimum cost of construction. These figures are selected on the basis of my experience and judgment in those matters.

The capacities of the pipe depend on the so-called roughness factor, and it is customary for engineers to have some variation in this factor, although that variation is slight. I used 0.015 and show it to permit these sizes that I have chosen to be checked.

On the balance of the page I show estimates for the main sewer lines.

The next page is an estimate for the sub-main lines; vitrified tile pipe in tunnel.

Sheets 8 to 15, inclusive, are unit costs for the construc-
12487 tion of the service sewers in the various positions in the streets and alleys.

The basis of the figures, in general, is a determination of the quantities, the proper unit prices for them, and the product of them with the quantities of sewers. In selecting a particular figure I am exercising my judgment, based on my experience as to what the proper unit cost for that item is. I have four summaries on pages 16, 17 and 18. I have determined first, in Summary No. 1, on page 16, the total cost of a sanitary system of sewers in Chicago with the service sewers built in the alleys, and including changes in the buildings of Chicago. The estimate for such a system is $426,356,000.

12488 It is not possible, from my knowledge of the sewer situation and the general layout of Chicago, to construct a separate system through the alleys throughout the city. There are many blocks in Chicago that have no alleys. There are many blocks in Chicago in which the alleys are not continuous. There are many jogs in the alleys. The alleys do not run through the entire block, but turn at right angles to meet parallel streets. They could be built in the alleys when we have a continuous alley extending from one end of the sub-district to another. I do think, however, that a proportion of this system could be built in the alleys.

The next summary, "System of sewers in streets, single

system," is an estimate of the cost of building a complete system of sanitary sewers with a single service sewer in
12489 each street, one sewer to serve both sides of the street and the total cost for such a system would be $568,766,000.

From my knowledge of the present sewer system of Chicago it is not possible to add to the existing system a single system throughout the city. Under the system of two sewers, a sanitary system and a storm system, the present system which would then become the storm system lies in the middle of the streets in Chicago, and in most cases would effectively block connections from one side of the street if a single sewer be provided for sanitary connections for the buildings.

It would not be good practice to build a siphon below the existing storm sewer. Page 17 is an estimate for a
12490 system in which there would be two service sewers in each street, one on each side of the street for the buildings on that side. The total cost of such system would be $658,484,000. My final conclusion is a total estimate for what we might call a mixed system. That is, service sewers would be built in the alleys where alleys were available. We would do this to as great a degree as possible, because it is cheaper to build sanitary sewers in the alleys. Where no alleys were available a single system would be built in the streets, and where a conflict of grades occurred between the sanitary system and the present sewer system, it would be necessary to built a system of double service sewers. It is my opinion that approximately one-third of the service sewers could be built in the alleys and about one-half of the city would require a sewer for each side of the street. Such mixed system would cost approximately $566,000,000, and this is what, in my opinion, is the probable minimum cost of a sanitary system for the City of Chicago.

12491 I have included figures for pumping stations, although

I have made no estimates, and as a matter of fact I am not qualified to make estimates for pumping stations, as it is not within my experience; but pumping stations will be required for a separate system.

12492 Of the total summaries which I have stated for costs of these various systems there is a total of $3,500,000 for pumping stations for the entire city.

12493 That is based, as I stated, on a typical district; one pumping station to serve ten square miles with a probable pumping capacity of about 250 cubic feet per second, and I used an arbitrary figure of $175,000 per pumping station. That item is about one-half of one per cent of the total estimate.

Defendants' Exhibit No. 1473 received.

Questions by the Special Master:

The Witness: In this separate sewer system as to
12494 which I have testified I collect the sewage from all buildings in Chicago, every place where sewage is to be found. It is then carried to the interceptors which the Sanitary District of Chicago have built or are building, so that all of it is diverted directly to the treatment plants built or being built by the Sanitary District of Chicago. So a large part of this plan of a separate sewer system I have outlined is to get the sewage to the sewage treatment plants.

Cross Examination by Mr. Jackson.

12565 Q. Referring to Drawing No. 1 of my estimate, Defendant's Exhibit 1473, a typical lay-out of a 10-square mile area. In this typical lay-out, which, by the way, is for a double system in the streets, there would be 32 miles of service sewers per square mile, so there would be 320 miles of service sewers for 10 square miles; and
12566 the total length of main sewer would be 5 lineal miles.

There would be 5 miles in the main sewers, and there would be 10 sub-branches, each 2 miles long, which would be 20 miles; 345 miles altogether. I estimate on an area of 200 square miles in the corporate limits of Chicago. For the sub-mains and mains, there would be a variation,
12567 due to the size and shape of the district. I do not intend to convey the impression that the city of Chicago would be divided up in districts each of ten miles.

In the first place, this is a typical lay-out on one basis, that is, for a double system of sewers in the street, that is, two service sewers. And as I have stated in the estimates, there was one summary of an estimate made for a double system, one estimate made for a single sewer in the street, and one estimate made for a single sewer in the alley. So that in the case of a sewer on two sides the mileage of service sewers would be twice as much as in the case of a single sewer or a sewer in the alley. This drawing is typical of the maximum miles of sewer you
12568 could get in a 10-mile area. I had a single sewer, instead of a double system. There would be only half as many miles of service sewers. It is reduced by half on
12568 the single system. But you do not change the total mileage of mains or sub-mains. They remain the same. For this typical district, the mains would be 5 miles and the sub-mains 20 miles. That is 25 miles, or 2½ miles per square mile.

12570 If you only put one sewer in the street to serve both sides, you only require half the mileage of sewers, obviously. I am using the term of "branch" and "service" in the same way; that is, a sewer which will run through the frontage streets and take the actual connections from the buildings. I have used the term "main" to indicate the trunk line which would run down through the middle of the district, and the term "sub-main" to cover the branch which would be at right angles to it every half mile, and these sub-mains, which are branches of the mains, would take in turn the service sewers.

12571 Of my 200-mile area to serve, I consider there would be sewered on this double sewer basis one-half, which would require 345 miles, which would require 3,450 miles of sewers altogether.

12572 Then I have 185 miles per 10-square mile area on another scheme—a single sewer system—1,850 miles of sewers on that, or 5,300 miles on the whole thing. The total mileage of all of the sewers of the City of Chicago today is about 3,200 or 3,100 and a fraction. That is about 60%, or a little less than that of this 5,300. 200 square miles
12573 represents the whole area of the Chicago incorporation in round numbers it does. I believe the figures are around 208 or 210. I have forgotten the exact amount. But some of that is water surface. For this computation, we take 200 square miles as the area within the corporation limits of the City of Chicago. It might be somewhat less; it might be a trifle more. There are very considerable areas of Chicago occupied both by railroads and industrial plants. The industrial area requires drainage facilities, in
12574 the same manner in which the residential district does. There would probably be a lesser proportion of street sewer facilities. I woud imagine that the total length of sewers required would probably be less. But there would be a corresponding increase within the limits of the property. In a railroad area it would be necessary to design your major system to include those areas, but not necessary to put in the branches.

You would have to design all these branch sewers for a sanitary system in the area covered by the railroad tracks in many cases.

The point I had in mind is this: Much of this property occupied by railroads eventually goes for other uses; that is the tendency, for the railroads to restore to ordinary use large tracts of land held within the city limits, for other purposes.

12575 We have certain areas which are occupied, or partially occupied by the railroads, which, in time, would pass to other uses. I do not know whether they are large areas. I have not attempted to sum them up.

There are large districts devoted to industrial purposes
12576 in Chicago, using that term very generally. There are areas in Chicago that are practically not in use for any purpose. I did not estimate or figure how many miles there are within the corporate limits of Chicago that are now devoted to industrial plants or occupied by all of the railroads entering Chicago. I did not have any idea of extending such a system into Chicago's parks only in so
12577 far as it was necessary for the uses in that park. I can't say whether I estimated the number of square miles occupied by parks. It would not require the same as a residential section.

12578 I had the impression, which is, only, an impression, in my mind that there were some approximately ten square miles that were devoted to park purposes.

I roughly summed up in my mind the parks that make up the particular park system, not considering minor playgrounds. We have a limited number of parks in Chicago. There are only five major parks in Chicago, and while I would not attempt to say what area each one covers, they are not, in toto, large.

We have two major parks in Chicago, on the west side—
12579 three, rather.

There is a substantial area in Chicago that is not sewered.

There is approximately 25 square miles in Chicago not now sewered.

But I did not compute the areas occupied by railroads or by industries and roughly estimate the parks at ten miles.

I did not deduct them from the two hundred miles, I allowed roughly eight or nine miles over two hundred.

I do not now think my assumption of two hundred square miles in the area inside the corporate limits was incorrect.

12580 I say that the area which would require a separate system of sewers might be less than two hundred.

It is not my understanding that the area of Chicago includes any portion of the waters lying outside.

The areas are computed by the city map department from time to time, as additional areas are annexed to the City of Chicago. They have a continuous record from the beginning as to the square miles within the city limits.

I say that it is not my understanding that the waters
12581 of Lake Michigan are part of the City of Chicago, and I assume, but do not know, that no portion of them or other water areas are included within their records.

As far as Calumet Lake is concerned, which now has a considerable area of water, I took that into consideration, that perhaps in the near future much of that water space would disappear, as there is a plan on foot to fill the larger portion of it. I did not consider Lake Michigan. The record of the map department I have taken as being correct.

In designing this sanitary system of sewers, I had to provide for a domestic pumpage of around 1,500 second-feet.

12582 The present combined system, which carries both the sanitary sewage and the storm water of the City of Chicago, has a capacity of somewhere about 13,000 cubic second feet. I did make computations some years ago, but I have forgotten it, but that might be a reasonable statement.

I do not remember the number of sewer outlets. I do not think it would have any such number of major outlets. My recollection is—but it is hazy—that it is something under 200, or perhaps nearer to 150.

My proposed plan here would not necessarily have twenty outlets.

It might have many more. In the first place, it will be remembered that this plan is to build a system of sewers that would be a continuation of the system of interceptors which the Sanitary District has built or are building. Now, there are some areas that are so close to that inter-
12583 ceptor that you would not require any main sewer, you could build what would then be really a submain for a short distance. There are other districts in Chicago where a district five miles long would not measure the length of the main.

We built sewers for Chicago in 1928 and 1929.

How many miles we built, I don't remember.

A total of $59,420,180 for a sewer system to provide for the sanitary sewage and all of the storm water overflows for the entire City of Chicago is the figure as carried in the report of the Chicago Department of Public Works.

12584 In addition, Mr. Matthews, your report states that this combined system at the end of 1927 had 157,892 catch basins.

I believe the report to be approximately correct.

I am not necessarily accepting the correctness of the statement in the report. But I say it should be approximately correct.

On your proposed sanitary system you would have no catch basins.

But limiting that to a discussion as to the street sewers, you would require basins in buildings, but aside from that there would be no basins in the public highway, keeping in mind that a basin as you are using the term is a storm inlet.

12585 In my set-up I think over 90% would be 8-inch. In this present combined system, there is no sewer less than 12 inches. I would not attempt to state the proportions of sizes.

It says in my report here, on page 290, for 1927, that 799.99 miles in place on January 1st, 1928, were brick and concrete sewers. They would be 24 inches or larger.

Q. On that page you show your overload that you just add to your other computations of cost?

A. What page is that?

12586 In all these estimates I have provided a percentage of the cost of construction for overhead. Insurance is 2½%, contingencies 5%. The next item, "Overhead and Equipment," is 12½%, profit you have got at 10%, and then engineering and the inspection 5%. That makes a total of 36%.

All of those items which you have there included and added to your figures otherwise every one of them, except engineering and inspection is included in contract prices.

12587 I have added them all here to my estimate of cost, to arrive at the contract price.

Turning to page 10 of my exhibit my estimate of cost for an 8-inch sewer in a 12-foot cut and on an unpaved street is $4.14 a foot. That is the net cost for an 8-inch sewer in place in an unpaved street.

I have to do with the estimates of the Board of Improvements in Chicago.

I am not familiar at the moment with the particular price for the particular size that you mention. We do very little 8-inch pipe work in the City of Chicago, but I would think that $1.50 a foot would be about the correct amount.

12588 I have no recollection of the city taking any bids for any 8-inch sewer at $1.18 per foot on a 12 foot cut either in 1927 or any other recent year, because the City of Chicago has not built any, but I would not want to answer one way or the other. There is no portion of this sewer work in an open cut for a 12-inch sewer. A 12-inch sewer would cost more.

The board has been estimating for 12-inch sewers in an open cut on an unpaved street in Chicago from $1.85 to about $2.50, and perhaps the average price is around $2 or a little more.

12589 In the first place, if you will read the estimates, you will find that that $4.14 for an 8-in. sewer, on an unpaved street, includes man-holes, which is an item of considerable size.

We can build man-holes in Chicago for ordinary cuts, say an 8-foot cut, for about $90. They may sometimes run a little less and sometimes a little more.

I am giving you what I think is a fair price when I stated $85 to $90. Sometimes $100. In this particular case these man-holes are about 12 feet deep and that calls for an additional height of about four feet. These man-holes would run roughly $7 or $8 a foot, over and above what you might take as the average depth. If they cost $100, you would have a man-hole every hundred feet, but as a matter of fact in this particular case you could not build them for $100.

12590 The man-hole spacing on sewers, be they combined or otherwise, depends largely on the diameter of the sewers; that is, for the small pipes that serve the buildings, tile pipe at least 12, 15, 18 and 24 inches, vary in Chicago from 4 to the block to 5 to the block, and I am referring to a 660-foot block. So, they vary from 165 feet to about 125 feet. On page 6, I give my base estimates of cost for a 9-foot sewer at $85 per foot. I really do not know what they have done in Detroit or whether Detroit built 9-foot sewers in tunnel for $34.75 per foot.

12591 I have only considered what they have done in Chicago. We have not within the last two years built 9-foot sewers in clay in the City of Chicago. I estimate here for an 8-foot sewer a cost of $74 a foot. I do not know that the current cost of these 8-foot sewers, built in tunnel in clay, in Detroit, has been $32.10 a foot.

12592 On the Cicero Avenue system we had some tunnel work in that job. The size has escaped me. At that time I was aware of the costs of that, and they conformed in a general way to the curve shown by these prices. I really do not remember the size, but I think it was about 8-foot tunnel. It might have been a little more or a little less.

I haven't built any separate sanitary sewer systems. Referring to page 8 of my exhibit, I provide for replacing 15 feet in width of paving in the alleys. Where an alley is paved, this estimate is for removing the existing
12593 pavement and replacing it after the job is completed. It is not the custom to build sewers in alleys in Chicago. Alleys present a different problem. It is cheaper to build sewers in paved alleys by removing the pavement than it would be to maintain the pavement by trenching. I have taken the cheaper method. We do not build sewers in paved alleys in Chicago. My conclusion that it is cheaper and more practicable to remove the whole pavement and lay new pavement is based upon actual experience which I have personally had.

12594 As I stated, I have never had occasion to build a sewer in a paved alley, but, none the less, experience would guide you in building a sewer in a paved alley as to the better and cheaper way by which it could be done.

On page 8 of your exhibit, it costs $7.50 per foot to replace the pavement torn up in an alley per lineal foot of sewer out of a total cost of $11.58. That is the large item.

And to that restoring of the pavement you then add your 36 per cent overhead item.

12595 On page 9, I state that the item for restoring the pavement over the sewer in a paved street is $2.50 per lineal foot of sewer, restoring pavement one-half square yard at $5.00.

Re-direct examination by Mr. Lynde.

12596 The ordinary sewer construction which affords the prices that have been referred to takes place under conditions where the sewers are the first improvement on the land, with this limitation, that sometimes in Chicago we may have sidewalks, but they have no effect on the sewer construction. The problem that I have been estimating here is the building of a sewer construction in a city where all of the other improvements and property exist as it does today in the City of Chicago. You face the problem of paved streets, sidewalks in place, grass plots improved, and buildings close to the line of your sewer.

12597 Page 8 is the cost estimate for laying sewers and very little of that would be affected by these improvements. The alleys are paved but there are seldom any utilities in the alley so we would not have to contend with utilities. The buildings are not usually close and are limited to such structures that are of no great importance. The first two items, breaking pavement per foot of sewer and removing broken pavement, $1.10; occasional timber left in, which is an item of about 25c. per foot; and the restoration of the pavement, $7.50. Those items out of $11.58 for labor and material are because of the paving in the alley.

If you leave the paving in you are first obliged to cut the trench through a pavement only 15 feet wide, a trench that would be at least 2½ feet wide. You would then be
12598 obliged to completely sheet the ditch so as to maintain what was left of the pavement in place. It would be practically impossible to excavate only by hand methods. The

cost of the sheeting of the ditch and the cost of replacing machine work, which I have provided for, would be more than plus the cost of cutting the trench and replacing all portion of the pavement which would be destroyed, would be considerably more than it would be to destroy the pavement and use machinery and repave behind you. I made estimates for both of them and adopted the cheaper method. The present mileage of sewers in Chicago is somewhere around 3,100 or 3,200. I calculated that the total mileage in my estimate was 5,200. The difference was due to this double system that I use in a certain portion of the area.

12599 For instance, in an industry we might have two types; perhaps one that is located in a single building. We might have another larger one that would have a group of buildings. It would be necessary in the case of a group to build some sort of a main with branches leading to each building and leading into and through each building to take up the fixtures. For a single building it would be necessary, of course, to carry a branch from the nearest public line to the building and through it.

The prices that I have arrived at were generally arrived at on the basis of the work being let by contract, except the items for plans and engineering and inspection. That would be an item which the City of Chicago would bear before making contracts and after the contracts were let.

12600 These overhead percentages are those which are proper in letting contracts of this kind.

I think they are properly entered into the estimate as providing a proper contractor's price.

The bids and construction that were referred to by Mr. Jackson in the last two years, the 8-foot sewer, etc., would be a sewer out in the open ground in which there would be only three items to consider; the use of a machine to trench, the placing of the pipe, the back-filling by machine.

Those three items are the only items that enter into the ordinary sewer construction.

I have an item for cost of connection with houses, between the sewers and the houses.

I figured an ordinary small structure, such, for instance, as a single dwelling house, a standard three-apartment
12601 building, a building that might be, we will say, 24 feet wide and 40 feet in depth, standing on a lot perhaps 32 to 35 feet in width and 125 feet deep to the alley. That item would increase with the size of the building.

Recross examination.

In an industrial area where the streets do not go through, the city does not build sewers onto the private property.

12602 They build along where there is an open public street.

And then the industry, if it had occasion to do so, would construct sewers from its buildings or plants to the public sewer.

In determining my estimate I did not give any consideration, with reference to sewers built in tunnel, to contracts which had been let by the Sanitary District of Chicago.

12495 **Henry A. Berger,** for Defendants:
A Trustee of Sanitary District.

Direct Examination by Mr. Beebe.

I am attorney at law.

Since 1911 I was Assistant Corporation Counsel of the City of Chicago; Assistant State's Attorney of Cook County; Attorney for the Board of County Commissioners of Cook County. Am now a Trustee of the Sanitary District of Chicago.

12496 I was elected for a six-year term in November last and held the office by virtue of an election by the Board during the preceding four and a half months.

Am Chairman of the Judiciary Committee and the Legislative Committee. Have had experience prior to this year in dealing with legislative matters for the City of Chicago and the County of Cook.

There are nine on the Board of Trustees of the Sanitary District. The more important officers and committies are Finance, Judiciary, Legislative and Engineering.

12497 Howard W. Elmore is President of the Board, and elected in January of this year. He was elected trustee for the first time in November, 1928. The chairman of the Finance Committee is Ross Woodhull. He was first elected trustee in November, 1928. The president is in the real estate business.

I recall the opinion of the Supreme Court of January 14, 1929.

12498 No bond issue has been submitted to a referendum vote by the Sanitary District. The first requirement made by the Illinois Legislature was in 1925 to be effective December 31, 1927. In the session of 1927 it was extended by amendment to become effective December 31, 1928. I was appointed chairman of the Legislative Committee of the Sanitary District in January of this year.

12499 Immediately following the decision referred to by the Supreme Court the District, in conjunction with the Law Department, discussed the introduction of a so-called bond bill. A bill was prepared which was unlimited as to amount but limited to the specific purpose of carrying out any decree of the United States Supreme Court or any order of a department of government or any act of Congress. Immediately upon its introduction at Springfield in the Legislature much

opposition developed, both on the part of ~~the~~ down-state valley claimants; that is, claimants who had claims against the Sanitary District by reason of damage that they claimed accrued to them because of the sanitary waters, and by various business and civic organizations in Chicago. Extensive conferences were had with civic organizations and meetings were called of those organizations. The Association of Commerce was called to come in conferences with officials of the Association. The revenue committee of the Senate and the executive committee of the Senate each had separate hearings on the bill, and then later a hearing was had before the
12500 Committee of the Whole. Opposition even on the part of those that believed that the Sanitary District ought to have some relief developed too as to the unlimited bonding power provided for in the bill. An amendment was offered by Senator Kessenger which the Senate adopted, limiting the expenditure to $15,000,000 annually, but no limitation as to the aggregate amount. That did not satisfy the oppositionists, and, after much discussion in the Senate, we understood that the Governor would not approve the bill in that form, and we understood also that Mr. Harris Keeler, who represented the civic organizations, was speaking for the Governor in connection with the maximum amount to be incorporated into the bill. As a result of these various discussions and that opposition, a conference was had between Mr. Keeler and Mr. Beebe and Mr. E. J. Kelly, the Chief Engineer, and myself, at which specific items contemplated under the permit of the Secretary of War of March, 1925, were discussed and, finally, pared down to approximately $47,0000,000. Then Mr. Keeler arbitrarily lopped off another $7,000,000 and made the figure $40,000,000 and said that he would recommend to the Governor that the civic organizations would approve that amount. An amend-

ment then again was offered in the Senate and the
12501 amount was limited to $40,000,000, with no limit as to time. There was considerable discussion as to a limitation as to time. At that time the specific projects were incorporated into the bill so that the bill instead of providing that the expenditure was to comply with the Supreme Court decree or an order of a governmental department or an act of Congress, there was substituted for that language the present language, specifically enumerating the projects for which this expenditure was to be made. Then the bill passed in that form. We met considerable opposition in the House. The Speaker of the House was openly against the bill, insisting that no bond bill should pass without a referendum.

12502 The bill filed in the House, of course, was the subject of so much discussion, and then we understood that the Governor was dissatisfied with the maximum amount of $40,000,000, so we arranged a conference with the Governor and met him in his office. Mr. Beebe, Mr. Elmore, Mr. Woodhull, and Mr. Kelly and myself, and the minority leader of the House, Mr. Igoe, were present. The Governor then expressed himself to the effect that in the fall of 1928 the Sanitary District had authorized the issuance of $27,000,000 in bonds, knowing that the referendum provision would attach the following December 31, and that the limitation as to amount had been placed there by the District itself, and that therefore he thought it would be inadvisable to ask now for an amount over $27,000,000.

We pointed out to him that at the time the District authorized that $27,000,000 bond issue in the fall of 1928, it was intended to go to the legislature immediately after the first of January and ask for relief from the referendum provision in the Laws of 1925 and 1927, and that that amount only contemplated the construction work for

the balance of the year 1928 and 1929; whereas the bill pending in the legislature contemplated at least the balance of 1928—that is, the outstanding contractual obligations of 1928—and the years 1929 and 1930. That arrangement, however, was of no avail, and the Governor seemed to indicate that the bill in its present form would not meet his approval, and that in view of the fact that we
12503 had issued bonds only to the extent of $27,000,000 which a lawsuit and injunction bill which had been filed in our court had tied up, because of some defect in the bond ordinance, and prevented its sale, he thought that if we were allowed the $27,000,000, so that we could place ourselves in the same position that we would have been in had the lawsuit not been brought, that that was as much as we ought to ask.

We left the Governor's office and, after careful consideration of the matter we concluded that it was better to get $27,000,000 than nothing, and we consented—that was the only amendment that we consented to in connection with the entire legislation—we consented to the reduction to $27,000,000.

On the second reading in the House an amendment was offered to attach a referendum clause, and on that amendment we won by one vote. In the Senate the bill passed with a margin of one vote. In the House the bill passed in its final form with a margin of seven votes.

Following the passage of the bill in both branches of the legislature, opposition also developed before the Gov-
12504 ernor, as still one or two of the civic organizations made objections and attempted to secure the veto of the bill.

We again asked the civic organizations and the improvements clubs and valley associations and others who were interested, finally became interested in the passage of the bill, to communicate their desires to the Governor, and the Governor permitted the bill to become a law without his signature, and at the time issued a statement stating his reasons.

Legislation becomes effective in Illinois on July 1 and this legislation became effective July 1, 1929.

12505 Immediately after the first of July the law department was directed to prepare the necessary bond ordinances—my recollection is there were nine of them—and those bond ordinances were passed in July, the latter part of July, which was the first meeting held—it was a meeting, I think, on the second or third of July, but that was too soon for these ordinances, but it was the first meeting held at which these ordinances could be submitted. After the passage of the ordinances we immediately authorized the clerk to advertise for the printing of the bonds.

The amount being in excess of $500, the statute prohibited the Board from contracting for the printing except upon competitive bids, and as soon as the subsequent meeting in August was held, the printing contract was entered into and the bonds offered for sale.

In the latter part of August, the last meeting in August, the bonds were—they had been advertised for sale and the bids were received. The bidding price, the highest bidding price, was approximately 92½, which was the lowest bid ever received, certainly by the Sanitary District, 12506 for municipal bonds, and to my knowledge in the last twenty years, at any rate, for any municipality in Cook County. The bids were rejected.

We re-advertised the bonds and, at a meeting held September 12 or 13, I am not sure as to the date, new bids were received, and the maximum bid then was 93.89. We had a conference of trustees, the engineering department, the law department, with reference to the advisability of accepting that bid, and only in view of the present situation and the present litigation and the present needs did we, as a matter of policy, finally conclude to accept that bid, although that bid is the lowest ever accepted by the Sanitary District.

Those bonds had a very ready sale, because they were very attractive to large investors, and I am told that the bank immediately, even before delivery, had contracted for the sale of all of them, $10,600,000 bid.

The physical bonds were delivered to the bank Thursday and Friday of last week, and the credit to our treasury was extended, as I understand it, on Friday or Saturday of last week.

12508 I refer to Defendants' Exhibit 1474 for identification.

Ever since I came upon the Board in June, 1928, the acquisition of the site for the Southwest Side Treatment Plant has been discussed. I recall that there were some definite discussions concerning it at the time the North Side Treatment Plant was opened, as to what the next plant would be that we would have to give our attention to.

Following the decision of the Supreme Court in this matter I had several conferences personally with Mr. Beebe and with the engineers, with reference to the location of this site. We had some little difficulties, however, in condemning. Under the statutes of Illinois it is a condition precedent to make a bona fide offer to the owners as to the purchase price.

12509 We were without funds. We could not make a bona fide offer without the moneys available and on hand. We had in mind in this bond bill that I have mentioned to provide funds for the acquisition of this site, and when the bill took its final form, one of the specific objects for which the moneys were to be expended was the acquisition of the Southwest Side site, and it was specifically mentioned in the bond bill and in the legislation, and until we had the funds on hand, as I say, we could not make a bona fide offer, because if the offer were accepted we would be in no position to carry out the offer, and until such offer was made, no condemnation proceedings could be commenced.

The first moneys available for the purpose of acquiring this site came to us last Friday or Saturday, as I have stated.

I think it was at the meeting before last, a week ago Thursday, and last Thursday, these particular blueprints (Defendants' Exhibit 1474) were brought into the President's office by Mr. Pearse and Mr. Kelly. The
12510 trustees were present; Mr. Beebe was present, and the matter of immediately acquiring this site was discussed.

A week ago last Thursday, as a result of the discussion, the engineering department was asked, after they had explained the general situation, the additional cost that there would be per mile in the way of constructing intercepting sewers if the site were further west; the accessibility of this site and its adjacency to the so-called West Side treatment plant; and, notwithstanding the fact that it might be necessary to condemn the subdivided property at an increased cost to the District, we asked the Engineering Department to recommend the acquisition of either the site commencing with Cicero Avenue or the one immediately adjoining it, or half a mile from it, at 48th Avenue. Cicero Avenue is on the right-hand side of this blueprint, and, as I say, this portion along the city limits at Cicero Avenue is subdivided and sold to many individual owners, as I understand it. Either the acquisiton of that or the immediately adjoining piece of property, a part of which is owned by the Alton Railroad, should be recommended. They said that they would come in with a definite recommendation as to one or the other site.

12511 It seems that the adjoining piece, if acquired, would necessitate a complete change in the physical layout of the buildings, whereas at the first site, the more costly site, an easier construction program could be carried out, and would leave room for future development. If we went further west, as was discussed at the time, a site being available four or five miles west, it would necessitate an additional expenditure of one and a half million dollars per mile for the construction of the intercepting sewer.

On last Thursday at the meeting I know that I personally asked the Engineering Department, Mr. Pearse, if they were ready to recommend the acquisition of one of these sites, and he said he thought they were ready, and would.

Now then the moneys are in the hands of our treasurer, and only since last Friday or Saturday, we can, at the next meeting, if we adopt the recommendation of the engineer—and I think personally that that will be done—we can at the next meeting pass the necessary ordinances for the acquisition of this site, make our bona fide offer; if they accept it, we can close, and if they do not, we can institute condemnation proceedings.

12512 I discussed the exercise of the power under the 1927 law, with reference to the regulation and control of industrial wastes and the right to contract with industries in connection therewith, with Mr. Beebe early this spring, and, because of the opposition to our bond bill in the legislature, and for the additional reason that if we then undertook the exercise of that power, the Stockyards interests and industrial interests would immediately go to Springfield for a modification or repeal of the present law, it would be advisable to wait until the legislature adjourned, and serve two purposes—prevent further opposition to our bond bill and prevent also the Stockyards and industrial interests from attempting a modification or repeal of that power. However, as a result of that talk with Mr. Beebe, attorneys were assigned to a study of the subject, and the preparation of ordinances, and immediately following the adjournment of the legislature those ordinances were taken up, and they are now under discussion.

12513 One ordinance was drafted to which there was a great deal of opposition on the part of industries and the Stockyards, claiming it was too drastic; that it would strangle industry; drive it out of Chicago; and a modified ordinance was prepared; and we are now considering the question of further modifying that ordinance. It is a live subject right now.

Cross-Examination by Mr. Jackson.

We have authority under the law to submit a bond issue to the people at all times. We never did submit a bond issue to the people.

There was a good deal of opposition at Springfield to giving our board unlimited power to issue bonds which was about the time there were many charges with reference to the padding of our pay-rolls; and when we had just reduced our pay-rolls from substantially 5,000 to 1,300.

12515 It was, also, when it had been brought out that there was a large part of the legislature in our employ.

At or about that time or just afterward there was an investigation by the grand jury of alleged misuse and misappropriation of the funds of the Sanitary District by some official or officials.

12516 With reference to this area which we had had under
12517 consideration for the Southwest Side site I understand it has been subdivided, and that to some extent individual lots have been sold. It is not acreage. I have never seen the site.

12518 My information is based entirely on the recommendation of the engineering department.

I have no personal knowledge whatever in regard to the matter.

Referring to Defendants' Exhibit 1474, that part of the area between Cicero Avenue and Laramie Avenue shown on that exhibit as inside of what is indicated as the proposed property lines of the Sanitary District of Chicago, is now subdivided running up to the Canal. I am told that the subdivision runs right up to the Canal. I do not know.

As far as I know, there are no sewers and buildings on that.

12519 This area that is proposed to be taken, in acreage, is between 500 and 600 acres.

I know that in conection with that plant at least for a year the discussions have run along the line of 500 acres, the North Side plant being slightly in excess of 200 acres. I think the West Side plant is 500 acres. The intention here was to provide for 1,200,000 population. The com-
12520 mercial feature of the sludge has never been discussed with me or in my presence.

How many acres required in the event that we do not have sludge beds, to manufacture our sludge for commercial purposes I could not answer.

12521 I had heard discussions concerning that site and its acquisition, this particular site.

12522 I know it was not recommended since I have been on the Board. I do recall that in October, 1928, immediately following the opening of the North Side plant, there was specific reference made to this plant in the discussions.

Redirect Examination by Mr. Beebe.

Prior to the decision of the Supreme Court on January 14, 1929, there was not considered to be any emergency for acquiring the Southwest Side plant.

At the September, 1929 Hearings on Re-reference, complainants concluded their testimony and evidence as follows:

The following is an excerpt from Complainants' Exhibit 274, being a copy of the contract between the War Department and Alvord, Burdick & Howson, pursuant to which the report in evidence as Master's Exhibit B was made:

> "Determination of a pollution standard for the Chicago Drainage Canal for each of the following average flows therein: 2,000, 4,167, 6,000, 7,500, 8,500, and 10,000 cubic feet per second; this standard to be the lowest that will prevent the occurrence of nuisance in the Des Plaines and Illinois Rivers and will permit a thriving fish life therein.
>
> "Determination of the extent to which purification measures must be taken by the Sanitary District of Chicago for each of the flows specified in Section 2a of this agreement in order that the pollution standard be maintained and unimpaired."

12449 **General Charles E. Keller:**

Direct Examination by Mr. Jackson.

Reside at Evanston, Illinois. Graduate of the United States Military Academy 1890; served in the Corps of Engineers between the grades of 2nd Lieutenant and Colonel, serving largely on rivers and harbors, including two years as resident member of Board of Engineers for Rivers and Harbors; member of Special Board of Engineers for a Waterway from Lockport, Illinois, to the mouth of the Illinois River, reported in House Document 762, 63rd Congress, 2nd Session; now retired, now assistant vice-president in charge of engineering of the Byllesby Engineering & Management Corporation, Chicago.

12450 For about four and a half years I, as the District Engineer officer, had charge of all harbors on the east side of Lake Michigan. During that same time for a few months temporarily I had charge of those of the harbors on the west side of Lake Michigan that are included in what is known as the Milwaukee district, including roughly those from Sheboygan north on the west side of the Lake. I also had charge for a period of approximately four years of the minor harbors on Lake Huron, and at that time, while it is not directly responsive to your question, I was in charge, approximately four years, of the United States Lake Survey, which had under its cognizance the surveying of all harbors on all the Great Lakes and of connecting channels (1906-1910).

2451 The Lake Survey, during the season of navigation, every month published a brief bulletin calling to the attention of navigators any changes in the conditions of navigation that were regarded as being of sufficient importance to publish to the navigation community in that fashion. Those publications included the mention not only of obstructions and difficulties theretofore unknown, but also of improvements in navigation that should be drawn to the attention of navigators and vessel masters.

In the course of such duties, I did not have occasion to advise of the existence of any difficulties to navigation at any points on the lakes, by reason of sewage pollution.

During this tour of duty that I have described on the lakes, both in charge of the United States Lake Survey
452 and in charge of these various harbors, I did not receive complaints from navigators as to difficulties occasioned by sewage pollution.

Since I last testified I have continued to be associated with the Byllesby Engineering firm of Chicago.

I was retained in May of this year by the River and Harbor Committee of the Chamber of Commerce of

Cleveland to make an investigation of the Cuyahoga River for the purpose of recommending a plan for the improvement of navigation of the Cuyahoga River, and I have, since May, been engaged intermittently—not continuously—in that investigation.

I have been and am familiar with the larger harbors on the lower Great Lakes. I have been in a great many of them and I am acquainted with all of them, or I was acquainted with all of them as a result of my connection with the United States Lake Survey.

12453 Have resided in Chicago about five and a half years. As far back as 1894 I first became familiar with Chicago harbor and waterways. At intervals in a general way I have been familiar with them since.

I was a member of a special board created by an Act of Congress of June 25, 1910.

I think that is the Board, which had as one of its duties the investigation of the contemplated channel connecting the Chicago River with the Mississippi River.

In the course of my experience, or from that experi-
12454 ence, I can state whether the extent of commerce is determined by the absence of pollution or the absence of discharge of liquid sewage from the sewers or streets of cities surrounding the ports and harbors on the lakes.

I can give my opinion on the subject, based not only on that investigation but on my service in connection with shipping and navigation, extending over 30 years. My opinion is that the presence or absence of pollution has nothing whatever to do with commerce or the extent of commerce.

In a general way I am familiar with the program that has been proposed for treating the domestic sewage and trade wastes at Chicago and as to whether it is contemplated to treat all of those wastes or a part of them, or
12455 how and merely as one who is acquainted with the sub-

ject as any moderately intelligent man might be, I am under the impression that the proposal is to treat all the wastes, including the domestic sewage and trade wastes.

In my experience, in planning river and harbor improvements, the presence or absence of the discharge of liquid sewage from the sewers of the city never was a factor which affected the planning or carrying out of a river or harbor improvement.

No flow whatever would be necessary, in my opinion, at Lockport, to maintain navigation of the Chicago River in the event that all diversions for the purpose of taking care of the sewage of the Sanitary District of Chicago were discontinued.

The termination of all flow at Lockport would increase the navigable depths in the Chicago Drainage Canal and the Chicago River.

12456 The cessation of all flow at Lockport would diminish the current in the Chicago River and Drainage Canal, except possibly at extreme floods when the flow would be reversed.

The diminution of that current would be favorable to navigation.

Cross-Examination by Mr. Adcock.

I have no objection to saying again that I was a commissioned officer for 33 years, which was prior to October, 1923, when my application for retirement went into effect. 12538

I am not a vice-president of the Byllesby Company; I am assistant to the vice-president, in charge of engineering.

During all of that period I was upon river and harbor work, with the exception of the first three years, which I spent at the Engineering Post-Graduate School, which at that time was on Long Island, now here at Fort Humphrey.

A good part of that time I was stationed in and about the Great Lakes, and I was also a member of the Board of Engineers for Rivers and Harbors, of the Engineer Corps, for nearly three years; most of the time as resident member here in Washington.

Part of the duty of the Engineer Corps and members of the Engineer Corps is to administer navigable waters
12539 of the United States and to make recommendations with reference to the improvement of navigation, as directed by Congress or as authorized by law.

I am not aware that I have ever made one recommendation that was not asked for by Congress.

It would be exceptional to find a voluntary suggestion of that sort. If it were made, it would not get past the Chief of Engineers.

In looking after navigable waters in the way I did, or in the way the Engineer Corps does, it is the purpose to obtain reasonably free, easy and unobstructed conditions for navigation.

Some of the appliances or regulations with reference, say, to the Great Lakes, that tend to produce free, easy and unobstructed conditions for navigation are characterized by breakwaters that afford shelter to a harbor entrance, piers, which usually are placed along in the mouths of the rivers, in which most of the harbors are situated, and carry the rivers to deep water by revetment
12540 of banks, by adequate bulkheads or similar structures, and by the necessary dredging which sometimes includes rectification or straightening of unduly crooked channels.

The Corps of Engineers has no jurisdiction whatever over aids to navigation, which include lighthouses and buoys. Those are under the jurisdiction of the Lighthouse Bureau. The object is to mark channels or to mark danger points.

Harbor lights are not under the jurisdiction of the Corps of Engineers, but they are put in by the Government.

I was lighthouse engineer for five years, and my territory included Lake Huron, Lake Superior, the St. Marys River and the Straits of Mackinac as far west as Sheboygan, Michigan, and it was part of my function to build or to supervise—plan and construct fixed aids to navigation. I had nothing whatever to do with buoys. Those were under the jurisdiction at that time of the Inspectors of Lighthouses, who were naval officers assigned to that duty.

12541 Foghorn signals are part of the equipment of light stations. Whistles are the same thing. Harbors of refuge come in the general class of harbor or ports, on the Great Lakes. I know of only one, at Harbor Beach, on the east side of the State of Michigan.

These appliances tend to promote safety and ease of navigation, and prevent loss of life and property. They are a convenience to the navigator, and to the passenger. They make him feel more secure.

12542 He probably would be more inclined to travel on boats where there were such safety devices provided on the Lakes. I think the commerce is promoted, increased to some degree by that which is true also of freight traffic. In spite of all those devices, a good old-fashioned mariner might be able to sail the Great Lakes with reasonable safety, but not nearly so conveniently. But I think he could get around all right. There might be some loss of life, some destruction of property and so forth, as the result. I have stated that sewage or other waste pollution of harbors or streams or navigable waters has no effect of any kind upon commerce on such

waters. I think the statement is correct. If I were a
12543 workman on a boat navigating these waters, or waters of the United States, and handling ropes and doing other work which would bring me in contact with the water in which the boat plies I would not rather do such work in waters which were polluted with sewage or otherwise, to the extent that there was no, or very little, oxygen content in the water, ebullition of gases, odors and obnoxious conditions due to sewage pollution; but I would rather do such work in waters free from such conditions. Naturally I would rather do it in water that was free of pollution and objectionable conditions.

If pollution were general, it is probable that it might have some small effect upon those who go to sea in ships. But I do not understand that that is the case here.

I am familiar with conditions at Newtown Creek, New York, and the Gowanus Canal in a general way. I have been there in years gone by. There used to be very seri-
12544 ous oil pollution there. I think it has been reduced and measures have been taken to eliminate that situation. I am not familiar with the death rate due to typhoid fever among sailors on the Great Lakes, or the case rate of typhoid fever. In my 35 years experience, more or less, upon the Great Lakes, it is not within my knowledge that governmental agencies have put into force regulations relating to the taking of water for lake shipping, and other regulations to protect the health and safety in commerce and navigation. I do not know about regulations with reference to taking water for drinking purposes upon boats. That may be a regulation of the Public Health Service. If it exists, it is something that
12545 has happened since I was directly connected with navigation. If such regulations have been made, they would promote the bringing of navigation to a point of reason-

ably easy, free and unobs[illegible]ucted conditions. I am familiar with regulations with reference to the use of water upon interstate trains merely in a general way. I understand the public health service does make an examination of the quality of the water that is used, and that it seeks to prevent the use of improper water supplies. That is for the convenience of the traveler and the trainman as well, and it is for the safety of the traveler.

In fact, the railroads are not permitted to take water
upon interstate trains that does not have a certain standard
of purity. It is not my opinion that navigation and
commerce upon the Great Lakes, or otherwise, is dependent
solely upon the depth and width of the fluid, and
12546 the boat and the condition of the velocity of the fluid.
I think it also depends upon the availability or otherwise
of profitable cargo. But, other than that added factor,
I think there is nothing that covers, to any appreciable
extent, the amount of traffic carried on the Great Lakes.
I do not believe that any conceivable degree of pollution
of the Great Lakes themselves would affect it. I do not
think that pollution of a harbor has very much to do
with it. It would have nothing at all to do with it. My
answer was an expression of my opinion. I know of no
case within my own knowledge in which pollution or abscence
of pollution in a harbor or port on the Great
Lakes or anywhere else has affected navigation or traffic
by water.

I have a vague general knowledge of what the controversy
with reference to the Passaic Valley sewage
12547 being discharged into New York Bay was about, but
I had no official connection with it. I was Assistant to
the Chief of Engineers for a few years, and some of these
questions may have come up at that time.

12548 If the United States intervened in that controversy on behalf of navigation, I think the intervention was not justified.

I venture to disagree with the Supreme Court on that subject, merely because of my general contact with the subject itself.

Q. Supposing all the Great Lakes, including their connecting waters, should become so polluted with sewage and other waste that they would become odorous and covered with sewage particles and waste settling therein, would that affect commerce on the Great Lakes, I do not think it would affect the volume of commerce.

I think it would go on just the same as before. Whenever there is a cargo to be moved, it would be moved. The rule, as I understand it, is that a vessel will go wherever it can get a cargo or deliver a cargo.

12549 I do not think that the passenger traffic on the Great Lakes is a very large factor in the situation, and I am not thinking in terms of passenger traffic.

The only traffic on the Great Lakes that is of any great importance is freight.

The large passenger-carrying boats that travel from one end of the system of the Great Lakes to the other might just as well be eliminated entirely, as far as their business importance is concerned.

I am excluding yachts from business considerations, and all uses of the water for recreational purposes, by way of boats—I would eliminate those—as those were excluded in my answer, yes.

12550 I did not receive any compensation in this case. This time I was engaged a matter of two weeks ago or approximately that length of time. Negotiations looking toward my appearance were begun, a matter of two months ago.

There is a tendency, as shown by my experience and the events of the last few years, to improve the health and safety and sanitary conditions affecting travelers and workmen upon interstate carriers.

Assuming that there is navigation to and from the Chicago River through the Drainage Canal and through the Illinois River, I doubt that the cessation of all flow or discharge at Lockport from the Drainage Canal would destroy that navigation on the Chicago River, particularly if navigation turns out to be commercially impor-
12551 tant, as I think it will. It would interfere with the navigation during periods of low discharge on the Des Plaines and Kankakee Rivers.

Speaking of the navigation that comes into the Chicago River and that also passes through the Illinois River, the cessation of diversion through the Drainage Canal into the Illinois River would not destroy that navigation. It would impair it.

There is a certain amount of run-off from the drainage basin of the Des Plaines River. Whenever that was sufficient to maintain navigation you could continue navigation.

12552 There is a lock, however, at Lockport from the Drainage Canal into the upper basin of the Illinois-Michigan Canal, which would have to have a little water to lock through there. That would not amount to anything.

These bulletins of the Lake Survey, published every month, called attention merely to changes in conditions of navigation, either as obstructions or as betterments.

The condition of water in the harbor of a great city, due to sewage or waste pollution of that city, would be a condition which would have existed for a long time prior to the issuance of any particular monthly bulletin. Sewage would not be discharged in there in a minute.
12553 It would have existed for perhaps years.

Q. So at the time any particular bulletin was issued, the conditions you have stated as to the obstructions or betterments that would appear in these bulletins, you would not have felt called upon to call attention to the condition of water in any harbor, even if it were at that time grossly polluted and thereby an impediment to navigation, would you?

A. We would not have felt called upon to draw attention to it in any event, because in those days—I am going back a considerable length of time—the only things that we paid any attention to or accumulated any information about were these changes in navigation of which I spoke this morning.

There would be no changes because of pollution.

I was not directed by Congress to take any interest with reference to that, except so far as the Act of 1899 bore upon the subject, and that bore upon it in very general terms.

12554 Our directions under whatever the Congressional acts were, were to deepen harbors or channels on the Great Lakes, or widen them. That was the general mandate, and to chart them—to provide depth and width, and so forth.

12555 I understood that the proposal here with reference to the treatment of sewage is to treat all the wastes, including the domestic waste and trade waste—all the flow from the sewers—but there would probably be times when the storm run-off would have to be by-passed and that would carry with it a certain measure of raw, untreated sewage pollution.

Q. Why does the city of London settle its sewage and use six sludge steamers each with 30 men in continuous service and take the sludge out of London and out into the English Channel and dump it in deep water except
12556 to provide freer and easier and more unobstructed navigation in the Thames River?

A. I do not know. I suppose there might be a good many reasons. I would guess at one and that is to make the conditions in and near the Thames more attractive, more bearable, for the citizens of London themselves.

Q. The traveler, you do not think, has any interest in that?

A. Well, I doubt whether the main interest is the traveler. I imagine it must have been a local nuisance of such proportions that it became offensive to everybody concerned and resulted in this drastic source of treatment.

If it were a nuisance to the people along the shore it would be a nuisance to the people navigating the Thames, in the same way and probably to a greater extent, but it would not be always a nuisance to those navigating the Thames, whereas to the man living in London it is ever present.

Q. As a traveler upon a boat, which would you rather travel upon, a boat plying upon water grossly polluted 12557 from which gas is coming, that had matters of sewage origin in it, or would you rather travel upon a boat in waters that were free from such conditions?

A. I would travel in the latter class of boat in the latter class of stream.

Witness continuing: Assuming the navigation from and to the Chicago River through the Drainage Canal and through the Illinois River; and assuming further that there is placed in operation sewage disposal plants and appurtenances at Chicago provided for by the Sanitary District program that I have mentioned as knowing about in a moderately intelligent manner; and further, assuming that the effluents from such plants, including storm water and drainage, only were discharged from the Drainage Canal to the Des Plaines River, and assuming further, that the effect of that discharge would be to cause the Illinois River to become malodorous, unsightly and offensive; and assuming that such condition of the waters of the Illinois River would be an impediment to navigation; that navigation upon the Chicago

River which has to pass through the Illinois River would be affected to the extent or to a per cent of the extent that the condition of the waters of the Illinois would be an impediment to navigation.

12558 *Redirect Examination by Mr. Jackson.*

Assuming that there was pollution in the Milwaukee River which constituted an impediment to navigation, and assuming that there was navigation from Milwaukee to the Chicago River, I would consider that indirectly an impediment to navigation in the Chicago River and that
12559 would be true of any place from which you could take a vessel to Chicago.

I am familiar with New York harbor. There has always been pollution ever since there was a community in New York City.

It is a matter of common knowledge that there is a very great coast Atlantic and coastwise traffic that originates or terminates at New York. I have been asked with respect to the navigation of passenger vessels to and from various ports on the Great Lakes now in existence. I do know that those vessels have been navigating between harbors which are the subject of sewage pollution.

They ply between all the great harbors of the Great Lakes and all of them are more or less polluted. I have
12560 been familiar with Chicago harbor for quite a number of years, and there was great pollution in that harbor by the discharge of untreated sewage during that time. During that entire time there have been passenger steamers that originated at Chicago or came there from other places.

Projects on the Great Lakes were carried out at the direction of Congress, subsequent to the recommendations and plans which had been submitted to the Congress by the Corps of Engineers in every case. Those projects then represented to Congress the judgment of the Corps of Engineers as to the practical navigable projects.

ABSTRACT OF EVIDENCE

Relied Upon by Defendants, Offered at 1926 and 1927 Hearings.

3282 **Horace P. Ramey**, for Defendants. January, 1927:

3283 *Direct Examination by Mr. Adcock.*

Live in Chicago. Civil and hydraulic engineer. Am Assistant Chief Engineer of the Sanitary District of Chicago and have held that position since 1922. Graduated from Carlisle, Kentucky, High School in 1901; attended Kentucky State College from 1901 to 1903, and the University of Michigan from 1903 to 1907, specializing in hydraulic engineering, and graduated in 1907 with a degree of Bachelor of Science in Civil Engineering. Ten years later, in 1917, was given the degree of Civil Engineer by the University of Michigan. In 1906 was instructor in surveying at the University of Michigan. Since 1907 have been with the Sanitary District as rodman, computer, junior engineer, resident engineer, assistant engineer, senior assistant engineer, and since 1922 assistant chief engineer, and acting chief engineer at intervals.

3284 Am a member of the American Society of Civil Engineers and of the Western Society of Engineers and a licensed structural engineer of the State of Illinois.

3287 Since 1840 Lake Michigan has been the source of municipal water supply for the city of Chicago. In that year a 15-inch intake pipe was extended out about 150 feet into the lake from the central distributing plant at Lake Street. That is in the central portion of the city. Municipal operation of the Chicago waterworks began in 1852. The first pumping station was on the shore of Lake Michigan at the foot of Chicago Avenue about three-

quarters of a mile north of the mouth of the Chicago
3288 River which is marked on the map as "Chicago Avenue Pumping Station." The intake for this station was a 30-inch pipe extending about 600 feet into Lake Michigan. The system of building water intake cribs far out into the lake was started in 1864. The first one built was the Chicago Avenue crib or the two-mile crib, as it is marked on the map, located two miles northeasterly from the Chicago Avenue pumping station.

3289 The same practice is followed today; the intake cribs far out into the lake, water supply tunnels from the cribs under the bed of the lake and on inland to pumping stations located at strategic points for good distribution of the water supply. The Wilson Avenue crib is three miles off shore, with a thirteen-foot tunnel leading in, diminishing to a 12-foot tunnel, leading over to the Mayfair pumping station located on the northwest side of the city. From this 13-foot tunnel there is a 6-foot and an 8-foot connection with the Lakeview pumping station. This is the last crib and it was built between 1913 and 1918. South of this Wilson Avenue crib is the Carter-Harrison crib three miles off shore from the foot of Oak Street, with a 10-foot tunnel leading from the crib inland to two
3290 pumping stations located on the west side of the city. This system was built between 1896 and 1899. Southwest of the Carter-Harrison crib we have the 2-mile crib with a 5-foot tunnel built between 1864 and 1867 and a 7-foot tunnel built between 1872 and 1874, and another 7-foot tunnel built between 1886 and 1896 leading to the Chicago Avenue pumping station. Farther south, opposite the central portion of the city, is the 4-mile crib with an 8-foot tunnel leading in, branching into two 6-foot tunnels, leading to different pumping stations. This 4-mile crib was built between 1887 and 1892. On the south side is the Hyde Park crib about two miles off shore from

68th street with a 7-foot tunnel leading back to the 68th
3291 street pumping station. This system was built between
1892 and 1898. Then immediately adjacent to the Hyde
Park crib we have the Edward F. Dunn crib with a 14-foot
horseshoe shaped tunnel leading from the crib to
shore and on inland down to the Roseland pumping station
located in the far south side of the city. Between
this 14-foot tunnel and the 68th Street pumping station
there is an 8-foot connection. In all there are now in use
some 25 miles of these lake tunnels; that is, tunnels under
the bed of the lake, and about forty miles of land tunnels
in Chicago, about 65 miles, with an average size of a
little larger than 8 feet. The water comes into the pumping
stations and from these various pumping stations the
water is fed out through the mains.

3292 The present capacity of the Chicago waterworks is 1,400,000,000 gallons per day or about 2100 second feet. The average amount pumped from the lake is about 1395 second feet for the last two or three years.

3293 There are 20 municipalities outside the city of Chicago which obtain their water supply through the Chicago waterworks system such as Oak Park, Cicero, Blue Island, Berwyn, Calumet City, Harvey, Riverdale, Dolton, Park Ridge, Norwood Park Township, Elmwood Park, Niles, Niles Center, and Tessville.

Exhibit 1103 is a map entitled "The Sanitary District
of Chicago, location of the intakes on shore of Lake Michigan
from Wisconsin to Michigan." That map was prepared
under my direction. It shows the intakes of the
various towns in Illinois and Indiana from Waukegan
3294 on the north of Chicago over to Michigan City
southeast of Chicago and there are indicated the water
intakes for these towns. Waukegan is about 50 miles
north of the mouth of the Chicago River. It shows the
towns in Northern Indiana taking their water supply as

indicated, such as East Chicago, Gary, Whiting, Hammond and Michigan City.

3295 The Chicago limits are shown on the map by a heavy black line. The limits of Chicago extend about ten miles 3296 north of the Chicago River, and the territory north of the city limits to Lake Forest and the Great Lakes and North Chicago is built up by residences. There is very little vacant space between Waukegan and Chicago.

Exhibit 1104 is a map entitled "Sanitary District of Chicago, map showing main sewers within the Sanitary District of Chicago as constructed to July, 1921". This map was prepared under my direction. The sewer sys- 3297 tem of the city of Chicago was started in 1855 and the first sewers were built in 1856. The sewers in the original system were built to drain mainly into the main branch and North and South Branches of the Chicago River on the combined plan so as to carry storm water as well as sanitary sewage. A separate sewer system is really two sewers, one built to carry off storm water and one built to carry off sanitary sewage. All of the sewers in Chicago are built on the combined plan, as are also the sewers in the Sanitary District.

3298 In the northern suburbs they are all separate sewers. The original system was from Ashland Avenue to Diversey Boulevard south to about Sixteenth Street, which constitutes but a small part of what is now the central portion of the city. They all drained into the Chicago River, except one, which drained into Lake Michigan at about 12th Street. In the portion of the city on the South Side east of State Street and on the North Side east of Clark Street, which are adjacent to the lake, the sewers were built to drain directly into Lake Michigan. South of 87th Street they were built to drain into Lake Calumet and the Little Calumet River.

In 1896 a commission was appointed by the city of

Chicago to draw up plans for a system of intercepting sewers which would divert all sewage which then flowed directly into the lake back into the branches of the Chicago River, whence it would find its way to the main channel of the Sanitary District, then under construction. These intercepting sewers were built in 1898, one starting near the lake at 12th Street into the river at 14th Street, as shown at about the center of this map by the heavy line, and another near the lake at 22nd Street into the South Branch at 21st Street, as shown by another heavy line on the map.

3299 The third sewer in the system of South Side intercepting sewer is shown in heavy black lines approximately parallel with the lake shore, down about one-third of the way from the bottom of the map. It takes up the sewage which formerly flowed into the Lake from 87th Street North to 31st Street, leading it to the 39th Street Pumping Station, located on the lake shore at 39th Street, and there it is pumped west into the South Fork of the South Branch of the Chicago River. The pumping station at 39th street was built in 1904.

The flushing water is added to the sewage at 39th Street and used to flush out the south fork of the South Branch. Pumping of flushing water began in 1908. The last sewer on the South Side, in the South Side intercepting system was entirely completed in 1910. That was the date of the last diversion of sewage from Lake Michigan.

The fourth sewer in the system of intercepting sewers, the North Side intercepting sewer, is shown on the upper portion of the map by a heavy black line, and took the sewage which formerly flowed into Lake Michigan from Diversey Boulevard, about the center of Lincoln Park, up to Howard Street at the north city limits, leading it to the Lawrence Avenue pumping station, where it is pumped west through a 16-foot conduit into the North Branch. Water is taken from Lake Michigan by the Lawrence Avenue Pumping Station and added to that sewage and also used to flush out the North Branch of the Chicago River.

3300 Sewers south of 87th Street drain south and east into Lake Calumet and the Calumet River, or did drain into Lake Calumet and the Calumet River until the Sanitary District built the Calumet intercepting sewer that intercepted this sewage, leading it into the Calumet Sag channel near Blue Island.

The Calumet intercepting sewer starts from near the lake near 87th Street, and runs in a general southwesterly direction, approximately parallel to the west shore 3301 of Lake Calumet and of the Calumet River, and empties into the Calumet Sag channel which extends west into the main drainage canal.

In the towns on the north, such as Evanston, Wilmette, Winnetka, Glencoe, the sewage is drained directly into Lake Michigan, or was drained there until the Sanitary District built the North Shore intercepting sewer on the lake shore, and the Evanston intercepting sewer, and diverted that sewage from the lake back into the North Shore Channel.

The sewage in these towns south of Chicago, Dolton, Burnham, West Hammond, Riverdale and Harvey, is drained into the Calumet and Little Calumet Rivers. In towns in the DesPlaines Valley it drains into the DesPlaines River, but a considerable portion of that sewage is now treated at the DesPlaines River sewage treatment plant before being discharged into the river.

Prior to the opening of the Sanitary and Ship Canal on January 17, 1900, the sewage on the North Side of 3302 Chicago went into the lake, and from the central portion discharged into the branches of the Chicago River.

At times there was a reversal of the South Branch of the Chicago River through the Illinois and Michigan Canal. Probably the greater portion of the time that sewage went down the Illinois and Michigan Canal although in flood times it went directly into Lake Michigan. The sewage interceptors on the North Side were put into operation, the one at Lawrence Avenue in May, 1909, and at 39th Street in 1904, although some of the sewers on the south side were not completed until 1910. The North Shore channel started from Lake Michigan at Wilmette and ran down to a connection with the North Branch of the Chicago River at Lawrence Avenue, and was built between 1907 and 1910 and put in service in 1911.

3303 Connecting with that is the North Shore intercepting sewer which picks up the sewage of these North Shore towns. It was built between 1913 and 1916. The Evanston sewer was built between 1916 and 1920. It leads along the lake front and back to the pumping station where the sewage is pumped through a 10-foot conduit into the North Shore channel. The Calumet Sag channel was started in 1911 and put in service in 19[illegible]. It is an outlet for the sewage of the Calumet region, everything south of 87th Street. The Calumet intercepting sewer was completed in 1924 but most of it was put in service
3304 in 1922. At the present time there is no sewage going into the lake between the Cook County line on the north and the Indiana State line on the south. It has been diverted, as I have described, through the main channel of the Sanitary District, through these intercepting sewers.

3305 The drainage area of the DesPlaines River above Joliet, is 773 square miles.

The drainage area of the Little Calumet River before its junction with the Calumet River may be divided into two areas of 229 and 372 square miles, respectively. The latter now drains directly into Lake Michigan east of the Indiana line.

3306 The flood run-off of the North and South Branches of the Chicago River is about 10,000 cubic second feet. The run-off of the Calumet varies from less than 100 second feet up to more than 9,000 second feet in storms.

The northern terminus of the canal where it connects with the Chicago River at Robey Street, Chicago, is about six miles, by river, from Lake Michigan.

3319 The South Branch of the Chicago River was improved by the Sanitary District. The main branch of the Chicago River extends about a mile inland from its mouth, to the junction of the south and north branches.

3320 At the junction the North Branch comes in from the Northwest, and the South Branch comes in from due south. Going along the South Branch you come to a place where it forks into the south fork and the west fork which extends on toward Ogden Ditch. The west fork extends a little over half a mile from the junction of the west and south forks to Robey Street where the main channel of the canal begins, and the west fork then extends on westerly some two miles into the Ogden Ditch, which was dug from the DesPlaines River to a connection with the west fork. That channel is still in existence. The Ogden Ditch has no connection with the DesPlaines at
3322 present, but it does have a connection with the west fork of the South Branch of the Chicago River.

The lock at the south end of the canal was 22 feet wide and 130 feet long with a maximum width of 40 feet. It was built merely to pass small craft which had been navigating the Illinois and Michigan Canal, but a space
3323 was left alongside the small lock for a large ship lock, which is now being built by the State of Illinois. This ship lock is 110 feet wide, 600 feet long and 14 feet deep over the mitre sills.

The Federal Government has completed all of the work on the North Branch below Belmont Avenue. The Sanitary District has improved the North Branch between Belmont and Lawrence avenues, by digging a new channel for it, 90 feet wide and 12 feet deep. The Sanitary District has built thirteen movable bridges over the canal. They were all built so that they may be moved by machinery, when the machinery is installed. Two of them
3324 are equipped with operating machinery and have been operated since 1918. They are all either swing bridges or bascule bridges, which lift.

The Calumet Sag Channel was built from the Little
3325 Calumet River over to a connection with the main channel at Sag. The bridges over the Main Channel have a clearance of 16½ feet above the flow line and the depth of the water is from 22 to 24 feet.

3326 In the Sag Channel the clearance is 16½ feet above the flow line, with a depth in the water of 20 feet. The North Shore Channel was built to extend from Lake Michigan at Wilmette, down to a connection of the North Branch of the Chicago River at Lawrence Avenue, a distance of eight miles. It has a depth of 13½ feet, a bottom width of 26 feet, and a surface width of about 80 feet. It is built as an outlet for the sewers of the North Shore towns, such as Evanston, Wilmette, Glencoe and Kenilworth. The full capacity of the North Shore Canal is 1,000 second-feet. This capacity is produced by pumping from Lake Michigan at the Wilmette Pumping Station. There is a lock at the Wilmette Pumping Station which has a 3-foot lift, through which boats may pass from the North Shore Channel to and from Lake Michigan.

The Sag Channel is 60 feet wide in the rock section, and in the earth section the bottom width is 36 feet and the surface width is from 115 to 120 feet.

3328 The natural depth in the Little Calumet River is from 4 to 6 feet, and just at present the Sanitary District is engaged in deepening the Little Calumet River, from the turning basin, southeast of Lake Calumet, over to the end of the Calumet Sag Channel, near Blue Island. This river is being dredged to a depth of 13 feet below the flow line to a bottom width of 90 feet. By a "flow line" I mean the water surface at ordinary stages. The deepening of this river was begun in January, 1925, and is about 70 per cent completed. It will be finished in 1927.

3329 The Little Calumet River connects with the turning basin southeast of Calumet and from that point on out to Lake Michigan the Government has improved the Calumet River to a depth of 21 feet and contracts have been let for building a harbor in Lake Calumet under authority of the State of Illinois and of the City of Chicago.

The Sanitary District has improved the south fork and the west fork of the South Branch of the Chicago
3330 River from the junction, where the North and South Branches unite and form the main river to the entrance of the Ship Canal. The Sanitary District has improved these stretches to a minimum width of 200 feet and a depth of 26 feet below the flow line for the middle 100 feet of the river shallowing to a depth of 16 feet at the dock line. The south fork of the South Branch has been improved by the United States to a depth of about 21 feet. In the North Branch to Belmont Avenue the project depth is 21 feet. From Belmont Avenue north to Lawrence Avenue the depth is 12 feet except for two blocks that were dredged to a depth of 15 feet by the United States Government during the war. The depth of
3331 the channel in the main river is 21 feet.

3332 The South Branch of the Chicago River and west part of the South Branch to the northern terminus of the canal has been improved to a width of 200 feet and a depth of

26 feet. In this stretch the Sanitary District has removed about twelve center pier bridges and replaced them with bascule bridges, for a clear span. It has also removed two center pier bridges in the main branch of the Chicago River, and replaced them with bascule bridges. All that work was done between 1897 and 1912.

3333 There are some elevators or navigation docks on the south fork of the South Branch and there is considerable
3334 navigation on the south fork from and to the other rivers and harbors.

3363 The maximum flow of the Chicago River Drainage area is approximately 10,000 cubic feet per second. A large part of that area is paved.

3364 In Exhibit 1, the Putnam report, are some run-off figures of that area prepared by me.

3365 A run-off flow from that area of 9500 second feet will occur about two times in three years; 7500 second feet three times a year, 5000 second feet five times a year, 4167 second feet seven or eight times a year, and 3000 second feet ten or twelve times a year. Under normal conditions the percentage of the diversion through the different intakes is as follows: through the North Shore channel, 9 per cent; through the Chicago River, 72 per cent; through the 39th Street conduit, 4 per cent; through the Calumet River and Calumet Sag Channel, 15 per cent.

3366 Under flood conditions the flood run-off will originate as follows: in the North Branch, 37 per cent; in the central and western portions of the Chicago River, 27 per cent; in the south fork and South Branch of the Chicago River, about 16 per cent; in the Calumet Sag Channel, about 20 per cent. The Sag Channel does not take off all the flow of the Calumet River in flood time, so that any quantity in excess of 2000 second feet in the Little Calumet River area will still flow to Lake Michigan. The sewage from West Hammond and six other small towns still flows into the Little Calumet River. All of the rest of the sewage draining toward that river is intercepted by the Calumet intercepting sewer.

3367 Plans have been prepared for a sewage treatment plant at Harvey, and West Hammond. In dry weather no part of the Little Calumet overflow will go into Lake Michigan. In dry weather about 400 to 800 second feet is taken from Lake Michigan through the Calumet River.

I studied the extreme flood data that we had in 1918, which amounted to about 12,500 second-feet in the lower end of the main channel, and estimated that, on that figure, 4700 second feet, about, came from the North Branch; from the central and west fork of the Chicago, about 3300, about 2000 second feet from the south fork of the South Branch, and about 2500 second feet from the Calumet Sag Channel.

The capacity of the Calumet Sag Channel is 2000 second feet, with Lake Michigan at datum, and 8000 second feet flowing in the upper portion of the main channel and 10,000 second feet flowing in the lower portion of the main channel, that part of the canal below the Sag. The amount that is normally taken through each one of the various channels directly from Lake Michigan is as fol-
3369 lows: from 600 to 800 feet through the Wilmette Pumping Station; about 6000 second feet through the Chicago River; and about 1000 to 1200 second feet through the Sag Channel.

3370 The Sanitary and Ship Canal was designed for a maximum capacity in the rock section of 10,000 second feet. As originally designed there was to have been taken through the 39th Street Pumping Station and conduit 2000 second feet, from the main river about 6000 sec-
3371 ond feet, from the Lawrence Avenue conduit about 750 second feet and through the North Shore Channel about

1000 second feet. The above figures relate to water abstracted directly from the lake.

3372 The hydro-electric plant of the Sanitary District was put in service late in 1907.

To supplement the dilution project the Sanitary District has adopted a program of artificial sewage treatment. Experiments were begun in 1908. 3392

4467-4469 Counsel for defendants read into the record Section 26 of the Sanitary District Act, providing that cities owning systems of waterworks may be required under certain conditions to supply adjacent cities with water therefrom; and cited the case of *Cicero* v. *Chicago,* 210 Ill. 390, in which that section was upheld and it was found that the town of Cicero could compel Chicago to deliver water to it.

4469 These twenty villages I mentioned obtain their water supply from the City of Chicago.

George M. Wisner, for Defendants, January, 1927:

Consulting Engineer for Sanitary District.

3666 *Direct Examination by Mr. Adcock.*

3667 Reside at Chicago, Illinois, and I am a Civil Engineer. I am now and since 1920 have been the consulting engineer for the Sanitary District of Chicago. Have been connected with the District since July 1892. My first position was rodman, after which I was made instrument man in charge of giving levels and grades on the construction of the main channel between Lockport and Lemont. I was sent there before any actual construction took place, but after some of the contracts for the excavation of the main channel had been awarded. I remained there for three years, until 1895, when I was promoted and made sort of an engineering secretary to 3668 the assistant engineer. In 1897 I was made assistant engineer in charge of Chicago River improvements, which position I held until 1901, when I was made assistant chief engineer and served in that capacity until 1907, at which time I succeeded Isham Randolph as Chief Engineer, which position I occupied until June 1920, when I became Consulting Engineer for the Sanitary District.

I received my grammar and high school education in the City of Detroit, afterwards graduating, after a four years' course, from the University of Michigan with a degree of Bachelor of Science in Civil Engineering, in 1892. I went to the Sanitary District right after my graduation.

3669 In respect to my experience, naturally after becoming connected with the Sanitary District, I became interested in the study of that question, and after 1900, when the drainage canal was opened and the particular study of sewage disposal became more prominent, it was found at that time that very little had been done in the science of disposal of sewage other than by dilution.

In 1906 there was a report made by Messrs. Hering and Fuller to the International Waterways Commission, of which my father was a member.

In 1907 a further report was made by Mr. Hering. The first report referred to the disposal of the sewage of the Calumet district by means other than dilution. The second one by Mr. Hering was in 1907.

We were requested by the President of the District (at that time Mr. Robert R. McCormick, now the editor of the Chicago Tribune), to report upon all methods of sewage disposal, including dilution. From these reports and the interest that the public was beginning to take in greater purity of water for drinking and better methods of disposal of sewage and cleaning up of sanitary conditions, I recommended that the Sanitary District engage the services of a chemist and biologist.

In 1909, or the latter part of 1908, upon my recommendation, we engaged a sanitary engineer.

In 1909, we built a testing station located at 39th Street and Lake Michigan, at the place indicated on one of these exhibits where the 39th Street Pumping Station is now located, the object being to make experiments to find out what was the best method of treating sewage other than by dilution, having in mind that it would soon be necessary to experiment with artificial methods by other than the so-called dilution method, particularly so far as the removal of settling solids were concerned.

I stated that upon my recommendation a sanitary engineer was engaged, Mr. Langdon Pearse, now Sanitary Engineer for the Sanitary District. A testing station was built under my supervision and his, and an elaborate system of every known method at that time was tried out in the sewage coming to the 39th Street Station, which was largely of domestic origin as distinguished from that which we call industrial waste, which would come from such plants as the packers, corn products and the tanners.

These tests were carried on for a number of years. Necessarily it took time, as we find in the treatment of sewage that the treatment is more successful in some seasons than others; that some methods would treat sewage satisfactorily in the summer time, but not in the winter. So everything we could think of was tried and some successful methods developed, which entered into our further study and application of these principles.

Following that an elaborate set of experiments was carried on to determine how to dispose of the waste coming from so-called Packing Town, where the stock slaughtering industry of Chicago is located, which occupies a square mile of the City of Chicago, right in the heart of the city, you might say, at the present time. They had been creating great nuisances, one of which had become nationally known as "Bubbly Creek." The situation was almost intolerable. These experiments extended over several years. I think we finished our first investigation in 1914, when Mr. Pearse and myself made a report upon the available methods of handling these trade wastes. This report was not satisfactory to the packing industry and we had hardly got it printed when another method known as the activated sludge method of sewage and waste disposal came into more or less general knowledge in this country, and so that method was tried out for a couple of years.

Now, these two years I speak of may seem long, but when it is appreciated that waste of this kind had never been successfully treated anywhere, it is not a long time to get results. After carrying out these experiments with the activated sludge method, it was agreed by the representatives of the stockyards that this method would successfully handle the waste coming from that industry as well or better than any other known method, and probably as well as it is possible for this science to do.

After the completion of these experiments the same thing was done with the waste coming from the tanneries. Elaborate experiments were carried on and different results obtained. Following that the waste coming from the Corn Products Company was experimented upon, and these experiments were carried to a successful conclusion, and, to my mind, the most successful of any of them, because through our work, working in co-operation with the officials of the Corn Products Company, a method not only of treating these wastes was found, but a method of conserving them, making an economic saving. This plant at Argo, located within the Sanitary District and on the bank of the main channel, had been grinding in the neighborhood of 70,000 bushels of corn per day, of which amount we found upon investigation

3,000 bushels were being wasted through a sewer into the main drainage channel. As I stated, through our investigation a method had been found by which this waste has been reduced so that the waste which originally came from this plant equivalent only to the waste coming from 400,000 people is now equivalent only to the waste coming from 10,000 people. That has been a big financial saving to the company, and they are very much pleased.

Also during that time, upon my recommendation, investigations have been carried on showing the condition of the DesPlaines and Illinois Rivers below the end of the drainage canal, so we would have a complete record as to what condition it was in at any particular time, to show whether it is getting worse as years go by. That was also done in connection with the main channel. The condition of the mixture of sewage and diluted water in the channel itself was investigated. So that generally the Sanitary District since 1909 has had a very good record of conditions in the Chicago River, main channel, Des Plaines and Illinois Rivers. Our studies have not extended below St. Louis.

In addition to that, in 1910 I visited the works in Birmingham, Manchester and London, England; Paris, France, and Berlin, Germany. I did the same thing again in England and France in the winter of 1922-1923. In addition to that I might say that I have visited many of the sewage disposal plants that have been built in the United States since 1906, and some that were built before 1906, but I did not visit them until after that year.

That generally has been my experience in sewage disposal.

3673 In 1892 when I came to the Sanitary District the Chicago River was a stagnant stream. Standing on the banks of the main river or the branches, you could not notice any current going either way, except as the lake

fluctuated. If the lake dropped six inches or a foot there would be a current you could see moving toward the lake. If it happened to rise a foot the water from the lake would run into the storage area of the Chicago River. The river was in a filthy condition. It was a large septic tank. I saw it first in July, 1892, before any work had been done on the construction of the drainage canal, or upon the Chicago River by the Sanitary District. The river was full of sewage mud that was festering in the bottom and generating gases, and these gas
3674 bubbles finally became so large as to give a buoyancy to the mud, and large masses of sewage mud would bubble up to the surface of the stream and break in rivulets that ran to exceed sometimes almost the entire width of the river. At other places the river was covered with a sewage crust, such as is found in a septic tank which at places would extend across the river. I have seen chickens walk upon this crust.

It would also in certain spots catch on fire, due to these gases and to tar products that came from industries. There was a continuous ebullition coming from the gas flame. The only real current you ever saw in the river, outside of the one I mentioned due to fluctuation of the lake level, was when a heavy rain would come and the sewers would commence to discharge into the Chicago River, as many of them did, driving that filth out into the lake as far as the cribs from which Chicago was obtaining its water supply. One of them is south of the Chicago River, about four miles from the shore, known as the Four-Mile Crib. The North Branch was full of
3677 polluted water, anaerobic.

3678 There was connected with the south fork of the South Branch of the Chicago River, near Ashland Avenue, the old Illinois-Michigan Canal, at which there was a pumping station which pumped water from the South Branch into the old Illinois-Michigan Canal to the extent of 7 or 8 hundred cubic feet of water per second. That was such a comparatively small amount that it did not give any current in the river that was perceptible to the eye, and only took away a fraction. It did not clear the river up, although it did help to the extent that it kept the amount of sewage that was pumped into the ditch from being washed into the lake in times of flood.

As you went up the west fork of the South Branch you came to the end of it beyond where Howard Avenue and Kedzie avenue ran into what was known as the Ogden ditch. That ditch continued up the DesPlaines River where there had been a small dam put over the east bank of the Des Plaines River, known as the Ogden Dam, which prevented in a small way the flood waters of the DesPlaines from flowing into the west fork of the Chicago River and washing the filth into the lake.

3679 That, generally, was the condition of the Chicago River.

In regard to the sewers, the sewers, as stated by Mr. Ramey, the previous witness, had been built under the direction of a man named Chesbrough in 1850, and these sewers had been added to from time to time. As he stated, they were of the combined type, which carried domestic sewage, industrial waste and storm water coming from the run-off of rainfall on the roofs and streets of the city. In the beginning they had generally been built so as to discharge into the river, either the main branch or the branches of the main branch. As the city grew they got to discharging them into the most convenient places, and many of these large sewers discharged directly into Lake Michigan.

The Illinois-Michigan Canal simply served to relieve the load of certain matter in the Chicago River that would be washed out into the Lake, to the extent of seven
3680 or eight hundred cubic feet per second, which was

pumped into the old Illinois-Michigan Canal, which flowed generally in a southwesterly direction to Lockport and Joliet, where it was mixed with the waters of the Des Plaines River, when there were any, and from there on down it flowed through the Des Plaines and the Old Illinois-Michigan Canal into the Illinois River below the confluence with the Kankakee, or it went through the Illinois-Michigan Canal into the Illinois River at La Salle.

3681 In 1890 the population of the City of Chicago was about a million. When the canal was opened in 1900, it had 1,500,000 people, and by 1910 that had increased, speaking from memory, over 500,000, and by 1920 it had reached nearly 3,000,000 people. At the present time, as nearly as we can estimate it, it is increasing at the rate of from seven hundred to seven hundred and fifty thousand every ten years. It is a real problem with the engineers to keep track of the population and its increase, as it becomes a real problem in taking care of the sewage as the city grows, particularly when one appreciates that this seven hundred to seven hundred and fifty thousand is a population that is fifty per cent, in round numbers, in excess of the present population of the City of Milwaukee. In 1890, as I understand, the population of Chicago was approximately the population that Cleveland is said to have now.

3682 I know the condition of the water supply in 1892 and in 1900 when the Sanitary District Channel was opened. In the late eighties and the early nineties there was not very much known in this country about water purification or of the germ theory of disease. The only things that were known were the results that came from polluted water as shown by the typhoid fever death rate and the death rate from other intestinal diseases. The press was full of warnings to the public to boil their water. The typhoid death rate rose as high in the nineties, I think it was, or the late eighties, as 174 per hundred thousand. There is a theory with us engineers that for every death from typhoid there are three other deaths from allied diseases, if I may use that term, or diseases that are waterborne. The average rate was high.

Through a series of years there would be epidemics which showed that the water was unfit to drink. Of course, with a city like Chicago, made up of a large population of foreign people who had immigrated to this country, and many of whom could not read or write, particularly the English language, this warning that was printed in the paper did not do much good, or to those who were careless or ignorant and who would not pay much attention. The result was that Chicago was a pest hole of typhoid and intestinal diseases.

As stated before, floods came into the Chicago River washing the filth into the lake. By the mere eye this could be traced beyond the cribs and probably if we had had the same knowledge then that we do now, by making bacterial counts this pollution could have been traced a great deal further than it is able to detect it by the eye.

I would like to correct one statement. My recollection was that prior to 1900, in the opening of the canal, it was in the neighborhood of 40 deaths from typhoid per 100,000 per year as an average. It may have been more and it may have been less. That, however, is stated in the report that I made to the Board of Trustees in a table showing it in October, 1911, which I would prefer that 3683 you use rather than my recollection. I have not looked that up lately.

After the opening of the canal the epidemics were materially reduced and the average was reduced. This was not entirely accomplished, however, until after 1910, when the intercepting sewers which collected and prevented the sewage of the sewers of Chicago from discharging directly into the lake were built, and that sewage diverted to the Chicago River and thence through the drainage canal.

At that time the Illinois and Michigan Canal was about 60 feet wide and had been constructed, as I recall it, 6 feet deep, but it had become so filled with sewage mud that it would accommodate a boat drawing only 4 to 4½ feet of water, and along one side the canal there was a sort of a trough through which the boats were drawn, either by mule power or propelled themselves by steam.

From Chicago to Joliet it was practically, with the ex-
3684 ception of this trough, filled with sewage mud. The Des Plaines River at Joliet was also filled above the dams that were in that stream at that time, there being three of them, creating three pools about the dams. This was septic and was very noisome both to the eye and nose. In fact, in Lockport, the gases coming from this canal were so bad that the gas attacked the paint on the houses situated in some cases from half to three-quarters of a mile away from the Illinois and Michigan Canal, turning the paint black where it had been white, and causing it to peel or blister seemingly after a few years.

I was with the Sanitary District during the entire period of construction of the main channel. I was present at the so-called "Shovel Day" in 1892 when the first shovel was turned with some ceremonies.

3686 From an engineering standpoint the construction of the main channel of the Sanitary District was particularly novel on account of its magnitude.

3687 In 1892 the Government of the United States had made some improvement upon the Chicago River and its branches. The first work that the Sanitary District did was to build what was known as a by-pass from a point just about a hundred feet north of Adams Street to a

5

point just about 75 feet south of Van Buren Street. It was a channel to provide a larger cross section for the Chicago River in that section because it was very narrow and to permit the flow to go through without creating any excessive current in that reach.

Prior to 1897 and up to 1900 the Government had deepened the main river and the North and South Branches to about 16 or 17 feet and had cut off some points along the North and South Branches where dangerous corners had been built into the river.

After 1900, and the canal had been opened and there was much complaint from the navigation interests about the current in the river, the Sanitary District developed plans for the improvement of the South Branch from 12th Street to Ashland Avenue, and then later from Lake Street at the junction of the North Branch with the South to 12th Street.

The Sanitary District replaced two center pier bridges
3689 in the main river with bascule bridges and generally in the South Branch removed nearly all of the center pier bridges and replaced with bascule bridges.

They deepened in the South Branch from 16 to 17 feet to 26 feet below what has been called the flow line here, but which really is water flowing down hill through the South Branch. There is a declivity to its surface and our 26 feet was below this plane of declivity which we have called the flow line.

It widened the river, the South Branch, from Lake Street to Ashland Avenue. So that at all points, excepting bridge openings, it was 200 feet wide, 26 feet deep in the center, sloping to 16 feet in depth to the dock line. That was done under my direction. I was on the river work. All the work the Sanitary District did on the Chicago River was the building of two bridges. The Government deepened it after 1900, as I recall it, from

16 or 17 feet to 21 feet; both the main river and the North Branch.

3690 The occasion for deepening and widening the South Branch was so there would not be a current in excess of one and one fourth miles per hour. The work of deepening the river from 16 to 26 feet and widening it was commenced in late 1900 or early 1901, as I recall it. The excavation of deepening was carried on with considerable rapidity and the widening was delayed somewhat on account of having to go to condemnation proceedings to obtain the property to widen it. As we obtained the property it was widened and it proceeded faster at first than it did in the latter part. I think it was practically all finished by 1909 or 1910. The limitation of the flow by the Secretary of War about 1901 was finally set at 4167 second feet.

3691 There had been different permits.

3692 The diversion from Lake Michigan was increased from time to time as the cross-section of the South Branch and west fork of the South Branch of the Chicago River was enlarged, always with the end in view of not exceeding 1¼ miles per hour velocity of the current.

3693 There was no controversy or objection made by the Engineer Corps to the increase over the 4167 second feet as the cross sections of these rivers were increased until after 1910. I came in contact in a business way with the division engineers of Chicago, and I know from them that they knew the flow was greater than 4167 cubic feet per second, prior to 1910.

3694 The maximum run-off of the Chicago drainage area was, prior to the time I came to the Sanitary District in
3695 1892, approximately 10,000 cubic feet per second, at maximum flood. That has increased since that time. We believe now, from our engineering data, that it will approximate 12,000 cubic feet per second.

I am familiar with the history of the art of sewage disposal in the last 35 years. The plan that was adopted
3697 by the Sanitary District, pursuant to the Act of 1889, was not only the proper plan at that time, in the light of the knowledge the engineers had of the treatment of sewage, but it is the proper plan at the present time.

From a sanitary engineering standpoint, the peculiarities with reference to the disposal of the sewage of the
3698 City of Chicago as compared with other cities are that on account of a geographical location, it is so situated that it can divert the sewage entirely from the city's water front and keep it out of its source of supply. The amount of diversion of approximately 10,000 second feet has this significance in connection with that problem, in addition to its value as a diluting and purifying agent, that the run-off of the Chicago River was thought at the time the canal was designed to be, and was, practically 10,000 cubic feet per second. By having that flow, it is possible to keep the Chicago River from reversing into the lake in time of excessive run-offs from rainstorm. If the flow is materially less than that amount, the Chicago River would certainly at times go into the lake. I have reached that conclusion through an experience with
3699 the operation for the last twenty-six years, and particularly due to the fact that, in the beginning, the canal was only flowing between, say, 4,000 and 6,000 cubic feet, and sometimes less than that; that the reversal of the main river so that the sewage-laden water went into Lake Michigan, was more frequent with the same general character of rains than it has been in later years, when the flow has been greater. And further, from experiments that I had made in 1914, I believe, by which the canal in both cases—the two experiments were some two or three weeks apart—was gotten into a state of equilibrium of flowing 4,000 cubic feet per second,

throughout its entire length, and then suddenly increased to 10,000 cubic feet per second; and it was found that the full effect of that increase was not felt in the Chicago River, near the heart of the city, in the 23 hours that we ran the experiment. We were never able to get the flow in that 23 hours up to the 10,000 cubic feet per second, in the vicinity of the forks where the North Branch and South Branch came together. The significance of this is that the peak of storms on the Chicago River basin will appear in the river in four to five hours, whereas we could not increase the flow from 4,000 sec-
3700 ond feet to 10,000 second feet in less than 23 hours, by manipulating the works at the lower end of the canal.

3701 You could not draw off the storage of water at the southern end of the canal in time to take care of the increase that would be delivered at or near the lake. It is certainly dangerous to the water supply when the rainstorms occur, because of the flat grade of the sewers of Chicago. Where the street level, even 7 or 8 miles back from the lake, is only fourteen feet above the lake level, necessarily, the grade of the sewers was not steep, and during dry weather filth accumulated in the bottom of the sewer, and when a rain came along it forced that out and into the river, and the storm water from the rains became very heavily polluted with sewage material.

In connection with that question of disposal of sewage by artificial means, we carried on experiments to determine the proper method to be used over a period which covered practically from 1908 down to date. We are still carrying on experiments to get the best method of handling it.

3702 We built purely experimental stations that I have mentioned before, and in addition to that, we have built several small practical stations. I always regarded the station known as the Des Plaines Sewage Disposal Station as a large experiment, and it was.

The ordinance of the Sanitary District Board of August 7, 1919, laid out a program for the building of artificial purification works to experiment with this dilution system. I had contact with the Engineer Corps of the Army with reference to working out that program. I had two or three or four interviews with General Black,
3703 then Chief of Engineers, I think in 1918, at which time I had authority from the Board with our attorney to see if there was some way of settling this controversy. There had been a report made by General Bixby and four other gentlemen, in which it was stated that compensating works could be built on the Niagara and St. Clair Rivers for $475,000, I believe, which would fully compensate for any lowering that the Chicago Drainage Canal had caused to the Great Lakes.

As I recall it, we told General Black the Sanitary District was willing to pay this money. He asked "How about Canada? This will be an international affair." Whereupon, our attorney, Mr. Adcock, and myself went to Montreal, as he referred particularly to Montreal, and had an interview with Mr. Cowley, who was engineer for the Harbor Commission.

3704 In the negotiations I had with the engineers at Chicago, General Black then said in substance to take the matter of sewage disposal up with Colonel Judson, the engineer then in charge at Chicago, and see if some scheme or plan of program could not be arrived at that would satisfy him that Chicago was doing everything within its power to meet the situation, as it had developed at that time. There was considerable opposition to that continued flow of water through the channel, and it was feared that the Chicago Sanitary District was going to take more than 10,000 feet, or wanted to. I had many interviews with Colonel Judson, and we finally arrived at an agreement as to what Chicago could reasonably do in taking care of the increasing population and reducing the burden of sewage or sewage material upon the drainage canal. Briefly, the ordinance which was afterwards passed, which was that Colonel Judson told me he thought was all that could reasonably be expected from the Sanitary District.

3706 Colonel Judson said that if the Sanitary District would reduce the load then coming into the main channel by 50 per cent, and provide works to do that and to take care of the increasing population of Chicago, so that this result would be accomplished in twenty-five years or by 1945, that was all that could be reasonably expected of the Sanitary District, under the conditions as they then existed. Work was to be laid out and performed progressively during that period to accomplish that final result. After that the ordinance of the Sanitary District of August 7, 1919, was passed.

In respect to what progress may be made or the difculties that are encountered in the execution of construction work and laying out plans in the Sanitary District or other municipal bodies, one of the principal objections to making speed and headway has been the uncertainty as to how much water we would be permitted to divert from Lake Michigan, as one kind or class of treatment work would be required in one case that would not be required if we were permitted to continue as we are. The principal delay, however, to performing a work swiftly in a public body is the change in administration of elective officers.

3709 I am referring to the Sanitary District or any public organization that has to work under elective officers, or any organization that has to work under elective officers.

3713 It is almost unthinkable to imagine that the diversion from Lake Michigan be cut off and entirely eliminated tomorrow or next day, but it would bring on worse con-

ditions than existed in 1892 and in 1900, for the reason that there would be more pollution that would go into the lake now than at that time, because the population has increased greatly and also the manufacturing and industrial waste has increased, and I know of no way in which scientific sewage disposal or water purification could take care of this situation practically over night. The disposal of the sewage of the Sanitary District is absolutely intimately connected with the water supply of the people of Chicago and environs. I do not recall offhand that that situation exists in any of the large cities of the United States, except those located upon the lakes. There is not available to Chicago other water supply than that of Lake Michigan sufficient to meet its needs. Prior to 1900 and generally prior to 1910, but not so much so, there was practically no bathing in Lake
3715 Michigan. The water was sewage-contaminated, and until after 1910 or about 1910 the people of Chicago commenced to use the lake front for health and pleasure giving pursuits in the summer time, so that at the present time there are hundreds of thousands who bathe in and use the lake on a hot summer day during June, July, August and September.

If the diversion at Lockport were limited to 1,000 second feet, the effect would be practically as bad as though we had no diversion. The condition that would result in the Chicago River drainage canal and the Des Plaines and Illinois Rivers would be practically the same as I described the Chicago River was in the nineties, except there would be more sewage going down due to the larger population.

The Illinois and Des Plaines Rivers have never been used as a source of water supply for the people. The towns all the way along the Illinois River discharge their sewage into it. The limitation of the diversion to nothing or to 1,000 second feet at Lockport would in a short time make the condition of the water along the waterfront so the people should not use it for bathing purposes. It would be unsafe, let alone unsightly. In my opinion, no works could be constructed which would protect the health of the citizens of Chicago and surrounding towns inside the Sanitary District to the same extent as the present diversion allowed by the permit, assuming that the flow were cut to zero or 1,000 second feet and ample time allowed to build such works. We have a better water supply than we would be able to build under the present status of the science of water purification and sewage disposal.

3728 The waste coming from a manufacturing industry like Packingtown is very excessive. For instance, as I have stated, the wastes coming from Packingtown are equivalent to the domestic or organic matter coming from a population of 1,100,000 people, in round numbers. That greatly increases the problem of taking care of the sewage of a city like Chicago.

I have estimated the population of the Sanitary District in 1945 will be about 4,800,000 as near as we can estimate by plotting curves showing its growth and making a study of those, and also the curves of population increases in other cities. There would also be the Packingtown waste and tannery wastes to take care of. That does not include the human equivalent of trade wastes from the packing and other industries.

Referring to the extent to which it is practicable to treat sewage in the percentage of purification, of course, plants vary. Some plants will be operated more efficiently than others and some processes will be more efficient than others, but generally I would say, to give you an idea, that if you take all of the sewage, and have it all treated in a municipality the size of the Sanitary District and if your general average of purification reaches 85 per cent, then Chicago would have what we engineers would call a very efficient working sewage disposal machine.

3729 Possibly I might illustrate it better by an example. If you take a city of 100,000 people and the sewage is treated as completely as it is possible and practicable to do it within financial reason, the effluent coming from that plant in taking care of these 100,000 people would contain organic matter to the same extent as raw sewage coming from 15,000 people untreated. There would not be the unsightliness about this effluent that there is about raw sewage, but as far as the organic matter in sewage is concerned the effluent from 85 per cent on 100,000 population would be equivalent to the organic matter in raw sewage from 15,000 people.

3730 It had been discovered, after the main drainage canal was completed, that the engineers in computing its size and designing it had been so conservative that instead of the main channel through the rock being built to carry only 10,000 cubic feet per second it would and could carry 14,000 cubic feet of water per second.

3740 *Cross-Examination by Mr. Jackson.*

It is certain, if you keep the sewage pollution away from your water supply, it is much safer than if you let the sewage pollution get to your water supply and attempt to treat it, on the theory that an ounce of prevention is worth a pound of cure.

3741 To a large extent, particularly in the beginning, I attribute the improvement in typhoid death rates in the City of Chicago to the opening of the Chicago Drainage Canal.

The witness was asked if he agreed with the following statement from page 34 of Exhibit for identification No. 3, the Warren Report:

"The opening of the Drainage Canal seems not to have reduced any of the death rates materially. For the three years before the Canal was opened, the general rate was 15.0 and for the three years following 14.5 per 1,000. For the 13 years which have now passed since the Canal was opened, the average general death rate has been 14.8. In 1913 it was 15.1.

3744 "The average reduction in typhoid for the three years following the opening of the Canal was trifling, 32.4 to 31.1, and appears especially inconsequential when it is noted that this average of 32.4 contains the rate of 40.8 for the exceptional typhoid year of 1898. Since the Drainage Channel was opened, the average typhoid rate has been 19.2. In 1913, it was 10.4. The figures since 1893 have shown a persistent decline, but no sudden and permanent fall. There have been years when the rate has been a great deal higher than these average figures indicate, as for example, in 1902, when the rate was 44.5, and in 1903, when it was 31.8, and there have been nine years when it was less than the average. It is necessary to go back beyond the opening of the Canal, and beyond the epidemic year of the Spanish-American war (1898), in order to equal the rate which obtained in the 3rd year of the Canal's operation.

"Looking through the printed list of specific causes of death, it does not appear that any rate was affected by the opening of the Canal so much as the rate for that indefinite group called diarrhoeal diseases, which includes diarrhoeal and arteritis among infants. The average death rate for diarrhoeal diseases for the three years preceding the opening of the Canal was 257.4 and for the three years subsequently 209.5, a reduction of about 19 per cent. The decrease in the death rate among children under 5 years of age for the same period was 17 per cent. There is no reason to suppose that the deaths in this class bear a measurable relation to the sanitary condition of the city, since the statistics are made up largely of children whose diarrhoeal diseases are chiefly caused by local circumstances. It seems as unsuitable to ascribe the reduction which has occurred since 1900 in diarrhoeal diseases to the Drainage Channel as it is to charge up against it the remarkable increases which have occurred in the prevalence of Bright's disease, heart disease and violence.

"Typhoid fever has become less prevalent since the Drainage Channel was opened than it was before, but before the decline is ascribed to that great work, it may be desirable to consider some facts outside of the Chicago death rates which have a bearing on this matter.

"Typhoid is disappearing everywhere, except in those places where its spread is encouraged by gross sanitary neglect. In those parts of the United States where the vital statistics are collected with sufficient accuracy to be used by the Government Census Bureau, there has been an average decline in the typhoid rate of one-half since the opening of the Chicago Drainage Channel in 1900, that is, from 35.9 to 17.9 per 100,000 population. Were it not for the excessively high rates in some states, the average would be much lower. The average rate for the cities in New York State in 1913 was 9.9 and in Massachusetts 8.6.

"In 1913 the typhoid death rate of New York City was 7.0 per 100,000; that of Boston, 8.2; Cincinnati, 6.8; Worcester, 5.6 and Seattle 4.7. These are particularly low rates, but they are not lower than are proper for Chicago.

"Chicago has had a number of explosive outbreaks of typhoid since the opening of the Drainage Channel, notably in 1901-1902 and 1903, and the circumstances which have attended them have led observers to form the opinion that they have been water-borne, in spite of a general opinion to the contrary.

"From a study of the seasonal incidence of typhoid in Chicago and in other cities with about the same rate, McLaughlin formed the opinion that the water supply was largely to blame."

3748 No, sir, for the reason that in the years 1901, 1902 and 1903 and later on the sewage had not been diverted from Lake Michigan on the North or South Side by the construction and completion of the intercepting sewers. As I recall it, that was not entirely completed until after 1910. And also due to the fact that the reversal of the Chicago River was frequent in those days when a small flow was being discharged through the main channel.

I know that the death rates were high in the beginning of the canal but in the later years they have gone away low. It is true that some of that is due, and probably large quantities, to milk inspection and better milk supply; but a fairer comparison would be to take the death rate as a whole of Chicago from typhoid and compare it with the death rate of cities in Northern Indiana where there are the same climatic conditions, the same character of population and the same food supply and where the death rate is higher than in Chicago and which is somewhat unfair to Chicago, too, because often a case of typhoid comes on a person in one of those Indiana towns and that person is brought to a Chicago hospital and is known to die there where the death would be charged against Chicago while the disease had been contracted in an Indiana town.

3749 Chicago attracts a large number of people. It is very attractive. It is a big railroad center and people come there and stay and others simply pass through. I sup-

pose there are a large number of all classes of people who come to Chicago to make their homes. I never classified them as to their age. I think there are more people coming to big cities that are of young age than
3750 of old. That should be reflected in the death rate, and that applies to pretty nearly every city. I think the decrease in the typhoid rate in Chicago was more marked as to 1903, and not having any pronounced epidemic where the curve went away up like it used to do when it would get up to 174 per 100,000 instead of staying around 30. I cannot recall when it got up to 174, but it was back before the opening of the Drainage Canal.

I do not know that Chicago was lagging behind other places. They had taken sanitary measures to the extent of extending their water cribs farther out into the lake to get away from the contaminated shore waters. In those days we did not know very much, before 1900, about water purification. It was just beginning to come into use and there had been very little real sewage purification before that in this country. There had been some cases where septic tanks had been built which only took out the solids and did not do that very well. The epi-
3751 demic I spoke of was about 1891. There was a great agitation all that time about boiling water. I presume that had been so before I came there in 1892. I do know that after this epidemic various health measures, such as boiling water, etc., were enforced. I suppose it had a beneficial effect on the death rates.

3752 On my recommendation in 1911 Chicago started to chlorinate its water. I even recommended to the Sanitary District that it do it if the city would not, and it was after that report. Undoubtedly chlorination of the water supply has helped, but it will not accomplish the whole thing if the water is polluted unless you so chlorinate as to practically ruin the taste of the water. I say

chlorination of water is very desirable to prevent waterborne diseases, and undoubtedly has a marked effect. That was instituted after 1911, as I recall it, because my report was made in October of 1911. I do not recall when
3753 the pasteurization of milk commenced in Chicago. That has undoubtedly helped in decreasing typhoid rates and similar diseases. When we first started to chlorinate water we did not know exactly just how much to use. I do not know whether they used complete chlorination when they started in 1912 or not. I knew its effect on typhoid rates in Chicago and the cause of their decline,
3754 but I do not know when complete chlorination was had nor do I remember when pasteurization of milk was started. I know that it was the combination of all of these circumstances that did bring about the final excellent health conditions, so far as typhoid fever and intestinal diseases are concerned in Chicago; and I also know their death rate is lower than that of other cities on the Great Lakes where they do the same thing, except they have not a Drainage Canal. My recollection is that in the last year the death rate is lower than that of the City of Milwaukee. As I recall it, the City of Milwaukee
3755 was 1½ or 2. I have read so many of those that I would have to refresh my recollection. The Sanitary District has been down previous to last year as low as 1.1 per 100,000, and last year, according to the health authorities, it was 0.79, less than one per hundred thousand. Speaking from memory, my recollection is that it got up to about 1.4 in Chicago in 1925. I do not recall what it was in 1923.

3758 I stated that the diversion at Chicago had resulted in an improvement of bathing facilities, but did not state that prior to 1910 it was impossible to bathe in the lake. I said that bathing was very infrequent up to that time, that the lake front was not used to any great extent for bathing. I did not mean that no one ever went in bathing in Lake Michigan. I have seen small boys jump into the Chicago River when it was nothing but septic sewage. Generally the bathing beaches developed from the demand, and this demand did not seem to exist, and the water in places along the lake front before the opening of the Drainage Canal was not fit to bathe in. There had been bathing beaches in Chicago privately operated for years, but the lake as a whole did not come into general use for that pleasure and health-giving sport until after 1910, to any great extent.

3759 I do not recall that there were extensive municipal or public bathing houses prior to 1910. Apparently there was no demand for them. It has been my observation that these facilities come when a demand exists. This diversion had no effect upon bathing, pleasure boating, etc., in the Des Plaines and Illinois Rivers. There has not been any bathing in there since I have known the streams, above Peoria. I do not know how far below Peoria.

3762 Before the Chicago Drainage Canal was opened the Des Plaines and Illinois Rivers were in a filthy condition, due to water that was coming through the old Illinois and Michigan Canal, and was not safe to bathe in. The Illinois River, due to the waters coming from the Illinois and Michigan Canal, was in bad shape before the Drainage Canal was ever opened. Below Peoria, from the distilleries, the river was in worse shape before the canal was opened than it was after, according to all my knowledge. We frankly admit the conditions in the Illinois River have not been what they should be, but it was not safe to use as a drinking supply or for bathing for many, many years before the canal was opened. That was because Chicago was already diverting a portion of its sewage down to the Illinois and Michigan Canal and,

of course, for the further reason that that is the only available place where the canal could get enough water for lockage without going to great expense. I am not trying to deny or relieve the sewage condition in Chicago.
3771 If we had adopted a policy of complete treatment of all of the sewage of the City of Chicago according to the greatest degree of purification known in the present state of the art of sewage disposal, to the end that we might reduce our sewage load to the lowest possible point, it would have been a useless expenditure. It would not have been practical to go out and spend untold millions when it would not be necessary if we were going to get the diversion.

As to whether it is good engineering to turn raw untreated sewage into a pure running stream, if the question were elaborated as to what use is made of that stream, I could better answer it. It seems to me it is going to be an economic question as to whether the stream is of more value as a drain or as a stream without that sewage in it. Of course, I feel there is a kind of half way position, that the streams in a way are the natural drains, to the extent of taking certain waste from
3772 big municipalities, and should be utilized as far as possible to do that and relieve cities of the expenditure of vast sums, when it does not interfere very materially with other peoples. If it came to a question then the number of people that are benefited would have a good deal to do with the solving of that problem. In one case where a stream was serving comparatively few people, and it became necessary from a practical standpoint to use it to serve a much larger community, it seems to me it should be used for that purpose, providing that no great nuisance was created.

On the question of whether the untreated sewage should go into a river depending on the size of the city and the number of people, I think the tendency is to purify sewage to some extent, and remove possibly what we call the settling solids or the solids that you see in the sewage, not those in solution. I think as we go along the tendency will become more strong to purify the sewage in our cities.

3773 The principal reason for a large flow in the Chicago Sanitary Canal is not in the slightest so as to carry the sewage away from the city rapidly so that the unpleasantness of that method of disposal is thrown upon the people down below. It is simply that the water is needed as a purifying agency. There is not enough at this time to purify it without offense in the Des Plaines and Illinois Rivers. It is not needed to get it away fast. If we had complete treatment of our sewage, we would still need the moving water, for the reason that it is not practical to treat sewage to more than 85 per cent. The remaining 15 per cent should have water to dilute it and oxidize the organic matter in the sewage.

It is my opinion that if the diversion at Chicago were limited to 1,000 cubic second feet it would render the lake unsafe for bathing purposes. It is my opinion that if the diversion were entirely cut off, or limited to 1,000 cubic second feet, it would create a condition in the Chi-
3774 cago River and in the vicinity of Chicago worse than existed prior to the opening of the Chicago Drainage Canal, but I was referring in that testimony to around about 1892 or 1893. I think the question assumed that raw and untreated sewage was going to be poured into the Chicago River. As I recall the question, it was asked both ways. Whatever the question may have been, that opinion is based upon the assumption that there would be raw untreated sewage turned into the Chicago River, and there would be under any conditions; but my opinion that it would be worse than it was prior to 1900 was

based upon untreated sewage coming into the river as it would come today, if that flow were reduced to nothing today.

3775 I think chlorination of the water supply would not protect it, with that awful load of sewage upon it. It is the opinion of the best authorities that it would be too severe a test for chlorination. I doubt if 1,000 cubic second feet would reverse the Chicago River so you could see it. The only motion that you could see, I think, would be that due to the rise and fall of the lake level. You might at certain times see it. The dry weather run-off of the Chicago River is about twelve or thirteen hundred cubic feet per second in extremely dry weather. We take the pumping supply as the dry weather run-off. Usually there is some seepage into the sewers that increases it.

3776 There have been reversals of the Chicago River in recent years. I do not know that there were eight in 1924. Some two years ago there were very heavy storms in Chicago, and there were reversals at that time to some extent. I think there was some trouble with the Chicago water supply in 1923 or 1924. The principal trouble has been complaints that were received due to the taste and odor produced from over-chlorination, if I may use that expression, not meaning over-chlorination as to the amount used for the killing of the bacteria, but to the effect that it has in producing a disagreeable taste and odor. This is particularly true with people that do not smoke. They are more sensitive to the taste and odor of chlorine. I would say that generally it has been perfectly safe.

3777 Chicago has not built any water purification works. Of course, many people buy water and the papers publish notices now to boil the water in times like that. In my opinion of the present state of sanitary plants, I think it would be better that filtering and purification of all lake water used for drinking purposes be had. It would make the water safer. That is true of any lake city or any city taking its water from the lakes. I would not go so far as to say it ought to be done regardless of whether we have diversion through the Chicago Canal or not. It would depend upon your definition of what ought to be done. If you compare it with where it is done, the results show that our water is equally as good as that at Detroit, where they have water purification and chlorination and take their water from above the sewage intakes, as I understand; and yet a very large epidemic of diarrhoeal disease occurred at Detroit a few years ago, in spite of the fact that they had water filtration and chlorination following it.

3778 With that method of water purification, they would have to use it, but not to such a great extent. I think it would improve it. We would not have quite as much chlorination, but we would still, in order to be safe, use some; but where the water filters do not exist there often is put in so much chlorine that it results in a disagreeable odor and a disagreeable taste. I know that is so at my home in Chicago, on the South Side, which gets most of its supply from the 68th street crib. Probably the water is worse there than at any other crib in Chicago. There are two cribs located there together. At the present time the water in Chicago is badly discolored from wave action, the stirring up of the clay soil from the bottom. Filtration plants would make the water better to
3779 look at. It would be more sparkling. I think it would also be more pure. There would be probably less contamination if the sewage were diverted from the lake and the water filtered also.

I have read the records of what they do in water purification at places. There is no doubt that the operation of a filtration plant reduces the B. coli, I would say appreciably, particularly followed by chlorination. Assuming a 150,000 B. coli load per 100 c.c., filtration might usually reduce it to 2. There is no doubt but what that is an improvement.

3780 My experience has been mostly with sewage purification. I have never been connected with any water purification plant in a professional way. They ought to go hand in hand. You ought to keep your sewage away from your water supply, and if the water supply needs a further purification and you can not get it that way it should be filtered. There are some cities that have no expenditures for water purification, and that spend considerable amounts on water supply. New York City is a notable example. Of course, they would not take their supply from the Hudson River, because it is a tidal stream and the water is salty or brakish. The cities have met difficulties that happen to exist by reason of their geographical locations, and some have more expenses for sewage disposal and some more expenses for water
3781 supply. That is the same thing that Chicago did.

3790 As to whether the activated sludge in some cases coupled with Imhoff tank treatment, is the highest type of sewage treatment now in use, I would like to qualify that to the extent that in some very small places they get very effective treatment by other methods where the population is not large. I think taken in connection with tanks of some kind an activated sludge followed by proper treatment is probably as efficient a method as we have, although trickling filters are very good, but not as good as activated sludge; and it depends considerably upon the length of time that you activate your sewage.

3791 If all the sewage of Chicago were completely treated by that process, we would probably get an effluent of around twelve or thirteen hundred cubic feet per second, provided the water supply continues to be as it is at present.

As to whether the limitation of 1,000 second feet of this diversion with complete treatement of that character producing that effluent would be injurious to the health of the City of Chicago, considerable quantities of this effluent would find its way to the lake and also it is not practicable to treat all of the storm flow that comes to a sewage system of the size of Chicago. As I stated before, there is an accumulation of filth in the sewers which is scoured out by the first flush of the storm and the storm bow is probably ten or twelve times as much as the dry weather flow, and it is not practicable to build sewage disposal works and intercepting sewers to absolutely treat all of the storm flow. The result is that large quantities of this storm flow, the larger quantity, about 90 per cent of it at maximum floods, goes into the river and that filth is scoured out into the lake, with only 1,000 feet diversion.

3792 If we had separate sewer systems that objection would be obviated to a large extent, but it would cost about three hundred to four hundred million dollars to change that system in Chicago. That figure was based on our experience of cost of other works of the Sanitary District and other places around the Sanitary District.

I think if we had a flow of practically what we are permitted to take now, 9,700 cubic feet, with the sewage that the increase from that to 12,000 second feet would not be so serious. It would increase the flow quicker with our present plant and the chance of its going into the lake would be materially reduced, although I think at times it would get away and some go in.

3793 I do not remember stating that it would take 13,000 to 15,000 second feet to reverse the Little Calumet River. There was a measurement made once, years ago, that showed a flood discharge of the Little Calumet of 13,000, but since that time, as appeared in the evidence, I believe, there had been a channel cut from the Little Calumet River between Gary and Michigan City, I believe, which diverts flood waters of the Little Calumet above that point and somewhat below it into the lake at that point, some miles east of the present outlet of the Calumet River. The drainage basin of the Calumet is much larger than the Chicago, but I do not know what the drainage basin of the Calumet is up to where this Burns ditch has its effect on the Calumet. I do not know whether the measurement I spoke of was at extreme high water of the Calumet or not.

3794 Of course, you could conceive that all the water that Chicago drank was distilled, but the expense would simply be out of the question. You could conceive that the sewage might all evaporate, carrying it to an absurd conclusion, but in a practicable working of the art as it is done in cities, and as Milwaukee is aiming to do, about 85 per cent is an average condition of purification. It would be practicable to treat all of the sewage of Chicago by activated sludge process coupled with an Imhoff tank, if you do not consider the financial end of it. As an engineering possibility all of the sewage of Chicago, if we throw away some of our works, could be treated by activated sludge method, I think. There would be some in the storm flow, as I have tried to explain, that we would not be able to take care of.

3795 If we had a separate sewer system we probably would get most all of the sewage to the sewage plant with the exception of street wash. It is not always the best in the world to go into a drinking supply, but, generally speaking, it would probably take care of it all, to 85 per cent. When I speak of 85 per cent treatment, that considers, I presume, 65 to 75 per cent of suspended solids to be removed by the treatment, or maybe more. I would doubt that 95 per cent is removed. It may be a little larger than I have said. I have not looked lately at what results we are getting, but in the preliminary settling we used to figure that we got about two-thirds of the suspended solids out in a reasonable length of time.

3796 I think following that with the settling coming from activated sludge you would get up around 90 per cent removed. 98 per cent bacterial removal has been secured. You could also chlorinate that effluent afterwards. I think that would not render it perfectly innocuous in a great big system where it would be dumped into the Chicago River, and I believe it would be impracticable to chlorinate, and there is organic matter there. I am not saying it is not a good treatment, but I am still saying I think about 85 per cent is the best we can do in a practical way.

3797 As to why this problem is peculiar to Chicago, with the exception of Great Lakes cities, I said on account of its geographical location and the topography of the country, Chicago is able within practical limits to send diverted sewage from its water supply into the Des Plaines River. Such a situation does not exist anywhere else in any large city that I know of on the Great Lakes, unless possibly I might say Buffalo which, in a way, takes its sewage and dumps it into the Niagara River below itself and pollutes the water supply of Niagara Falls. I think the other large cities on the Great Lakes will have to meet that problem in a way that Chicago refuses to do, if they have not done it yet. Milwaukee has not. They have a large sewage disposal plant there which they have been operating for a year and a half. I examined it just before they were going to operate. They are by-passing half their sewage now, and the plant is supposed to be large enough to take it all, but they have not been able to do it successfully yet. My statement that Chicago is peculiar with reference to that problem dealt with the fortunate loca-

tion that Chicago has, in order to be able to take care of its sewage so efficiently by the method it now em-
3799 ploys. Leaving out the benefits of that situation, there are other cities in all parts of the country so situated that they have a similar hard problem of polluted water supply. Cleveland and Milwaukee have. Right offhand I do not think of any leaving out the Great Lakes cities. I presume there are. Detroit has no serious problem. That is a river city.

Assuming a city located below another city, the upper city not having a 100 per cent purification disposal plant and discharging its sewage into the water and the lower city taking its water supply from that river, of course, the upper city has the benefit of the dilution system, and the time element enters into that, purfying the sewage and killing the bacteria.

3800 If the streams where the cities are located are so close it is almost immediate, the time element does not affect the purification as much as though the distance were greater. I do not know how many cities there are in the United States situated in such a position, small villages and hamlets. Of course, there is Niagara Falls which is below Buffalo. I presume those cities so situated do or should meet the problem by filtration plant or chlorination of their water supply. I am not familiar with what all of them do.

The Witness was asked his opinion of the following statement made by Mr. Soper in the report of the so-called International Commission:

"We have been unable to find anything in the situation at Chicago as regards drainage or the sociological condition of its inhabitants which warrants the adoption of lower sanitary standards than are suitable for the most enlightened communities. To attain to these standards, the city needs works of main drainage and sewage disposal such as other great centers of population have found it necessary to construct."

Well, some other cities have constructed sewage disposal works, and others, like New York City, have not to any great extent. Cleveland has not to any great extent. I disagree with them when they say we have not good sanitary conditions and standards in Chicago. It is true, as I stated, that conditions in the Illinois River are not what they should be but we are trying to get them into shape as fast as we can, from a physical and financial standpoint.

3804 I would say the expense of putting in filtration plants in the City of Chicago would be somewhere between fifty and sixty million dollars, although there have been lower estimates. There are about three and one-half million people in the Sanitary District. You can figure out what that would be per head of population. Twenty dollars, or something like that. I recommended that in my report of 1911. I think it is desirable from an aesthetic standpoint, and as a safe treatment. I did not recommend that it be done entirely because of the reversal of the flow of the Chicago River at that time.

3805 I also took into consideration the pollution of Lake Michigan from passing ships. However, that is being somewhat controlled now by the cooperation of the vessel owners. It is remarkable how well they are cooperating in that matter. There is also some pollution from a certain amount of shore drainage, off the streets, that cannot be controlled. I do not believe that amounts to very much. There is some pollution coming in from the Indiana towns and from the Calumet River. The water at the 68th street and Dunne Cribs is usually in a worse condition than the others.

3806 ***Redirect Examination by Mr. Adcock.***

When I spoke of "by-passing" sewage in Milwaukee, I meant they are having trouble in operating their works, and with the sludge-handling devices and drying devices, and so they have up to recent times—I have not heard of its being changed—by-passed practically fifty per cent of their sewage, letting it discharge into the lake without treatment. I refer to the dry weather flow. I do not recall at this time the percentage of the sewage the Milwaukee plant will take care of, or the percentage of purification. I have not seen an analysis of what they have done.

3807 The size of Chicago, located on Lake Michigan, has something to do with the solution of the problem of disposal of sewage or protecting the water supply. As the city becomes larger, the problem becomes greater and usually more expensive. Particularly is that so with a city growing rapidly, as is Chicago, increasing at the rate of about 750,000 every ten years. The problem of a lake city disposing of its sewage is one intimately connected with the protection of the water supply. All of these lake cities like Chicago, Milwaukee, Cleveland, get their water from the lakes, and that is their only water supply.

In referring to a flood or heavy rain in Chicago when there was a reversal in the flow of the Chicago River,
3808 in 1923 or 1924, there had been severe rains in Chicago at that time, very unusual for that season of the year. That was estimated at about 11,000 second feet. I doubt if that would happen more often than once a year, if that often. I do not recall how long the river was reversed at that time. If the diversion had been reduced to as low as 500 second feet, and a heavy rain at that time came along, such as the one referred to of 11,000

feet, the reversal would be greater in volume and time than it would be with that dilution.

3809 A separate sewer system, so that we would have a sewer only for the sewage, and a sewer for the storm run-off or other drainage, would mean the reconstruction of all the sewers in Chicago, or the adding of another system, the tearing up of all the streets, the making of new connections between every building and its domestic sewer, the shutting off of all connections between the buildings, and the present storm system—or the combined system; and it would be impossible to estimate the damage it would cause, with the intangible loss to the City of Chicago by having to do this. Outside of the cost, while it would be a guess, I think it would take twenty or thirty years to do this.

3810 The matter of the flood times has an important bearing on the question of what the percentage of purification would be, because it is impracticable to purify all of the storm water that is mixed with the domestic sewage in the combined sewers. In order to free all of that storm flow, in the first place, you would have to build your intercepting sewers to about eight or ten times of their capacity under the present condition—maybe that is a trifle large; I might say seven times—and the disposal works would have to be built correspondingly large, to take this large volume that would come there in times of storm. That would run the cost up to a prohibitive figure. I do not know of any city of any size in the world that has installed any such system as that. I know of some small towns and villages that have a separate system, but I do not know of any large city that compares in any way with Chicago, where they are treating the storm water.

3815 The 68th street crib and the Dunne crib are practically alongside of each other. I do not think they are over 100 feet apart and they are the cribs that are nearest to the mouth of the Calumet River, and to the Indiana towns, and the water supply there is more apt to be contaminated than at the other cribs; and for that reason there is usually more chlorine put in the water than at other cribs further to the north. There is some pollution that comes from the Indiana towns. Practically the only pollution I know of in the water supply is beyond the Indiana line.

3816 If we had the sewage going into the lake, if we had this purification of sewage referred to, to the amount that I say is practicable, and had a water filter, if the water supply were filtered, and we had chlorination, with the sewage going into the lake at times, the only barrier against the people getting contaminated water would be these artificial means; that is, the perfect operation of the chlorination system and the water filtered at all times.

In referring to the situation at Detroit, it seems to me that was within the last year. There were several hundred thousand cases of diarrhoreal diseases there.
3817 Detroit has a filter. It filters its water supply, and also chlorinates it. The pollution or contamination of that supply was traced to some sewage pollution above, or blown up by the wind on the surface of the water against the current, from the pollution in the water in Lake Erie, and it was claimed some backing up of Lake Erie there at the time, so that the Detroit River did not flow as rapidly as it had before.

In speaking of this diversion as serving the purpose in the Illinois River of diluting or oxidizing the sewage, that was not the only purpose. I referred to the necessity at all times of keeping the sewage or contamination out of the lake.

3819 When I said the Sanitary District had not done anything in the way of taking solids out of the sewage, except to look after garbage and dead animals, etc., I referred to the time prior to 1914. I thought I made it clear that I did not want to be understood as covering any date later when they put in some purification works.

Cleveland and other cities around the lake have been
letting their sewage go into the lake practically un-
treated, except Milwaukee, and that has been only within
the last year that they have done any treatment there. I
think back ten or twelve years they commenced to work
3820 on that, and they have been ten or twelve years de-
veloping plans and putting in the works. The sewage of
these towns flows into the rivers and from there into the
lakes, or goes directly into the lakes.

Along the Des Plaines and Illinois Rivers there are
a number of towns of considerable size, Joliet, Mar-
seilles, Ottawa, that discharge their sewage into the river.
Joliet has a population of sixteen or seventeen thousand.
3821 They have always done that since they have had a sew-
age system. And Peoria with a population of ninety or
one hundred thousand.

Re-cross Examination by Mr. Jackson.

In referring to an outbreak or epidemic in Detroit,
my knowledge is just as a matter of engineering knowl-
edge and opinion resting in things of that kind with
people whom I have talked to and who have read to
me. I have not seen it, of course. All I have heard is
what I have had read to me from technical papers and
from talking to sanitary and health officers. As I re-
3823 call it, there were somewhere around 200,000 cases.

In response to Mr. Adcock I said the Sanitary District had not taken any fecal matter out of the sewage prior to 1914.

3824 Since 1914 there is a pretty good size plant built at Des Plaines and Calumet. The Sanitary District in a way did remove solids by retaining them. They probably did not want to, but they did, due to sedimentation in the canal and river itself that did not find its way to the Illinois River. Sludge was so heavy that it showed in the canal in spots, but no works had been built prior to 1914.

3826 I said that 8,500 cubic feet per second through the Chicago Canal, plus the 1,200 for sewage, making a total flowing at Lockport of 9,700 when we can get that through, will practically keep the river flowing away from Lake Michigan all the time. In case of a severe storm we would shut the controlling works in the Sag Channel and it would take nothing from the Calumet River. That would reverse the Calumet Sag Channel and Calumet River and cause them to flow into the lake, but that is not as serious as the other. It is not quite as serious in the Indiana cities as it would be if practically all of the sewage of Chicago, which is in the Chicago River, goes into the lake. It is not a thing to be desired, but we choose the lesser of two evils, and this big flood occurs only occasionally and we have to make the best of it.

3827 We did not also take about one thousand cubic feet of our water through the North Shore pumping station and down through the North Channel. We shut that down in time of flood. We do not pump any lake water into the channel at all, except as it comes through the drinking supply in times of heavy flood.

3828 Assuming that the geographical situation of Chicago were such that the construction of a drainage canal, as is now in existence, were impossible, it is my opinion as a sanitary expert that the sewage and water supply problems of Chicago would be solved, but not as well as they are now being solved. I would not say they would be solved so that the conditions in Chicago would be perfectly healthful. That is going pretty strong, as I understand the meaning of the word "perfect." As cities generally go, I assume that would be done, that they would do as well as they could. I think it would work out in the best way possible, and while the result might be satisfactory, it would not be as satisfactory as at present.

3829 If I were called upon now to design a sewage treatment proposition for Chicago to take care of its water supply, and there were no sanitary or drainage canal in existence or any of its works, I certainly would advise, in the present state of sanitary science, the installation of such a system, because it would improve conditions over what they would be without it.

If we could build the canal and dispose of the sewage as we are doing it, I would do that in preference to putting in artificial methods, except possibly to the extent of removing objectionable solids and keeping the sewage matter away from the drinking supply. Even if it were healthful to drink the effluent from a sewage disposal system, yet it is not a very delicious thought to think you are doing so. I suppose Milwaukee is now
3830 drinking the effluent coming from a sewage disposal station to some extent, and to some extent drinking the raw sewage, when being fixed up by chlorination. My testimony is that turning that sewage into the lake, and having the intake from that same lake, at least part of that sewage effluent is going to get to the water intake during the course of a year. It may not be every day, and some may every day, depending on how far apart they are, and the direction of the wind.

3831 I do not know whether it would be entirely purified by that time. It would depend on how long it was before it got to the intake and how far apart they were. I suppose there are some places on Lake Michigan at the lower end where the intake could be set fifteen miles from the shore. It would be very expensive.

Redirect Examination by Mr. Adcock.

This diversion plan by which this water is diverted from the lake works scientifically and automatically, and does not require the hand of man or artificial works.

Dr. William A. Evans, for defendants, January, 1927.

Health Expert:

3855 *Direct Examination by Mr. Lewis.*

Live at 2319 Commonwealth Avenue, Chicago, Illinois. Am a physician and surgeon. Graduated in medicine in 1885 and am licensed to practice in the States of Mississippi and Illinois and do practice in Illinois. Have degrees of B. S. and M. S. from the Agricultural College of Mississippi, M. D. from Tulane University Medical School in Louisiana, Doctor of Public Health from the University of Michigan, Doctor of Laws from Tulane and the University of Mississippi and another M. D. from the University of Illinois.

Have been Professor of Public Health at Northwestern University Medical School since 1908, finishing my ninteenth session.

3857 Prior to that time for seventeen years was Professor of Pathology at the University of Illinois Medical School. Am a writer on the subject of health for the Chicago Tribune and the Tribune Syndicate and have been since 1911.

Am a member of the American Public Health Association and have been president thereof; of the Illinois

Health Society; the Illinois, Chicago and American Medical Associations, and various health societies such as the Chicago Tuberculosis Institute, the Illinois Social Hygiene, the Chicago Heart Society, Infant Welfare Societies, and perhaps others.

3858 Have lived in Chicago since 1891, and was Health Commissioner for the city from 1907 to 1911. Am at present on the State Board of Health of Illinois and on the Advisory Board of Health of Cook County and of Chicago. Began practicing medicine in Chicago in February, 1891, and had considerable opportunities for knowing of conditions as they were during the years preceding the opening of the canal in 1900.

3859 Since 1907 my opportunities to know conditions have been better still by reason of official connections which have been continuous or nearly so.

3860 In the nineties the water in the Chicago River was almost indescribably foul. The water was black and bubbling and sludge was floating here and there. It happened not infrequently that the river would catch on fire. The fire department was occasionally called out to extinguish a fire on the river. I once saw a fish start up the Chicago river and he was caught by hand at about the Adams Street bridge. The water flowed into Lake Michigan quite frequently whenever there was a storm and the currents carrying sewage out into the lake could be traced for considerable distances in the lake.

3861 I have seen streams of pollution extending out as far as the cribs or water intakes.

3862 The health of the city was very bad. The death rate was very high and the typhoid death rate was especially high. The maximum typhoid death rate was reached in 1891 or 1892 with a rate of 173.4 per 100,000. The death rate from diarrhoeal diseases was high, and, as I have stated, the general death rate was high. The sickness rate was correspondingly high.

The largest single factor, certainly in the high typhoid rate, was a polluted water supply. It was an important factor in the high diarrhoeal death rate, although not the most important.

The changes since the opening of the Sanitary Canal have been very marked and notable. The very high death
3863 rate of Chicago of the nineties has been succeeded by perhaps the lowest death rate of any large city in this country, so far as the general death rate is concerned. The death rate from typhoid fever has been reduced to 1 per 100,000 or thereabouts, which has been held for just ten years, showing that it is not an accident or temporary improvement.

No other city, I believe, in the civilized world has had so marked an improvement in its death rate and its typhoid death rates as the City of Chicago has experienced during the past 36 or 37 years. Starting from a position that was worse than the position of the other lake cities in the nineties, it has moved to a position which is better than that of the other lake cities at the present time.

3864 Typhoid is contracted practically exclusively by swallowing polluted articles. There may be a little typhoid contracted by inhalation, but that is altogether theoretical, and I think improbable. The articles that are commonly taken into the mouth, polluted, and are therefore responsible for typhoid fever, are water, milk, oysters, and vegetables, and of these water is infinitely the most important.

Typhoid is regarded as a yardstick by which not only health is measured but by which the works of health departments are measured. If a community has a high typhoid rate, it is accepted among health officers (and I claim to have been one) that the community has poor health conditions; that it has a health department that

is not functioning very well; that under certain circum-
3865 stances they have not much regard for the decencies
of life.

It has been discovered that when we decrease the deaths from typhoid fever we incidentally decrease the deaths from other diseases. About that time there was developed what is frequently known as the Hazen phenomena or the Mills-Reinecke phenomena, described by those three gentlemen rather separately to the effect that when you save, let us say, a thousand lives that otherwise would have died from typhoid fever, by purifying the water supply, in some other unexplainable way you save three thousand lives from other causes.

3866 It was determined, and I think is now accepted by health officers, that a part of that improvement is the result of improvement in the death rate or sickness rate from diarrhoeal diseases among adults and among babies, but particularly among babies. I believe that demonstration was first made by McLaughlin of the Public Health Service.

3867 There are three barriers for protection of the water supply: Diversion of sewage from the supply, chlorination of water, and filtration. The great majority of places employ diversion of the sewage; chlorination is very generally used; filtration somewhat less generally; and I am aware of a few places at which both chlorination and filtration are employed.

Diversion of the sewage is far and away the most efficient of the three procedures. It is infinitely better to protect the water supply from pollution than it is to endeavor, by whatever means, or however scientific they may be, to purify it after it has once been polluted.

The custom is to employ at least two of these procedures; there are places that are employing three.

3868 There are comparatively few places now that are without some one of the three. There are some places, though not very many, that employ one, but no more than one.

Chicago employs diversion and chlorination. Diversion is our chief method of defense and it is responsible for 95 per cent of the results, for which we are proud. Those results are reduction of the typhoid death rate from about 174 to 1; reduction of the general death rate from about 28 to a little more than 11; reduction of the infant mortality rate to about 70 or 80. There are men who believe that we had an infant mortality rate as high as 300 back in the nineties.

3869 The facts have been studied carefully and the opinion is not ill considered. I have never thought it was as high as that, but it was certainly as high as 200.

Typhoid is by no means a local proposition. In the first place, a considerable part of the people who have typhoid in one place contract it in other places. The incubation period of typhoid fever is at least a week, sometimes two weeks, rarely three weeks. There is an interval of about three and occasionally seven days after a man begins to feel sick before he becomes bedfast. That gives between two and three weeks between the time when the man is infected and the time when he becomes bedfast.

During that time men can, of course, travel a great distance. In three weeks a man can go from one con-
3870 tinent to another. In fact, I have seen a man sick with typhod fever in Paris who was infected in New Jersey. I have seen men who were infected with typhoid fever in California who were sick in Chicago or at other points in Illinois.

Since about 1902 we have known the typhoid carrier, who is a person not sick with typhoid but who bears typhoid germs in his body and is capable of infecting others. It is generally accepted now that of those who recover from typhoid about two per cent are chronic lifetime typhoid carriers, a large percentage of them capable of infecting people for the remainder of their lives. Different authorities give this figure differently, say from ½ of 1 per cent to 10, but the consensus of opinion is about two per cent.

3871 We are now of the opinion that that is the most important cause of typhoid fever in the United States. Pollution was the most important in the nineties but since the improvement of that situation the carrier has become more important. This is certainly true of the protected cities such as Chicago and New York. In many places they hold that the carrier is responsible for about 40 per cent of typhoid. Carriers have been known to infect several thousand people. Under former conditions, in all probability, we were making in Chicago something less than 600 typhoid carriers a year; at the present time perhaps two or three a year.

3872 Of course, Chicago is a railroad center. About 1,600 cars are watered in Chicago every day. About 250,000 suburbanites come into the city and go out every day, and something like 60,000 transients other than suburbanites. So that, according to calculations which I have made, people other than Chicago people undergo about 96,000,000 exposures in Chicago every year for a day's unit. That would mean 96,000,000 drinking water in one day, though of course the actual number who drink it is not so large as that. I do not know the number of people who travel on boats but I think it is only moderate.

3873 Boats and trains take on water at Chicago. Prior to 1910 there were a great many epidemics of typhoid fever and diarrhoeal diseases on vessels on the Great Lakes.

I have read and investigated the subject widely and I found that the typhoid rate among the crews was higher than the typhoid rate of the community from which they came. We began an agitation which resulted in the passing of rules by the Public Health Service relating to water supply and by the City Health Department of Chicago relating to the discharge of sewage.

Prior to 1910 the vessels frequently took their water
from the harbor. At the present time they only take
3874 on water that conforms to the requirements of the serv-
ice, or else they have means of purifying the water. As
a result the death rates among the crews of Great Lakes
vessels is now down to about the level of the typhoid
death rate of rural communities; it has not yet reached
the level of urban communities.

3875 In 1908 my attention was called to the fact a good
deal of our typhoid fever was coming to us from Ham-
mond, Gary, East Chicago, and Michigan City, cities lo-
cated at the foot of Lake Michigan, taking their water
out of the Lake, and discharging their sewage directly or
indirectly into the Lake. Some of these cities are prac-
tically continuous with the City of Chicago. Chicago
3876 people were getting their typhoid in Hammond and in
addition these cities were contributing to our typhoid
by depositing their pollution where it could reach our
crib intakes with a short flow.

Some of these places are protecting their water supply by chlorination, some of them by chlorination and filtration, and some of them by filtration without clhorination. In none of them is there complete diversion of the sewage.

I served as president of the Lake Michigan Sanitary
Commission which spent several years in investigating
the condition of the waters at the foot of Lake Michi-
3877 gan. As a result of chlorination or filtration, begin-

ning in some instances in 1915, they have had a very material improvement, but in no case has the improvement been satisfactory in my judgment. For instance Gary began chlorinating in 1915, since when they have had typhoid rates as high as 83, but immediately following the year in which they began chlorinating the rates were 23, 31, 10, and I find one rate as low as 1½. In contrast, however, Chicago has had 1 for about ten years.

3878 East Chicago began filtration in 1920, since when they have had the typhoid death rate as high as 25. They had one year in which they had no deaths and there were none the first ten months of this year; but the lowest rates they had were 4 and 7.

Whiting has been filtering since 1920 and has had a pretty good record, though in one year the rate was 18.

Hammond has been chlorinating since 1918, using about as much chlorine as the people will stand for; and in spite of that they have had rates as high as 51, 21, 41, 17, 26, although I find they did have a rate as low as 6 and 9, which again I compare with our 1. Michigan City has not had a rate anywhere comparable with ours.

I think we are entitled to the conclusion, therefore,
3879 that no method of purification of water by chlorination
or filtration, alone or combined, has sufficed to protect
water according to existing standards. By existing
standards I mean that, under the conditions now prevalent in this country, a city with a typhoid death rate exceeding 20 is regarded as scarcely a decent place in which to live. Cities are in bad odor now if their typhoid death rate is over 5.

Filtration of water supply is an effective method of
3880 purification, but there are few places, if any, depend-

ing upon filtration which have not experienced breaks in their method of protection, for one reason or another. Literature is full of illustrations of typhoid outbreaks and diarrhoeal outbreaks as the result of breaks in operation, physical or otherwise, of filtration plants.

It is my professional opinion that without diversion we could not hold our typhoid death rate as low as it is, nor do I believe we could maintain our general death rate.

7

3881 If we were limited to taking from the lake such water as would be required for domestic purposes, say 1,000 cubic feet, my judgment is that we would have a very considerable increase in our typhoid rate.

3884 I do not believe it would be possible, by any method of purification of sewage and the protection of the water supply to maintain as good health conditions as we maintain in Chicago now by the method that we employ at present.

The present system of protection is, under the circumstances, the best that could be applied in Chicago. None of the other systems which have been suggested, even if they could have been put into effect, would have had so beneficial an effect upon conditions from the standpoint of public health.

3885 If we were to discharge the sewage into the lake untreated, we could probably hold the death rate from typhoid down to 50, or somewhere thereabouts. We might be able to hold the general death rate down to 20; the diarrhoeal death rate amongst babies down to, perhaps, 130. The things that we could do to compensate are more effective now than they were in the nineties. I do not believe we could maintain conditions that are regarded as conditions of decency amongst civilized people, although they would not be so bad as they were

3886 in the nineties.

Under such conditions we should have to discontinue beach-bathing. I used to go swimminng occasionally in Lake Michigan in the earlier days and I now swim daily in the summer. It was while I was Health Commissioner that our people began to use the beaches. Practically the foot of every street is now used as a bathing beach; there are several large public beaches. Bathing first came into vogue about 1909 or 1910. Occasionally we
3887 have to close a beach on account of pollution; the beaches around 80th street were closed most of last summer. The beach that I swim in, the Oak street beach, was polluted once or twice by ashes from the South Chicago Rolling Mill, but I do not believe there was any sewage pollution up there at any time. If raw sewage were discharged into the Lake in volume, I am quite certain that we should have to discontinue the use both of the public beaches and of the ends of the streets as bathing places.

Cross-Examination by Mr. Jackson.

3889 In 1891 the typhoid death rate was 174.2; in 1899 it was 27.2; that drop cannot be ascribed to the drain-
3890 age canal. Nevertheless, it was a fair statement to attribute the reduction in the typhoid death rate in its major proportions to the opening of the drainage canal. There was always epidemic typhoid in Chicago and in every other city. There is considerable fluctuation in the typhoid rate from year to year. The years 1891
3891 and 1892 were the maximum peak in Chicago. It is the history of typhoid that it will fluctuate considerably from time to time. It is natural that there should be a fluctuation in the year 1900. In addition thereto, we find that the people were doing a good deal to make water conditions tolerable. The Health Department was constantly advising the people to boil the water. The

newspapers were carrying statements to that effect every day. The people were expending large sums of money in boiling the water and otherwise purifying it. They were drinking large quantities of mineral water. The improvement between 1891 and 1900 was partly the result of the recession of the wave action customary in
3892 typhoid and partly the result of extensive health protection measures. A fairer way of making the contrast is by ten-year periods.

From 1892 to 1899 there was no year in which the typhoid rate exceeded 53.5 (the rate for 1896). In 1902, the third year of the opening of the drainage canal,
3893 the typhoid rate was 44.5, which was higher than four of the six years from 1892 to 1899, although 1898 was practically the same. 1898 was the Spanish-American War period, though its characterization by counsel as "the epidemic year of the Spanish-American War period" is new to me.

3894 From 1912 to 1916 there was a marked general improvement in the typhoid rate over preceding years; the
3895 figures were 1912, 7.6; 1913, 10.6; 1914, 6.9; 1915, 5.3; 1916, 5.1. The partial chlorination of water supply was begun in 1912; other things happened as well.

3896 I was Health Commissioner from 1907 to 1911, during which time we began the chlorination of the stock yard water. In 1912 the city began in a larger way at the Dunne crib. All the typhoid rates from 1912 to 1916 are under 10, except 1913, which is 10.6; and far
3897 lower than any rate ever had before.

In 1917 there was a drop in the typhoid rate from 5.1 to 1.6, being the commencement of the present low rate. I do not know whether this was the year when complete chlorination of the water supply was commenced, as suggested by counsel; I should say that the complete chlorination of water according to the present development of the art, began in 1926.

3898 It is true that on the exhibit of the Sanitary District on the easel there is the statement that complete chlorination of water was begun in December, 1916; but that is inaccurate, and there are some other minor inaccuracies in the chart. The statement as to the pasteurization of milk is not exactly accurate either; it began in January, 1909, and not in January, 1910.

3902 At this point counsel read into the record an offer in evidence from page 219 of Document No. 4, 69th Congress, first session, Committee on Rivers and Harbors, House of Representatives, which is Complainants' Exhibit No. 18 for identification, the following statement out of the table entitled, "Table 1—Comparison of Typhoid Fever with Total Mortalities in Chicago (Based on Chicago Department of Health Records)."

Year 1917. Death rate, all causes, per 100,000, 14.79. Total deaths from typhoid fever, 43. Deaths per 100,000 from typhoid fever, 1.6. Per cent total deaths, 0.11. Under the Heading "Remarks" Complete Chlorination of Water.

3903 Since 1891 there has been considerable advance in medical science; more advance, I should say, in public health than in medicine. There has been a great advance in sanitary measures other than the matter of water supply. It is to be expected that these advances will be reflected to some extent in death rates.

3905 There are other methods of contracting typhoid fever besides the drinking of polluted water, although the cause suggested by counsel, "Unsanitary conditions in the home" is too broad and indefinite. Small children might get typhoid occasionally by climbing about the floors, though that would not amount to very much.

Typhoid carriers have typhoid bacilli in the bowel movement and in the urine and those typhoid bacilli get into the water and milk and other articles of food. In some instances they get on the body of flies and in that way indirectly get into the food. There may be other

3906 ways such as infected fingers. Much of it is milk infection; some is infection of food other than milk. Much of it is water infection. The carrier is now the principal source of typhoid fever in the large cities.

In smaller cities the typhoid rate is naturally subject to greater fluctuation than in large cities. A few cases influence the rate more in small cities.

3907 There has been marked improvement in health conditions in every modern city in the last thirty-five years.

3908 I think we have got about as good a water supply as anybody has, but I would not want to say that it was perfectly satisfactory.

3909 The Public Health Service standard for bacteriological quality is as follows:

"(1) Of all the standard (10 c.c.) portions examined in accordance with the procedure specified below, not more than 10 per cent shall show a presence of organisms of the B. coli group.

"(2) Occasionally three or more of the five equal (10 c.c) portions constituting a single standard sample may show the presence of B. coli. This shall not be allowable if it occurs in more than (a) 5 per cent of the standard samples when 20 or more samples have been examined; (b) one standard sample when less than 20 samples have been examined."

3910 "Note: It is to be understood that in the examination of any water supply the source of samples must conform to both of the above requirements (1) and (2). For example, where the total number of samples is less than six, the occurrence of positive tests in three or more of the five portions of any single sample, although it would be permitted under requirement (2), would constitute a failure to meet requirement (1).

"Definition: A B. coli group is defind, for the purpose of this test, as in Standard Methods of Water Analysis, American Public Health Association, New York, 1923, and the procedures for demonstration of organisms in this group shall conform to those of the 'completed test' as therein specified."

3911 In the report published on page 703 of Treasury Department Public Health Report, Volume 40, No. 15, April 10, 1925, the following comment may be used in explanation of the rule:

"In accordance with these principles the first requirement stated in the standard, namely, that not more than 10 per cent of all the 10 c.c. portions tested shall show the presence of B. coli may be interpreted as implying that the mean density of B. coli shall not exceed about one per 100 c.c."

3912 As a general proposition the water supply at Chicago complies with that requirement. According to the report of the Department of 1925 there were a moderate number of instances in which it did not conform. The Department believes at the present time that it is conforming practically 100 per cent.

Councel for complainants produced an official document of the United States Public Health Service, entitled "Report on an Investigation of the Pollution of Lake Michigan in the Vicinity of South Chicago and the Calument and Indiana Harbors, 1924 and 1925, prepared by H. R. Crohurst, Sanitary Engineer, and N. D. Veldee, Past Assistant Surgeon, United States Public Health Service, in Cooperation with the Sanitary District of Chicago and Others," which was marked Complainants' Exhibit 155 for identification.

3913 The table on page 57 shows that the B. coli reading (mean for 12 months) for 100 c.c. for the Chicago intake ran from a minimum of 4 to a maximum of 50 between

November, 1924, and October, 1925. The highest mean for the highest month showed the B. coli reading in one instance 380 and in another instance 362.

3914 In the instance of the two high yearly means and monthly mean there was excluded in each instance a single extraordinary result on one day. I believe the figures to
3915 be accurate. During this period chlorination was the only chemical treatment of the water supply.

Filtration, plus chlorination, plus diversion should have
3916 given us a better product than we had. A better opinion than mine can be obtained as to the operation of a purification plant. My experience is that with heavily polluted water the hazard of having a breakdown where both filtration and chlorination are employed is considerable.

3918 In Detroit, Michigan, in February, 1925, there was an epidemic of diarrhoea and dysentery involving about 200,000 people, according to the estimate of the Health Commissioner. The water supply was protected, I think, by chlorination, but protected.

3919 I do not think I have made personal observation of
3921 any breakdowns, except that I call attention to the break at Whiting, Indiana, where chlorination was begun in 1915, and where filtration was added in 1920. I do not know the type of plant. The filtration plant was built
3922 about six years ago and I should say it could be called a
3923 modern plant. I do not know what the B. coli index of the raw water was. I do not know what particular kind of break they had there.

Assuming that you had complete treatment of all the sewage of the City of Chicago, according to the best type of sewage treatment and purification known to sanitary science at this time, in my opinion there would be some danger of the drinking supply of the City of Chicago, if it had modern filtration and water purification plant, supplemented with chlorination. I base my conclusion that cessation of diversion would create unhealthful conditions upon the assumption that untreated sewage would thereby be turned into Lake Michigan.

3925 If there is added as an additional condition that the effluent of this sewage plant is also chlorinated, there would still be some danger, although it would not be to the same degree.

Even with sewage purification—85 per cent complete purification—there still remains a certain amount of matter which is not purified. In addition thereto we would have shore wash and storm water, and the river flowing
3925-a into the lake, which is, in my judgment a condition necessary for the complete and proper protection of the public health.

3926 Assuming the removal of 95 per cent of these suspended solids, 98 per cent of the bacteria, a chlorination of the effluent, a reduction of the oxygen demand to 7 parts per million, and the location of intakes four miles and further out into the lake, with a water purification plant and chlorination, I do not believe that the water would be what we would like to have it, even under those circumstances. I have known of the outflow of the river going
3927 more than four to six miles into the lake. The various commissions on which I have sat, where bacterial and chemical examinations of the water at various parts of the lake have been made, have indicated that there is a moderate amount of pollution out that far. Under most conditions I think that chlorination and filtration would provide a satisfactory safe water. There would be conditions in which we would have breaks, even with all the safeguards.

3928 Assuming a diversion of 1,000 second feet through the drainage canal and a clear, non-putrefactive effluent of the kind and character I have heretofore described di-

verted through the drainage canal, assuming a modern
3929 purification works and chlorination, I think that the water would be better protected under those circumstances. There still would remain the existing condition of shore wash, and the periods in which we have had storm outflows into the lake. We will have chlorination and ultimate filtration in the course of time—a protection. I hope we will have it. I would still feel that there would be times when we would be subject to small epidemics, small breaks. I think under those circumstances we could hold the death rate for typhoid fever below 5 pretty much all the time.

3930 I do not think there would be a very great deal of difference between the water under the conditions you have predicated and the water we have now.

3933 I know a good deal about the milk sold in the cities of Whiting, Hammond, East Chicago, and the general sanitary conditions, as well as the sewage disposal and the water. They are, of course, conditions entering into the death rate.

It is not true that in the computation of the typhoid death rate for Chicago in recent years there have been excluded those typhoid deaths where it was believed that the disease had been contracted outside of Chicago.

Re-direct Examination by Mr. Lewis.

3950 Our sewers have not very much fall, and a good deal accumulates in them. With diversion limited to 1,000
3951 feet, this would wash out into the river and then into the lake at times of storm. When conditions of wind and weather were right it would reach the cribs. A modern purification plant would not fully relieve that condition.

3954 The method of chlorination that is now customary is the addition of enough chlorine to leave an amount of

free chlorine in the water after the organic pollution has used up a certain amount. We came to that method after the little typhoid epidemic of 1923 or 1924. We are now putting in about as much chlorine as our people will stand for. They will not tolerate the use of a considerably larger amount than now. The city has been experi-
3955 menting with super-chlorination, which I think is being used in Toronto, and which is a method in which they add to the water considerably more chlorine than the people will stand for and then attempt to neutralize the taste by adding other chemicals.

In the case of typhoid fever it is fairer and better to use a ten-year average than to use a short period.

3956 Beginning with the nineties the cribs were moved further out, which had an effect on health.

3957 The opening of the canal was not simultaneous with the diversion of sewage because the intercepting sewers were only gradually extended. When I was in the Health Department there was a good deal of sewage going directly into the lake from the district north of Fullerton Avenue and down as far south as 39th Street. At that
3958 time all of the sewage from south of 22d Street and from somewhere up about Fullerton or Belmont or Evanston was flowing directly into the lake. Not all of it is diverted yet. There is a little sewage going into the lake down at 80th Street now, and more that is going in through the Calumet River.

3963 Referring to the report of an investigation of the pollution of Lake Michigan by Crohurst and Veldee, U. S. Public Health Service, the following extract beginning on page 67 expresses my view:

"The pollution of Lake Michigan by sanitary sewage and industrial waste discharged from the Calumet district in Illinois and Indiana, especially from Indiana, is such as to render the sources of water supply now used

by Hammond, Whiting, and East Chicago unfit for that
3964 purpose, even with elaborate and efficiently operated purification plants. The source of water supply at Gary, Indiana, though lying outside of the zone of grossest pollution, is also seriously contaminated but not beyond the capacity of modern purification processes to safeguard it. The water supplies drawn by the City of Chicago from the 68th Street and Dunne cribs are also affected and at times may be seriously endangered by sewage pollution from the Calumet district. * * *

"If the use of the lake as a source of water supply for the urban population in the area south of the Chicago River is to be continued, as seems inevitable, it is necessary, in the interest of public health, that the water supply intakes be protected. To remove the intakes beyond
3965 the zone of at least occasional gross pollution would require their extension very far into the lake, to a distance which is probably not practicable. Moreover, in the absence of remedial measures it is to be anticipated that the existing zone of pollution would be extended, with increase in the population and development of the adjacent land area. Therefore, the obvious remedy for the present intolerable situation is abatement of the existing pollution of the lake. The choice of methods to achieve this end involves engineering and economic problems which it is not in the province of this report to discuss. There is no question, however, that abatement of the existing pollution is possible, notwithstanding the difficulty which it may present; and it is certain that the need is imperative."

3966 The bacteriological analysis in this report referred to raw water and not to chlorinated water.

3968 In February and March, 1926, Detroit had an epidemic of diarrhoea with an estimated number of cases of 200,000, which was ascribed by the officials in charge to a break in their method of water protection which consisted of a modern mechanical filtration plant followed by chlorine in the water.

3969 In March and April, 1920, Mt. Vernon, New York, had an epidemic of typhoid due to a failure of the water supply. The water is coagulated with alum, filtered and disinfected with liquid chlorine.

An epidemic of typhoid fever occurred at Moline, Illinois, in 1917 and 1918, which resulted from a break in the operation of their filtration plant.

Re-cross Examination by Mr. Jackson.

3970 I have no information as to the size of Mt. Vernon or
3971 the nature of the filtration plant. The filtration plant at Moline was installed in 1902. The State Health Department was not satisfied with the operation of that plant. Sewage is put into the Mississippi River unpurified. I do not know what is done with the sewage at Mt. Vernon.
3972 Practically all of the sewage of the Indiana lake cities goes into Lake Michigan in a raw state; there is some purification other than dilution at Gary, although not
3973 very much. Abatement of the pollution is possible. This
3974 is a zone of growing population; some of it is dense.
3975 The year 1921 was used in Exhibit No. 1142 because the chart was made many years ago and used for teaching purposes. It was started about 1892 and the first year used was 1891; 1921 was the result of using every tenth year thereafter. Moreover, beginning with the year of the greatest typhoid fever epidemic that Chicago has had made the chart more effective for teaching purposes.

3980 If the chart had begun with the year 1888 or 1894 it would have shown a different picture as to the typhoid rate.

The data on which Exhibit 1143 was based were obtained by inspectors of the Health Department who customarily record where the patient's first symptoms appeared. This information is tabulated by the Health Department.

3981 In 1926 the typhoid rate was .8; the increase in chlorine
3982 treatment was quite largely responsible for this low rate.
3984 The amount of chlorine used is more than would be used if the water were filtered.

Langdon Pearse, for Defendants. January, 1927:

4935 *Direct Examination by Mr. Adcock.*

Winnetka, Illinois; sanitary engineer for Sanitary District of Chicago; consulting engineer of the firm of Pearse, Greeley & Hansen; graduate of Harvard in 1889, A. B.; civil engineering course at Massachusetts Institute of Technology, B. S., and M. S. in civil engineering
4937 in 1902; since then municipal work; in 1901 and 1902 with Massachusetts Harbor Commission as level man; 1902 and 1903 assistant to John R. Freeman, Charles River Commission; in 1903 assistant engineer for Commission on Additional Water Supply New York City; 1904, investigation of water supply in Maine, Cleveland, Ohio, Jersey City; 1904 to 1907, assistant engineer on additional water and sewage works in Columbus, Ohio; 1907 and 1908, on the California coast in the vicinity of San Francisco, studying filtration for water supply of Oakland and bay cities; from 1909 to date continuously connected with the Sanitary District in various capacities, organizing sanitary work, studies on supplementing
4938 the dilution method; the work has been built up on the sanitary side under my direction, and I am in charge of sanitary work, comprising general supervision of design work, laboratory work, testing stations, water supply from Gary to Waukegan; have complete charge of design

and construction of intercepting sewers and critical work, some of which has been split off on account of magnitude of work; at present am largely consulting and critical on sanitary work after it has once started in the drafting room.

4939 In private work, am consultant to United States Public Health Service on stream pollution; have advised various communities on the subject of water supply and sewage treatment; consulting engineer for most of the Sanitary Districts of Illinois, for example, Decatur, Bloomington, Normal, Urbana, North Shore Sanitary District; also involved in the study of water supply conditions in Indiana; have built four filtration plants, one
4940 at Evanston, two at Whiting and Winnetka, and one at East Chicago; additional engagements in Oklahoma City, where am building sewage treatment works, and in other cities; am member of the American Society of Civil Engineers, Institute of Civil Engineers of London, England; Engineering Institute of Canada.

My duties in connection with the Sanitary District relate to sanitary problems of the District, discharge of sewage, protection of water supply, general technical supervision of operation of treatment works, contact with all problems developed in laboratory and drafting room. In connection with Sanitary District work have visited sewage plants since 1909 in the United States, England, France and Germany, for the purpose of ascertaining
4941 best and latest methods; have visited large plants in England, thus coming in contact with various men in prominence in the profession; have had occasion to report upon and study the situation along the Cook County frontage of Lake Michigan, North Shore Sanitary Dis-
4942 trict, Calumet region, including the industrial region to the Illinois State line, through the Lake Michigan Water Commission; also have come in contact with the

same problems; helped to carry on work of so-called Crohurst-Veldee investigation for the United States Public Health Service, through which the Sanitary Districts
4943 of the States of Illinois and Indiana carried on co-operative surveys of condition of water supply of Lake Michigan along the frontage of Lake County, Indiana, and the frontage of the State of Illinois up to Waukegan.

4944 My work has made it necessary for me to become familiar with the Illinois River country, and since 1909 have carried on continued investigations of the necessary work to be done to meet the conditions as now existing in the upper part of the river, involving cumulative collection of data which have become very much more exact in later years.

In 1922 and 1923 the Public Health Service desired to reinforce work done on the Ohio River, and asked the aid of the Sanitary District in supporting a co-operative survey of the Illinois River, covering data of the different surrounding states over a period of about 14 months. During the past two years have been making a complete and extended survey of the entire river from Lake Mich-
4945 igan to the Mississippi, with a view to determining by frequent sampling and specific local studies the specific condition that has to be met at the present time and in the future.

4946 The condition peculiar to Chicago is the location of a group of cities of large size extending from Waukegan on the north to Gary on the southeast along the southern and western shores of Lake Michigan, where there is practically no circulation. In a state of nature the two rivers, Chicago and Calumet, flowed into that lake, and are now surrounded by a large aggregation of population and industry.

4947 On account of the physical configuration, the peculiarities are unique, in that they present an opportunity to divert the sewage from the water supply of the city in a way that other cities around the lakes, like Cleveland and Milwaukee have been unable to do through the lack of natural advantages.

Another peculiarity of the Chicago situation is the rate of growth of between six and seven hundred thousand population in each decade, a growth in itself that of a large city. In addition, there has been a remarkable growth in industry, due to the concentration in Chicago of the largest unit of packing house industry in the United States, large tannery and corn products industries, all of which complicate the situation.

Another peculiarity is the flatness of the country, necessitating flat grades in sewers, increased expense for sewage and pumping.

4948 The development of sewage treatment as supplementing dilution or diversion has been considered by the Sanitary District since 1909, to my personal knowledge, and from observation and contact with others since 1887. It has always been the policy to obtain supplementary methods to reinforce the dilution plan, since about the year 1910.

4949 Since the domestic situation was studied over a period of years, and it was found it would divide naturally into a number of projects, there have been developed the Calumet, Des Plaines River, North Side, West Side and Southwest Side projects. In addition to the domestic situation there was the importance of the industrial problem in the solution; the presence of the largest aggregation of packing houses in the world produced a waste which has a direct bearing; the packers dumped their waste into the channel, and in earlier years dumped in almost everything except the meat, until the by-products were recovered for business reasons; this produced a great deal of suspended matter and material in solution in the water.

4950 After a number of conferences, a survey was undertaken in 1911 and money appropriated for dredging and for a testing station built in 1912 and operated until 1918, for the demonstration of devices for elimination of waste, various types of tanks, and biological treatment.

In 1915 the so-called activated sludge process was developed, which required a fresh series of experiments, which culminated in September, 1918; this extended effort terminated in an admission on the part of the packers that the activated sludge system could handle
4951 their sewage; in 1917 a program was outlined, but the war disturbed the basis of negotiations, and even though an agreement was drafted it was never put into effect; the studies showed that the packers' waste was equivalent to the sewage of about one million people, compared with the population in 1920 of about three million.

I next undertook a study of the tannery situation. There are 21 tanneries on the North Branch of the Chicago River of various sizes, and some wool-cleaning plants, all of which deposit solids in the river and create conditions, together with those produced by the solids of
4952 sewage, which are unpleasant. In the summer the river was black and full of gases above its junction with the main river. This required the installation of a testing station for treatment and a study of the effect of the various forms of treatment. These studies evaluated that the effect of the tannery group was equal to a population of seventy thousand people.

The packers themselves had given up the problem in disgust. In addition, a testing station on domestic sewage was started, and went into service in October, 1909. It operated with various types of tanks to determine the
4955 characteristics of the known apparatus experimenting with various sizes and types of trickling filters and other devices. It was learned that Chicago sewage was such that it required more extended apparatus than was commonly thought necessary in places on a smaller scale, partly because of volume and partly because of condi-

tions of climate. We learned how to provide for the sludge or solids deposited from the sewage, and studied the various ways of dealing with that. We worked out the data upon which later work and projects were predicated.

This testing station work has been a very important part of the development of sanitary science. In this country they have been visited by people from abroad, and it has been commented upon favorably by govern-
4956 ment officials. These studies led the Sanitary District to adopt for the treatment program of the District a general program of taking out the suspended solids, or the so-called "sludge banks," and decided on the adoption of the Imhoff tanks, a double-deck type of tank, the upper chamber for reception and the lower chamber for the deposit and digestion of solids. This type has been adopted in the Calumet works and installed in the West Side works.

Where the work required was more than could be done by settling out the solids in suspension, two methods were considered: One applying the liquid to beds of crushed stone, in so-called "trickling filters," with the prepared liquid spread on the stone, and around the stone are films of bacteria which work upon the material coming in. These beds have to be followed by secondary sedimentation.

4957 The local significance of the activated sludge process, which came into prominence in 1915, was worked out. It performed the same general functions as the trickling filters, but instead of having the films and bacteria around the stones in a bed, they are held in suspension and agitated by air in tanks full of sewage.

4969 The intercepting sewers will pick up as much as they can during storms or thaws and the excess liquid flowing into the sewers discharges directly into the river from all existing outlets. Such liquid may discharge into the stream on as many as 115 days off and on during the year, which has the effect of putting into the stream deposits which have occurred through dry weather, so that the storm water for several hours may be even stronger than sewage flowing in dry weather.

The dilution method has been regarded as an ultimate means of disposal of sewage for years. The early works built for collecting sewage discharging into streams were partly because it was the easiest and cheapest way. As conditions went along such disposal was studied and found to be of suitable use, subject to limitations in many 4971 cases as to the removal of settling solids. The dilution ratio was expressed by engineers and voiced by Mr. Hering in his early reports and has been incorporated in the Enabling Act of the Sanitary District. This ratio has been studied from time to time and criticisms expressed towards increasing the ratio and requiring a greater flow of water per thousand population rather than decreasing it. Where industrial wastes are prominent more water has been found necessary.

Referring to bulletin of the United States Public Health Service, known as Reprint 580, January 16, 1920, "Treatment and Disposal of Sewage," which was introduced as **Exhibit 1163**, of which page 1 was read into the record. I quote that page to the effect that:

> "The disposal of sewage by dilution consists of its discharge into natural bodies of water, in some cases with and in others without preliminary treatment. In the former instances it constitutes a single and complete method of disposal. In the latter it may be regarded as the final step of a more or less elaborate system of treatment, in which it is employed in conjunction with one or more artificial processes. Wherever sewage or a sewage effluent is discharged into a natural watercourse, dilution constitutes an integral part of the disposal process.
>
> "Dilution has for a long time been the most common means of sewage disposal practiced in the

United States. Formerly it was regarded as a temporary and undesirable expedient, to be ultimately abandoned as soon as sewage purification became sufficiently developed. During recent years, however, the economic need for utilizing to the greatest possible extent the self-purification capacity of natural watercourses has been apparent, with the result that the disposal of community wastes by natural dilution has become recognized as a legitimate and desirable process, where carried out in such a manner as not to endanger the public health. 4973

"Where dilution is successfully applied it must, in general, accomplish one or both of the two following results, depending upon the uses to which the receiving body of water is to be subsequently devoted:

"1. The limitation of bacterial numbers present in the receiving watercourse to within boundaries safely consistent with the hygienic safety of whatever sources of water supply, bathing beaches, or shellfish areas may be dependent upon such a watercourse.

"2. The maintenance of a sufficient reserve supply of dissolved oxygen in the receiving watercourse to insure its freedom from objectionable odors or other conditions, either locally or at more distant points.

"In general, the degree of dilution necessary to satisfy the first of these requirements is much higher than that required for the second, although this principle may not necessarily hold if careful local precautions relative to the proper dispersion of sewage are neglected.

"The prescription of definite quantitative standards with reference to the dilution of normal sewage has for a long time engaged the attention of sanitary engineers. The first authoritative standard of this sort proposed in the United States was that of Hering, Williams, and Artingstall in 1887, who concluded from a study of data for the design of the Chicago drainage canal that the minimum flow of the canal safely consistent with the avoidance of objectionable conditions should be 3.3 cubic feet per second per thousand of waste-contributing pop- 4974 ulation. This standard was widely accepted for many years.

"More recently, however, a further knowledge of the variable part played by self-purification in determining the capacity of watercourses for pollution has resulted in a greater degree of caution in attempting to adopt and apply widely any fixed standard of dilution which must be met at the point of sewage outfall. On the contrary, the present tendency in the United States is in the direction of prescribing standards as to maximum bacterial loads impassable upon water purification plants at the intake, and as to the minimum permissible degree of dissolved oxygen saturation at critical points consistent with the avoidance of nuisance. An example
4975 of the former is the so-called International Joint Commission Standard which states that the maximum safe bacterial load impassable upon a modern efficient water purification plant should be such that no more than 50 per cent of 0.1 c.c. portions of the raw water, tested regularly throughout the year, should contain B. coli. In terms of the commonly employed B. coli index, this is equivalent to a yearly average bacterial load of not exceeding 500 B. coli per 100 c.c. An example of the second type of standard noted above is that which was proposed by Black and Phelps as governing the minimum permissible dissolved oxygen content of New York Harbor. This standard, which was given as not less than 70 per cent oxygen saturation, is not concurred in by Fuller, who states that 20 per cent for winter conditions and 30 per cent for summer (each equivalent to about 2.5 parts per million of dissolved oxygen) represent a more practical and generally accepted minimum.

"Still more recently the United States Public Health Service has conducted in the Ohio River basin probably the most intensive scientific study of stream pollution which has ever been carried out. The results obtained from this study, the publication of which is now under way, have thrown considerably new light upon the entire matter of standards of dilution as well as upon the fundamental principles un-
4976 derlying the disposal of community wastes by this

method. They have emphasized the great need for caution in applying any fixed standards of dilution to widely varying conditions. At the same time they have shown conclusively that the combined resources of natural dilution and self-purification represent a tremendous economic asset which, in a given case, may be evaluated in definite quantitative terms through properly planned preliminary studies. Such resources should be utilized to the fullest extent in connection with any proposed project of sewage treatment involving artificial processes in order that the cost of the latter may be minimized.

"A full description of the theory and practice of dilution processes is given by Metcalf and Eddy and by Fuller in the general reference (1 and 2) accompanying the present discussion."

4977 I have had occasion to follow the work carried on by the International Joint Commission with reference to pollution of the international boundary waters.

Progress Report of the International Joint Commission, On the Reference by the United States and Canada, on the question of pollution of boundary waters, and whether or not such pollution extended across the boundary in contravention of the treaty of January 11, 1909, and, if so, in what manner and by what means it was possible to prevent the same, **Defendants' Exhibit 1164.** Page 12 to page 15 as follows:

4978 "PRINCIPAL FACTORS IN THIS POLLUTION.

"The greatest single factor in this avoidable and remediable pollution is the sewage discharged without restriction or treatment of any kind by the municipalities situated on the boundary waters. The second factor in point of importance is the discharge of sewage by vessels. Vessels not only contribute their quota to the sewage pollution of these waterways, but they menace the public health in other ways. Vessels are supposed to fill their drinking water tanks from mid-lake, remote from sources of pollution. The distance pollution travels from shore in the lake, as shown in the report, demonstrates how difficult it may be to find an unpolluted area.

There is excellent evidence to show that vessels frequently fill their tanks from polluted sources.

"During the season of 1913 several epidemics caused by polluted water aboard vessels were investigated by the United States Public Health Service. In the laboratories of the Commission also samples from water tanks of vessels on the lakes were shown to be polluted. Another pernicious practice attributed to vessels is the taking on of water ballast from a polluted harbor and the discharge of the same in less polluted waters, frequently within a short distance of some waterworks intake.

"Effect of Pollution Upon Public Health.

"In the cities and towns upon the Great Lakes and their connecting rivers, sanitary and climatic conditions, exclusive of public water supplies, are much better than the average for the country as a whole. These sanitary conditions are infinitely better (with the exception of water supplies) than those which pertain in European cities. These Great Lakes cities lack the overcrowding, the filth and the poverty of less favored communities; yet the typhoid fever rate in these cities for many years has been excessive and punctuated at intervals by massive explosive epidemics which are without parallel in European countries. Typhoid fever death rates per 100,000 in the large cities of Northern Europe with safe water supplies have an average of less than 5. Without reverting to the appalling disasters of a decade ago, in the last three years a rate of over 300 was registered in Ashland, Wisconsin; of 109 in Marquette, Michigan; of 196 in Port Huron, Michigan; of 194 in Niagara Falls; of 190 in Erie, Pennsylvania; and above 50 in Alpena, Bay City, Sault Ste. Marie, Duluth and Sandusky; of 179 in Port Arthur, Ont.; of 330 in Sault Ste. Marie, Ont.; of 134 in Sarnia, Ont.; of 55 and 57 in Windsor and Walkerville, Ont.; of 86 in Niagara Falls, Ont.; of 63 in Brockville, Ont.

"Even in the more fortunate cities possessing intakes which are not so grossly polluted rates are attained for typhoid fever which would not be tolerated in European countries. Detroit has never registered a lower rate than 15, and in 1913 had a rate of above 30. In most instances these high typhoid fever rates were due to the use of sewage-polluted water without purification of any kind. In a number of cases, however, an alleged purification plant was in operation, but disasters have occurred in spite of these plants, either due to faulty construction or more frequently careless or unskilled operation.

"SECOND BRANCH OF INVESTIGATION.

"Having concluded the investigation of the question at what places, from what causes and to what extent these boundary waters are polluted on either side to the injury of health or property on the other side, and it having been established by the investigation that these waters are thus polluted, the Commission will now proceed as rapidly as possible with investigation of the second question, viz:

" '(2) In what way or manner, whether by the construction and operation of suitable drainage canals or plants at convenient points or otherwise, is it possible and advisable to remedy or prevent the pollution of these waters, and by what means or arrangement can the proper construction or operation of remedial or preventive works, or a system or method of rendering these waters sanitary and suitable for domestic and other uses, be best secured and maintained in order to secure the adequate protection and development of all interests involved on both sides of the boundary, and to fulfill the obligations undertaken in Article IV of the waterways treaty of January 11, 1909, between the United States and Great Britain, in which it is agreed that the waters therein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other?'

"In view of the magnitude of the interests involved, an adequate plan must be prepared by the Commission, with the aid of sanitary engineers qualified to give competent and intelligent advice, to the end that the investigation of this second question may proceed along proper lines and be concluded at the earliest time possible. It is the intention of the Commission at its special session called to meet March 9, 1914, for the consideration of other matters pending before the Commission, to give this branch of the investigation consideration, and at that time to prepare and adopt a plan under which it shall be conducted and to outline the procedure that will be followed with respect to working out the sanitary engineering problems and affording the people and the municipalities affected on both sides of the line a full and complete opportunity to be heard regarding remedies where avoidable pollution has been found to exist."

4989 There was also offered in evidence the maps facing pages 18 and 41 of Exhibit 1164. The map facing page 18 shows the zones of pollution in the Great Lakes, and discloses serious pollution in the Rainy River from the outlet of the Rainy River to International Falls, serious pollution in Lake Superior in the vicinity of Port Arthur and Fort William, serious pollution in practically the entire St. Marys River, a good deal of boat pollution at the head of Lake Huron, serious pollution throughout the entire St. Clair River and about one-fifth of the entire area of Lake St. Clair, boat pollution along the principal vessel lanes in the St. Clair, serious pollution covering the whole head of Lake Erie, the whole of Niagara Falls, the whole head of Lake Ontario, the whole foot of Lake Ontario, and the whole St. Lawrence River from Kingston to Cornwall, and the St. John River from Grand Falls to Edmonston.

The serious pollution at the head of Lake Erie is shown in detail on the map facing page 41, by a statement of the B. coli average count, from samples taken at various areas in the lake, and shows B. coli counts running from a minimum of 11 to a maximum of 2620 distributed all over the area from Put-in-Bay in a line almost north by northwest to Bar Point.

4990 Mr. Pearse continuing: The conditions as shown on the map on page 13 of Exhibit 1164 are substantially today as stated in the table. The major pollution, such as from Detroit, Buffalo and Toledo, are still being carried on to an even greater extent than at the time of the report, because of the growth of population, and, with the exception of a small plant in a suburb of Buffalo, there has been practically nothing done towards sewage treatment in the United States cities mentioned in that table. In other cities, as for example, Cleveland and Milwaukee, there has been an effort to carry on treatment.

4995 **Defendants' Exhibit 1166**, entitled "Final Report of the International Joint Commission on the Pollution of Boundary Waters, Washington-Ottawa, 1918," is in part as follows:

> Page 19. "Rainy River through its entire course has been rendered unfit for domestic uses owing to the unrestricted discharge of sewage and other wastes. * * * Thunder Bay is extensively polluted in the neighborhood of the towns of Port Arthur and Fort William, but not to such an extent as to affect Lake Superior. * * * Lake Superior at the head of the St. Marys River is practically pure. * * * The discharge of sewage from vessels was shown to seriously pollute the waters in the lanes of vessel travel. Especially does vessel pollution menace the water supplies of the towns of Sault Ste. Marie, Michigan and Ontario. * * * A serious condition of the river continues * * * down to Neebish Island. * * * Water examined in the Straits of Mackinac proved to be quite pure.
>
> "The waters of Lake Huron at the head of the river would be practically free from B. coli were it not for the pollution from vessel sewage. * * * Below the towns of Port Huron and Sarnia the waters of the St. Clair River for a stretch of about 34 miles are quite unfit for drinking purposes, unless extensively treated * * * The pollution below these towns is due to the combined effect of the discharge of untreated sewage from vessels and the towns along the shores. * * *
>
> "Lake St. Clair, which receives the discharge of

the river, showed less evidence of pollution. * * *

"The results of our analyses of samples taken above the intake for the Detroit city water supply showed this to be an unsafe source of supply without careful treatment. Samples taken along the several cross-sections from this point to the site of the Michigan Central tunnel showed a marked increase of pollution in the shore samples. The water intakes of Walkerville and Windsor are both located in dangerous situations, owing to the discharge of sewers above these intakes. * * * At times the pollution is so great that the quantity of chlorine required to overcome it gives an objectionable taste to the water. * * *

"Samples taken from a cross-section over the Michigan Central Railroad tunnel showed gross pollution at sample points near the Canadian and United States shores, and a considerable pollution extending across the entire river. Samples taken from several cross-sections showed gross pollution throughout the entire river from the Michigan Central Railroad tunnel to Fighting Island. From Fighting Island to the mouth of the river the water is grossly polluted. * * * Wyandotte, Trenton and Amherstberg are taking their water supplies from this part of the river. * * *

"The pollution in the Detroit River is occasioned by the discharge of raw sewage from its riparian communities, notably the City of Detroit, and by the sewage from vessels * * *

"Lake Erie, outside of this polluted area and the polluted areas at the mouths of its tributaries and its littoral waters, affords a remarkable instance of self-purification. * * * Above Niagara Falls the great bulk of the pollution in the river, and due to the discharge of sewage therein, is confined to the marginal waters of the country in which it originates and that the sewage of Buffalo is polluting to a serious extent the available water supplies of the two Tonawandas and the City of Niagara Falls. The effect of the pollution of the lower Niagara is to render the river water totally unfit for domestic uses unless purified. * * *

"* * * The waters of Lake Ontario are comparatively free from B. coli, with the exception of

> an 18-mile radius from the mouth of the Niagara River. * * *
>
> "The St. Lawrence River is the only water supply available for the summer residents at the Thousand Islands and for the communities along its banks.
>
> "During the period of examination it was observed that the present practice of unrestricted discharge of sewage renders certain areas unfit sources of drinking water. * * * Below the Thousand Islands the population is denser and considerable pollution exists * * *."

The report states that the pollution in the St. John River amounted to about 125 B. coli per 100 cubic centimeters in the late fall; that vessel pollution is confined to the vicinity of the traffic lanes, and consists of two kinds: raw sewage and water ballast discharged by vessels on approaching ports of destination; that this pollution is a serious menace to public health; that the grossly polluted condition of boundary waters is doubtless because of the abnormal prevalence of typhoid fever throughout the territory bordering thereon.

On page 32 of the report the statement is made that:

> "SANITARY CONSIDERATION FIRST IN ORDER OF PROCEDURE.
>
> "It must be admitted that the conservation of public health is of paramount importance under the treaty. This is evident from Article IV to which reference has been made. The significance of sanitary considerations is also evidenced by Article VIII of the treaty."

Part VI of the report refers to the "Limits of Permissible Pollution and Standards of Sewage Purification," and takes up the question of whether boundary waters are to be looked upon as open sewers for the reception of riparian pollution, and whether the policy should be to restore the purity of the boundary waters; in other words, whether the riparian right to discharge sewage is stronger than the riparian right to receive water pure.

The Commission recommends that all sewage should, before being discharged into boundary waters, receive some purification treatment, and the limit of such treatment should depend upon the limit of safe loading of water for purification plants. It says that on the one hand, it is evident that the paramount importance of public health and the binding obligations of the treaty must be borne in mind; that on the other hand, sewage treatment requirement must not be made so excessive and unreasonable as to involve the cities and towns along these waters in an expenditure entirely unjustifiable.

As to the Detroit and Niagara Rivers, the Commission was of the opinion that the towns discharging sewage into them should purify it to such an extent that the resulting average cross-sectional pollution in each river will not exceed the limit of safe loading for a water purification plant.

The report says that the standard of sewage purification as to safe loading must be regarded as tentative; that in view of the difficulties and uncertainties of bacteriological technique, it is distinctly advantageous to have a working rule which is more accurate and readily determinable than the bacterial standard suggested. Reference is made to Professor Phelps in connection with the progress report, and his statement that if the sewage of the city be diluted in a stream flow of 4 cubic feet per second, per capita, the resulting water will contain approximately 500 B. coli per 100 c.c.; that if the dilution is proportionately less, a corresponding degree of purification of the sewage will be necessary; that in the light of accumulated knowledge it is considered that for all purposes of a present inquiry the practical equivalent of the dilution of the bacteriological standards may be accepted.

The report further says that the fixing of standards for boundary waters, and the subsequent modifications of the standards from time to time, should be left as hereinafter recommended to some authority clothed with the necessary power to deal with the question.

Part VIII is "Conclusions and Recommendations," which are in effect that:

> "1. The Great Lakes beyond their shore waters and their polluted areas at the mouths of the rivers which flow into them are, except so far as they are affected by vessel pollution, in a state of almost absolute purity. With the exception of these pure areas, the entire stretch of boundary waters, including Rainy River, St. Marys River, St. Clair River, Detroit River, Niagara River, St. Lawrence River from Lake Ontario to Cornwall, and the St. John River from Grand Falls to Edmundston, New Brunswick, is polluted to an extent which renders the water in its unpurified state unfit for drinking purposes. This pollution has its origin chiefly in the sewage and storm flows from the riparian cities and towns and the sewage from vessels. It is very intense along the shores of the Detroit and Niagara Rivers and in the contaminated areas in the Lakes. Throughout the whole length of the boundary waters where sewage is discharged from the sewage works of cities and towns the pollution is most concentrated in the shore waters on the side of the boundary on which it originates. These shore waters, besides being in places unsightly, malodorous, and absolutely unfit for domestic purposes, are a source of serious danger to summer residents, bathers, and others who frequent the localities. So foul are they in many places that municipal ordinances have been passed prohibiting bathing in them.
>
> "2. In the Detroit and Niagara Rivers conditions exist which imperil the health and welfare of the citizens of both countries in direct contravention of the treaty. This is true, though in a less marked degree, of the Rainy and St. John Rivers.

"3. In the St. Marys, St. Clair, and St. Lawrence Rivers pollution exists which is in substantial contravention of the spirit of the treaty, and unless these conditions are improved, and the rivers placed under the control of competent authority, the resulting injury will be much more pronounced as population increases.

"4. Vessel pollution in certain parts of boundary waters exists to an extent which causes substantial injury to health and property. * * *

"6. It is feasible and practicable, without imposing an unreasonable burden upon the offending communities, to prevent or remedy pollution, both in the case of boundary waters and waters crossing the boundary. * * *"

4999 From **Defendants' Exhibit 1167**, Bulletin 83 of the Public Health and Marine Hospital Service, March 1912, on "Sewage Pollution of Interstate and International Waters," (page 133) the following appears:

5000 "The growth of the City of Chicago finds no parallel in history. From a population of 7,500 in 1843 it has grown to be the second city in the United States with a population in 1910 of more than 2,000,000. No argument is necessary to show the importance to the whole country of sanitary conditions in Chicago. Its vast commerce and giant industries make it the metropolis of an enormous territory and bring thousands of visitors daily from nearly every State in the Union. These visitors drink Chicago's milk and water and eat Chicago's food. Contamination of these articles of food or drink by typhoid fever germs means infection of transients as well as citizens—transients who go to their homes in other States to establish new foci of typhoid fever. These transients and interstate travelers are less able to protect themselves against contaminated food or drink than the citizen who heeds the warnings of Chicago's excellent department of health. Thousands of interstate travelers drink water on trains which is taken aboard cars in this great railway center, and the character of Chicago's water supply is of vital importance to these travelers and to the States to which they are destined."

5002 **Defendants' Exhibit 1169**, is a table showing the number of sewer outlets of the Sanitary District of Chicago in 1926. It shows in the North Branch of the Chicago River 96; in the main Chicago River 21; in the South Branch of the Chicago River 104; in the Calumet River and Calumet Sag Channel 34, and in the Des Plaines River and Salt Creek 59, making a total of 314.

5003 Mr. Pearse continuing: Outside the Sanitary District, there is a total of 479 outlets along the lower Des Plaines and Illinois Rivers from Lockport to Grafton. 131 are municipal and 348 are private. The greatest number, 134, is at Joliet; 76 at Ottawa and 64 at Peoria. The
5004 problem of the Illinois River is intimately related to the problem of disposal of Chicago sewage through the relationship of the diversion of flow to the amount of treatment required. With a high flow, slight treatment is required; with a low diversion or no diversion, a high degree of treatment would be required.

5005 **Defendants' Exhibit 1170**, summarizes the result of the survey of the industries of the Illinois River based upon work done partly by the United States Public Health Service in 1921, showing a total of 44 major industrial developments up and down the valley, and in 1925 a report made by me and engineering associates found 21 industries at Peoria in place of 11 in 1921.

The principal trade wastes found are at Joliet 11; beverage, chemical, paper, rendering, slaughtering, iron works and penitentiary; at Morris 2, paper mill and tannery; at Marseilles 3, paper mills; at Ottawa 2, brewery and packing house; at La Salle 3, smelting, chemical and plating; at Peru 6, plating, zinc refinery, clocks and brewery; at Depue 1, zinc; at Chillicothe 1, cannery; at Peoria 11, distilleries, milling, packing house, paper, refinery, tractor, steel, feed, stoves and syrup; and at Pekin 4, corn products, distillery, paper and yeast.

5006 The total equivalent load of the industries upon the Illinois River has been calculated in connection with the investigation made by the Sanitary District and the United States Public Health Service in 1921. The equivalent load is very close to that of a million people, the major portion of the load being concentrated at Peoria and Pekin. Since that time I have made an investigation leading to the conclusion that due to changes in industries at Peoria, the total effect would be nearer to that of a million and a half people, the principal elements in the load being distilleries and other similar waste-producing elements in Peoria and the Corn Products Refining Company plant at Pekin.

5007 **Defendants' Exhibit 1171**, Table 13, Part III, Engineering Board of Review, The Sewage Disposal Section, summarizes data obtained jointly by the Engineering Board of Review and the United States Public Health Service. This table is headed "Total Population Loads, Human plus Industrial equivalents, on Des Plaines-Illinois River from data of the United States Public Health Service, 1921-1922," and includes the Sanitary District of Chicago, the towns of Joliet, Morris, Marseilles, Ottawa, La Salle, Peru, Peoria, Pekin, Havana and Beardstown, showing for each of these communities the sewered human population and industrial equivalent population, total population and percentage of total. The total sewered human population is 3,240,460, of which 3,100,000 pertains to the Sanitary District of Chicago. The total industrial equivalent population is 2,590,490, of which 1,530,000 pertains to Chicago. The total population is 5,830,950, of which 4,630,000 pertains to Chicago, of which total population Chicago represents 79.4 per cent; cities from Joliet to La Salle, 3.4 per cent; Peoria and Pekin 17 per cent, and Beardstown .2 per cent.

5010 The flow of the tributaries of the Illinois enters into the problem of the Illinois River through furnishing additional diluting water according to the stage of the river.

5011 I have been working upon the treatment problem for the sewage of the district in general since 1909 and in particular since 1919. The Engineering Board of Review for the Sanitary District laid out a program in 1924, which was substantially the program that our organization and myself had arrived at for purposes of treating the sewage of Chicago and supplementing the diversion from the lake as a means of disposing of our sewage. The program of the Sanitary District for sewage disposal was fixed by the permit of March 3, 1925, and the understanding in connection with it to the extent that the Sanitary District was going ahead on the program for treating the sewage, but after the permit was issued and subsequently through negotiations with the District Engineer of the United States Engineer Corps modifications were made from time to time, whereby because the treatment of the Packingtown waste was put back to a later date, the District Engineer requested that the West Side Treatment Works be shoved forward.

5020 With respect to the sewage of Chicago south of 87th St., the study of the Calumet region in 1907 recommended a separate sewer system for the Calumet region. The work was done under special assessment, the engineers' recommendation being disregarded, and it has been built as a combined system of sewers. Therefore, with the knowledge that the Calumet River could not be entirely reversed in times of storms, owing to run-off, interceptors there have been designed large enough to take up the flow of the other sewers intercepted and to carry that flow to the point of maximum storm behind the gates at the entrance to the Calumet Sag Channel. So that the sewage, as well as the effluent, picked up from the operation of that treatment works can, with the exception of a very short period of the year, be taken into the Calumet Sag Channel and kept out of the lake.

5021 The Indiana situation is separated by a state line, separating South Chicago from the towns of Whiting, East Chicago, Hammond and Gary, an area that has developed remarkably in the last few years. The flow of sewage through the entire region enters either Lake Michigan directly or the Grand Calumet River and passes
5022 thus directly into the lake east of the State boundary, and at a point where, with favorable winds, the pollution, both bacterial and of taste, reaches the southern cribs of the City of Chicago. The pollution from those towns is very gross. Their water supply is grossly polluted, full of tastes and odors produced by phenol waste, oil waste, and other material of that type, and has to be dosed with chlorine to an extent which renders it very unpalatable.

Essentially, the sewage should be diverted from the
5023 lake and turned over to the Sanitary District. This has been discussed and the engineering department of the Sanitary District instructed to co-operate and receive effluents properly prepared within the channel.

Efforts have been made to form sanitary districts in Indiana. The water of Gary and Hammond has been chlorinated, and water filtration plants have been built at Whiting and East Chicago. But with all that the water has tastes, and is heavily chlorinated, and with the possible exception of Gary, is unable to meet the United States Treasury standards for sometimes one or two months at a time, and the whole situation is one explosive in character.

The Calumet region, through dual water supplies and the use of bad water through mains available to workers keeps alive a certain amount of typhoid as a reservoir adjacent to Chicago. It is not a pleasant situation for the community itself and is a source of apprehension to Chicago.

5025 The Crohurst-Veldee report in evidence, shows 123 industrial plants, 82 in Indiana and 41 in Illinois.

5027 A summary of the industrial wastes situation, as shown on page 27 of Exhibit No. 155 of said report was introduced in evidence. It shows the points of discharge of industrial wastes, the putrescible organic wastes, the taste-producing wastes and the ultimate point of disposal for the Calumet River, the Little Calumet River, the Grand Calumet River between Indiana Harbor Canal and Little Calumet River; Indiana Harbor Ship Canal and Grand Calumet River above entrance of Canal, and Lake Michigan.

In the Little Calumet River the putrescible organic wastes are beet wastes and canning wastes; in the Grand Calumet River, 517,000 gallons of fertilizer wastes and 1,300 gallons of glue wastes; in the Indiana Harbor 400,000 gallons dehairing wastes and Lake Michigan 1,500,000 gallons corn products wastes.

Of taste-producing wastes the Calumet River has 524,000 gallons of coke wastes, Indiana Harbor 1,800,000 gallons coke wastes and 582,000 gallons oil wastes, and Lake Michigan 4,500,000 gallons oil wastes and 672,000 gallons of coke wastes.

All these wastes are ultimately disposed of in the Calumet Sag Channel, except that of Indiana Harbor, and those into Lake Michigan near Whiting and at Indiana Harbor.

5028 **Defendants' Exhibit No. 1172**, a computation from the United States Census Report of 1920, shows past and estimated future populations of Indiana cities on Lake Michigan, including East Chicago, Hammond, Whiting, Gary and Michigan City. The totals are as follows:

1890	18,867
1900	34,620
1910	82,439
1920	156,951
1930	233,000
1940	308,000
1950	384,000
1960	458,000

5030 **Defendants' Exhibit No. 1173** is a computation made in the Engineering Department of the Sanitary District of Chicago for the years 1900 to 1927, showing population discharges into Lake Michigan by years for the Calumet district of Illinois and Indiana.

The report divides the Calumet district as between the Illinois portion and the Indiana portion and shows the total population in the Illinois portion discharging sewage into Lake Michigan at 397,555 (the maximum) in 1905, declining in an irregular but steady reduction to 174,019 in 1921, and then, because of the diversion in 1922 of several communities in Illinois suburbs to the City of Chicago, declining in that year to 67,460 and in 1925 to 35,534, by reason of other works intercepting this sewage from Lake Michigan, and in 1927 to zero, which estimate is based upon the work of dredging by the Sanitary District in the Calumet River.

The total Indiana population discharging into Lake Michigan begins in 1900 with a figure of 34,620 and increases on a steadily rising curve to 202,579 in 1926, or an estimated 210,185 in 1927.

5031 If this Indiana sewage could be treated, it is entirely practicable to take the effluent into the Calumet Sag Channel, but this has not yet been discussed, the suggestion having been made to the Indiana towns that they discharge treated sewage into the river and then by proper dredging open the waterway from Indiana into Illinois so that treated liquid could flow through the

Sanitary District channel and be kept out of the drinking water drawn from the lake by both States.

The program of the Sanitary District is to treat all the flow of sewage that passes through the sewers at time of dry weather and 50 per cent in addition thereto. The 50 per cent increase is possible with the hydraulic capacity provided in the plant and the raw sewage above that mixed with storm water would discharge into the water courses like the Chicago River and the Calumet River.

5032 As a general procedure, this amount of treatment appears to be good practice and as much as the District is justified in trying to take care of. There has been a procedure in England where a treatment of six times the dry flow has been considered, but inasmuch as it starts with a very much lower initial quantity, the net result of the final amount treated is about the same as the result of the present program of the Sanitary District. In England they are running from 35 to 50 gallons per capita. On a metered use of about 150 to 200 dry flow in the sewers, if the Sanitary District takes 50 per cent of the dry flow, it has 300 gallons per capita as a basis upon which to start.

In times of storms the untreated sewage in storm waters would flow into the rivers and canals which would ultimately carry the storm water. It has not yet been considered practicable to treat storm water on the scale of operation projected because the cost of works required for that purpose is as much as ten times the dry flow that would have to be taken care of.

5034 **Defendants' Exhibit 1174**, is an estimate of human population and population-equivalent of industrial wastes by treatment projects and shows itemized by districts the human population and the industrial population equivalent for the City of Chicago, and shows in 1920 a human population of 3,000,000 and a population-equivalent of 1,500,000; in 1925—3,355,000 human and 1,600,000 population-equivalent; in 1930—3,710,000 human and 1,700,000 equivalent; in 1935—4,070,000 human and 1,800,000 equivalent; in 1940—4,425,000 human and 1,900,000 equivalent; in 1945—4,785,000 human and 2,000,000 equivalent; in 1950—5,140,000 human and 2,100,000 equivalent; in 1955—5,500,000 human and 2,200,000 equivalent; in 1960—5,860,000 human and 2,300,000 equivalent, and in 1970—6,580,000 human and 2,500,000 equivalent.

Some industrial experts and one college professor have a much more exaggerated viewpoint on the increase of population in Chicago, but those responsible for expenditure have made a conservative estimate, because it is difficult to find where the money is coming from.

5036 There are about 55 storm overflows into the river in the course of a year, with about 360 overflow hours in varying amounts according to duration and extent of storms; and the storm overflow would carry that portion of the sewage at time of storm that did not get into the interceptors from the sewers and got out into the river past the devices for admitting the dry flow into the intercepting sewers.

The estimated treatment by tanks at the different plants testified about would be equivalent to the removal of 33⅓ per cent of the organic matter measured in biochemical oxygen demand. The treatment by tanks plus
5037 trickling filters or activated sludge process would remove 85 per cent on a similar basis of test. The removal of suspended solids is a different matter and on the tanks might run from 40 to 80 per cent, averaging possibly 60 per cent, and on the tanks and trickling filters from 85 to 95 per cent, averaging 90 per cent. The removal of settling suspended solids is higher, but that has never been determined gravimetrically.

I made a study of filtration of Lake Michigan as consulting engineer for the City of Evanston with George W. Fuller, with whom I built the first water filtration plant inside the Sanitary District, a plant of 12-million gallons capacity. Have been in touch with the operation of it since and recently I and engineering associates have enlarged this capacity to 24-million gallons per day and have operated it since.

5038 Had occasion to build, with associates, the plant in the Village of Winnetka which supplies Winnetka and Glencoe, and also a plant in the Calumet district. Have examined the situation in Chicago to determine what would be the cost of filtration in order to ascertain the costs and the funds necessary to be raised.

The program of the Sanitary District contemplates continued diversion of water from Lake Michigan. Have been unable to find any break in the program which would permit a reduction in the diversion, because even with the so-called complete 85 per cent treatment I do not see how the flow can be cut if at all until 1945. There is not sufficient treatment provided by the program prior to that time to permit it and after 1945 and even up to 1955, with modern knowledge and available equipment I do not know how the Illinois River can be kept in a proper condition without continued diversion of
5039 practically the same amount now permitted, assuming that everything goes to 85 per cent treatment. That is because of the presence of storm overflows and the carrying over of the sludge from the treatment works; that is, the finely divided suspended matter; the fact that the treatment does not produce 100 per cent treatment in the demand for oxygen in the stream receiving an effluent, and, further, from the fact that even with the storm overflows, as experienced on the Des Plaines River system, constantly patrolled, does not prevent raw sewage

from getting into the river at times, even with careful and continued operations in dry weather.

There is a further problem coming from the effect of nitrates produced by high degree of treatment and the possibility of an after effect produced by the rapid growth of organisms, which means that there is a necessity to flow, even with 85 per cent treatment, a definite diversion down the river.

The protection of water supply and sewage disposal problems has two aspects, one that of keeping the sewage out of the lake and the other to dispose of the sewage in such manner that it will not create a nuisance in the lower river system. The program of the
5040 Sanitary District was originally instituted to protect the water supply of the City of Chicago by diversion of sewage from the drinking water. That program went into effect actively in 1900 and has produced reduction in typhoid along with other causes which have been shown here in the record.

The program at first contemplated dilution of the sewage, but as time went on, as was foreseen by the planners of the work, the load reached the point where dilution would not alone suffice. Supplementary methods had to be planned and installed in the program to reduce the load upon the diluting water and so take care of the increments of population and industry. The capacity of the channel was planned for the purpose of keeping the flood discharge of the Chicago River out of the lake and required 10,000 second feet. In the present and near future at maximum flows as the city grows the flood discharge may get up as high as 12,000 second feet.

5041 The cost of filtering the water supply of the City of Chicago with the present intakes would run from about $50,000,000 to $55,000,000, and with the addition of a cross-town tunnel which is necessary might run to from $58,000,000 to $65,000,000, based on a metered program as provided under the present permit.

5043 If the diversion were now cut to zero or 1,000 second feet the effect would be to produce a very disastrous condition. It would vastly increase the pollution in the intakes and put the city in a position where with the modern methods available in such an emergency it would be unable to cope with the situation at all adequately. It would be a calamity, as a waterworks engineer would see it, and the condition is unthinkable. There would undoubtedly result an increase in typhoid fever death rates and the cases appertaining thereto, and other disease rates, as has been outlined previously in the record, according to figures that are known in the art. The entire effect would result from the vast and sudden increase of pollution at the existing intakes.

5044 The Chicago River would become a stagnant cesspool or septic tank, with the flow of sewage into it. It would revert to the conditions in what was known as Bubbly Creek before remedial measures were taken to clean that out, with a scum formation and gas bubbles, a foul condition of odor and very unsightly. The flow would be very sluggish.

In the Illinois and Des Plaines Rivers there would be no flow, except what came from the Drainage Canal, so that those cities would have likewise a very difficult time, not only at the north end system but also in the vicinity of the industrial development further south, at La Salle and Peru and Peoria. The river has in a state of nature a dry flow, which is unable to cope with the organic pollution that would be delivered into it. The condition would be extremely foul and would become a great nuisance.

5045 I refer to Bubbly Creek because it stands in my mind as a typical picture of a foul, noisome stream, grossly polluted, bubbling with gas from decomposition with an accumulated scum through which you could force a rowboat with difficulty, or even a small gasoline launch.

If the diversion were reduced to zero and an adequate time were available and funds were also available in the amount required, the works that might be installed to try to offset the situation would include a line of complete treatment of all sewage, carrying the program forward to the point hoped for in 1955, involving 85 per cent treatment of all works, not only of human population but of industry. It would involve the chlorination of the effluent from those works.

5046 For the protection of the water supply from the discharge of sewage at times of storm overflow it would be necessary to treat the chlorinated effluent, and the city would have to install filtration works in addition to chlorination. To arrive at a suitable result it would be necessary to abandon the present intakes and go to a point north twenty miles from the Chicago River and construct a new intake and feed tunnel to the present tunnels, in order to reach water that would be reasonably safe. That would cost in the neighborhood of $300,000,000, including some of the present program.

5047 If diversion were reduced to 1,000 second feet the conditions would be practically the same from the standpoint of the public health and the desirability of a safe water supply. Assuming that funds were provided, it would take from 20 to 30 years to install the works, depending on the difficulty of getting started right away and other matters that have to be overcome in such undertakings.

Assuming that new works were installed and the diversion were reduced to zero or 1,000 cubic second feet, from a public health standpoint I would regard that condition as being almost as good as it would be with the program of the Sanitary District carried out with reference to sewage disposal and a diversion of 8,500 second feet, but the present situation would be better. It would be hard to choose, but the balance is in favor of the present situation with 8,500 second feet and the Sanitary District sewage disposal program.

The principal reason why the present situation would be better is that I regard it as important to keep sew-
5048 age out of the drinking water in any form. There is an opportunity here. The situation is complicated by the presence of two rivers and the possibility of storm water discharges and the like, so that it is highly advisable to keep the sewage out of the water supply. The machinery exists for doing it and it would have to be abandoned in favor of something not quite so good.

5049 During the period of construction of works under the present program as regards the protection of water supply, it is necessary and desirable to have 8,500 second feet, because the 10,000 second-feet capacity of the Canal prevents the discharge of the Chicago River, except at most infrequent intervals.

Even with 85 per cent treatment of all sewage as the program requires by 1955, the continued flow in the Chicago River would be necessary for the cleanliness and freedom from nuisance in the Illinois River Valley. The flow in general can be taken roughly as one cubic foot per second per thousand of total population, including the industries, which is roughly 7,700,000, and that means, roughly speaking, 7,700 or practically the 8,500 now permitted.

5050 A study of this subject is being undertaken at the present time by a two-year investigation of the river. The condition in the Canal and rivers is now bad. It constitutes a condition of nuisance and has been going on for a number of years; in fact, ever since I have been connected with the District there has been a passage of solids from the Canal down the rivers lodging behind dams and creating consequent nuisance in the water pools, and the water behind the dams can be smelled for a distance of half a mile. Fish have been driven out of the upper river as far down as Chillicothe, and conditions of odor are noticeable at Chillicothe, a distance, roughly, of 110 miles from Lockport. By the time Peoria is reached the condition has cleared up somewhat, but the solids are sometimes down in the river to points considerably below Peoria, obstructing the natural flow of clean water and interfering with conditions that ought to obtain there. The problem of the lower river with the present diversion hinges on Peoria and its metropolitan area and the industries, rather than on Chicago.

If diversion were cut down to 1,000 second feet now, and if the sewage of Chicago went down there untreated, there would be a nuisance and obstruction to navigation on the Illinois River. The objectionable condition
5052 on the upper river would extend down to Peoria, with a reduction of flow. The amount of flow at present is of value to the valley as well as to Chicago. A reduction in flow would tend to make conditions worse.

I have studied the quality of water from Gary as far as Waukegan in association with my chemist and director of laboratory. Daily from the various cities have been collected intake samples of the raw water along the frontage, received each day for six days a week, resulting in knowledge of the raw water conditions as well as the water supplied in the cities and villages in the Sanitary District; that is, the North Shore District and also in Indiana. Reports are not received from all villages but from the more important ones, and there are available studies of their water supply and from the various cribs of the City of Chicago.

5053 In general the water supply of the City of Chicago is good. It meets the Treasury standard. The pollution reaching the cribs in the raw water is slight, and the cribs of the Chicago Waterworks, taking the South Side crib at 68th Street and extending north to the northern boundary of the Sanitary District, the water supply is taken from the lake quite free from pollution. Proceeding into Lake County, Illinois, the water gets worse. At Waukegan there is a condition of extereme local pollution due to the discharge of the sewage in that city into its own drinking water.

South from the 68th Street crib toward Indiana the condition of pollution gets worse. Off the Indiana shore, in the vicinity of the intakes of Whiting, East Chicago, and Hammond, there is gross pollution, making a load upon water filtration and chlorination plants that they ought not to be called upon to bear. They are near the breaking point all the time.

The water supplied in that locality cannot meet the Treasury standard at all times.

5054 The Treasury Standard is one B. coli per 100 c.c. That is approximately one-tenth of a quart. In the study of water supply the significance of B. coli is the known relation to the human being, indicating fecal pollution; so that water chemists and sanitary engineers of late years have used the presence of B. coli as indicating a bad state of pollution. The Treasury Department has done good work in laying out those standards for water used by interstate carriers and on lakes and trains on the shore. If there are more than 1 B. coli in about a
5055 glass of water, the water is dangerous.

In the City of Milwaukee they drink water with many B. coli per hundred c.c. and they seem to survive, but it is expected that if the Treasury standard is exceeded an area of trouble is entered, and if the B. coli are numerous enough there is a degree of pollution that might become dangerous, depending on typhoid bacilli and other bacilli that might produce intestinal disturbance. The presence of the bacilli is taken as an index, because they are ready of determination.

There are many other bacteria in sewage besides B. coli. Thirty-five kinds have been isolated. Many more have been found in sewage, but they have not much significance in the sewage treatment art unless the protection of the water supply is being considered with the discharge of sewage into it. The number of B. coli found in sew-
5056 age runs into the millions per cubic centimeter, between five and ten million in raw sewage.

5064 **Defendants' Exhibit No. 1178,** shows for the principal cities of the United States their population in 1920, the typhoid fever death rate per 100,000 for the years 1900 to 1926, inclusive, the source of their water supply and the method of purification thereof.

5065 **Defendants' Exhibit No. 1179,** is a map of Chicago and the Sanitary District, on which had been marked by heavy black lines those beaches in Chicago under the direction of the municipal department having to do with bathing beaches. The beaches are operated under local park departments by park boards, and there are certain private beaches. The nearest beach to the mouth of the Chicago River is the Oak Street Beach, about three-quarters of a mile north. Over five million people use the available beaches in the summer time during the warmer months for bathing purposes. The Oak Street Beach is along the Lake Shore Drive, Park Drive or Boulevard, with an esplanade along the lake front. There is a clean sandy beach there and in hot weather it is black with humanity along a frontage of nearly a mile. Bathing beaches are scattered all along the North Shore at almost every street intersection with the lake.

5068 The pollution of Lake Michigan will materially affect the condition of bathing beaches. If the sewage were allowed to go into the lake, the beaches would not be fit to bathe in, and even with a treated effluent going into the lake, there is a serious question as to whether bathing should be permitted within a number of miles of the mouth of the Chicago River.

5073 The operation and maintenance costs for 1945 on the Sanitary District program, leaving out any interest or sinking fund allowances for the retirement of bonds or the depreciation fund, would amount to $4,300,000, and that is exclusive of the cost of chlorination of the sewage.

The program in 1955, adding complete treatment, 85 per cent on all plants, would increase the cost to a little less than $5,000,000. In estimating costs exact estimates cannot be made because of the restrictions imposed by union labor in adding men that in a private plant might not be used. So that operating costs are higher than would obtain in the absence of restrictions.

5074 The additional cost for chlorinating effluents would be around $2,000,000 to $2,200,000, and the operation of water filtration plants would probably run about $1,500,000 to $1,700,000.

5077 Practically all the sewers in the Sanitary District are on a combined system. Two small villages on the North Shore have separate systems. An estimate for Chicago alone has been made and it has been found that it would cost between $250,000,000 and $300,000,000 to build an additional system for the purpose of separating storm water from human sewage. The streets and alleys would have to be torn up and there are something like 2,970 miles
5078 of existing sewers that would have to be duplicated. This estimate includes not only the cost of the sewers, but the cost of making connections to buildings, and the

like, which of necessity must be arrived at roughly. It would be more expensive on the big down town office buildings than on the smaller outlying apartments and individual houses.

In building works to purify storm water as well as dry weather flow great expense would be occasioned by the greatly increased quantity of liquid that would have to be handled. The unprecedented nature of such an attempt would increase the cost of interceptors and pumping stations and treatment works. Such a system must be regarded as highly impracticable, and I have no knowledge of its being practiced in any other large place.

With reference to the work that might be installed to compensate for cutting off on the diversion to a thousand second feet or to zero, the amount of annual operating cost in excess of the amount of operating cost under the present program would be $4,800,000 for operation exclusive of interest and other charges.

Cross-Examination by Mr. Jackson.

5422 I am referred to my testimony given before the Rivers and Harbors Committee of the House of Representatives between March 17 and 20, 1924, as follows:

> "The development of the sprinkling filter, or trickling filter, in which sewage is spread over beds of crushed stone, marked a great advance in the intensive treatment. With this process from 10,000 to 25,000 people could be handled per acre, according to the strength of the sewage and the depth of the filter. A well-nitrified effluent was produced. The stones furnished a workshop for the bacteria, which attacked the material coming in the sewage and converted it into humus, nitrifying the organic matter and delivering an effluent, which, after settling, was fit to run down the stream without dilution. A sprinkling filter, unlike a water filter, manufactures solids. These must be settled out."

I made the statement for the purpose of outlining, in a popular manner, to nontechnical men, the process that would occur in general, and not in particular.

5423 Referring to a paragraph on page 1640 of the same hearing, the following:

> "The biological processes, such as sprinkling filters, or activated sludge, when properly operated, produce a high grade effluent, requiring no dilution, in which fish can live. The effluent, further, will create no nuisance, and can be turned into a water course, even though dry, without fear of consequences. Such a process removes about 80 to 90 per cent of the bacteria. However, where bacterial removal is desired, sterilizing agents must be employed."

I made the foregoing statement before the Committee subject to the same qualification as I have stated before, to explain, in a purely general brief way, to nontechnical men, and in general, not in particular. The statement is correct in that fish were living in the effluent of the Sani-
5425 tary District trickling filters right at the filters. Young carp were living in the effluent, some shiners from Lake Michigan, and some others.

6645 LANGDON PEARSE recalled for further examination:

Direct Examination by Mr. Adcock.

6646 Defendants' Exhibit 1310 is four tables marked A, B, C and D, and B, C and D are as follows:

“DEFENDANTS' EXHIBIT 1310.

(B)

TOTAL CONSTRUCTION COSTS AND CAPITALIZED ANNUAL COSTS OF ADDITIONAL SANITARY DISTRICT AND CITY WORKS TOGETHER WITH CAPITALIZED PUBLIC UTILITIES COST AS OF THE YEAR 1955 ASSUMING LAKE MICHIGAN DIVERSION AT CHICAGO LIMITED TO 1,000 C.F.S.

Construction Cost		
Sanitary District		
Chlorination	$ 2,100,000	
City		
Sanitary Sewers	335,125,000	
Water Filtration	53,000,000	
Super Tunnel and Crib	70,000,000	
Total Construction Cost	$460,225,000	
Interest during construction	53,522,000	
Total		$513,747,000
Capitalized Annual Costs—as of year 1955		
Operating	$107,653,000	
Depreciation and obsolescence	83,127,000	
Overhead	28,593,000	
		219,373,000
Total Municipal Costs		$733,120,000
Public Utility Damage as of year 1955		186,900,000
Grand Total		$920,020,000

(C)

SUMMARY OF ANNUAL COSTS AS OF 1955 FOR ADDITIONAL SANITARY DISTRICT AND CITY WORKS.

Based on Diversion at Chicago Limited to 1,000 c.f.s.

Sanitary District and City		
Interest on Capital Cost	$ 21,834,000	
Depreciation and obsolescence	3,532,900	
Operating Expense	4,575,250	
Overhead (and interest on expended overhead during construction period)	1,215,220	
	$31,157,370	
Public Utility		
Mean Borrowing Rate (6%)	11,214,000	
Grand Total		$ 42,371,370

(D)

ANNUAL COSTS AS OF 1955 FOR ADDITIONAL SANITARY DISTRICT AND CITY WORKS.

Based on Diversion at Chicago Limited to 1,000 c.f.s.

Sanitary District	
Interest at 4¼% on $2,145,000*	$ 91,000
Depreciation and obsolescence	171,600
Operating Expense	2,220,000
Overhead	111,000
	$ 2,593,600
Municipal	
Interest at 4¼% on $511,602,000*	$21,743,080
Depreciation and obsolescence	3,361,300
Operating Expense	2,355,250
Overhead and interest on expended overhead	1,104,220
	$28,563,850
Public Utility	
Mean borrowing rate of 6% on $186,900,000	$11,214,000
Illinois Valley	
Interest at 4¼% on $15,395,000*	$ 654,290
Depreciation and obsolescence	474,306
Operating Expense	1,131,450
	$ 2,260,046

6647 These tables were prepared by me from testimony given by me, Mr. Eddy and Mr. Fuller, to show the cost of additional works up to 1955 and probable operating costs, with allowances for depreciation, obsolescence and overhead.

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*Including interest during construction on principal sum."

Referring to Defendants' Exhibit 1310-B, the figures therein given for sewers are in addition to my original statement of $250,000,000 because I have allowed an additional 750 miles to be built. These are built at a lower rate per mile, assuming they are to be built in new territory, making a total of $335,000,000 as compared with the original $250,000,000. However, Mr. Fuller testified to $300,000,000, so the figure in Exhibit 1310-B is lower than if I used his figure.

6648 With other figures as previously given, the total construction cost is $460,225,000. I have computed the interest at 4¼ per cent, which is the average rate experienced by the Sanitary District over a long period of years. The capitalized annual costs are based on operating costs as testified to by Mr. Fuller and myself, with allowance for depreciation and obsolescence on the filtration plant of 1¾ per cent; on the super-tunnel, crib and sewers, ½ per cent; and on the chlorination, 8 per cent. The figure also includes an allowance of $350,000 for the maintenance of the sewer system. The overhead is at the rate of 5 per cent. Operating expense is taken as of the year 1955, and includes the capitalization of the operating cost, both capital expenditures and operation in that year for the water filtration, sanitary sewers and chlorination.

6649 To that total municipal cost as distinct from the public utility I have added a public utility damage as of 1955, which I believe was testified to by Mr. Fuller. It was obtained in the same way that he obtained it, by taking information from Exhibit 18. It shows a figure for 1950 for damage to the Commonwealth Edison Company which I have extended to 1955 at the same rate. That makes a grand total of $19,925,020.

6650 **Defendants' Exhibit 1310-C** is a summary of 1310-D, and shows the total for the year for the Sanitary District and City as distinct from the Public Utility, giving a grand total of $42,371,370.

I included an estimate of the annual cost of the Illinois Valley, because of the additional cost of works for a flow of 1,000 c. f. s. over and above that for 8,500 c. f. s. diversion.

6688 *Recross Examination by Mr. Jackson.*

6691 The cost for the water purification plant was $53,000,000, based on 720 m.g.d. as of 1945. This esti-
6693 mated cost covered recovery of land from the lakes, connections to existing tunnels, cost of cross-town tunnel, low-lift pumping station, and the connections to the tunnels to cover a working addition to the present water works plant.

6694 The computations are built up from different unit prices for different parts of the plant, but if averaged they are roughly $40,000 a millon gallons. We have assumed that there would be four plants, with an average initial installation of 275 m.g.d. at each. Thus the initial cost for each is $14,100,000, and in 1950 there is to be additional capacity added. The total ultimate cost for 375 m.g.d. as of 1950 is $17,550,000. The cost per million gallons over all is $46,000. That is split. Exclusive of
6695 low service that would be $44,000, and we have allowed $2,000 for the million gallons of low service, which means the pumping from tunnels to plant.

The figures include the completion of purification plants, connections to tunnels and water mains, and the necessary piling and other connections. That is a single stage filtration plant with a single stage coagulation basis. If the installation were built as one plant the cost would be practically the same. It might be a little
6696 higher or a little lower. My estimates are based on what work has cost in the last three or four years, and

what we would consider a reasonable price could be obtained by letting contracts in the open Chicago market under the municipal conditions.

6697 The item of chlorination, $2,100,000, in Exhibit 1310-B, is for chlorinating the sewage effluents. It is a construction allowance for the additional equipment and housing of the same at the different main plants, based upon the capacity on a metered basis of flow through our treatment plants as of 1955. The total estimated flow is 998 m.g.d. and the first cost is estimated at $2,109,000, some of the apparatus being put in in accordance with the theory of this table at years successive from 1930 to 1955. Roughly, the unit cost is $2,100 per million gallons, but the total cost was built up from assumed costs of apparatus and housing, and not from unit costs.

6698 In the estimate for the water purification plants I did not use the cost of pumping a million gallons a foot high. I took an allowance for chargeable head and power in kilowatt hours, using actual assumed operating conditions. The figure of chlorination assumed 10 parts per million of chlorine at all plants except the North Side, and at the latter 5 parts per million. I allowed a base figure of $1,500 a machine for chlorinating, and I think

6699 a rate of 720 pounds per day per machine as a maximum, to which was added, of course, an allowance of 15 per cent for contingencies and engineering.

As to how I arrived at my figure of $2,100 per million gallons ,if a machine costs $1,500 and the application is 83 pounds per million gallons of chlorine, there are other incidentals required in such a plant. I allowed for chlorine storage, scales, heaters, switches, centrifugal pumps, piping, booths, wiring and building housing apparatus. The cost of the chlorination is a comparatively small proportion of the total cost.

6700 One of these machines furnishes chlorine for a little

less than 9,000,000 gallons, but you must recall that spare machines are required. The difference between the cost per machine of $140 per million gallons and the estimated cost of $2,100 per million gallons is overhead, if you include in that term housing, chlorine storage and other appurtenances. The overhead constitutes a large portion of the expense. As I recall, we allow a floor
6701 space of 7 by 14 for each machine. The actual floor space for each machine is 3 by 3, but there has to be space to go around it.

The super-tunnel was based on a diameter of 35 feet, or else two tunnels 24 feet in diameter for the main line from the intake in shore. The size becomes less as we go south. My computation does not show the distance off shore. The location chosen is 20 miles northwesterly from the mouth of the Chicago River approximately in 60 feet depth, and is about 7 miles off the mouth of the North Shore Channel.

6702 I figured on 14 miles from the intake to Lawrence Avenue, 5 miles from Lawrence Avenue to Chicago Avenue, 2½ miles from Chicago Avenue to 14th Street, 7 miles from 14th Street to Western Avenue, in order to reach existing connections. At the furthermost point south the tunnel is reduced to the equivalent of a 20-foot circle. I cannot say offhand whether it connects with a present tunnel that is only 12 feet, but the estimate was
6703 made to furnish the capacity which we felt was needed.
6704 The relative capacity of a 20 foot and a 12 foot tunnel would be as 400 to 144. For the unit cost of a 35-foot tunnel we used $500 a foot; for 32 feet, $350; for 24 feet $250; for 20 feet, $200. The cost was based on our
6705 judgment of what such work would cost. I do not recall that I have ever seen any actual figures of the cost of water tunnels in Chicago, though I have asked for them from time to time. I did not have the advantage of such figures in making this estimate.

The sanitary sewers are to be a separate system built alongside the present existing sewer system, the assumption being that the old system would be left for storm water. As a matter of fact, the sewers in the loop are very old and inefficient to carry off sewage and storm water at the present time. The construction of a new
6706 system is required in that district, on which there have been various estimates. I do not know of any estimate that a new system could be constructed for approximately $28,000,000. As to whether the loop is the most expensive place in which to construct a system, it depends upon what you mean. It may take the highest rate per mile, but there is a low mileage in the loop. It is the additional mileage that will build up the cost in the outlying territory. The cost per mile would be the highest in the loop.

6707 I am told that under present conditions in the loop the capacity is so small that sewage and storm water frequently backs up into basements which, of course, is not a desirable condition.

My estimate of miles of sewers was originally 2,970, based, as I recall, on mileage which existed in 1926, but in making up the present estimate I added 750 miles to take care of the additional separate system that would be required if the policy went into effect in a period of
6708 years up to 1955. The added mileage was in outlying districts which I anticipated would be built up in the next period of years. I would not as a sanitary engineer recommend that separate sewer systems be constructed in such districts under present conditions. Theoretically that would be a desirable policy, but not practically.

6709 In determining the diameter of sewers we considered a range of diameters based on typical layouts in different
6710 sections of the city. The cost was built up from costs

on different sizes, so that I cannot state a unit cost on all the sewers. I have not the costs with me. I have costs here which average from $81,000 to $121,000 a mile, exclusive of engineering and contingencies. The largest amount per mile is in the loop district. There is a difference made in our estimates for location, the amount of work that would have to be done in going into other buildings, pavement allowances and other incidental work.

6711 It is true that the cost of construction between buildings and sewers was paid by the owners of the property when the sewers were originally built, but in adopting a program of this sort I included that item in the estimated cost of the project. We allowed approximately $100 per building, and cross-connections for every 30 feet on each side of the street. The estimate of $250,000,000 is an average cost of about $84,000 a mile. That comes out lower because we made deductions for certain sewers in unpaved streets, and certain adjustments. The 750 miles of new work was added at a reduced price, because they would be in new territory and built alongside
6712 of other sewers; but in view of the fact that there would be two sets of connections required in the houses, I have assumed that the estimates made include the cost for the sanitary connection. The size of the sewers for the outlying districts would average probably less than 30 inches. I could not say offhand what proportion are less than 30 inches. Probably none are greater than 30 inches,
6713 but that might be depending on the distance they run to connect with the interceptors.

My estimate of $250,000,000 for 2,970 miles did not include engineering and contingencies. I added 15 per cent for those items. As I recall, the estimated cost for the 750 miles of additional sewers was $66,000 a mile.

6715 As to counsel's question whether 12-inch sewers in Chicago did not cost $2 a foot or $10,000 a mile for ordinary depths, it depends on what you are estimating. This is not an estimate of new sewers. It is an estimate of going in and tearing up streets and pavements and rebuilding. That is not the case with the additional 750 miles, but the figures include house connections, and certain contingent items of uncertainty as to design.

As to counsel's question whether 30-inch sewers in Chicago did not cost about $7 or $8 a foot or about $40,-
6716 000 a mile, there may have been some let by the city at or around that price. I would not care to say there have not been. I would not say that there has been a marked difference between the cost of sewers built by the city and those built by the Sanitary District, because our sewers in general have been so much bigger that there is no comparison, except on a few shorter lengths and smaller sizes.

The 35-foot tunnel is assumed to have a capacity of 2400 c.f.s. and a velocity of 2.4 feet per second. That
6717 would be 1,560 m.g.d. The cross-sectional area of the tunnel is approximately 1,000 square feet. I cannot say offhand what is the combined cross-sectional area of all Chicago's present intakes. I would not be surprised to know that it is less than 1,000 square feet, but this is a longer tunnel and therefore the slope conditions are not the same. I cannot say offhand what would be the frictional loss in the 35-foot tunnel at an average pumpage in 1955. I never estimated that, because the figure was built up to give approximately the same drop on our line that now exists.

6718 It is true that four or five tunnels with a combined cross section of 1,000 square feet would have greater frictional loss than one tunnel of the same dimensions, if they were the same length, but they are not. I would not say offhand that the present intakes are figured on a 4 to 5 foot velocity. I have stated the data on which I have figured this tunnel and the velocity. It would be smaller in bore if it had a higher velocity. I am not denying that.

6719 I cannot say whether the velocity is greater in the present intakes.

6720 I have no comparison of the aggregate size of the present intakes or their proportions, and I can only say that there is a total average water consumption now of 888 m.g.d. which would be about 1200 second feet, according to my notes, or a maximum demand of 1,450 m.g.d. As to whether this maximum capacity is met by pulling in at a higher velocity and reducing the level, it is, of course, up to the capacity of the works. The same process followed with the proposed tunnel would, of course, materially increase its capacity.

6721 The proposed tunnel provides for some enlargement of the intakes. As to whether I would consider it fair to charge that expansion of the waterworks to a cessation of diversion, I would not care to answer that question without a detailed examination of the capacity of existing tunnels, which I have not got here. If the proposed
6722
tunnel more than replaces the present facilities, that portion should not be charged.

An extension of the intakes, such as the Dunne crib and the 68th Street crib, would be an addition, and it would be somewhat of an improvement in a general way.

I cannot agree in general that many of our existing tunnels are leaky and permit the entrance of polluted water. I have heard that one tunnel, the old 68th Street tunnel, might be slightly leaky through some connections that were improperly blocked when they were abandoned, but I would not care to say that the tunnels are leaky and obsolescent. I have never examined them personally and they are not within my supervision.

I am not familiar with the report made by Mr. Gorman on the condition of the tunnels. He is an employee of the City of Chicago, and his reports go to the city. I would not necessarily feel that I should consider and investigate these questions before determining what the loss occasioned by replacing the present intakes would be.

6724 It is likely that the useful life of the proposed tunnel will be longer than the useful life of the tunnels replaced. No allowance for that is made in the estimate.

6725 In my estimate I used 10 parts per million of chlorine for the trickling filter effluent, and 5 parts for the activated sludge. This consumption of chlorine is based on complete treatment.

6726 As to whether the item of water filtration included in Exhibit 1310 is an expenditure which must be sustained by Chicago in any event, I believe that the water will be eventually filtered, but I do not feel that the filtration works will proceed as summarily as will be undertaken in this estimate. I believe that filtration will come from the standpoint of esthetic improvement of the water to get rid of the turbidity and to give another bulwark against chance pollution. It would also somewhat lessen the quantity of chlorine used. Nevertheless, I think it is proper under the conditions of this inquiry to include the cost of a filtration plant as a loss attributable to a cessation of diversion.

6727 The estimate for the filtration plant has been based on the reduction in the per capita use of water, but making allowance for the increase over the average daily consumption in the chosen capacity of the plant. In other words, I have assumed that the water supply will go on a metered basis and that after a certain period of years the consumption will begin to increase again in a slight amount, but taking account of the maximum over the average for the year in allowing the size of the plant.

6728 My estimate of $14,104,000 for each of the filter plants makes a total of $56,000,000 for the four. That is prac-
6729 tically the same as the figure of $53,000,000 given in my original testimony for 1,100 m.g.d. That is slightly more than the present consumption.

6730 I would not say that the installation of metering would cut water consumption one half. My figures show a per capita consumption considerably reduced by 1945, and somewhat increased again by 1955 to 160 gallons per capita, as compared with the present consumption of 274. I am not informed that the metering in the Calumet district has reduced the per capita consumption from 400 to a little over 80.

6731 I made no investigation of the effect of such metering as has been done in Chicago in arriving at these estimates. For the water filtration plants we took a maximum loading of 125 m.g.d.

6732 As to whether in computing the loss from abandoning present intakes, it is fair to determine the value of the intakes in their present obsolescence rather than taking the cost of a new piece of construction, my thought was that this is an additional expenditure upon the community to replace existing plants and therefore we have used a reasonable expense to estimate. I would not be surprised if the 65 miles of tunnel now existing cost only $18,000,000. It was built over a period of years and under much cheaper construction costs, and much of it was built by the city itself.

6733 My figure of operating costs capitalized, $107,000,000, in Exhibit 1310-B, is derived from the $4,575,000 operating expense in 1310-C by capitalization at 4 per cent. That figure in Exhibit 1310-C is a summary of 1310-D, in which the operating expenses are detailed. The item of operating expense in the Sanitary District of $2,220,-000 is an annual expense for additional chlorination of

6734 effluents on the basis of 10 and 5 parts per million, depending on the type of treatment. The item of $2,255,250 under the head of "Municipal Operating Expense" includes the cost of operating the filter plant with a low-lift pumping station, and the additional cost because of this super-tunnel, and an allowance for the operation of the additional sanitary sewers.

6735 I did not make any allowance to offset the present cost of operation of tunnels and cribs. Six tunnels would

6736 cost more than one. However, operation of cribs and tunnels is a very small proportion of the whole cost.

I cannot state the unit cost for operating the filtration plant, because that was built up. The total cost was $1,700,000 for an average load of 720 m.g.d. The low-lift head in the allowance for pumping was 25 feet. The allowance made for low-lift pumping was $388,000 plus 5 per cent for general overhead.

6737 The figures in Exhibit 1310 on public utilities were taken from Exhibit No. 18. Mr. Fuller used that figure of $186,900,000 derived from the table on page 244 by taking the 1950 figure given there and adding to it the difference between the 1945 and 1950 figures. I have used his testimony that $186,900,000 is a fair allowance for 1955, and also his testimony that 6 per cent was a fair mean borrowing rate.

6738 As to counsel's question whether in arriving at the capitalized annual cost of operating expenses in Exhibit 1310-B I gave any consideration to the fact that operating expenses would be increased by 1955 regardless of diversion, I made no allowance for such assumption, because I understand that this table fits in with the sewage treatment program up to 1955, and I made no allowance for increases that might come if the filter plant were built anyway. There is nothing in the exhibit relating to the present sewage program.

6739 There might be a saving in waterworks expense resulting from metering and water filtration already contemplated, but my examination has not given me the data to say how much that saving would be. There would not be a very substantial saving for the sewage disposal plant.

6741 Assuming that metering cuts the consumption of water in half, it would have caused a substantial saving, if it could have been made before our work was planned and put under construction; but, unfortunately, that does not obtain today, because part of our work has been built up on a partly metered basis, and future work taking into consideration the effect of metering. An allowance has been made in the estimates for the effect of metering on the plants which were designed without considering such effect.

I am referred to page 435 of the official reports for 1923, 1924 and 1925 of the Department of Health of the City of Chicago, in which it is stated that in July and November, 1925 there was a sharp rise for short periods in the bacterial contamination of water in the Clarendon Avenue tunnel; that the tunnel system was promptly investigated, but the cause was not determined; that it might be that water from the old Lakeview land tunnel surges across the station to the Clarendon Avenue system; that the tunnel gate at Wilson and Clarendon Avenues was found jammed, that the results of a sampling pump installed September 11, 1925, indicated serious contamination of the tunnel shaft just east of the station; that the contamination persisted throughout the remainder of 1925, and it was necessary to use quite heavy doses of chlorine. 6742

That statement indicates that it is a point that requires investigation by the proper authorities.

6743 I am referred to page 142 of the same bulletin, in which it is stated that on November 16th salt was dumped into shore shaft No. 13 on the abandoned section of the 68th Street tunnel, and that tests for salt in the South Branch tunnel were positive and showed that the bulkhead between the two systems was leaking; that a diver was sent down into shaft 13 to inspect conditions, and found a serious break in the brick bulkhead, which was plugged by bags of sand during the latter part of November; that on December 1st another test on the 68th Street tunnel from the shore side was conducted and the leakage was found to be greatly reduced; that on dewatering the tunnel the leak was found to be around the cast-iron bulkhead between shaft 13 of the abandoned tunnel and shaft 11 of the 5-foot branch tunnel to the 68th Street Pumping Station.

That is the particular place I had in mind when I told you my knowledge of the situation. It is a local place, as your description indicates.

My attention is directed to page 445 of the same bulletin, where it is stated that as the result of an unusually high contamination at the Green Street shaft an investigation was made showing visual evidences of sewage seepage through the west wall.

That indicates an unsatisfactory condition at that particular point, in the manhole. It is just a local situation.

6745 The same bulletin states that samples of water in the shaft showed gross contamination by sewage organisms; that further investigation showed there was a 24-inch brick sewer passing within one foot of the shaft wall; that the invert of this sewer was about the elevation of the seepage through the wall; that the sewer was exposed in August, 1924, and found to be in fair condition, but three house drains, one of which was within 10 feet of the shaft wall, were found leaking; that probably following heavy rainfall periods this sewer flowed full and even under considerable pressure; that grossly contaminated seepage water undoubtedly entered the tunnel shaft.

It indicates an unsatisfactory condition locally, that the authorities are curing to the best of their ability and speed. I do not see that that invalidates the entire tunnel system or destroys its usefulness.

6746 The estimates of dry weather flow in the new interceptors are based upon an adjusted flow from the new work reflecting the effect of metering. The old interceptors are those under contract up to the time when the permit was issued by the Secretary of War requiring metering. Those are based on a capacity which is somewhat under what would have been the pushed ahead figuring from existing conditions. We made slight allowance, assuming that there might be a slight effect if meters were considered; but the effect of that has been, in general, to give us structures that will have a longer life, depending on the conditions of actual flow. That is, the earlier structures were able to take care of existing conditions at that time, but since the Secretary of War's permit we are taking account of the effect of metering.

6747 If the water consumption should be reduced, you will have a greater provision for storm water in the sewers originally built, but the treatment plants are designed to take care of a definite proportion of the dry flow, so that that proportion of the sewage will not necessarily be treated, unless it proved that on the North Side plant, for instance, we have additional capacity because of lower flow and, therefore, can take that through. I cannot make an estimate of the increased capacity of storm water flow in the sewers designed before metering was taken into consideration, in the event that metering should be effective. Offhand I cannot give the figure of water consumption on which the interceptors are based.

6748 Referring to the figures of flow shown in Table 54 of the
6750 report of the Board of Review, Part 3, Appendix 1, page 88, if you are talking about capacities, this table with ref-

erence to the Calumet area is based on some allowance of flow other than what your question asks me for that particular area, because, if I remember rightly, somebody testified to 700 c.f.s. capacity at the Calumet Pumping Station.

If the population be taken from Table 52 of the same report that you are quoting as 350,000 people as of 1950, and the 700 c.f.s., be translated into million gallons per day, that is about 455 m. g. d., for 350,000 people. That is about 1,300 gallons per capita, and I think that is likely correct, because that sewer was designed purposely years ago to keep out of the Calumet River or out of the lake as much of the sewage as possible, and to put it behind the controlling works at Blue Island. It is on an entire different basis of design from that adopted afterwards with our treatment program on the North Side, West Side and Southwest Side.

6751 I would not say that that interceptor was designed to carry all the storm water, because there is a double hookup in there. A certain part of the area goes through the 95th Street pumping station. That pumps again into an interceptor going to the Calumet pumping station. In an extraordinary rainfall, if the capacity is taxed at the Calumet pumping station, we can divert the flow at 95th Street direct into the river. We have not yet found, and probably will not for many years find, it necessary to do that, but it is possible. It is also possible to discharge direct at the Calumet station.

6908 In my computation of the cost of low-lift pumping I made no credit as such for the saving in high-lift pumping due to the heads being increased, because I assumed that over the whole program the heads would be practically the same. In so far as there is any change and if there is a saving, I am willing to admit that it should be deducted.

6909 The original Calumet interceptor was laid out without any thought of metering, because it was built about twelve years ago.

6911 To the best of my recollection, we did the designing for a flow of 1,300 gallons, as previously explained. As to whether it was built to last until 1970, I can only say that we put it in without regard to the exact design on
6912 the basis of the question you have asked me of dry flow. I cannot say what dry flow the North Side interceptor was designed for, because our method of designing was not based on that factor. I have had a man working a year and a half with proper assistance developing the flow in the different areas. I cannot answer your question as you have asked it. I can tell you what flow we would expect to get at the treatment works.

6913 In 1955 we expect an average flow at the North Side works of 202 m. g. d.; at the West Side plant, 354 m. g. d.; at the Southwest Side plant, 366 m. g. d. There are two intercepting sewers running to the North Side plant, one from the territory north to the Cook County line, which is comparatively small, about 5½ feet in diameter; and one from the south, which I think is 15 feet in diameter. The North Side sewer, as I remember,
6914 was designed for between 1960 and 1970. I have not with me information on its capacity.

6915 The south sewer was built for between 1960 and 1970.

6916 The West Side sewer is estimated at the plant to be 17 feet. It is not exactly circular. A horseshoe would describe it generally. What I have stated is the horizontal diameter.

The West Side interceptor is designed for 1970, at which period the population given in Table 52 of the report of the Board of Review is 1,920,000 humans, plus
6917 an allowance of Loop population of 300,000, a total of 2,220,000 people.

The Southwest Side interceptor is laid out for a size coming to the works of 17½ feet horizontal diameter. It is designed for 1970 with a population at that date of 2,200,000 and the sewage from the stockyards.

6918 As to sewers designed without reference to the effect of metering, they will be available to take storm water to the end of the sewer, but if the treatment facilities are not provided it does not do us any good to take it there. I will endeavor to furnish the percentage of increase of capacity for excess storm water by reason of metering.

6919 In saying that sewers are designed at one and one-half times the dry weather flow, I mean in a general way one and one-half times the average dry weather flow. However, we allow for a factor of safety, and for an air space, so that the sizes are not capable of being computed without knowledge of those data.

6920 Regarding my testimony on page 5032, I did not say anything about interceptors being designed for a specific
6921 flow. I stated as a general proposition what the procedure was, and referred to the practice in England. Then I stated that estimating on a metered use of 150 to 200 gallons dry flow in the sewers and 50 per cent of that would give 300 gallons per capita as a basis on which to start.

That was not given as a basis of design, but was given because during some of the periods of operation we have estimated that on some of the old sewers we would get as low as 100 gallons per capita, and on others we would get as high as 200 gallons per capita of flow. We have in mind ultimately that when these systems are to be tested out, in 1970 or thereabouts, we are hoping to arrive at an amount of 50 per cent more than the flow; but these figures are given for the purpose of illustration and were not stated otherwise.

6922 In the case of the West Side interceptor, we estimated so much for domestic sewage, but it was built up from the different areas tributary.

6923 On the West Side there is an allowance for industrial waste, including a large portion of the tanneries on the North Branch and such additional allowances for industrial water as are shown by our survey of the territory to be required. In building up the West Side interceptor there was an allowance for infiltration of ground water, which varied according to our estimates of the character of the areas. Our computation was on the basis of acres.

6924 We allowed a 50 per cent overage for storm surplus, and then as I have explained, an additional percentage for a factor of safety, an air space. The additional capacity for storm surplus was based on dry weather flow, because, as we regard it, that total capacity is limited by the size of the treatment works.

6925 If that additional provision for ventilation was used for taking care of storm water it would defeat its pur-
6926 pose. It may fill up in time of storm, but the intention is to keep the air space there. The sewer may run nine-tenths. The interceptor capacity is not based on the capacity of the sewage plant, except in so far as the interceptor is laid out, and then the amount in excess of the dry flow that we expect to take care of is limited by the capacity of the treatment plant, because we do not build our treatment works so far ahead in capacity as we build our sewers. The interceptors were designed so that any excess of storm water would go directly into the South Branch or the Main Channel.

6929 The capacity of the interceptor is not affected by the capacity of the sewage treatment plant. There will be a difference between these two capacities until they become equal. Until they are equal the excess can be carried down to the plant, if you are willing to pay for the pumping, but it is cheaper to spill it into the river as we have designed at each of the present outlets of the existing sewers.

6932 In estimating the population equivalent of industrial waste there is no bacterial comparison made. I may be mistaken as to packing house waste, but I know we have done very little in the other wastes from a bacterial standpoint. The basis is the oxygen demand.

6933 I would not want to say offhand whether the bacterial equivalent of industrial waste would be very much less than the bacterial equivalent of domestic sewage of a population of a million and a half people. I believe that on account of the packing house problem industrial waste is a greater problem in Chicago than elsewhere.

6934 I have no information on the proportion of packing house waste occurring in Madison, Wisconsin, or Cudahy or Milwaukee. I do not see that the proportion cuts any figure, because it is the total aggregate. The seriousness in the case of tannery wastes comes from accumulated solids. I have no information on the proportional industrial load of tannery waste in Milwaukee, though I am ready to believe that they have more than Chicago.

6935 I know it has been a source of worry to those operating the plant there. My opinion as to the problem of industrial waste in Chicago was expressed without consideration of the situation elsewhere, because I believe the aggregate is the important thing.

6936 The total rainfall going into sewers may vary from as low as 10 or 20 per cent up to practically 100 per cent. We have assumed there would be from 50 to 60 per cent for certain years, which refers to the main treatment
6937 works, and in so far as the Loop is contained in that it is averaged up. It might go as high as 90 or 100 per cent in the Loop, and other points might run as low as 20 per cent. We consider the average to be 50 or 60 per cent.

6938 In so far as an average of our best judgment is hypothet-

ical, I suppose the average may be so termed. The esti-
6939 mate of 50 to 60 per cent is based on my own judgment and that of another man, from our experience of 6 to 17 years.

The storm run-off might equal 10,000 c.f.s. once in 2 years. I cannot say how many inches in rainfall per hour that would be. How long it would continue would
6940 depend on a good many factors. As to specific instances of such a flow, I am informed that one occurred in 1923 or 1924 when I was out of the city. I think it was August 11, 1923, and I think you will find it in a memorandum to the Chief of Engineers that is in evidence.

6942 I am unable to state what percentage of the total storm overflow is stronger than sewage. I have made some observations in connection with pumping station operations and in connection with the operation of treatment works and the drainage canal which indicate that storm water overflow is frequently stronger than ordinary sewage.

One of the purposes of the 50 per cent excess in design of sewers is to take care of that storm sewage. One of
6943 the effects of overflow discharge is to put into the stream deposits of organic and mineral matter which have occurred in the sewers. These are not necessarily largely
6944 grit or substances of that character. There is slightly more mineral in relation to the volatile than ordinarily, but it is a difficult matter to decide just what does happen. I do not say it is all gritty material or that it is inoffensive. It may be very offensive. I am not giving an opinion as to the bacterial comparison, but it undoubtedly does contain bacteria.

6945 The muddy appearance of the overflow is due to grit and dirt, with a proportion of human sewage and industrial waste or whatever may be coming. My understanding is that Chicago sewers were designed with a

minimum flow of 2 feet a second, and in some tight
places the design is less than 1½ feet per second. I
believe the 2 feet per second was on the basis of a sewer
flowing half full or slightly under. 1½, I believe, is the
minimum velocity of dry weather flow. These are the
6946 Chicago sewers, and not the intercepting sewers of the
Sanitary District. On the interceptors we have worked
to a minimum velocity of 2 feet per second. I think in
our Des Plaines River interceptor, on account of the presence
of rock, we used in a certain critical section a minimum
velocity of 1½ feet per second on the dry flow.

As to counsel's suggestion that the Chicago sewers
were designed for an average flow of 3 feet per second,
my recollection is that as to critical velocities the minimum
velocity is as low as 2 feet per second, and that is as
6947 far as I can go in expressing an opinion of work done
by the city over a period from 1854 to date. A velocity
of 2 feet per second or better is considered a cleaning
velocity. In tanks for the settling of sewage solids we
allow a velocity of ½ foot per second on an average, or
a maximum of 1 foot a second for settling grit or mineral
6948 matter, and for the balance of the plant the velocities
are much more, depending on the type of structure
and design. That is where the major portion of the work
is done.

6950 Chicago sewers are provided with catch basins to entrap
street dirt. I cannot say how often they are cleaned.
I believe some, particularly in the Loop district, are
cleaned fairly frequently. I believe some are not
cleaned more than once a year. That is not under the
control of the Sanitary District.

Each of the 314 sewer outlets in the Sanitary District
represents a possible storm overflow. Under present
working conditions none of these overflows can go into
6951 Lake Michigan, though if the canal were shut off there

is a possibility that at high flood water from the Des Plaines River, it would find its way into Lake Michigan by reason of the overflow near Willow Springs. The dam constructed in 1909 allows excessive peaks to go over, as I have personally seen, though it rarely hap-
6952 pens. That would occur if the gate at Lockport is raised and there is no diversion. The Des Plaines River has no connections with the Drainage Canal above Lockport, except in so far as the excess flood at Willow Springs can spill over into the canal.

I do not recall whether the Hering report of 1887 recommended a separation of storm water from sewage. I believe some recommendation was made in 1907 for the Calumet region.

Referring to the report of the Drainage and Water Supply Commission, dated Chicago, January 1887, signed
6953 by Rudolph Hering and others, stating that it is practicable to exclude the storm water from the sewers over a large portion of the future city by adopting a separate system of sewerage, and that the area north of the town of Jefferson and of the middle of Lakeview may be treated to advantage in this way, and also a large portion of Hyde Park, Lake Calumet and other adjoining towns, I do not question that Mr. Hering said that, though it was written in 1887 and not in 1927.

6954 As to what portion of the city would have had separate sewers if that report had been adopted, I cannot answer, because I have no information at hand as to the sewer system of the city at the time the report was
6955 made. As to whether the report would include all the south part of Chicago south of the 39th Street station, I know there were some sewers around 39th Street in existence at that time, and some I believe in the town of Pullman, and some in the town of Lake, but I do not have any exact knowledge on that so as to give a definite

opinion. I cannot say that three-fourths of the area of the present city would have had separate sewers if the report had been followed.

6956 There are separate sewer systems in Glencoe and Winnetka, and there is a portion of Pullman that was originally built up on a separate sewer system discharging into Lake Calumet. To my knowledge, there is no separate system contemplated in the City of Chicago. Whether such would be built in the suburbs is difficult to ascertain, because the selection of sewer types so far has been largely in the hands of village authorities, boards of local improvement and village councils.

6958 The testimony I gave on page 4969 is correct, to the effect that as we built interceptors up along the sides of the River we were able to pick up by suitable devices to a total flow of 1½ times the dry flow; that after that the liquid discharges directely into the river from practically all the existing outlets, and that such liquid may discharge into the stream for as many as 115 days off and on during the year, but the major overflows probably occur 55 times a year. I will explain, however, that that is based on a theoretical relation between the time when the interceptors would fill up and the overflow, and assumes the kind of storms. That relation would occur on an average perhaps 94 times a year, and the maximum, so far as we can determine, would be perhaps 115 times. There are, however, so-called major overflows in 55 instances. So I see nothing inconsistent in that statement.

6959 By "major overflow" I mean a decided outfall to the river, and not merely a balancing in the interceptor between the rainfall coming in and the capacity of the interceptor and what the treatment plant will take away. It is a rather difficult hydraulic question to give an exact opinion on. The filling up of the intercepting sewers was taken at a rate of rainfall of .03 inch run-off in one hour, .035 in two hours, and .04 in three hours. The .04 corresponds to between 71 and 115 storms, depending on the year analyzed. It would average 94.

6960 As I testified before, the amount of run-off was assumed to be between 50 and 60 per cent of the rainfall. As to counsel's suggestion that if the rainfall merely reached the rate taken as a basis and then immediately subsided, it would not produce an overflow, that is why I stated that is a delicate computation.

6961 To say what is the average run-off in inches per hour required for the 55 major overflows, you have to pick out the storms for a considerable period of time, and I cannot answer the question definitely. We tried to analyze the number of storms in the years from 1920 to 1924, where the data were available and it was on this that I arrived at the average result of 55 as major, which would not be balancing or just a slight spewing over for a few minutes.

6962 A major overflow results from a rainfall materially exceeding the rates I have given, and the degree depends on the extent of the actual storm. As to how long a period of time the rainfall would have to continue to produce a major overflow, that is a difficult proposition to answer. I find on this list a so-called major overflow that a storm of .92 inches produced. I also find another storm of 3 to 4 inches. I have not the exact statement of the rates in those storms.

6963 A tabulation of 56 storms in 1920 shows 332 hours of overflow. You can draw your own average. In 1921 there were 55 storms with 364 hours of overflow; in 1922, 48 storms with 329 hours of overflow; in 1923, 54 storms with 333 hours of overflow; in 1924, 9 months only, 51 storms with 291 hours of overflow. The difference between the total of 115 overflows and 55 major overflows is slight in quantity, but I would not say it is practically negligible.

Redirect Examination by Mr. Adcock.

6976 I find that the capacity of our present intakes is 1,670 m.g.d., which would be 2,500 c.f.s. as compared with
6977 2,400 c.f.s. for the proposed new tunnel. I believe that only one of the tunnels which counsel for complainants referred to as defective was from the Lake, and that the others were what are called land tunnels.

George W. Fuller, for Defendants. January, 1927:

Sanitary and Water Supply Engineering Expert.

5091 *Direct Examination by Mr. Adcock.*

New York City, engineer; member of the firm of Fuller & McClintock; graduate of the Massachusetts Institute of Technology; student in Berlin at the Hygienic Institute and in the office of the Berlin Waterworks; nine years in research work connected with the purification of water and sewage; from 1890 to 1895 attached to the Technical Staff of the Massachusetts State Board of Health; most of that time at Lawrence, where the board conducted an experiment station for study-
5092 ing methods of purifying water and sewage; from 1895 to 1899 four years at Louisville, Kentucky, and Cincinnati, studying means of purifying muddy sewage-polluted waters; went to New York and have been in private practice since 1899, making a specialty of matters of water supply, water purification, sewage and sewage disposal.

In 1906, in association with Dr. Hering, made a report to the International Waterways Commission in respect to alternate methods for treating sewage as contrasted with the dilution method for certain outlying areas, notably in the Calumet area of the Chicago Sanitary District and the adjacent area in the State of Indiana.

Employed by the International Waterways Commission to find out alternate methods for treating sewage
beyond the capacity or ability of 10,000 second feet to
5094 dispose of through dilution and diversion, which in their
instructions were accepted as a fixed fact. This was
on top of what was to be done with that particular
stated volume. In 1914 was one of the advisory engineers to the International Joint Commission in their inquiries concerning some of the terms of their reference under the treaty between Great Britain and the United States concerning the pollution of boundary waters. During the war I was in Washington as a member of a sub-committee under the Council of National Defense, concerned with engineering and sanitation.

5097 I have had occasion, beginning in 1893, to have personal knowledge of matters pertaining to water supply and sewage disposal in the Chicago area, going back to the time of the World's Fair, when I had charge of the Massachusetts State Board of Health exhibit at the Columbian Exposition.

Next I came in contact with this enterprise in 1901, when I was retained by the City of St. Louis to advise concerning the securing of an improved water supply. This involved consideration of matters at Chicago.

In 1903 I was retained by the State of Missouri in injunction proceedings before the United States Supreme Court, whereby Missouri sought to enjoin the State of Illinois from continuing the use of the canal.

5100 In 1921 and 1922 I was on a board with Mr. Eddy and Mr. Hatton as to the best means of treating the sewage for the North Side treatment works district.

In 1924 and 1925 I spent several months on the activities of the Chicago District, and was chairman of the Engineering Board of Review of 28 engineers.

The Board of Review divided into groups of ten committees, of which perhaps seven were the most important, each committee having from three to five members of the board, some relating to lake lowering levels, some relating to the Illinois waterway, some to the water supply aspect, which happened to be the sub-committee of which I was chairman, the sewage disposal committee, power aspect, etc.

The board considered the program already laid out by
5103 the Sanitary District, so far as sewage disposal is concerned. In my opinion, the program for sewage disposal at Chicago was suitable. It equals in the aggregate the performance of all cities in matters of sewage treatment.

5106 The means available for taking care of the water supply problem at Chicago are related to the five items which are generally available in getting a fairly suitable water supply. One of those barriers against pollution is to start out with pure water which does not need any purification or which is particularly protected by diversion from becoming polluted. Secondly, there is the question of taking advantage of means of purification which are natural agencies, self-purification, which is taking place in lakes and reservoirs and streams within certain conditions. Then there is the sewage treatment method of preventing disastrous effects of a pollution by treating the sewage before pollution gets into the source of water supply. Then there is water filtration, and, finally, there is chlorination. There are five different steps or lines of defense available in different cities and under different conditions.

5109 The storm overflow into the Chicago River and

into the Calumet River is a very important item in the solution of the problem of water supply, because that method of disposition of sewage in the area of the Chicago Sanitary District, as well as from Lake Michigan is intricately tied up to the question of water supply and the flow away from the Lake down the Drainage Canal.
5111 That overflow comes about when the interceptors are built, and when the sewers are discharging through the outlet. The overflow comes around about once a week on the average, depending on the frequency and intensity of rainfall, and aggregates in time during a year perhaps five per cent, roughly measured, and will equal about two per cent of the total volume of sewage which goes through the sewer outlets in the course of a year. For a long time these outlets are going to discharge this sewage under certain rainfall conditions. Sometimes that volume, as with the Chicago River outlets will equal about 11,000 cubic feet. I mention that to indicate in the first place that it is roughly the carrying capacity of the sewers of Chicago when they are all running full. It also happens to be roughly what the carrying capacity of the drainage canal is, which is roughly 10,000 cubic feet per second. That is why Mr. Hering and his commission recommended that the canal be built at a certain depth and width, so that under the Act of the Illinois legislature in 1889 they should be receiving 10,000 cubic feet per second of diversion to prevent the polluted water of
5112 the Chicago River from going into the lake. That 11,000 second feet is larger than the flow would have been under the former conditions in 1887 and 1889, when the Act of the legislature was passed.

If this storm flow cannot be diverted, it is necessary to consider what can be done to minimize or lessen the evil coming into a water course which is a source of water supply. That brings in the question of chlorination and

what is spoken of as sterilization, the attempt being to apply liquod chlorine to that storm flow in order to destroy the bacteria or the germs which would cause typhoid fever and other diseases of an intestinal order. This particular chlorination has for its efficiency a very important prerequisite; it is necessary to add 150 pounds to a million gallons of that storm flow, and it is neces-
5114 sary to provide that there shall be a certain excess, say, for illustration, 10 pounds to a million gallons. So that if they would add 130 or 140 pounds the efficiency could not be relied upon. It is necessary to add that excess to get a good sterilizing method which can be relied upon.

There is a rapid variation of flow as to quantity and a rapid variation in the quality of these storm flows. That is sufficient to prove to those who have had experience in recent years that it is simply unmanageable to get that excess flow effectively adjusted so as to destroy the bacteria in these storm flows. That being so in general, it is more than so in Chicago, where they have more than 250 of these sewer outlets that are discharging into the water courses. So the treatment of these storm flows, in the absence of adequate means of diversion, means a very serious health problem in relation to the water supply.

In the event of the diversion being decreased to zero or 1,000 second feet, assuming that funds were available, there would have to be added to the Sanitary District's project to protect the water supply and to dispose of sewage a sterilization item; that is, arrangements to put chlorine in the majority of the sewage. As the dry weather flow goes through these treatment works, there is 50 per cent of additional quantity, being in part a mixture of storm flow and dry weather flow and sewage.
5115 This could be subjected to sterilization. Then there could be built water filters for the water supply of the

City of Chicago, and intakes could be extended by additional new tunnels so as to get the water at the most distant point from the shore.

I have studied for some time the question of costs of these additional works. The cost of the sewage treat-
5116 ment program to 1945, as recommended by the Board of Review, and on the basis that all water is to be metered, would be $145,000,000 in round numbers; that is, $25,000,000 more than the Board of Review estimated.

5117 Referring to Table 17 on page 62 of Defendants' Exhibit 1157, the sum of $115,000,000 expenditure for the program of sewage treatment to the year 1945 does not include the last three items shown on Table 17. I estimated that for additional works to complete the program up to the year 1955, that is, so that all the dry weather flow of sewage can be subjected to so-called complete purification, would bring the total item up to $187,000,000 in round numbers, including an item of $30,000,000 which I have taken as the cost of sewage treatment works put through December 31, 1924, which was the period when the Engineering Board of Review was actively considering these questions two years ago.

In addition to the sewage treatment works, I have looked into the question of water filtering plants and apparatus, and find that amounts to an item for the city, but not for the Sanitary District, of $53,500,000. That involves only a sufficient installation to connect the filter-
5118 ing plant with the existing water system, and does not make for any general benefit to the city waterworks, except as it relates to water filtration.

I have looked into the question of water tunnels, and in summing up the figures it provides for an item of $20,000,000 for the extension of the three principal tunnels of the city to go about 20,000 feet additional distance out into the lake and connect with the intake cribs.

5121 I have noted also in a rough way what would be the cost of providing a super-tunnel, getting one tunnel off Wilmette at the northerly limits of the Sanitary District for a distance of, perhaps, 8 miles into a 60-foot depth of water, which location would be 20 miles from the mouth of the Chicago River. That would cost $70,000,000 for a tunnel under the lake and the land tunnels which would be required in order to bring the water down north and south through the city and make available the existing waterworks and pumping stations, and making arrangements for supplying water to the southerly limits. The sum of these different items would assume substantial proportions; the full sewage treatment program up to the so-called 85 per cent of purification, and with the extensions of plants as required through to the year 1955, with the water filters, the total sum in round numbers
5122 would be $240,000,000. Adding 20,000 feet of extensions to the three major tunnels of the city would bring that $20,000,000 higher, or to $260,000,000. If, instead of building tunnel extensions, there would be built this so-called super-tunnel at Wilmette, the total item would be $310,000,000. The operating cost of the water filtering plant and the pumping which would be necessary to get the lake water to the filters would amount, in round numbers, to $1,620,000 a year on the basis of an average consumption of 720 m.g.d. The cost of operating the sewage works would be about $4,300,000 in 1945 and $4,900,000 in 1955.

Miscellaneous work required, such as bridges, highways, settlement of Illinois Valley overflow claims, contingent projects, including the Sanitary District's share of cost of lake level regulating works, and a small item
5123 for discount, which is apparently a balancing figure to give a rounded figure of $125,000,000 on page 62 of Defendants' Exhibit 1157, has been excluded from my tes-

timony of a total of $310,000,000, $260,000,000 and $240,000,000.

Assuming a reduction of the present diversion to zero or 1,000 second feet, the installation of complete sewage and water purification works as I have outlined, from a public health standpoint the conditions resulting would not be so good as would exist with a diversion of 8,500 second feet or substantially that amount, and the installation of sewage purification works such as the Board of Review has recommended. The reason is there would be a pollution reaching the intakes of the City of Chicago water supply. During dry weather periods if there were no diversion there would be all the sewage from this large population which would get into the intakes, controlled largely by temporary currents which are induced by wind and weather conditions.

5132 The extent to which those currents would bring the pollution from the mouth of the Chicago River in dry weather is very difficult to estimate. It would probably vary with the different intakes very markedly on the same day. During the storms there are indications that the water can be driven by currents for 12 or 15 or 18 miles, or even farther distances, and that is the essentially weak link for all of this polluted material, perhaps infected material.

5133 In times of storm, winds will drive this pollution to the intake, and it is then that the element of danger comes in, with all filter plants in service by overloading them to a point where with any mishap there would be some of the objectionable bacteria pass on through the filters and also a chlorination process.

In addition, if the tunnels are to be moved roughly four miles out it would lessen the frequency of the times when currents would drive the water from the mouth of the Chicago River to the re-established intakes. Even in the case of the super-tunnel off Wilmette, twenty miles from the mouth of the Chicago River, I do not doubt that there would be currents which would carry the polluted water to such intakes.

The question of efficiency of operation comprises the question of lapses in performance and the weak links in the chain of purification works subject to human control. The whole question comes back to the question of pure water being really better than purified water. Innocence
5134 is better than repentance. The more I have seen of the frailties of human nature particularly in municipal works, the more convinced I am that pure water is better than purified water.

During the period of construction of the alternative method of a complete replacement of the present sewage and water projects a diversion from Lake Michigan would be required unless all risks of pollution of water supply be taken. If diversion is cut down there would certainly be serious trouble in the Chicago River.

During the ten years required for building these waterworks there should be diversion to prevent the discharge of storm flows out into the lake. If the diversion were cut down, the public health would be affected through the pollution that would come at times through the intakes and it would overtax the ability of chlorination devices regularly to produce a water which would meet the United States Public Health Service tests, which limit the B. coli content in water which may properly be used in interstate commerce.

As to the effect on the Chicago-Des Plaines-Illinois River, if there should be a diversion of, say, zero or a thousand second feet, there would be a large accumulation of organic matter sent into the branches of the Chicago River so as to make a set of open sewers or cesspools or septic tanks, from which would emanate serious odors, and there would accumulate at places on the bottom of these water courses banks of sewage mud. These accumulate during the colder season and in the summer time when the weather is warmer they putrefy and cause a gas-lifting scum and objectionable odors. It would menace property interests and cause some kinds of property devoted to certain purposes to be abandoned, as far as those particular uses are concerned.

5136 Going down the Canal, these conditions would continue in substantial form. If there were 1,000 second feet diversion the situation would differ from the zero diversion. Below Lockport, if you had zero diversion, that would end it, so far as the Illinois Valley is concerned. With 1,000 second feet diversion it would produce worse conditions in the Illinois Valley than now exist, by which I mean there would be foul odors; the sewage solids would move on down the waterway, and conditions would be very unsatisfactory from the standpoint of riparian owners. I do not see how fish life could be restored or how there could be any freedom from objectionable conditions. They would become worse.

Respecting the setting up of a canalized river with more locks, I think that would tend to accentuate the objectionable conditions in the upper stretches of the lower river system below Lockport. It would cause solids to be deposited and they would putrify there, and it is quite likely that at times would be better conditions down toward Peoria, but at times of storms in the Des Plaines River all those solids would be moved on down. They would not go towards making a betterment of these conditions, but they would grow worse. There would also be in these lower basins quite a tendency for growths of what is called aquatic or microscopic life, so that with a clear sewage you might get quite a line of objectionable conditions in that respect. It would create a very serious overburdened water course.

5139 Assuming that the diversion continues as authorized at present during a period of construction of the alternative methods of handling the water and sewage problem as described by me, the diversion from Lake Michigan from a public health standpoint could never be reduced to 1,000 second feet without affecting the water supply of the District because of the storm flow. I do not believe it could ever be reduced on account of the storm flow. I am aware that filtration and extension of intakes would handle reasonable loadings as regards pollution, but after installation there are elements coming from flood flows where winds will carry dirty water fifteen or twenty miles and adding to that the question of failures and weaknesses and breaks and lapses incident to operating filtration plants. I am familiar with these faults of operation and know that there are times when the efficiency of filtering falls off materially.

5140 Storms bring to a filtering plant water which needs a change in the amount of chemical treatment. This may happen at three o'clock in the morning with a sleepy attendant, to whom that line of work is an old story. They do not make the adjustment. The pollution gets away and goes into the water supply of the city. They do not know it. The citizens do not know it. They drink it. There are unfortunate results, dependent on whether the water or its bacterial content happens to carry disease germs.

There is another fault that comes from breaks in pipes and connections and arangements which cannot be immediately corrected and sometimes are not detected.

5141 There is the question of efficient maintenance. After a long period of use filters get out of condition. Failure to make current repairs as needed causes a portion of the sand bed to become entirely impervious. Wash and the water fails to clean that sand or disturb that mass, causing the filters to get out of condition. It becomes larger and larger. The water does not penetrate it. The time comes when if the water should go down at the average rate of two gallons per square foot there is a falling off of efficiency.

The people to whom the operator in charge reports
do not realize the importance of such conditions, and
that raises the fourth weakness, the failure of adminis-
trative or executive authority to support the operator.
There is also delay in making extensions. A good many
plants in this country after the armistice being operated
in this country got far beyond their limits. They ought
to have been extended and were not. These things are
5142 constantly being encountered in the line of my work
as a sanitary engineer. After ninety days of operation
they may need thorough cleaning, but it almost al-
ways comes within five or six years. As to the compe-
tition for funds, it is a perfectly normal and natural out-
growth of our type of administration. Sometimes a
health department checking the bacterial content is more
enthusiastic about getting money for a hospital, or for
establishing a larger laboratory in its own department
or in supporting a friend in some other branch who is
interested in the park department or in some other de-
partment of the city, than in a water filter or sewage dis-
5143 posal plant. I have encountered in the last few weeks
specific instances where it was impossible to get exten-
sions at the time when it was of the greatest importance
from the public health standpoint.

5146 Referring to the five barriers or lines of defense against infection of water supply, the most nearly practicable one is that one which provides naturally pure water protected against pollution, which is better than any line of defense in securing a hygienically safe water supply. Pure water does not carry hazards or lapses due to errors or unavoidable mistakes which occur in the operation of purification plants.

5151 *Cross Examination by Mr. Jackson.*

5159 The activated sludge process will behave in a generally similiar maner to the trickling filters, but be slightly more efficient, depending upon operating conditions. That would apply to the consideration of all the various tests which have been discussed in relation to the trickling waters.

5160 Modern activated sludge plants have removed 98 per cent of the bacteria. That is the Milwaukee standard, and is the standard they seek to obtain.

5161 I have no information that at Milwaukee they have ever failed to obtain 98 per cent removal, but my information is that while they have been running this plant at half capacity, as they have been for a year and a half, they have been making that standard.

Chlorination of the effluent of any one of these processes of sewage purification would remove objectionable bacteria, if applied in a careful way. With an activated sludge plant operated with an efficiency of 98 per cent removal of the bacteria, followed with complete chlorination of the effluent so as to have some residual chlorine in there, there would be a removal of over 99 per cent on all occasions when there is a real excess of chlorine in the effluent; and would have no other marked effect on the effluent than the reduction of the bacteria content. The remaining organic matter would be slightly affected by this powerful oxidizing agent, but I do not believe it would measure in units of organic pollution. The amount of chlorine added is too small. I do not know that it has been established that chlorination of such an effluent does substantially and materially reduce the B. O. D. demand of that effluent. There is a tendency in that direction, but it has never come within my range of observation.

5163 Chlorination of the effluent has not been recommended by me to be added to the sewage program of the Sanitary District, because that sewage program is also related to the question of diversion to keep storm flows out of the lakes, and from that angle this program would be developing through a period of ten or twenty years and there would be no occasion for it, because the effluent would go down the Canal and down the Illinois Valley.

5164 The diversion of the sewage away from the lake and into the Illinois Valley is a function of the program to protect Chicago's water supply, and if the diversion were stopped or reduced to very low quantities, sterilization or chlorination of the effluent of the works which were built under this program would be a thing to be done, or desirable.

If the sewage from a population of 10,000,000 people were treated by the activated sludge process to the highest degree of treatment which is practicably possible, followed by chlorination of the effluent so as to obtain a removal of 99 per cent or more of the bacteria from that effluent, the polluting effect of the effluent from 10,000,000 people upon the public water supply would not be any greater than the discharge of untreated sewage for a population of 100,000 people, mathematically, but the question has to be considered in the light of the lapses.

5165 It is a fact that the City of Cleveland turns practically all of its sewage in a raw state into Lake Erie opposite the intake of the city water supply at the present time. They seek to remove some of the settleable solids to a limited extent, but there is no removal of any of the

settleable solids from the sewage which is discharged
from the Cuyahoga River opposite the intake of the
5166 Cleveland waterworks. It would surprise me if 65 per
cent of the sewage of Cleveland comes down the Cuyahoga
River.

5167 Whether the City of Cleveland, taking its water supply
from the Lake about 4½ miles off shore, from the outlet
of the principal sewer of the City of Cleveland, having
at the same time water purification, has met the
Treasury's standard for pure water supply for the last
two years I do not know; but I do know that the overloading
5168 is only following floods. The trouble in 1925
or 1926 was only when heavy floods came. I do not know
whether they came in those years or not.

In October, 1925, the B. coil index for the water at the Division Avenue filtration plant was not within the limit of 1 to 100 c.c., and there is a note that the filters were down and out of service for two days; that the effluent was 25 for 100 c.c., and the chlorinated water averaged for that month 15 for 100 c.c., at Division Avenue, the older of the two filtering plants. The situation at Cleveland, with reference to sewage disposal and water purification plants is worse than was indicated on the basis of 99 per cent bacterial removal of a population of 10,000,000 people, providing purification of the water supply, in the sense that Cleveland does not get the removal from the treatment arrangement they have, but they do get into the same trouble I have been trying to make plain, and that is overloading. The Cleveland sewage system handles the sewage of approximately 1,000,000 people.

5183 In comparison with the conditions that now exist in Illinois River treatment of all the sewage of the Sanitary District, so as to remove 95 per cent of the settleable solids, would improve materially the formation of sludge banks and would eliminate future increments of such sludge banks, but would not remove present accumulations.

5199 Generally speaking, it is true that water purification is based upon well-known and well-established principles. For example, I designed or advised the designing and the installation of water purification works at Cincinnati, dealing with the Ohio River, which was badly polluted, and ever since that plant was placed in operation in 1907 it has constantly turned out an effluent that has met the Treasury's standard, and that performance has been equalled in other parts of the country.

5200 Breaks and inefficiences in such plants come through failure to have variations in chemicals—speaking of coagulation—necessary in order to get efficiency of the so-called rapid filters. With sudden changes in the quality of the water, it is necessary to add 25 per cent more chemicals, sometimes at three o'clock in the morning, and sometimes the best of instructions on the part of the technical supervisors are not carried out.

5201 Physical breaks will also come in, and they are, of course, a danger, especially if there is any very sudden increase in the amount of pollution, and there is need of instantaneous adjustment of the chemicals and the whole treatment process of the water. If that is not adjusted it is unfortunate and sometimes there will be lapses which are serious. The change in the lake water would be as great as that in the case of the Ohio River, or greater, because it would depend in large measure upon the effect of these variable currents introduced by wind.

5202 The opportunity for taking the operating personnel of a filter plant by surprise would be markedly greater in a plant operating with lake water than it would be for the Cincinnati plant on the Ohio River. Of course, 5203 wind shifts can be observed, and they do not affect currents in the Lake for several hours, although pollution at the mouth of the Chicago River could be taken to the filtration plant in a very few hours. The current of the Lake has a definite mathematical ratio to wind velocity, sometimes several miles an hour.

5205 At times, although the figures of the test that I made years ago have escaped my memory, it is as much as four miles an hour. The wind moves a mass of this polluted matter along the surface of the lake in a certain direction. With shifting winds, it breaks up that mass of polluted water and sends prongs out in different directions. There would be no advantage in determining the probable change in degree of pollution in Lake Michigan over the conditions in the Ohio River, unless it be assumed that the water is always going to be polluted at a certain wind velocity. Real benefit could be gotten, of course, from readings of wind movement in advance of the effect on current.

5206 Three or four filtration plants would be necessary in Chicago, if the existing tunnels be used. If extra units are provided, (and it is usual to so provide), it is feasible to shut down each filter unit or more than one and go forward with the balance of the filter units.

5208 During the early life of the plant, probably no large percentage of the 250 units would go out of commission at the same time, but after a while, after wear and tear, these plants deteriorate, there comes a time when it is necessary to thoroughly overhaul them. There is also the question of funds, which is a very serious difficulty. Deferred maintenance is a very common experience in municipal undertakings.

5209 The use of chlorination is a factor of safety, rather than a bigger part of the normal process of removing objectionable bacteria. The testing of the chlorine content and proper amount is simple, but when the quality of water is considered it is sometimes difficult to do it adequately, and unless there is excess chlorine in an amount so that it will be in excess for ten or fifteen minutes or longer, the benefits of that chlorination are not what may be expected from scheduled performances, if there is a sudden load of bacterial pollution or infection that gets by the earlier lines of defense and goes through the filters.

5211 Water filtration plants are successful, generally speaking, and are a great help where it is necessary to deal with polluted water. They are ordinarily constructed on a single stage, that is, just a single filter, one unit and only one. They have coagulating and settling basins in which, after the chemical is applied the water is prepared for filtration. After the water passes through the filter it is usually chlorinated and goes through a basis holding several hours' flow, the purpose of which is to equalize irregularities of pumping. It is possible to put water through a filter twice, and it is done in some places, which gives a better effluent.

5212 With a large water purification plant of suitable size under competent technical supervision, there is practically no danger, except in the unusual period of the weak links in the chain, such as times when storm flow will get out into the lake and be carried fifteen or twenty miles, and the volume of pollution per unit volume of water will overload the capacity.

5213 If an intake were located twenty miles from the mouth of the Chicago River, pollution at the river mouth would be greatly purified by the time it reached the purification works. Ordinarily, the resultant wind would have to be in the direction of the intake, although the wind may have been variable. There would have to be a wind for a sufficient period of time to create an appreciable current, so that in the first instance the difficulty would only arise in the case of a storm reversing the Chicago River, and the frequency of that would depend upon the diversion. These storms come on the average about once a week, and vary in intensity. Once a year the run-off would equal 10,000 second feet, if my recollection is right. Six or eight times a year it gets up to 4167 c.f.s.

5214 In such conditions, to have pollution carried toward the water purification plant off of Wilmette, it would be necessary that the wind should be blowing at the time of that storm substantially from the south. That would be relatively infrequent, but when the volume of storm flow is less than 4,000 second feet there would still get out into the lake a very great deal of very polluted water. In dry weather, if there were no diversion and all the sewage would go into the lake, there would be zones of polluted water some distance out, and the wind would drive it as far as twenty miles. This is true both with raw sewage, as well as the case during the next ten or fifteen years. Assuming the treatment works and chlorination, there still would be in times of storm real quantities of pollution going out, and there would be some pollution in the lake shore water at all times.

5216 With complete treatment of all of the sewage of Chicago, followed by a chlorination of the effluent, so as to remove over 99 per cent of the bacteria, there would be at times pollution at the intake off Wilmette in dry weather, but it would be very infrequent, and it relates to the storm or flood periods.

Ordinarily there would be 250,000 B. coli per cubic centimeter in raw sewage. 99 per cent would be removed, which is a maximum more or less theoretical, and that effluent that came out of the Chicago River would be diluted, and would also be polluted with storm flow and sediments. By the time that pollution had proceeded twenty miles in the lake it would be still further diluted.

5222 Assuming the removal of 95 per cent of the bacteria, the installation of controlling works at the mouth of the Chicago River, the location of the water intake off Wilmette twenty miles from the mouth of the Chicago River, the installation of a water purification plant coupled with chlorination of the effluent of that plant, I think safe water would be gotten, because pollution would be kept out of Lake Michigan. Without the existence of the controlling works and with a diversion of 1,000 second feet, the City of Chicago would in general have a safe water supply, subject, however, to the storm flow situation, which is serious at times.

5223 Assuming the same conditions, without any controlling works, except that the regulation of the flow through the Sanitary Canal is at the junction with the Chicago River instead of at Lockport; and assuming the opening of that control to permit a large flow in time of storm, I believe
5225 that the water supply would be safe, except from flood conditions. There would be more water coming from the North Branch of the Chicago River and from that end of the Chicago River system out into the Lake, and it would make more frequent and probably more intense the weak links referred to. The assumption as to the condition in normal seasons, with an effluent from which bacteria have been removed to the extent of 99 per cent in all the cases that have heretofore been assumed, is the same so far as
5226 the condition of the effluent discharged into the Lake is concerned; but the storm flows, which occur in the aggregate of about five or six per cent of the time in the course of a year, are going into the Lake, if they are not barricaded at the mouth of the Chicago River, and that is the time when there will be practically no sewage treatment at all.

5227 Even with controlling works at the entrance of the canal and a movable gate at Robey street, the entrance to the Drainage Canal, then, the North Branch of the Chicago River is like the stem of the letter Y. One arm would be through the end of the Chicago River into the Lake, and the other arm of that Y would be five miles away at Robey Street. Without entering into precise hydraulics, it seems easier for that flow of the North Branch to go relatively a short distance, less than one mile, out to the Lake, than to go a distance of some five miles to Robey Street, even with the gates open at Robey Street, on account of the inertia of the water in that five-mile stretch.

5229 Assuming a complete treatment and chlorination removing 99 per cent of the bacteria in the effluent, the construction of a separate storm sewer system, no diversion of water from Lake Michigan whatever, location of an intake off Wilmette twenty miles from the mouth of the Chicago River, the water supply of Chicago would be safe, based on a separate system of sewers which would convey all household wastes to a sewage treatment plant to be subjected to these degrees of purification, and eliminating storm flows going through existing sewers, and having no mixtures of household wastes or discharges of a fecal nature in them. Theoretically, under those conditions, you could get a treatment of all of Chicago's sewage in the way assumed, and that would eliminate the storm flows, because the existing sewers then would have no household waste in them, and that would stop the pollution of the Lake. I do not believe that under those circumstances there would be enough objectionable bacteria in that effluent to move twenty miles to be an overloading on a modern purification plant that would take water from that source.

5231 Having in mind the above assumption, and the fact that in 1924 there were under present conditions seven or eight reversals of the Chicago River, present conditions otherwise to be the same with respect to the treatment of Chicago sewage and the location of the intakes and whatever treatment there is of the water supply today, as it now actually exists, with water supplies furnished under the conditions suggested, they would come in the same general class, and it would then be a question of measuring the freedom from the pollution on the one hand as against the adequacy of filtration with a not excessive loading on the filters on the other.

5232 Assuming the completion of the sewage treatment projects recommended by the Board of Review, with a diversion of 1,000 second feet, the construction of the supertunnel and the relocation of the intake off Wilmette, chlorination of the water supply thus secured, hygienically, the water supply would not be as good or better than the present supply, because one-fourth of the sewage at all times during dry weather would be going out into the Lake, and storm flows going out there, which would throw at times more of a load on the filter plant and purification plant. The effect on the possibility of pollution or severity of any pollution which might occur on the changing or removal of the intake to the position of 4½ miles off Wilmette and twenty miles from the Chicago River, would result in lessening the effect of the pollution greatly. I took that factor into consideration, and with that in mind, my opinion is still the same.

5233 Assuming that the storm flows are a burden to a purification system even with the intake from this supertunnel, with a diversion of 1,000 feet, a completion of the sewage program recommended by the Board of Review, filtration and chlorination of the water supply at the suggested Wilmette intake, the burden of the pollu-
5234 tion from storm flows would still obtain in these slugs of sewage going out into the Lake fifteen or twenty miles, not with any degree of frequency, but still existing. With

a filter plant in operation it would take care of the pollution under ordinary circumstances, but I still believe, that under those circumstances the water supply would not be as good or better than the present.

The reversal of the Calumet River in storms in the vicinity of the 68th street crib is one of the things I am relying upon for the travel of sewage in time of storms. It is my opinion that there can be and have been effects of sewage pollution of Indiana Harbor at the Carter Harrison crib twenty miles away.

5235 Assuming the foregoing conditions, except the complete treatment of all the sewage of the Sanitary District of Chicago, the only way in which the change in assumptions would bear on this question is that more chlorine would have to be used, assuming that all the sewage would be put through Imhoff tanks or activated sludge and settled. It would not be 85 per cent complete treatment, but somewhere about 33, as far as removal of solids is concerned. You could chlorinate such an effluent and it would not change my opinion It would simply change the amount of chlorine to be added, and would still leave the weak link of the storm flow periods and the ability under certain unusual conditions to cause or permit the flow of pollution to go as much as twenty miles. The assumption of 85 per cent treatment of all sewage in connection with other conditions is not a factor in affecting my conclusion, because it simply affects the amount
5236 of chlorine. It is, of course, a little easier and a little cheaper, and a little more satisfactory to apply chlorine to a sewage that has been well treated up to 85 per cent, but it is practicable to apply chlorine to a sewage that has been treated only to a 33 per cent stage and settled. The bacteria removal would not be as great, but that relates to the dry weather period. It does not direct itself to the weak link, which is the storm flow period, except where a separate system of sewers is built.

5237 At times the water supply of Chicago, under present conditions, is turbid with silt that comes from the silt deposit on the bottom of the lake. It is not clear water for several months each year. Chlorine does not improve the appearance of it, although treatment by chlorination tends to remove the objectionable bacteria. The recommended program of sewage treatment does not improve the appearance. If you remove the intake further away you have sixty feet in depth, instead of forty, and the winds that would stir up the bottom of the lake would
5238 be very much less frequent in occurrence; 55 to 60 feet is the depth at which the wind most severe in intensity ceases to have an influence in causing turbidity, but the water has become turbid nearer shore, and it would be possible to avoid the turbid water and get an entirely clear water eight or ten miles from the shore. Filtering would take out that turbidity, under ordinary circumstances. Regardless of sewage disposal, I believe that water ought to be filtered from the standpoint of getting a good, clear, satisfactory, palatable water. It would also improve the condition under which a safe water hygienically could be had.

5240 Any city located on the Great Lakes, the sewage effluent of which must be returned into the lake from which the water supply is taken, is sure to encounter real difficulties if it does not get its financial program on a proper basis. Whether such cities will encounter real difficulties, or limitation in growth on account of these difficulties, I feel puzzled as to how to answer. From an engineering standpoint these things can be managed, but the thing that is most serious is whether plans are set in motion sufficiently early to avoid serious pollution. That is probably the situation at Cleveland. I have been studying the Toledo situation for the last year. The day has gone by when a city of less than 1,000,000 people can put sewage partly treated into a lake and take water out of it, and get it of satisfactory quality. The people have been thrown off their guard by putting the burden of work onto chlorination devices. That is why the United States Public Health Service has jacked up its loading for B. coli in these waterways from 500 B. coil, to which I testified in 1914, to a statement that it should be 100 B. coli with filters alone, 600 with the two together. There are times when you can get from these records 10,000, 50,000, and even 100,000. The day is coming when the weak links are going to get away in a manner that will be very prejudicial to the public health. While these things can be built in a reasonable period of time, the administrative and financial difficulties get to be real burdensome.

5241 It is perhaps true, from an engineering point of view, that the growth of cities may not be limited by difficulties of sewage treatment; but it means separate systems of sewers that may cost $300,000,000. It would tax the patience of the people in ripping up every street in the City of Chicago and the replacement of the sewer system. It would mean changing the connections from the street sewer into the house, in some cases a shifting of the household plumbing in the household or office building. $300,000,000 is not a sum at all extravagant for that particular purpose. The question of how long it would take to do it is the thing the people would not stand for. I am asked academically if that can be done, I will say yes, but in my judgment it is not practical.

5243 If you start early enough with the assumption that there were no Drainage Canal in Chicago and no possibility of constructing one, the sewage question of Chicago could be handled with safety to the Chicago water supply, but it would still leave the question of purified supply as against the pure water supply, which no doubt would develop and would be prolonged for a term of years.

5244 The City of Cleveland has a combined sewer system. I am not of the opinion that the future growth and development of Cleveland is either limited by the sewage question or contingent upon the construction of a separate sewer system. While I would not attempt to give an offhand opinion, I know they are coming to a point where their water filter is subject to very serious overloading, with practically no treatment at all at Cleveland, except they are putting in chlorine for about three months of the year to protect bathing beaches.

5250 I have never taken the position that sewage pollution reaching the intakes must necessarily have traveled in a bee-line from the mouth of the Chicago River. With an intake north of Chicago the sewage might go directly east from the Chicago River and then be carried by shifting winds to the southeast of the intake. Engineers who have studied this question have not been able to get the weakest link in the chain, because it is not practicable in severe storms to go out and collect samples. In a study made for the City of Buffalo, in regard to locating a new intake, it was thought that water coming from practically the middle of Lake Erie would go down there without the effect of the pollution at shore.

5256 **Harrison P. Eddy**, for Defendants. January, 1927:

Sanitary Engineering Expert.

Direct Examination by Mr. Adcock.

5262 The Chicago problems of sewage disposal and protection of water supply are peculiar, due to the proximity of Lake Michigan and the large amount of water available for dilution of sewage. The opportunity of diverting the sewage away from Lake Michigan is a very unusual condition. The low divide made it feasible to build the Canal and divert the sewage away from the city. The flatness of the country tends to reduce the rate of run-off during storms, and the size of the Chicago River made it feasible to divert the entire flow of the River through the Canal away from Lake Michigan. Another peculiarity is the size of the District, with a population of some 2,500,000, which is a very important factor with reference to the pollution of the Lake and the disposal of the sewage.

5263 The small run-off of the Chicago River makes it possible to divert it away from the Lake. The amount of diversion from Lake Michigan is measured by the maximum run-off necessary to keep the sewage out of the Lake. Taking the conditions as found in 1887 and 1889 and as they have been since, and in the light of the accumulated knowledge and experience, the program the Sanitary District has put into effect has resulted in an efficient diversion of a major part of the sewage from Lake Michigan, and has been a very important factor in protecting the water supply from pollution. It has also been an important factor in protecting the shore water so that it is suitable and satisfactory for recreational purposes, and in protecting bathing waters so that they are used with comparative safety by a great number of bathers.

The system of dilution which was adopted in 1889 is scientifically sound as a method of disposing of or purifying the sewage. It is the best example of a natural method of purifying sewage. In my judgment the system adopted and that which has been adopted for the future is the best method which was available at the time the sewage portion of the program was adopted and which is available at the present time, for carrying out the project for the disposal of the sewage and the protection of the purity of the water of Lake Michigan.

5266 As a result of the growth of Chicago and the great industries located there, the dilution works have become outgrown and seriously overloaded, so that they have been unable to function as well with respect to purification of the sewage before it is discharged into the lower Illinois River as would be desired. As a result of that overloading of the Canal and River system the District undertook studies, investigation and research, and during the past twenty years has carried out a very extensive program with respect to such research, with which I am personally familiar. In my judgment the work done by the District has been an important factor in the advance of knowledge and in the advance of the art of sewage treatment during the last twenty years.

The program recommended by the Board of Review, which includes the Canal and River system which was in use and is now in use, in my judgment, will protect the water supply better than any other method, and will also protect the shore waters and bathing waters as well as they can be protected. The program recommended by the Board of Review will result in far better conditions down the River, and the improvement will be progressive. It will take time to accomplish the result, but when the program shall have been carried to completion, the conditions down the Des Plaines-Illinois Rivers will be satisfactory. In that program I am including the diversion of such water as may be necessary to supplement the purification of the sewage by artificial means, as a part of the program.

5267 In my judgment, there is no other plan which is practicable to adopt, or with which it is possible to secure the same degree of protection, coupling the two words "practicability" and "possibility." The system which has been adopted, coupled with the program, will continue to efficiently divert the sewage and storm water and protect the water supply and the shore water. To abandon the system which has been built and which is capable of performing the functions stated, in my judgment, would be a serious backward step from the point of view of sanitary engineering and public health. Failure to take advantage of these natural opportunities, in my judgment, is not justified.

5268 From an engineering standpoint it is necessary, for the protection of the health of the community, to keep the sewage away from the Lake, and it is highly desirable for the protection of the shore waters for recreation and other purposes.

5276 The term "Complete Treatment," is applied to the dry weather flow, plus a percentage of the storm flow in times of storm; that is, all of the dry weather flow is to be treated, and in times of storm a small percentage in excess. This percentage of excess varies with the different plants, from 50 per cent in excess of the dry weather flow, in some cases of storm flow, and in others it has at times been double the dry weather flow.

5277 The storm overflow enters into the solution of the Chicago problem, both with respect to the Chicago River and the Calumet River, in that it is not practically possible to treat the storm flow which, under Chicago conditions, may be as much as 10 times the dry weather flow. It is not possible to build intercepting sewers and pumping stations to carry those flows to treatment plants, and after they arrive, if they do arrive, at the treatment plant, the cost of providing for their treatment would be prohibitive. For that reason, the storm flow must be discharged without treatment. Those storm flows contain the sewage, as well as the storm water, and the storm water itself, if there were no sewage in it, is seriously polluted and contaminated. In addition to that load of pollution, the sewage escapes with its contribution of contamination and pollution.

5278 When there are small overflows the proportion of sewage in that storm overflow discharge is very large; it may be from almost all of the sewage to 50 per cent thereof. In times of great storm the proportion of sewage may be relatively low, perhaps 10 per cent or even lower. On the other hand, in times of low or small overflows, the proportion of the total volume of sewage produced, which is discharged into the canal system, is small, whereas, in times of great overflow the proportion of the sewage escaping is very large, and may be as much as 90 or 95 per cent of the total dry weather flow escaping with the storm flow.

These discharges of storm pollution, whether it be from the surface of the streets or from the sewers, are a serious menace to the purity of the waters along the water front. If allowed to be discharged into Lake Michigan they would seriously pollute and contaminate bathing beaches, and would render offensive and objectionable the waters along the parks and in the enclosures at the water front, and seriously pollute the water supply.

5279 The conditions which I have mentioned with reference to the Chicago River, primarily, are applicable in the same general way to discharges from the Calumet River. There are something over 300 storm outlets at the present time which must continue. In my judgment, it is not practicable from any point of view to discontinue them. These storm outlets are located in the Sanitary District on different rivers and channels of the canal system.

5280 If this program that has been under consideration by the Board of Review and recommended and adopted by the Sanitary District were carried out as planned, the conditions of the Des Plaines and Illinois Rivers will tend to improve gradually with a reduction in load resulting from the gradual putting into operation of the sewage treatment plants. The present conditions in the

River are such that no immediate change to inoffensive conditions will result. In other words, the River is so seriously overburdened that there will not be an immediately noticeable improvement in offensive conditions. By 1945, when all the sewage is treated, in accordance with the program laid down by the Board of Review, there will be a noticeable improvement in conditions after that work has been completed. If there is a diversion of water amounting to about 10,000 second feet, including the sewage flow, the conditions down the River will be satisfactory from the point of view of nuisance or offensive conditions.

5281 It is a question whether fish life can thrive or exist at all points in the River even under those conditions, but so far as nuisance is concerned it is believed that a 10,000 second feet flow at Lockport will prevent any nuisance at any point. It is a possible that a somewhat smaller volume might result in that condition, but as nearly as we can predict, 10,000 second feet is indicated.

5282 With respect to the water supply, with the flow contemplated in the program approved by the Board of Review, the water supply would be efficiently protected. There would be some contamination in the vicinity of the Calumet River outlet coming primarily from the River outside the District, but taking it in general the water supply would be protected by that program. With respect to bathing beaches, they would be protected as they are now. There would not be material storm discharges or sewage discharges from the Sanitary District into the Lake.

With the diversion reduced now to 1,000 second feet there would be a continuous discharge of sewage into Lage Michigan from the Sanitary District. In addition to that continuous discharge of dry weather flow, there would be discharges of storm flow varying from relatively small quantities to perhaps 10,000 or 11,000 second feet. Such discharges would subject the raw water supply to almost continuous serious contamination.

5283 Taking the intakes as a whole, under certain conditions of wind and lake currents, certain of the intakes might be relatively free from contamination, but others would be certain to be seriously contaminated. In times of large storm, discharges of great quantities of the solids which have settled out in the sewers and in the canal system would be flushed into the Lake. These would add to the pollution already described and would settle on the bed of the Lake and along the shores to be later stirred up by currents, and in that way furnish a continuous potential source of contamination of the water supply.

5284 With the diversion reduced to zero or 1,000 second feet, by which I assume is meant the maximum discharge of 1,000 second feet, the works which should be installed would comprise the filtration works for filtering and purifying the water supply, and works for the complete treatment of the sewage. Such equipment as would be necessary for the treatment of the sewage effluent with chlorine would probably be advisable, although their efficacy is a subject of doubt, because of the discharges of sewage and storm flows and the accumulation of sewage solids and deposits in the Canal System which would in a measure offset the benefits derived from the disinfection with chlorine. The best thing that could be done with respect to the intake would be the construction of the so-called super-tunnel to a point perhaps off Wilmette to get as far away from the pollution as practicable.

5286 After all these works have been installed and are in operation, and the diversion has been reduced to 1,000 cubic feet per second, the water supply would not be as good as under the program laid down by the Board of

Review, because with zero diversion the treated sewage and the storm flows and other contamination would at all times be discharged into Lake Michigan. In addition to the storm flows there will be more or less continuous discharge of untreated sewage through regulating devices which cannot be kept 100 per cent perfect. For a number of years I had charge of some thirty such regulating devices, and it is not humanly possible to prevent their becoming clogged and allowing sewage to pass them at times. This is a serious source of more or less continuous pollution.

5287 The sewage and storm water discharged into the lake would at times—how often it is impossible to predict—in my judgment reach the intake, even if it were carried as far north and east as off Wilmette, and I do not think the water supply would be as good as it would be under the system proposed by the Board of Review.

I had a very direct experience with breaks in the operation of water filters, particularly last summer in connection with my investigation of the storm water problem of the city of Detroit. I made a careful study of the effect of the discharge of storm water and sewage into the Detroit River which has a velocity opposite the waterworks intake of from 1½ to 2½ feet per second. The current of the river is such that it prevents the sewage and storm water discharged on the Detroit side of the river from crossing the stream to the intake under all ordinary conditions, but on this occasion there was a severe storm and an intense wind reaching a velocity as high as 56 miles an hour. The result of that was to pile up the water in the River at the down-stream end and stop the velocity, stop the flow, in a measure. It is just possible that the water flowed back toward Lake St. Clair. I was not able to prove it, but at any rate, the water was nearly quiescent, if it did not actually reverse the flow towards the east into Lake St. Clair.

5288 As a result of that condition the sewage did get across the River to the intake, and there was a very large number of cases of intenstinal disorder or diarrhea. I investigated that subject to the extent of discussing it with Dr. Vaughn of the local health department and put into one of my reports that as nearly as I could tell there were 200,000 cases. The water was filtered and chlorinated, and got by these barriers of protection. Just what the cause was I do not know, other than those I have mentioned, but that is a fact to the best of my knowledge.

5289 The problem of Chicago has to do with two aspects, the protection of the water supply and taking care of conditions in the lower river. There is also an exceedingly important additional condition, the protection of the shore waters and the bathing beaches which, while not perhaps as directly connected with the public health as the water supply, are certainly worthy of a very serious consideration from the public health point of view.

Referring to page 26 of Complainants' Exhibit No. 18, there is found a standard for the condition of the flow discharged at Lockport after the treatment of the sewage.

This standard is somewhat ambiguous. It provides that the liquid discharged into the Drainage Canal, as evidenced by the average of representative samples taken for any 30 consecutive days, "shall (a) be practically free from solids deposited in 2 hours."

That, I think, is a reasonable standard. It is not as definite as it might be, but it is helpful.

It further provides:

> "(b) shall contain not less than three parts per million of oxygen and enough to equal or exceed the biochemical oxygen demand of said liquid for five days when incubated at 20 degrees C."

The ambiguity comes in the word "and", because it states two things; it shall contain not less than three parts per million of oxygen; and then it says, "and enough to equal or exceed the biochemical oxygen demand of said liquid for five days when incubated at 20 degrees C." If they are to be taken as cumulative; that is, three parts in addition to the five-day demand, I think it is quite likely that the standard would be satisfactory, as nearly as can be predicted at this time. My impression is that that is not the interpretation that was intended, but I am not certain.

The last sentence in paragraph 35 reads as follows:

> "It so happens that the adoption of a standard that no appreciable nuisance will result carries with it the restoration of conditions which will permit fish life to thrive."

That is going further than the Board of Review went. There is no question but that that is a tendency of the popular demand with reference to the cleaning up of streams, and I am in accord with that general principle. I think possibly I had better read some that goes before that.

"Whether adherence to this standard"—which is the standard I have read—"will produce exactly the results desired or not is unknown."

I agree with that, that it cannot be definitely determined at the present time.

> "but in view of the present extremely unsatisfactory conditions prevailing with upward of 4,000 cubic yards of settleable solids, being dumped into the Illinois each day, and with series of several months each year with no oxygen whatever present in the effluent, there is no question but what conditions will be improved materially."

On the interpretation that Section (b) of the standard is to be taken as cumulative, I think that that is a correct statement.

> "It should be understood that other sources of pollution are contributory to the Illinois River, and

> that with no contamination whatever from the Sanitary District of Chicago, conditions in the Illinois will not be satisfactory until the rest of the communities now discharging their sewage into the system carry out satisfactory sewage treatment programs of their own."

That with the limited dilution is certainly true.

5303 The works recommended by the Board of Review contemplated so-called complete treatment of all sewage, that is, all sewage must be treated finally by trickling filters or by the activated sludge method. The effluent from that would flow into the Canal System and then down the Des Plaines and Illinois Rivers. The effluent from that treatment still has a residual demand for oxygen. If the conditions in the River are to be maintained satisfactorily it will be necessary to satisfy that demand. In addition there are large volumes of storm water and sewage passing regularly, sewage getting in accidentally or through surreptitious connection, which cannot be kept out, which will go down the River and add suspended solids to the flow and cause deposits in the stream. These solids will decompose and use up the available oxygen.

In addition to those sources of oxygen demand, the effluent from activated sludge or trickling filter plants contain fertilizing ingredients which result in prolific growth of microscopic plants, of large plants like duck weed, which float on the surface of the water, of grass and of other vegetation. Some of the micro-plants produce oxygen in their life process, and they add to the supply of dissolved oxygen and help to make conditions free from offense.

5304 On the other hand, the increase in the number of those organisms, due to the fertilizing effect of the effluent, is enormous. At Marlboro, Massachusetts, the number increased from two to three hundred to over 20,000 per c.c., while the oxygen in the surface water—and that is where the plants live chiefly, on the surface of the pond or stream—was more than 100 per cent of the normal amount of oxygen present in water at that temperature. It contains so much of the organic matter of the dead plants that oxygen did not remain for much more than 24 hours. At Brockton, Massachusetts, there is a dilution ratio of in the neighborhood of ¼ of a second foot per 1,000 persons, and there the conditions are exceedingly offensive.

When the Chicago sewage shall have been treated as indicated and the effluents turned into the River System, there will be a prolific growth of these organisms. It is not possible to know in advance just how much water will be required or just what the conditions will be, but after giving that the best study that we could, we felt that 1 cubic foot per second per 1,000 persons would be satisfactory, possibly somewhat less, which would mean in 1955 a flow of about 7,700 cubic feet per second, plus the flow of sewage.

Defendants' Exhibit 1166, Rec. 4995-99—Final Report of International Joint Commission dated September 10, 1918:

Page 6-7:

> "Any conclusions the commission may reach and any recommendations it may make, may, if acted upon, affect the physical health of millions of people who dwell along these waters, as well as the financial and other interests of eight States of the United States and three Provinces of the Dominion."

* * *

Page 7:

> "The boundary waters are the natural channels of interstate and international commerce."

* * *

Page 8:

> "In working out the enormous possibilities of this

vast section of the continent the proper observance of international sanitary requirements will be a most essential factor."

* * *

Page 23:

"The grossly polluted condition of boundary waters is doubtless the cause of the abnormal prevalence of typhoid fever throughout the territory bordering thereon."

* * *

Page 24:

"Notwithstanding the general improvement, violent outbreaks of typhoid fever have occurred, and the potential danger must continue to exist in view of the extensive pollution of these waters and the limitations and inefficient operation of water-purification plants. Not only have the border communities suffered from this condition, but the navigation interests have also been injured very severely from the disastrous outbreaks consequent on the use of polluted boundary water."

* * *

Page 25:

"The City of Detroit discharges into the former all the raw sewage from its estimated population of 850,000. On the United States side opposite Amherstburg the pollution of the river reaches the enormour figure of 10,392 B. coli per 100 c.c., and its waters from that point to Lake Erie and the waters of that lake within a radius of about 4 miles from the mouth of the river are very greatly polluted."

* * *

Page 29:

"The pollution of drinking water supplies and of bathing waters at Bois Blanc Island, on the lower Niagara, at the Thousand Islands, or at other summer resorts, or of the waters navigated by vessels and yachts, might not only be an injury to the immense number of citizens of both countries who would be brought immediately in contact with the pollution, but would indirectly be a source of great peril to hundreds of thousands more. To illustrate the danger the following citation is made from the

United States Public Health Service Report for 1914, volume 29, page 393:

> It is stated that during one short period of the summer's cruise (referring to the voyage of a lake boat) 77 cases of typhoid fever developed as the result of the use of impure drinking water taken from the Detroit River. * * * Investigations by this service of similar outbreaks on three Great Lakes vessels during the summer of 1913 showed that out of a total of 750 people there were over 300 cases of diarrhea and 52 cases of typhoid with 7 deaths.

The lamentable prevalence of typhoid fever referred to previously calls for consideration in this broad international view of the question of pollution of boundary waters."

* * *

Page 32:

"It must be admitted that the conservation of public health is of paramount importance under the treaty."

* * *

Page 33:

"The harm done by existing pollution to bathing resorts cannot be remedied except by preventing the discharge of sewage into the waters which flow to them. Contamination of the sources of the drinking supplies of these classes of people is a most serious matter. The millions whom it affects or may affect are more exposed to danger than are the urban inhabitants who draw their water supplies from public water systems."

* * *

Page 40:

"Sewage-polluted drinking water constitutes an actual or potential menace to health, so much so that the presence of the bacterial organisms of water-borne diseases in the sewage of an urban community should always be assumed. While bacterial pollution is most serious in the case of waters used as sources of drinking-water supply, it is also serious in the case of waters used for bathing, boating, and other pleasurable exercise, and also, although to a less degree, in the case of shore waters on account of possible indirect infection through cattle and insects."

Defendants' Exhibit 1167, Rec. 5000—Bulletin No. 83, Treasury Department, entitled "Sewage Pollution of Interstate and International Waters with Special Reference to the Spread of Typhoid Fever":

"CHICAGO.

The growth of the City of Chicago finds no parallel in history. From a population of 7,500 in 1843 it has grown to be the second city in the United States with a population in 1910 of more than 2,000,000. No argument is necessary to show the importance to the whole country of sanitary conditions in Chicago. Its vast commerce and giant industries make it the metropolis of an enormous territory and bring thousands of visitors daily from nearly every State in the Union. These visitors drink Chicago's milk and water and eat Chicago's food. Contamination of these articles of food or drink by typhoid fever germs means infection of the transients as well as citizens—transients who go to their homes in other states to establish new foci of typhoid fever. These transients and interstate travelers are less able to protect themselves against contaminated food or drink than the citizen who heeds the warnings of Chicago's excellent department of health. Thousands of interstate travelers drink water on trains which is taken aboard cars in this great railway center, and the character of Chicago's water supply is of vital importance to these travelers and to the States to which they are destined."

Abstract of Evidence Relied Upon by Complainants Offered at 1926-27 Hearings.

Dr. Harry L. Rockwood, for Complainants. March, 1927.
Public Health Expert:

8168 *Direct Examination by Mr. Jackson.*

Am Health Commissioner of the City of Cleveland. My high school education was in Olean, New York, where I was born, subsequent to which I had academic and premedical training at Cornell University, and graduated in medicine from Western Reserve University in 1909. After graduation I became House Officer at Lakeside Hospital, Cleveland, and served there for practically two years.

In 1911 I became a medical examiner for the Pennsylvania Railroad, and in 1912 I entered private practice
8169 and practiced until the close of 1913. At that time I became medical director of the Cleveland Municipal Tuberculosis Sanitarium, and still hold that position, but in addition I became Health Commissioner of the city in 1918.

The responsibility for the quality of the public water supply and supervision of swimming pools and bathing beaches from a public health point of view is charged to the Health Division, of which I am Health Commissioner. It is one of our very urgent duties to watch the relationship of typhoid fever to water supply.

I am a member of the American Public Health Association, American Medical Association, Ohio State Medical
8170 Society, Cleveland Academy of Medicine, and President of the Ohio Society of Sanitarians. I have a certificate of Public Health of the Ohio State Department of Health, Rockefeller Foundation course.

I have read and studied the testimony of Dr. Evans, 8171 and Exhibits 1140 to 1144, which were offered by him.

There was received in evidence as Complainants' Exhibit 187 a photostatic copy of a table entitled "Table 1, Comparison of Typhoid Fever with Total Mortalities in Chicago," taken from Exhibit 18 which is as follows:

"COMPLAINANTS' EXHIBIT 187.

TABLE 1.—COMPARISON OF TYPHOID FEVER WITH TOTAL MORTALITIES IN CHICAGO (BASED ON CHICAGO DEPARTMENT OF HEALTH RECORDS.)

Years	Death rate, all causes per 1,000	Typhoid fever			Remarks
		Total deaths	Deaths per 100,000	Per cent total deaths	
1867....	21.21	165	73.3	3.45	
1868....	23.74	200	79.3	3.34	
1869....	23.17	183	65.3	2.82	
1870....	23.88	268	87.4	3.66	
1871....	20.87	204	61.0	2.92	
1872....	27.34	524	142.6	5.16	
1873....	25.15	272	71.6	2.85	
1874....	20.30	211	53.4	2.63	
1875....	19.72	207	51.7	2.62	
1876....	21.03	168	41.2	1.96	
1877....	18.67	159	37.0	1.98	
1878....	16.99	146	33.4	1.97	
1879....	17.53	208	42.3	2.41	
1880....	20.79	171	34.0	1.63	
1881....	26.11	568	105.2	4.03	
1882....	23.60	462	82.4	3.49	
1883....	19.92	361	62.2	3.12	
1884....	19.80	354	56.2	2.84	
1885....	18.76	496	74.6	3.98	
1886....	19.47	483	68.6	3.53	
1887....	20.27	382	50.3	2.48	
1888....	19.65	375	46.7	2.38	
1889....	18.12	453	48.4	2.67	
1890....	19.87	1,008	91.6	4.61	
1891....	24.16	1,997	173.8	7.20	
1892....	21.85	1,489	124.1	5.68	
1893....	21.61	670	53.5	2.47	
1894....	18.26	491	37.5	2.06	
1895....	17.72	518	37.9	2.14	
1896....	16.29	751	52.6	3.23	
1897....	14.63	437	29.3	2.00	
1898....	14.64	636	40.8	2.79	
1899....	15.68	442	27.2	1.73	
1900....	14.68	337	19.8	1.35	Opening of Drainage Canal.
1901....	13.93	509	29.1	2.09	
1902....	14.69	801	44.5	3.03	
1903....	15.62	588	31.8	2.03	

Years	Death rate, all causes per 1,000	Typhoid fever			Remarks
		Total deaths	Deaths per 100,000	Per cent total deaths	
1904....	13.85	373	19.6	1.42	
1905....	12.36	329	16.9	1.21	
1906....	14.54	370	18.5	1.27	Opening south side interceptors.
1907....	15.72	372	18.2	1.16	Completion south side interceptors.
1908....	14.49	332	15.8	1.09	Opening north side interceptors.
1909....	14.58	271	12.6	0.87	
1910....	15.13	300	13.7	0.90	Pasteurization of milk.
1911....	14.48	241	10.7	0.74	Completion north shore interceptors.
1912....	14.78	175	7.3	0.51	Chlorination of water started.
1913....	14.99	249	10.6	0.71	
1914....	13.93	167	6.9	0.49	
1915....	14.16	132	5.3	0.37	
1916....	14.42	128	5.1	0.35	
1917....	14.79	43	1.6	0.11	Complete chlorination of water.
1918....	17.01	38	1.4	0.08	
1919....	12.52	31	1.2	0.09	Completion Evanston interceptors.
1920....	12.77	30	1.1	0.09	
1921....	11.08	30	1.1	0.09	Completion Calumet interceptors.
1922....	11.18	31	1.1	0.10	Opening of Calumet Sag Channel.
1923....	11.7	57	1.9	0.17	
1924....	11.2	45	1.5	0.14"	

I am familiar in a general way with the method of sewage disposal by dilution and diversion for the protection of the water supply that has prevailed during a part 8172 of the period covered by that exhibit; and also in a general way with the conditions prevailing prior to the opening of the Drainage Canal in 1900.

8173 The greatest reduction in the typhoid rate in Chicago came before the opening of the Drainage Canal. Previous to the opening of the Canal there was a rate averaging 50 deaths per 100,000. At the time of the opening of the Canal the rate was 20 per 100,000. Since that time it has fallen to 1.5. This would indicate that the fall in rate was greater previous to the opening of the 8174 canal than since, and since that time a large number of factors have contributed to the rate reduction in typhoid fever, particularly the chlorination of water, which was instituted in 1912, and became complete in 1917 and the pasteurization of milk, which coincided with these years.

Some credit must also be given to the general improvement in public sanitation and development of the science of public health in the last 20 years.

No chart could be constructed from Defendants' Exhibit 1142 which would show a reduction in death rate from typhoid fever, with the selection of any other year than 1891, because the year 1891 which was selected was the peak year in typhoid for the city of Chicago, as far as all available records show.

Assuming the complete treatment of all sewage of the
8175 Sanitary District of Chicago, by the activated sludge process, or by Imhoff tanks, or trickling filters, and final sedimentation; no diversion of water through the Drainage Canal; and the present location of the water intakes, water purification plants could be so constructed that the public health conditions in Chicago, with special reference to the public water supply, would be as well safeguarded, as under present conditions.

I would assume the type of water purification works, in the operation of which the water entering the distribution system would comply with the standards for potable water set up by the American Public Health Association and the United States Treasury Department.

Assuming the complete treatment of all of the sewage of the Sanitary District of Chicago, as described, with reference to the activated sludge and the trickling filter processes; no diversion of water through the Chicago Drainage Canal; the replacement of the present water intakes, by a super-tunnel, located four and one-half miles off shore, in the vicinity of Wilmette, and twenty miles from the mouth of the Chicago River; with chlorination of the water supply only; the public health conditions in Chicago, with special reference to the public water supply, would be as well safeguarded as under the conditions now obtaining.

8176 I am basing my opinion on the underlying principle in the prevention of water-borne diseases, of a wide separation of susceptible individuals from these infecting organisms which cause these water-borne diseases.

In our Cleveland experience, as long as the source of the water supply was from a point in Lake Erie, near the city, and in an area where water pollution from these infecting organisms causing water-borne diseases was heavy, our typhoid fever rates, and rates in other water-borne diseases, were exceedingly higher than when the source of our water supply was placed at a distance more remote from the city, at a point 4½ miles, as compared with a point slightly over a mile from shore previously. Under these conditions, our typhoid rates showed an immediate reduction, with subsequent steps taken to safeguard the water supply in Cleveland, which are substantially the same as referred to. With regard to chlorination our typhoid rate showed a still greater reduction. With the changes contemplated in Chicago, as outlined, of the complete treatment of all of the sewage, the location of the water intakes as remotely as twenty miles from the mouth of the Chicago River, the water supply would be still increasingly safeguarded. If water filtra-
8177 tion or purification works were installed, in connection with such relocation of the intakes, that would still fur-
8178 ther improve the water supply. It would protect the entire water supply from the standpoint of public health.

Assuming complete treatment of all the sewage of the Sanitary District of Chicago, with the definition of complete treatment that has heretofore been adopted, with no normal or dry weather diversion of water from Lake Michigan, but with diversion of all the sewage and storm water by means of proper control works, the present location of the water intake and filtration and chlorination of the water supply, the public health conditions in the City of Chicago, with special reference to the water supply, would be safeguarded as well as under present conditions.

8180 My opinion is based on the maximum pollution of the lake water occurring from the overflow produced by storm water, and with some diversion of this greater source of pollution by proper control works that factor would be eliminated.

Assuming complete treatment of all the sewage with no normal or dry weather diversion of water but with diversion of all the storm water by means of proper control works, relocation of the water intake and chlorination only of the water supply, the public health conditions in the City of Chicago, with special reference to the water supply, would be better safeguarded than under present conditions and for the same reasons, substantially.

8181 The water supply of Chicago should be filtered, regardless of the method of sewage disposal. In the conditions which have been assumed regarding sewage treatment there would be further protection to the public health by
8182 chlorination or sterilization of the effluents, the result of which is to reduce the pathogenic or disease-causing bacteria which may be present.

8184 Defendants' Exhibits 1178, 1140, 1142 and 187 do not show any unique or unusual experience in the typhoid fever death rate in Chicago not common to other cities mentioned therein during the last forty years.

Complainants' Exhibit 188 is a chart entitled "Cleveland and Chicago Typhoid Mortality Rates per 100,000 Population, Years 1878-1926, 1870-1925."

Complainants' Exhibit 189 being a chart entitled "Deaths Due to Typhoid Fever with Population Estimates and Total Deaths Years 1878-1926", is as follows:

"COMPLAINANTS' EXHIBIT 189.

DEATHS DUE TO TYPHOID FEVER WITH POPULATION ESTIMATES AND TOTAL DEATHS YEARS 1878-1926 INCLUSIVE. CLEVELAND, OHIO. H. L. ROCKWOOD, M. D.

Year	Typhoid Deaths	Typhoid Death Rate per 100,000 Pop.		Total Deaths	Total Death Rate per 100,000 Pop.	% Total deaths due to Typhoid Fever	Population
1926....	14	1.46		10,636	1107.5	.13%	960,468
1925...	14	1.50		9,706	1036.4	.14	936,485
1924....	11	1.20		9,287	1017.7	.12	912,502
1923....	16	1.80		9,618	1082.4	.17	888,519
1922....	19	2.22		8,743	1023.1	.22	854,565
1921....	29	3.49		8,705	1047.3	.33	831,138
1920....	26	3.22		9,997	1236.8	.26	808,273
1919....	21	2.67		9,932	1264.5	.21	785,408
1918....	37	4.85		13,061	1712.8	.28	762,543
1917....	53	7.20		10,848	1473.0	.49	736,452
1916....	36	5.05		9,987	1402.3	.36	712,187
1915....	54	7.83		8,841	1282.5	.61	689,322
1914....	54	8.12		8,266	1242.4	.65	665,327
1913....	88	13.69		8,842	1376.2	1.00	642,462
1912....	38	6.22		8,149	1332.8	.47	611,397
1911....	85	14.45		7,967	1354.2	1.07	588,292
1910....	105	18.57		8,034	1420.8	1.03	565,427
1909....	67	12.26		7,032	1286.6	.95	546,503
1908....	64	12.10		7,177	1357.7	.89	528,613
1907....	84	16.44		7,678	1503.3	1.09	510,723
1906....	93	18.87		7,353	1492.0	1.24	492,833
1905....	67	14.11	34.5	6,424	1352.5	1.04	474,943
1904....	203	44.41		6,476	1416.9	3.14	457,053
1903....	472	107.47		6,799	1548.2	6.94	439,163
1902....	133	31.57		6,134	1456.0	2.17	421,273
1901....	140	34.70		5,834	1446.2	2.40	403,383
1900....	205	53.18		6,104	1583.4	3.35	385,493
1899....	119	31.97		5,556	1492.5	2.15	372,241
1898....	121	33.59		5,040	1399.2	2.40	360,199
1897....	73	20.97		5,007	1438.1	1.46	348,157
1896....	142	42.24		4,959	1475.3	2.86	336,115
1895....	117	36.10		5,167	1594.3	2.26	324,073
1894....	89	28.52		5,663	1814.8	1.57	312,031
1893....	153	51.00		5,261	1753.6	2.90	299,999
1892....	166	57.64		5,227	1815.2	3.17	287,947
1891....	155	56.18		5,204	1886.1	2.97	275,905
1890....	182	68.97		5,058	1916.9	3.59	263,863
1889....	185	73.02		4,414	1742.3	4.19	253,345
1888....	113	46.45		4,415	1815.1	2.55	243,224
1887....	120	51.47		4,139	1775.6	2.89	233,103
1886....	113	50.67		3,525	1580.8	3.21	222,982
1885....	71	33.35		3,574	1679.3	1.99	212,861
1884....	121	59.68		3,730	1839.8	3.25	202,740
1883....	105	54.51		3,399	1764.6	3.09	192,619
1882....	122	66.85		3,563	1952.3	3.42	182,498
1881....	168	97.46		3,727	2162.1	4.51	172,377
1880....	70	43.14		3,156	1945.0	2.25	154,820
1879....	46	29.71		3,038	1962.3	1.52	162,256
1878....	55	37.14		2,710	1829.9	2.03	148,088"

8186 As shown by these charts, the mortality rate in both Cleveland and Chicago shows a marked decline during the period of 1880 and previous years to the present time, the rate in both cities having been in the neighborhood of 50 per 100,000 on an average in the early part of the period, and having now reached a rate which is almost identical in each city of 1 per 100,000.

8187 In addition, the chart also shows years of unusual prevalence of typhoid fever when it reached the epidemic stage, the highest year of its prevalence being in Chicago the year 1891, when the mortality exceeded 170 per 100,000, and the year of greatest prevalence in Cleveland having been the year 1903, when the mortality rate reached 108. The Cleveland peak is some 40 per cent lower than the Chicago peak, nevertheless. With respect to the last few years, the significant point is the practically identical rates for both cities.

Cleveland has no complete sewage treatment up to the present time. Only a small portion is treated. The sewage passes into the Lake in a raw state, with the exception of a small portion.

8188 There are two intakes. One is 4½ miles out, and the other is only a few hundred feet nearer the shore.

Complainants' Exhibit 190 is a chart entitled "Typhoid Fever Death Rates per 100,000 population, Cleveland."

8189 The statement regarding the opening of the new tunnel comes from a public document of the Cleveland Division of Water. The statement with reference to complete chlorination is from the Cleveland Department of Health records, and from the statement of city officials at the present time.

8190 The records I examined with reference to chlorination were the annual reports of the Division of Health for the years in the neighborhood of 1911. The data are repeated in several reports. The statement with reference

to the pasteurization of milk came from my own knowl-
8191 edge as a member of the Division of Health in 1916, when I was medical director of the Cleveland Tuberculosis Sanitarium and chief of the Cleveland Division of Tuberculosis. When I say "pasteurization of milk instituted," I mean that an ordinance was passed requiring all milk of a grade commonly known as market milk to be pasteurized before being offered for sale, and that the enforcement of that ordinance was immediately begun. I canot state the date in 1916 when the ordinance was passed. It was so that the pasteurization of milk began
8192 early in the year.

8193 The ordinance became 100 per cent effective within 2 years from the date of its passage. I don't know how effective in 1916, but it was considerably more than 5 or 10 per cent.

8195 Exhibit 190 is prepared on a larger scale than 188, showing the years from a point previous to 1880 in Cleveland, as regards the typhoid fever mortality rate per hundred thousand population for each year up to the present time and, in addition, there are shown changes in the sources of the water supply or other changes in the operation of the distribution system of water which were made for the purpose of reducing the water borne diseases.

It also shows certain other steps taken in Cleveland relating to the subject of preventing water-borne or other diseases of an infectious nature.

In brief, the Cleveland chart shows previous to the year 1904 a period of greatest prevalence of typhoid fever, the rate averaging between 40 and 50.

Reference to the Chicago data shows that similar conditions prevailed in Chicago with a slightly higher rate, between 50 and 60 per hundred thousand throughout the same period with the exception of epidemic years as stated.

8196 The Cleveland chart shows 1903 as the year of greatest prevalence and also shows that in the following year, 1904, both a new tunnel 26,048 feet long and an intake 4 miles from shore were opened and an old tunnel and intake 2 miles or less from shore abandoned; that subsequent to that step the typhoid fever mortality rate fell, never again to exceed 20; that in 1911 complete chlorination of the water began, and following that the decline in typhoid death rate continued until 1916 or 1918, in which years pasteurization of milk became practically 100 per cent, and filtration of the water 60 per cent, 100 per cent of the water having been chlorinated since 1911. Immediately after 1918 a still further drop occurred in the typhoid mortality rate, and that favorable typhoid mortality rate has continued up to the present time.

The chart also shows that in 1925 the Cleveland water supply was 100 per cent filtered.

8197 On Exhibit 188 the Cleveland mortality rate is represented by the dark blue solid line. Exhibit 187 shows the opening of the Drainage Canal in 1900. Exhibit 188 shows that the typhoid rate previous to 1900 averaged between 50 and 60. Exhibit 187 shows that pasteurization of milk in Chicago began in 1910, and that chlorination of water began in 1912. The Chicago rate shows a general and gradual decline until 1910 or 1912, but a more radical drop after those dates when chlorination and pasteurization was begun. Complete chlorination occurred in 1917, and since that date a rate almost identical with Cleveland has continued.

8198 Complainants' Exhibit 191 is a chart entitled "Cleveland Typhoid Actual Deaths by Months, Years 1912-1926."

8206 With reference to the alleged break in the water purification plant at Cleveland in October, 1925, the typhoid deaths in October were two and in November two. Reference to Exhibit 191 for previous years will show that this number of deaths was not in excess, but, in fact, was below the deaths in former years.

8207 Exhibit 192 shows that in October, 1925 there were 36 deaths from diarrhoea and enteritis in children under 2 years of age, whereas during the period shown on the chart there are three other years in the total number of 7 where the deaths from these causes were in excess of that in October, 1925. In November, 1925, there were 11 deaths, and in each of the other years except one the number was in excess of 11.

There is no significance of the statistics shown on Defendants' Exhibit 1178 with reference to the Chicago situation and particularly in regard to the safety of the public water supply as compared with the public water supplies of the other cities included in the chart.

In order to draw comparisons between various cities it is necessary to analyze the conditions prevailing in each as regards location, general sanitation, safeguards respecting milk, general food supply, character of the population and the private water supply, such as wells and springs. Comparison from a set of statistics without giving weight to any of these other factors is of no significance.

The following statement by Dr. Evans, page 3880 of the record, is not sound:

> "We could not hold our typhoid death rate as low as it is without diversion, nor do I believe we could maintain our general death rate as low as it is without diversion."

8209 There are other ways of protecting water supply equally or more effective than diversion. I am basing my opinion on the Cleveland experience. In Cleveland the sewage is returned to the Lake, "only a small portion treated, and the lake is used for a source of water supply.

We do not, nor could we, practice diversion of the sewage. Our general death rate, nevertheless, has remained consistently lower than the death rate of Chicago in recent years, and the typhoid rate has remained practically identical with Chicago. On this account I conclude that Chicago could duplicate the Cleveland performance.

Assuming that Chicago installs complete sewage treatment, including disinfection of the sewage effluent, and no diversion down the Drainage Canal, that method of handling the sewage problem at Chicago would not re-
8210 sult in any increase of typhoid fever among bathers at the public bathing beaches.

It is our practice in Cleveland to make a careful investigation of typhoid cases as shown by Exhibit 193, and we have observed that bathing at public beaches has not contributed to our typhoid. All of the sewage in Cleveland is discharged into the lake only partially treated and in close proximity to the public beaches. I conclude from this that at Chicago with complete sewage treatment there would also be no increased typhoid from the use of the public beaches.

8211 The greatest danger from typhoid at beaches arises from the bathers themselves. That is shown by the experience in connection with indoor swimming pools where the number of intestinal bacteria in the pools increases in direct ratio with the number of bathers.

Complainants' Exhibit 194 is a chart entitled "Cleveland Typhoid Mortality Rate per 100,000 Population by Years 1911 to 1926," designed to show the change in the typhoid rate if out-of-town cases are eliminated.

8511 For my comparison of the general death rates of the two cities of Chicago and Cleveland I am using for the
8512 Chicago rate those shown in the Chicago Department of Health Reports for the years 1923-1925, a table on page 784, giving deaths from all causes exclusive of still births,

and for the Cleveland rates I am using Exhibit 189. I find that since 1900 there are but 2 years, namely, 1918 and 1919, when the Chicago general mortality was lower than the Cleveland mortality.

8513 For infant mortality I am using the Public Health reports for the City of Chicago, page 234, Table 109 which shows the infant mortality 1914 to 1925.

For Cleveland I am using a publication of the Division of Health known as Statistical records, years 1916 to 1924, on page 35 of which in Table 16 the infant mortality rates are given from 1916 to 1924.

I find that for 1916 the Chicago rate was 122.4 per thousand births; the Cleveland rate 105.4. For 1917 Chicago rate 117.7, and Cleveland 106.8. For 1918 Chicago rate was 117 and Cleveland was 95.4. For 1919 Chicago was 100.9 and Cleveland was 92.8. For 1920 Chicago was 99.5 and Cleveland was 86. For 1921 Chicago was 89.3 and Cleveland was 73.1. For 1922 Chicago was 85.5 and Cleveland was 75.9. For 1924 Chicago was 76.9 and Cleveland was 66.2.

I am also using for the Cleveland rate the annual re-
8514 port of the Cleveland Division of Health for 1925. Page 25, which shows the infant mortality rate as 65.8, the Chicago rate for the same year being 74.7.

This indicates that from 1916 to 1926 in each year consecutively the infant mortality rate in Cleveland was well below that of Chicago.

In diarrhoea and enteritis the deaths under two years of age are considered separately from deaths over two years of age, and almost invariably, except in epidemic seasons, the deaths from this disease, among children under two, equal 90 per cent of all deaths from these causes as shown by death certificates.

In the Chicago report previously referred to, using the deaths from these causes reported in that publication,

and using as a population divisor for each year the population as submitted in the same report, on page 783, I have computed that for the previous three years, 1925, 1924, and 1923, the rates for Chicago as compared with Cleveland per 100,000 population deaths caused from
8515 diarrhoea and enteritis under two years of age were as follows: Chicago rate, 1923, 38—Cleveland rate, 29; 1924, Chicago, 30—Cleveland, 20; 1925, Chicago, 30—Cleveland, 25. The data for the Cleveland figures are shown on page 119 of the annual report of the Division of Health of the City of Cleveland, Table No. 30.

The Hazen Theorem, as it has been called, is in reality a derivation from a similar formula known as the Mills-Reincke phenomenon, which was named from the fact that a Mr. Mills of Lawrence, Massachusetts, at the time when Lawrence was having considerable difficulty, not only with typhoid but with the question of water purification, made public an observation that at approximately the same time a Dr. Reincke of Hamburg, Germany, made a similar public observation, to the effect that whenever water supplies were purified and a drop in typhoid fever incidence resulted therefrom, at the same time the general mortality rates of the population groups affected were similarly reduced, and the Hazen Theorem attempts to set up a ratio as to the amount of reduction and has been interpreted variously by various authors, which substantially is to the effect that a reduction or prevention of 1 typhoid death at the same time prevents from 2 to 4 deaths from other general causes in the same population group.

The theorem, however, is discredited by most public health authorities and can be shown very definitely to be unworkable under existing conditions, whereby typhoid rates have been reduced to a small fraction of their
8517 former level and play on this account a very slight part in death rates.

For example, in Chicago, according to the annual reports, in 1916 the typhoid death rate is given as 5.1 per 100,000 and for 1917 as 1.6, a reduction of nearly 80 per cent.

Reference to the table on page 784, which illustrates deaths from all cases, indicates that the death rate in 1916 in Chicago from all causes was 14.42, the total deaths being 36,304 and the following year the death rate was 14.79 and the total number of deaths 38,027. Instead of being a reduction, there was an actual increase in the number of deaths. This same illustration could be repeated, of course, for Cleveland and most communities of the same type.

Cross-Examination by Mr. Adcock.

As to what authorities besides myself have discredited
the Hazen Theorem, you will find a rather extensive
8518 discussion in "Rosenau's Preventive Medicine." That
was a standard text, and there are several editions. I
should say that the edition of 1910 or 1911 would certainly
carry that statement.

There had been a marked decrease in the typhoid death
8519 rate generally in 1910. The average death rate at Cleveland from 1890 to 1899 was about 41; from 1900 to 1909
the average, including the epidemic years, was about 34.2.
8520 That was a decrease of about 7 per 100,000.

I am not familiar with Mr. Ellms' work on Water Purification, published in 1917.

Mr. Ellms' book, page 40, in substance as follows:

> 8521 "Sedgwick and MacNutt have called this expression 'Hazen's Theorem,' and have concluded from the studies which they have made that the statement appears sound and conservative, but not necessarily precise. The ratios they worked out varied widely. For example, at Hamburg, Germany, for every death less from typhoid fever after filtration, there were

> 15.8 deaths less from other causes; at Lawrence, Massachusetts, the ratio was 1 to 4.4; at Lowell, Massachusetts, 1 to 6; at Albany, New York, 1 to 4.1; and at Binghampton, New York, 1 to 1.5."

I disagree with that statement only to this extent: As I understood what you read there, it says the death rate has fallen and refers to a period back of 1904. In the light of later observations it is now generally concluded that much of the changed death rate was not due to water purification, but takes into consideration such things as the reduction of infant mortality from purified milk supply, and the reduction in tuberculosis from causes en-
8522 tirely separate from those that have to do with the reduction in typhoid fever, and that the Hazen Theorem received the benefit of those reductions which were going on at that time.

The following is a foot note from Mr. Ellms' book:

> "W. T. Sedgwick and J. Scott MacNutt: On Mills-Reincke Phenomenon of Hazen's Theorem, concerning the decrease in mortality from diseases other than typhoid fever and following the purification of a public water supply. Journal Infectious Diseases, Volume 7, page 10."

It would appear that the observation of Sedgwick and MacNutt referred to in Mr. Ellms' book was published in 1910.

I think it is very reliable to take one year like 1916, and compare it with another year, 1917, without knowing whether there were some extraordinary conditions existing in 1917 that might have caused deaths in Chicago other than from typhoid fever infection as the very statement of the theorem takes into consideration those con-
8523 ditions. It does not exclude epidemic conditions for other causes.

I do not think it is necessarily true that a city must have a typhoid epidemic every few years, if the proper precautions are observed. In Cleveland in 1907 we had a rate of 16.44. The rate has never exceeded 20 since 1905.

8524 I account for the difference between the Chicago typhoid rate of 67 from 1890 to 1899 and the Cleveland
8525 rate of 41 by the epidemic or peak at Chicago of 173 in 1891. There was an epidemic in 1881, when the rate reached 105, and there was another in 1872. There is no question but that the amount of sewage had something to do with the death rate in that period.

The population of Chicago in the decade of 1890 to 1900 is given as from 1,099,000 to 1,698,575. The population of Cleveland in 1900 was 381,768. I do not know the figure in 1890, but I think it was about 175,000.

8526 Unquestionably, the increased population of towns from which sewage is put into the lakes has something to do with the problem of water supply.

Q. So in 1890, Chicago had the problem that Cleveland now has, practically, did it not, as far as water supply was concerned, and the pollution of its water supply?

A. As far as the ratio in Chicago is concerned, the increased population would bring an increased amount of sewage and hence more provision for caring for such sewage.

8527 I judge it is true that until 1910 there was a good deal of sewage going into the Lake at Chicago by means of sewers. The statement in Exhibit 187 indicates that subsequent to 1900 there were several interceptors which were finished and put into operation.

8528 The death rate for typhoid in Chicago from 1900 to 1909 is probably close to 22. The year 1902 was 44. I would call that a pretty stiff year. We had one of 108 at Cleveland, and that was an epidemic. We never had a year as high as Chicago. The average for Cleveland from 1900-1909 was 34.

8529 Graduated medicine in 1909, Western Reserve; have been engaged in medical work since; interested in tuberculosis and medical director of a 300 bed institution at Cleveland, known as the Municipal Tuberculosis Sanitarium; have been connected with the Sanitarium since 1913, and my connection in 1913 is the same as now; resided at the institution for two or three years and have been Health Commissioner of Cleveland since 1918.

8531 It is undoubtedly true in Chicago as well as Cleveland that a great many people who die of typhoid were infected in other places, probably in the same ratio. Of
8532 course, it is true that they have many hospitals. It is quite likely that people have been infected with typhoid in Chicago and died elsewhere. The same is true of Cleveland. There is also a Marine Hospital at Chicago. There is also a Hines Memorial Hospital for Disabled Soldiers of the World War. Those two hospitals would have an effect upon the typhoid rate of Chicago.

8533 I cannot state with accuracy the cities or villages outside of Cleveland which get their water supply from the Cleveland Waterworks. The Cleveland Health Department has no supervision over health conditions in those cities or villages, although they have a good deal of concern regarding them. It makes no investigations of health in them.

I did not say that the typhoid infection had ever been
8534 traced to bathing beaches. We have traced one instance
8535 to a bathing beach, but not a public beach. It was a private beach along the lake shore east of the city, but I am unable to recall the name of it.

I am familiar with the Treasury Department Reprint No. 659 entitled "Typhoid Fever in Cleveland, 1918-1920, by Roger G. Perkins. M. D., Professor of Hygiene and Preventive Medicine, Western Reserve University, Chief, Bureau of Laboratories, Cleveland Division of Health."

8536 Page 10 of said report in substance is as follows:

> "The main bathing areas at Cleveland are in Edgewater Park on the West Side, and from Gordon Park eastward on the east side. All these beaches are subject to heavy contamination from untreated sewage, those on the west side from the West 58th Street sewer less than a mile away, and draining the greater part of the west side; and those on the east side from the intercepting sewer outlet at East One Hundred and Fortieth, a maximum of two miles from any of the beaches and within a mile of many. Laboratory tests show a high degree of pollution, and there is little question that infection can occur while swimming. It is interesting, however, to note that of the many thousands who have used the beaches in the last three years, only 12 give a history of bathing at these points being followed by a typhoid infection within a reasonable period.
>
> 8537 It is obvious that the interval between exposure and the onset of the disease is within the average of the incubation period of typhoid, and while the fact that other persons in the same vicinity, with no history of bathing, developed the disease, makes it impossible to make an absolute statement, yet, in the absence of other factors, it seems probable that these cases must be attributed to sewage infection of Lake Erie."

The cases cited in all but five instances out of the twelve were public beaches, anyway. The others were
8538 all private beaches, and I have not contended anything about those, and according to Dr. Perkins' own statement it is questionable whether these infections occurred at these beaches.

It is true that there would be at times of storms raw sewage going into the lake, but we find that it is not during times of storm that people as a rule enter the lake for bathing. Our bathing season is only ten weeks long at the most, and the period which corresponds with the bathing season is usually the season of dry weather, when there is very little overflow compared with the rest of the year. Sometimes we do have heavy rains at that time. However, in my experience, these are the exact facts: That this bathing at public beaches, regardless of the exposure to infected water, which we freely admit, has not resulted in a marked or appreciable change in our typhoid incidence. The water has been polluted all the time.

8539 We have never had an unpolluted water supply for bathing, in the sense that probably at no time would the water be found to be free from B. coli, but we must remember that we are not discussing pathogenic matters when we talk of B. coli. We do not to my knowledge find feces around these beaches once in a while after storms. I have never heard such a report referring to the bathing beaches.

I have been in Chicago very little. I was there the year of the Spanish American War, which I think was
8540 the first time. I was in Chicago in February of this year with Mr. Ellms. I cannot state exactly at what prior time I visited Chicago. I have never been there for any length of time, only passing through to St. Louis and other points. I visited in Chicago in connection with this case to get the lay of the land, so to speak. I did not exceed over two days there.

8541 At Cleveland we exclude typhoid carriers from the food supply. We do not isolate them in the sense that you would a contagious case, but they are excluded from handling food supplies or any other occupation by which they might contaminate the food supply. We do everything we possibly can to prevent infection, although "carriers" must be considered as a relative term. All people who have typhoid are carriers, some for a very short period and some for a long period. It is our custom to examine the feces and urine in every case of typhoid which occurs, and not to allow that case to leave quarantine until these examinations are shown negatived by typhoid, by two examinations made 24 hours apart. Typhoid infection may cause one to become a typhoid carrier. I think that is the only known way.

8542 As to my understanding of the term "complete purification" of sewage, as applied to Chicago, I think it was defined in the testimony, but my recollection is that it includes the establishment of Imhoff tanks, trickling filters and activated sludge. I have studied various sewage purification processes only so far as they relate to our Cleveland experience. We have no activated sludge plant at Cleveland. I do not think I ever saw one. I have seen experimental activated sludge plants, but not a practical one in operation.

8543 I do not agree that an increase in typhoid fever with no other factors indicates that the water is open to suspicion. You must take into consideration the existing conditions. There might be a very serious epidemic in the neighborhood of Cleveland. These cases in large numbers might be brought into Cleveland hospitals. The increases in Cleveland, therefore, would have no justification for involving the Cleveland water supply.

Even supposing there were cases arising inside Cleveland, you must take into consideration that an epidemic
8544 may occur at any time in the year. When the oyster epidemic occurred in Chicago, and the other one relating to the water supply, in the fall of the year, the increase began in November and the end of the epidemic was not until February. The result is, as far as death rates are concerned, you had practically no increase, because two years bore the epidemic, instead of one.

8545 A typhoid germ has to get into the body by way of the mouth, either through food or water.

The B. coli index is a percentage ratio which allows us to get relative judgment that relates to the infection of the water by B. coli, B. coli being used as an index for

the reason that pathogenic organisms are impossible to draw or find. As a matter of fact, it is almost impossible to cultivate typhoid baccili from sewage. They die out
8546 very quickly. They are not resistant. The water will purify itself when in motion very rapidly from such organisms. They do not propagate very readily in the water.

It is true that if at any time there are living typhoid organisms in sewage, there would be certain potential danger of infection. As to what extent B. coli would be decreased by sewage treatment is the question which would be more related to sanitary engineering, and one
8547 which I can only answer from having had a chance to see the data relating to our Cleveland plant, and some other plants.

We do not have complete treatment in Cleveland. I think the question asked me stated specifically a reduction of 95 per cent of the bacteria. It was solely on that assumption that I answered the question. As to the facts with reference to the effect of the operation of complete treatment plants, I can only take the statements of others
8548 that the complete treatment is effectual. I did not do that for this particular case. It is a matter of record in books on preventive medicine. The books I have used and consulted are Rosenau's of Harvard, Park's of New York, and MacNutt. Rosenau has written on sewage treatment in a recent edition. I cannot say what the year of it is or when I read it.

8549 In saying on page 8175 of the record that I assumed a type of water purification works which would comply with American Public Health and Treasury Department standards, I did not refer to any specific plants. I referred to a plant which would produce that result. Water purification plants can produce such results. I do not know what you mean when you ask about the condition of loading.

8550 Q. If the water that is to be taken care of is heavily loaded with B. coli, what is the limit to which that purification would serve the purpose of producing a water that would pass the United States Treasury Standard? A. Not having any purification plant particularly in mind, I say that I was dealing only with results; so I cannot state what the loading would be.

F. H. Waring, Sanitary and Water Purification Engineer Expert, for Complainants, March, 1927:

8225 *Direct Examination by Mr. Jackson.*

Am Chief Engineer of the Ohio State Department of Health, Columbus, Ohio. Received high school education at Lowell, and Worcester, Massachusetts. Attended the Technical School at Worcester Polytechnic Institute, from which I graduated in 1912 with the degree of Bachelor of Science in Sanitary Engineering.

Following graduation, for two years I was in the employ of Metcalf & Eddy, consulting sanitary engineers at Boston and engaged upon field studies at Cincinnati, Ohio, on sewage disposal investigations and the effect of
8226 sewage disposal upon the Ohio River and the water supply therefrom.

During 1914 I entered the employ of Pollard & Ellms, consulting engineers, Cincinnati, Ohio, and was engaged in the study of nuisance investigations and the design of waterworks.

From August until December, 1914, I was valuation engineer for the Big Four Railroad. From December, 1914, until January, 1916, I was in the employ of the United States Government as filtration chemist in the Panama Canal zone, as chemist in charge of water purification plants, first at Mt. Hope and second at Miraflores.

From January, 1916 to March, 1927; that is, up to date, I have been in the continuous employ of the Ohio State Department of Health; first, as Assistant Engineer up to 1920, then as Principal Assistant Engineer up until 1926, and from April, 1926 to date, as Chief Engineer.

During that interval the important duties have been the supervision of water filtration plants for the State of Ohio, the review of plans and recommendations for or against approval of waterworks and sewerage projects, stream pollution studies leading to orders for cor-
8227 rection of nuisance conditions by municipalities and industrial establishments; and active co-operation with the division of communicable diseases in epidemiological studies of typhoid and other water-borne diseases.

In the performance of my official duties, I have direct supervision of the operation of all water purification plants for the State of Ohio. I have exercised control in my official capacity over water purification plants in Ohio for some 11 years; that is, control and supervision of the water treatment plants was begun in 1916 when I entered the employment of the State Department of Health, and this control and supervision was placed upon a state-wide basis covering all plants shortly after the close of the war, or about 1919.

8228 There are about 70 municipal water purification plants under my supervision, serving approximately 50 per cent of the entire population of Ohio. That represents some 70 per cent of the urban population, and the total amounts to about 3,500,000 people.

The surface water sources of supply for these filtration plants are, without exception, contaminated, some of them very badly. For example, the plants along the Ohio River serving the cities along the Ohio River take their supply from a badly polluted stream. The City of East Liverpool, for example, is located 44 miles by river below the metropolitan district of Pittsburgh, where some several hundred thousands of people reside, and contribute sewage untreated into this river. This plants are required to make official monthly reports to the State Department of Health under my direction.

8229 I absolutely do not agree with Dr. Evans, as stated on pages 3879 and 3880 of the record, as follows:

> "But there are few places, if there are any, that depend upon a filtered water supply that have not experienced breaks in their method of protection, for one reason or another. Literature is full of illustrations of typhoid outbreaks and diarrhoeal outbreaks as the result of breaks in operation, physical or otherwise, of filtration plants."

Properly designed modern water purification plants operated with due regard to the provision of proper personnel may be fully depended upon to produce a water of satisfactory quality. Modern water purification is not experimental or speculative; it is an exact science. Many public water supplies are dependent upon such works;
8230 for instance, we have in our State works installed at Cincinnati and at Columbus, provided in 1907 and 1908, respectively, which have been in continuous service and have produced at all times water of satisfactory quality, meeting at all times the prescribed standards of purity.

During the past 7 years, when the State Department of Health, under my direction, has exercised careful supervision and control of the many water purification plants in that State, there have been no instances of breaks in the operation of such plants, and, there have been no outbreaks of typhoid or water-borne diseases attributable to the public water supplies furnished by these works.

I have had in my official capacity experience in the epidemiological study of typhoid fever cases.

Based upon the studies which have been brought to my personal attention, therefore, I state that it is not sufficient merely to note the incidence of typhoid fever in any given community, nor to draw conclusions about the quality of the public water supply.

A critical study of all cases in any given community reported with an epidemic is needed before a proper interpretation of the causes of the epidemic may be made.

I have read the testimony of the witness Fuller.

8238 Complete sewage treatment, as the term has been used in this case—and I will confine my remarks to the same definition—is a plant consisting of Imhoff tanks, trickling filters, secondary settling tanks or activated sludge process of sewage treatment, or possibly a combination of the two types of treatment, such that the effluent from these works would have a biochemical oxygen demand of 85 per cent removal or better.

Assuming the complete treatment of all sewage of the Sanitary District of Chicago by the activated sludge process or by Imhoff tanks, trickling filters or final sedimentation, no diversion of water through the Chicago Drainage Canal, and the present location of the water intakes, water purification works could be so constructed that the public health conditions in Chicago, with special reference to the public water supply, would be as well safeguarded, as under present conditions.

8241 Assuming complete treatment of all of the sewage of the Sanitary District of Chicago, according to my definition of complete treatment, no diversion of water through the Chicago Drainage Canal, replacement of the present water intake by a super-tunnel located 4½ miles off shore in the vicinity of Wilmette and 20 miles from the mouth of the Chicago River, with chlorination of the water sup-
8242 ply only, the public health conditions in Chicago, with special reference to the public water supply, would be as well safeguarded as under the conditions now obtaining.

I reason by analogy from the experience which we have had at Cleveland in the treatment of Lake Erie water by chlorination only.

As already stated by the witness, Doctor Rockwood, complete filtration or complete water purification, including filtration, was not practiced at Cleveland until 1925. From 1911 to 1925, therefore, we have had all or a portion of the water supply treated only by chlorine.

8243 From 1918 to 1925 approximately 60 per cent of the Cleveland city water was filtered and chlorinated, but the other 40 per cent was chlorinated only. We have observed the ability of chlorination to treat this water and render it safe for drinking. It is to be borne in mind that the Cleveland intakes are only 4½ miles from the shore and opposite the center of the city, and that the sewage of some 1¼ million people, including suburbs, is discharged into Lake Erie about at the center of the city.

The sewage at Cleveland is only partially treated. We estimate at the present time that there may be less than 10 per cent of the sewage receiving treatment.

8244 Therefore, with the relocation of the Chicago intakes as proposed, chlorination only will be able to meet the situation and produce a safe drinking water.

If in connection with the treatment of the sewage and the relocation of the water intake in the way described in the last question, there is installed water filtration or purification works at this intake off Wilmette, that would improve still further the water supply of Chicago.

Assuming complete treatment of all of the sewage of the Sanitary District according to my definition of com-
8245 plete treatment, no normal or dry weather diversion of water, but with a diversion of all sewage and storm water by reason of proper controlling works, the present location of the water intakes with suitable water purification works for the water supply, the public health condition in

Chicago, with special reference to water supply, would be safeguarded as under the conditions now obtaining.

With the controlling works installed and in operation, not only would storm water be prevented from entering the Lake but any untreated sewage, by reason of the overflow from the sewer system would also be prevented from reaching the lake, and hence the most important pollution factor would be eliminated. The water treatment would, therefore, be more easily controlled.

8246 Assuming complete treatment of all sewage, with no normal or dry weather diversion, but with diversion of all storm water by means of proper controliing works, relocation of the intake off Wilmette, and the chlorination only of the water supply, the public health conditions in Chicago, with special reference to water supply, would be better safeguarded than by the conditions presently obtaining and for the same reasons.

8247 Assuming the substitution of a large water purification plant instead of chlorination, only, assuming the same conditions otherwise, that would still further improve the water supply and produce an entirely satisfactory and safe water supply.

The water supply of Chicago should be filtered, regardless of the method of sewage disposal, and regardless of the location of the intake. It is most certainly advisable to remove the turbidity which is in evidence in lake waters. People object to the silt from a common decency standpoint. They desire a clean water, and I believe they are entitled to it. It is also to be borne in mind that filtration works constitute an added factor of safety
8247 in the treatment of water. That is, each step in the process is a purification step, and of course if chlorination alone can meet the requirements, coagulation, filtration, and chlorination must easily meet the requirements with factors of safety at each step. Chlorination of the

effluent of the sewage treatment plant, if carried to the point as I would see it of disinfection, commonly reported as a residual chlorine in the effluent, the chlorine remaining some time after its application to the effluent, results in a disinfection of the bacteria, but more particularly of the pathogenic variety, which is disease producing. If such organisms are eliminated from the body of the water from which the water supply is taken, most certainly it renders the problem of water treatment easier.

8622 *Cross-Examination by Mr. Adcock.*

8636 When I had entered the employ of the Ohio Department of Health in January, 1916, I reported immediately
8637 to W. H. Dittoe, Chief Engineer. He was my superior until April, 1926, when I took his place.

I have never constructed nor designed any sewage disposal works. One of the duties of the Department of Health is to observe sewage treatment plants under construction, but it is not our function to assist in construc-
8638 tion. I operated a sewage disposal plant in a suburb of Cincinnati previously referred to, while in the employ of Metcalf and Eddy. I supervised the process and the steps to be taken in the conduct of the treatment. I had one laborer under me at the plant, and I directed him in what he was to do. I gave instructions as to the conduct of the several steps in the treatment, such for example, as when to clean the settling tanks, and where to put the sludge from the tanks, and how to conduct the operation.
8639 How to conduct the operation of the trickling filters, as to alternation of the beds, and also secondary tanks, when to clean those tanks, and what to do with the sludge. That was a special study lasting about 3 months.
8643 There are about as many sewage disposal plants in Ohio as water purification plants, say, some seventy.

Not all of these sewage treatment plants are operated

during the entire year. The Marion and Canton works are. At Canton, Imhoff tanks are now in service, and it is expected to place the trickling filters in service very
8647 soon. The works at Canton are not all constructed nor in full operation. Marion is the only large city in Ohio which has complete treatment, and which is operated all
8648 the year.

8655 It is my understanding that all of the dry weather flow of sewage is to be treated at a location such as Chicago, plus a proportion of storm water runoff during early portions of such storms or all of the flow if the storms are small. Referring to what I had in mind in giving my answers, the amount of storm water to be conveyed to the treatment works, would be possibly two to two and a half
8656 times the dry weather flow.

I could not say offhand what Ohio plants treat 200 to 250 per cent of the dry weather flow or whether there were any. I cannot say offhand whether any plant in Ohio at storm time treats more than 150 per cent of the dry weather flow. I do not know of any plant in the country which does. I cannot say whether there is any place in the United States where there is a population of over 50,000 where the sewage effluent is chlorinated for the full 12 months or for 6 months. I think it has
8657 been stated that the Cleveland plants chlorinate for the summer months. The Cleveland plants do not chlorinate
8658 throughout the year. I cannot say the exact number of days.

Joseph W. Ellms, Sanitary and Water Purification Engineer Expert, for Complainants:

8257 *Direct Examination by Mr. Jackson.*

8262 I am familiar with modern methods of sewage treatment and the results obtained therefrom. I am familiar

with the present methods of sewage disposal and water supply protection at Chicago, having made inspections and studied conditions there. There are in my opinion other methods of protecting Chicago's water supply than the present method of diversion, which will be equally
8263 or more effective in providing a safe supply.

The two modern and accepted methods of sewage treatment at the present time consist of Imhoff tanks, and trickling filters, with secondary sedimentation in connection with those filters, and the so-called activated sludge method. Such methods may be practiced at Chicago, and the plants which would care for the large volume of sewage which this city produces could be installed to take care of the sewage even though that sewage should be diverted after treatment directly into the lake. The methods of further protecting the water supply since it is drawn from the lake, would be filtration, disinfection with chlorine, either one or both depending upon the location of the intakes. These methods are
8264 well known and standardized, and fairly present some problems which require more or less research. Nevertheless, they offer practicable methods for protecting public water supplies and disposal of sewage.

Referring to the estimate of defendants' witness Fuller, that the cost of a water purification and filtration plant for Chicago, with a capacity of 1,000 million gallons daily, would be $53,500,000, I have made an estimate of cost for such plant. Depending upon the elaborateness with which such a plant might be constructed, more particularly with reference to the design and cost of building, I would say that the reasonable cost would be anywhere from $35,000,000 to $40,000,000. I would say
8265 that a unit price per m.g.d. capacity is a reliable basis of estimate, for the reason that it is based on actual cost of construction, and, therefore, it is not subject to any assumptions with respect to price of material.

I have studied the testimony of Witness Evans and Witness Fuller with respect to the dependability of water purification devices. I believe that water purification works are a reliable protection for public water supplies.

Since 1907 I have been in constant touch with or had actual supervision over two large filter plants, and have been consulted with respect to the operation of other plants. I know that in connection with the plant at Cincinnati we had a water which was polluted, and which required the proper operation of the plant, and that with that operation we did succeed in producing a potable water, a safe water from every standpoint. The same is true of the two Cleveland plants with which I am at present connected, and these two plants are also able to produce a safe, potable water, even though the supply contains more or less pollution from sewage.

8267 In my general experience I have not know that plants have broken down where properly operated by sufficient men and technical talent that understood the process involved. I was in charge of the Cleveland water purification plant in October, 1925, the time at which the witness Fuller stated that it experienced a break down. On account of foundation difficulties, with which this Division Avenue plant has had to contend ever since it was constructed, certain remedial measures have had to be taken, among them being a line of steel sheet piling, surrounding the north and part of the ends of the east and west sides of this plant. In order to make that piling complete, that is, to make it water tight, to have no break in it, it was necessary on the 13th of
8268 October to shut the plant down, because the piling crossed two effluent pipes, 60 inches each in diameter, and these pipes had to be cut. In consequence, the plant could not be operated, and we were obliged to take the raw water from the adjoining pumping station and dis-

infect it with chlorine. The bacterial content of that water is the figure which has been cited by the witness, Mr. Fuller, as evidence of the breakdown. It was not a breakdown, because the plant was not in operation. The water which Mr. Fuller cited as evidence of improper operation of the filtration, had not passed through the plant at all. The shut down was not occasioned because of any imperfection in the plant or its operation.

Assuming the complete treatment of all of the sewage of the Sanitary District of Chicago, by the activated sludge process, or by Imhoff tanks, trickling filters and
8269 final sedimentation, no diversion of water through the Chicago Drainage Canal, and the present location of the water intakes, water purification works could be so constructed that the public health conditions in Chicago, with special reference to the public water supply, would be as well safeguarded, as under present conditions.

Assuming a complete treatment of all of the sewage of the Sanitary District of Chicago as heretofore defined, no diversion of water through the Chicago Drainage Canal, the replacement of the present water intakes by a super-tunnel located 4½ miles off shore in the vicinity of Wilmette and 20 miles from the mouth of the Chicago
8271 River, with chlorination only of the water supply, the public health conditions in the City of Chicago, with special reference to the public water supply, would be as well safeguarded as under present conditions.

My opinion is based upon the fact that the intakes would be removed a considerable distance away from the point of discharge at the mouth of the Chicago River for the treated sewage of the city; that it would be located a distance of some 4½ miles off the shore of Wilmette, and that the chlorination of the purer water would be an added safeguard to its quality when distributed to the citizens of Chicago.

Assuming the same conditions and that there was substituted the construction of a modern water purification plant at the proposed Wilmette intake in lieu of chlorination of the water supply, that would further improve the water supply of Chicago.

8272 Assuming complete treatment of all of the sewage of the Sanitary District of Chicago, with no normal diversion of water from Lake Michigan, but with the diversion of all sewage and storm waters by means of proper control works, the present location of the water intakes, with suitable water purification works for the water supply, the public health conditions in the City of Chicago, with special reference to the public water supply, would be safeguarded as well as under present conditions.

They would be better safeguarded. The water which escapes at times of storm into the Lake would be prevented and the water of the Lake would in consequence remain in a purer condition than it would if such overflows escaped into the Lake, and the purification of the supply would be very much easier because the load would be considerably less than it would be even supposing that such overflows should reach an intake located 20 miles away from the mouth of the River. If the water 8273 supply were given only treatment by chlorination, the supply would be as good as at present. With purification works, the supply would be improved over the present.

8274 In my opinion the water supply of Chicago should be filtered without regard to the method of sewage disposal. The water at times is not clear and contains more or less suspended matter. Without filtration larger quantities of chlorine are necessary for disinfection purposes, but, with filtration less quantities would be required, and hence complaints of excess treatment would be largely eliminated. For aesthetic reasons alone, the water would be greatly improved.

In connection with the foregoing opinion, chlorination or sterilization of the effluents of the sewage treatment plants would be a further protection to the water supply, because they would very largely eliminate the pathogenic organisms which are always probably present in sewage.

At the time of the shut down of the Cleveland filtration plant, there was a plant that was started, known as the Baldwin filtration plant, on the 15th of September, or a month previous to the shut down; but until the 20th
8275 of October, the water which was supplied in that section of the city was a mixture of filtered water and disinfected raw water, but after the Division Avenue plant was again placed in operation on the 24th of October the entire city was supplied with filtered water.

The two periods happened to overlap, but this was done for the express purpose of providing as much filtered water as it was possible to provide during this period when we were obliged to shut down the Division Avenue plant. Up to the time of the reopening of the Division Avenue plant, the proportion of filtered water was about the same because of the opening of the Baldwin Plant just at the time of the closing of the Division Avenue Plant.

8396 *Cross-Examination by Mr. Adcock.*

8397 I have official title in Cleveland of Engineer of Water Purification and Sewage disposal.

8423 The shut-down of the Division Avenue Plant in October, 1925, was due to a structural difficulty. It was shut
8424 down 10 days. The Baldwin Avenue Plant was in operation during that period and had been since the 15th of the preceding month. It only filtered part of the water supply. While the Division Avenue Plant was shut down the only barrier against infection was chlorination.
8425 During the month of October the average number of

B. coli delivered in the disinfected water to the mains was 15 per 100 c.c. The Treasury Standard is 1 per 100 c.c. During the 10 days the average B. coli was 37 per 100. That would not be a satisfactory water supply, according to those standards. The Treasury Standard is accepted for water purification. It is established for the purpose of endeavoring to produce water which will at all times be sanitarily safe.

As to how I reach the conclusion that this was not a breakdown of the Division Avenue Plant, if you stop a plant it does not necessarily mean that it was broken down.

8427 It was broken down in the respect that you could not operate it and it had to be repaired; but that was on account of structural difficulty, not on account of the process.

There might be in most any plant some structural difficulty that would require it to be shut down. Of course, that is possible in any mechanical device, no matter what it is.

It is true that it would be better to have something that would operate automatically, if it is possible to find it.

8429 Cleveland has no opportunity to divert its sewage. All of its sewage goes into its water supply. The water supply has been very seriously polluted at times. We have been extending our cribs out all the time, the purpose being to get away from the pollution that was directly discharged into the Lake. If we had 3,300,000 people at Cleveland we might have to extend the cribs still farther or to remove them to some point not opposite the thickly populated center. Those waters are always liable to pol-
8430 lution in the vicinity of densely populated areas.

I understand the Hazen Theorem to be the probability that for every death from typhoid fever prevented prob-

ably 2 or 3 other deaths may also be prevented on
8432 account of general improvement of the quality of the
water supply. I do not remember whether it is 3 or
4 instead of 2 or 3. For every death from typhoid
fever I would expect there had been 10 cases. There
are carriers of typhoid produced after infection. I
8433 always presumed they were carriers because they had
had the disease. The typhoid rate in Chicago was less
than 2 or something like. I do not remember whether
it was less than 1.

A suitable standard of B. coli index for bathing beaches would be the standard which is set up for swimming pools, which is practically equivalent to the drinking water supply of the city in which they may be located.

8441 I made a survey of the bathing beaches in Cleveland
in 1920 and found the B. coli index 6 miles from shore in
40 feet of water was 1,000 per 100 c.c. on certain lines.
That was beyond our intakes about a mile and a half. We
have not been able to meet the Treasury Standard at
Cleveland without chlorination because we have not used
a sufficient quantity of coagulant on account of cost, and
we depended very largely on chlorine which we added
afterwards to bring the bacteria down. By filtering and
chlorinating we have come very close to the Treasury
Standard. In 1925 it was 1.3 on an average, including
8442 the month when we were only chlorinating the water, but
since 1926 I think the figure was below 1; that is, during
the year in which all the water was filtered.

In the examination of the bathing beaches in 1924 the B. coli index was found to vary all the way from 12,300 to 81,100 per 100 c.c.

8443 I do not regard the water at the bathing beaches east
and west of the Cuyahoga River as satisfactory for bathing. There was evidence of fecal deposits there after
storms due to the limited amount of treatment which
the sewage of Cleveland receives at the present time.

8445 I would say we could practically filter water contain-
ing 386,000 B. coli per 100 c.c. I think it has been done.
It would be a pretty good performance. It seems to be
done at times in the Ohio River. I have not the data
here.

The United States Public Health Standard 6,500 B. coli
per 100 c. c. representing the most that should be found in
water in order to treat it by filters is a tentative figure
for certain processes, chiefly single stage coagulation and
sedimentation and filtration, which has been successfully
8446 handled and produces a water of less than 1 B. coli per
100 c.c. Those studies were not completed and the fig-
ures are regarded only in a sense as tentative.

Referring to the report entitled "Fifth Annual Re-
port of Ohio Conference on Water Purification, Akron,
October 15, 1925," pages 79 and 80, those are the figures
that I had in mind for the average yearly result of opera-
tion at Ironton. The average yearly B. coli per 100 c.c.
in raw water at Ironton in 1924 was 16,700. This does
not represent maximums, and I believe since this period
even larger quantities of B. coli have been successfully
8447 handled. Ironton may be a place of 10,000 people pos-
sibly.

Whether the tentative figure of 6,500 B. coli per 100 c.c.
could be increased 50 or 60 times and still have satisfac-
tory results in a filter plant, I only know that it seems
to be done with certain combinations of processes. It
has been done, so there is no guess-work about it.

However, I do not know that it has gone as high as that
figure, but it seems to me it has gone as high as 100,000,
and I am not so sure but that it may have gone as high
as [illegible]25,000. That would probably be the maximum load.
8448 In connection with purification plants, we are apprehen-
sive of sudden loads, just like on any machine. It is pos-
8449 sible for the load to run away up suddenly. In such case

if the factors of safety are sufficient the water that is turned out still continues to be satisfactory. In speaking of factors of safety, I refer to sufficient coagulating chemicals, sufficient previous disinfection, and sufficient excess lime in order to prevent bacterial growth, and chlorination.

In the usual method of chlorinating water the chlorine gas is withdrawn through special apparatus and dissolved and passed in to the water to be treated in solu-
8450 tion form. The efficiency of the chlorination depends upon the machine and upon the vigilance with which the operator looks after it. Whether I would require a greater factor of safety in connection with the filtration of lake waters than in connection with a river like the Ohio, would depend entirely upon the bacterial load which it was necessary to remove, the extent of the pollution of the water being treated, and also the evenness of the load.

Whether I would expect the load to be as even in lake
8451 water as I would in river water, I think variations can occur in both places, as far as that is concerned, and be very sudden and indeterminate. In the case of lake water such sudden changes are caused by storms and wind, and by sufficient current induced by wind movement over the surface of the water, meteorological conditions, barometric changes, etc.

You might have 5,000 or 6,000 B. coli per c.c. in the effluent of a trickling filter or activated sludge plant.
8452 The B. coli in sewage run about 120,000 per c.c. with a total bacterial count of 2,000,000 or over, so that if 95 per cent of the bacteria were removed we would expect to have about 6,000 left in the effluent. I have never made a test to determine the count in the effluent of the trickling filter or activated sludge plants. I am just
8453 assuming that there might be 95 per cent purification.

I do not think anybody knows how many different kinds of bacteria are found in sewage. Identification of organisms of that kind is not generally undertaken.

Taking this situation at Chicago, putting this effluent into the lake, supposing all the sewage were purified by trickling filters or activated sludge, and then depending upon chlorination of the water supply alone,—I do not know that I would recommend it. I think it can be done, though.

8454 All this effluent could be put into the water supply and then chlorination might be made a sufficient barrier.

8455 I believe that 100 per cent elimination of pathogenic organisms from sewage effluent could be accomplished if you used a sufficient amount of chlorine. That has never been done. I cannot say what we have accomplished at Cleveland in the removal of bacteria. We cannot determine the pathogenic organisms or elimination of B. coli. We reduced them from 186,000 per c.c. to about 6,000 per c.c.

8456 Of course, this is a plant which has nothing but screens —no trickling filters or activated sludge process. It has no settling tanks. At the plant where we have the Im-
8457 hoff tanks we reduced the B. coli from 128,000 to 34,000. That was with greater treatment than at the other plant. The percentage of reduction was about 69 per cent. During that year we used 72.1 pounds of chlorine for each million gallons. I do not remember how much chlorine we used in 1924, but it has always been around 75 or 80 pounds, as I remember.

8458 I never have made any experiments to determine whether all the pathogenic organisms could be eliminated by chlorination, nor do I know of any place where it has been done. I think I have seen the reports of March, 1926, of the Municipal Research Bureau of Cleveland on the correlation of water purification and sewage disposal in Cleveland. I furnished some data in connection with it and I know Mr. Layton E. Carter.

I do not agree with their interpretation of the data.

I agree with the statement in that report that Cleveland is heading toward a crisis with respect to the pollution of the Lake and must take immediate steps to complete sewage treatment.

That is my own statement. I do not know when it
8460 was made, some time within the last 2 years, probably.

Page 27 of the same report is generally true, to the effect that only a part of the general pollution of Lake Erie can be controlled; that if sewage is given the most refined treatment pollution would still be extensive; that surface wash contributes a considerable part of the pollution for which there is no known treatment; that treatment of storm overflow would be very expensive; that this source is an appreciable part of the general pollution, but is objectionable primarily because of nuisance and that it may be desirable to ultimately remove the solids, even though the cost is seemingly prohibitive.

8461 Page 28 of the same report presents a good picture of the conditions regarding the Cuyahoga River to the effect that it is at all times heavily charged with sewage and the spread of its discolored waters has been plainly observed well beyond the water intakes, that it has been observed that the occurrence of phenolic tastes due to wastes brought down by the river is simultaneous with heavy bacterial contamination; that the sources of pollution are not important because of the numbers of bacteria which are discharged, but on account of their
8452 relation with contamination of the intakes which is dependent on current and distances (dilution); that lake currents are changeable from day to day; that there is no settled general current eastward; that movements

of the water are almost entirely dependent on the topography of the lake bottom, the river current and the winds, the last of which are the most essential; that the location of intakes and beaches with reference to sewer outfalls is less significant than might at first be supposed; that there is no evidence of the relative importance of sources of pollution with respect to their effect on intakes, except that it is certain that the river does pollute at times; and that the reported reduction
8463 of 85 per cent of the bacteria in the lake outfall discharges by chlorination during the bathing season did not have an apparent effect on the water intakes.

I agree with page 30 of the same report that neither of the lake front plants materially reduces the number of bacteria in the sewage, but, inasmuch as the westerly plant is at capacity and the easterly has nearly approached capacity, it is apparent that general pollution will not be appreciably increased by outfall discharge if the southerly plant is constructed to provide for expansion of the easterly and westerly districts; that if a new water intake is installed opposite East 185th Street, as now planned, the influence of the easterly plant will be much more serious than at present, and treatment of the discharge will become necessary, and that the lake front outfalls by reason of their position and amounts and condition of sewage are obvious sources of nuisance.

8465 I agree with page 31 of the same report, that it is questionable if the greatest care in sewage treatment and control of surface drainage would ever restore the water along the bathing beaches to the bacterial purity usually exacted in closed pools.

I agree with the statements in a paper entitled, "Foul Tastes in Cleveland Water Again Caused by Phenol. Wind and Ice Carry by-Product Coke-Oven Wastes to

Intake and Chloro-Phenolic Compounds Cause Bad Taste in Water," appearing on page 453 of the Engineering News Record of March 13, 1924, written by me, that coincident with the appearance of the foul taste in the water supply bacterial samples showed a tremendous increase in the number of bacteria present in intake waters; that samples from both intakes for a week or 10 days had shown less than 100 bacteria per c.c.; with usually less than 50 and practically no evidence of B. coli in 10 c.c.; that on March 3, however, the number of bacteria increased to 10,000 or 20,000 per c.c. with B. coli present in .1 c.c.; and that these figures plainly indicate the direct nature of the pollution and also show its dangerous character.

I agree with page 31 of the Municipal Research Bureau Report that a canvass of those with experience of lake front conditions discloses that deposits of feces and other objectionable animal and vegetable waste are common on the beach, especially after storms; that similar matter may usually be observed floating and decomposing in the water, together with finer suspended material, causing unpleasant odors: that oil and grease in sufficient quantities to befoul the beaches are also reported; that observations indicated that the discharge of storm water from the interceptor system is most responsible for the coarse material deposited, and that it is probably true that treatment of sewage would not eliminate the oil nuisance, but it would put the city in a much better position to discover and control the sources of such wastes.

The phenol taste arises from the wastes discharged from by-product coke-ovens on the Cuyahoga River which are discharged into Lake Erie, and coming in contact with the chlorine we use for disinfecting produces a compound of objectionable taste. Taste arises in connection with the use of chlorine when there is a sufficient quantity of the wastes in the water. Gas works are one source of such waste.

I wrote a paper which appeared in the Canadian Engineer on April 30, 1926, entitled "Pollution of Boundary Waters, Problems of Cities on Great Lakes Discussed in Paper Read at Meeting of Central States Section, A. W. W. A." and I now subscribe to the statement that it was found that at the mouth of the Detroit and Niagara Rivers serious pollution extended normally more than 10 miles into the lakes, and sometimes was found 16 to 18 miles from the shore, and at Cleveland contaminated water may be found at times as far out as 8 miles; that the high natural purity of the Great Lakes is, therefore,
8468 to a great extent of merely academic interest, so far
8469 as a source of water supply is concerned, particularly
in the neighborhood of large cities; that the high cost of intakes and long tunnels and the engineering difficulties involved in constructing such works in water over 70 feet in depth forced the conclusion that effluent purification is usually necessary for the maintenance of a safe water supply, and that further means for diminishing the load on water purification processes must in many cases also be taken; that far too little has been done towards diminishing pollution of the waters of the Lake by more complete purification of sewage; that there is no question that the natural sources of dilution should be availed of, but that it should also be realized that there must be a limit to the ability of purification processes to make safe from a sanitary standpoint waters which have once been contaminated; that cities on the Great Lakes are in a peculiar position regarding water supply and sewage disposal; that they are all fouling their own nests, and that whether they realize it or not the problems of a safe water supply and the proper and adequate treatment

of their sewage are so intimately related that one cannot be solved without solving the other.

In other words, all these lake cities are sending their own sewage into their water supply except Chicago. I presume you might say, as counsel suggests, that they are stewing in their own gravy.

8471 I wrote a work entitled "Water Purification" and page 32 of said work states that the pollution of the Great Lakes is to a large extent local but since these communities draw their water supply from the same source the problem of preventing the contamination is a troublesome one; that the common remedy of extending intakes has been resorted to with fair success and with marked decreases in the typhoid rate; that the City of Chicago has diverted a large part of its sewage, thus keeping a constantly increasing volume of sewage from polluting the lake water farther and farther from the shore; that other large cities are contemplating partial purification of sewage, and that the effect of wind on these large bodies of water is causing currents; that the influence which the shore lines may have on these currents and the movement of ice polluted with sewage from the shores out into the lakes in the spring months are all factors which may at times be the cause of waterborne epidemics.

I did not know that I had stated it as well as I had.

The pollution affects the use of water for recreational purposes and for bathing and it affects fish life and recreational boating, to some extent. It depends, of course,
8473 upon the degree of pollution of the shore waters, but it certainly would become more or less objectionable, I imagine; that is, if very large volumes of untreated sewage are turned directly into the Lake. The floating solids are the things most objectionable from the point of view of boating and bathing. It is true that a person in a launch or sail-boat or row-boat is liable to become infected.

8474 The paper which appeared in the Canadian Engineer contains the following statement, with which I agree, to the effect that in 1911 the U. S. Public Health Service completed a survey of the Great Lakes on the United States side, finding that in certain localities there was dangerous sewage pollution, but the bulk of the water remains in its pristine purity; that the colon bacillus is practically never present in the unpolluted waters, and that the normal bacterial content is less than 10 per c. c.;
8475 that the dangerous contamination of the lake waters arises from the discharge of sewage from towns and cities located on the shore, and from vessels and from surface wash, and that the distance which polluted water may travel depends upon volume, natural currents induced by flow and the currents induced by wind action;
8476 that the zones of pollution opposite Cleveland have increased in area between 1904 and 1924 and contaminated water has forced its way farther out into the Lake; that the natural advantages of these waters as a source of pure supply and for recreational purposes have not been properly appreciated; that the natural clarity of the waters leads to a belief that they must be necessarily pure and fit for consumption, and that this idea has been gradually changed during the past fifteen years as a result of the overwhelming evidence obtained in cities located on the shores whose inhabitants have suffered from typhoid epidemics and other intenstinal diseases; that
8477 lake water is the only source of supply for cities on the Great Lakes and the only place for the ultimate disposal of the liquid portion of the sewage, giving rise to the question how far we can safely go in disposing of sewage without treatment before the water is so badly contaminated that purification processes become overloaded, and the further question whether it is a proper policy to encroach too closely upon the barriers set up by filtration

and disinfection; that the economics of water purification versus sewage treatment needs serious consideration in each case; that we should not question costs where life and death are at stake; that so long as we huddle together in large cities we must pay the penalty of concentration; that it is necessary to look forward and provide in our engineering structures for concentration of population;
8478 and that the public will continue to demand more effective measures for the disposal of sewage and trade wastes, not only for reasons of health but of ordinary decency.

The size of the city has something to do with the question of providing a water supply.

8486 I made a report with reference to the Milwaukee filter and recommended filtration in 1920. My reason for recommending filtration was to safeguard the water supply
8487 against sewage pollution. They were then building an activated sludge sewage disposal plant considered to be one of the modern plants of the country. In 1920 it had just begun, that is, the construction. They had been carrying on experiments for quite a long time, and they had been preparing plans in connection with it. They began operations some time in 1926. All the sewage of
8488 Milwaukee and the area which it serves is passing through the plant. I do not know to what extent the sewage is receiving complete treatment, though I believe it is about one-third, including the processing of the sludge. I presume the remainder passes into the Lake. It was designed for the treatment of all the sewage. The plant was designed by T. Chalkley Hatton who has gained considerable reputation as an engineer in that
8489 line. He has elaborated the activated sludge method considerably further than some other engineers, though there are other plants in the United States. I understand the reason that they do not operate the plant so as to

take care of all the sewage is because they cannot process the sludge. So that so far as present operation is concerned, the plant is really effective to only one-third of what it was intended to be.

Milwaukee water at the intakes contains, as a rule,
very little suspended material. I do not know whether
or not it is less turbid than in Chicago, but I imagine
8490 it may be. It averages less turbidity than Cleveland by
8491 10 or 12 parts per million. I recommended filtration at
Milwaukee because of the sewage that might pass into
the lake at any time. I believe there are portions of the
sewage plant designed and constructed to handle consid-
erably more than the average flow for partial treatment.
Just to what extent I am unable to say. My recommenda-
tion was because of the liability of the water supply be-
coming polluted, even after the treatment plants were put
8492 in. The filtration plant has not been built. The city
depends solely on chlorination. The intake is about a
mile and a half from shore. It may be 6 miles from the
mouth of the Milwaukee River. I do not remember ex-
actly. I do not know that I would be surprised to hear
that within the last two weeks notices have been issued
by Milwaukee authorities that people should boil water
before using it. This is not surprising if they are only
taking care of a portion of their sewage through the
plant.

8493 In making my report I expected the plant to be completed and to operate to the full extent for which it was designed. I do not have the figures as to the quality of tap water in Chicago.

8498 I cannot say what the pumpage capacity in Cleveland was in 1915. Cleveland has been metering practically 98 or 99 per cent ever since 1908.

8499 My recollection is that the lowest pumpage per capita since metering has fallen below 100 gallons per capita per day. The present consumption per capita is, I think, in the neighborhood of 150 gallons. It might be more accurate to say 162 gallons per day for 1925.

Redirect Examination by Mr. Jackson

8503 ~~As to~~ the problem of phenol wastes at Cleveland the waste from the coke-oven plant has been impounded; that is to say, it is accumulated constantly and used for cooling the water in order that it may not pass into the Cuyahoga River, and within the last year that has been successfully accomplished and the difficulty from phenol waste in the water supply has been virtually eliminated. There has been no offensive taste recently.

8504 The excess of the B. coli content over the Treasury Standard in 1925 was because of the fact that disinfected raw water was supplied during the 10 days mentioned in the testimony, and when that was included in the yearly average the B. coli content of the water ran slightly above the standard. Considering only the part of the supply treated by the purification plant, it was way below the Treasury Standard in 1925, in the sense that it had a smaller B. coli content than required by the standard.

Since October, 1925, there has been 100 per cent filtration at Cleveland. The average B. coli content for 1926
8505 at the Division Avenue Plant was .3 and for the Baldwin Plant .23, which is that fraction of one better than the Treasury Standard. This included chlorination. That is the water supply that was delivered to the city system.

Referring to the papers that I have written, it is my opinion that all sewage should be completely treated before it is turned into lakes and streams.

L. R. Howson, Sanitary Engineering Expert, for Complainants. March, 1927:

Direct Examination by Mr. Jackson.

8932 With no diversion, works could be installed for the complete disposal or treatment of the sewage—the effluent from those plants might be further chlorinated, the water supply might be filtered through plants in connection with the present intakes; the water supply might be changed by building a large tunnel extending out into the lake north of the city some 20 miles from the river's mouth. The other works that might be installed would be controlling works either in the channel out at the river's mouth or above. The water supply should be metered in order to reduce the quantities and make the prob-
8933 lem of taking care of the water supply and sewage disposal less costly. These, either individually or in combination might be adopted. All of them would not be required.

By complete treatment for the disposal of the sewage I mean settling tanks, sprinkling filters, and secondary sedimentation as one type, and activated sludge as another type.

The efficiency in the removal of bacteria practical to secure through chlorination of the effluent in sewage-disposal plants of modern types, approaches 100 per cent.
8945 Assuming the completion of the sewage treatment program outlined and the diversion of 1,000 c. f. s. through the Chicago Drainage Canal, the conditions on the Illinois and the Des Plaines Rivers would be very much better than those which have obtained in the past. So far as the prevention of nuisance in the Illinois River is concerned, the effluent from these plants could be discharged into the river without dilution and without subsequent nuisance.

Assuming complete treatment of the sewage in the Sanitary District of Chicago, either by the activated sludge process or Imhoff tanks, trickling filters and sedimentation, with occasional dilution due to storm water overflows, the aquatic growths would not be promoted to such extent in the Des Plaines and Illinois River as to create a nuisance.

The addition of dilution water would have no appreciable effect in improving conditions in this respect.

The reasonable cost of a water supply purification plant for Chicago, based upon an assumption of complete 8947 metering would be $30,000,000.

Assuming a super-tunnel as outlined by the witness Fuller were built in the vicinity of Wilmette, 4½ miles off shore, approximately 20 miles from the mouth of the Chicago River, for the purpose of replacing of the present water intakes of Chicago, such a tunnel to be 8948 approximately equivalent to the present water intakes of the City of Chicago, should start at the crib with a diameter of 27 feet, and it would maintain that diameter from the crib to the point of the first connection with the pumping station; that is, the Lake View and the Mayfair stations. It would decrease in size there and progressively decrease with each additional station served until at its terminus it would be 15 feet in diameter.

The reasonable cost of the construction of such a tunnel would be $40,000,000, and assuming funds to be available, a reasonable time for the construction would be 8949 from 5 to 8 years.

The water level between the proposed regulating or control works at the northern terminus of the Drainage Canal and Lockport, would be maintained at about 7 feet or more below the water level lakeward of the proposed controlling works.

8954 It would be possible to construct a separate sewer

system in Chicago, and I have estimated the cost of that to be approximately $130,000,000 to $150,000,000. Assum-
8955 ing funds to be available, the time required for such construction would be somewhere between 10 years and 20 years.

Counsel read from Exhibit 1061, page 2566, the recommendation of Mr. Rudolph Hering, as follows:

> "It is practicable, however, to exclude the storm water from the sewers over a large portion of the future city by adopting a separate system of sewers. The area north of the town of Jefferson, and of the middle of Lake View may be treated to advantage in this way, and also a large portion of Hyde Park, Lake Calumet, and other adjoining towns."

8956 There is a present necessity for a reconstruction of the sewer system in downtown Chicago. The sewer system there is very badly overloaded, and is operating today practically with only the capacity required for sanitary sewage. During storms the water pools on the
8957 streets, and backs up into the basements that are not protected by backflow devices.

Assuming complete treatment of all of the sewage of the Sanitary District of Chicago by the installation of sewage disposal works as heretofore described by me, no diversion of water through the Drainage Canal, the present location of the water intakes and the installation of water purification plants, the public health conditions in Chicago, with special reference to the public water supply, would be as good as those which presently obtain.

Assuming complete treatment of all of the sewage of the Sanitary District of Chicago, no diversion of water through the Chicago Drainage Canal, the replacement of the present water intakes, by a super-tunnel located 4½ miles off shore, in the vicinity of Wilmette, and 20 miles from the mouth of the Chicago River, with chlorination of water supply only, the public health conditions in Chicago, with special reference to public water supply, would be as good as those now obtained.

8958 The installation of a complete water purification plant, in addition to the relocation of the intake off Wilmette, would make the water supply very much better than at present.

Assuming complete treatment of all of the sewage of the Sanitary District of Chicago with no normal diversion of water from Lake Michigan, and by that I mean no diversion except at times of storm, but with diversion of all the sewage and storm water overflows, by means of controlling works located near Western Avenue, the present location of the water intakes with filtration and chlorination of the water supply the public health conditions in the City of Chicago, with special reference to water supply, would be safeguarded as well as under present conditions.

Assuming complete treatment of all of the sewage of the Sanitary District, no normal or dry weather diver-
8959 sion, but diversion of storm water overflow through the controlling works proposed near Western Avenue, replacement of the present water intakes by a super-tunnel located 4½ miles off-shore, in the vicinity of Wilmette, and 20 miles from the mouth of the Chicago River, with chlorination only of the water supply, the public health conditions of Chicago, with special reference to the public water supply, would be better than those presently obtaining.

The installation of filtration or purification works would improve the quality of the water supply. In the three preceding questions the addition of controlling works at the mouth of the Chicago River for use in time of storm would be a further safeguard. In all these questions, involving no diversion or diversion of storm

water only, if the effluent from the sewage disposal plants
were chlorinated, this would still further safeguard the
8960 water supply.

8965 On page 8, of Exhibit 202 the table shows that under
the present metering plan there will be an excess of expenditure over income of $67,000,000. If, however, universal metering is adopted, there would be a surplus of revenue of $131,000,000, making the difference accomplished by metering between 1925 and 1960, $198,000,000. That outlay was only for operation; that is, cost of pumping, labor, fuel, etc., repairs and renewals, additions and
8966 extensions, over a period of 35 years.

I made a very detailed study of the saving in consumption of water to be derived from universal metering some 10 years ago, and at that time came to the conclusion that the water consumption could be reduced from 275 gallons per capita to 125. The biggest part of this saving is in the dwellings and flat buildings. Prior to the universal metering, about 9½ per cent of Chicago's service was metered. That included all manufacturers and large consumers, but did not include the small consumers, except those who specifically requested it, or who had lived in a suburb which had meters before it was
8967 taken over by Chicago.

The saving is all with respect to what is wasted; it does not mean any curtailment in convenience.

Complainants' Exhibit 204 is a true copy of a report
8975 on universal metering for Chicago by Maury & Gordon.

Beginning on page 3 of Exhibit 204, certain conclusions are stated in substance as follows:

Chicago pumps more water than any other city in the world.

The average daily pumpage in 1924 was 840,000,000 gallons, equivalent to 280 gallons per day for every man, woman and child in the city. The amount pumped per

8976 capita is constantly increasing. Unless meters are installed it will exceed 300 gallons per day within 10 years, and will continue to increase thereafter.

Two-thirds of this enormous pumpage is waste, caused either by the reckless use of the water by consumers or by unchecked leakage in their plumbing fixtures. At least one-half of the total pumpage can be saved by the installation of meters, and in no other way.

8977 Meters stop waste, but they never restrict the use of water to the detriment of health. After the city has been metered, and filters have been installed, consumers will have plenty of water of first class quality on the third and fourth floors of buildings, and the fire protection of the city will be greatly improved.

8982 Assuming intakes replaced by a super-tunnel, the total expenditure for water purification plants, intake relocation, up to 1945 or 1955, would be $70,000,000, which includes $30,000,000 for the plant, and $40,000,000 for the tunnel. The total expenditures for both Chicago and the Sanitary District according to my estimates, would be $152,000,000.

8994 *Cross-Examination by Mr. Adcock.*

I got my degree of civil engineer in 1912, as the result of writing a thesis. I did not attend the institution after
8995 1908.

Interceptors for cities of 100,000 inhabitants are about the largest size that I have laid out. The population of Lincoln in 1920 was 65,989. Gary, Indiana, is now approximately 100,000. We made a preliminary layout for Gary. I cannot say what was the size of the interceptors there. What we did was to pick up the intercepting sewers. We built one 8-foot sewer in 1908 and 1912, and we picked that up and pumped up by cast iron force main, which, I think, was 36 inches, and picked up a couple of additional sewers and pumped them the same way.

9038 The report was made about 3 years ago. According to my recollection we designed the interceptor on the first installation to be about 36 inches.

9117 I had a great many conversations with Major Putnam, District Engineer at Chicago, before we were employed and some subsequently, with reference to our employment and making report to the War Department (Special Master's Exhibit B), but I had no conversations with Major Putnam with direct reference to the Chicago permit of March 3, 1925.

9118 On some items we probably gave Major Putnam some information prior to March 3, 1925, such as the effect of metering upon waste water. I think that had been discussed. We were at that time about in the middle of our report. So we had reached no conclusions. We did not discuss with Major Putnam the question of standard of water or what conditions we wished to be produced by the operation of the disposal plant in the Des Plaines and Illinois Rivers. The definition of the pollution standard and what it was to accomplish was given to us as part of our employment. We had no part in stating that stipulation.

9402 I believe it is a well-known fact that where meters are introduced into a city and the waste is cut, there is subsequently a gradual rising tendency in the consumption.

I am referred to page 63 of a report entitled "The Commonwealth of Massachusetts—Report of Joint Board Relative to Water Supply Needs and Resources," dated January, 1922, by Mr. Goodnough, in substance as follows:

The general use of meters has caused at first a great reduction in the consumption of water per capita, but in Cleveland and Milwaukee, since the bulk of the services

were metered, the consumption has again rapidly increased,
notwithstanding the fact that the percentage of
9403 metered services has increased until practically all of
the services are metered. In Detroit and Cincinnati the
experience has been too short to enable safe conclusions,
one having shown an increase since complete metering,
and the other a decrease in a period of one or two years.
In the case of Newark, where the records are limited, the
full effect of meters appears to have been obtained when
the percentage of metered services amounted to from
55 to 60 per cent. Since that time the increase of metered
services to over 90 per cent has been accompanied by
an increase in the per capita use of water.

9404 I disagree with it in respect to Newark. I disagree
with it with respect to Detroit and Cincinnati. It is correct
in respect to Cleveland and Milwaukee. That is
according to my information, which is some three years
more recent than the article. I have the tabulation of
data on universal metering in all cities of over 100,000
population, from a compilation made by the Chicago city
9405 engineer. I did not furnish the data to the city engineer.
I have checked it on a few cities.

9448 At the end of 1925 there were in Chicago 2,871 miles of sewer in the combined system, of which 72 per cent were pipe sewers and 28 per cent were brick sewers.

I investigated the costs of those sewers per mile and in total expenditure for the past 15 years, and I found the portion of sewers which had been built in each of the past 15 years.

First, this estimated cost of a sanitary sewer system, will, of course, involve smaller sizes than a storm water sewer system or a combined sewer system; but I assumed that for all sewers built since 1918, which is about one-seventh of the total mileage, sanitary sewers could be built today for the same price that combined sewers of three or four times the capacity were built at that time. That mileage of sewers under that condition costs $12,000,000.

For sewers built between the period 1909 to 1919, during which period they spent approximately $10,000,000, I doubled the cost of the combined sewers for the separate sewers and added 50 per cent for additional interference—another $25,000,000.

I then took all sewers except those in the Loop which were built prior to 1910, some 63 or 64 per cent of the total. I doubled for the sanitary sewers the cost of the combined sewers and multiplied this by a factor of 2 for price levels, and it comes to $118,000,000.

9449 Then the Loop sewers which include about 67,000 feet of sewer, were estimated at $3,000,000, a total of $158,000,000.

I then took a second basis in which I made a very tentative layout of a sewer system of separate sewers, estimated the mileage of the various sizes, studied the contracts let by the City of Chicago for sewers of those sizes in the last couple of years, found the cost per foot of those sewers and added in some 72,000 manholes and came to the conclusion that a sanitary sewer system would cost to date, exclusive of interference with paving and other construction, $52,000,000, an average of $17,300 per mile.

Chicago now has 2,474 miles of paving, practically as much paving as its sewer system, although a lot of this paving is in alleys. I added for the paving, assuming we would have to cut through 634 miles of macadam, 333 miles of asphalt, 507 miles of brick blocks, and estimated that paving at prices which amounted to an additional $12,810,000.

9450 Then I made a separate allowance for the item of obstructions. One-third of this mileage, or approximately

1,000 miles, is built in more or less outlying territory. I added 50 per cent to these costs as representing an average of the additional difficulty since those sewers were built. That made $8,500,000, another third. I added 100 per cent for difficulties, making $17,000,000 additional; and the last third I added 200 per cent, making the cost three times the cost of the equivalent sewers without obstructions, adding $59,500,000 to the previous total. I then added 500,000 house connections, making a total of $4,700,000 for those connections.

Adding all these allowances together, I reached the result of $129,010,000, which gives me a range of from $130,000,000 to $150,000,000. The house connections in-
9451 cluded connection from the building line to the sanitary sewer. I put in an allowance of 75 feet which is sufficient to go to the house from the center of the street.

I have made a mistake in that item. My total here should be $171,000,000 instead of $129,000,000. My range therefore, should be between $158,000,000 and $171,000,000, rather than $130,000,000 to $150,000,000. My mistake was due to a misplaced decimal point.

All of my calculations of the degree of treatment required and the amounts of water required for disposing of the effluents of Chicago sewage down the Illinois River are based entirely upon supplying enough dissolved oxygen to satisfy what I have taken as the 5 day demand of these effluents.

I bear in mind the only source of dissolved oxygen considered in that question is the dissolved oxygen supplied
9479 from diversion water. Under that pollution standard I did not use the dissolved oxygen in the sewage effluents or in the oxygen available from nitrate or nitrite. The testimony which I gave regarding the saving from metering was based upon the assumption that water consumption would increase to 440 gallons per day per capita

without metering, based upon Exhibit 202, the report made by the City Engineer, Mr. Ericson.

9481 As to whether any city in the United States over 100,000 population ever got as high a consumption as 440 gallons, Buffalo got to 373 before they started to meter. I know of no other city which has ever let it get that bad before putting in meters. The Buffalo rate just mentioned was in 1905 and in 1915 it was 345. Last year it was down to 208, and they are still only a small percentage metered. Those are figures for 1925. I have not the figures for 1926.

9482 I know where the yacht harbors are located in Chicago only in a general way. I think probably there are a number of yacht harbors there. I am not informed as to that. The lake about Chicago is used for rowboating and sailboating and launches.

Every bit of our report of April 16, 1925, was used in making up the estimates we have offered in this case. I have made no investigation since three years ago when the report was turned in. The estimates of cost that I put in in this testimony are an exact copy of the estimates in our report.

9533 *Redirect Examination by Mr. Jackson.*

The standard sought by the Government for the purpose of my report requiring such as would permit a thriving fish life in the Des Plaines and Illinois Rivers, is a very rigorous standard, particularly in a stream—that is, the restoration of thriving fish life—in a stream in which there has been none for a period of 20 years or more. Such a pollution standard is not necessary to prevent nuisance. There are factors of oxygen supply which are available for preventing a nuisance, and which are not available for permitting a thriving fish life. There are two principal sources of oxygen which 9535 are in the effluents themselves. These sources are the dissolved oxygen of the effluents and the oxygen which is contained in the effluents as nitrates and nitrites.

With the standard set up by the District Engineer the nitrate and the nitrite oxygen is not available, because that only becomes available for satisfying the oxygen demand of the sewage effluents after the dissolved oxygen has been exhausted; and as fish life is stifled when the dissolved oxygen is drawn to below about 3 parts per million, the big source of oxygen from the nitrate and nitrite is not available in the pollution standard which requires a thriving fish life. Therefore, the factor of safety against nuisance is about twice as great as the factor of safety against killing fish life. There is a further reason as to a greater factor of safety, in that fish life once established, if through a temporary reduction in plant efficiency the oxygen supply is reduced, the fish life is killed and it takes years to replace it; whereas, if only a nuisance were established a temporary
9536 break in the operating efficiency would result only in a nuisance for 2 or 3 days which could be corrected with no injurious effects other than the temporary nuisance.

9545 Referring to page 211 of the report where appears a statement that sterilization of sewage removes 90 to 95 per cent of the bacteria, this refers to sterilization of raw sewage, and not to sterilization of effluent.

Even though there is an increase subsequent to metering, the ultimate rate is much lower than that prevailing without metering.

George B. Gascoigne, Sanitary Engineering Expert, for Complainants, March, 1927:

Direct Examination by Mr. Jackson.

I have considered the effect of storm overflows, and
8921 in my opinion it would be practicable to treat sewage

and storm water flows in Imhoff tank trickling filter plants substantially greater than 1½ times the average dry weather flow. It will be possible to treat approximately 4 times the average dry weather flow. If this were done, the amount of pollution from storm overflows will be practically eliminated. This procedure would involve very minor, if any, changes in the proposed treatment plants of the Imhoff type.

Assuming the complete treatment of all of the sewage in the Sanitary District of Chicago by the installation of sewage disposal works as heretofore described, no diversion of water through the Drainage Canal, the present location of the water intakes and the installation of water purification plants, the public health conditions in Chicago with special reference to the public water supply, would be as good as those which presently obtain. 8922

Assuming complete treatment of all of the sewage of the Sanitary District of Chicago, no diversion of water through the Chicago Drainage Canal, the replacement of the present water intakes by a super-tunnel located 4½ miles off-shore in the vicinity of Wilmette and 20 miles from the mouth of the Chicago River, with chlorination only of the water supply, the public health conditions in Chicago, with special reference to the public water supply, would be as good as those now obtaining.

If there should be substituted water purification or water filtration for chlorination only of the water supply, the supply would be improved.

Assuming the complete treatment of all of the sewage of the Chicago Sanitary District with no diversion of water from Lake Michigan except in time of storm overflows, but with diversion of storm water overflows by the operation of controlling works located in the vicinity of Western Avenue, the present location of the water intakes, with filtration and chlorination of the water supply, the public health conditions in the City of Chicago, with special reference to the water supply, would be safeguarded as well as under present conditions.

8923 Assuming complete treatment of all of the sewage of the Sanitary District, with no diversion of water through the Chicago Drainage Canal except in time of storm, but with diversion of all storm water overflows through the Drainage Canal by the operation of the controlling works, located in the vicinity of Western Avenue, the replacement of the present water intakes by a super-tunnel located 4½ miles off-shore in the vicinity of Wilmette, and 20 miles from the mouth of the Chicago River, with chlorination only of the water supply, the public health conditions in Chicago, with special reference to the public water supply, would be better than those presently obtaining.

8924 If there should be substituted filtration of the water supply for chlorination only, the water supply would be 9659 improved.

9661 *Cross-Examination by Mr. Adcock.*

To my personal knowledge I do not know of Imhoff tanks serving 100,000 population or over where 4 times the average dry flow is treated.

I think I delivered a paper before the Cleveland Engineering Society about June 10, 1925, the subject being "Plans for Meeting Sewage Treatment Problem of Cleveland." I said in that paper that in the matter of disposing of sewage—

> 9698 "We are not as favorably located as Chicago in having available a back yard into which we can discharge our filthy sewage or used water supply. If we were so situated, there is no question in my mind about the wisdom of taking advantage of such an asset."

Extracts From Complainants' Exhibit 1, ENTITLED

"Diversion of Water from Lake Michigan"

By Major Putnam, District Engineer, Nov. 1, 1923.

"Deliberate efforts on the part of the Sanitary District of Chicago to establish and maintain a uniform flow of 10,000 cubic feet per second through the Chicago River have been unsuccessful. While these attempts were experimental, they indicate that the stream is still too crooked and narrow to permit that volume of discharge under ordinary conditions of head." (Page 34)

"It has been estimated that rates of storm run-off from the drainage area of the Chicago River have the following frequency:

3,000 cubic feet per second	10 to 12 times per year.
4,167 cubic feet per second	7 to 8 times per year.
5,000 cubic feet per second	5 to 6 times per year.
7,500 cubic feet per second	3 to 4 times per year.
9,500 cubic feet per second	2 times in 3 years."

"Without going into details it might be stated that the present average consumption of water in the city of Chicago is 800,000,000 gallons per day, or about 1,200 cubic feet per second. The per capita consumption is about 275 gallons per day. Chicago pumps more water than is supplied to Greater New York, Milwaukee, Cleveland and Newark combined, although the total population served in these four cities is nearly 7,500,000. Water is now furnished to about 325,000 premises, of which only 10 per cent are metered." (Page 66)

"The ultimate solution will be to filter the water supply of the city. The economies resulting from universal metering will pay for filtering, and when that is done there is no reason why the discharge through the drainage canal could not be safely decreased to a very low limit, as far as protection of water supply is concerned, for the damages attending the reversal of flow of the river would be entirely eliminated." (Page 68)

EXTRACTS FROM DEFENDANTS' EXHIBIT 1157

ENTITLED

REPORT OF THE ENGINEERING BOARD OF REVIEW OF THE SANITARY DISTRICT OF CHICAGO ON THE LAKE LOWERING CONTROVERSY AND A PROGRAM OF REMEDIAL MEASURES.

"18. WATER CONSUMPTION—In 1924 the City of Chicago pumped 826,000,000 gallons daily into the system for its own use, equivalent to a per capita consumption of 280 gallons. Approximately one-half of the water pumped is wasted." (Page 28)

"Records of the Health Department of Chicago show that of 253 days in 1924, in which observations were made, the Calumet Rivers were discharging into Lake Michigan on 115 days, occasionally the flow being continuous for several consecutive days." (Page 32)

"While the filtration of water supplies and the complete treatment of sewage appear to be capable of affording a large degree of protection from infection through contaminated water, and both of these agents are practicable in the case of Chicago, it is nevertheless desirable to prevent, in so far as practicable, the contamination of any water which may reach public waterworks intakes. Chicago is remarkably well situated through the use of the Main Drainage Canal already built and in operation to avoid such contamination. To abandon this plan and to discharge the sewage into the lake, however well the sewage may first be treated, would be a backward step, highly repugnant from the sentimental viewpoint and equally objectionable from the point of view of the public health.

"If a Lakes-to-Gulf waterway is to be maintained, water for its successful operation will probably be obtained from Lake Michigan. Regardless of the amount necessary, the volume represented by the effluent from sewage treatment plants performs the same service as would water taken directly from the Lake. If this effluent is such that objectionable conditions are not created thereby in the canal or Des Plaines-Illinois Rivers, then it is logical to have the effluent flow through this course instead of into the Lake." (Page 44)

Terms of Decree Submitted by Defendants to Special Master on Re-reference.

The Court finds:

A.

The defendant, the Sanitary District of Chicago, has presented a program for the construction, completion and placing in operation of sewage treatment works to treat and dispose of, from a practicable standpoint, the sewage and industrial wastes arising within the territorial limits of the Sanitary District of Chicago. This program for sewage treatment and disposal embraces various and sundry plants, works and appurtenances, including intercepting sewers and pumping stations completed, in process of construction and to be constructed by the Sanitary District of Chicago. The works completed consist of six treatment works, plants and equipment, intercepting sewers and appurtenances, as follows:

1. *Morton Grove Sewage Treatment Works.*

2 Imhoff tanks, 1 covered trickling filter with settling basins, sludge drying beds and pumping station, designed for population of approximately 1,200 people, located at Morton Grove and known as the Morton Grove Sewage Treatment Works.

2. *Glen View Sewage Treatment Works.*

1 Imhoff tank, trickling filter, settling tank, sludge drying beds and pumping station for population of approximately 1,200 people, located at Glen View, Illinois, known as the Glen View Sewage Treatment Works.

3. *Northbrook Sewage Treatment Works.*

1 small Imhoff tank, trickling filter, secondary settling tank, sludge drying beds and pumping station for popu-

lation of approximately 1,500 people at Northbrook, Illinois, known as the Northbrook Sewage Treatment Works.

4. *Des Plaines River Sewage Treatment Works.*

Main pumping station and blower house, grit chambers, fine screens, 4 aeration tanks, 12 settling tanks and activated sludge processing equipment for population of approximately 45,000 people, located at or near the Des Plaines River, near Maywood, Illinois, known as the Des Plaines River Sewage Treatment Works.

5. *Calumet Sewage Treatment Works.*

30 Imhoff tank units, 2 aeration tanks, constituting an activated sludge process in 2 remaining Imhoff tank units, with 2 settling tanks and connections, small trickling filter, secondary settling tank in two units, for population of approximately 225,000 people, located in the southern part of the City of Chicago, known as the Calumet Sewage Treatment Works.

6. *North Side Sewage Treatment Works.*

North Side Sewage Treatment Works, known as an activated sludge plant, with buildings, tanks and appurtenances, located on approximately 100 acres of ground at or near Howard Street and McCormick Road in the eastern part of the Village of Niles Center, designed for a population of 830,000 people. (In order to bring this plant to full completion, it will be necessary to complete the North Branch Pumping Station, hereafter to be mentioned)

B.

The said program for the construction and installation of treatment works to dispose of all the sewage, as far as practicable, arising within the Sanitary District, also involves and embraces the following plants to be entirely constructed or completed, including their pumping stations, intercepting sewers and appurtenances:

1. *North Side Sewage Treatment Works.*

There is required to complete this plant for the practicable treatment of the sewage of a population of 830,000 as of the year 1930, the completion of the North Branch Pumping Station which is appurtenant to said plant and will furnish part of the means by which all the sewage of said population will be delivered to the said plant.

2. *West Side Sewage Treatment Works.*

This plant is under construction and is located at or near 52nd Avenue and the Main Channel or Canal of the Sanitary District in the Village of Stickney, just outside the limits of the City of Chicago.

This plant is designed to treat the sewage of a population of 1,850,000 people as of 1940 by sedimentation in Imhoff tanks, in addition to providing for the digestion of sludge from the North Side Sewage Treatment Works.

Part of the intercepting sewers for these works have been constructed, bringing in sewage from the west as well as the east. A large amount of intercepting sewer work is still to be done. The treatment plant proper now under construction comprises pumping station, skimming tanks, grit chambers, Imhoff tanks, sludge drying beds, and a standard gauge railroad to carry the dried sludge to points along the Drainage Canal some miles south and west of the said plant. Certain portions of said West Side Sewage Treatment Plant have been substantially completed, such as the pumping plant, two batteries of Imhoff tanks, sewers and conduits within the plant area.

Upon the completion of the Imhoff tank plant and appurtenances, it is proposed to add an activated sludge plant to give so-called complete treatment.

Intercepting sewers are under construction to convey the sewage now and hereafter tributary to the Des Plaines River Sewage Treatment Works, to the West Side Sewage Treatment Works, and when such intercepting sewers are constructed after the completion of the West Side Works, the Des Plaines River plant will be abandoned except in so far as it may be retained for experimental purposes.

3. *Southwest Side Sewage Treatment Works.*

This plant has not been designed or constructed, nor has the site therefore been obtained. The program of the Sanitary District contemplates the design of a plant known as the Southwest Side Sewage Treatment Works, to be located to the south of the West Side Sewage Treatment Works and south of the Main Channel of the Sanitary District, including the South Side intercepting sewer project and Racine Avenue pumping station, as well as all other intercepting sewers and appurtenances thereof. It is proposed that this plant will take care of the sewage of approximately 1,200,000 people plus the trade or industrial wastes of the stockyards and packing town area, which has a volume of waste equivalent to the sewage of aproximately 1,000,000 people.

It is proposed that the plant shall be, when constructed, of the activated sludge type of sewage treatment works having the necessary pumping stations, blower house, grit chambers, skimming tanks, Imhoff tanks, aeration tanks, sludge drying beds, sludge processing equipment, mechanical and electrical equipment, intercepting sewers and appurtenances.

4. *Calumet Sewage Treatment Plant.*

This plant is to be extended to handle the increase of population on the present tributary area, as well as the population of an additional area, and will consist of Imhoff tanks, trickling filters, grit chambers, secondary settling tanks, sludge drying beds and appurtenances, and treat a total population of 455,000 as of the year 1945. The additional site required has yet to be obtained.

5. *Miscellaneous Works.*

Miscellaneous intercepting sewers, pumping stations, disposal stations and other work incidental and appurtenant to the construction program herein outlined to collect and treat all the sewage originating within the boundaries of the Sanitary District of Chicago.

6. *Controlling Works.*

To prevent flow so far as practicable of the Chicago River into Lake Michigan at all times, controlling works may be constructed and installed in the Chicago River at or near its mouth and near Lake Michigan, or at or near the northern and eastern terminus of the Main Drainage Canal. These works may consist of dams, locks and other devices designed, when operated, to prevent the discharge of sewage or sewage effluent, rain-water runoff or storm waters from the Chicago River into Lake Michigan. The controlling works at the northern or eastern terminus at or near Blue Island of the Calumet Sag Channel of the Sanitary District may be operated so as to cause the ordinary flow of the Calumet River to pass to said Calumet Sag Channel and the storm flow of said Calumet River to the maximum amount of 3,000 cubic feet per second to be discharged into said Calumet Sag Channel.

C.

The said works above described completed and in operation, and those to be completed or to be entirely constructed, are commonly known in the art of sewage treatment as works embodying Imhoff tanks with trickling filters and secondary sedimentation or embodying preliminary sedimentation followed by the activated sludge process.

When all of the said works under construction or to be constructed are placed in operation and all of said works, including those already constructed, are continued in operation in a practicable and efficient manner, such practicably efficient operation of said sewage treatment works and appurtenances should accomplish the utmost practicable treatment of the dry weather flow of sewage and wastes of the Sanitary District, in the elimination of solids and organic matter; that at storm times only approximately 150 per cent, more or less, of the ordinary dry weather flow of sewage and wastes in the sewers may be practicably treated or disposed of, and the balance of the storm flow in the sewers exceeding the volume presently to be treated, will pass into the Chicago River and its branches and the canals of the Sanitary District, and any storm flow so passed or by-passed to such channels or canals at storm times will contain sewage and wastes untreated by any treatment works.

D.

The Sanitary District of Chicago should proceed with all practicable speed and diligence with the construction and completion of all of said sewage treatment works and appurtenances, including intercepting sewers and pumping stations, not now completed and in operation. The said sewage treatment works above described should be completed and placed in operation to treat practicably and efficiently the sewage of the population for which they are respectively designed, as follows:

(1) North Side Sewage Treatment Works and appurtenances, July 1, 1930.

(2) West Side Sewage Treatment Works—
Battery A—Imhoff Tanks—January 1, 1930.
Battery B—Imhoff Tanks—July 1, 1930.
Battery C—Imhoff Tanks—June 1, 1932.

(3) Southwest Side Sewage Treatment Works—as to that portion of the works to settle sewage—January 1, 1936.

(4) Calumet Sewage Treatment Works, complete—January 1, 1936.

(5) West Side Sewage Treatment Works, complete—January 1, 1941.

(6) Southwest Side Sewage Treatment Works, complete—January 1, 1943.

(7) All said works to be fully completed and in practicably efficient operation January 1, 1945.

(8) The dams, locks and controlling works to be constructed in the Chicago River at or near its mouth and near Lake Michigan or at or near the northern or eastern terminus of the Main Drainage Canal by the Sanitary District, shall be completed and in operation within a period of two years subsequent to the date of the approval of plans therefor by the Secretary of War, upon the recommendation of the Chief of Engineers. The Sanitary District shall immediately submit plans for such works to the Chief of Engineers or such other officer as he may direct, in order that the plans may be approved at the earliest practicable time and the work thereunder instituted.

It Is Therefore Ordered, Adjudged and Decreed As Follows.

The Court hereby retains jurisdiction of this controversy and of these causes until all the said treatment works and their appurtenances, including all controlling works that may be installed in the Chicago River or in the Main Drainage Canal, as above enumerated, are completed and placed in operation in a practicably efficient manner, for the purpose of entering any orders that may be appropriate to accomplish the completion and placing in operation of the said works at the time or times above mentioned, or with all reasonable and practicable speed.

REQUESTED FINDINGS OF FACTS, CONCLUSIONS OF LAW AND RECOMMENDATIONS FOR A DECREE SUBMITTED BY COMPLAINANTS TO THE SPECIAL MASTER ON RE-REFERENCE.

The above named complainants deeming the facts and conclusions of law, hereinafter set forth, to be respectively proven and established by the evidence and the law applicable to said facts, and material to the framing of a decree under the terms of the decision and mandate of the Supreme Court of the United States rendered in the above entitled causes on January 14, 1929, request the Special Master to make and find the following findings of fact, conclusions of law and recommendations for a decree in these cases.

FINDINGS OF FACT.

I.

For the purpose of providing for the treatment of all of the sewage of the Sanitary District of Chicago by artificial processes, the area of the Sanitary District of Chicago has been divided by the Sanitary District into four parts, which are respectively known as the North Side project, the West Side project, the Calumet project and the Southwest Side project. All of the domestic sewage and industrial waste arising in each one of said four divisions of the area of the Sanitary District of Chicago will be treated in a single sewage disposal plant located in each of said districts.

II.

A modern activated sludge plant has been completed on the North Side project. This plant is now in operation to the extent of taking care of the sewage of from 200,000 to 250,000 of the population of that District. That all of the sewage of the entire population of the area covered by the North Side project is not presently being treated by the North Side sewage disposal plant is due to the fact that the North Branch pumping station, which is necessary for the conveyance of the sewage of the remainder of the population to the plant, has not been completed and placed in operation. The North Side pumping station could have been completed and placed in operation during 1929. Owing to the fact that the Sanitary District suspended all physical construction work on sewage disposal plants and auxiliary structures during 1929 up to the middle of September of that year, the

North Side pumping station will now be completed, and in full operation April 1, 1930. After the completion and placing in operation of the North Side pumping station all of the industrial wastes and all the sewage of the population of the area covered by the North Side project wil be treated by the North Side sewage works. On and after April 1, 1930, the North Side plant will provide the equivalent of 100 per cent treatment of the sewage of a population of 602,500 people.

III.

At the Calumet project an Imhoff tank or preliminary treament sewage disposal plant has been completed and in operation since 1922, furnishing partial treatment for about one-half of the population of the area covered by the Calumet project which is the equivalent of 100 per cent treatment of the sewage of 64,500 people. The Calumet sewage disposal plant can be enlarged and extended for complete treatment by the trickling filter process so as to provide for complete treatment of all of the sewage and industrial waste of the area covered by the Calumet project by December 31, 1932.

IV.

At the West Side project, the pumping station, outdoor substation, one-half the skimming tanks, the grit chambers, the coarse screens, the meter vault and one of the three batteries of Imhoff tanks were substantially completed in March, 1929, so that they could be placed in operation in a month if the money had been then available to pay the contractors. The second battery of the Imhoff tanks at the West Side plant and the remaining skimming tanks were more than one-half completed and some work had been done on the sludge drying beds in

March, 1929. The second battery of Imhoff tanks at the West Side plant, together with the remainder of the skimming tanks and auxiliary structures for that battery of tanks could have been completed and placed in operation by December 31, 1929. Owing to the fact that the Sanitary District suspended all physical construction work on sewage disposal plants and auxiliary structures during 1929 up to the middle of September of that year, the second battery of Imhoff tanks at the West Side project, together with the remainder of skimming tanks and auxiliary structures will be completed and placed in operation by April 1, 1930, and will provide the equivalent of 100 per cent treatment of the sewage of the population of 240,000 people. The third battery of Imhoff tanks and the additional structures necessary to provide complete treatment on the activated sludge principle of all of the domestic sewage and industrial waste arising in the area covered by the West Side project can be completed and placed in operation by December 31, 1933.

V.

On the Southwest Side project, no contracts had been let when the testimony was closed. The program for sewage disposal at the Southwest Side project provides for the construction of a plant on the activated sludge principle for the treatment of all of the domestic sewage and industrial waste arising in the area covered by that project. The site for the Southwest Side Plant was selected prior to taking testimony on the original hearing in these suits. Studies with reference to the proper method of treating the sewage and industrial waste, and the location and type of sewage disposal plants to be constructed, have been carried on by the Sanitary Experts of the Sanitary District of Chicago since 1909. General plans, detailed estimates of quantities and a tentative lay-out of the structures involved in the construction of the Southwest Side plant have been prepared by the Sanitary District of Chicago and offered in evidence on this re-reference. This plant can be designed, constructed and placed in operation by December 31, 1935.

VI.

While the completion of said sewage disposal plants, with chlorination only of the domestic water supply as presently practiced, will undoubtedly provide as good a water supply as presently obtains and one which is adequate to safeguard the public health, the construction of water filtration plants for the filtration of the entire domestic water supply of Chicago would be a further factor of safety or protection to the public health and would unquestionably provide a safe public water supply. In the present state of the art a comprehensive and scientifically sound program for the sanitation of Chicago should include the construction of water filtration works for the domestic water supply. Since the construction of water filtration plants is not an indispensable element in the practical disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion, the construction of such water purification works should be left to the discretion of the defendants.

VII.

The design and construction of water filtration plants is under the jurisdiction of the City of Chicago. The evidence discloses that the construction of such plants has been under consideration by the Engineering Department of the City of Chicago for a number of years. No evidence was offered through the Engineering Department of Chicago with reference to the progress which has been made on plans for water filtration works, other than that it appears that the number and location of such plants have been tentatively determined. Regardless of whether any progress has been made upon these plans by the Engineering Department of the City of Chicago, the water filtration plants, if included in the program, can be designed, constructed and placed in operation by December 31, 1934.

VIII.

The completion of the North Side and West Side sewage disposal plants on the activated sludge principle, the completion of the Calumet plant on the trickling filter principle, and the construction of the Southwest Side sewage disposal plant on the activated sludge principle, together with the completion or construction of such additional sewers and pumping stations as may be necessary to convey all of the sewage to said respective sewage disposal plants, will provide a practical method or program for the complete treatment of all of the sewage and industrial waste of the Sanitary District by means other than Lake diversion.

IX.

If Chicago desires to improve the present standard or quality of its water supply, or to provide any additional factors of safety in the case of a breakdown in any of the plants for the disposal of the sewage by artificial processes, it would be practicable to extend the present water intakes farther into the Lake, to substitute a new water intake off the North Shore about 20 miles from the mouth of the Chicago River in the vicinity of Wilmette, to chlorinate the effluents from the sewage disposal plants and/or install controlling works at the junction of the Drainage Canal and the Chicago River, which would permit almost immediate diversion from the Lake in the case of an emergency. None of the foregoing variations in the program for the practical disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion is essential. The construction or installation of any such additional works or structures should be left to the discretion of the defendants.

X.

From five to six years is a reasonable, and in fact, liberal, period of time for the design, construction and placing in operation of all of the structures and facilities involved in the completion or construction and placing in operation of the sewage disposal plants which are required in a practical program for the disposal of the sewage of the Sanitary District by means other than Lake diversion. All of said sewage disposal plants can be completed and in operation by December 31, 1935.

XI.

The Corn-Products waste has been eliminated or treated so as to relieve the Chicago River and the Drainage Canal of the equivalent of the sewage of a population of 360,000 people.

XII.

The Imhoff tanks for the Southwest Side plant can be completed so as to provide tank treatment for all of the sewage and industrial waste of the area covered by the Southwest Side project on December 31, 1932.

XIII.

Upon the completion of this program of practical measures for the disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion, no diversion or flow at Lockport will be necessary to maintain navigation upon the Chicago River as part of the Port of Chicago. Navigable depths will be increased and no nuisance will be created which will obstruct or interfere with navigation.

XIV.

Upon the completion of this program of practical measures for the disposal of sewage of the Sanitary District of Chicago by means other than Lake diversion, it is practicable to flush the navigable channels of the Chicago and Calumet Rivers together with the auxiliary channels by pumping circulating water through the North Branch by means of the existing pumping station near Wilmette, by pumping water into the South fork of the Chicago River or into the Chicago Drainage Canal by means of the existing pumping station at 39th Street and by pumping water through the Calumet-Sag Channel so that such flushing water would mingle with the effluents of the sewage disposal plants and proceed out into the Lake with no flow at Lockport. While this procedure is not necessary it is entirely practicable and would afford an adequate factor of safety, if desired, for the prevention of any possibility of interference with navigation in these channels.

XV.

With the completion of this program of practical measures for the disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion, it is practicable to discharge the effluents of all of the sewage disposal plants involved in this program through outfall sewers or tunnels directly into Lake Michigan so as to wholly remove the said effluents from the Chicago River and its branches and auxiliary channels in the Sanitary District of Chicago. While such procedure is not necessary, it is entirely practicable and affords an adequate factor of safety, if desired, for the prevention of any possibility of interference with navigation in said waters.

XVI.

During the period of construction of the practical measures involved in this program for the disposition of the sewage of the Sanitary District of Chicago by means other than Lake Diversion, the following progressive reductions will be practical:

1. A reduction to 6500 c. f. s. in addition to domestic pumpage on April 1, 1930.
2. A reduction to 5000 c. f. s. in addition to domestic pumpage on December 31, 1932.
3. A reduction to 3000 c. f. s. in addition to domestic pumpage on December 31, 1933.
4. A complete cessation of all diversion or flow (including the domestic pumpage) at Lockport on December 31, 1935.

CONCLUSIONS OF LAW.

I.

That the decree in the above entitled cases should require the Defendants to carry out the practical measures for the disposition of sewage of the Sanitary District of Chicago by other means than Lake Diversion by December 31, 1935.

II.

That the decree in the above entitled cases should require the Defendants to reduce the flow at Lockport to 6500 c. f. s. in addition to the domestic pumpage by April 1, 1930, to 5000 c. f. s. in addition to the domestic pumpage by December 31, 1932, to 3000 c. f. s. in addition to the domestic pumpage by December 31, 1933, and to cease all flow or diversion at Lockport by December 31, 1935.

III.

That the decree in the above entitled cases should require the Defendants to complete and place in full operation the North Side Activated Sludge Plant and Batteries A and B of the Imhoff tanks at the West Side plant (as outlined in the program proposed by the Sanitary District of Chicago) by April 1, 1930, and to continue the operation of the Calumet sedimentation sewage disposal plant which was completed in 1922.

IV.

That the defendants be required to complete and place in full operation the Calumet sewage disposal plant, all of the batteries of the Imhoff tanks at the West Side plant, and all of the batteries of the Imhoff tanks at the Southwest Side plant (all as outlined in the program proposed by the Sanitary District of Chicago) by December 31, 1932.

V.

That the defendants be required to complete and place in operation all structures (all as outlined in the program proposed by the Sanitary District of Chicago) required to provide complete treatment for all of the sewage and industrial waste tributary to the West Side Plant by December 31, 1933.

VI.

That the defendants be required to complete and place in full operation all structures required to provide complete treatment for all of the sewage and industrial waste tributary to the proposed Southwest Side sewage disposal plant by December 31, 1935.

VII.

That the discharge of liquid sewage or street wash into any of the navigable waters of the United States does not constitute an obstruction to or interference with navigation or impairment of navigable capacity as a matter of Law.

VIII.

That the discharge by the Defendants of the domestic pumpage of the City of Chicago and/or the run-off of the Chicago and Calumet basins, which are naturally tributary to Lake Michigan, constitute an illegal diversion from the Great Lakes-St. Lawrence watershed to the Mississippi watershed.

IX.

That upon the completion of the program of practical measures for the disposition of the sewage of the Sanitary District of Chicago by other means than Lake diversion, no diversion or flow at Lockport from the Great Lakes-St. Lawrence watershed may be lawfully maintained by the defendants, either in interest of the sanitation of Chicago or for the maintenance of navigation on the Chicago River as part of the Port of Chicago.

X.

That the Defendants and each of them should be enjoined from so polluting the Chicago River and the auxiliary navigable channels or the Des Plaines or Illinois Rivers by the discharge of sewage or otherwise as to create an obstruction to or interference with navigation or the navigable capacity of any of said navigable waters of the United States.

XI.

That the defendants have the legal duty of preventing any obstruction to or interference with navigation on or the navigable capacity of the Chicago River and auxiliary navigable channels and that after the completion of the program for the treatment of all of the sewage of the Sanitary District of Chicago, the defendants are legally bound to provide, at their expense, such quantity of circulating water, if any, in and through the various navigable channels in the Chicago Sanitary District as may be necessary to prevent any obstruction to or interference with navigation thereon or the navigable capacity thereof without any diversion or flow at Lockport.

XII.

That defendants should be required by the terms of the decree to provide for the discharge of effluents from the sewage disposal plants involved in the practical program for the disposal of the sewage by other means than Lake diversion, by such methods as will remove all of said effluents from the Chicago River and the navigable channels of the Sanitary District of Chicago and provide for the discharge of such effluents into Lake Michigan or elsewhere in such manner and at such places as will not create any obstruction to or interference with navigation on or the navigable capacity of any of the navigable waters of the United States.

XIII.

That the complainants are entitled to a decree in the above entitled cases enjoining the State of Illinois and the Sanitary District of Chicago, their employees, agents, attorneys and servants from diverting any of the waters of the Great Lakes-St. Lawrence System through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency in excess of 6500 c. f. s. in addition to the domestic pumpage subsequent to April 1, 1930, in excess of 5000 c. f. s., in addition to the domestic pumpage subsequent to December 31, 1932, in excess of 3000 c. f. s. in addition to domestic pumpage subsequent to December 31, 1933, and from diverting any water or maintaining any flow through the controlling works at Lockport subsequent to December 31, 1935.

RECOMMENDATIONS FOR A DECREE.

1. Complainants request the Special Master to recommend a decree in these cases in substance as follows:

(Caption Omitted)

These causes coming on to be heard, upon the supplemental report of the Master, Hon. Charles E. Hughes, to whom they were referred pursuant to and for the purposes specified in the opinion of this court rendered in said causes on January 14, 1929, and also upon the exceptions taken to said supplemental report on the part of the complainants and defendants, and said causes having been argued by counsel for the respective parties, and due deliberation having been given thereto, it is:

Ordered, adjudged and decreed as follows:

1. That the supplemental report of the Special Master, his findings of fact, conclusions of law and recommendations for a decree be and the same hereby are in all respects confirmed.

2. That the Defendants complete and place in full operation the North Side activated sludge plant and Batteries A and B of the Imhoff tanks at the West Side plant (as outlined in the program as proposed by the Sanitary District of Chicago) by April 1, 1930.

3. That the Defendants continue the operation of the Calumet sedimentation sewage disposal plant which was completed in 1922.

4. That the Defendants complete and place in full operation the Calumet Sewage disposal plant, all batteries of the Imhoff tanks at the West Side plant, and

all of the batteries of the Imhoff tanks at the Southwest Side plant (as outlined in the program as proposed by the Sanitary District of Chicago) by December 31, 1932.

5. That the Defendants complete and place in full operation all structures (as outlined in the program proposed by the Sanitary District of Chicago) required to provide complete treatment for all of the sewage and domestic waste tributary to the West Side Plant by December 31, 1933.

6. That the Defendants complete and place in full operation all structures required to provide complete treatment for all of the sewage and industrial waste tributary to the proposed Southwest Side sewage disposal plant (as outlined in the program proposed by the Sanitary District of Chicago) by December 31, 1935.

7. That the Defendants carry out the foregoing and all other practical measures which may be necessary for the disposition of all of the sewage and trade wastes of the Sanitary District of Chicago by other means than Lake diversion by December 31, 1935.

8. That on and after April 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any and all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from diverting or abstracting any of the waters of the Great Lakes-St. Lawrence System or watershed through the Chicago Drainage Canal and its auxiliary channels, or

through or by means of any other method, device or agency in excess of 6500 c. f. s. in addition to domestic pumpage.

9. That on and after December 31, 1932, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any or all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from diverting or abstracting any of the waters of the Great Lakes-St. Lawrence System or Watershed through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency in excess of 5000 c. f. s. in addition to domestic pumpage.

10. That on and after December 31, 1933, the defendants, State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any or all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from diverting or abstracting any of the waters of the Great Lakes-St. Lawrence System or Watershed through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency in excess of 3000 c. f. s. in addition to domestic pumpage.

11. That on and after December 31, 1935, the defendants, State of Illinois and the Sanitary District of Chi-

cago, their employees, servants, attorneys, agents and any or all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from diverting or abstracting any of the waters of the Great Lakes-St. Lawrence System or Watershed (including the domestic pumpage of Chicago) through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency.

12. That on and after December 31, 1935, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any and all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from so polluting the Chicago River and the auxiliary navigable channels of the Sanitary District of Chicago or any other of the navigable waters of the United States by the discharge of sewage or otherwise so as to create an obstruction to or interference with navigation or the navigable capacity of any of the navigable waters of the United States.

13. That the complainants have and recover from the Sanitary District of Chicago and the State of Illinois their costs and disbursements herein to be taxed and noted at the foot of this decree.

In the oral argument of Attorney General Ward of New York (one of counsel for complainants) before the Special Master on Re-reference, he made the following statement (Transcript Oral Argument, 319):

> "Chicago should be left to say whether it wants to turn its sewage into its water supply. Certainly the complaining States do not want Chicago to turn

its sewage into this water supply. That is our water supply as well as Chicago's."

Respectfully submitted,

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Attorney General, The State of Illinois, Defendant.

WALTER E. BEEBE,
Attorney, The Sanitary District of Chicago, Defendant.

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FREDERICK D. COLSON,
Assistant Attorney General of New York.

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Annual Report, Secretary of War, for year 1890.

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Office Supreme Court, U.
FILED
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CHARLES ELMORE CROP
CLERK

In the Supreme Court of the United States

October Term, 1929

No. 12, Original

State of New York,
Complainant,

vs.

State of Illinois and Sanitary District of Chicago,
Defendants.

COMPLAINANT'S SUBSTITUTE EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER ON RE-REFERENCE

68

In the Supreme Court of the United States

OCTOBER TERM, 1929

No. 12, Original

State of New York,
Complainant,
against
State of Illinois and Sanitary District of Chicago,
Defendants.

COMPLAINANT'S SUBSTITUTE EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER ON RE-REFERENCE

Permission therefor having been granted, the complainant hereby submits its exceptions to the report of the Special Master on re-reference, in the stead of and in substitution for the exceptions heretofore filed in Original Causes Nos. 7 and 11 in which it joined; and for that purpose it hereby excepts to the findings of fact made and filed by the Special Master on the Re-Reference in this cause, to the failure or refusal of the Special Master to make and file findings of fact requested by said complainant on such Re-Reference, to the conclusions of law made and filed by the Special Master on said Re-Reference, to the recommendations for a decree made and filed by the Special Master on said Re-Reference and to the failure of the Special Master to make and file conclusions of law and recommendations for a decree requested by said complainant in the following particulars, to-wit:

EXCEPTIONS TO FINDINGS OF FACT

I.

Complainant excepts to the conclusion or finding of fact, appearing in duplicate on pages 34-35 (under designation of FIRST, Conclusion (1), and on page 141 (under the designation of Summary Conclusions (1), of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(1) That the completion of the North Side, West Side Calumet, and Southwest Side Sewage Treatment Works, above described, with their appurtenances and the necessary intercepting sewers, and the efficient operation of these plants, will afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes of all the area comprised within the Sanitary District of Chicago, and also, in times of storm, of approximately 150% of the ordinary dry weather flow of sewage and wastes; that in the actual operation of these plants it may appear that a greater amount of the storm flow can be treated at least in part."

because said finding of fact (measured by the Master's interpretation of the relief which may be predicated upon such a program) is incomplete and not responsive to the order of Re-Reference of this Court dated January 14, 1929, in that said finding of fact does not provide a program for "the disposition of the sewage" of the Sanitary District of Chicago, "through other means than lake diversion," as required by said order of re-reference, but merely provides a program for the treatment of the sewage of the Sanitary District of Chicago by artificial processes without regard to whether other or additional structures are necessary to provide a program for "the disposition of the sewage through other means than lake diversion;"

and because, if the Special Master were of the opinion that this program of works for the artificial treatment of the sewage of the Sanitary District of Chicago, unsupported by any auxiliary structures or measures, would not permit of the disposition of the sewage of the Sanitary District of Chicago without diversion, then, and in that event and in order to comply with the order of re-reference in this case, the Special Master should have found and included in said finding of fact and in his recommended program for "the disposition of the sewage" of the Sanitary District "through other means than lake diversion," a finding that the construction of water filtration works for all the domestic water supply of the City of Chicago, the extension of the waterworks intakes, the construction of a new water intake remote from the mouth of the Chicago River, the chlorination of the effluent of the sewage disposal plants, the construction of a separate system of sanitary sewers, the construction of outfall sewers or tunnels from the respective sewage disposal plants so as to divert the effluent wholly from the Chicago River and its auxiliary channels and/or the utilization of existing pumping stations or construction of new pumping stations to provide circulating water for the Chicago River and its auxiliary channels constitute (as to such of the foregoing works, structures and operations as he deemed essential) part or parts of a practical program for "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion," that the construction, installation or operation of any or all of the foregoing structures or measures is practical, that any or all of said structures can be built and completed before December 31, 1938, and that the defendants be required to construct and place in operation any or all of said structures deemed essential to a practical program for "the disposition of the sewage" of the Sanitary District "through other means than lake diversion" before December 31, 1938.

As ancillary to and in support of the foregoing exception, complainant takes the following detailed exceptions to findings contained in the Master's Report:

I-A.

Complainant excepts to that portion of finding of fact FIRST (3), appearing on page 23 of the Report of the Special Master, which reads as follows, to-wit:

> "The evidence does not, in my judgment, furnish a basis for a finding that enlargements are necessary in the sewage disposal plants as proposed in the program of the Sanitary District. The complainants state that the changes they propose in these plants relate to their operation. Mr. Howson said that his proposed modification would 'somewhat improve' the program, but that the modification was 'not essential.' Mr. Gascoigne assumed that the change he proposed 'would require no enlargement of the plants proposed to be built.' Mr. Townsend said that no enlargement would be required, 'but merely a different utilization of the preliminary treatment plant.' "

because, insofar as said finding of fact finds or implies any concession by complainant that the defendant should not be required to enlarge the sewage disposal plants as proposed in the program of the Sanitary District, and/or to so operate them as to give at least preliminary treatment to all storm water overflows up to the capacity of the intercepting sewers (4000 c.f.s.), if such enlargement of the disposal plants or the treatment of such a volume of the storm water overflows be, in the opinion of the court, necessary to permit the disposition of the sewage of the Sanitary District by other means than lake diversion, said finding of fact is not supported by any competent evidence and is contrary to all the competent evidence in this case; and because, if the Special Master deemed or found that enlargements are necessary in the sewage disposal plants, and/or that their operation so as [illegible] provide at least preliminary treatment for all of the storm water overflows up to the capacity of the intercepting sewers is necessary to provide for or permit "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion," then. and in that event, he should have found and included in said finding of fact that the enlargement of the sewage disposal plants as proposed in the program of the Sanitary District, and/or the operation of the sewage disposal plants so as to provide at least partial treatment for all of the storm water overflows up to the capacity of the intercepting sewers is part of a practical program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, and he should have incorporated the enlargement of said sewage disposal plants and/or their operation so as to provide at least preliminary treatment of all of the storm water overflows up to the capacity of intercepting sewers as part of his recommended program "for the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion" in accordance with the mandate of this Court bearing date of January 14, 1929. *Wisconsin et al. vs. Illinois et al.*, 278 U. S. 367.

I-B.

Complainant excepts to that portion of finding of fact First (3) appearing on page 24 of the Report of the Special Master, which reads as follows, to wit:

> "The complainants have not proposed the installation of a separate system of sanitary sewers. When the defendants presented testimony as to their estimates of the extremely heavy, and in their view prohibitive, cost that would be involved in that undertaking (estimated by William R. Matthews, engineer of the Bureau of Sewers of Chicago at over $400,000,000) counsel for complainants stated that complainants'

> program does not provide for any such sewer system; that the defendants had not advanced any program involving the construction of a separate sewer system for Chicago nor had the complainants. * * * As the suggested change does not appear to be regarded as an essential feature, its feasibility may be left to be determined in the course of the actual operations."

because, insofar as said finding of fact finds or implies any concession by complainant that the defendants should not be required to construct a separate system of sanitary sewers if such a system be, in the opinion of the court, necessary to provide for or permit the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, said finding of fact is not supported by any competent evidence and is contrary to all the competent evidence in this case; and because, if the Special Master deemed or found that the construction of a separate system of sanitary sewers is necessary to provide for or permit "the disposition of the sewage" of the Sanitary District "through other means than lake diversion," then, and in that event, he should have found and included in said finding of fact that the construction of a separate system of sanitary sewers is practicable, that the testimony of the complainant was that a separate system of sanitary sewers could be constructed for Chicago at a cost of from $158,000,000 to $171,000,000, and that the construction of such a separate system of sanitary sewers is part of a practical program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion; and he should have incorporated the construction of such a separate system of sanitary sewers in and made the construction of such a system of sanitary sewers a part of his recommended program for "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion" in accordance with the mandate of this Court bearing date of January 14, 1929.

I-C.

Complainant excepts to that portion of finding of fact First (3), appearing on pages 24-25 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The complainants, however, state that the program they propose does materially differ from the one presented by the Sanitary District in two respects. The first is that the program of the Sanitary District contemplates a continued diversion of a certain amount of lake water, while the complainants propose that there shall be no diversion whatever or any flow at Lockport after the completion of the program. But this difference between the two programs does not relate to the character of the sewage treatment works, as such, but to the disposition of the effluent, a question which will be examined later. The second difference is that the program presented by the complainants provides for the installation of water purification works for all the domestic water supply of the City of Chicago. But the complainants recognize that the construction of such works is not a part of the program for the treatment of the sewage of the Sanitary District and in the findings of fact which the complainants have requested it is stated that, since the construction of water filtration plants is not an indispensable element in the practical disposal of the sewage by means other than lake diversion, the construction of such water purification works should be left to the discretion of the defendants. It also appears that the design and construction of water filtration plants for the City of Chicago is under the jurisdiction of that city which has not been made a party to this suit. Thus, what are stated in the complainants' brief to be the two material differences between the two programs do not relate to the sewage treatment works."

because, insofar as said finding of fact finds or implies any concession by the complainant that the State of Illinois should not be required to install water purification works for all of the domestic water supply of the City of Chicago, if this Court should consider the installation of water filtration works necessary to provide for or permit the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, and insofar as the Special Master found, directly or by implication, that the construction of water filtration works for the domestic water supply of Chicago should be left to the discretion of the defendants regardless of whether the construction of such water filtration works is necessary to provide a practical program for "the disposition of the sewage" of the Sanitary District "through other means than lake diversion," or insofar as the Special Master found, directly or by implication, that the omission of water filtration works from this program by the defendants could be made the basis of any abridgement of the rights of the complainants to have this diversion terminated, said finding is unsupported by any competent evidence, contrary to all the competent evidence and erroneous as a matter of law; and because if the Special Master deemed or found that water filtration works are necessary to provide for or permit "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion," then, and in that event, he should have found and included in said finding of fact that the construction of water filtration works for the domestic water supply of Chicago is practicable and that the construction of such water filtration works is part of a practical program for "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion," and he should have incorporated the construction of such water filtration works in and made the construction of such water filtration works a part of his recommended program for "the disposition of the sewage" of the Sanitary District of Chicago "through other means than lake diversion" in accordance with the mandate of this Court bearing date of January 14th, 1929.

I-D.

Complainant excepts to that portion of finding of fact First (3), appearing on page 25 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The complainants also say that while 'they consider any additions to or modifications of their program, summarized in Exhibit 238, to be wholly unnecessary,' they have pointed out that 'there are several variations which might be incorporated in that program, if Chicago desired to improve the present standard or quality of its water supply, or entertained any honest doubt as to the efficacy of this program from the public health standpoint. These variations are the extension of the present intakes' (for the water supply), 'the substitution of a new intake off the North Shore in the vicinity of Wilmette, chlorination of the sewage effluent and/or the installation of control works at the junction of the drainage canal and the Chicago River.' The complainants say that they do not urge any of these modifications and in their proposed findings they state that the 'construction or installation of any such additional works or structures should be left to the discretion of the defendants.'"

because, insofar as it finds or implies any concession by the complainant that the defendants should not be required to make such variations in the program if this Court should be of the opinion that such variations in the program are necessary to provide for or permit the disposal of the sewage of the Sanitary District of Chicago by other means than lake diversion, it is not supported by any evidence, is contrary to all the evidence and is erroneous as a matter of law; and because, if the Special Master deemed or found that such variations in the program, or any of them, were necessary to provide for the disposal of the sewage of the Sanitary District by other means than lake diversion, then, and in that event, he should have found that such variations in the program and each of them is practicable, that such variations in the program proposed by the Sanitary District (or such one or ones of such variations as he found to be essential) are parts of a practical program for the disposition of the sewage of the Sanitary District by other means than lake diversion, and that such variations in the program proposed by the Sanitary District could all be made or effected by December 31, 1938, and he should have incorporated all of such variations in the program proposed by the Sanitary District, or such ones of them as he deemed essential, in and made them a part or parts of his recommended program for the disposition of the sewage of the Sanitary District by other means than lake diversion, in accordance with the mandate of this Court bearing date of January 14, 1929.

I-E.

Complainant excepts to that portion of finding of fact Third (2), appearing on page 106 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The complainants' sanitary experts have not testified that these controlling works would not be needed."

because, insofar as it finds or implies that complainant's sanitary experts, or any of them, testified directly or by inference that such controlling works are necessary to permit or would affect the practicability of terminating all flow at Lockport after the completion of complainant's program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, said finding of fact is unsupported by any competent evidence and contrary to all of the evidence in this case; and because, insofar as said finding of fact finds or implies that the installation of controlling works is necessary to provide for or permit the disposition of the sewage of the Sanitary District by other means than lake diversion, or that the installation of such controlling works is an essential part of a practical program for the disposition of the sewage of the Sanitary District without diversion, such finding is unsupported by any competent evidence and contrary to all of the competent evidence in this case; and because, insofar as said finding implies that complainant's right to terminate the diversion is dependent upon the construction of controlling works, it is erroneous as a matter of law.

I-F.

Complainant excepts to that portion of finding of fact FOURTH, appearing on page 137 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The suggestion that outfall sewers or tunnels might be built to take the effluents directly to Lake Michigan has been made in a general way, but the evidence is by no means convincing that it would be a reasonable requirement to compel the Sanitary District or the city to build such sewers or tunnels to take the effluents from the sewage treatment plants across the city to the Lake (*supra*, p. 134). The problem of the storm flow would still remain and would be especially serious in view of the volume which may be expected in the run-off of this large area with its great and growing population."

because said finding of fact is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case; and because, if the Special Master deemed or found that the diversion of the effluents of the sewage disposal plants from the Chicago River and its branches is necessary to provide for or permit the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion, then, and in that event, he should have found and included in said finding of fact that the construction of such outfall sewers or tunnels is practical, that such outfall sewers or tunnels can be built and placed in operation before December 31, 1938, and that the construction of such outfall sewers or tunnels is part of a practical program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion; and he should have incorporated the construction of such outfall sewers or tunnels in and made the construction of such sewers or tunnels a part of his recommended program for the disposition of the sewage of the Sanitary District of Chicago by other means than lake diversion in accordance with the mandate of this Court bearing date of January 14, 1929.

I-G.

Complainant excepts to that portion of finding of fact Fourth, appearing on pages 137-138 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "The pumping of circulating water into the Drainage Canal and the Chicago and Calumet Rivers would, as pointed out in the testimony (*Supra*, p. 135) carry whatever filth there would be in these rivers to the Lake more rapidly. It is not clear that this course would be compatible with the interests of navigation in the Chicago harbor, and that there would be a serious danger of contaminating the water supply and of creating offensive conditions at the bathing beaches of the city is quite evident."

because said finding of fact is immaterial, because insofar as said finding of fact finds or implies that the pumping of circulating water would create any interference with navigation in the Chicago Harbor, it is not supported by any competent evidence in this case, and is contrary to all competent evidence in this case; and because, insofar as said finding of fact purports to find that the pumping of circulating water would endanger the public water supply, said finding is immaterial, not supported by any competent evidence in the case and contrary to all competent evidence in the case; and because, if the Special Master deemed said finding material or if this Court should be of the opinion that said finding of fact in said respect is material, then, and in that event, the Special Master should have found that the installation of water filtration works for the domestic water supply of the City of Chicago, the extension of the waterworks intakes, the construction of a new water intake and/or the chlorination of the effluents of the sewage disposal plants would provide a full and complete safeguard for the public health; and because, insofar as said finding of fact finds, implies or concludes as a matter of law that any diversion in this case may be allowed for sanitary purposes, it is erroneous as a matter of law.

II.

Complainant excepts to the finding of fact designated as Summary Conclusion No. (9), appearing on page 143 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(9) That, after the installation of controlling works as above provided, and on the completion of all the sewage treatment works above described, and in the absence of competent action by Congress in relation to navigation lawfully imposing a different requirement, the diversion by the Sanitary District of water from Lake Michigan should not exceed an annual average of 1,500 c.f.s. in addition to domestic pumpage."

because, (1) insofar as said finding finds or implies, either as a finding of fact or a conclusion of law, that the Congress has the power to authorize any diversion from the

Great Lakes-St. Lawrence Watershed to the Mississippi Watershed under the circumstances of this case as against and without the consent of the complainant States, it is erroneous as a matter of law; (2) and because, insofar as said finding of fact finds or implies that controlling works are an essential part of a practical program for the disposition of the sewage of the Sanitary District by other means than lake diversion, said finding of fact is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case; (3) and because, insofar as said findings of fact finds or implies or concludes as a matter of law that the Sanitary Canal is a part of the navigable waters of the United States and subject to the jurisdiction of the Secretary of War so as to require his authorization or consent for the construction of controlling works therein, said finding or conclusion is not supported by any competent evidence in this case, is contrary to all the competent evidence in this case and is erroneous as a matter of law; (4) and because, insofar as said finding either as a finding of fact or conclusion of law, finds, concludes or implies that controlling works are an essential part of a practical program for the disposition of the sewage of the Sanitary District by other means than Lake diversion, and that the authorization, consent or approval of the Secretary of War is necessary to their installation or erection, the effect of said finding, conclusion or implication is to delegate or leave to the Secretary of War the determination of when, or whether at all, the relief which complainant was awarded by the decision of this Court dated January 14, 1929, shall be effective, of when, or whether at all, the rights which this Court adjudged in this complainant shall be secured to it and to transfer the functions of this Court in the adjudication of this cause to the Secretary of War; (5) and because to the extent that said finding of fact finds or implies that any diversion of water from Lake Michigan or flow of water at Lockport is necessary to maintain navigation in the Chicago River as part of the Port of Chicago, said finding is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case; (6) and because to the extent that said finding of fact finds or implies as a fact or concludes as a matter of law that any flow at Lockport is necessary or legally admissible to maintain navigation in the Chicago River as a part of the Port of Chicago, said finding of fact or conclusion of law is not supported by any competent evidence in this case, is contrary to all the evidence in this case and is erroneous as a matter of law; (7) and because the Special Master should have found as a fact and concluded as a matter of law that on and after the completion of the sewage treatment works described in his Summary Conclusions numbered 1 and 4, appearing on pages 141 and 142 of the Report of the Special Master on Re-Reference, no flow or diversion from the Great Lakes-St. Lawrence Watershed should be maintained by the Sanitary District of Chicago.

As ancillary to and in support of the foregoing exception, complainant takes the following detailed exceptions to findings contained in the Master's Report:

II-A.

Complainant excepts to finding of fact designated as Summary Conclusion No. (6), appearing on pages 142-143 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> (6) That subject to the approval of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to the applicable statute, controlling works should be constructed by the Sanitary District for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan; that for this purpose the Sanitary District should immediately submit plans for such works to the Chief of Engineers of the War De-

> partment; and that such controlling works should be constructed by the Sanitary District within two years after receiving the authorization of the Secretary of War.

because, insofar as said finding of fact finds or implies that controlling works are an essential part of a practical program for the disposition of the sewage of the Sanitary District by other means than lake diversion, such finding is not supported by any competent evidence in this case and is contrary to all the competent evidence in this case; because, insofar as said finding of fact finds or implies as a fact or concludes as a matter of law that the Drainage Canal is part of the navigable waters of the United States so as to be subject to the jurisdiction of the Secretary of War and to require his authorization and consent for the installation of controlling works therein, said finding of fact is not supported by any competent evidence in this case, is contrary to all competent evidence in this case and is erroneous as a matter of law, and because the effect of said finding of fact or conclusion of law is to delegate or leave to the discretion of the Secretary of War the determination of when, or whether at all, the relief which complainant was awarded by the decision of this Court in this case dated January 14, 1929, shall be effective and of when or whether at all the rights which this Court adjudged in this complaint shall be secured to it.

II-B.

Complainant excepts to the finding of fact designated as Summary Conclusion No. (7), appearing on page 143 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(7) That when such controlling works have been constructed, the diversion by the Sanitary District of water from Lake Michigan should not exceed the annual average of 5,000 c.f.s. in addition to domestic pumpage."

for the reasons which are set forth in detail in the preceding exception designated as II-A.

II-C.

Complainants and each of them except to that portion of finding of fact FOURTH, appearing on pages 121-122 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "But, as there is no means known at present of otherwise disposing of the effluent from the sewage treatment plants, when the sewage disposal program has been fully carried out, it is assumed that the effluent must be turned into the Drainage Canal and Chicago River, thence to be discharged at Lockport, the western terminus of the Canal, or be carried into Lake Michigan. The question of the disposition of the effluent from the sewage treatment plants thus demands consideration in connection with the award of relief as to the diversion by the Sanitary District."

because, insofar as said finding of fact finds that there is no means known at present of otherwise disposing of the effluent from the sewage treatment plants than discharging it into the Drainage Canal and Chicago River, said finding of fact is not supported by any evidence in this case and is contrary to all the competent evidence in this case that it is clearly practicable under the evidence in this case to discharge the effluent through outfall sewers or tunnels to remote places in Lake Michigan and wholly divert them from the Chicago River and the Drainage Canal; and because, insofar as said finding of fact finds as a fact or concludes as a matter of law that the disposition of the effluent from the sewage treatment plants controls, limits or abridges the relief to which complainant is entitled under the decision of January 14, 1929, said finding or conclusion is not supported by any competent evidence, is contrary to all the competent evidence in this case and is erroneous as a matter of law.

II-D.

Complainant excepts to that portion of finding of fact Fourth, on page 122 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "It is pointed out by the defendants, however, that the Drainage Canal is actually connected with what is called the Illinois Waterway (which is under improvement by the State of Illinois under the authority of a permit of the Secretary of War) and that there is now through navigation. This navigation appears to be at present of slight volume and importance, consisting of pleasure craft, but such as it is it would be cut off by a complete stoppage of flow at Lockport."

because, insofar as said finding of fact implies or finds or concludes as a matter of law that the Illinois Waterway is being constructed under authority from the Secretary of War, or that the Secretary of War would have jurisdiction to authorize the construction of said Waterway, or that the Congress would have power to authorize any diversion from the Great Lakes-St. Lawrence Watershed for such a Waterway without the consent of the complainant states, such finding or conclusion is not supported by any evidence in this case, is contrary to all evidence in this case and is erroneous as a matter of law.

II-E.

Complainant excepts to that portion of finding of fact Fourth, appearing on pages 126-127 of the report of the Special Master made and filed herein, which reads as follows, to-wit:

> "There is still the question as to the conditions which will exist in relation to navigation in the Chicago River as a part of the Port of Chicago, because of the introduction of the effluent from the sewage treatment works and the untreated sewage carried into the river at times of storm, after the proposed program as sub-

> stantially approved by the complainants, so far as sewage treatment is concerned has been completed. That pollution caused by the introduction of sewage has relation to the interests of navigation was recognized by this Court in the case of *New York v. New Jersey,* 256 U. S. 296, 397, 398, cited by the Court in referring to the exigency which confronted the Secretary of War when he gave the permit of March 3, 1925 (278 U. S., p. 418). The fact that at that time the Sanitary District had been direlict, and that the present question relates to the conditions which will exist after the sewage has been treated so far as practicable from the standpoint of sanitary engineering knowledge, can not be deemed to change the conception of the interests of navigation or the need of their appropriate protection."

because, insofar as said finding finds or implies as a fact or concludes as a matter of law that the discharge of liquid sewage or the effluent of sewage treatment plants into any of the navigable waters of the United States constitutes an interference with or obstruction to navigation or an obstruction of navigable capacity, said finding or conclusion is not supported by any competent evidence in this case, is contrary to all competent evidence in this case and is erroneous as a matter of law; and because, insofar as said finding of fact finds as a fact or concludes as a matter of law that if the discharge of the effluent from the sewage treatment works and the discharge of the storm water overflow into the Chicago River were injurious to navigation, the defendants would not be required to remedy that condition by pumping circulating water, by discharging the effluent elsewhere through outfall sewers and/or constructing a separate system of sanitary sewers instead of attempting to found a right to divert water to the damage of the complainant upon conditions thus created by the defendants, such finding or conclusion is not supported by any competent evidence, is contrary to all competent evidence and is erroneous as a matter of fact.

II-F.

Complainant excepts to finding of fact First, Conclusion (3), appearing on page 35 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(3) That the remainder of the storm flow, in excess of the volume treated in the sewage treatment plants, will pass into the Chicago River and its branches, and into the canals of the Sanitary District, and any storm flow so passed into the river, its branches and the canals, will contain sewage and wastes which have not been treated by the sewage treatment works."

because said finding of fact is immaterial and because if this court should be of the opinion that said finding is material, then, and in that event, the Master should have found that any untreated sewage and waste passing into the Chicago River and its auxiliary channels with storm water overflow will be diluted with an immense volume of water and innocuous, and that the degree of such dilution and its effect on navigation, if any, will be the same whether the storm water overflow flows westward through the Chicago River toward Lockport, or flows eastward through the Chicago River toward Lake Michigan.

II-G.

Complainant excepts to that portion of finding of fact Fourth, appearing on page 137 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "While the residual organic matter in the effluent may be very different from an equal percentage of the raw sewage as a potential source of nuisance, it is far from demonstrated, in my judgment, that with all flow stopped at Lockport, the concentration of such a vast volume of effluent as will flow from the proposed

> sewage plants together with the untreated sewage and wastes carried with the storm flow into the limited channels of the Drainage Canal and Chicago River will not create conditions in these channels seriously detrimental to navigation."

because said finding of fact is not supported by the competent evidence in this case and is contrary to all the competent evidence in this case; because if the Special Master were of the opinion that said finding of fact was supported by competent evidence in this case, then, and in that event, he should have found and included in said finding of fact a finding that it was practicable and feasible to prevent any possibility of interference with navigation in said channels either by discharging the effluent of the sewage treatment plants through outfall tunnels directly into the Lake, or by pumping circulating water through the various channels of the District and/or by construction of a separate system of sanitary sewers; because said finding of fact erroneously assumes that the burden of proof was upon the complainants to show that under the program proposed by the defendants, no conditions would be created which would be detrimental to navigation, without diversion, whereas in law the burden was upon the defendants to establish such facts, if they existed, as an equitable defense *pro tanto* to the rights of the complainant as declared by this Court in its decision of January 14, 1929.

II-H.

As ancillary to and in support of its exception No. II, complainant renews its ancillary exceptions under Exception I, designated respectively as Exceptions No. I-F and No. I-G.

II-I.

Complainant excepts to that portion of finding of fact FOURTH, appearing on page 138 of the Report of the

Special Master made and filed herein, which reads as follows, to-wit:

> "But if the effluent from the sewage treatment plants and the storm water are to be discharged through the Drainage Canal at Lockport, it is well established that some flow from the Lake will be required. This it appears should not be less than a mean annual diversion of 1,000 c.f.s., in addition to pumpage; and it does not at present appear that it is necessary that the diversion should exceed a mean annual amount of 1,500 c.f.s., in addition to pumpage.
>
> My conclusion is that, so far as the question can be determined at this time, the interests of navigation in the Chicago River as a part of the Port of Chicago, when the above described sewage treatment program has been carried out, will require that the flow of the Drainage Canal be discharged at Lockport, and that for this purpose there will be necessary a diversion of water from Lake Michigan of an annual average of not less than 1,000 c.f.s., and that it would be safer to allow a mean annual diversion of 1,500 c.f.s., in addition to pumpage."

because, insofar as said finding of fact finds as a fact, or concludes as a matter of law, that it is necessary, or legally admissible in the interests of navigation in the Chicago River as part of the Port of Chicago to discharge the effluent of the sewage treatment works and the storm water through the Drainage Canal at Lockport without the consent of the complainant, said finding and conclusion is not supported by the competent evidence in this case, is contrary to all the competent evidence in this case, and is erroneous as a matter of law; and because insofar as said finding of fact finds as a fact, or concludes as a matter of law, that any flow at Lockport, is required or is legally admissible in the interests of navigation in the Chicago River as part of the Port of Chicago, such finding or conclusion is not supported by the competent evidence in this case, is contrary to all the competent evidence in this case, and is erroneous as a matter of law; and because said finding is immaterial in that it fails to state whether any flow is necessary to *maintain* navigation in the Chicago River as a part of the Port of Chicago.

II-J.

The complainant excepts to the finding of fact designated as Summary Conclusion No. 11, appearing on page 144 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "(11) That provision should be made in the decree for an examination of results after the completion of the sewage treatment works so that there may be such further or other relief in respect to the diversion of water from Lake Michigan as may be found to be feasible."

because, insofar as said finding finds or implies as a fact or concludes as a matter of law that any diversion or flow at Lockport may be maintained by the Sanitary District as against this complainant after the completion of the practical program for the disposition of the sewage of the Sanitary District without diversion, such finding or conclusion is not supported by the competent evidence in this case, is contrary to all the competent evidence in this case, and is erroneous as a matter of law.

III.

Complainant excepts to the finding of fact or conclusion of law appearing in the Summary at page 145 of the Report of the Special Master made and filed herein, which reads as follows, to-wit:

> "No recommendation is made as to costs."

because the Special Master should have found or concluded as a matter of law that the complainant is entitled to have and recover from the Sanitary District of Chicago and the

State of Illinois its costs and disbursements herein, and that the fees of the Special Master, as fixed and allowed by this Court, should be taxed against the defendants, the Sanitary District of Chicago and the State of Illinois, as part of the costs herein.

EXCEPTIONS TO FAILURE OR REFUSAL OF SPECIAL MASTER TO GRANT FINDINGS OF FACT REQUESTED BY OR ON BEHALF OF COMPLAINANTS.

IV.

Complainant excepts to the failure or refusal of the Special Master to find or grant complainant's requested finding of fact No. 6, appearing on page 5-6 of Complainant's Requested Finding of Fact, which reads as follows, to-wit:

> "While the completion of said sewage disposal plants, with chlorination only of the domestic water supply as presently practiced, will undoubtedly provide as good a water supply as presently obtains and one which is adequate to safeguard the public health, the construction of water filtration plants for the filtration of the entire domestic water supply of Chicago would be a further factor of safety or protection to the public health and would unquestionably provide a safe public water supply. In the present state of the art a comprehensive and scientifically sound program for the sanitation of Chicago should include the construction of water filtration works for the domestic water supply. Since the construction of water filtration plants is not an indispensable element in the practical disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion, the construction of such water purification works should be left to the discretion of the defendants."

Complainant excepts to the failure or refusal of the Special Master to find or grant complainant's requested finding of fact No. 9, appearing on page 7 of Complainant's

Requested Findings of Facts, which reads as follows, to-wit:

V.

> "If Chicago desires to improve the present standard or quality of its water supply, or to provide any additional factors of safety in the case of a breakdown in any of the plants for the disposal of the sewage by artificial processes, it would be practicable to extend the present water intakes farther into the Lake, to substitute a new water intake off the North Shore about 20 miles from the mouth of the Chicago River in the vicinity of Wilmette, to chlorinate the effluents from the sewage disposal plants and/or install controlling works at the junction of the Drainage Canal and the Chicago River, which would permit almost immediate diversion from the Lake in the case of an emergency. None of the foregoing variations in the program for the practical disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion is essential. The construction or installation of any such additional works or structures should be left to the discretion of the defendants."

VI.

Complainant excepts to the failure or refusal of the Special Master to find or grant complainants' requested finding of fact No. 13, appearing on page 8 of Complainants Requested Findings of Fact, which reads as follows, to-wit:

> "Upon the completion of this program of practical measures for the disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion, no diversion of flow at Lockport will be necessary to maintain navigation upon the Chicago River as part of the Port of Chicago. Navigable depths will be increased and no nuisance will be created which will obstruct or interfere with navigation."

VII.

Complainant excepts to the failure or refusal of the Special Master to find or grant complainants' requested finding of fact No. 14, appearing on pages 8-9 of Complainant's Requested Findings of Fact, which reads as follows, to-wit:

> "Upon the completion of this program of practical measures for the disposal of sewage of the Sanitary District of Chicago by means other than Lake diversion, it is practicable to flush the navigable channels of the Chicago and Calumet Rivers together with the auxiliary channels by pumping circulating water through the North Branch by means of the existing pumping station near Wilmette, by pumping water into the South fork of the Chicago River or into the Chicago Drainage Canal by means of the existing pumping station at 39th Street and by pumping water through the Calument-Sag Channel so that such flushing water would mingle with the effluents of the sewage disposal plants and proceed out into the Lake with no flow at Lockport. While this procedure is not necessary it is entirely practicable and would afford an adequate factor of safety, if desired, for the prevention of any possibility of interference with navigation in these channels."

VIII.

Complainant excepts to the failure or refusal of the Special Master to find or grant complainants' requested finding of fact No. 15, appearing on page 9 of Complainants' Requested Findings of Fact, which read as follows, to-wit:

> "With the completion of this program of practical measures for the disposal of the sewage of the Sanitary District of Chicago by means other than Lake diversion, it is practicable to discharge the effluents of all of the sewage disposal plants involved in this program through outfall sewers or tunnels directly into Lake Michigan so as to wholly remove the said effluents from the Chicago River and its branches and auxiliary channels in the Sanitary District of Chicago. While such procedure is not necessary, it is entirely practicable and affords an adequate factor of safety, if desired, for the prevention of any possibility of interference with navigation in said waters."

EXCEPTIONS TO FAILURE OR REFUSAL OF SPECIAL MASTER TO GRANT COMPLAINANTS' REQUESTED CONCLUSIONS OF LAW.

IX.

Complainant excepts to the failure or refusal of the Special Master appointed herein to grant complainants' requested conclusion of law No. (7) appearing on pages 11-12 of Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That the discharge of liquid sewage or street wash into any of the navigable waters of the United States does not constitute an obstruction to or interference with navigation or impairment of navigable capacity as a matter of Law."

X.

Complainant excepts to the failure or refusal of the Special Master appointed herein, to grant complainants' requested conclusion of law No. 9, appearing on page 12 of Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That upon the completion of the program of practical measures for the disposition of the sewage of the Sanitary District of Chicago by other means than Lake diversion, no diversion or flow at Lockport from the Great Lakes-St. Lawrence watershed may be lawfully maintained by the defendants, either in interest of the sanitation of Chicago or for the maintenance of navigation on the Chicago River as part of the Port of Chicago."

XI.

Complainant excepts to the failure or refusal of the Special Master appointed herein, to grant complainants' requested conclusion of law No. 12, appearing on page 13 of the Complainants' Requested Findings of Fact, Conclusions of Law and Recommendations for a Decree, which reads as follows, to-wit:

> "That defendants should be required by the terms of the decree to provide for the discharge of effluents from the sewage disposal plants involved in the practical program for the disposal of the sewage by other means than Lake diversion, by such methods as will remove all of said effluents from the Chicago River and the navigable channels of the Sanitary District of Chicago and provide for the discharge of such effluents into Lake Michigan or elsewhere in such manner and at such places as will not create any obstruction to or interference with navigation on or the navigable capacity of any of the navigable waters of the United States."

Complainant hereby tenders a form of decree to carry out the exceptions herein taken to the Report of the Special Master, which form of decree is as follows:

COMPLAINANTS' REQUESTED FORM OF DECREE

(after formal parts and modifications of findings.)

1. The Court finds that there are practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than lake diversion, and that the adoption, completion and operation of such practical measures, will make it practicable to terminate all flow at Lockport (other than domestic pumpage) from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, with due regard for the maintenance of navigation in the Chicago River as part of the Port of Chicago.

2. The Court finds that practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than Lake diversion can be so far completed and placed in operation on or before July 1, 1930, as to make it practicable (with due regard for the sanitary emergency and for the maintenance of navigation

in the Chicago River as part of the Port of Chicago) to reduce the diversion or flow at Lockport to an annual average not exceeding 6500 c.f.s. in addition to domestic pumpage.

3. The Court finds that on and after July 1, 1930, the diversion or flow from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, which is maintained at Lockport by the Sanitary District of Chicago, should be reduced to an annual average not exceeding 6500 c.f.s. in addition to domestic pumpage.

4. The Court finds that practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than lake diversion can be so far completed and placed in operation on or before December 31, 1935 as to make it practicable (with due regard for the sanitary emergency and for the maintenance of navigation in the Chicago River as part of the Port of Chicago) to reduce the diversion or flow from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, which is maintained at Lockport by the Sanitary District of Chicago, to an annual average not exceeding 5000 c.f.s. in addition to domestic pumpage.

5. The Court finds that on and after December 31, 1935, the diversion or flow from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, which is maintained at Lockport by the Sanitary District of Chicago, should be reduced to an annual average not exceeding 5000 c.f.s. in addition to the domestic pumpage.

6. The Court finds that all practical measures necessary wholly to provide for the disposition of all of the sewage of the Sanitary District of Chicago through other means than lake diversion and to permit the termination of all flow at Lockport (other than domestic pumpage) from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed, with due regard for the maintenance of navigation in the Chicago River as part of the Port of Chicago,

can be wholly completed and placed in full operation on or before December 31, 1938.

Now, Therefore, It Is Ordered, Adjudged and Decreed:

1. That on or before July 1, 1930, the defendants so far complete and place in operation practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than lake diversion as will make it practicable (with due regard for the maintenance of navigation in the Chicago River as part of the Port of Chicago) to reduce the diversion or flow, which the Sanitary District maintains at Lockport, to an annual average not exceeding 6500 c.f.s. in addition to domestic pumpage.

2. That on or before December 31, 1935, the defendants so far complete and place in operation practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than Lake diversion as will make it practicable (with due regard for the maintance of navigation in the Chicago River as part of the Port of Chicago) to reduce the diversion or flow which the Sanitary District maintains at Lockport to an annual average not exceeding 5000 c.f.s. in addition to domestic pumpage.

3. That on or before December 31, 1938, the defendants complete and place in full operation all practical measures necessary wholly to provide for the disposition of all of the sewage of the Sanitary District of Chicago through other means than lake diversion and to permit the termination of all flow at Lockport (other than domestic pumpage) from the Great Lakes-St. Lawrence Watershed to the Mississippi Watershed.

4. That on and after July 1, 1930, the defendants. the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence System or Watershed through the Chicago Drainage Canal and its auxiliary channels or other-

wise in excess of an annual average of 6,500 c.f.s. in addition to domestic pumpage.

5. That on and after December 31, 1935, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any or all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from diverting or abstracting any of the waters of the Great Lakes-St. Lawrence System or Watershed through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency in excess of 5000 c.f.s. in addition to domestic pumpage.

6. That on and after December 31, 1938, the defendants, State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any or all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from diverting or abstracting any of the waters of the Great Lakes-St. Lawrence System or Watershed or maintaining any flow therefrom into the Mississippi Watershed (other than domestic pumpage) through the Chicago Drainage Canal and its auxiliary channels, or through or by means of any other method, device or agency.

7. That on and after December 31, 1938, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees, servants, attorneys, agents and any and all persons assuming or purporting to act under their authority or under the authority of either of them be, and they hereby are, ordered to desist and refrain from discharging sewage or the effluent of sewage disposal plants at such place or places and/or in such manner or by such methods as to so pollute the Chicago River and the auxiliary navigable channels of the Sanitary District of Chicago or any other of the navigable waters of the United States to such an extent as to create an obstruction to or in-

terference with navigation or the navigable capacity of any of the navigable waters of the United States.

8. That, pending the completion of the practical measures for the disposition of the sewage through other means than lake diversion, the defendants, the Sanitary District of Chicago and the State of Illinois, shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago and the progress made on all other structures or measures necessary to provide for the disposition of the sewage of the Sanitary District through other means than lake diversion, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

9. That the complainants have and recover from the Sanitary District of Chicago and the State of Illinois their costs and disbursements herein to be taxed and noted at the foot of this decree, including the fees of the special Master hereby fixed at .... Dollars.

By the Court:

....
Clerk of the Supreme Court of
United States of America.

Respectfully submitted,

Hamilton Ward,
Attorney General of New York State
Thomas Penney, Jr.,
First Assistant Attorney General of New York.
Solicitors for Complainant.

FILED

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Supreme Court of the United States

October Term, 1929

No. ~~[illegible]~~, Original 17

State of New York,
Complainant,

vs.

State of Illinois and Sanitary District of Chicago,
Defendants.

BRIEF FOR COMPLAINANT IN SUPPORT OF COMPLAINANT'S SUBSTITUTE EXCEPTIONS, AND I OPPOSITION TO DEFENDANT'S EXCEPTIONS T THE MASTER'S REPORT ON RE-REFERENCE.

Hamilton Ward,
Attorney General of the
State of New York,
Solicitor for Complainant.

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Supreme Court of the United States

October Term, 1929

No. 12, Original

State of New York,
Complainant,
vs.
State of Illinois and Sanitary District of Chicago,
Defendants.

BRIEF FOR COMPLAINANT IN SUPPORT OF COMPLAINANT'S SUBSTITUTE EXCEPTIONS, AND IN OPPOSITION TO DEFENDANT'S EXCEPTIONS TO THE MASTER'S REPORT ON RE-REFERENCE.

PRELIMINARY STATEMENT

This original action No. 12 was commenced in October, 1926. Subsequently, upon the petition of complainant, the Supreme Court permitted complainant to participate in the trial of the related suit No. 7 original, entitled "State of Wisconsin, State of Minnesota, State of Ohio, State of Pennsylvania, against The State of Illinois and the Sanitary District of Chicago" in "like manner as if those suits had been consolidated." Complainant herein thereupon did participate in the proceedings before the Hon. Charles E. Hughes, as Special Master. On November 23, 1927, the

Special Master filed his report on original reference and on January 14, 1929 the Supreme Court handed down its opinion and order herein. (*The State of Wisconsin* v. *The State of Illinois,* 278 U. S. 367). That opinion reviewed in detail the history of the diversion by the defendants of large quantities of water from the Great Lakes into the Mississippi watershed for the purpose of sewage disposal to the damage of the complainants.

The order referred the case againt to the Master for a further examination into the questions indicated in the opinion. The parts of the opinion deemed to indicate the questions are those appearing on pages 418 to 421 as follows:

> "It will be perceived that the interference which was the basis of the Secretary's permit, and which the latter was intended to eliminate, resulted directly from the failure of the Sanitary District to take care of its sewage in some way other than by promoting or continuing the existing diversion. It may be that some flow from the Lake is necessary to keep up navigation in the Chicago River, which really is part of the Port of Chicago, but that amount is negligible as compared with 8,500 second feet now being diverted. Hence, beyond that negligible quantity, the validity of the Secretary's permit derives its support entirely from a situation produced by the Sanitary District in violation of the complainant's rights; and but for that support complainants might properly press for an immediate shutting down by injunction of the diversion, save any small part needed to maintain navigation in the river. In these circumstances we think they are entitled to a

decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end. But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction. * * *

In increasing the diversion from 4,167 cubic feet a second to 8,500, the Sanitary District defied the authority of the National Government resting in the Secretary of War. And in so far as the prior diversion was not for the purposes of maintaining navigation in the Chicago River it was without any legal basis, because made for an inadmissible purpose. It therefore is the duty of this Court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis and thus to restore the navigable capacity of Lake Michigan to its proper level. The Sanitary District authorities, relying on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore, they can not now complain if an immediately heavy burden is placed upon the District because of their attitude and course. The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion.

Though the restoration of just rights to the complainants will be gradual instead of immediate it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project. * * *

To determine the practical measures needed to effect the object just stated and the period required for their completion there will be need for the examination of experts; and the appropriate provisions of the necessary decree will require careful consideration. For this reason, the case will be again referred to the Master for a further examination into the questions indicated."

The questions thus indicated are deemed to be these:

(1) What are the practical measures necessary for the disposition of the sewage of the Sanitary District of Chicago through other means than the lake diversion;

(2) Within what time can these practical measures be completed and put into operation;

(3) What reductions in the diversion will be practicable immediately, and from time to time, pending the completion and placing in operation of said practical measures;

> (4) What flow or diversion, if any, from Lake Michigan is necessary to maintain navigation in the Chicago River, as a part of the Port of Chicago, after such practical measures have been completed and placed in full operation.

After hearings on re-reference, the Master made and filed his report answering the foregoing questions on December 17, 1929.

Joint exceptions to this report were filed by the complainant in Original Action No. 7 (*Wisconsin et al.* v. *Illinois et al.*), Original Action No. 11 (*Michigan* v. *Illinois et al.*), and Original Action Action No. 12 (*New York* v. *Illinois et al.*). But, upon permission duly granted, Substitute Exceptions have been duly filed by this complainant in the last named action.

COMPLAINANT'S EXCEPTIONS

Complainant's Substitute Exceptions do not object to the Master's answer to the second and third questions, but object to his answers to the first and fourth questions, to his failure to recommend costs, and to his refusal to find certain proposed findings of fact and conclusions of law.

In answer to the first question the Master should have found what practical measures were necessary to dispose of the sewage by means other than diversion of lake water. At pages 34 and 35 of his report he sets out his answer but describes the measures which he there recommends as those which will afford practical measures from the standpoint of present sanitary engineering knowledge for complete treatment of the dry weather flow of sewage and waste, and in times of storm, of approximately 150 per cent of the ordinary dry weather flow.

Complainant has excepted to that finding, deeming it unresponsive, having in mind the relief which the Master deemed could be predicated upon it as expressed in his answer to the fourth question.

The fourth question required a finding of what diversion, if any, would be necessary to maintain navigation in the Chicago River as a part of the Port of Chicago after the said practical measures were completed and in full operation. The answer of the Master on this question (M. R. 138) finds necessary a diversion of 1500 c. f. s., in addition to pumpage, to carry away from the Chicago River the effluent which he had provided in his answer to Question 1 should be allowed to flow into that river. Complainant deems this not responsive to the order of the Court which directed the provision of means of sewage disposal without diversion.

Complainant's exceptions ancillary to its Exceptions I and II, and complainant's Exceptions V, VII and VIII are exceptions to the Master's failure or refusal to grant findings of fact requested by it that there were additional means to make diversion unnecessary, such as the chlorination of the effluent from the sewage disposal plants; the flushing of the Chicago River by pumping circulating water into it so that it would flow in its original direction; and the construction of outfall sewers or tunnels to carry the effluent entirely away from the Chicago River and its branches. Other possible additional means are the construction of a separate sanitary sewer system to take care of the storm water run-off, and additional preliminary treatment of storm water overflow.

ARGUMENT

POINT I

The program outlined by the master is not an adequate program of practical measures for the disposition of the sewage in the sanitary district through other means than lake diversion, as interpreted by the Master, and does not comply with the order of this Court dated January 14, 1929.

A

It is not adequate.

This Court intended to require "the sanitary district to take care of its sewage in some other way than by promoting or continuing the existing diversion"; that the sewage of the district should be "entirely disposed of thereby"; and that the method so adopted "must include everything that is essential to an effective project" (278 U. S. 367, 418, 419, 421).

The Master deemed his program one that would provide for the artificial treatment of sewage so as to purify to the extent of 85 per cent to 95 per cent. He was troubled with the question of the final disposition of the effluent.

Complainant's witnesses believe the effluent from the sewage disposal plants provided for in the Master's program to be one not harmful to navigation or to public health. The testimony to the contrary is insignificant. The Master could have provided for additional artificial treatment of the sewage; or for additional means for its disposal within the watershed instead of by diversion; or he might have deemed the treatment by the means specified by him on pages 34 and 35 to be adequate and no diversion from the lake to be necessary to dilute or carry it away.

Complainant considers the Master's program suitable, and additional practical measures to be in the nature of improvements not essential to accomplish the purpose stated by the Court, but described these additional practical measures in detail to show their availability. If their adoption is necessary to the restoration of complainant's rights, they should be adopted. If they are essential to the restoration of the claimant's rights, the order of the Court requires their inclusion.

Among the practical measures which are available to safeguard conditions of navigation and public health in the Chicago River and one or all of which should be adopted rather than the continuation of the infringement upon the rights of the complainant by diversion are the following:

> Chlorination of the effluent of the sewage disposal plants (Substitute Exception V);
>
> Flushing the Chicago river by pumping circulating water through it in its original direction (Substitute Exception VII);
>
> The construction of outfall sewers or tunnels to carry ~~the~~ effluent away from the Chicago River (Substitute Exception VIII);
>
> Additional preliminary treatment of storm water overflow;
>
> Construction of a separate sanitary sewer system.

Chlorination of the effluents of the sewage disposal plants would remove 99 to 100% of the bacteria and would be entirely practicable (J. A. 239, 627; M. R. 28).

The installation and operation of pumps to circulate water so that the Chicago River would flow in its original direction is entirely practicable (J. A. 109, 110, 210, 216).

The construction of outfall sewers or tunnels to carry the effluent away from the Chicago River would be practicable according to complainant's witnesses Gascoigne and Howson (J. A. 210, 109) and this was not denied by any witness for the defendants.

The Master's program calls for the treatment of only 150% of the dry weather flow at times of storm water runoff. Although this is probably adequate the existing sewer system of Chicago could be so operated that a greater amount of the initial storm water flow could be carried by the intercepting sewers to the sewage disposal plants rather than by-passed through the outlets provided for excess storm water which lead directly into the Chicago River. The capacity of the existing sewers is such that this preliminary treatment could be given to from 267% to 400% of the storm water runoff rather than to the 150% called for by the Master's program.

If it is deemed that the existing system of sewers is inadequate to carry both the storm water runoff and the content of the sanitary sewer system, a separate system of sanitary sewers could be constructed so that both types of sewage could be given adequate and complete treatment. Such an additional system would of course not be inexpensive, but the estimate of its cost as fixed by defendants' witness Matthews (M. R. 24) was grossly excessive. His figures as to the mileage of sewers required called for the installation of sewers in large areas which are devoted to lakes or parks and consequently do not need any sanitary sewers. The cross examination showed his estimate to be in other respects entirely haphazard.

B

The inclusion by the Master of controlling works as a part of his program of practical measures for the disposition of sewage was erroneous because it preserves rather than prevents diversion and because it conditions complainant's relief upon the discretion of the Secretary of War.

The Master's program calls for the construction (subject to securing the approval of the Secretary of War therefor) of controlling works at or near the mouth of the Chicago River. The purpose is to prevent storm water from causing that River to flow into Lake Michigan as it was wont to flow.

Until the completion and full operation of this sewage disposal system provided for by the Master, or by complainant's program, this would protect the lake from contamination by untreated sewage from the river. But after the completion of the disposal system the effluent and the content of the river will be innocuous and not offensive.

Controlling works cannot be built without the consent of the Secretary of War. Their inclusion by the Master in his program and proposed decree subjects the restoration of complainant's rights to the discretion of an administrative officer. They are not essential to the program and should be stricken therefrom.

POINT II

Upon the completion of the sewage disposal program no diversion or flow at Lockport is necessary or legally admissible to maintain navigation in the Chicago River as part of the Port of Chicago.

In answering the fourth question the Special Master found that a minimum diversion of 1500 c.f.s. (in addition to pumpage) was necessary to maintain navigation in the Chicago River as a part of the Port of Chicago. His answer to the first question had provided that the effluent from the sewage disposal plants should go into the Chicago River. Its presence there he considered would cause such a condition in regard to navigation and public health as to require the above diversion from the Great Lakes watershed to the Mississippi watershed.

In its opinion of January 14, 1929, this court found that Congress had not authorized any diversion for the purpose of navigation on the Illinois or Mississippi rivers and held that such diversion was not allowable for the purpose of this case (278 U. S. 367 at 417). Congress has not taken any subsequent action (M. R. 122). It is perfectly clear from the Court's opinion that any diversion to be permitted in the interests of navigation was to be in the interests of navigation in the Chicago River as a part of the Great Lakes-St. Lawrence system, and not as a part of the Mississippi-Illinois river system. Nor was it to be in the interests of sanitation. At 418, the Chief Justice said:

> "He (the Secretary of War) could not make mere local sanitation a basis for a continuing diversion."

A

Diversion is not necessary in the interests of navigation on the Chicago River as a part of the Great Lakes system.

At page 126 of his report, the Master says:

> "So far as depths are concerned, it appears that no diversion of the water from Lake Michigan is required for purposes of navigation in the Chicago River, and there is testimony that without a flow at Lockport there would be an improvement with respect to the current in the river."

All of the witnesses in this case save the witnesses Eddy and Jadwin testified that upon the completion and operation of the proposed program no flow at Lockport would be necessary to maintain navigation; that this elimination of the current would improve navigation; that depths and widths would be improved; that deposits from street wash would be negligible and removed in the regular course of maintenance; that the purified effluent would have no adverse effect upon navigation.

Such testimony was given by Colonel Townsend who has had forty-five years experience in the Army Engineering Corps on River and Harbor work (J. A. 244-258); by General Keller who has had thirty-five years experience in the same service (J. A. 401, 405); by Major Putnam who had been United States District Engineer at Chicago (J. A. 99); and by Captain Inches, a captain who has sailed the Great Lakes and the Chicago River for about thirty years (J. A. 239-241).

And General Jadwin testified that the cessation of flow at Lockport would improve navigable conditions so far as width, depth and current are concerned. The need of diversion he found to be in the alleged nuisance (J. A. 9, 10, 16, 19, 31).

B

Upon the completion of the practical measures recommended by the Master, or of complainant's program, there will be no nuisance in the Chicago River such as to require the diversion of any lake water.

The Master has found that the completion and operation of his proposed sewage disposal system will result in a pollution of the Chicago River such as to constitute a nuisance and to require the diversion of water from the lake to dilute it and carry it off, in the interests of navigation.

The Master finds "that pollution caused by the introduction of sewage has relation to the interests of navigation, citing *New York* v. *New Jersey*, 256 U. S. 296, at 397, 398.

But in *New York* v. *New Jersey*, 256 U. S. 296, the discharge of sewage into New York Harbor with only simple preliminary treatment for the removal of gross material was held to be not harmful to navigation.

If the Chicago River is polluted after the completion and operation of his proposed program, it is because his proposed program is inadequate and does not meet the requirements of the order of this Court. But complainant believes that the resulting condition of the Chicago River would not be of such pollution as to affect adversely either navigation or public health.

It was testified that the resulting conditions in the Chicago River would be satisfactory from the point of view of public health; that there would be no odor due to putrefaction of organic matter (Howson, J. A., 108, 109; Gascoigne, J. A., 209;

Townsend, J. A., 215, 216)~~; nor~~ would there be any visible suspended particles recognizable as of sewage origin; nor any oil or floating material upon the surface; nor would the waters be offensive or injurious to the health of passengers or employees on boats or docks; nor would the condition be such as to produce an excessive growth of water plants (id.).

To the same effect was the testimony of the witnesses Waring (J. A. 239, 613) and Rockwood (J. A. 591).

Defendants' witness Pearse affirmed the correctness of previous testimony by him to the effect that effluent from a sewage treatment plant such as provided for "would create no nuisance, and can be turned into a water course, even though dry, without fear of consequences" and that fish could live in it (J. A. 520, 521).

The testimony of the witnesses Eddy and Jadwin were the sole support of the Master's finding to the contrary. The witness Eddy's testimony as to the offensive nature of the effluent (quoted M. R. 129, 130) is in direct conflict with the testimony of the same witness to the Board of Estimates of the City of Milwaukee on November 12, 1919, which is set out in the Master's report on page 30.

The testimony of General Jadwin, Chief of Engineers, is material on the question of navigation but not on the question of sanitation or public health. He testified that the cessation of flow at Lockport would result in greater available depth for navigation in the Chicago River and that the question of diversion "is really a nuisance question". "I am not an expert in the field of nuisances, in the sanitary sense, —" (J. A.

9, 10, 31), and further, that "I think it is correct that as to the quantity of dilution water from the lake, if any, which is necessary when complete treatment plants are in operation, in order to prevent any active nuisance, I am not an expert and am not able to advise" (J. A. 17), and he stated that he was not a sanitary expert or a sanitary engineer (J. A. 15, 38, 39). He further says that "assuming that the effluent from an activated sludge plant is clear, odorless and contains no suspended matter, and also stays odorless indefinitely, I do not see that it would be an objection to navigation." (J. A. 42). And he admits that sewage passes largely untreated into all of the other harbors of the Great Lakes (J. A. 26).

C

The Congress by general and special legislation has affirmatively determined that the discharge of local sewage and street wash into any of the navigable waters of the United States shall not constitute an obstruction of navigation or navigable capacity as a matter of law.

Title 33, U. S. C., Section 407, reads in part:

> § 407. Deposit of refuse in navigable waters generally. It shall not be lawful to throw, discharge, or deposit, or cause, suffer, or procure to be thrown, discharged, or deposited either from or out of any ship, barge, or other floating craft of any kind, or from the shore, wharf, manufacturing establishment, or mill of any kind, any refuse matter of any kind or description whatever *other than that flowing from streets and sewers and passing therefrom in a liquid state,* into *any* navigable water of the United States, or into *any* tributary of any navigable water from which the same shall float or be washed into such navigable water;" * * *

and Section 421 of Title 33, relating specifically to the vicinity of Chicago, reads in part as follows:

> "§ 421. Deposit of refuse, etc., in Lake Michigan near Chicago. It shall not be lawful to throw, discharge, dump, or deposit, or cause, suffer, or procure, to be thrown, discharged, dumped, or deposited, any refuse matter of any kind or description whatever *other than that flowing from streets and sewers and passing therefrom in a liquid state into Lake Michigan*, at any point opposite or in front of the county of Cook, in the State of Illinois, or the county of Lake in the State of Indiana, within eight miles from the shore of said lake." * * *

This determination by Congress that the discharge of local sewage and street wash into any of the navigable waters of the United States shall not constitute an obstruction of navigation or navigable capacity as a matter of law, is conclusive.

Monongahela Bridge Co. v. *United States,* 216 U. S. 177 at 195.

POINT III

The defendant's exceptions are not well taken.

A

The time allowed by the Master for the construction and placing in operation of practical measures for sewage disposal was sufficient.

Defendants' exceptions numbers three and four complain that the Special Master did not give due consideration to the fact that the level of the lakes has risen an appreciable amount since the date of his original report. Defendants claim that by reason of this elevation of lake levels complainant would not be injured by the granting of a longer period for the construction of their sewage disposal works. However, since the elevation of the lakes varies it might well be that the period beyond 1938 would be a period of very low lake levels which would cause great damage to complainant, and the diverson during that period would be very harmful. Further, this court allowed defendants a reasonable time to complete suitable sewage disposal plants to avoid unnecessary hazard to the people in the vicinity of Chicago, and not because it deemed that the injury to complainant could be disregarded.

Defendants' exception six complains that the Special Master failed to allow a time for acquiring sites for plants, but it seems that all the sites except one have already been secured (Master's report pp. 45–48; 50); and further complains that the Master did not allow the time necessary to raise funds, but it appears that the Master allowed an additional year for this purpose (Master's report p. 80).

B

The jurisdiction of this Court to fix the amount of diversion in the interest of Navigation has been decided (*Wisconsin v. Illinois*, 278 U. S. 376).

Defendants' exception seven alleges error on the Master's part for its failure to conclude that for this court to fix the amount of diversion would be unconstitutional as an infringement upon the legislative and administrative branches of the government. Since this question was disposed of by the opinion of the court herein of January 14, 1929, discussion is deemed unnecessary.

C

The Master was correct in not allowing additional diversion in the alleged interest of navigation in the Illinois River or Michigan Canal.

Defendants' exceptions ten and eleven complain that the Master failed to permit sufficient diversion to maintain the waters of the Illinois River and the Michigan Canal in a condition reasonably acceptable for navigation. But this court has held that complainants are entitled to a "shutting down by injunction of the diversion, save any small part needed to maintain nevigation in the (Chicago) river" (*Wisconsin* v. *Illinois*, 278 U. S. 367 at 418), and that Congress had never undertaken to authorize any diversion for purposes sought by defendants.

D

The Master was correct in finding it to be practicable to determine permissible reductions in diversion during the construction.

Defendants' exception number thirteen claiming that it is impracticable to determine the permissible reductions in the diversion during the construction period is not sustained by the testimony. Witnesses for both parties support the Master's finding in this regard (Master's report, pp. 96–105).

POINT IV

The decree proposed should have awarded costs to the complainant including the fees of the Special Master.

The original report and the decision of this court have found that the complainant and its citizens were substantially damaged; that these damages were inflicted upon their navigation, commercial interests, structures, summer resorts, fish and game preserves, and other interests. Furthermore, this litigation has been long and expensive. Complainant is entitled to costs under such circumstances.

North Dakota v. *Minnesota*, 263 U. S. 583.

POINT V

Wherefore this Court should amend the findings of fact and conclusions of law and recommendations as submitted by the Special Master in his report on re-reference and issue a decree in the form proposed by complainant in its substitute exceptions.

Respectfully submitted,

HAMILTON WARD,
Attorney General of the State of New York.
Solicitor for Complainant.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

MAR 12 1930
CHARLES ELMORE CROPLEY
CLERK

In the Supreme Court of the United States

OCTOBER TERM, 1929.

No. 7, ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA, COMPLAINANTS,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS, INTERVENING DEFENDANTS.

No. 11, ORIGINAL.

STATE OF MICHIGAN, COMPLAINANT,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

No. 12, ORIGINAL.

STATE OF NEW YORK, COMPLAINANT,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

BRIEF FOR COMPLAINANTS IN NOS. 7 AND 11 ORIGINAL, IN SUPPORT OF COMPLAINANTS' EXCEPTIONS AND IN OPPOSITION TO DEFENDANTS' EXCEPTIONS TO MASTERS' REPORT ON REREFERENCE.

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In the Supreme Court of the United States

OCTOBER TERM, 1929.

No. 7, ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA, COMPLAINANTS,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS, INTERVENING DEFENDANTS.

No. 11, ORIGINAL.

STATE OF MICHIGAN, COMPLAINANT,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

No. 12, ORIGINAL.

STATE OF NEW YORK, COMPLAINANT,

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HISTORY AND STATEMENT OF CASE.

These original actions, numbered respectively 7, 11 and 12, were begun by the respective complainants during the period extending from 1922 to 1926. Generally all of the Bills in the foregoing suits alleged great damage to the complainant States and their peoples by reason of the diversion of the waters of the Great Lakes-St. Lawrence Watershed by the State of Illinois and the Sanitary District of Chicago, and prayed that an injunction issue out of this Court to restrain said defendants from continuing such diversion, which was alleged to be unlawful. After motions to dismiss the bills of complaint in the respective suits had been severally overruled, the three cases, pursuant to orders of this Court and election of the parties in Nos. 11 and 12 Original, were consolidated and heard by Honorable Charles Evans Hughes, as Special Master.

Thereafter the Special Master duly filed his Report (hereinafter designated as Master's Original Report) in which he found that the diverson of water from the Great Lakes-St. Lawrence Watershed by said defendants had lowered the level of Lakes Michigan and Huron approximately six inches, the levels of Lake Erie and Ontario approximately five inches and the levels of connecting Rivers, Bays and Harbors to the same extent. (Master's Original Report, p. 104-5.) The Master further found that the extent of the lowering of said waters was in direct proportion to the extent of the diversion and that an increase of 1500 c.f.s. in the diversion would produce an additional lowering in said waters of approximately one inch. (Master's Original Report, p. 105.) As a result of this diversion, the Master found that the complainant States and their people had suffered substantial damage to their navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other interests and to riparian property generally. (Master's Original Report, pp. 105-118.) The Master's finding in this respect was confirmed by this Court. *Wisconsin v. Illinois,* 278 U. S. 367 at 407-9.

Upon the consideration of the Master's Original Report and the exceptions filed thereto, this Court held in *Wisconsin, et al. v. Illinois, et al.*, 278 U. S. 367, that the diversion of water from the Great Lakes then and now being maintained by the State of Illinois and the Sanitary District of Chicago was unlawful and in violation of the rights of complainants, that the Sanitary District was under a legal duty to provide some other means of disposing of the sewage to the end that the unlawful diversion might be terminated, that in keeping with the principles of a Court of Equity, the defendants would be afforded a reasonable time within which to provide other means of disposing of the sewage and that thereafter there should be a final, permanent, operative and effective injunction.

Thereupon this Court again referred these causes to the Special Master for a determination of certain questions deemed to be essential to the formulation of an appropriate decree which, while avoiding unnecessary hazard to the health of the people of the Sanitary District, should nevertheless terminate the unlawful diversion and restore the rights of the complainants as speedily as possible. In that connection, Mr. Chief Justice Taft, speaking for the Court, said in part (278 U. S. 367 at 418-421):

> "It will be perceived that the interference which was the basis of the Secretary's permit, and which the latter was intended to eliminate, resulted directly from the failure of the Sanitary District to take care of its sewage in some other way than by promoting or continuing the existing diversion. It may be that some flow from the Lake is necessary to keep up navigation in the Chicago River, which really is part of the Port of Chicago, but that amount is negligible as compared with 8,500 second feet now being diverted. Hence, beyond that negligible quantity, the validity of the Secretary's permit derives its support entirely from a situation produced by the Sanitary District in violation of the complainants' rights; and but for that support

complainants might properly press for an immediate shutting down by injunction of the diversion, save any small part needed to maintain navigation in the river. In these circumstances we think they are entitled to a decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end. But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction. * * *

"The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion.

"Though the restoration of just rights to the complainants will be gradual instead of immediate it must be continuous and as speedy as practicable, and *must include everything that is essential to an effective project.*

* * * * *

"To determine the practical measures needed to effect the object just stated and the period required for their completion there will be need for the examination of experts; and the appropriate provisions of the necessary decree will require careful consideration. For this reason, the case will be again referred to the Master for a further examination into the questions indicated."

By this order of Re-Reference there was, therefore, submitted to the Special Master for determination the following questions:

(1) What are the practical measures necessary for the disposition of the sewage of the Sanitary District of Chicago through other means than diversion;

(2) Within what time can these practical measures be completed and put into operation;

(3) What reductions in the diversion will be practicable immediately, and from time to time, pending the completion and placing in operation of the various practical measures necessary for the disposition of the sewage of the Sanitary District through other means than diversion;

(4) What diversion, if any, will be necessary for the purpose of maintaining navigation in the Chicago River, as part of the Port of Chicago, after such practical measures have been completed and placed in full operation?

After extended hearings on Re-Reference, the Master made and filed his report, (hereinafter called Master's Report in contra-distinction to Master's Original Report) answering the foregoing questions, as follows:

In answer to the FIRST QUESTION the Master found:

> "That the completion of the North Side, West Side, Calumet, and Southwest Side Sewage Treatment works, above described, with their appurtenances and the necessary intercepting sewers, and the efficient operation of these plants, *will afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes* of all the area comprised within the Sanitary District of Chicago, and also, in times of storm, of approximately 150% of the ordinary dry weather flow of sewage and wastes; that in the actual operation of these plants it may appear that a greater amount of the storm flow can be treated at least in part." (Master's Report, pp. 34, 35, 141.)

While not included in his answer to the FIRST QUESTION, the Master subsequently in his Report provided for the construction of new controlling works at or near the Northern or Eastern terminus of the Drainage Canal, or in the Chicago River for the purpose of preventing restoration of the natural flow of that river into Lake Michigan, and concluded that the ultimate relief of the complainants should be dependent upon the discretion of the Secretary of War in authorizing the construction of such controlling works. (Master's Report, pp. 81, 142-3.) Complainants submit, as hereinafter more particularly pointed out, at pages 35 to 37 *infra,* that such controlling works are not an essential part of the program of practical measures for disposition of the sewage without diversion, and that the effect of this conclusion is to transfer the functions of this Court in the adjudication of these causes to the Secretary of War and leave to his discretion the determination of when, or whether at all, the rights which this Court adjudged in these complainants shall be secured to them.

In answering this question on Re-Reference, the Master further found that none of the following structures, measures or operations is an essential part of a program of practical measures for the disposition of the sewage of the Sanitary District without diversion.

(a) That it is not essential to require the Sanitary District to so construct and/or operate its sewage treatment works as to afford at least preliminary treatment of storm water overflows up to the capacity of the intercepting sewers. (4000 c.f.s.) (Master's Report, pp. 19-23.)

(b) That the construction of a separate system of sanitary sewers so as to prevent any sewage in dilution or otherwise being carried into the river or channels at times of storm water run-off or overflow, is not an essential part of a program of practical measures for the disposition of the sewage without diversion. (Master's Report, p. 24.)

(c) That water filtration or purification works for the domestic water supply of Chicago are not a necessary part of a program of practical measures for the purpose stated. (Master's Report, p. 25.)

(d) That any extension of the present water intakes is not an essential part of such a program. (Master's Report, p. 25.)

(e) That the construction of a new water intake off the North Shore at Chicago and remote (20 miles) from the mouth of the Chicago River is not an essential part of such a program. (Master's Report, p. 25.)

(f) That chlorination of the effluents of the sewage disposal works is not an essential part of such a practical program. (Master's Report, p. 25.)

(g) That the construction of outfall sewers from the sewage treatment works to selected points in Lake Michigan so as to divert the effluents wholly from the Chicago River and auxiliary channels is not an essential part of such a program. (Master's Report, pp. 133-134, 137.)

(h) That provision for the pumping of circulating water through the channels of the Chicago River to guard against the possibility of any interference with navigation in such channels is not a part of a program of practical measures for the purpose stated. (Master's Report, pp. 134, 135, 137, 138.)

It is thus apparent that the Special Master interpreted this question on Re-Reference as though it simply required him to find what sewage treatment works would be required to provide complete treatment of the sewage of the Sanitary District by artificial processes. On the other hand, complainants respectfully submit that the question submitted to the Special Master by this Court was not as just stated, but required the inclusion in the program of practical measures of every structure, plant or operation, whether it be for the artificial treatment of the sewage or otherwise, which might be necessary to effect the object stated by the Court. In the words of the Court, this program "must include everything that is essential to an effective project.". (278 U. S. 367 at 421.)

In answer to the SECOND QUESTION, the Special Master found that all of the sewage treatment works could be completed and placed in operation on or before December 31, 1938. (Master's Report, pp. 141, 142.) He also found that controlling works, if built, could be completed in a period of two years, (Master's Report, p. 81) and that water filtration works, if built, could be completed within a period of five calendar years (Master's Report, p. 82). The Master also found that complainants' witnesses estimated that it would take from five to eight years to construct a new super-tunnel or water intake 4½ miles off shore in the vicinity of Wilmette and approximately 20 miles from the mouth of the Chicago River.

In answer to the THIRD QUESTION, the Special Master found that the diversion could be reduced to an annual average of 6500 c.f.s. in addition to domestic pumpage on July 1, 1930, that if and when controlling works should have been constructed, pending the completion of the program, the diversion should be reduced to 5000 c.f.s. in addition to domestic pumpage and that whether any further reductions could be had in the diversion pending the completion of the practical measures for the disposal of the sewage without diversion should await an examination of results from time to time as the work of sewage treatment progresses. (Master's Report, pp. 142-3, 104-5, 118-9.)

In answer to the FOURTH QUESTION, submitted by the Court on Re-Reference, the Master concluded as a matter of law that the Sanitary District was entitled to divert the domestic pumpage of the City of Chicago and that the interests of navigation in the Chicago River as a part of the Port of Chicago will, therefore, require the diversion of not less than 1000 c.f.s. and not more than

1500 second feet of water in addition to the domestic pumpage, but that all reduction subsequent to the reduction to 6500 c.f.s. in addition to domestic pumpage on July 1, 1930 should be contingent upon the construction of controlling works at or near the head of the Sanitary Canal if and when the construction of such works should be authorized by the Secretary of War. (Master's Report, pp. 138, 143.)

COMPLAINANTS' EXCEPTIONS.

Complainants take no exceptions to the findings and conclusions of the Special Master in answer to the SECOND and THIRD QUESTIONS submitted by the court, which questions and answers have hereinbefore been specifically stated and relate respectively to the determination of the time required for the completion and placing in operation of the practical measures described by the Master and the determination of the reductions in the diversion which may be had immediately and from time to time during the carrying out of the program. Complainants do except to the findings and conclusions of the Special Master in answer to the FIRST and FOURTH QUESTIONS submitted by the Court. While it was deemed necessary to take a number of ancillary exceptions to statements contained in the report of the Special Master, the primary and fundamental exceptions of the complainants, to which all other exceptions are ancillary and subordinate, are as follows:

> 1. That the program of practical measures for the disposition of the sewage of the District without diversion outlined by the Special Master in answer to the first question submitted by this Court (measured by the relief which the Master found could be predicated upon it) does not constitute a complete program for the disposition of the sewage of the District without diversion and is not in compliance with or responsive to the order of Re-Reference in this case. (Complainants' Exceptions I and I-A to I-G incl.)

2. That the Master erred in concluding that controlling works are an essential part of a program of practical measures for the disposition of the sewage of the District without diversion and that the construction of such controlling works in the Drainage Canal is subject to the discretion of the Secretary of War under the Act of March 3, 1899; and that he erred in thereby transferring from this Court to the Secretary of War the adjudication of this case and the determination of when or whether at all complainants should have the relief awarded by the decision of this court under date of January 14, 1929. (Complainants' Exceptions I-E, II, II-A.)

3. That the Special Master erred in not concluding in answer to the FOURTH QUESTION submitted by the court that upon the completion of the program of practical measures outlined by him (less control works) or of that program (less control works) supplemented by other available practical measures, no diversion or flow at Lockport is necessary or legally admissible, without the consent of the complainants, for the purpose of maintaining navigation in the Chicago River as part of the Port of Chicago or for any other purpose. (Complainants' Exceptions II and II-A to II-N, incl.)

4. That the Special Master should have recommended that the costs, including the fees of the Special Master as fixed by this Court, should be taxed against the defendants. (Complainants' Exception III.)

DEFENDANTS' EXCEPTIONS.

Defendants' Exceptions Nos. 1 and 2 challenge every finding and conclusion in the Report of the Special Master and every provision in his recommended decree with the exception of the description of the sewage treatment works proposed by the defendants. We are informally advised that the defendants do not intend their exceptions to go so far but intend their general Exceptions Nos. 1 and 2 to be limited by their subsequent Exceptions Nos. 3 to 13 inclusive. Measured in that way, the Exceptions of the defendants are:

1. That the Master erred in not allowing a longer period of time for constructing and placing in operation the practical measures outlined by him for the disposition of the sewage of the Sanitary District without diversion. (Defendants' Exceptions, Nos. 3, 4, 5 and 6.)

2. That the Master erred in holding that this Court has jurisdiction to determine the amount of diversion, if any, which will be legally admissible during the construction and after the completion of the program of practical measures for the disposition of the sewage of the District without diversion on the ground that such action constitutes an invasion by the Judicial Branch of the jurisdiction of the Legislative and Administrative Branches of the Federal Government. (Defendants' Exceptions Nos. 7, 8 and 9.)

3. That the Master erred in not allowing an additional diversion in the alleged interests of navigation on the Illinois River and the Illinois-Michigan Canal. (Defendants' Exceptions Nos. 10, 11.)

4. That the Master erred in not finding that a diversion of at least 2000 second feet in addition to domestic pumpage would be necessary after the completion of the program of practical measures outlined by him in the interests of navigation in the Chicago River as part of the Port of Chicago. (Defendants' Exception No. 12.)

5. That the Master erred in refusing to find that it is impracticable at this time to determine the permissible reductions in the diversion at various times during the construction period of the program and to determine whether any diversion will be necessary at the end of said period in the interests of navigation and in refusing to find that the determination of these questions should be made by the Secretary of War upon the recommendation of the Chief of Engineers. (Defendants' Exception No. 13.)

ISSUES.

The issues thus raised upon the exceptions to the Report of the Special Master filed by the respective parties are:

1. Whether the program of practical measures for the disposition of the sewage of the District without diversion outlined by the Special Master in answer to the first question submitted by this Court (measured by the relief which the Master found could be predicated upon it) constitutes a complete program for the disposition of the sewage of the District without diversion and is responsive to or in compliance with the order of Re-Reference in this case.

2. Whether control works are an essential part of a program of practical measures for the disposition of the sewage of the District without diversion, and if so, whether their construction in the Drainage Canal is subject to the discretion of the Secretary of War so as to delegate to him the determination of whether the rights of the complainants shall be restored to them.

3. Whether any diversion or flow at Lockport is necessary or legally admissible for the purpose of maintaining navigation in the Chicago River as part of the Port of Chicago, or for any other purpose, upon the completion of the program of practical measures outlined by the Special Master (less control works) or of that program (less control works) supplemented by other available practical measures.

4. Whether the Master erred in failing to recommend that the costs, including the fees of the Special Master as fixed by this Court, should be taxed against the defendants.

5. Whether the Master should have allowed a longer period of time for the construction and placing in operation of the practical measures described by him.

6. Whether this Court has jurisdiction to determine the extent of diversion, if any, which will be legally

admissible during and after the completion of the construction of the program of practical measures.

7. Whether the Master erred in not allowing an additional diversion in the alleged interests of navigation in the Illinois River and Illinois and Michigan Canal.

8. Whether the Master erred in not holding that a diversion of at least 2000 c.f.s. in addition to domestic pumpage will be necessary after the completion of the program described by him in the interests of navigation in the Chicago River as part of the Port of Chicago.

9. Whether the Master erred in failing to find and conclude that it is impracticable at this time to determine the permissible reductions in the diversion during the construction period or on the completion of the program and that such reduction should be determined by the Secretary of War upon the recommendation of the Chief of Engineers.

Additional Issues which must be determined before a Decree can be entered in these causes allowing any diversion or flow at Lockport subsequent to the completion of the program of practical measures for the disposition of the sewage without diversion.

Complainants believe that on a consideration of the exceptions filed by them a judgment terminating all flow at Lockport after the completion of the program should be entered without regard to the fundamental constitutional questions which complainants have urged throughout this litigation. However, if the Court should conclude that, apart from the constitutional questions hereinafter mentioned, a judgment terminating all flow at Lockport should not be entered upon the consideration of the exceptions to the Master's Report, then the fundamental constitutional questions challenging the power of the Federal Government to authorize any diversion from the Great

Lakes-St. Lawrence Watershed to the Mississippi Watershed under the circumstances of this case must be determined; for unless such questions are all determined adversely to these complainants, no judgment permitting the continuation of any flow at Lockport after completion of the program can have a legal basis. This Court in its opinion of January 14, 1929, after adverting to the defendants' claim that the diversion was authorized by Congressional action in the regulation of Interstate Commerce, said in 278 U. S. 367, at 410:

> "Those States reply that the regulation of interstate commerce under the Constitution does not authorize the transfer by Congress of any of the navigable capacity of the Great Lakes System of Waters to the Mississippi basin, that is from one great watershed to another; second, that the transfer is contrary to the provision of the Constitution forbidding the preference of the ports of one State over those of another and, third, that the injuries to the complainant States deprive them and their citizens and property owners of property without due process of law and of the natural advantages of their position, contrary to their sovereign rights as members of the Union. If one of these issues is decided in favor of the complaining States, it ends the case in their favor and the diversion must be enjoined. But in the view which we take respecting what actually has been done by Congress some of these objections need not be considered or passed upon."

The complainants believe that, under the findings and evidence in this case, apart from the foregoing constitutional objections, neither the recommended decree nor any other decree purporting to authorize or permit a continuation of diversion after the completion of the practical program may be lawfully entered; but if a different conclusion were reached in that respect, then every one of these constitutional questions which were laid to one side by this Court in its previous decision must be decided and determined. These questions are all argued fully in the briefs filed by the complainants at the hearing on the exceptions to the Master's Report on the Original Reference. It is, therefore, deemed unnecessary to reiterate those arguments, but if the Court in the consideration of these causes reaches a point where it is necessary to determine those questions, then complainants refer to their briefs so filed for the argument in support of complainants' views.

If a decree were entered as recommended by the Special Master, it would result in a permanent diversion amounting under present conditions to approximately 3200 second feet (about 1700 c.f.s. domestic pumpage and 1500 c.f.s. additional abstraction), and subject to an indefinite increase, limited only by defendants' moderation in pumping water which could be advantageously used for sanitation and water power on the other side of the Continental Divide. Measured by present conditions, this would result in a permanent lowering of the Lakes substantially in excess of two inches. The only difference between such a situation and the one found to exist by the Special Master on his Original Report would be that the vast, widespread and annually recurring damages of the Complainants, which were described in the Master's Original Report and in the decision of this Court, would be reduced to something in excess of 37% of the damages so found, with a constant increase as Chicago pumped more water. The vast and annually recurring damages of the complainant States, which would then remain, could not by any fair process of reasoning be said to be insubstantial or within the rule of *de minimis non curat lex.* The rights of the complainant states and their peoples in the interests involved in these cases should not be defeated by a decree which would merely result in the lowering of the Lake levels in excess of two inches instead of six inches.

ARGUMENT.

I.

THE PROGRAM OUTLINED BY THE MASTER, (MEASURED BY THE MASTER'S INTERPRETATION OF THE RELIEF WHICH MAY BE PREDICATED UPON IT), DOES NOT CONSTITUTE A COMPLETE OR ADEQUATE PROGRAM OF PRACTICAL MEASURES FOR THE DISPOSITION OF THE SEWAGE OF THE SANITARY DISTRICT THROUGH OTHER MEANS THAN LAKE DIVERSION AND, AS INTERPRETED BY THE MASTER, IS NOT RESPONSIVE TO OR IN COMPLIANCE WITH THE ORDER OF RE-REFERENCE OF THIS COURT DATED JANUARY 14, 1929.

A.

The scope of the FIRST QUESTION submitted by the Court.

This discussion here deals with the answer to the FIRST QUESTION submitted to the Master on Re-Reference, to-wit:

> "What are the practical measures necessary for the disposition of the sewage of the Sanitary District of Chicago through other means than diversion?"

From the opinion of the court, it is clear that the purpose of this question on Re-Reference was twofold:

> 1st. To determine what practical measures were required so to dispose of the sewage that no nuisance or interference with navigation would be created, and so that thereafter no diversion should be necessary to protect navigation in the Chicago River against injury from the sewage or from the method of sewage disposal adopted by the Sanitary District.
>
> 2d. To determine what practical measures were necessary for the protection of the public health with the termination of the diversion, not because any diver-

sion could be maintained in the interests of sanitation, which was expressly denied, but to the end that the court might give the defendants a reasonable period of time for the construction of any needed measures in the interests of public health so as not to create "any unnecessary hazard to the health of the people of that section."

It is clear that this Court expected "the Sanitary District to take care of its sewage in some other way than by promoting or continuing the existing diversion"; that the sewage of the District should be "entirely disposed of thereby"; and that the method so adopted "*must include everything that is essential to an effective project.*" (278 U. S. 367, 418, 419, 421.) It was "to determine the practical measures to effect the object just stated" that this question was referred to the Special Master. (278 U. S. 367, 421.)

Obviously the practical measures so necessary could not be determined without a consideration of the relation of their operation to the object the Court stated should be accomplished. This clearly meant that in the selection of such measures, both as to their nature and quantity, the rule of determination must be that the program must include the kind and number of measures which, without diversion, would not in their operation produce any interference with navigation. We think it also fairly appears that the Court intended that the program should include any measures necessary to protect the public health in the absence of diversion so that the Court could give a reasonable time for their construction to prevent "any unnecessary hazard to the health of the people of that region."

In short, the mandate of the Court required the inclusion, in the program of practical measures, of every structure, plant and operation, whether it be for the artificial treatment of the sewage or otherwise, which might be necessary to effect the object stated by the Court.

B.

The practical measures established by the evidence as available to accomplish the purposes stated by the court, their operation and effect, and the extent to which such practical measures were included in the Master's program.

With this analysis of the FIRST QUESTION submitted by the Court on Re-Reference, we proceed to inquire whether the answer of the Special Master is responsive thereto. The sufficiency of the Master's findings in that respect must be tested by the extent to which the Master finds his recommended program will effect the object of the Court as hereinbefore stated. For that purpose we proceed to compare the program of practical measures recommended by the Special Master with the program advanced by the defendants, the program advanced by the complainants and the additional practical measures proved to be available for inclusion in such a program if deemed essential to effect the object which the Court held should be accomplished.

1.

PROGRAM RECOMMENDED BY SPECIAL MASTER.

The Master recommended the construction and operation of sewage treatment works and the installation of control works. (Master's Report 141-3, 146-7.) The Master made the construction of control works dependent upon the discretion of the Secretary of War (Master's Report 81, 142-3), and thereby made complainants' relief beyond the preliminary reduction of 2000 second feet dependent upon the discretion of the Secretary of War. (Master's Report 143.) Assuming the Secretary of War authorized control works, the Master's program in his opinion would only reduce the diversion to an amount equivalent to the domestic pumpage plus 1500 c.f.s. additional water from the Great Lakes-St. Lawrence Watershed. (Master's Report 143.) While complainants believe that the Master erred in his conclusion as to the relief which could be predicated upon his program, its sufficiency is here being tested by the Master's determination in that respect.

2.

PROGRAM OF THE DEFENDANTS.

In answer to the mandate of this Court, the defendants proposed the construction of sewage treatment works, control works, diversion of the domestic pumpage, diversion of the run-off of the Chicago and Calumet Rivers naturally tributary to Lake Michigan, and the diversion of 2000 second feet additional water from Lake Michigan. Complainants submit that this program of the defendants not only wholly fails to comply with the mandate of the court, but is directly in the teeth of the decision of January 14, 1929.

Defendants' principal witness, Pearse, admitted that there was a program which would not require any flow at Lockport, but stated that he had not given such a program so much consideration. (Joint Abstract 70-71.) Pearse stated that it would be "rather hard to choose" between such a program and the one advanced by the District from a public health standpoint. (Joint Abstract 514-5.)

3.

PROGRAM OF THE COMPLAINANTS.

The complainants propose the construction of the sewage treatment works, the construction of water purification works, no controlling works unless defendants desire them as a factor of safety, and no diversion or flow at Lockport after the completion of the program. (Master's Report, 18-25; Joint Abstract, Howson 106; Gascoigne 207; D. Townsend 213-4.)

All of complainants' witnesses testified that this program would be adequate to maintain navigation in the Chicago River as a part of the Port of Chicago without interference from nuisance or otherwise, and with no flow at Lockport, and would likewise provide public health conditions equal or superior to those now obtaining in Chicago. (Joint Abstract, 107-110; 208-210; 214-216.)

However, complainants pointed out that this program by no means exhausted the available practical measures either for the prevention of nuisance to or interference with navigation, or for the protection of the public health. The nature and operation of these additional practical measures were shown. The complainants took the position that since such additional practical measures were in the nature of improvements not essential to accomplish the purpose stated by the Court, complainants would not urge their inclusion in the program in the event that the Court accepted complainants' view that they were not essential to the restoration of complainants' rights; but complainants at all times insisted that if in the opinion of the Master or Court any or all of such additional measures were essential to the restoration of the complainants' rights, then such measures must, to that extent, be included in the mandatory program to be imposed upon the defendants.

4.

ADDITIONAL PRACTICAL MEASURES AVAILABLE FOR INCORPORATION IN THE PROGRAM IF DEEMED ESSENTIAL TO ACCOMPLISH THE PURPOSE STATED BY THE COURT AND TO RESTORE COMPLAINANTS' RIGHTS.

The precise relation of such additional practical measures to the relief essential to a restoration of complainants' rights will be discussed in the following section of this brief. At this point complainants will simply point out the nature of such additional practical measures and the method and purpose of their operation.

a.

Additional practical measures available to safeguard conditions of navigation in the Chicago River.

(1)

That the District be required to so construct and/or operate its sewage treatment works as to afford at least preliminary treatment of storm water overflows up to the capacity of the intercepting sewers.

Defendants propose to treat only 150% of the dry weather flow at times of storm water run-off. (Master's Report, 14, 15.) While complainants deem treatment to this extent adequate with no diversion or flow at Lockport, defendants seek to preserve their diversion upon the ground that the excess of storm water run-off will carry some sewage, although in a high state of dilution. (Joint Abstract, 228-9.) The Court is, of course, familiar with the fact that the main sewers of the City of Chicago discharge into large intercepting sewers which convey the sewage to the respective treatment works. When a sufficient quantity of rainfall enters the sewers to produce a flow greater than the capacity of these intercepting sewers, the surplus is by-passed, through outlets provided for that purpose, into the Chicago River, its branches and the auxiliary channels of the Sanitary District.

The capacity of the intercepting sewers is 4,000 c.f.s. (Joint Abstract 113-114.) The volume of the sewage flow at Chicago under present conditions is approximately 1500 c.f.s. (Joint Abstract 87.) If Chicago meters its domestic water supply as it was required to do under the Permit of March 3, 1925, but has not done, the domestic pumpage and the corresponding sewage flow will only be 1000 c.f.s. in 1935. (Joint Abstract 111.) As pointed out by the Special Master, the sewage treatment works consist of Imhoff tanks which remove a large part of the settleable solids and other impurities, followed by activated sludge or trickling filter treatment which provide complete treatment. (Master's Report 12.) While it seems clear that, at least with metering, the plants as proposed by the Sanitary District can give complete treatment very largely in excess of 150% of the dry weather flow, it is perfectly clear that the preliminary or tank treatment can be given to all of the storm flow up to the capacity of the intercepting sewers or 4000 c.f.s. (Joint Abstract, Howson 113-4; Gascoigne 648-9; Master's Report, Howson 20; Gascoigne 21; D. Townsend 22.) This will mean at least preliminary treatment for 267% of the dry weather flow at times of storm run-off of that amount even under present conditions and with metering will afford at least preliminary treatment for 400% of the dry weather flow at times of storm water run-off equaling or exceeding that extent. While complainants deem this to be wholly unessential, it is perfectly practical and its omission can not be made the ground of any diminution of the complainants' rights. The relation of this provision to termination of the diversion will be discussed in an appropriate section.

(2)

The construction of a separate system of sanitary sewers.

The Court is, of course, familiar with the fact that where a city has a separate system of sanitary sewers, no storm water run-off passes into the system of sanitary sewers, but such run-off is carried away by the storm water sewers instead of mingling with the sewage as in the case of a combined sewer system. Complainants consider the construction of such a system wholly unnecessary to permit a termination of all flow at Lockport either from the standpoint of public health or navigation. However, such a system can be constructed in Chicago if it be deemed necessary. We do not understand that that fact is denied by the defendants, who have offered several estimates of the cost of such a system. (Master's Report 24; Joint Abstract 638-9, 519, 529, 572, 798, 800, 453.)

If it were constructed, there would be no sewage, untreated or otherwise, carried into the Chicago River or its branches by storm water run-off; but all of the sewage of the Sanitary District would be given complete treatment, as that term is understood, at times of storm water run-off as well as at times of dry weather flow. This would remove all of the alleged likelihood of some portion of the sewage being carried by the storm water, though highly diluted, into the River at such times. All debate as to the effect of storm water run-off would be thereby removed. The Special Master states that the complainants have not incorporated such a sewer system in their program. That is true for the reason that complainants do not deem it essential to accomplish the purposes stated. However, complainants have never conceded that the construction of such a system could be omitted, if it were deemed a condition of the restoration of their rights, but on the contrary insist that under such circumstances it must be incorporated in this program. An infringement of complainants' rights can not be substituted for this measure. We do not believe that defendants think that such a system would be necessary from the standpoint of navigation or public health with complete cessation of all flow at Lockport, but it is advanced in line with the consistent policy of the Sanitary District for at least 20 years to take the position that they are confronted with a situation with which they are unable to cope.

The Master states that defendants' witness, Matthews, estimated the cost of such a system at over $400,000,000. (Master's Report 24.) Of course, the Master does not find that such a figure would be a reasonable cost. It is clear from Mr. Matthews' own testimony that it would be grossly excessive. The present mileage of the combined sewer system in Chicago is less than 3200 miles. (Joint Abstract 378.) This witness based his estimate upon a mileage of 5300 miles. (Joint Abstract 378.) Matthews stated that a large part of his plan of the separate sewer system is to get the sewage to the sewage treatment plants. (Joint Abstract* 376.) That is a clear duplication since the Sanitary District has separately included exorbitant estimates of costs of sewers for such purposes in its program. (Master's Report 10-11, 72-80.) He provided a sewer system on the basis of residential requirements on the total area of Chicago without any deduction for the large industrial areas, the areas occupied by railroads, the areas occupied by parks, or the 25 square miles in Chicago which are not built up or sewered. He provided sewers for the area covered by Lake Calumet. (J. A. 378-80.) If any other water areas are included in the computation of area of the City Map Department, sewers are also provided for them.

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*Hereafter references to the Joint Abstract of Record for hearing upon exceptions to the Special Master's Report on Re-Reference, filed February 20, 1930, are indicated by use of the abbreviation "J. A."

(J. A. 380.) The Sanitary system proposed was for domestic pumpage around 1500 second feet. The capacity of the present combined system is about 13,000 second feet. Of course, sanitary sewers are very small compared to combined sewers for storm water purposes. The total cost of the present combined system which carries the sanitary sewage and all of the storm water overflows up to a capacity of 13,000 second feet is less than $60,000,000 as shown by the records of the Department of Public Works. This should be compared with witness' estimate of over $400,000,000 for a sanitary system carrying only 1500 c.f.s. Catch basins are not required on the sanitary system except in buildings. (J. A. 380-1.) The witness was unwilling to state that the City of Chicago had not received bids for the construction of 8" sewers, at $1.18 per foot in comparison with his estimate of $4.14 per foot. (J. A. 382-3.) It seems clear that the witness' estimate in all of these respects is grossly excessive.

Complainants' witness, Howson, on Original Reference estimated the cost of a separate system of sewers to be from $158,000,000 to $171,000,000. (J. A. 639, 644-646.) The defendants' witness, Pearse, estimated the cost of such a system at $250,000,000. (J. A. 519, 529.) Defendants' witness, Fuller, testified on Original Reference that a separate system *might* cost $300,000,000, and thought such a sum would not be extravagant to spend for such a purpose. (J. A. 572.)

(3)

Construction of Outfall Sewers from the Sewage Treatment Works.

Again the complainants' witnesses have pointed out that it is perfectly practicable to construct outfall sewers from the various sewage treatment works so as to discharge the effluent of those plants at remote points in Lake Michigan and remove such effluents wholly from the channels of the Chicago River and its branches. This was stated to be perfectly practical by complainants' witnesses. (J. A., Gascoigne 210; Townsend 216-7; Howson 109.) The practicability of so doing was not denied by any witness for the defendants. The Special Master stresses that Mr. Howson testified that he could physically construct such outfall sewers but that he did not mean that it was practical in the sense that he would recommend doing it as an available means for the City in disposing of the sewage at this time. (Master's Report 134.) Of course, Mr. Howson did not recommend it, and did not incorporate it in his program. That, however, as clearly appears from the testimony of all of complainants' witnesses, was merely because in his opinion there was no necessity for removing the effluents of these works from the River, either in the interests of navigation or public health. Naturally, Mr. Howson would not, therefore, recommend the performance of work which he considered wholly unnecessary. However, Mr. Howson did not mean that if there were any reason for removing the effluent from the River to protect navigation or otherwise, it would not be practicable to do so in the way outlined. It would only involve the construction of a few miles of sewers. The position of the complainants is that such a course is unnecessary but if the court feels that the presence of the effluent in the River without diversion would constitute any interference with navigation or give rise to any necessity for diversion, then it is practical to construct such outfall sewers and the defendants should be required to do so.

(4)

Pumping of Circulating Water.

While complainants submit that it will be unnecessary to pump circulating water, on completion of these sewage treatment works and no flow at Lockport, to prevent any interference with navigation in the Port of Chicago, there is no question but that such a procedure is practical and that the defendants should be required to provide such circulating water if any necessity therefor should develop. (J. A., Howson 109-110; Gascoigne 210; D. Townsend 216; Ramey 87; Jadwin 19, 27-29.) By this process 1000 c. f. s. of lake water may be pumped into the head of the North Channel through the existing Willmette Pumping Station; 2000 c. f. s. of lake water into the South Branch of the Chicago River through the existing Pumping Station at 39th Street, and 2000 c. f. s. of lake water through the Calumet-Sag Channel. This water will then flow through these Channels and out through the Main Channel of the Chicago River into the Lake. (Master's Report 135; J. A. 109, 110; 210; 216; 19, 27-29, 87.) This would not only prevent any possibility of interference with navigation, but would restore a thriving fish life, which has been absent from these waters for many years and which is not essential to protect navigation. (J. A., Jadwin 29; Howson 110.) It is a complete answer to any claim that there could be any nuisance to navigation in the Chicago River as a result of the presence of effluent or storm water overflow. If a certain quantity of water will protect navigation flowing westward through the Chicago River, it is axiomatic that the same quantity of water flowing in the opposite direction will equally protect navigation in that River. The same may be said of storm water overflow.

The Master, in his Report at page 138, states that it would create a danger of contaminating the water supply and have a possible adverse effect on bathing beaches. Initially complainants submit that no diversion can be justified in the interests of sanitation after the completion of the program under the terms of the Court's decree and that this observation of the Special Master is in contravention of the decision of the Court. However, we invite the Court's attention to the fact that the Master has refused to include water filtration works, chlorination of effluents, extension of water intakes, construction of a new water intake or a separate system of sanitary sewers as part of his practical program. All of these measures would guard against any possible injury to the water supply or the public health. All of them would not be needed. Water filtration works alone would do so. Yet, after omitting all such provisions from his program, the Special Master bases, in part at least, a denial of complainants' rights upon an alleged danger to public health, created, (if it exists at all) by reason of the failure to include some one or more of these measures in the program. We submit that complainants' rights should not be thus defeated.

b.

Additional practical measures available in the interest of public health.

(1)

Water Filtration Works.

The program proposed by the complainants provides for the installation of water purification works for all of the domestic water supply of the city of Chicago. (Master's Report 20, 24-5; J. A. 207, 214, 226-7, 238-9.) As far as the complainants and the court are concerned, it is wholly unnecessary to provide any measures in the interests of the public health, because the court has expressly held that any diversion for sanitary purposes is inadmissible because resting upon no legal basis. Undoubtedly it is also true that with the completion and operation of the plants for what is known as complete treatment of all of the sewage of the Sanitary District of Chicago, chlorination of the water supply, as now practiced, could be made a sufficient barrier. (Ellms, J. A. 627.) Certainly, however, it is true that the installation of water purification works with complete sewage treatment and no flow at Lockport would adequately safeguard the public water supply. (Joint Abstract, Howson 108, 639; Gascoigne 208-9; Townsend, D., 214-15; Ellms 226-7, 236-7; 620; Waring 238-9, 613; Rockwood 591-2.) For that reason, the complainants have incorporated in their program a provision for filtration of all of the domestic water supply of Chicago.

Even the defendants' witness Pearse admits that it would be very difficult for him to choose, from the public health standpoint, between the conditions which would obtain with the completion of sewage purification works and water filtration works with no diversion and the conditions which would obtain with the completion of sewage purification works and a continuance of the present diversion. (J. A. 514-15.) Pearse stated at the last hearings that if the sewage effluent were returned to the Lake, such effluent should be chlorinated if the water supply were chlorinated only, and that if the storm water overflows are also discharged into the Lake at all times, then water filtration plants should be provided "in order to make the result as a whole of the same degree of effectiveness to the community as we have attained or *contemplate,* as regards sewage treatment and the protection of the water supply." (J. A. 70.)

Although any claim of a diversion in the interest of public health subsequent to the completion of the program is no longer open under the decision of this Court, the claims of the defendants in this respect on the original hearings were based upon answers to the following artfully framed question:

> "Q. Now, assuming that these works (works similar to those in complainants' program) were installed and the diversion were reduced to zero or 1000 c.f.s. from a public health standpoint would the condition be as good as it would be with the program of the Sanitary District carried out with reference to sewage disposal and with a diversion of 8500 c.f.s. or substantially that?" (Record 5047-8.) (Abstracted J. A. 70.)

This identical question was asked of all of the defendants' sanitary experts. It is very significant that this question did not ask the witnesses to state whether under the assumed condition, the public health conditions would be safe or satisfactory, or whether they would be as good as presently obtain. This question was answered by defendants' witnesses upon the theory of the Sanitary District that under their program all of the sewage would be completely purified, and that in addition thereto, there would be a continuous flow through the Sanitary Canal sufficient to divert all of the waters of the Chicago basin from the Lake both at times of storm and otherwise. This was equivalent to asking a witness whether it would be preferable for a city to have no sewage disposal and water supply problem at all, or to solve such problem in a scientific and satisfactory way. This begged the whole question. The purpose of so artfully framing this question is apparent. Even then defendants' witness Pearse found it "rather hard to choose" between the two situations.

While the complainants were under no legal obligation to propose a program in the interests of the public health of Chicago, they felt that a practical program should make such an obvious provision for the protection of the public health; and they, therefore, included such a provision in their program. If the defendants prefer to waive that provision in the interests of public health, the complainants have no objection; but neither the defendants nor the

Master should make a waiver of this obvious and adequate provision for the protection of the public health the basis of any demand for an infringement of the legal rights of the complainants through a diversion of some quantity of water from the Great Lakes-St. Lawrence Waterway in the interests of public health. Such a course would not only be grossly inequitable as a continuation of the illegal procedure of providing for the sanitation of Chicago at the expense of the complainant States, but it would be directly in the teeth of the decision of January 14, 1929, wherein it was expressly held that any diversion in the interests of sanitation at Chicago had no legal basis and was unsupportable.

The Master apparently omits water filtration works from his program on the ground that they are not structures for the treatment of sewage. (Master's Report 25.) He apparently bases their elimination upon the ground that the complainants have stated that such works are not an indispensable element in the program and therefore should be left to the discretion of the defendants. The Master thus follows the method adopted throughout his report of eliminating every practical measure which the complainants deem not essential to their relief and then denying the complainants relief because of the elimination of such measures. The position of the complainants was stated before the Special Master in exactly the same way and practically the same language as here stated. There was, therefore, no ground for a conclusion that complainants stated that this and other practical measures should not be included in the program if the omission of any such measures were to be made the ground of a denial of their rights.

The Master does in effect find that if diversion at Lockport is not continued, water purification works should be constructed. (Master's Report 81.) The Master does find that they are practical and could be completed in a period of about five calendar years. (Master's Report 82.)

(2)

The construction of a new water intake or the extension of the present water intake.

Complainants' experts did not regard it as open to debate but that the present water intakes, with sewage treatment, no flow at Lockport and the installation of water filtration works would provide a water supply equal or superior to that presently obtaining at Chicago and which defendants have consistently claimed to be of superior quality. (See pp. 28 to 39 *supra* and citations to Joint Abstract there given.) However, complainants pointed out that if any doubt were entertained on that point, two courses were practical:

> 1st—the present water intakes might be extended farther into the Lake as it is universally admitted that with or without diversion the distance from the shore is an important factor in the purity of the raw water at the intakes. (Joint Abstract Howson, 106-7, 637; Gascoigne 208; Ellms 227; Waring 239; Rockwood 592; Fuller 553, 555; Ex. 18, Par. 42, pp. 222-3, Appendix p. 105.)*
>
> 2d—both complainants' and defendants' witnesses pointed out that it would be practical to construct a new water intake remote from the mouth of the Chicago River. The point suggested by witnesses for both sides was about 4½ miles off shore at a point approximately 20 miles north of the mouth of the Chicago River. (Joint Abstract Howson 106-7, 637, 638; Gascoigne 208, 649; Ellms 227, 620; Fuller 553-4; Waring 239; Pearse 527.)

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*Pursuant to agreement of counsel, set forth in the foreword to the Joint Abstract, certain small items of evidence inadvertently omitted from the Joint Abstract are set forth in an Appendix to this brief for the convenience of the Court.

Complainants' witnesses were of the opinion that with an intake in such a location and no flow at Lockport the public water supply, without any water filtration works, would be as good or better than now obtained and that with water filtration works the water supply would be superior to that now obtaining. (Joint Abstract, Howson 639-40; Gascoigne 649; Ellms 620, 21; Waring 613; Rockwood 591.) We reiterate that objections to the complainants' program urged by the defendants are for the purpose of trying to induce a belief that there is no practical solution for the problem, to the end that their diversion may be continued. We do not think that with no diversion the defendants would construct such an intake, and complainants' witnesses consider it wholly unnecessary; but it is perfectly practical to do so. If the defendants choose to interpose captious objections to the program which has been proposed then they should be required to include one or the other of these measures in the program.

(3)

Chlorination of the effluent of the sewage disposal works.

Witnesses for both parties testified that it is perfectly practical to chlorinate the effluent of the sewage disposal works and that such chlorination will remove practically 100% of the bacteria. (Joint Abstract, Howson 637; Gascoigne 208; Ellms 627; Fuller 560; Rockwood 593; Pearse 514; Waring 615-6. Master's Report 28.)

Again, it is not considered necessary; but it is an obligation which the defendants should be required to assume if they choose to insist upon fanciful objections to the program.

(4)

The practical measures in the interests of navigation which likewise safeguard public health.

The practical measures in the interests of navigation with reference to treatment of additional quantities of storm water overflow or the construction of a separate system of sanitary sewers likewise constitute additional safeguards in the interests of public health. Since they have been discussed in relation to navigation, no further reference will be made to them here.

C.

The Master's recommended program (measured by the relief which he holds, can be predicated upon it), is not responsive to the order of Re-Reference.

The Special Master excluded all of the foregoing practical measures in the interests of navigation and/or public health from his recommended program. Because of the omission of these practical measures from his program the Master then proceeds to conclude that some diversion, in abridgment of the complainants' rights, is necessary in the interests of navigation in the Chicago River because of the possibility of a nuisance being created by the defendants. Notwithstanding the holding of this Court that public sanitation could not be made the basis of any diversion subsequent to the completion of the program contemplated by the Court, the Master seems to base his conclusion that some diversion is necessary, after the completion, in part on considerations of public sanitation. (Master's Report 138.) He thereby makes his omission of the practical measures which would clearly safeguard the public health a partial ground of denial of complainants' rights.

We submit that under the Order of Re-Reference the Special Master should not thus exclude certain practical measures from the program recommended by him and then make his failure to include such practical measures and their omission from his program the basis of a conclusion that some diversion would be necessary upon its completion in the interests of navigation or otherwise.

Complainants reiterate that the program proposed by them is fully adequate to accomplish the purpose stated by this Court and the termination of diversion without addition of further practical measures. They are confident that if a decree is entered shutting off all flow at Lockport the defendants will provide just the practical measures outlined by the complainants as their program, and nothing more. However, these further measures are practical and available to defendants, if their professed dissatisfaction and fear were well founded. The defendants have raised specious and impractical objections to every proposal which would result in the termination of their diversion. If they wish to raise such objections, then they must assume the burden of meeting them at their own expense rather than at the expense of the complainants.

D.

Controlling works are not an essential part of the program.

The only function of controlling works is to prevent the flow of the Chicago River into the Lake, and thus preserve the diversion. They were originally suggested as a means of preventing the reversal of the Chicago River in times of storm water run-off with small diversion, for the protection of the water supply, in the absence of treatment for all the sewage, water purification works, extension or re-location of water intakes. As before stated, with complete sewage treatment, complainants hold that such reversals will not endanger the water supply, even without water filtration works. With water filtration works, or the extension or re-location of water intakes, there could be no reasonable apprehension of danger to the water supply. If objections are to be pressed further, then the answer is that the defendants must construct a separate system of sanitary sewers.

General Jadwin testified that control works are not necessary in the interests of navigation; that there is no reason to fear that occasional storm discharge of untreated sewage into the Lake will render conditions there intolerable for navigation; and that the question of control works is therefore a sanitary matter for solution by the defendants (Master's Report 108, 109.) The inclusion of control works in the Master's program would be, therefore, but a harmless error so far as the complainants are concerned, if the Master did not make their inclusion in his program the basis of a denial of the relief awarded the complainants by this Court, and a remission of the protection of their rights to the discretion of the Secretary of War, substantially as he had held in his original report. (Master's Report 81, 142-3.)

The Master has stated both that "the complainants' sanitary experts have not testified that these controlling works would not be needed" and that complainants' experts "have not been ready to testify as to the feasibility of further reduction of the diversion without their installation, pending completion of the program." Every one of complainants' sanitary experts have testified that with completion of the complainants' program, and no flow at Lockport, (under which circumstances controlling works would not be operated and would be useless), conditions would be satisfactory both from the standpoint of navigation in the Chicago River and from the standpoint of public health. (Joint Abstract, Howson 106, 108; Gascoigne 207, 209; Townsend, D., 214, 215; Ellms 227, 228, 236-7; Waring 239;

Rockwood 591.) It is difficult to conceive how complainants' witnesses, unless it be by a categorical denial, could more definitely and clearly testify that controlling works are non-essential.

The defendants had proposed controlling works. Under the program proposed by complainants' witnesses such controlling works could serve no useful purpose except during the period of construction of practical measures, when only a part of the sewage would be receiving treatment, and the water filtration works would not yet be in operation. During that period it was considered important to prevent substantial reversals of the Chicago River. The operation of such control works during the construction period removed all debate as to the interim reductions in the diversion which would be practical. Thereafter such works could serve no useful purpose except as a factor of safety for use in the event that there should be a general breakdown in the sewage disposal plants, which complainants felt to be so remote a contingency as not to be worthy of consideration, but which defendants professed to fear. If defendants' fears were well founded, complainants submitted that defendants could readily construct control works merely as a standby factor of safety.

The complainants submit that on the testimony in this case the inclusion of such works is not only not essential, but is legally inadmissible, because they are not in the interests of navigation; because they can not be substituted in abridgment of complainants' rights for water filtration works or other measures, and because their purpose is to continue and not terminate the diversion.

II.

NO DIVERSION OR FLOW AT LOCKPORT IS NECESSARY OR LEGALLY ADMISSIBLE FOR THE PURPOSE OF MAINTAINING NAVIGATION IN THE CHICAGO RIVER AS PART OF THE PORT OF CHICAGO, OR FOR ANY OTHER PURPOSE, UPON THE COMPLETION OF THE PROGRAM OF PRACTICAL MEASURES OUTLINED BY THE SPECIAL MASTER (LESS CONTROL WORKS) OR OF THAT PROGRAM (LESS CONTROL WORKS) SUPPLEMENTED BY OTHER AVAILABLE PRACTICAL MEASURES.

The FOURTH question submitted on Re-Reference by this Court was:

> "What diversion, if any, will be necessary for the purpose of maintaining navigation in the Chicago River, as part of the Port of Chicago, after the practical measures for the disposition of the sewage without diversion have been completed and placed in full operation?"

In answering this question, the Master held that the defendants were entitled as a matter of law to divert the domestic pumpage from the Great Lakes-St. Lawrence Watershed, and that with or because of this diversion an additional 1500 second feet of water should be diverted in the interests of navigation in the Chicago River as part of the Port of Chicago. (Master's Report 138.) In discussing the basis of his conclusion that some diversion should be allowed subsequent to the completion of the program, so as to guard against the possibility of any interference with navigation, the Special Master said:

> "It seems to me that the best way and the reasonably sure way, of accomplishing this result is to permit an outflow from the Drainage Canal at Lockport." (Master's Report 137.)

Again on page 138 the Master said:

> "As to the water supply, it is urged that water filtration plants should be constructed. The fact remains that the effluents from the sewage treatment plants and the storm water must go somewhere, and if they are taken away from the Lake and discharged through the canal at Lockport, both the danger to the water supply will be removed and conditions suitable to navigation can be maintained."

It is thus clear that the Master did not base his conclusion upon the belief that some diversion was the only way of preventing interference with navigation but upon the ground that, in the exercise of discretion by him, he thought it would be a simple method of safeguarding the water supply without filtration works and insuring the maintenance of suitable conditions for navigation. Complainants submit that this Court did not delegate to the Master on this Re-Reference the power or duty to exercise his discretion whether the protection of navigation and/or the public health should be accomplished by diversion or by other practical measures. The question required a determination of whether any diversion in the interests of navigation would be necessary with the completion and operation of every practical measure available to avoid any necessity of diversion as an incident to the disposal of the sewage of Chicago. The answer obviously does not rest upon such a basis and is not responsive to the order of Re-Reference.

In further exposition of his finding, the Master at pages 139-140 of his report bases his conclusion, allowing the diversion of the domestic pumpage and 1500 c.f.s. of additional water from the Great Lakes watershed, upon an alleged balancing of equities between States. He thereby justifies his allowance of this diversion, not for the maintenance of navigation in the Chicago River but as a matter of right in the defendant State. The Master in his Original Report found that the State of Illinois had no power to divert water from the Great Lakes-St. Lawrence Watershed as against the complainant States and that finding was confirmed by this Court. (278 U. S. 367 at 417.) His later conclusion would overrule the previous decision of this Court. From the standpoint of equity, a conclusion so based would not only authorize the State of Illinois to withhold its entire natural contribution to the Great Lakes System (503 c.f.s., Master's Original Report 23) but it would authorize the State of Illinois to abstract in addition from 2 to 5 or 6 times the amount of its natural contribution to this waterway, (depending on whether the domestic pumpage be included) and which additional water was contributed by the lower riparian States, and would never have been within the boundaries of the State of Illinois except for this unlawful act. No equity to thus take the waters of the complainant States can be founded upon a claim that such water will be or is useful to the appropriator. In view of the vast damage shown in this case and found by this Court, it could not be said that the expense which the defendant would save by the appropriation of such water would exceed the damage inflicted upon the complainants. But if that be assumed, a State can not justify the taking of waters of another State upon the ground that it can derive a greater profit from their use than could the rightful owner. *Wyoming v. Colorado,* 259 U. S. 419, 468-9. Certainly, as far as these waters were contributed by lower riparian States and were not naturally tributary to the State of Illinois, what such complainant States have, they may keep and give no one a reason for their will. *Hudson County Water Co. v. McCarter,* 209 U. S. 349.

However, laying aside all such facts and principles, this Court by its order of Re-Reference did not delegate to the Special Master the discretion or duty to apportion the waters of the Great Lakes System between the complainant States and the State of Illinois either on the basis of use which he might think most beneficial or on any other basis. This Court did not delegate to the Special Master the discretion or duty to determine whether in his opinion the rights of the complainant States and the natural advantages of their position as members of the Union should be abridged or denied either for the purpose of relieving the defendants of additional expense in the disposal of the sewage of Chicago through other means than Lake diversion, or to fulfill any alleged desire of the defendants to create super-conditions at Chicago at the expense of the complainants. We submit that this exposition by the Master of the basis upon which his conclusion rests demonstrates that it is without legal basis and not responsive to the mandate of Re-Reference issued by this Court.

Moreover, the complainants believe that the Master, in his consideration of this question, erred throughout in treating the issue as though the burden of proof rested upon the complainants. This Court held that no diversion was admissible in the interests of sanitation and that the defendants must provide some method of disposing of the sewage other than promoting or continuing the existing diversion. If any diversion, therefore, were to be justified by reason of or as incident to the disposal of the sewage, the burden was on the defendants to establish both its necessity and extent as an equitable defense *pro tanto*. While complainants submit that a consideration of the evidence hereinafter discussed, overwhelmingly establishes that no necessity for diversion to maintain navigation in the Chicago River will exist, they believe that the Master did err in treating the subject as though the burden of proof rested upon the complainants.

A.

The scope of the determination to be made in answer to the FOURTH question.

This Court expressly held that the Congress had not attempted to authorize any diversion for navigation purposes on the Illinois or Mississippi Rivers and that no diversion of water for such purposes could be allowed in this case. *Wisconsin v. Illinois,* 278 U. S. 367, at 417. The Special Master on Re-Reference has specifically found that there has been no subsequent action by the Congress, (Master's Report 122). The question, therefore, here to be determined is solely whether on the completion of this program, the diversion of any quantity of water will be required in order to maintain such navigation as may use the Port of Chicago and the Chicago River in connection with the Great Lakes-St. Lawrence System. *Wisconsin v. Illinois,* 278 U. S. 367 at 418. However, it may be noted that there is no navigation in any practical sense coming into the Chicago River by way of the Illinois Waterway or the Illinois-Michigan Canal. (Ex. 102; Appendix p. 101; Woerman, Appendix p. 102.) Only a few canoes and small pleasure craft have passed through the little lock of the Sanitary District. (Master's Report 122.)

It is uncontroverted and incontrovertible that with the cessation of all flow at Lockport, navigable depths will be increased in the Chicago River and the Drainage Canal because of the reversal of slope which will be incident to the restoration of the natural flow of the Chicago River into Lake Michigan. (Jadwin, J. A. 9-10, 16-17, 19, 31; Col. Townsend, J. A. 240-1; Gen. Keller, J. A. 400-1.) The inquiry is then immediately reduced to the question of whether any diversion of water is necessary after completion of this program in order to prevent a nuisance which will obstruct navigation in the Chicago River as part of the Port of Chicago.

B.

With the completion of practical measures recommended by the Master (less control works) or of complainants' program, for the disposition of the sewage without diversion and no flow at Lockport, no interference with or obstruction in fact to navigation or navigable capacity will be created in the Chicago River as part of the Port of Chicago.

While be believe (See pp. 74 to 75 *infra*) that Congress has authoritatively determined that, as a matter of law, there could be no obstruction to navigation or navigable capacity in the Chicago River from the discharge of liquid sewage or effluent, we proceed to discuss whether upon the completion of the Master's program (less control works) or such program supplemented by other available practical measures, and no flow at Lockport, there will be any nuisance in fact created in the Chicago River, which will constitute an obstruction to navigation or to its navigable capacity.

Assuming, solely for the sake of argument, that the Court, in adverting to the possibility of some negligible quantity of diversion being necessary to maintain navigation in the Chicago River, referred not merely to the preservation of adequate depths and widths, but to the prevention of any nuisance conditions arising from the disposal of the sewage which could create an interference with, or obstruction to, navigation or navigable capacity, complainants assume that the Court did not have in mind any fanciful standard for the Chicago River, but intended simply to secure practical conditions which have been found adequate for navigation in line with the experience in navigable harbors generally.

While defendants originally contended that the discharge of the entire volume of raw sewage into the Chicago

River did not create any interference with navigation, ever since this Court held that diversion for sanitation is illegal and inadmissible, defendants have steadily attempted to create an impression that in order to maintain navigation at Chicago, it is necessary to eliminate all possibility of contamination of the water in the River, no matter how negligible, so that in effect it may be as pure as it was when there was no city of Chicago. If the contentions of the defendants were correct, there would be no free and unobstructed navigation at any of the substantial ports of the United States, and navigation, instead of growing upon the lakes and elsewhere, would have died out long ago, as the cities continued to grow. On the contrary, it has increased by leaps and bounds.

In *New York v. New Jersey*, 256 U. S. 296, the Federal Government, with the consent of this Court, approved the discharge of the sewage into New York Harbor, with simple preliminary treatment for the removal of coarse material. This establishes the fallacy of contending for any such fanciful standards as suggested by the defendants. If the method of discharge used in New York Harbor did not constitute an interference with navigation, clearly the discharge of a purified effluent can not be held to do so.

We believe that the testimony in this case establishes that with the completion of the practical measures, (described in the program of the Master) for the treatment of the sewage and no flow at Lockport, conditions in the Chicago River will be more than adequate for maintenance of navigation. However, if that limited program of practical measures would not accomplish that result, or if an unusual standard of purity is to be required at Chicago, then the other practical measures hereinafter indicated must be added thereto. We proceed to analyze, briefly, the testimony upon this point.

Testimony supporting conclusion that no diversion is necessary.

Colonel Townsend, a man with 45 years' experience in the Engineer Corps on river and harbor work in the United States, testified that with the completion of complainants' program, no flow at Lockport will be required to maintain navigation in the Chicago River. (J. A. 244-248; 257-8.) In fact, he testified that the termination of flow at Lockport would improve navigation on the Chicago River by removing the current and its impediment to navigation, (J. A. 247), and that the question of whether sewage is discharged into a river or harbor would not be one consideration in planning an improvement. He held this opinion even though there were no sewage treatment, although he was aware that treatment would remove a great deal of the solids. (J. A. 247-8.) Shoaling comes largely from street wash, carrying sand and similar material and not from domestic sewage. (J. A. 250.) In any event such deposits are dredged out of all harbors in the regular course of maintenance. (J. A. 258.)

General Keller, a man with 33 years' experience in the Engineering Corps on river and harbor work in the United States, and with subsequent experience on harbor work and problems on the Great Lakes since his retirement, testified that with the completion of this program no flow at Lockport will be required to maintain navigation in the Chicago River. (J. A. 401.) Navigable depths would be increased and the currents decreased. (J. A. 401.) General Keller pointed out that in no case in his knowledge had pollution or absence of pollution in a harbor or port affected navigation or traffic by water. (J. A. 405.) Clearly then the purified effluent would have no adverse effect. When both freight and passenger traffic has plied the port of Chicago for 30 years while it was admittedly in a state of gross pollution from unpurified sewage, it seems ironical, to say the least, to suggest that the purification of the sewage would destroy this traffic.

Captain Inches, a Lake Captain, testified that he has never experienced any interference with or obstruction to navigation from pollution on the Great Lakes, even though there was no sewage purification, but that he has experienced great difficulty by reason of the obstructive currents in the Chicago River, and that the elimination of the current through cessation of diversion will render navigation in the Chicago River much less difficult and expensive. (J. A. 239-241.)

Major Putnam, while U. S. District Engineer at Chicago, said in his official report on the diversion of Water from Lake Michigan in 1923. (Exhibit 1, Original Joint Abstract[1] 179.)

> "As far as the navigation of the Chicago River and the Drainage Canal is concerned, if the flow at Lockport were entirely throttled and the power-house gates closed so as to permit no diversion from Lake Michigan, conditions would be decidedly improved. The current which now averages 1½ miles per hour and in some bridge draws is as high as 4, would be practically eliminated, making navigation considerably simpler, especially for the larger vessels whose passage through a narrow bridge draw is apt to increase the current materially." (pp. 59-60.)

This opinion was expressed by Major Putnam when there was no sewage treatment at Chicago. Major Putnam, appearing as defendants' witness at the hearing at Chicago last March, reaffirmed the correctness of that statement. (J. A. 99.) Obviously with complete treatment conditions will be further improved.

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[1] For convenience of citation, the Joint Abstract filed with this Court on January 24, 1928, is cited as "Original Joint Abstract" in contra-distinction to the Joint Abstract filed February 20, 1930, which is merely denominated "Joint Abstract."

All of the complainants' witnesses testified that with the completion of this program and no flow at Lockport no nuisance will be created in the Chicago River and no interference with navigation. The Sanitary Engineers testified that conditions would be satisfactory both from the standpoint of navigation and public health. (Howson, J. A. 108-9, 639; Gascoigne, J. A. 207, 209; Townsend, D., J. A. 214, 215, 216, 218; Ellms, J. A. 227-8; Townsend, Col., J. A. 246-7; 257-8; Inches, J. A. 240-241.) While such standards are purely fanciful so far as determining whether an obstruction to or interference with navigation will be created under the conditions assumed, the complainants' witnesses testified that such conditions would meet the hypercritical standards assumed by the witness Eddy. There would not be any odors arising from the Chicago River due to putrefaction of organic matter contained in the sewage effluent. (Howson, J. A., 108; Gascoigne, J. A. 209; Townsend, D., J. A. 215.) There would be no visible suspended particles in the Chicago River recognizable as of sewage origin. (Howson, J. A. 108; Gascoigne, J. A. 209; Townsend, D., J. A., 215.) There would not be any oil, grease or floating material on the surface of the Chicago River arising from the flow from sewage treatment plants. (Howson, J. A. 108; Gascoigne, J. A. 209; Townsend, D., J. A. 215.) These questions were based upon the fanciful standard assumed by the witness Eddy. (J. A. 76-8.) Of course, oil and such materials may come from vessels or oil tanks, if no steps are taken to eliminate such sources of pollution, whether there be diversion or otherwise; and it would be impossible for any witness to state that there would be no material or pollution from such sources with or without diversion. The waters would not be offensive to or injurious to the health of passengers or people employed on boats or docks. (Howson, J. A. 108; Gascoigne, J. A. 209; Townsend, D., J. A., 216.) The conditions would not produce an excessive growth of water plants. (Howson, J. A. 108-109; Gascoigne, J. A. 209; Townsend, D., 216.) An inspection of the effluent of an activated sludge plant shows that it is as good in appearance as lake water. (See Eddy, Master's Report 30.) That is greatly superior to the waters in any harbors on the Great Lakes where there is no sewage treatment. The effluent is stable, clear, odorless and sparkling; it will remain stable indefinitely. (Howson, J. A. 110; Gascoigne, J. A. 210; Townsend, D., J. A. 216.)

All of the foregoing witnesses (except Colonel Townsend and Captain Inches, who are not sanitary experts,) testified that with completion of this program and no flow at Lockport, there would be no nuisance from the standpoint of sanitation. The following witnesses also so testified: (Waring, J. A. 239, 613; Rockwood, J. A. 591). That is not an issue on this Re-Reference, but it is clear that if there is no nuisance from the standpoint of sanitation, there certainly can be none from the standpoint of navigation.

The defendants' Sanitary Engineer Pearse testified before a Committee of Congress in 1924. In his testimony before the Committee, which he reaffirmed in this suit, he stated that the effluent of a sprinkling filter or activated sludge plant is fit to run down a stream *without* dilution. He reaffirmed that fish were living in the effluent of Sanitary District trickling filters, right at the filters. (Master's Report 29, J. A. 520.) He stated further, (J. A. 521):

> "The biological processes, such as sprinkling filters, or activated sludge, when properly operated, produce a high grade effluent, *requiring no dilution, in which fish can live. The effluent, further, will create no nuisance, and can be turned into a water course, even though dry, without fear of consequences.*"

Can it be reasonably contended that such an effluent would not be fit to use for the flotation of vessels, or that it would not be better than the waters in any one of the important harbors on the Great Lakes under present conditions? Moreover, the effluent will not be turned into a dry run (which Pearse says will create no nuisance) but will obviously be diluted with water by seiches, rains and natural run-offs. It should be noted that this witness did not undertake to state on the Re-Reference that any quantity of diversion would be necessary in order to maintain the waters of the Chicago River in a suitable condition for navigation.

The testimony of Mohlman, Eddy and Jadwin.

The Master has referred to the testimony of the witness Mohlman. This witness was first asked to testify to investigations at Milwaukee, but when these investigations were ruled inadmissible by the Master, the witness was asked to express an opinion upon Chicago conditions. The sum total of his testimony on direct was that he did not have sufficient knowledge with reference to the controlling factors to determine what conditions would exist after completion of the program with no diversion, but that he thought they would not be satisfactory without some diluting water, although he was not in a position to make any determination on the point. (J. A. 342, 343-4.) He also testified that an activated sludge effluent is not clear and odorless. (J. A. 346.) If he was mentally taking refuge in the technicality that all water contains some small quantity of suspended material, he would probably be technically correct. Under such an hypothesis, that answer would apply to the best drinking water in the United States. On cross examination he admitted that turbidity is a measure of the clearness of a liquid. (J. A. 346.) He admitted that the turbidity of an activated sludge effluent is about 20. (J. A. 346.) He admitted that the maximum turbidity of the Chicago drinking water in April 1927 was 115 and that the average for the month was 50. (J. A. 346.) This indicates that the drinking water in Chicago in April 1927 averaged 2½ times as much suspended material as an activated sludge effluent. Turbidities for the Chicago water supply exceeding 20 (exceeding 50 at some intakes), have commonly prevailed for 50 to 90% of the time during some months. (Ex. 1157, p. 25; Appendix pp. 102-3.) Yet the witness states that the effluent is not clear. It is contended that it is not fit to float a boat. The witness agreed generally with Eddy's statement that an activated sludge effluent is as good in appearance as lake water. (J. A. 347.) He agreed generally with Eddy's statements that an activated sludge effluent is clear, colorless, odorless and stable. (J. A. 347-8.) He agreed generally with Fuller's statement that an activated sludge effluent is well purified, non putrescible and freed of 95 to 98% of its bacteria. (J. A. 348.) He admitted that the B Coli are not more resistant than other bacteria. (J. A. 348.) Under these circumstances it can hardly be said that he has produced any evidence upon which an interference with navigation could be predicated. He did not discuss navigation.

The only witnesses testifying that any diversion would be necessary in the interests of navigation in the Chicago River were the witnesses Eddy and Jadwin. After giving his original testimony at Chicago, Eddy apparently undertook to work out some sort of scheme to which he could hang a conclusion that a diversion of 2,000 c. f. s. would be required to prevent any interference with navigation. He returned to the stand with a list of seven or eight requirements (J. A. 76-78) which he admitted, as far as he knew, had never been met in any other harbor of the Great Lakes. (J. A. 85-86.)

Although it has been shown that these requirements will be met, (*supra*, pp. 47-8) on what does this claim for superior treatment of Chicago waters at the expense of the complainant states rest? We have no right to criticise any effort of any city to provide super conditions for itself at its own expense, but it hardly seems reasonable that a city can lay the foundation for the right to injure others by asserting an alleged desire to create a condition greatly superior to that which exists in other cities or harbors of the United States. With what Chicago creates for herself, we are not concerned. With what she appropriates from complainants, we are. *Moreover with what ports is this navigation at Chicago to be carried on, since the conditions set up as necessary exist nowhere else?* However, accepting the standard set forth by the witness Eddy, it is the unanimous testimony of all the other witnesses in the case who have testified on the point (with the exception of General Jadwin, whose testimony will be discussed later), that with the completion of this program those conditions will be met without any flow at Lockport. (See pp. 47-8, *supra.*)

Eddy testified (quoted by the Special Master, Master's Report 129-30):

> "The discharge of the effluent from the various works to be completed under the program into the Lake, would be detrimental to navigation. The effluent would be devoid of oxygen, black and offensive much of the time. It would tend to discolor light-colored paint on boats. It would be offensive to people riding on boats and having to work on the vessels and along the wharves. This condition would gradually decrease in intensity as the distance from the mouth of the river increased, due to the dilution and oxidation which would take place in the waters of the Lake. And in reaching the above conclusion, I assumed that the storm water would be discharged to the Des Plaines River, and that the effluent from purification works in dry weather time would flow into the Lake." (J. A. 75-76.)

Let us compare this testimony with Eddy's statement of November 12, 1919, to the Board of Estimates of the City of Milwaukee:

> "The activated sludge system will produce an effluent which is,—speaking, now, in general terms,—*as good in appearance as the lake water itself.* It won't show material color—it won't contain a noticeable quantity of suspended matter. It will be very low in bacteria, although in that respect there will be more than there are in the normal lake water, of course; it does not completely sterilize the sewage; *and in all respects is an effluent which ought to be absolutely satisfactory. I think that there can be no question upon that point.*" (Master's Report 30.)

His statement should also be compared with his statements mentioned in the cross examination of the witness Mohlman. (Page 50, *supra.*) Has the efficiency of the activated sludge process deteriorated since 1919? Is the effluent of an activated sludge plant in Milwaukee "as good in appearance as the lake water itself," and "absolutely satisfactory," but at Chicago "devoid of oxygen, black, and offensive"?

The only other testimony is that of General Jadwin, then Chief of Engineers, who was called by the Special Master. General Jadwin admitted that with cessation of all flow at Lockport the widths and depths of the Chicago River and Drainage Canal available for navigation would be increased and that under such circumstances the only question relating to the maintenance of navigation in the Chicago River as part of the Port of Chicago was whether with no flow at Lockport any nuisance would be created in the Chicago River which could be obstructive to navigation. (J. A. 9-10, 12-13.) *He admitted that he was not an expert and had no technical knowledge which would enable him to express an opinion whether any such nuisance conditions would develop, and that he was not competent to advise the Court.* General Jadwin stated (J. A. 16-17):

> "I was directed by the Special Master to answer, ignoring the Illinois Waterway and limiting myself for

> the moment to the Chicago River. It is true that neither now nor when all the treatment plants are completed, will there be any diversion necessary as a matter of providing adequate depths in the Chicago River. This is correct referring simply to depths of the Chicago River. But if you mean simply depths in the Chicago River, it is true. If you limit your navigation to the Chicago River and accept the thought of barring out of it that navigation *which I think should come through there,* then the sole problem is what dilution, if any, will be required for the effluents of complete treatment to prevent an active nuisance in the Chicago River as far as the Chicago River is concerned. *I think it is correct that as to the quantity of dilution water from the Lake, if any, which is necessary when complete treatment plants are in operation, in order to prevent any active nuisance, I am not an expert and am not able to advise.''*

See also J. A. 39-40.

It is, of course, no reflection upon General Jadwin that he is not qualified to express an opinion or advise upon this technical sanitary question which is peculiarly one for sanitary experts. The officers of the Corps of Engineers of the War Department are not sanitary experts and could not be fairly expected to express an opinion outside of their own field. General Jadwin's cross examination abundantly supports his frank admission that he was not qualified to advise the court on this point, and conclusively establishes that his written statements, no doubt prepared in an effort to be of as great assistance as possible, could not be made the basis of any finding of fact upon this point. (J. A. 2-17; 22-27; 33-42.)

General Jadwin was not sure whether he had ever seen the effluent of an activated sludge plant and admitted that he did not know its characteristics. (J. A. 33, 34, 39-40.) When he was asked to state of what his nuisance or obstructions to navigation would consist, he could state no single element of a nuisance. (J. A. 37-40.) His only answer was that if conditions were insanitary for people on shore, then they would be worse for the navigators. (J. A. 35, 38, 39.) Since he did not know, and had no means of knowing, whether conditions would be insanitary for people on shore, we are left quite in the dark as to how he concluded that they would be insanitary for navigators. He did not know whether in reaching his conclusion he assumed that there would be visible suspended material; whether he assumed the effluent would be putrescible; whether he assumed that it would give off an offensive odor, or any other element of a nuisance. He finally admitted that he not only had no scientific qualifications to pass upon the question, but that everything which he stated was based upon his reading and understanding of Master's Exhibit "B"—the Alvord, Burdick & Howson Report. (J. A. 35, 39-40.)

It is obvious that he had no qualifications to assist the court in interpreting this Report. He admitted that he had not considered any of the fanciful conditions suggested by the witness Eddy, and did not know whether they would be met or not. (J. A. 37-40; compare Eddy 76-78.)

The Special Master has quoted the original statements which were prepared in the Department, and read by General Jadwin before the Master, but not, of course, his cross-examination. It is obvious that the Special Master's finding on this point is based largely upon these statements read by General Jadwin. We submit that if General Jadwin had not occupied an official position and had shown no other or additional qualifications than are shown in this record, he would have been ruled incompetent to express an opinion on this scientific question. Can the rights of these states and their millions of people be abridged upon the testimony of a witness who, however brilliant he may be in other fields, has frankly admitted himself to be both scientifically unqualified and lacking in familiarity with the facts which are known to interested laymen, simply because he holds an official position with the War Department of the United States?

Even laying aside the fact that General Jadwin by his own statement was not competent to express an opinion, his conclusion could not be given any weight because it is based upon false premises of fact and law. The only basis for his conclusion was that accepting an assumption (of which he had no knowledge) that conditions would be insanitary for people on shore, then they would be insanitary for navigators. (J. A. 35, 38, 39.) He failed to understand that the sanitary question involved, as it related to the people of Chicago, was concerned only with the protection of the domestic water supply. The necessity of protecting the public water supply did not, of course, turn upon whether the consumers lived along the banks of the River, or elsewhere. No sanitary or health expert in this case has even suggested that the carrying out of this program, without any flow at Lockport, would be injurious to or affect the people living along the shore. Due to his lack of familiarity with sanitary questions he erroneously assumed that the question relating to the public health at Chicago had to do with the health of the particular people who lived along the shores of the River. The witness, therefore, not only based his conclusion upon a complete misunderstanding of the subject of debate, but upon a false premise not supported by any evidence in the case, even though unknown to him.

However, we think General Jadwin's testimony does demonstrate what controlled him in his conclusions. It involved a false assumption of law. When he was confronted with a statement of Major Putnam that if all flow at Lockport were terminated, navigation on the Chicago River and Drainage Canal would be decidedly improved, and that with practically no sewage purification, General Jadwin stated that he did not quite agree. General Jadwin said (J. A. 11-12):

> "I do not think that is entirely correct. * * * I do not think the statement is quite right in the way we are looking at it now, *but from what that man had in mind in writing that, it is probably correct.* He had something different in mind from what I had in mind. I think he had in mind that shutting off the sewage from getting down there, there would be no offense from sewage. *I have in mind that if you shut off the connection, you shut off the navigation already authorized by Congress, which we are doing under the existing project.*"

In the first place, the statement is in error because there is no authorization for diversion for navigation by Congress which the witness subsequently admitted when interrogated by the Special Master. (J. A. 20, 45; Master's Report 122.) But this testimony does show the thing that permeates the whole of the testimony of General Jadwin. That is, that what he is really thinking about is some quantity of water which he has conceived to be desirable for the purpose of navigation on the Illinois waterway and the Illinois River. But the testimony just quoted shows that General Jadwin's only reason for disagreeing with Major Putnam was that he thought it would prevent the passage of navigation from the Illinois River and waterway into the Chicago River. Since that was his only reason, he must have agreed that considering the Chicago River and Drainage Canal alone, the cessation of the flow at Lockport would decidedly improve navigable conditions and that with practically no sewage treatment. Obviously General Jadwin conceived that if he were to testify that no diversion was necessary, it might bar the utilization of any Lake water for through navigation to the Illinois, if and when Congress should authorize it. He did not realize that this suit had no bearing upon that question, if Congress has the power and should attempt so to act. General Jadwin seemed to feel that, because he had been called by the Master and was Chief of Engineers, it was his duty to state what he conceived to be the present position of his Department, not realizing that the object of the inquiry was not to ascertain his personal or other position, but to ascertain the facts.

Master's Exhibit B, Alvord, Burdick & Howson Report.

Finally General Jadwin admitted that he had no information whatsoever except what might be contained in Master's Exhibit "B"—the Alvord, Burdick & Howson Report. (J. A. 39-40.) In the first place this Report (Exhibit B) had no relation to the Chicago River, but only to conditions in the upper Illinois and Des Plaines Rivers. In the second place it did not purport to define conditions necessary to maintain navigation anywhere, but was based on an entirely different standard. It was also a technical report to which, we submit, nothing could be added by a statement of a nonexpert as to his understanding of it. This is made clear from an analysis of the report.

In the first place, the pollution requirements set forth in that report (Master's Ex. B; J. A. 114-191) are to maintain a certain standard in the upper Illinois and Des Plaines Rivers. (Ex. 274; J. A. 398; 114-115.) With the cessation of flow that question no longer gives rise to concern. In the second place, the War Department required the sanitary engineers to adopt a standard which would permit the reestablishment of a thriving fish life in a river which had had no fish life for 25 years and which contained great sludge banks from the sewage of Chicago, which would continue to putrefy and render the waters inimicable to fish life for an indefinite period of time to come, even with the cessation of sewage pollution. (Ex. 274; J. A. 398, 113, 647-8, 126, 136.) The Sanitary Engineers had no part in setting up this standard. (J. A. 113, 643.) A standard which will maintain, much less re-establish a thriving fish life is very different from one which requires the absence of nuisance. This has not been controverted by any of the Defendants' witnesses. The former is a much higher standard, which is neither required nor adopted in practice to satisfy sanitary and health requirements nor to prevent interference with navigation. (Howson, J. A. 109, 647-8; Gascoigne, J. A. 209-10; Townsend, D., J. A. 216, Ex. B. 152-3.) General Jadwin admits that he does not know the difference between these standards; but that, if no obstructive nuisance is created, the conditions will be satisfactory for navigation even though fish life is not restored. (J. A. 26.) The great difference in these standards is obvious from the fact that an activated sludge effluent contains about 20 parts of oxygen per million. Of this oxygen 5 parts per million are in the form of dissolved oxygen and the balance in the form of nitrates and nitrites. (Mohlman, J. A. 349-50.) To maintain and much less to re-establish a thriving fish life requires that there shall always be a residual of at least three parts per million of dissolved oxygen. But an effluent will not putrefy or give rise to a nuisance until it has exhausted, first, the dissolved oxygen in the water (J. A. 647-8) and second, the oxygen contained in the form of nitrates and nitrites. (J. A. 647-8.) Hence, if the effluent should absorb over two parts per million out of the 20 parts per million of the available oxygen, fish life would be killed; but no nuisance would be created until after 20 parts per million had been exhausted by the oxygen demand. Moreover, a large factor of safety is required in the case of fish life because a short lapse from the standard will destroy fish life which can not be readily resurrected. (J. A. Howson 648.) However, if a standard of no nuisance should temporarily fail, it would only result in a slight nuisance for a very short period of time and with no continuing effects. (J. A. 648.) All of the flows considered in this report were measured at

Lockport and included the domestic pumpage. (Ex. B., J. A. 115, 155.) The analysis of these flows was based upon oxygen requirements to meet this hypercritical standard during July and August, the months of maximum oxygen demand of the effluents and sewage and minimum oxygen content of diluting waters; so that the determinations represented the maximum and not the average flows required to meet that standard under the conditions assumed. (J. A. 125-6, 144-6.) All conclusions were affected and governed by these considerations, as well as the requirements of restoring a thriving fish life, which far exceeded the requirements for establishing sanitary conditions or preventing a nuisance obstructive to navigation. (Joint Abstract 643, 647-8, 109, 209-10, 216.) Under the contract standard oxygen available in the effluents and from re-aeration to prevent nuisance or insanitary conditions could not be utilized. Obviously, however, neither the Federal Government nor the Complainant States are under any obligation to restore to Illinois the fish life which she has destroyed.

General Jadwin's cross examination shows that all of the foregoing factors were unknown to him. He admits that sewage passes largely untreated into all of the other harbors of the Great Lakes (J. A. 26). Yet he asserts that the purified effluent would destroy or obstruct navigation at Chicago.

The Official Reports and Documentary Evidence.

The untenable character of this conclusion is thus established by the fact that if it be sound, there is not any free and unobstructed navigation in the United States. The weight of any such contention on the part of the former Chief of Engineers could not but be further minimized by a consideration of the fact that the Chicago River and the auxiliary waters at Chicago have been grossly polluted with raw, untreated sewage for 30 years. During that period of time the War Department never took any steps to force the cleaning up of the Chicago River by the Sanitary District until the Permit of March 3, 1925. A casual reading of the long series of reports by District Engineers at Chicago, the particular report upon which that Permit was based, the recommendation of the then Chief of Engineers, the letter of the Secretary of War, and the diplomatic correspondence with Great Britain, demonstrates that the step taken in the Permit of March 3, 1925 was not for the purpose of removing an obstruction to navigation in the Chicago River, but for the purpose of reducing the injurious effect of the diversion on the Great Lakes by cutting it down; and the requirement for sewage treatment was to the end that this reduction might be had without danger to the health of the City of Chicago, which was the club that the Sanitary District had held over the Secretaries of War for 25 years for the purpose of entrenching itself in this unlawful diversion. The reduction was limited by the sanitary emergency at Chicago and not by the needs of navigation. (Master's Original Report 71-2, 76-80, Original Joint Abstract 181, 182, 133-138, 140-158; 169-173, 179.) Suddenly we find, since this Court has ruled that diversion for sanitation is inadmissible, that we must have waters at Chicago,—although not any place else,—which are entirely free of any sewage pollution, no matter how negligible, or navigation will be destroyed. The mere statement of the contention refutes it.

The untenable character of General Jadwin's conclusion is also established by the fact that from the earliest reports down to the testimony of General Jadwin in this case a long line of distinguished engineers, who were acting in the line of duty as members of the Corps of Engineers, have consistently and repeatedly reported to the Congress that a total flow of 1000 second feet or less from the Great Lakes watershed would be ample for all navigation requirements upon a waterway from Lake Michigan through the Des-

Plaines and Illinois Rivers to the Mississippi. (Original Joint Abstract pp. 35-46; J. A. 60-65.) In the latest comprehensive report transmitted to Congress March 29, 1926, and being House Document 4, 69th Congress, 1st Session, the Board of Engineers of which General Jadwin was senior member, advised Congress that an adequate waterway could be obtained with a total diversion or flow of 1000 second feet. (Ex. 18, Original Joint Abstract, pp. 37, 38.) This view was confirmed by General Taylor, then Chief of Engineers, both in transmitting the foregoing report and in his testimony before the Committee on Rivers & Harbors of the House of Representatives in 1926. (Ex. 209, Original Joint Abstract, pp. 35-36.) The view was reaffirmed by both General Taylor as Chief of Engineers and General Jadwin as senior member of the Board in Senate Document 130, 69th Congress, 1st Session, dated June 16, 1926. (Ex. 249, J. A. 60-65.) House Document 4, 69th Congress, First Session (Ex. 18), was again reviewed in House Document 12, 70th Congress, First Session dated May 11, 1928, and the various plans for a waterway including one with a total flow of 1000 second feet were again set forth in that report. (Ex. 276, page 18, Master's Report 124.) In discussing the Chicago Drainage Canal the Special Board reporting in Exhibit 276, (Master's Report 124) states:

> "However, since this is a lake-level canal no discharge is actually necessary for its use for navigation as distinct from sanitary uses except for the lockages at Lockport."

This report was transmitted to Congress by General Jadwin, as Chief of Engineers, with his approval.

Can it be supposed that all this long line of eminent engineers, including General Jadwin himself, would have consistently advised the Congress that it would be practicable to construct such a waterway with 1000 second feet or less, at times when there was no sewage treatment, if the limitation of the flow to 1000 second feet would, as General Jadwin has testified, create conditions which would obstruct and destroy navigation in the Chicago River and throughout all of the reaches of the proposed waterway? Can it be believed that General Jadwin would have joined in advising the Congress to, or at least that it would be practical to, adopt a project upon which no navigation could be carried on and which would also under the theory advanced by General Jadwin in his testimony, destroy any remaining commerce in the Chicago River? Yet, if General Jadwin's testimony were correct, all of these engineers would have been advising Congress to adopt a project which would be utterly worthless. Such a conclusion is unbelievable.

Defendants introduced Exhibit 1413, which was a report of the Chief of Engineers to the Congress, entitled "Navigable Waters of the United States and Non-navigable Waters connecting therewith into which polluting substances are being deposited to such an extent as to endanger or interfere with navigation, commerce or fisheries." It is significant that this comprehensive study of 127 harbors or waterways, of which all are polluted with domestic sewage, industrial wastes, or both, shows that in 102 of these harbors or waterways, there is no effect on commerce or navigation. (J. A. 46-47.) The Exhibit shows that in the 25 harbors or waterways on which interference is reported, the interference is confined in practically every instance to interference with pleasure boating and a few cases of shoaling from sewage sludge which is largely dredged out by local authorities. (J. A. 48-49.) The greater number of these places are in the vicinity of New York Harbor, the New Jersey Coast and in the vicinity of Chicago and the Illinois River. Have there been any instances of obstruction of navigation in New York Harbor from sewage pollution? But the report is further illuminating. The Chief of Engineers said:

"3. In general the injuries caused by polluting substances in non-tidal waters do not, except in the Pittsburgh area, directly affect commerce or navigation *in the sense of making more difficult or expensive the movement of water carriers, the handling and transshipment of freight, or the creation, operation and maintenance of navigable channels.* The direct injury resulting from pollution in non-tidal waters is rather to the public health, to fish and other wild life, animal and vegetable, and to outdoor forms of recreation, such as bathing and boating, together with the land and property values which depend thereon."

"4. Water-borne commerce and navigation may be held to be indirectly affected on this latter basis, for in a sense they are affected by almost any important activity of the public."

* * * * *

"8. While at present there appears to be only one port on the Great Lakes in which oil pollution is sufficient to endanger commerce, nevertheless, due to the importance and extent of this commerce, and the probable increase in the number of oil-burning and oil-cargo vessels, oil refineries and terminals, pollution from this source may increase unless controlled." (J. A. 51-52.)

This report shows that except in the Pittsburgh area, there has been no case of pollution directly affecting commerce or navigation in the sense of making more difficult or expensive the movement of water carriers, the handling and shipment of freight or the creation, operation and maintenance of navigable channels. The interference in the Pittsburgh area is from the effect of acid wastes from mines on the hulls of steel vessels. Such a problem does not exist at Chicago but its solution would consist of elimination of the waste and not in its propulsion through other navigable waterways by diversion. This official report completely demonstrates that, even in the past, with the gross pollution of the Chicago River without any sewage treatment whatsoever and with the gross pollution of the Illinois River, there has been no interference with navigation. Can anyone reasonably contend that with the complete purification of this sewage there will arise any interference with navigation? Under these circumstances it is idle to contend that any diversion will be necessary to maintain navigation on the Chicago River after the completion of this program.

The foregoing analysis of the testimony and evidence demonstrates that no diversion is necessary to maintain navigation in the Chicago River.

The foregoing testimony is believed to be all of the testimony bearing upon this question. We believe that an analysis of this testimony and a reading of the Master's Report discloses that his finding rests upon the testimony of the witnesses Eddy and Jadwin. Eddy, in his testimony, has described the effluent as black and offensive. Before the Common Council of Milwaukee he states that it is "as good in appearance as lake water" and "absolutely satisfactory" for the Milwaukee harbor, both for sanitation and navigation. He has based his testimony upon a hypothetical standard neither existing nor considered necessary in other harbors. General Jadwin admits that he is not qualified to advise the court, and shows a not unnatural lack of familiarity even with facts of the situation familiar to interested laymen. On the other side there is the testimony of the witnesses Hewson, Gascoigne, D. Townsend, Pearse and Fuller, Sanitary Experts; General Keller, Colonel Townsend and Major Putman, retired army engineers of wide experience; Doctor Rockwood, a Public Health Expert; Waring, Chief Sanitary Engineer of the State of Ohio with supervision of all of the water supplies, sewage disposal and stream pollution problems in that state, and

Inches, a Lake Captain of many years' experience. Howson, Gascoigne, D. Townsend, General Keller, Colonel Townsend, Major Putman, Waring and Inches have testified directly and positively that no diversion will be necessary to maintain navigation in the Chicago River. The testimony of Pearse, Rockwood and Fuller sustains the conclusion that no diversion is necessary. Some of these witnesses have testified that the termination of the diversion will greatly improve navigation in the Chicago River. In addition we have the reports of all of the most eminent Engineers of the War Department, covering a period of at least 35 years, and including the latest report signed and transmitted by General Jadwin himself advising the Congress that a *total flow* of 1000 c.f.s. at Lockport would adequately provide for through navigation to the Mississippi if Congress should choose to provide it. We have the exhaustive report of the former Chief of Engineers, General Taylor, showing that even without this sewage purification there has been no obstruction to navigation from sewage pollution in the navigable channels of the United States.

We submit that upon this record findings of any necessity for diversion to maintain navigation in the Chicago River after complete sewage treatment can not be sustained.

Not only is a finding that any diversion will be necessary to maintain navigation in the Chicago River after complete treatment of all the sewage unsustainable under the evidence, but the unreasonable and arbitrary character of such a finding is inherent in the very nature of the assumption upon which it is based. If the Chicago Drainage Canal had never been constructed, does any one imagine that an immense Drainage Canal or sluiceway would be cut across the Continental Divide, or would be deemed necessary, for the purpose of drawing off the waters of the Chicago River in order to maintain navigation in that River as part of the Great Lakes System? Sewage, largely untreated, is discharged into all of the great navigable harbors of the world. Has there ever been another instance where it has been deemed necessary to construct a sluiceway to divert the waters of the harbor into a different watershed in order to maintain navigation in that harbor? Why is it that with complete treatment of all of the sewage at Chicago, it should happen that of all the harbors in the world, the harbor at Chicago is the only one where it is necessary to sluice off the waters into a different watershed in order to maintain navigation—indeed in order to prevent its absolute destruction under the testimony of General Jadwin. While it is immaterial, neither will the Chicago River be stagnant. In addition to the natural flow, the flow of the unconsumed portion of the domestic pumpage amounts to approximately 1700 c.f.s. This is larger than the low water flow of the Ohio River at Pittsburgh, and larger than the low water flow of many other large navigable rivers at their mouths during several months of the low water season.

C.

If it be assumed that the program of practical measures recommended by the Master is not adequate to prevent interference with navigation in the Chicago River as part of the Port of Chicago with no flow at Lockport, then other available practical measures must be included in the program; and with their inclusion, no claim of a necessity for any diversion to maintain navigation in the Chicago River can be supported.

With the completion of the sewage treatment works described by the Special Master with no control works and no flow at Lockport, only two possible sources of nuisance are suggested. They are:

First, that at times of storm water runoff in excess of the volume to be treated by the sewage treatment works, a portion of the sewage will be carried into the River and auxiliary channels with the excess storm water, although in a high state of dilution, and that such portion of the sewage so carried in dilution with the storm water might create a condition of nuisance in the Chicago River; and

Second, that the discharge of the purified effluent of the sewage treatment works into the Chicago River and auxiliary channels at dry weather times with no diluting water might create a condition of nuisance in the River.

Complainants regard the claim of any nuisance from such conditions as wholly specious, unfounded and designed to promote or continue the present diversion. Even the treatment at times of storm of only 150% of the dry weather flow as provided by the method of operation suggested by the defendants, provides for the purification of the initial and most highly polluted runoff. (Pearse, J. A. 543.) Thereafter any sewage spilling into the channels with the storm water is necessarily in a highly diluted state and would not be visible. (Ellms, J. A. 228-9.) If this large storm water runoff, carrying a small quantity of sewage in dilution will not create a nuisance to navigation as it flows westward in the River through the power wheels of the Sanitary District, it is difficult to understand why the same liquid will create intolerable conditions for navigation in the Chicago River if it flows eastward through that River.

The Master has referred to the testimony of Darwin Townsend with reference to Milwaukee. (Master's Report 132-3.) The Milwaukee plant not only does not treat any storm water flow but at times of storm treats only 35% of the normal or dry sewage flow. (J. A. 222, 224-6.) This manipulation is solely due to the desire at Milwaukee to manufacture for profit a by-product fertilizer of a standard fixed by contract. (J. A. 224-5.) The conclusion from these facts is that conditions are satisfactory at Milwaukee both from the standpoint of public health and navigation without any water filtration plant and with the treatment of less than the ordinary sewage flow at times of storm.

In passing, it should be noted that defendants persistently measure the quantity of sewage at Chicago by referring to an estimated human population, and a theoretical population alleged to represent the equivalent of industrial wastes. They then proceed to compare the grand total of these figures with the human population of other cities. This ignores the fact that all cities have industrial or trade wastes, and many cities have as large, or larger, loads than Chicago, in proportion to the population. (J. A. 218; Gascoigne, Appendix pp. 103-4.) This method of measuring the size of sewage plants is not employed elsewhere, and has been introduced by Chicago in line with its persistent policy of trying to magnify every difficulty which the problem presents.

However, if an unusual standard of purity and beauty in the interests of navigation is to be adopted for the Chicago River, then there are available practical measures other than diversion for accomplishing such a standard.

1.

The construction and/or operation of the sewage treatment works so as to provide at least preliminary treatment of storm water overflows up to the capacity of the intercepting sewers.

We have heretofore shown that it is practical to provide at least preliminary treatment up to the capacity of the intercepting sewers or for a total runoff of 4000 c.f.s. (Pages 21-22, *supra*). This will provide treatment for from 267% to 400% of the dry weather flow, depending upon the installation of metering for the water supply. Such a method of operation would practically eliminate pollution from storm overflows. (Gascoigne, J. A. 649.) Defendants' witness, Fuller, testified that, assuming treatment of 150% of the dry weather flow, the sewage carried in dilution with storm water overflows "will equal about 2% of the total volume of sewage" in the course of one year. (J. A. 551.) This estimate is high; but with at least preliminary treatment of four times the dry weather flow, it is clear that the quantity of sewage which would escape with storm overflows would be negligible, and would necessarily be in a high state of dilution. Rainfalls which would produce any such overflow would have to be large in volume and consequently of very infrequent occurrence.

According to the runoff estimates of Major Putnam, District Engineer, the frequency of any such runoffs would not exceed 7 or 8 times per year. (J. A. 651.) Such overflows would also be of very short duration since they would only be reached during the peak of the runoff and would not obtain during the period of building up the volume, nor during the subsidence of such runoff. The Master refers to a new calculation of frequency of runoff presented by the defendants' witness, Ramey, at the last hearing and alleged to be based on 1929 conditions. (Master's Report 102.) His previous estimates (agreeing with those of Major Putnam) were claimed to have been based upon 1923 conditions. Without determining the increase, if any, in paved area or sewer capacity which are alleged to govern the frequency of such estimated runoffs (J. A. 357, 358-9 the words "not determine" should be inserted after the word "did" in first line page 359 to conform to the record), the witness has in some instances tripled the estimated frequency of a given runoff. (J. A. 351, 421). All of his estimates include a domestic pumpage of from 1500 to 1700 c.f.s. (J. A. 361). He did not determine the duration of the hypothetical runoff from a given rainfall. (J. A. 354-356, 359.) His estimates purported to be based upon a given flow at Lockport when the river became stagnant from some cause up near the forks, (which General Jadwin testified may be caused at any time by seiches regardless of the amount of diversion.) The water at Lockport had passed from the Lake more than 24 hours before and no part of it was rainfall. (J. A. 357.) Ramey and other witnesses for the Sanitary District have insisted that it would take many hours before an increased flow at Lockport would be felt on the upper Chicago River. (Original Joint Abstract, pp. 126-7 J. A. 436.) If this be true, it is clear that his method of estimating could furnish no basis for his conclusions. Moreover, the testimony shows that it takes from 4½ to 8 hours for the maximum storm water runoff arising from a given rainfall to concentrate. (J. A. 436; Ex. 1, p. 57 Appendix p. 104.) Ramey based his conclusions upon an assumed momentary runoff. (J. A. 356). Obviously an assumed rainfall would have to continue at least 4½ hours before it could concentrate in the River. For rains of shorter duration the runoff at the forks would have disappeared before that of the North Branch arrived. The fallacy of estimating the frequency of runoffs from assumed momentary runoffs arising from a given rainfall is thus obvious. Moreover since the Sanitary District was maintaining a flow at Lockport of approximately 10,000 second feet in 1929, it is difficult to understand how Ramey determined the frequency of the various runoffs below that figure by observing a stagnant condition in the Chicago River. (J. A. 361.) However, it is clear that even on Ramey's computation and with the treatment of 4000 c.f.s. flow, the quantity of sewage spilling into the River would be negligible and in such a high state of dilution as to be innocuous. Certainly its character in that respect can not be determined by the question of whether it is flowing eastward or westward in the River. General Jadwin has testified that there is no reason to fear that occasional storm discharges into the Lake containing untreated sewage in dilution will render conditions there intolerable for navigation or that the working in and out of effluent would be objectionable to navigation. (Master's Report 108, 109, J. A. 59.)

2.

Circulating water.

If it be contended that the discharge of the effluent undiluted and without flow at Lockport can create any condition of nuisance in the Chicago River, and that it is necessary to add some quantity of water such as 1500 c.f.s. recommended by the Master, 2000 c.f.s. stated by Eddy, or provide a total flow of 3200 c.f.s. as stated by Jadwin, we have heretofore shown that it is simple and practical to provide a circulation of at least 5000 second feet of Lake water (introduced at the head of the North and South Branches of the Chicago River and through the Calumet Sag Channel) through the Chicago River and its auxiliary channels. (*Supra,* pages 27-28.) While it is self-evident that, if a certain quantity of Lake water flowing westward through the Chicago River will insure satisfactory conditions, the same quantity of Lake water flowing eastward through the Chicago River must likewise produce satisfactory conditions in that stream, both General Jadwin and Mr. Howson have testified that the provision of circulating water in such a manner would not only prevent the possibility of any interference with navigation but would restore a thriving fish life, which is not essential to navigation and which has not obtained in the Chicago River for many years. (Jadwin, J. A. 29; Howson, J. A. 110.) This is a complete answer to any claim for necessity of diversion to maintain navigation in the Chicago River as a result of the presence of effluent or storm water overflow.

3.

Practical measures are available to wholly eliminate the effluent of the sewage treatment works and the discharge of any untreated sewage at times of storm from the Chicago River, if that is deemed necessary.

However, if a still higher and more unusual standard of purity is to be adopted for the Chicago River, then practical measures are available to entirely eliminate from the River the suggested sources of contamination, to-wit, the effluent of the sewage treatment plants and the storm water runoff carrying any sewage in dilution. We have shown heretofore in this brief that it is practical to construct outfall sewers from the sewage treatment works so as to discharge the effluent of those plants at remote points in Lake Michigan and remove such effluent wholly from the Chicago River and its branches. (*Supra*, pp. 25-26.) We have heretofore shown that it is practical to construct a separate system of sanitary sewers. (*Supra*, pp. 23-25.) The adoption of the first measure would entirely eliminate the effluent from the River and its branches and prevent any possibility of a nuisance from that source. The construction of a separate system of sanitary sewers would prevent any sewage being carried into the River or its branches by storm water runoff. These two measures, therefore, remove every suggested possibility of a nuisance without any flow at Lockport. With the only alleged possible sources of nuisance thus removed from these channels by such practical measures, there can be no further claim, however fanciful, of any necessity for diversion to maintain navigation in the Chicago River. Complainants consider the adoption of these measures wholly unnecessary in order to maintain navigation in the Chicago River or for any other purpose, but if an unusual standard of purity is to be adopted for those waters or if the elimination of effluent and storm water overflows from those waters is to be made a condition of the complainants' relief, then the defendants should be required to incorporate these practical measures in their program and carry them out to the end that the diversion may be terminated and the complainants' just rights restored.

D.

In any event no permanent diversion in abridgement of complainants' rights is admissible as a matter of law.

1.

Diversion to remove nuisance created by the sewage of Chicago is not in aid of navigation.

While complainants contend that with completion of the program of available practical measures and no flow at Lockport, no nuisance conditions will be created in the Chicago River or Port of Chicago, they submit that without regard to the question of the existence of a nuisance, the creation of a nuisance by Chicago can not be made the basis of legalizing any diversion of water from the Great Lakes watershed. In the last analysis, such a basis results in a diversion not for the benefit of navigation, but for the purpose of relieving the nuisance from sewage pollution, or in other words, for the purpose of assisting in the disposal of the sewage of the Sanitary District of Chicago which this Court has held may not lawfully be done. In the words of Mr. Chief Justice Taft at 418:

> "Merely to aid the District in disposing of its sewage was not a justification, considering the limited scope of the Secretary's authority. He could not make mere local sanitation a basis for a continuing diversion."

2.

The Congress by general and special legislation has affirmatively determined that the discharge of local sewage and street wash into any of the navigable waters of United States shall not constitute an obstruction to navigation or navigable capacity as a matter of law.

Any contention that the discharge of local sewage and much less of the purified effluent of the sewage treatment works at Chicago will create any obstruction to or interference with navigation in the Chicago River is not only untenable as a matter of logic but it is unsustainable as a matter of law. The material portion of Title 33 U.S.C., Section 407 reads:

> "Deposit of refuse in navigable waters generally. It shall not be lawful to throw, discharge, or deposit, or cause, suffer or procure to be thrown, discharged, or deposited either from or out of any ship, barge, or other floating craft of any kind, or from the shore, wharf, manufacturing establishment, or mill of any kind, any refuse matter of any kind or description whatever *other than that flowing from streets and sewers and passing therefrom in a liquid state,* into any navigable water of the United States, or into any tributary of any navigable water from which the same shall float or be washed into such navigable water."

Title 33, Section 421 is a special Act of similar import applying to Lake Michigan in front of Chicago, and prohibits the discharge of "any refuse matter of any kind or description whatever other than that flowing from streets and sewers and passing therefrom in a liquid state into Lake Michigan" within eight miles of shore.

These statutes constitute both a general and special determination by the Congress that the discharge of street wash and liquid sewage into any navigable water of the United States is legal and does not constitute an interference with or obstruction to navigation or navigable capacity as a matter of law. Since Congress has thus directly authorized the flow from streets and sewers which passes in liquid form to be discharged into navigable water, and has so declared that the same shall not constitute an obstruction to navigation or navigable capacity, it is clear that the same material, modified only by the treatment of the sewage element which takes out the solids and purifies the effluent, can not constitute such an obstruction. In other words, the discharge of the street wash and purified sewage effluents of Chicago are, as a matter of positive statutory enactment, neither an interference with or obstruction to navigation or navigable capacity. This determination by the Congress is conclusive. *Pennsylvania v. Wheeling Bridge Co.*, 59 U. S. (18 Howard) 421; *Southern Pacific Co. v. Olympian Dredging Company*, 260 U. S. 205.

We are unable to find from reading the opinion of *New York v. New Jersey*, 256 U. S. 296, that this statute was construed in that case. Certainly the special statute was not construed. The Federal Government was there seeking to protect government property as well as the interests of navigation. The Government's contention was never decided on the merits. We do not know what would have been the decision of this Court in such an event. That the granting of a petition for intervention is not significant is shown by the action of this Court in this case with reference to the claims of the Mississippi Valley States.

3.

If the Court should find that there is any basis in fact for any diversion subsequent to the completion of the program of practical measures in the interests of navigation, complainants reassert their contentions (laid aside without decision in the opinion of January 14, 1929) that neither the State of Illinois nor the Federal Government has the power to authorize the diversion of any water in the Great Lakes-St. Lawrence watershed to the Mississippi watershed without the consent of the complainant states.

With respect to the absence of power in the State of Illinois or the Federal Government to authorize diversion between these two great watersheds without the consent of the complainant States, complainants refer to the statement of their position, pp. 13-15 *ante,* and in their briefs filed with this Court on the hearing on the exceptions to the Master's Original Report, if the Court should reach a point where it is necessary to decide those principles as a basis of a judgment in this case. However, in further support of the argument appearing at pages 101-109, inclusive, of the brief for complainants in No. 7 Original, filed on the hearing on the exceptions to the Master's Original Report, and in further exposition of the principle that the servitude of riparian property in favor of navigation is a natural servitude confined to the improvement of the watercourse for navigation purposes in its natural location, and not subjecting such riparian property to the sufferance of damages without compensation through the destruction or impairment of such natural waterway for the improvement of another natural waterway in a different watershed, or for the creation of an artificial waterway, complainants cite *Hewitt-Lea Lumber Co. v. King County,* 113 Wash. 431, 21 A.L.R. 201. Complainants also refer to their brief filed in opposition to the Motion to Dismiss which was heard in March, 1926.

E.

The City of Chicago does not divert the unconsumed portion of its domestic pumpage; if it did so, it would have no legal right so to do against the objection of these complainants; and if such a right be conceded for the sake of argument, such a diversion could not be made the basis of diverting an additional quantity of water in derogation of the rights of the complainants.

1.

The City of Chicago does not divert its domestic pumpage.

The Special Master seems to find that the City of Chicago diverts its domestic pumpage from the Watershed. It is said that no injunction is asked against the City of Chicago which is not a party to the suit. (Master's Report 120.) The answer, of course, is that the City of Chicago does not divert its domestic pumpage. The domestic pumpage of Chicago after reasonable use is discharged into the Chicago River and its branches where in the course of nature, and but for the interference of the Sanitary District with the flow of that stream, it would return to the watershed from whence it came. In determining the extent of the abstraction of the Sanitary District, it would be quite as reasonable to exclude some estimate of the pumpage of industries for condensing water and allied purposes. The short answer is that if a decree is entered requiring the Sanitary District to terminate all flow which it alone maintains at Lockport, there will be no diversion. Since Chicago does not divert the unconsumed portion of its domestic pumpage, the question of its power to do so is moot in this case.

2.

Domestic pumpage does not cease to be water because it has become in a greater or lesser degree contaminated through its reasonable use for domestic purposes.

The Master finds that domestic pumpage after its reasonable use is no longer water. (Master's Report 121.) Complainants submit that there is no evidence in the record to support such a finding; and it is not the fact. Large quantities of the pumpage are used for industrial purposes and not for household use. The whole burden of the sanitary testimony in this case shows that the process of sewage treatment is merely the removal of the suspended and settleable solids carried in the water. Because some solid substances or particles are carried in suspension in water it does not cease to be water. It is true that the water may be dirty, unless it is purified by the removal of suspended solids at the treatment works, but dirty water does not cease to be water.

3.

A quantity of water equivalent to the domestic pumpage of Chicago can not be subtracted from the abstraction of the Sanitary District for the purpose of determining its legality.

A substantial part of the flow maintained by the Sanitary District can not be arbitrarily treated as non-existent because the City of Chicago pumps but does not divert a certain quantity of water for domestic purposes. The Master states that the term "diversion" as used by the War Department does not include the domestic pumpage. (Master's Report 120.) That, of course, is a purely arbitrary definition, having nothing to do with the facts. It was erroneously adopted on the assumption that to place a gross limit on the flow at Lockport would place a limitation upon the pumpage of the City of Chicago, which was not a party to the Permit. (See Diplomatic Correspondence; Original

Joint Abstract 181.) It was of course a very illogical definition from the standpoint of the War Department in that it permitted Chicago to increase the diversion as much as it was willing to pump. In granting the recent temporary permit to bridge the gap between the expiration of the Permit of March 3, 1925 and the entry of a decree in this case, the Secretary of War, recognizing this fact, fixed a gross limit on the interim diversion of 7250 c.f.s. plus the 1200 c.f.s., which represented the pumpage when the Permit of March 3, 1925 was granted, with a further reduction to 6500 c.f.s. in addition to the domestic pumpage on July 1, 1930 when additional sewage treatment works will be in operation in accordance with the recommendation of the Special Master. Neither did the Corps of Engineers exclude the pumpage in advising Congress as to the available methods of providing a through waterway with various diversions. (Ex. 18, H. Doc. H. 69th Cong., 1st Sess. Par. 6, 7, 12. Appendix pp. 104-105.)

The Master states that the bills do not challenge either the taking of an unreasonable quantity of water for domestic uses or its diversion from the watershed. (Master's Report 120-121.) That challenge has been asserted consistently throughout this case. In the view of the complainants that neither the defendants nor the City of Chicago have or has the right to divert the unconsumed portion of the domestic pumpage without the consent of complainants, it is immaterial that Chicago pumps an excessive and unreasonable quantity of water. Chicago is presently pumping over 1600 c.f.s. (J. A. 87.) When the Permit of March 3, 1925, was granted the pumpage was estimated at 1200 c.f.s. (Original Joint Abstract 171, J. A. 651; Master's Original Report 73.) The present pumpage is approximately 300 gallons per capita per day, which is obviously not consumed by the inhabitants. (J. A. 641-642.) From one-half to two-thirds of the Chicago pumpage is wasted.

(Ex. 204, J. A. 641-2; Ex. 1, J. A. 651; Def. Ex. 1157, J. A. 652.) Complainants have, however, consistently contended that if the unconsumed portion of the domestic pumpage is to be diverted then Chicago must be compelled to confine its pumpage to a reasonable amount. As to diversion of the unconsumed domestic pumpage from the watershed, any claim of right so to do has been challenged consistently throughout this case, and we do not believe that in a suit between States this Court would require the parties to commence a new suit to settle any issue raised by its application of the law to evidence because of any alleged technicalities of pleading. However, Michigan in No. 11 Original, asked this Court for an order restraining the defendants "from taking or causing to be taken any water from Lake Michigan and its natural tributaries in such manner as to permanently divert the same from the said Lake and said watershed." (Mich. Bill of Complaint, p. 28.) It is difficult to conceive how the right to divert water in any way could have been challenged any more broadly.

4.

The State of Illinois under the circumstances of this case has not the power to authorize Chicago to take its domestic water supply from the Great Lakes Watershed and divert the unconsumed portion to the Mississippi Watershed.

The Master concludes that Illinois has the power to authorize Chicago to take its water supply from Lake Michigan and after reasonable use to divert it to another watershed or otherwise dispose of it. (Master's Report 121; Complainants' Exceptions II-E.) The Master therefore concludes that by virtue of such State authority Chicago has a legal right to take its domestic pumpage from Lake Michigan and that the City may thereafter dispose of the portion of the domestic pumpage which has been used but not consumed as it sees fit. Complainants submit that a State has no such right under circumstances which make such legislation effective extra-territorially to the damage of other States and that a State can not authorize a municipality to take its domestic water supply from an *interstate* lake or river without returning the portion of said water which remains unconsumed after a reasonable use thereof, where such conduct results in extra-territorial damage. The State of Illinois does not possess the power to exercise eminent domain in these complainant States, much less to take the property rights of the complainant States and their citizens without compensation. Such a procedure invades the territorial integrity and quasi sovereign rights of the complainant States and confiscates the property of their citizens against the will of those sovereignties from whom alone such property rights flow. *Holyoke Water Power Co. v. Connecticut River Co.,* 22 Blatch. 131, 20 Fed. 71; *Saunders v. Bluefield Imp. Co.,* 58 Fed. 133; *Pine v. New York,* 50 C. C. A. 145, 112 Fed. 98 (Reversed on other grounds in 185 U. S. 93); *Rutz v. City of St. Louis,* 7 Fed. 438; *Hoge v. Eaton,* 135 Fed. 411.

However, the defendants now contend that it is the law of the complainant and defendant states that a city located upon a waterway has the right to take water therefrom for all domestic purposes without liability to lower riparian owners, and that under the doctrine of *Kansas v. Colorado,* 206 U. S. 46 and *Wyoming v. Colorado,* 259 U. S. 419, this common rule of law will be applied to a determination of the respective rights of the States in an interstate waterway. Defendants, therefore, conclude that complainant States can not complain of diversion of the domestic pumpage of Chicago after reasonable use by the municipality and its inhabitants.

Complainants do not challenge the right of the City of Chicago to take its domestic pumpage from Lake Michigan, but they do challenge the right of Chicago to divert from the watershed, after use, that portion of the pumpage not consumed, and much more to adopt a method of diversion of such pumpage from the watershed which shall be made the basis of the appropriation and diversion of an additional quantity of water therefrom. In the view of the complainants the excessive use of water by Chicago is not material, but if the right of diversion of the domestic pumpage were to be sustained, then Chicago should be confined to a reasonable use of water for those purposes through the installation of metering, which would avoid the present waste of from 1/2 to 2/3 of the water pumped. (Ex. 204, J. A. 641-2; Ex. 1, J. A. 651; Def. Ex. 1157 J. A. 652.) The present pumpage is 300 gallons per capita per day, which obviously is not consumed by the inhabitants of Chicago. (J. A. 641-642.) When the permit of Mar. 3, 1925, was granted it was estimated as 1200 c.f.s. (Original Joint Abstract 171). Now it is 1625 c.f.s. (J. A. 87.)

The common law of waters obtains in the complainant and defendant States. Every riparian owner is entitled to the natural flow of the stream or watercourse without substantial diminution in either quantity or quality and an upper riparian owner must return any waters diverted from a water course before it leaves his land. *Kimberly & Clark Co. v. Hewitt,* 79 Wis. 334; *Priewe v. Wisconsin State Land & Improvement Co.,* 93 Wis. 534; *Village of Dwight v. Hayes,* 150 Ill. 237; *Minnesota Loan & Trust Co. v. St. Anthony Falls Waterpower Co.,* 82 Minn. 505; *Pinney v. Luce,* 44 Minn. 367; *Clark v. Pennsylvania R. R. Co.,* 145 Pa. St. 438, 77 Atl. 989; *Miller v. Miller,* 9 Pa. 74, 49 Am. Dec., 545; *Strobel v. Kerr Salt Co.,* 164 N. Y. 303, 320, 58 N. E. 142; *Loranger v. City of Flint,* 185 Mich. 454; *Stock v. Jefferson,* 114 Mich. 357, 72 N. W. 132.

However, the defendants claim that under the law of complainant and defendant States "a city located upon a public navigable waterway has the right to take water from such stream for its domestic purposes * * * either as a riparian owner or by virtue of a grant by the State of such use of public waters, and no lower or other riparian owner can complain of such use for domestic purposes." (Defendants' Brief before Master on Re-Reference p. 30.) It will be noted at once that this is not the point at issue. The question is not whether the City of Chicago may take water for domestic purposes from Lake Michigan, but whether it may divert from the watershed the portion of the water so taken which is not consumed, or must return it or permit it to return in the course of nature. To determine the soundness of the defendants' contention and of the conclusion of the Special Master, we proceed to a consideration of the law of the respective States in regard to the use of water for domestic purposes.

It will be further noted that the defendants' contention is really a statement of two independent propositions, neither of which is relevant. These two propositions are:

> (a) That a municipality situated on any stream, navigable or otherwise, may take water therefrom for domestic purposes as a matter of riparian rights even though damage result to lower riparian owners;
>
> (b) That a State may grant a municipality situated upon a navigable stream the right to take its domestic water supply from such public waters without regard to the effect upon lower or other riparian owners.

Assuming the applicability of *Kansas v. Colorado* to a navigable stream and that said case establishes that where the law of a State gives rights to the upper riparian owner as against a lower, such a state can not complain if some rights are given to an upper riparian State as against it, the first proposition is irrelevant, because the question here involved is not whether Chicago may take the water for such purposes but whether it must restore to the watershed the unconsumed portion thereof. Assuming the second proposition to be the law of some of the complainant States, it is wholly irrelevant because it does not turn upon riparian ownership, still less upon upper riparian ownership, and therefore, can not be used to give an upper riparian State rights as against a lower.

Before the Special Master the defendants, in support of their contention that it is the law of all the complainant and defendant states that a city may, either as riparian owner or in the exercise of the state's police power delegated to it, take water from a public stream or lake upon which it is located for domestic purposes, and discharge the unconsumed portion of such water as it sees fit; cited the following cases:

> *Canton v. Shock,* 66 O. S. 19; *Minneapolis Mill Co. v. Water Commissioners of St. Paul,* 56 Minn. 485; *Lamprey v. State,* 52 Minn. 181; *Loranger v. City of Flint,* 185 Mich. 454; (quoting dissenting opinion equally divided court). *Appeal of Haupt,* 125 Penna. St. 211; 3 L. R. A. 536; *Philadelphia v. Collins,* 68 Pa. 106; *Phila. v. Commissioners of Spring Garden,* 7 Pa. 348; *Filbert v. Deckert,* 22 Pa. Sup. Ct. 362; *Crill v. City of Rome,* 47 How. Prac. Rep. 398; *Sumner v. City of Gloversville,* 71 N. Y. S. 1088; *Strobel v. Kerr Salt Co.,* 164 N. Y. 303; *United P. B. Co. v. Iroquois P & P Co.,* 226 N. Y. 38; *Champion v. Town of Crandon,* 84 Wis. 405; *Heth v. Fond du Lac,* 63 Wis. 228; *Harp v. City of Baraboo,* 101 Wis. 368; *City of Elgin v. Elgin Hydraulic Co.,* 85 Ill. App. 182.

None of the foregoing cases sustain any right to appropriate a domestic water supply without returning the unconsumed portion thereof to the waterway. Some of them are wholly inapplicable, such as the Wisconsin cases which relate to surface waters.

Considered seriatim, the law of the various complainant and defendant States is as follows:

a.

Ohio.

In Ohio a municipality situated on a natural watercourse is a riparian owner and "has the right to use out of the stream all the water it needs for its own purposes, *returning to the stream all that is not consumed in such use.*" "*The water not consumed in the use or 'legal purpose' must be returned to the stream, or an opportunity given for it to flow back into the stream by the ordinary channels. It can not be lawfully diverted or transported so as to prevent it from flowing back into the stream.*" *Canton v. Shock,* 66 O. S. 19, 29, 33.

b.

Michigan.

In Michigan the right of a municipality to take its water supply from a stream to which it is riparian, whether navigable or otherwise, is considered to depend on a determination of the law of riparian rights. The rule in Michigan is that such a municipality can not even appropriate water necessary for its domestic purposes without paying compensation. *Stock v. City of Hillsdale,* 155 Mich. 375; *Loranger v. City of Flint,* 185 Mich. 454 (Dissenting opinion of equally divided court printed first). Obviously, it could not divert the unconsumed portion.

c.

Pennsylvania.

In Pennsylvania the right of a city riparian to a waterway, whether navigable or otherwise, to take its domestic water supply therefrom is the exercise of a riparian right, and the extent of such right is determined by a definition of riparian rights under the law of Pennsylvania. It is the law of Pennsylvania that a municipality situated upon a navigable or innavigable stream may take all of the water which is reasonably necessary for domestic use without compensation to lower riparian owners, as a reasonable exercise of a riparian right. However, such a city can not take an additional quantity of water to provide water power for the pumpage of the domestic supply at the expense of navigation. *Philadelphia v. Collins,* 68 Pa. St. 106; *Haupt's Appeal,* 125 Pa. St. 211, 3 L. R. A. 536. It has been repeatedly held that the right of a municipality to take its domestic water supply from a stream upon which it is located is no different from the right of any other riparian proprietor to take his domestic water supply. This, of course, does not comprehend the right to take water not consumed into another watershed. Thus it is held in Pennsylvania that a city not situated upon a stream can not by buying a plot of land riparian to such stream acquire the right to take its domestic water supply therefrom to the injury of riparian owners. *Lord v. Meadville Water Co.,* 135 Pa. 122, 8 L. R. A. 202.

d.

New York.

In New York it is held that the State owns the bed and waters of the Mohawk, Hudson and St. Lawrence Rivers and of the portions of the Great Lakes within the boundaries of the State. The riparian proprietors own to the thread of the stream in all other cases. Hence, the State may, as against its citizens, authorize a municipality located on the Mohawk River, the title to the bed and waters of which is in the state, to appropriate such waters to public purposes, such as a domestic water supply, without compensation. *Crill v. City of Rome,* 47 How. Prac. Rep. 398. However, the right of a municipality on the other streams, of which the title to the bed and flowing water is not in the State, is merely that of a riparian owner, and if the city takes a quantity of water which causes immediate, perceptible damage to a lower riparian owner, compensation must be paid. *Sumner v. City of Gloversville,* 71 N. Y. S. 1088. None of the cases sustain a diversion from the watershed or the deprivation of lower riparian owners of unconsumed portions of the domestic water supply. It has been expressly held that the State can not authorize a city to take water from a lake to which it is not riparian without providing compensation. *Smith v. Rochester,* 92 N. Y. 463. See also *Fulton Light H. & P. Co. v. State,* 200 N. Y. 400, and note in 37 L. R. A. (N.S.) at 312.

e.

Minnesota.

In Minnesota the law is that a municipality can only appropriate the waters of a private or innavigable stream for domestic use upon payment of compensation, but that the State, as the owner of the beds and waters of large, navigable streams, can appropriate or authorize the appropriation of their waters for public use, such as a municipal water supply, as against its citizens, without compensation. *Minneapolis Mill. Co. v. Water Comm. of St. Paul,* 56 Minn. 485.

There was no authority that a municipality in Minnesota may divert to another watershed the water taken for its domestic water supply but not consumed in that use.

f.

Wisconsin.

Defendants have cited no authority in point and we are able to find none. Clearly there is no authority which would sustain the right of a municipality in Wisconsin riparian to a watercourse to divert that portion of the domestic pumpage which has not been consumed to another watershed, or to do other than to return or permit it to return to its natural watercourse in the usual and ordinary way. Generally, Wisconsin cases rigidly uphold the common law right of a lower riparian owner to the natural flow of the stream without substantial diminution in quantity or quality. *Kimberly & Clark Co. v. Hewitt,* 79 Wis. 334; *Priewe v. Wisconsin State Land & Improv. Co.,* 93 Wis. 534. Even the state can not use the waters in the same watershed so as to interfere with lower riparian owners, except in aid of navigation. *Green Bay & Co. v. Kaukauna Water Power Co.,* 90 Wis. 370.

g.

Illinois.

In support of their proposition the defendants have heretofore cited *City of Elgin v. Elgin Hydraulic Co.,* 85 Ill. App. 182 (affirmed 194 Ill. 476). The holding relied upon merely is that the public residing along the Fox River may take its domestic water supply without regard to the effect upon water powers of lower riparian owners. This, of course, has nothing to do with the right or duty of a municipality as a riparian owner to return the portion of the domestic pumpage not consumed to the waterway. Moreover, the statement in the case is purely *obiter* since the complainant was not an interested riparian proprietor.

From a consideration of the law of the complainant and defendant states, it is submitted that there is no authority for the claim that a city located upon a watercourse may divert that portion of the domestic pumpage which is not consumed instead of permitting it to return to the waterway in the course of nature. Such a proposition is directly contrary to the law of Michigan where the right of the city even to use the waters of such a stream for domestic supply without compensation is denied. It is directly contrary to the law of Ohio where it is specifically held that the portion of the domestic pumpage of a riparian city not consumed must be returned or permitted to return in the course of nature to the waterway from whence it was taken. We think that this is the unquestioned rule of the common law. We, therefore, submit that the City of Chicago has not the right to divert that portion of the domestic pumpage which is not consumed to another watershed to the detriment of the complainant States and their people.

It is clear that as against those states where the right to take a domestic water supply is purely a riparian right subject to the corresponding obligation to return the unconsumed portion thereof to the waterway, Illinois can claim no right to divert the unconsumed portion of the domestic pumpage at Chicago under the doctrine of *Kansas v. Colorado,* which holds that if a complaining state is accorded the same rights in an interstate waterway as are provided by its laws, it has no just cause of complaint. Neither can Illinois divert a portion of the water of an interstate waterway in that way as against states which hold that the state is the owner of the beds and flowing water of large navigable streams in the interests of the public, and that the state (as such owner) can, as against its citizens, take the waters thereof for any public purpose without compensation. Such a rule of law does not furnish any basis for the appropriation by an upper state of the waters of an interstate watercourse to the injury of such other state. So far as the property rights of riparian owners of such streams are concerned the fact that the state may take the waters without compensation for a public purpose is immaterial in the application of that principle. The principle of these cases of public right in a state is that the title to the bed of navigable streams and the transitory title to the flowing water is in the state. It is the property of the state; and for that reason, as a matter of intrastate law, and as a matter of conflict between the state and its citizens, the state may take the water as its own property. However, assuming that principle to prevail in two states bordering upon an interstate waterway, it by no means follows that the upper riparian state can therefore appropriate the waters of the interstate stream to the prejudice of the rights of the lower riparian state in that stream. Under the riparian right theory the upper state would be taking the property of the citizens of the lower state derived from such state as a sovereign. Under the state title theory the upper state would be taking the property of the lower state. The upper state has no greater right to take the property of the lower state than of its citizens and vice versa. The determination of whether the property rights in such stream shall be vested wholly in the state, or shall be vested partly in the state and partly in the riparian ownership of its citizens is merely a promulgation of the law of property in the state. It is a wholly immaterial question in determining the respective rights of states in an interstate watercourse under the doctrine of *Kansas v. Colorado* and *Wyoming v. Colorado.* Under that doctrine it must appear that by the law of both states certain advantages are given to an upper riparian owner against a lower riparian owner, and that the advantages which are claimed by the upper riparian state do not exceed the advantages which are accorded to an upper riparian owner by the law of the complaining state.

The manner in which a state by its law divides the property rights in flowing streams, either navigable or innavigable, between that state and its citizens is not material in determining the respective rights of states in interstate streams. That determination depends upon the relation of the total property rights in one state vested by its law in such state and in its citizens in comparison with the total property rights in such a waterway vested by the law of the other state in such state and its citizens. As they are determined the upper riparian state can not infringe them.

5.

Assuming arguendo, that the City of Chicago does divert and has the general right to divert the portion of the domestic pumpage not consumed, it can not adopt a method of diverting such pumpage which involves the abstraction of an additional quantity of water in derogation of complainants' rights.

In this case it is sought to take an additional quantity of water from the Great Lakes watershed to assist in the disposition of the portion of the domestic pumpage not consumed by transportation to another watershed. No matter how broadly the right to dispose of the unconsumed portion of the domestic pumpage may be considered, it can not justify the taking of an additional quantity of water. In short, the defendants can not select a method of disposition of the unconsumed portion of the domestic pumpage which designedly, or otherwise, involves a further abstraction of water. Such further abstraction is not part of the domestic water supply, nor is it in the exercise of any right to take such a supply. It is analogous to taking an additional quantity of water for power purposes in order to furnish the power to pump the domestic supply. This is inadmissible. *Philadelphia v. Collins*, 68 Pa. St. 106. There is no difference, either in fact or law, between taking additional water to provide power to pump the domestic supply and the taking of additional water for the purpose of carrying away in dilution the unconsumed portion of the domestic supply.

III.

THE MASTER COMMITTED NO ERROR IN NOT ALLOWING A LONGER PERIOD OF TIME FOR THE CONSTRUCTION AND PLACING IN OPERATION OF THE PRACTICAL MEASURES RECOMMENDED BY HIM.

Defendants, in their Exceptions Nos. 3 and 4, assert that the Master erred in not allowing a longer period of time for the completion of the practical measures, because, due to high rainfall during the past two years, levels of the respective Great Lakes are higher than when the Master filed his original Report on November 23, 1927. It is alleged that this presently minimizes the damages which are being sustained by the complainants, and that therefore, a longer period of time should be allowed to the defendants. This contention is wholly untenable for two reasons:

First,—the Master has allowed until December 31, 1938, a period of 9 years, for the completion of the recommended practical measures. It is, of course, obvious from the testimony in this case, and from the circumstances cited by the defendants, that by December 31, 1938, levels of the various Great Lakes may be lower than they have ever been. If the Court were to grant some additional period of time because of present high lake levels, it might very well happen that such additional period of time beyond 1938 would coincide with lower lake levels than have ever been experienced, and hence result in greater annual damages during such period than have been sustained during any of the past years.

Second,—the contention of the defendants erroneously construes the equitable principle upon which this Court allowed the defendants any period of time for the completion of practical measures before termination of the illegal diversion. The court said that "in keeping with the principles upon which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the people of that section, our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage." The measure of such reasonably practicable time is the necessities of the defendants, and not the extent of or fluctuations in the annual damages of the complainants. In short, the principle invoked is in the nature of an equitable defense *pro tanto;* and the defendants must establish the extent of that defense by proof of their necessities, and not by offering to show a temporary diminution in annual damages to the complainants.

Defendants' Exception No. 5 simply asserts that the Master erred in not accepting the maximum estimates of time made by defendants' witnesses as the reasonable period of time required for the construction of the various sewage treatment works. Defendants thereby assert that the Master should have ignored all other testimony in the case. We think that a reading of the second section of the Master's Report (pp. 35-83, incl.) demonstrates that the Master was very liberal in his allowance of time. We think that an examination of all of the evidence in the case on this point would demonstrate the extreme liberality of the Master even more clearly. We regard it as unnecessary to further comment upon this Exception.

Defendants in Exception No. 6 assert that the Special Master erred in not allowing a longer period of time because of delays "incident to acquiring sites for plants" and incident to delays in raising funds for public work. Notwithstanding the use of the plural, a site for every one of the plants described by the Special Master was long ago acquired, with the exception of the Southwest Side plant. (Master's Report pp. 45, 48, 50) That has long been selected, and counsel stated in the course of the hearings on

Re-Reference that proceedings were being initiated to acquire it. The Master has allowed a period of 2½ years for the necessary preliminary steps for the Southwest Side plant, including the acquisition of a site. (Master's Report 58) We think an examination of the evidence will disclose that this was a very liberal allowance. The Special Master allowed an additional period of one year solely as a concession to any delays incident to the raising of funds for this work. (Master's Report 80) While complainants have not excepted to this allowance, they believe that it is not justified under the facts or law; and it certainly can not be criticized as an insufficiently liberal concession to the defendants.

IV.

THIS COURT HAS ALREAY DECIDED (WISCONSIN, ET AL. v. ILLINOIS, ET AL., 278 U. S. 367) THAT IT HAS THE JURISDICTION TO DETERMINE THE EXTENT OF DIVERSION, IF ANY, WHICH IS LEGAL, AND ITS RIGHT SO TO DO IS CLEAR.

By their Exception No. 7 the defendants assert that the Special Master erred in failing to conclude that this court had no power to fix the extent of diversion which would be legal from time to time pending the construction of the practical measures, or the final diversion, if any, which would be legal, upon the completion of the practical measures. They thereby, in effect, assign error because the Master carried out the mandate of this Court on Re-Reference. The Master was specifically directed to find the facts with respect to the reductions in the diversion which might be had from time to time during the construction of the program, and whether any diversion would be necessary to maintain navigation in the Chicago River after the completion of the program. By this assignment of error defendants challenge the decision of this Court in *Wisconsin, et al. v. Illinois, et al.*, 278 U. S. 367, and assert that the Master should likewise have refused to be bound by it, and, in effect, should have overruled it. If defendants deemed the previous decision of this Court erroneous they should have petitioned for a re-hearing, pointing out the alleged error. This contention has been raised throughout this litigation, and was finally disposed of and set at rest by the previous decision of this Court in this case.

This Court held that this diversion had no legal basis except to the extent, if any, that any flow should be required to maintain navigation in the Chicago River after completion of the program. The determination of all of these questions was a determination of fact as the basis of a dedetermination of law, which is obviously a justiciable question. If this Court has no jurisdiction to determine the factual basis of the power and jurisdiction, either of the Secretary of War or the Federal Government, then it is idle to invoke the jurisdiction of this Court to protect either states or citizens from usurpation of power on behalf of either. This Court has the jurisdiction to determine the power of the Federal Government or any Federal officer to act, and if the extent of that power depends upon a determination of fact, it requires no argument to show that such facts may be determined by the Court as part of its jurisdiction. It is exactly the same kind of determination as was made in *United States v. Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, where this Court directed the lower court to determine the amount of water which might be appropriated from innavigable portions of the Rio Grande River by an Irrigation Company without substantial damage to the navigable portions of that river, and to thereupon enjoin the abstraction of any larger quantity of such waters.

V.

THE MASTER COMMITTED NO ERROR IN NOT ALLOWING AN ADDITIONAL DIVERSION IN THE ALLEGED INTEREST OF NAVIGATION IN THE CHICAGO RIVER AND THE ILLINOIS AND MICHIGAN CANAL.

By their Exceptions Nos. 10 and 11 defendants allege that the Master erred in not allowing some additional quantity of water in the alleged interests of navigation, or of the improvement of navigation along the Illinois River and the Illinois and Michigan Canal. The alleged desirability of such an allowance is apparently predicated upon some plan of improvement which the defendants would prefer to have adopted for those waters. It is unnecessary to debate the merits of the plan apparently desired by the defendants as compared with other plans of improvement involving little or no diversion of water. This Court specifically held, in *Wisconsin v. Illinois,* 278 U. S. 367, at 417, that Congress, if it had the power, had never undertaken to authorize any diversion of water for navigation purposes to or along these waters, and that no diversion for such purposes could be allowed in this case. 278 U. S. 367, at 417. The Master specifically found that there had been no action by Congress subsequent to the previous decision of this Court (Master's Report 122). Again, in effect it is alleged that the Master erred in not undertaking to overrule this Court.

VI.

DEFENDANTS' CONTENTION THAT THE MASTER ERRED IN FAILING TO FIND THAT IT IS PRESENTLY IMPRACTICABLE TO DETERMINE THE PERMISSIBLE REDUCTIONS IN THE DIVERSION DURING THE CONSTRUCTION PERIOD, OR ON THE CONCLUSION OF THE PROGRAM IS WITHOUT MERIT.

Defendants' Exception No. 13 asserts that the Special Master should have found that he was unable to answer the question submitted to the court with reference to the reductions in the diversion which would be practical from time to time during the construction period, and whether any diversion would be necessary in order to maintain navigation in the Chicago River upon the completion of the program. They also reiterate in effect the claim that this Court should abdicate its jurisdiction in this case and turn it over to the Secretary of War for determination. This has already been covered in connection with the discussion of defendants' claim of lack of jurisdiction in this Court. The initial reduction prescribed by the Special Master is sustained by the testimony of the witnesses for both complainants and defendants. (Master's Report 83-105, incl.) The Secretary of War has incorporated this finding in his Interim Permit covering the period between the expiration of the Permit of March 3, 1925 and the entry of the decree in this case. While there is much evidence supporting the Master's finding as to the initial reduction which is necessarily not reviewed in his Report, we think it unnecessary to burden the Court with a reference thereto because the finding is so overwhelmingly supported by the evidence, and is, in fact, substantially uncontradicted. With respect to the question of what diversion, if any, is necessary to maintain navigation in the Chicago River after the completion of the practical measures recommended or available for the disposition of the sewage of the District without diversion, complainants submit that the evidence which has heretofore been discussed in Part II of this brief (Pages 38 to 73 *ante*) not only establishes that it is practical now to determine whether any diversion will then be necessary to maintain navigation in the Chicago River, but conclusively shows that no diversion or flow at Lockport will be in fact necessary to maintain navigation in that River, and that in fact the available practical measures will provide conditions in that river far superior to those ordinarily considered necessary or achieved to maintain navigation in the principal ports of the United States.

VII.

THE SPECIAL MASTER SHOULD HAVE RECOMMENDED THAT COSTS BE TAXED AGAINST THE DEFENDANTS INCLUDING THE FEES OF THE SPECIAL MASTER.

On the previous decision in this case the court found that the defendants had for many years maintained an unlawful diversion in contravention of the rights of the complainants, and that through such illegal action on the part of the defendants, the complainants had sustained great damages to their navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other interests, and to riparian property in general. 278 U. S. 367, at 407-9. The complainant States were compelled to prosecute long and expensive litigation to vindicate their rights and the rights of their citizens. It was not a suit involving "one of those governmental questions in which each party had a real and vital, and yet not a litigious interest" (*Nebraska v. Iowa,* 143 U. S. 359, 370). These suits involved interests which entitled the complainants to costs upon an adjudication that their complaints were meritorious. (*South Dakota v. North Carolina,* 192 U. S. 286, 321.) Apparently if complainants' appeals had not been meritorious, costs would have been adjudged against them as they were charged against New York in the case of *New York v. New Jersey,* 256 U. S. 296, 313. There is no instance of such vast injuries being suffered with such great patience as has been exhibited by the complainant states and their peoples in connection with this controversy. All other recourse failing, they were compelled to resort to litigation before this Court. Their right to relief has been sustained; and we regard it as clear under the decisions of this Court that they are entitled to a recovery of their costs from the defendants. (*North Dakota v. Minnesota,* 263 U. S. 583.)

For the foregoing reasons the exceptions of the complainants should be sustained, the Master's Report should be amended in accordance with the prayers of the complainants, and the decree as tendered by them entered.

Respectfully submitted,

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APPENDIX.[1]

The following is an extract from page 14 of Exhibit 102 entitled: "Statistics Relating to the Freight Commerce of the Great Lakes, the Chicago River, the Chicago Sanitary Drainage Canal and the Illinois River."

To the statistics for the Chicago Drainage Canal for 1924 there is appended the note:

> "A few large manufacturing companies, one oil company, and one public utility corporation, maintain storage plants along the waterway, and the commerce consists largely in the removal of material from these storage plants and quarries to distributing stations in the city of Chicago.
>
> The Sanitary District estimates that an average of one vessel a week—launches, canoes, and row-boats—used the canal during the navigation season."

A note practically identical with the above is appended to the 1925 statistics.

To the 1923 statistics there is appended the note:

> "Practically all of this material except spoil bank stone was transported by the owners in their own floating plant. The spoil bank stone was transported by local contractors, using their own scows and tow boats.
>
> The lockage records of the Sanitary District show that 133 vessels—mostly launches and other pleasure boats—passed through the lock at Lockport during the year 1923.
>
> The 1925 traffic of the drainage canal consisted of 659,568 tons of stone and 28,527 tons of gasoline and other oils; the 1924 traffic of 479,637 tons of stone and 51,280 tons of oils, and the 1923 traffic of 364,889 tons of stone and 47,162 tons of oils."

---

[1] This appendix is added, pursuant to agreement of counsel, to set forth for the convenience of the Court certain items of evidence to which reference is made in the foregoing brief, and which were inadvertently omitted from the Joint Abstract.

John W. Woerman, called by defendants on Original Reference. Principal Assistant Civil Engineer in the United States District Engineering Office at Chicago.

> (Record 4200). "There is no through commercial traffic between the Des Plaines River and Lake Michigan that I know of at the present time. There has been no through traffic over the Sanitary & Ship Canal since it was opened that I am familiar with, but during 12 or 13 years of that period I was in the St. Louis office and very possibly there was some that I did not know about. It is possibly true that there could not have been such traffic in very considerable amount and I not know of it."

Extracts from Defendant's Exhibit 1157, entitled: "Report of the Engineering Board of Review of the Sanitary District of Chicago on the Lake Lowering Controversy and a Program of Remedial Measures":

> 12. Turbidity—An intensive study by the Department of Health for the nine months from February to October, 1924, shows that turbidities of 50 parts per million or more occur at all of the cribs, with a duration of two to seven consecutive days for the cribs off the Chicago River front. Turbidities were more than 20 parts per million in some months for 50 to 90 per cent of the time. The highest turbidity of 100 parts per million was reached at the Two-Mile crib. Table 7 shows the monthly average turbidities, and Table 8 the relation of turbidities at the several cribs.
>
> 13. Observations at the Two-Mile crib by the staff of the city engineer between the years of 1915 and 1923 show that in some months the turbidity was 50 parts per million for a little over 50 per cent of the time, and that the turbidity of 50 parts per million or more was continuous in one month for 10 consecutive days. These high turbidities occur annually for from three to seven consecutive days. Rarely was the turbidity at this crib less than 10 parts per million, an amount easily dis-

cernible in a drinking glass. Table 9 shows the duration of continuous periods of relatively high turbidity at the Two-Mile crib. (Ex. 1157, pp. 25-26.)

George B. Gascoigne, recalled by Complainants on Re-Reference. A sanitary engineering expert.

DIRECT.

My attention is directed to the statements of witnesses for defendants that the sewage problem at Chicago amounts to providing treatment for a population of about 7,000,000 people. If the size of the sewage disposal problem at Chicago (10679) is measured on the same basis as is ordinarily used in measuring the sewage problems of other cities (10680), the Chicago Sanitary District problem is the treatment of the sewage of a population of 4,785,000 in 1945 as set forth on page 113 of part 3, Appendix 1, Board of Review Report, entitled, "Sewage Disposal." As of that date the industrial load is given roughly as 40 per cent. There is nothing unusual or unique in such a proportion of industrial load in a sewage problem. (Complainants' Abstract, pp. 15-16.)

CROSS EXAMINATION.

When I stated that it is quite usual to find industrial waste loads of from 30 to 50% additional to the human population sewage load I had in mind, from personal experience, the West Side Treatment Works at Cleveland. There are other cities such as Milwaukee, Madison and (11140) Indianapolis. Any engineer who is specializing in sewage treatment work is acquainted with what is going on at Milwaukee, Chicago and Indianapolis as regards activated sludge treatment. I refer to my experience in the design of the plant at the West Side in Cleveland, serving 200,000 persons, with an industrial load from stockyards of approximately 100,000, if not a little more. (Defendant's Abstract, p. 335.)

(11199) The industrial load at the Southwest Side Plant expressed in equivalent population as of 1945, is 100%, the human population (11200) served by that plant to be 1,200,000 people. I do not know of any sewage disposal plant of this size. The largest is the North Side Plant at Chicago, with (11203) designed capacity of 830,000 people. The capacity may be increased some, under certain conditions of operation. (Defendant's Abstract, p. 349.)

Extract from Exhibit 1 entitled: "Diversion of Water from Lake Michigan" by Major Putnam, District Engineer, November 1, 1923.

> "Were it not for the inertia of the water in the canal it would be possible to divert only 4,167 cubic feet per second regularly, and, upon due warning, increase the diversion to any necessary amount. But while a heavy storm can concentrate in 6 to 8 hours it generally takes 12 to effect any appreciable increase in flow through the Chicago River by opening the gates at Lockport so that the river might discharge into the lake for several hours before flow toward Lockport could be re-established. (p. 57) (Complainants' Abstract, p. 370.)

Extracts from Exhibit 18, House Document No. 4, 69th Congress, 1st Session, entitled: "Report of the Board of Engineers for Rivers and Harbors on Illinois River, Illinois" dated March 29, 1926.

> "6. The resolution next calls for answers to four specific questions. These questions are listed and answered successively below:
>
> Question 1. What is the estimated cost of channels each 200 feet wide and of depths of 7, 8, and 9 feet, from Utica to the mouth of the Illinois River, on the basis of assumed diversions of water from Lake Michigan of 2,000, 3,167, 7,500, 8,500 and 10,000 second-feet?
>
> 7. Before answering the question, it is necessary to define what is meant by 'diversion.'

(a) The word is used in the district engineer's report and in the present report, unless otherwise stated, to mean the flow in the drainage canal at Lockport. It consists of two parts: (1) The water withdrawn from Lake Michigan for Chicago's water supply, and delivered into the river after use. (This at present is about 1,400 cubic feet per second, but after the metering of the city's water it is expected to be reduced to about 900 cubic feet per second.) (2) All the rest of of the flow, which is considered as the diversion of the Sanitary District of Chicago, and is limited by a War Department permit." (Ex. 18, pp. 8-9.)

* * * * *

"12. The resolution requires the submission of estimates for improving the Illinois River to given dimensions for each of several 'assumed diversions of water from Lake Michigan.' It is supposed that by 'diversions' the Committee on Rivers and Harbors meant 'annual average flows at Lockport,' for it is the flow at Lockport that is inclusive of all diversions from Lake Michigan at Chicago, and it is the annual average flow that is effective as regards the levels of the Great Lakes." (Ex. 18, p. 21.)

"42. The total amount of pollution increases directly with the population and with it the danger of typhoid infection. But if the water intakes are moved farther from the source of pollution, the degree of pollution decreases almost as the cube root of the distance moved. In other words, if Milwaukee conditions, with the intake located 5 miles north of the discharge of the sewage treatment plant, will produce a death rate of not over 2 per 100,000 by 1930, the same system with an intake located 10 miles from the mouth of the Chicago River should produce equal results for Chicago, assuming 85 per cent or better treatment of all the sewage; for while the population involved is seven times as great, doubling the distance between intake and discharge should give eightfold protection, due regard being had to prevailing currents in the lake in the selection of location of the intakes." (Ex. 18, pp. 222-3.)

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IN THE

Supreme Court of the United States

October Term, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS,
Intervening Defendants.

No. [redacted] Original. 6

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. [redacted] Original. 10

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

No. [redacted] Original. 11

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GUNTHORP-WARNER PRINTING COMPANY, CHICAGO.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA, *Complainants,* *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** *Defendants.* **STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI and STATE OF ARKANSAS,** *Intervening Defendants.*	**No. 7, Original.**
STATE OF MICHIGAN, *Complainant,* *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** *Defendants.*	**No. 11, Original.**
STATE OF NEW YORK, *Complainant,* *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,** *Defendants.*	**No. 12, Original.**

DEFENDANTS' BRIEF UPON EXCEPTIONS TO SPECIAL MASTER'S RE-REFERENCE REPORT.

STATEMENT OF CASE.

These original suits in equity, instituted by certain States bordering upon the Great Lakes to enjoin the diversion of water from Lake Michigan at Chicago by the defendant, Sanitary District, are again before the Court for hearing upon the exceptions filed by all parties to the Special Master's Report on Re-reference pursuant to the opinion and order of the Court of January 14, 1929.

The Court's opinion (278 U. S. 367) was rendered pursuant to a hearing upon the exceptions of the Complainants to the Special Master's Original Report filed November 23, 1927, and it is printed for convenience as an appendix to this brief.

THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS OF THE SPECIAL MASTER'S REPORT ON RE-REFERENCE.

The re-reference was conceived by the Special Master to embrace the determination of the practical measures required to accomplish with due speed the elimination of the unwarranted part of the diversion, namely, that portion which was and is used to oxidize sewage and wastes and which may not be required in the interest of navigation and its protection when practicable artificial means are used to purify said sewage (Master's Report, p. 4*). The Special Master having found what plants and structures are practicable, (costing approximately $176,000,000), to be installed and put in operation to purify and eliminate sewage and wastes, was confronted with the fact, well known in the sanitary engineering art, **that such works will not entirely, (100%), purify, eliminate or dispose of all the sewage and wastes of the great metropolitan area of Chicago and its environs** (Master's Report, p. 35). **The extent of such purification or elimination of sewage and wastes will be only 85 to 90 per cent of complete theoretical purification at ordinary dry weather times after all such sewage disposal works are in operation** (December 31, 1938). These works will not and cannot practicably at *storm times treat a volume of sewage flow in sewers substantially in excess of 150 per cent of the dry weather flow.* At storm times all flow in the sewers in excess of 1½ times the dry weather flow never will come in contact with or reach the sewage disposal plants, and the sewage and wastes therein will be wholly untreated (Master's Report, pp. 34, 35).

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*Note: The Special Master's Report on Re-reference filed December 17, 1929, will be referred to herein as "Master's Report," and the Special Master's Original Report of November 23, 1927, will be referred to as "Master's Original Report."

Consequently, the effluents from the sewage disposal plants containing the residual wastes equal to 15 per cent, (maybe 10 per cent), of the untreated sewage of the human population and industrial waste equivalent population, (6,000,000 on December 31, 1938, when all works shall be in operation according to the Master's Report and 6,800,000 in 1945), served by the plants, and at storm times vast and increasing quantities of wholly untreated sewage and wastes must pass into the channels of the Chicago and Calumet Rivers and Canals of the Sanitary District, part of the waters of the Port of Chicago (Master's Report, p. 136).

These effluents, at dry weather times equal to about 1,700 cubic feet per second flow in the sewers, and the storm water, equal frequently to 6 or 7 times that amount, must pass from the rivers and channels of the Port of Chicago either into Lake Michigan or away from the Lake through the Main Drainage Canal to the DesPlaines River at Lockport (Master's Report, pp. 92, 93, 138), where they have been *all* discharged for the last thirty years and where they were, *to a considerable degree,* passed for almost fifty years before that (Joint Abst., 87).

The Special Master, having had the benefit of the opinions of the various experts for all the parties, and *particularly* of General Jadwin, then Chief of Engineers of the United States Army, called to testify by the

Special Master, also concluded that, while no discharge at Lockport is required for purposes of navigation in the Chicago River so far as depths are concerned, nevertheless it would be **incompatible with the interests of navigation and its protection in the rivers and canals of the Port of Chicago, including the Chicago Harbor, for these effluents and storm water, with its untreated sewage and wastes, to be discharged into Lake Michigan** (Master's Report, pp. 126, 138); and that they *should pass* in the interest of navigation and its protection, *through the Main Drainage Canal to the DesPlaines River, together with a reasonable amount of water from Lake Michigan to prevent the waters of the Port of Chicago, including the Harbor and Shore waters, becoming objectionable from a nuisance standpoint to navigation and to other interests such as bathing and domestic water supply uses* (Master's Report, pp. 126, 135-140).

Believing that he was directed by the Court's Opinion (January 14, 1929) to consider the subject, the Special Master concluded from the opinions of said experts and from the opinions of General Jadwin, the Chief of Engineers, that the amount of diversion in the interest of navigation and its protection, so far as navigation in the Port of Chicago was concerned, should be, when all the works are in operation, 1,500 cubic feet per second* (Master's Report, pp. 138-140). Thus, the total discharge from the Drainage Canal at Lockport would be 3,200 cubic feet per second, that is, 1,700 second feet of effluent at ordinary dry weather times (assumed to be approximately the pumpage from the lake for ordinary domestic purposes), plus the above mentioned 1,500 cubic feet per second which includes about 1,000 cubic feet per second direct from the Lake, and about 500 cubic feet per second, being the rain water runoff of the Chicago River and Calumet River Watersheds.

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*Note: "Cubic feet per second" will at times be indicated by the abbreviation c.f.s.

Having concluded as a matter of law that complainants *had not* by their pleadings *complained* and *could not* in law *complain* of the use of water pumped for ordinary domestic purposes by the City of Chicago and the other cities within the territorial limits of the Sanitary District, and that the place of discharge of sewage in the form of effluents from sewage treatment plants and storm water, was within the discretion of the defendants (Master's Report, pp. 120, 121), the Special Master further concluded that the said 1,500 cubic feet per second in addition to the pumpage, would not cause such a substantial injury to the complainants as to warrant the discharge of effluents and storm water wastes into Lake Michigan, thus interfering with navigation and bathing beaches and endangering the domestic water supply (Master's Report, p. 140).

The Special Master also recommended certain reductions in the diversion at certain times during the construction period corresponding to completion dates as fixed by him for important units of the construction program. Consequently he recommended that the diversion be fixed at 6,500 cubic feet per second (in addition to pumpage) from July 1, 1930, to the date when controlling works should be installed either at the mouth of the Chicago River near Lake Michigan or in the Main Drainage Canal near its northern terminus, to prevent reversals or flows of the Chicago River, in times of storm, into Lake Michigan, at which time the diversion should be reduced to 5,000 cubic feet per second in addition to domestic pumpage; and at that amount it should continue to the end of the construction period, December 31, 1938, when it should be reduced as before stated to 1,500 cubic feet per second, in addition to pumpage.

However, the reduction in diversion below the 6,500 second feet after July 1, 1930, is to be subject, according to the Master's Report, to the approval of plans (to be submitted immediately to the War Department by the Sanitary District) by the Secretary of War on the recommendation of the Chief of Engineers for and the construction of said controlling works within two years after such approval of plans (Master's Report, pp. 142, 143, 147).

The decree recommended by the Special Master, in addition to embodying the above mentioned findings as to completion dates for the different sewage treatment works, including said controlling works to prevent flows into Lake Michigan from the Chicago River, and as to amounts of diversion (in addition to pumpage), during the construction period, and at the end of such period, provides, in ordinary mandatory and coercive terms, for injunctions against the defendants to compel the installation of the said works at the times stated and to prevent diversions in excess of those fixed. The decree recommended also provides that the Court should retain jurisdiction for the purpose of entering any order or direction or modification of the decree or any supplemental decree in relation to the subject matter, and for the purpose of receiving and acting upon reports required by the decree to be filed semi-annually, beginning July 1, 1930, by the Sanitary District relating to the progress of construction work on the sewage disposal plants, the extent and effects of the operation of plants placed in operation, and the average diversion of water covering the period from the entry of the decree to the date of the particular report.

The recommended decree also provides that upon the coming in of each of said reports, any of the parties may apply for such action or relief, either with respect to the time to be allowed for the construction or the progress of construction, or the methods of operation of any of the sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate, and that at the foot of the decree the parties may apply for any other or further action or relief, irrespective of the filing of the above mentioned reports (Master's Report, pp. 148, 149).

DEFENDANTS' CONTENTIONS ON THEIR EXCEPTIONS.

Defendants' objections to the Special Master's Report embrace principally the following contentions:

(1) The Master's Report (p. 85) finds that

> "since the hearings on the original reference (1926-27) the levels of Lake Michigan and of the other Great Lakes have risen",

Lakes Michigan and Huron approximately 3 feet 9 inches, Erie and Ontario during the said period exhibiting a corresponding relative rise in level. Consequently, there is now no interference to complainants' commercial, riparian and other interests due to the diversion at Chicago to the amount fixed by the March 3, 1925, permit. On the contrary, the said high lake levels have caused and are now causing and will cause damage to complainants' riparian interests, to docks, wharves, piers and other like structures. If complainants' contention is correct as to the effect of the Chicago diversion in lowering lake levels, the damage so caused would have been greater had such diversion not existed and therefore such damage will be greater if said diversion is reduced (Defts. Ex. 1456, Photographs showing conditions of high water and effect of same upon shore properties).

The hydrograph of the Great Lakes (Defts. Ex. 1447), showing the rise and fall of their elevations from 1860 to date, indicates that under ordinary circumstances such high lake levels extend over periods of from six to eight years. For instance, in 1881 when the levels of Lake Michigan reached approximately the elevation 582 (present level of Lake Michigan 582.4—Master's Report, p. 86), in the beginning of the year, they remained at the same elevation or higher until the latter part of the year 1888. During four years of that period, namely, from the beginning of the year 1883 to the latter part of the year 1886, they were always above 582, and during a considerable portion of such period they were above 583. From about the middle of the year 1875 to the end of the year 1878, they were substantially 582 or higher. From the beginning of the year 1860 to the end of the year 1863, except for a period of two months, they were always above 582. From the beginning of the year 1904 to the end of the year 1908, they remained substantially at elevation 581. From the middle of the year 1916 to substantially the end of the year 1920, except for short periods, they were near elevation 581.

In view of said high lake levels now existing, which in all probability will continue to exist for a number of years, the nine year period (ending December 31, 1938), fixed by the Master for the construction of all the sewage disposal works required, is too short. It appears from his report that he disregarded to some extent the testimony of defendants' witnesses as to the reasonably practicable period required for construction, and fixed the short period of nine years as the period of construction for all the works, in view of his conclusion that the Court by its opinion of January 14, 1929, intended to impose "an immediately heavy burden" upon the Sanitary District in the installation of said works (Master's Report, p. 80).

This conclusion as to the effect of the Court's opinion should not have been given weight since the said opinion was rendered with reference to low lake level conditions when there was a supposed immediate or existing injury to the complainants' commercial and riparian interests. The high lake level conditions removed any necessity for undue haste or the imposition of "an immediately heavy burden" in the installation of the sewage treatment works. Furthermore, in all likelihood, compensating works for lake levels may be constructed by the time high lake levels may recede, which works the Master found by his Original Report to be entirely feasible costing only a small sum, a reasonable portion of which expense the Sanitary District has offered to bear (Master's Original Report, p. 125).

(2) The program for the installation of sewage disposal works and their appurtenances, requires the expenditure of the huge sum of approximately $176,000,000. This program is made up of immense plants—Southwest Side Project costing approximately $71,000,000, West Side Project costing approximately $62,000,000, Calumet Project costing approximately $21,000,000 and other miscellaneous works costing several millions (Master's Report, pp. 10, 11). The magnitude of these plants almost surpasses the powers of imagination. Located upon areas of from 500 to 600 acres each for the largest plants, and each serving populations of 2,000,000 to 2,500,000 people or industrial waste equivalent population, they have no peers in the sanitary engineering art. The nearest approach to those two large projects (West Side and Southwest Side Works), is the Sanitary District's own North Side Project, upon which there has been expended $33,000,000 and will be expended to complete, the additional sum of $4,783,000 (Master's Report, pp. 7, 10), serving a population of 830,000 people and being the larg-

est activated sludge sewage disposal plant in the world. The Master should have extended the completion date fixed by him (ending December 31, 1938) for all the projects for a number of years to about January 1, 1945, to allow for necessary delays due to carrying on a number of vast construction projects at the same time by one organization, (the Sanitary District), and to acquiring sites for plants and rights of way through condemnation, and to delays necessarily arising in a municipal corporation's raising and providing moneys as and when needed for construction work.

(3) The decree of the Court if entered as recommended by the Master, fixing the amounts of the diversions in the interest of navigation and its protection at various times during the period of construction as important units in the construction program go into operation and at the end of the period when all the works are completed and in operation, would usurp the functions of the Secretary of War on the recommendation of the Chief of Engineers under section ten of Rivers and Harbors Act of 1899, and invade the Political and Administrative branches of Government contrary to the Constitution. However the Court can properly determine what works should be constructed and put in operation and the time for the completion of such works.

(4) The Master concluded that all the works installed, (December 31, 1938), to treat from a practicable standpoint all the sewage and wastes, will accomplish only 85 to 90 per cent purification of such sewage and wastes; that the population and equivalent population in trade wastes of the Sanitary District when the works are installed, will be approximately 6,000,000 people, and by 1945 approximately 6,800,000; that there will remain an effluent from these sewage purification works substan-

tially equal to the raw sewage of 10 to 15 per cent of the human population and equivalent population in industrial wastes served by such works, or equal to the untreated sewage of a city of 600,000 to 900,000 people; that it is impracticable to treat all the sewage at storm times; that at such storm times only 150 per cent of the dry weather flow may be, practicably, treated; that consequently at storm times, when the storm flow will range from 1½ to 7 times the dry weather flow, there will be large quantities of sewage wholly untreated that will not come in contact with or be treated by any sewage disposal works; that said effluent from said sewage purification works and sewage wholly untreated at storm times, must pass into the Chicago River and its branches and the various channels and canals of the Sanitary District; that complainants have not sought by their bills of complaint to enjoin the taking of water from Lake Michigan by the City of Chicago for the ordinary uses of its inhabitants; that as a matter of law, the City of Chicago is entitled to take its water supply from Lake Michigan for the ordinary and reasonable uses of its inhabitants; that when the City of Chicago sought to intervene in this case to assert its right of domestic consumption, complainants opposed such intervention and this was denied; that, if it is so entitled, then it cannot be said that the State or the City is subject to any established rule of law which requires it to turn into the Lake what is no longer water but sewage or the effluent of sewage treatment works (Master's Report, pp. 120, 121); that the effluents from the sewage treatment plants and the storm water must go somewhere; that with all flow stopped at Lockport, the said effluent from sewage disposal works, together with untreated sewage and waste carried with storm flow, discharged into the limited channels of the Drainage Canal and Chicago River, will create conditions in these channels seriously detrimental to navigation; that the discharge of this effluent and storm water into Lake Michigan, even with circulating water through the Chicago River, would be incompatible with the interests of navigation in the Chicago Harbor, and there would be serious danger of contaminating the water supply and of creating offensive conditions at the bathing beaches of the city (Master's Report, pp. 136-140); that if the effluents from the sewage treatment plants and the storm water are taken away from the Lake, and discharged through the canal at Lockport, both the danger to the water supply will be removed and conditions suitable to navigation can be maintained; that under such conditions, 1,500 c. f. s. annual average from the Lake is required to maintain proper conditions for navigation; that the said 1,500 second feet annual average diversion from the Lake, in addition to domestic pumpage, would not produce

> "such a substantial injury to the complainants when the fluctuations of lake levels due to other causes than diversions are considered as to preclude attention to the serious consequences which may result from a failure to maintain suitable conditions in the interest of navigation in case all flow at Lockport should be terminated" (Master's Report, p. 140);

that this disposition of the problem by the discharge of the effluent from treatment plants and storm water, together with 1,500 cubic feet per second annual average from Lake Michigan, is

> "in accord with the equitable principles which appropriately govern the exercise of the jurisdiction to determine controversies between States, a jurisdiction which is unfettered by technicalities and in the last analysis is for the purpose of establishing substantial justice." (Master's Report, p. 139.)

It appears that there is navigation in the Chicago River or its branches which passes over and upon navigable waters of the United States south of the southern terminus of the Drainage Canal, namely, upon the DesPlaines River, the Illinois and Michigan Canal and the Illinois River (Master's Report, pp. 122-123); that there will be required to maintain the waters of the DesPlaines River, Illinois and Michigan Canal and Illinois River in a condition reasonably acceptable for navigation when all the sewage disposal works are installed with the discharge of the effluent and storm water to the DesPlaines River, a total discharge, including effluent, storm water and diversion directly from the Lake, of approximately 5,000 cubic feet per second, or approximately 3,300 cubic second feet diversion from the Lake, in addition to pumpage, (1,800 cubic feet per second more than the 1,500 cubic feet per second that the Master allowed), (Master's Report, pp. 94-95).

Defendants contend that the Master should have found that said 3,300 cubic feet per second diversion in addition to domestic pumpage, will be required in the interest of navigation and its protection and that it would be a reasonable amount under all the equitable considerations involved, and that said 3,300 cubic feet per second, in addition to domestic pumpage, would be a reasonable riparian use of the Great Lakes waters.

(5) Even considering only that navigation which plies in and about the Port of Chicago and the various waters thereof and enters the Chicago River from Lake Michigan, or passes from the Chicago River into Lake Michigan, according to the weight of the evidence, a mean annual diversion of 2,000 cubic feet per second in addition to domestic pumpage instead of 1,500 cubic feet per second in addition to domestic pumpage, as allowed by the Master, will be required when all the sewage purification works are installed, and such amount is a reasonable amount under all the equities of the case (Special Master's Report, pp. 131-132).

(6) It is impracticable at this time to determine the amounts of diversion that may be required in the interest of navigation and its protection at the end of the construction period for the sewage disposal plants and at various times during the construction period when the important units of the program go into operation (Joint Abst., 69-70, 74). Therefore, the Master should have provided by the decree for the determination of such amounts at such times, or that the determination of such amounts at such times should be made by the Secretary of War upon the recommendation of the Chief of Engineers, being the officers of the United States particularly qualified by reason of training and experience, and provided with the equipment of their departments, to make such determinations.

COMPLAINANTS' CONTENTIONS ON THEIR EXCEPTIONS.

(1) Complainants do not except to the findings of the Master with respect to the time of completion of the different sewage disposal works, nor do they except to the construction period for placing in operation all of said works, as recommended by the Master, December 31, 1938.

(2) Complainants have not excepted directly to the conclusions of the Master (Master's Report, p. 139) that the disposition of the problem by the discharge of the effluent from treatment plants and storm water, together with a reasonable diversion of water from Lake Michigan (1,500 cubic feet per second annual average) through the Main Channel of the Sanitary District to the DesPlaines River, is in accord with the equitable principles which govern this Court in determining similar controversies; and that (Master's Report, p. 140) the 1,500 feet annual average diversion from the Lake in addition to domestic

pumpage, would not produce such a substantial injury to the complainants under all the circumstances of the case as to preclude attention to the serious consequences which may result from a failure to maintain suitable conditions in the interest of navigation, in case all flow at Lockport should be terminated.

On February 3, 1930, pursuant to the order of Court, exceptions were filed by all the complainants. On February 24, 1930, New York obtained leave to withdraw its exceptions and substitute other exceptions. The exceptions thus substituted by New York are substantially similar to the exceptions filed by all the complainants on February 3, 1930, except that New York does not object to the conclusion of the Master that the effluent from sewage disposal works should be discharged through the Drainage Canal to the DesPlaines River. This action of New York in thus substituting the said exceptions is in harmony with the statement of Attorney General Ward of New York in oral argument before the Master that

> "Chicago should be left to say whether it wants to turn its sewage into its water supply. Certainly the complaining states do not want Chicago to turn its sewage into this water supply. That is our water supply as well as Chicago's." (Joint Abst., 676).

(3) Complainants' exceptions, however, raise almost every issue of fact that was before the Special Master on re-reference, except, as before stated, the issue involving the time of construction of the different units of and of the entire construction program. Their exceptions on the facts apparently fall into three general heads.

The *first* general head relates to the failure of the Master, as they say, to include as a part of the practical measures to dispose of the sewage of the Sanitary District other than by Lake diversion, the installation by the

City of Chicago (not a party to the suit) of a different water supply system, namely, the extension of intake tunnels many miles further into the Lake, or the construction of one super tunnel in place of the other intake tunnels, and the installation of filter plants for the entire water supply of the city, including works for chlorination of the water supply, (which works would cost the City of Chicago upwards of $80,000,000 to $140,000,000—Joint Abst., 522, 618, 637); the installation by the City of Chicago of an entirely separate sewer system to collect only the sewage from houses and buildings, the present sewers carrying the storm water, (costing approximately $400,000,000—Joint Abst., 371-387); provision by the Sanitary District for the chlorination of the effluent of sewage disposal works, and construction of outfall sewers or tunnels from the respective sewage disposal plants many miles to the Lake to divert the effluents wholly from the Chicago River and its auxiliary channels directly to the Lake, or the utilization of existing pumping stations or construction of new pumping stations to provide circulating water for the Chicago River and its auxiliary channels from Lake Michigan through such channels and then back to the Lake; and the provision by the Sanitary District for passing through the Imhoff tank part or preliminary settling tank part of the sewage disposal works, not, a volume at storm times equal to 150 per cent of the dry weather flow found by the Master to be the amount practicable, but a volume at such storm times equal to about 4,000 c.f.s., which is about 2¼ times the ordinary dry weather flow.

These works and provisions which complainants claim should have been included by the Master as part of the practical measures to dispose of the sewage of the Sanitary District, were never urged by the complainants to be a part of any such practical measures, but on the contrary, complainants by their findings stated with reference to all such works and provisions in substance that "the construction or installation of any such additional works or structures should be left to the discretion of the defendants" (Joint Abst., 666).

The Master found the works to be installed to provide a practicable method or program for complete treatment, to be the very works mentioned in Complainants' Requested Finding VIII (Joint Abst., 665).

The *second* general subdivision of their exceptions to the Special Master's Findings of Fact, relates to the Master's conclusions that, after the installation of controlling works and after all sewage treatment works have been installed, the diversion should not exceed an annual average of 1,500 c.f.s., in addition to domestic pumpage (Master's Report, p. 143); that such controlling works, either at the north end of the Drainage Canal or at the mouth of the Chicago River, should be installed by the Sanitary District after the Secretary of War, on the recommendation of the Chief of Engineers, has approved the plans (Master's Report, pp. 142-143); that the diversion should not be reduced during the construction period below 5,000 c.f.s., until such controlling works are installed (Master's Report, p. 143); that the question of pumpage from the Lake by the City of Chicago and other municipalities for the ordinary domestic purposes, is merely incidental to that relating to the diversion as the bills were only brought to restrain the Sanitary District from abstracting water from Lake Michigan, and the State has not been called upon to answer on the theory that the mere taking of water by the City of Chicago for the ordinary uses of its inhabitants, constituted an actionable wrong (Master's Report, 120); that the City of Chicago, under authority of the State, has the riparian right to take water from Lake Michigan for the ordinary uses of its inhabitants, and there is no question before the Court as to any abuse of that right (Master's Report, p. 121); that, the City of Chicago having the right to take its water supply for ordinary domestic purposes, it will not follow that there is any rule of law which requires it to turn into the Lake what is no longer water but sewage or the effluent of sewage treatment plants (Master's Report, p. 121); that there are no means known at present of otherwise disposing of the effluent from the sewage treatment plants when they are in operation, and, therefore, such effluents must be turned into the Drainage Canal and Chicago River and thence to be discharged at Lockport, the western terminus of the Main Drainage Canal, or be carried into Lake Michigan (Master's Report, pp. 121-122); that such navigation as now passes from the Drainage Canal to the DesPlaines River and the waterways south, would be cut off by a complete stoppage of flow at Lockport (Master's Report, p. 122); that pollution of navigable waters caused by the introduction of sewage has relation to the interest of navigation (Master's Report, 126-127); that storm flow, which cannot be taken care of by the sewage treatment plants, will pass into the Chicago River and the Canals of the Sanitary District and will contain sewage and wastes untreated (Master's Report, p. 35); that it is far from demonstrated that with all flow stopped at Lockport, the concentration of such a vast volume of effluent as will flow from the sewage plants, together with untreated sewage and wastes at storm times, into the limited channels of the Drainage Canal and Chicago River, will not create conditions in these channels seriously detrimental to navigation (Master's Report, p. 137); and that, if the effluent from the sewage treatment plants and storm water are to be discharged through the Drainage

Canal at Lockport, some flow of water from the Lake, (about 1,500 c.f.s, in addition to pumpage), will be required in the interests of navigation in the Chicago River as part of the Port of Chicago (Master's Report, p. 138).

The *third* general subdivision of complainants' exceptions to the findings of fact, relates only to the Master's statement "no recommendation is made as to costs" (Master's Report, p. 145).

The complainants also except to the failure of the Master to find as requested by them, but inasmuch as these relate to the exceptions to particular findings of fact, above mentioned, it is unnecessary to point them out here.

(4) The failure of the Master to conclude with reference to the law, as requested by the complainants, is also the subject of certain exceptions. The conclusions of law requested by complainants and refused by the Master to which exceptions are taken are in substance as follows: that the defendants should cease all flow or diversion at Lockport at the end of the construction period for all the treatment plants (Joint Abst., 669); that the discharge of liquid sewage or street wash into navigable waters of the United States does not constitute an obstruction to or interference with navigation or impairment of navigable capacity (Joint Abst., 670); that the discharge by the defendants of the domestic pumpage and/or the runoff of the Chicago and Calumet River basins to the DesPlaines River, constitutes an illegal diversion (Joint Abst., 670); that, upon the completion of the program of practicable measures for the disposing of the sewage of the Sanitary District of Chicago by other means than Lake diversion, no diversion or flow at Lockport may be lawfully maintained (Joint Abst., 671); that the effluents

from the treatment plants when the construction program is completed should be discharged by such methods as will remove all said effluents from the Chicago River and the navigable channels of the Sanitary District of Chicago and provide for the discharge of such effluents into Lake Michigan or elsewhere in such manner and at such places as will not create any obstruction to or interference with navigation or the navigable capacity of any of the navigable waters of the United States (Joint Abst., 672); that complainants are entitled to a decree enjoining the defendants, their agents, etc., from diverting any water and from maintaining any flow through the controlling works at Lockport subsequent to the date when the entire construction program is completed.

(5) With complainants' exceptions and apparently as part of same, complainants have submitted "Requested Form of Decree" "to carry out the exceptions * * * taken to the Report of the Special Master." (Their Exceptions, p. 37 *et seq.*)

Defendants' form of Decree submitted to the Special Master is still the one that defendants urge (Joint Abst., 653-660). It finds what works should be installed to treat the sewage and wastes, from a practicable standpoint, substantially as found and recommended by the Special Master (Master's Report, pp. 146-147). The dates of completion of the different important units of construction program and for all the works (Jan. 1, 1945), are set forth in the form of decree submitted by defendants, (Joint Abst., 659). The form of Decree provides for the Court's retaining jurisdiction until all the works are put in operation. The amounts of the diversion, from time to time during the construction period and at the end of the period, are to be fixed by the Secretary of War on the recommendation of the Chief of Engineers, and there are no mandatory or coercive terms provided. It is considered that the mere finding of the Court, as to what works should be installed and the time within which they should be put in operation, is sufficient, considering the character of the parties before the Court (*Virginia* v. *West Virginia*, 246 U. S. 565).

DEFENDANTS' POINTS TO SUPPORT THEIR EXCEPTIONS AND TO MEET COMPLAINANTS' EXCEPTIONS TO THE SPECIAL MASTER'S REPORT ON RE-REFERENCE.

(1) The bills of complaint do not seek to interfere with the discharge of Chicago's sewage, wastes and storm water to the DesPlaines River.

(2) The Supreme Court Opinion of January 14, 1929, does not contemplate preventing discharge of sewage effluent, wastes, storm water and rain water runoff to the DesPlaines River, nor does it intend that diversion from the Lake should cease.

(3) The City of Chicago has the right to take water from Lake Michigan for its domestic purposes and discharge the drainage, sewage or effluent or wastes from sewage purification works wherever in its judgment it may seem most appropriate.

(a) The Supreme Court, in original suits between States, adopts the law of complainants and defendants as announced by the Constitution, Statutes or opinions of their courts.

(b) The law of the complainant and defendant States is that a city located upon a public navigable waterway has the right to take water for its domestic purposes and appropriate it for all the uses to which the city may put it, such as drinking, cooking, sanitary, manufacturing, fire department and such like, either as riparian owner or by virtue of a grant by the State of such use of public waters, and no lower or other riparian owner can complain of such use for domestic purposes.

(c) The law of other States is similar.

(d) Diversions of water from one watershed to another have been the common practice of complainant states.

(e) For approximately 65 years, (since about 1865), there has been discharged to the DesPlaines River by way of the Illinois and Michigan Canal or the Sanitary and Ship Canal and from the Chicago River, an amount of sewage, waste and water equal to the average rain water runoff of the Chicago River drainage area and the sewage and wastes (Chicago's pumpage).

(4) After the works recommended in the Special Master's report for the treatment of sewage and wastes have been installed, then there will have been disposed of and eliminated, all the sewage and wastes that may be so eliminated and disposed of from a practicable standpoint. There will be left a residue in the effluents and in storm water after such works are put in operation. Therefore, a reasonable amount of water will be required and may be diverted from Lake Michigan to appropriately prevent nuisance to or interference with navigation or navigable waters in the port and harbor of Chicago and in Lake Michigan, to prevent pollution and impairment of the domestic water supply, impairment of bathing beaches and to prevent other nuisances.

(a) The Court in exercising its jurisdiction in controversies between States, will apply the principle of comity and equality of right and opportunity, and such equitable principles as will effect a just and equitable solution of the problem under all the circumstances of the case.

(b) The natural and logical place for the discharge of the effluent, wastes and drainage of the Sanitary District, including the untreated sewage and storm waters, with a reasonable amount of Lake water to avoid nuisance and impediment to navigation, is the DesPlaines River.

(5) The practicable measures required for the disposition of the sewage and wastes of the Sanitary District of Chicago, do not embrace the construction, installation and placing in operation of filter plants by the City of Chicago for its water supply, the extension of intake tunnels or the construction of a super tunnel or the building of a separate sewer system, the provision by the Sanitary District for the chlorination of the effluent of sewage disposal works and construction of outfall sewers or tunnels from the respective sewage disposal plants to the Lake, or the utilization of existing pumping stations or constructing of new pumping stations to provide circulating water for the Chicago River and its branches, or the provision by the Sanitary District for passing through Imhoff tanks or preliminary settling tanks a volume at storm times in excess of 150 per cent of the dry weather flow.

(a) These works were never urged by the complainants to be a part of the practicable measures for the disposition of the sewage of the Sanitary District other than by Lake diversion.

(b) The said works if installed would be impracticable.

(6) Pollution of navigable waters caused by the introduction of sewage has relation to the interests of navigation.

(a) The evidence is overwhelming in support of this proposition.

(b) Considering the interests of navigation on the Illinois River, as well as that at the Port of Chicago, the evidence is undisputed that approximately 5,000 c.f.s., including domestic pumpage, is required to maintain unobjectionable conditions on the Illinois River.

(c) Considering only the waters of the Port of Chicago, 2,000 c.f.s., in addition to pumpage, is required for navigation.

(7) The provision for controlling works at the mouth of the Chicago River or at or near the northern terminus of the Drainage Canal to prevent reversals of the Chicago River into the Lake is part of the defendants' construction program to provide practical measures in order that the amount of water diverted from the Lake, when all the works are in operation, may be reduced to the lowest practicable amount consistent with the interests of navigation and prevention of nuisance to the various interests involved.

(a) The complainants never contested by evidence or otherwise the practicability of said controlling works being provided as a part of the program of practical measures for the disposition of the sewage and wastes of the Sanitary District by means other than Lake diversion.

(b) The complainants first proposed controlling works as a part of the program for practicable measures in the 1926-27 hearings, and their witnesses in the hearings upon re-reference testified on the assumption that such controlling works should be provided.

(c) Unless such controlling works are installed, it will be impracticable, as the Master found, to reduce the diversion below 6,500 cubic seconds feet.

(d) The Drainage Canal and the Chicago River are navigable waters of the United States and it will be necessary that, before such controlling works may be installed, the plans therefor shall be approved by the Secretary of War on the recommendation of the Chief of Engineers under Section 10 of the Rivers and Harbors Act of March 3, 1899.

(e) The Master has found that such controlling works will not materially interfere with navigation, and has provided by his form of decree that the defendant Sanitary District shall immediately submit plans to the War Department for such control works and that the control works shall be constructed and installed by the Sanitary District within two years after the date of the approval of such plans by the War Department. Consequently, an exception on any prognosis that they may not be built is without merit.

(8) The amounts of the diversion at various times during the period of construction as the different important units of the sewage disposal construction program go into operation, and the amount of diversion at the end of the period of construction after all the works are completed, should be fixed by the Secretary of War, on the recommendation of the Chief of Engineers.

(a) The Opinion of January 14, 1929, herein intends that the Secretary of War, on the recommendation of the Chief of Engineers, shall continue the exercise of the functions heretofore exercised in fixing the amounts of the diversions in the interests of navigation and its protection as the exigencies of the situation may prompt.

(b) The Court ought not to take any action in fixing the amount of the diversion from time to time which will invade the sphere of action of the Political Department. The Court's Opinion of January 14, 1929, must not be so construed and if it may bear such construction, it should be modified.

(c) It is impracticable now to fix the amount of the diversion during the construction period and at the end of the period. The practical solution with due regard to the statutory functions of the Secretary of War on the recommendation of the Chief of Engineers, and to the usual judicial powers of this Court, is to provide by the decree that the diversion shall be, during said construction period and at the end of said construction period, such amounts as may be determined by the permit or permits of the Secretary of War on the recommendation of the Chief of Engineers; but such permits shall be subject to review by this Court on the evidence already submitted and any further evidence that may then be presented.

(9) The time fixed by the Master's Report for the installation of all the different works is too short.

(a) The rise in Lake levels since the introduction of the evidence on which the Court's opinion, (January 14, 1929), was rendered should have caused the Master to disregard his conclusion that the Court by its said opinion intended to impose "an immediately heavy burden" in the installation of said works. Consequently, the reasonable time for completion should have been allowed. The shorter time which would impose such immediately heavy burden is inequitable under the circumstances.

(b) Liberal allowance for unforeseeable delays, in the construction of such vast and unusual works, should have been made which would have extended the construction period beyond the date, (December 31, 1938), fixed by the Master.

(10) It is inappropriate at this time to determine which one of the parties shall pay the costs.

ARGUMENT.

PRELIMINARY STATEMENT.

After the opinion of the Supreme Court was delivered January 14, 1929, upon the Master's Original Report and the Exceptions thereto filed by the complainants, the Special Master set the hearings on the re-reference to begin March 25, 1929, at Chicago. Prior to that time the Special Master indicated that the Sanitary District should first proceed with its evidence and disclose its program of practicable measures for the disposition of the sewage and wastes of the Sanitary District embraced within the order of re-reference.

At the beginning of the March hearings, the Special Master inspected the North Side Sewage Treatment Plant then in operation and the West Side Sewage Treatment Plant under construction, which is important to be borne in mind in connection with the consideration of complainants' exceptions to findings of fact.

Pursuant to the Master's request, General Jadwin, then Chief of Engineers, United States Army, and other officers of the Corps of Engineers, were present at the beginning of the hearings on re-reference. General Jadwin was called to testify principally on the question

> "with regard to the extent of the flow from Lake Michigan, if any, that would be necessary to maintain navigation in the Chicago River in the event that all diversion for the purpose of taking care of the sewage of the Sanitary District were discontinued." (Master's Report, p. 90).

His answer to that question appears at pages 91 to 96, both inclusive, of the Master's Report.

The defendants then proceeded with their evidence on the re-reference and submitted witnesses who testified as to the program for sewage disposal which their witnesses had outlined to comply with the order of re-reference and the Court's Opinion of January 14, 1929. The program for the installation of works to provide the practical measures is set forth in the Master's Report, pp. 5-17, both inclusive. This program provides for the construction, installation and completion of various artificial sewage treatment works which are unnecessary to be described in detail. It also provides for the installation of controlling works either at the mouth of the Chicago River or at the northern terminus of the Drainage Canal, to prevent reversals or flow of the Chicago River into Lake Michigan. This construction program will require the expenditure of approximately $176,000,000, in addition to, approximately, $75,000,000 already expended, (or obligated to be paid), for artificial sewage disposal (Master's Report, pp. 7, 10, 11).

The complainants did not criticize materially the construction program so laid out to provide the practical measures to dispose of the sewage as is indicated by the statement of their principal witness, Mr. Howson (Master's Report, p. 19):

> "That is substantially the program, as I understand it, outlined by the engineers for the Chicago Sanitary District, which I believe to be a good program, well adapted to meet the conditions.
>
> No major modifications of the program of the Sanitary District to achieve the best practical sewage disposal so far as the plants themselves are concerned are necessary."

According to this program put forward by the Sanitary District and admitted to be "a good program" by the complainants, the sewage and wastes arising within the area of the Sanitary District may be treated at ordinary times to 85 per cent or 90 per cent of complete and entire theoretical disposition. There will be left a residue of about 15 per cent in the effluent from the sewage purification plants, which 15 per cent in nature and extent, is substantially equal to the raw sewage of 15 per cent of the population and wastes treated. At all storm times when the storm flow exceeds 150 per cent of the ordinary dry weather flow, there will be a large volume of storm water carrying raw sewage, street and other wastes, totally untreated, going directly into the canals and waterways within the limits of the Sanitary District (Master's Report, p. 35). This effluent from the purification works and the storm water with the raw sewage must go somewhere, and the only place it may go is into the rivers, canals, channels and waterways within the limits of the Sanitary District. By so doing it will impair navigation, whether such effluent and storm water is discharged from the Drainage Canal to the DesPlaines River or from the Chicago and Calumet Rivers into Lake Michigan or by means of tunnels direct to the Lake from the different plants. In the former case, the rivers and canals carrying the sewage effluent and storm waters to the DesPlaines River, the DesPlaines and Illinois Rivers will be impaired for navigation purposes. In the latter cases the rivers and canals carrying the sewage and storm water to Lake Michigan and Lake Michigan itself will be impaired for navigation purposes by reason of this discharge. The flushing of the Main Channel of the Sanitary District from Sag and the West Fork and South Branch of the Chicago River and the flushing of the North Shore Channel and North Branch of the Chicago River and the Chicago River by means of pumping water from the Lake through the Calumet Sag Channel and the North Shore Channel, will not eliminate impairment of navigation (Master's Report, pp. 136-140).

When defendants proceeded with the offering of evidence on the re-reference, the complainants by their cross-examination of defendants' witnesses and by the questions put to their own witnesses on direct examination, indicated that they proposed, which they had not done before, to seek a decree restraining the defendants from discharging anything of any kind from the Drainage Canal at Lockport; that is, to prevent defendants from discharging the sewage and wastes or effluents from sewage treatment plants, including storm water with untreated sewage, when the construction program should be finished, away from Lake Michigan to the DesPlaines River. Complainants also objected to the discharge at Lockport or the withdrawal from Lake Michigan of any water from the Lake to maintain unobjectionable conditions for navigation in the waters of the Port of Chicago or in the waters of the DesPlaines and Illinois Rivers.

This was also contrary to the attitude which the complainants had taken in the hearings which preceded the Master's Original Report—1926-27—when they had as part of their program presented an alternative program for the disposition of the sewage and wastes which included the operation of controlling works, above mentioned, at or near the northern terminus of the Drainage Canal. These control works when operated, as the evidence shows, will require the abstraction of a certain amount of water from Lake Michigan in order to properly and effectively carry the dirty, sewage-laden storm water untreated by sewage purification works, away from the Lake to the DesPlaines River (Joint Abst., 281-294, 295-304).

The complainants also contend that if the effluent and storm water may be discharged under the law and the facts in the case to the DesPlaines River, and a reasonable amount of water is required from the Lake in the interests of navigation and its protection, then the amount of such diversion or abstraction of water shall be fixed by the decree of the Court. We do not understand, however, that, under such circumstances, the complainants now object or except to the amount of the diversion as fixed by the Master, 1500 c.f.s. in addition to pumpage.

After all the works in the sewage treatment program are in operation, the effluents from these treatment works and the untreated sewage in storm flow at storm times must go into the channels of the Chicago River or the Canals of the Sanitary District. By such discharge of said wastes into said river channels and canals, the navigable waters will be obstructed in some manner, and this obstruction to navigable waters must take place, for there is no other place for these wastes to go. If the wastes are discharged from the said rivers and canals into the Lake, the obstruction to navigation will embrace the waters of said Chicago River and the Canals of the Sanitary District and also Lake Michigan. If the said wastes are discharged from said rivers and canals by means of the Main Drainage Canal of the Sanitary District to the Des Plaines River, the obstruction will embrace the waters of the said rivers and canals and the DesPlaines and Illinois Rivers. However, it must be borne in mind that the said DesPlaines and Illinois Rivers will be obstructed to some extent by discharge of wastes from other cities and towns located along them.

It must necessarily follow that the manner and conditions of the discharge and flow of said wastes in the navigable waters must be within the paramount power of Congress to regulate. Congress has provided the regulation to be made by the Secretary of War on the recommendation of the Chief of Engineers. It would there-

fore be improper for the Court to step over into the field of action of the political department to determine these very questions that are committed to the Secretary of War.

It is our contention as one of the fundamentals of this case that many of the questions relating to the amount of the diversion are entirely irrelevant to the solution of the problems which the Court may properly consider. So, when we discuss some of these questions which are necessarily irrelevant under our theory of the power of the Secretary of War, we do so merely for the purpose of meeting the arguments of complainants thereon.

Point I.

THE BILLS OF COMPLAINT DO NOT SEEK TO INTERFERE WITH THE DISCHARGE OF CHICAGO'S SEWAGE, WASTES AND STORM WATER TO THE DES PLAINES RIVER.*

The suits here were instituted against the State of Illinois and the Sanitary District. The City of Chicago, obtaining its water supply directly from the Lake by means of intake tunnels and waterworks system, and discharging sewage and wastes by means of its sewer systems into the waterways and canals within the limits of the Sanitary District, was not made a party. The complainants did not seek to disturb the then existing situation which permitted Chicago to have through the operation of the canals of the Sanitary District, its sewage and wastes kept out of the Lake, its only water supply. The bills were directed against the permit of March 3,

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* NOTE: When we speak of Chicago sewage or wastes or water supply in this brief, for convenience it will include any other cities, towns or villages within the Sanitary District which directly take water from the Lake for ordinary domestic purposes and discharge sewage and wastes through their sewer systems, for the reason that a number of such cities, towns and villages obtain their domestic water supply from the Chicago Waterworks System. The amount of domestic pumpage by these municipalities is small, about 60 c.f.s., (Joint Abst., 87).

1925, which authorized a diversion of 8500 *c.f.s. exclusive of pumpage.* The Master found.

> "These bills were brought to restrain the abstraction of water from Lake Michigan by the Sanitary District. * * * In its opinion this Court described these bills as brought 'for an injunction against the State of Illinois and the Sanitary District of Chicago from continuing to withdraw 8500 cubic feet of water a second from Lake Michigan at Chicago.' (278 U. S. 367, 399.)" (Master's Report, p. 120.)

An examination of the bills of complaint discloses that they nowhere complain of the discharge of sewage and wastes. These bills contain substantially the same allegations. In referring to the Main Canal of the Sanitary District, it is alleged (paragraphs 12 and 13 of the Wisconsin Bills, paragraphs 10 and 11 of the New York Bill and paragraphs 12 and 14 of the Michigan Bill):

> "It was at all times the plan of the defendant State of Illinois and the defendant Sanitary District of Chicago, that the said Canal should be used as a passageway for the sewage of the territory comprising the Sanitary District of Chicago, to the end that such sewage might be carried down the said Canal into the DesPlaines and Illinois Rivers, and in order to accomplish the said purpose, it was the intention of said defendants at and prior to the commencement of the construction of said Canal, *to divert from Lake Michigan and pass through said Canal, such amounts of water as might be deemed by said defendants to be necessary for the proper dilution of the said sewage and its propulsion through the Canal and the DesPlaines and Illinois Rivers.*
>
> * * * * *
>
> *And thereupon, on or about the 2nd day of January,* 1900, *said defendant District commenced the diversion of water from Lake Michigan into the Chicago River.*
>
> * * * * *
>
> *that the only source from which water in such quantities as required by said act could be obtained was by the diversion of water from Lake Michigan."*

Paragraphs 27 of the New York Bill and 31 of the Michigan Bill allege that the acts of the defendants

> *"in abstracting water from the Great Lakes basin, * * * and diverting them into the Canal * * *,* are in violation of the legal rights of complainant."

The Michigan Bill further alleged that neither Congress nor any Federal agency or authority, nor the State Legislature, has the power

> *"to abstract from the Great Lakes basin any water to be diverted into any other natural or artificial watershed, whether for the purpose of operating, maintaining and flushing an open sewer maintained in violation of modern standards of sanitation, or even for the purpose of navigation."*

The prayer of the first paragraph of all three bills of complaint was for an injunction against the defendants State of Illinois and the Sanitary District from taking or causing to be taken,

> "any water whatever from Lake Michigan."

The Wisconsin Bill further prayed that in the event the Canal

> *"shall be used as a navigable waterway of the United States and subject to the same control on the part of the United States as the other navigable waterways thereof,"*

then the defendants should be restrained

> "from taking or causing to be taken, any water from Lake Michigan * * * in excess of the amount which the Court shall determine to be reasonably required for the purpose of navigation in and through said Canal and the connecting waters to the Illinois and Mississippi Rivers, without injury to the navigable capacity of the Great Lakes and the connecting waters thereof."

The Wisconsin Bill also asked that defendants be restrained

> *"from dumping and draining into the said Sanitary District Canal any sewerage or waste in such quan-*

> *tity and manner as to excessively pollute and render the Sanitary District Drainage Canal, the Chicago, DesPlaines and Illinois Rivers unsanitary, pestilential and dangerous to the health, safety and comfort of the people of the complainant states navigating said rivers."*

Complainants did not complain of the discharge of sewage to the DesPlaines River through the Sanitary Canal. Their own Exhibit 17, letter of the Secretary of State to the British Embassy of November 24, 1925, states that the Government considered the diversion by the Sanitary District and the domestic pumpage and discharge of sewage to the DesPlaines River, to be entirely separate (Joint Abst., filed Jan. 24, 1928, 181):

> "Diversion of water for domestic consumption in the City of Chicago being purely a function of the municipal government of the city, it is considered that the authority granted the Sanitary District could not be made to apply to or include this other diversion as well. The case before the Secretary of War for action involved the granting of a permit for diversion of water for sanitary purposes only, and the instrument of authority was worded accordingly."

In any event, the sewage and rain water runoff of the Chicago River watershed has been since the year 1865 to the present time, discharged to the DesPlaines River by means of the Illinois and Michigan Canal or by the Sanitary Canal. The amount diverted from time to time up to 1900, is shown from the following statements from the Master's Original Report (November 23, 1927):

> (Master's Original Report, p. 12). "Originally, only enough water was pumped to answer the needs of navigation.
>
> * * * * *
>
> In the same year, (1865) for the immediate relief of the city, an arrangement was made by the municipal authorities by which the canal commissioners agreed to pump water from the river in excess of

> the needs of navigation. This pumping was done chiefly in the summer and early fall and the usual rate was 200 cubic feet per second, or a little less."
>
> (Master's Original Report, p. 13): "In 1879, there was a lakeward current for thirty days, and no perceptible current either way for ten days. The mean flow was less than 300 c.f.s. The canal was grossly polluted.
>
> In 1881, the legislature of Illinois (Illinois Laws, 1881, p. 159) passed a resolution * * * authorizing the installation of pumps at Bridgeport, the northern terminus of the canal, with a capacity of not less than 1,000 c.f.s. * * * For a few years, this afforded sufficient dilution in the canal. But at that time, Lake Michigan stood at a high stage, and the pumps had sufficient capacity to provide 1,000 c.f.s. only under that condition. In 1886, the lake level began to fall, and it continued to fall, until in 1891 it was about two feet lower than when the pumps were installed. Their capacity was thus reduced to a little more than 600 c.f.s. As the city continued to grow, the nuisance along the canal was at times as bad as ever."

Since 1900 the amount discharged to the DesPlaines River is shown by the table appearing in the Master's Original Report (pp. 22-23). The annual average rainwater runoff of the Chicago River Drainage Area under natural conditions would be approximately 193 c.f.s. Under present conditions, because of built-up areas, the Chicago River Drainage Area runoff annual average is 256 c.f.s. The Calumet watershed runoff annual average under natural conditions would be approximately 273 c.f.s. Under present conditions of built-up areas it is 287 c.f.s The domestic pumpage in cubic feet per second by the City of Chicago ranged from 11.8 c.f.s. in 1865 to 465 c.f.s. in 1899 (Joint Abst., 86-87). The domestic pumpage from 1900 to 1926 is shown by the Master's Original Report (pp. 22-23) to have been 449 c.f.s. in 1900 and 1395 in 1926. In 1929 it was 1625 c.f.s. (Joint Abst., 87).

Thus, it is apparent from the above statements from the Master's Original Report, that since 1865 at substantially all times an amount of sewage and water has passed through the Illinois and Michigan Canal and/or the Sanitary District Drainage Canal to the DesPlaines River, equal to or exceeding the amount of domestic pumpage and the average annual rainwater runoff of the Chicago and Little Calumet River Drainage Areas. Obviously, the complainants could not seek successfully to stop the long standing and acquiesced in discharge of these quantities of sewage and rainwater runoff to the DesPlaines River.

It necessarily follows that when the sewage disposal works are completed and placed in operation according to the program of the Sanitary District and admitted to be "a good program" by complainants, there is no complaint as to the discharge of the effluent and storm water from Lake Michigan to the DesPlaines River.

The prayer of the Wisconsin bill does not seek to enjoin that portion of the diversion which is required or necessary in the interest of navigation, when

> "the canal constructed by the defendant District shall be used as a navigable waterway of the United States and subject to the same control on the part of the United States as other navigable waterways thereof."

The Sanitary District Canal connects the upper basin of the Illinois and Michigan Canal at Joliet with the West Fork of the South Branch of the Chicago River, navigable waterways of the United States, and has been used and has been devoted to through waterway traffic between Chicago and points along the DesPlaines, Illinois and Mississippi Rivers. It replaced the old Illinois and Michigan Canal as to the section between Chicago and Joliet. *Mortell* v. *Clark,* 272 Ill. 201. The Sanitary

Canal is necessarily a navigable water of the United States and under its control, as other such waterways are. In *Ex parte Boyer*, 109 U. S. 629, the Court held the Illinois and Michigan Canal to be "public water of the United States."

The Wisconsin bill seeks to enjoin merely the Sanitary District dumping and draining

> "any sewerage or waste in such quantity and manner as to excessively pollute and render the Sanitary District Drainage Canal, the Chicago, DesPlaines and Illinois Rivers unsanitary, pestilential and dangerous to the health, safety and comfort of the people of the complainant states navigating said rivers, or to injure or destroy the property of the people of the complainant states navigating said rivers and waterways."

This clause of the prayer of the Wisconsin bill admits that the deposition of sewage and wastes in waterways may be injurious to navigation, and seeks merely to compel the Sanitary District to provide practicable artificial sewage disposal plants to purify its sewage. It is clearly recognized by the prayer of the bill above mentioned that whatever water may be required in the interest of navigation after such purification works are constructed and placed in operation to render such waters suitable for navigation, should be provided from Lake Michigan. There is no thought that the method so long used by Chicago of discharging its waste to the DesPlaines River, should be stopped.

Pursuant to these bills of complaint, much evidence was offered by complainants at the 1926-27 *hearings, and their witnesses at those hearings never contemplated discharge of treated or untreated sewage and storm waters into Lake Michigan.*

On the question of nuisance and danger to water supply by flood waters going into the Lake, the report of

Alvord, Burdick & Howson to the Secretary of War of April 16, 1925, states (Master's Ex. B):

> "A large flood on the Calumet and Chicago Rivers will undoubtedly wash great quantities of filth into Lake Michigan. * * * No practicable means for sewage purification will place these streams in condition where their waters may be periodically flushed into the water supply of the region even occasionally, with safety to the water supplies." (Joint Abst., 164.)
>
> "It must be a part of any scheme for sewage disposal that the water supply should be protected against any possibility of sewage contamination.
>
> In the Chicago region the means has been provided through the drainage canal by which the great majority of all impurities are diverted from Lake Michigan." (Joint Abst., 161, 162.)

Mr. Ellms (complainants' witness) subscribed to the Report of March, 1926, of the Municipal Research Bureau of Cleveland, as follows:

> "Only a part of the general pollution of Lake Erie can be controlled. If sewage is given the most refined treatment known in the present state of the art, pollution of the water would still be extensive. Surface wash is said to contribute a considerable part of pollution. There is no known method of treating it." (Joint Abst., 628.)

The witness also agreed with the following statement appearing in the Canadian Engineer on April 30, 1926, paper entitled: "Pollution of Boundary Waters, Problems of Cities on Great Lakes":

> "But it must also be realized that there must be a limit to the ability of purification processes to make safe, from a sanitary standpoint, waters which have once been contaminated.
>
> The cities on the Great Lakes are in a peculiar position regarding the water supply and sewage disposal. They are all of them fouling their own nests. Whether they realize it or not, the problems of a safe water supply and the proper and adequate treatment of their sewage are so intimately related

that one can not be solved without solving the other." (Joint Abst., 631.)

Gascoigne, complainants' witness, testified (Joint Abst., 650) that he subscribed to his paper, regarding Cleveland sewage disposal and water supply problem, in which he stated:

> "In the matter of disposing of the sewage of the city, we are not as favorably situated as the City of Chicago in having available a back yard into which we can discharge our filthy sewage or used water supply. If we were so situated, there is no question in my mind about the wisdom of our taking advantage of such an asset."

Complainants' witnesses, in the original hearings, were asked the following hypothetical question (Joint Abst., 620, 637, 649):

> "Q. Assuming complete treatment of all of the sewage of the Sanitary District of Chicago, with no normal diversion of water from Lake Michigan, but with the diversion of all sewage and storm waters by means of proper control works, the present location of the water intakes with suitable water purification works for the water supply, would the public health conditions in the city of Chicago with special reference to the public water supply, in your opinion, be safeguarded as well as under present conditions"?

On re-reference the feasibility of constructing and using control works for the purpose of so discharging the storm overflow to the DesPlaines River, was further explained by complainants' witnesses (Joint Abst., 111, 208, 217, 229, 230).

Point II.

THE SUPREME COURT OPINION OF JANUARY 14, 1929, DOES NOT CONTEMPLATE PREVENTING DISCHARGE OF SEWAGE EFFLUENT, WASTE, STORM WATER AND RAIN WATER RUNOFF TO THE DES PLAINES RIVER, NOR DOES IT INTEND THAT DIVERSION FROM THE LAKE SHOULD CEASE.

The Supreme Court understood that the only question involved was as to the amount of water that should be "directly abstracted from Lake Michigan." In speaking of the history of the diversion, the Court said (Appendix, p. 5):

> "Meantime, all the sewage in the drainage district, including Evanston, was turned into the main channel, and the water *directly abstracted from Lake Michigan* by the Sanitary District was increased from 2,541 cubic feet a second in 1900 to 5,751 in 1909, to 7,228 in 1916, to 6,888 cubic feet a second in 1926, not including pumpage."

For the facts stated, the Court evidently referred to the table set forth in the Master's Original Report (pp. 22-23).

When the Supreme Court stated the issue in the case, it likewise had reference to the 8,500 cubic feet per second diversion from the Lake as authorized by the permit of March 3, 1925, for that was the permit the complainants sought to have declared invalid, together with the amount of diversion authorized by it. The Court said (Appendix, p. 10):

> "The exact issue is whether the State of Illinois and the Sanitary District of Chicago by *diverting* 8,500 *cubic feet per second from the waters of Lake Michigan* have so injured the riparian and other rights of the complainant States bordering the Great Lakes and connecting streams by lowering their levels as to justify an injunction to stop this diversion and thus restore the normal levels."

The opinion of the Supreme Court further stated (Appendix, p. 11):

> "The diversion of 8,500 cubic feet a second is now maintained under a permit of the Secretary of War of March 3, 1925, acting under Section 10 of the Act of 1899, which it is contended by the complainants vests no such authority in him."

The diversion there referred to, as it is referred to all through the opinion, is *the abstraction of water directly from Lake Michigan,* and it does not include sewage.

The Master's Original Report herein (November 23, 1927) states (p. 81):

> "The amount mentioned in the permit is exclusive of the domestic pumpage in Chicago, which in 1924 amounted to 1,274 c.f.s., in 1925 to 1,338 c.f.s., and in 1926 to 1,395 c.f.s."

The Supreme Court stated the complainants' claim as follows: (Appendix, p. 11):

> "They claim that the diversion is based on a purpose not to regulate navigation of the Lake, but *merely to get rid of the sewage of Chicago,* that this is a State purpose, not a Federal function, and should be enjoined to save the rights of complainants."

In other words, the Court did not understand that complainants in any manner contested the right of the City of Chicago to take from Lake Michigan the domestic water supply and to discharge the sewage into the DesPlaines River by means of the Drainage Canal.

That the Court did not contemplate complete cessation of the diversion or abstraction of water directly from Lake Michigan is apparent from the following quotation from the opinion (Appendix, p. 17):

> "In these circumstances we think they are entitled to a decree which will be effective in bringing that violation and the *unwarranted part* of the diversion to an end."

(Appendix, p. 19) "It therefore is the duty of this Court by appropriate decree *to compel the reduction* of the diversion to a point where it rests on a legal basis * * *."

Point III.

THE CITY OF CHICAGO HAS THE RIGHT TO TAKE WATER FROM LAKE MICHIGAN FOR ITS DOMESTIC PURPOSES AND DISCHARGE THE DRAINAGE, SEWAGE OR EFFLUENT OR WASTES FROM SEWAGE PURIFICATION WORKS WHEREVER IN ITS JUDGMENT IT MAY SEEM MOST APPROPRIATE.

(a) THE SUPREME COURT IN ORIGINAL SUITS BETWEEN STATES, ADOPTS THE LAW OF THE COMPLAINANTS AND DEFENDANTS AS ANNOUNCED BY THE CONSTITUTION, STATUTE OR THE OPINIONS OF THEIR COURTS.

Kansas v. *Colorado*, 206 U. S. 46.

Wyoming v. *Colorado*, 259 U. S. 419:

> "(458) Turning to the decisions of the courts of last resort in the two States, we learn that the same doctrine respecting the division and use of the waters of natural streams has prevailed in both from the beginning and that each State attributes much of her development and prosperity to the practical operation of this doctrine.
>
> * * * * *
>
> (466) Diversions from one watershed to another are commonly made in both States and the practice is recognized by the decisions of their courts.
>
> * * * * *
>
> (467) The principle of such diversions being recognized in both States, its application to this interstate stream does not in itself afford a ground for complaint, unless the practice in both be rejected in determining what, as between them, is reasonable and admissible as to this stream, which we think should not be done.
>
> * * * * *

(467) The lands in both States are naturally arid and the ***need for irrigation is the same*** in one as in the other.

(468) In neither State was the right to appropriate water from this interstate stream denied. On the contrary, it was permitted and recognized in both. The rule was the same on both sides of the line. Some of the appropriations were made as much as fifty years ago and many as much as twenty-five. In the circumstances we have stated, why should not appropriations from this stream be respected, as between the two States, according to their several priorities, as would be done if the stream lay wholly within either State"?

(b) THE LAW OF THE COMPLAINANT AND DEFENDANT STATES IS THAT A CITY LOCATED UPON A PUBLIC NAVIGABLE WATERWAY HAS THE RIGHT TO TAKE WATER FOR ITS DOMESTIC PURPOSES AND APPROPRIATE IT FOR ALL THE USES TO WHICH THE CITY MAY PUT IT, SUCH AS DRINKING, COOKING, SANITARY, MANUFACTURING, FIRE-DEPARTMENT AND SUCH LIKE, EITHER AS RIPARIAN OWNER OR BY VIRTUE OF A GRANT BY THE STATE OF SUCH USE OF PUBLIC WATERS, AND NO LOWER OR OTHER RIPARIAN OWNER CAN COMPLAIN OF SUCH USE FOR DOMESTIC PURPOSES.

It has always been recognized that the riparian owner has the right to use such of the waters of a stream or lake as may be required for his domestic purposes. No lower riparian owner can complain. A city is recognized by some of the complainant States to be in the same position as a riparian owner of property with reference to the stream or lake upon which it is located. In the remainder of the complainant States it is recognized that a city has the right to take such waters as may be necessary for its domestic purposes from the public waters of the state. The water thus taken for domestic purposes is used by or digested by the city. It is consumed by the people in drinking, cooking, in washing and bathing, by the fire department and by manufacturers, as well as others. This water is consumed just like other materials, such as food, soap and various other things. Waste is discharged from the city in the form of sewage. The water taken through the city's mains and thus consumed is not emptied from the sewers as water. It is something else, namely, sewage. Various chemical transformations have taken place. Further chemical processes go on as the sewage is passed through treatment plants such as have been described by the various sanitary witnesses. From the treatment plants there comes heavy material called sludge which is sometimes disposed of upon land. It is sometimes dried and a fertilizer is produced. Complainants certainly do not ask that we place this sludge in Lake Michigan. There is another material coming from these treatment plants called the effluent. It is a liquid and in its chemical constituents it is very materially different from water. It may have to some extent the appearance of water. It is not water. It is another substance,—sewage. Complainants' witness Ellms described the chemical constituents of sewage and the various chemical processes that go on in the sewers (Joint Abst., 234, 235).

Under an act of the General Assembly of the State of Illinois, entitled, "An Act to provide for the incorporation of cities and villages," approved April 10, 1872, in force July 1, 1872 (Hurd's Revised Statutes of Illinois, Chapter 24), the City of Chicago is empowered to do all acts and make all regulations which may be necessary or expedient for the promotion of health or the suppression of diseases, to establish and maintain a waterworks system for the purpose of furnishing residents and inhabitants of the city with water for the various uses of such inhabitants, such as drinking, cooking, bathing, washing, manufacturing, prevention and extinguishment of fire and other uses to which water is ordinarily put by the residents and inhabitants of a city.

The Act further provides that the city shall have jurisdiction over all waters within or bordering on the same, to the extent of three miles beyond the limits of the city or village, but not to exceed the limits of the state, and that it may prevent or punish any pollution or injury to the stream or source of water or to such water-courses, its jurisdiction for such purposes extending five miles beyond its corporate limits, or so far as its waterworks may extend.

This Act empowered the City of Chicago to take from Lake Michigan, the only available water supply for Chicago, as the record shows, the water required for its domestic purposes.

The cases which we will now cite clearly show that it is the law of all complainants as well as of the defendant that a city may either as riparian owner or in the exercise of the State's police power delegated to it, take water from a public stream or lake upon which it is located for domestic purposes and discharge its sewage wherever reasonably appropriate without rendering compensation to riparian owners and against their complaint.

(1) *Ohio.*

City of Canton v. *Shock,* 66 Ohio 19.

Suit was instituted by Shock against the City of Canton to recover damages for the taking by the City of Canton of water for domestic purposes of the city from Nimishiller Creek, depleting, as the plaintiffs claim, the water for his grist mill located below the point where the water was appropriated by the City. The court said:

"(28) While the inhabitants own their lots individually, the city owns the streets, the fire department and all other public property and public works, and in its corporate capacity, provides for the convenience and welfare of its inhabitants, as to streets, fire, protection, lighting and supplying water, and in such, and other like matters, the city overshadows the individuals, and stands in its corporate capacity as a single proprietor extending throughout its entire limits, and entitled as such to all the rights and subject to all the liabilities of a riparian proprietor on the stream upon which it is situated. Sound reason, the weight of authority, and the present advanced state of municipal government, rights and liabilities, require that a municipality should be held and regarded, in its entirety, as an individual entity, having in its corporate capacity the rights, and subject to the liabilities, of a riparian proprietor, and we so hold in this case.

• • • • •

(31) From the earliest dawn of history to the present time, the primary use of water has been for domestic purposes, and its secondary use for the purposes of power. People on the upper stream have the right to quench their thirst, and the thirst of their flocks and herds, even though by so doing the wheels of every mill on the lower stream should stand still. *Pennsylvania R. Co.* v. *Miller,* 112 Pa. 34, 41, 3 Atl. 780. And the same right in the use of water as to quenching thirst, extends to all uses for domestic purposes; and the rights of a lower proprietor to the use of the waters of a stream for power purposes, is subject to the superior right of all upper proprietors for domestic purposes, and must yield thereto. All water powers on a stream are established subject to the superior right of all upper proprietors to use water out of the stream for domestic purposes, and, if the upper proprietors have grown so large, or become so numerous as to consume most, or all of the water, the lower proprietors have no cause of complaint, because it is only what they should have reasonably expected in the growth and development of the country, and subject to which contingency they established their water powers.

• • • • •

(33) but for the water consumed by the city for its own purposes, or so supplied to its inhabitants for domestic use, even though it received pay therefor, it is not liable."

(2) *Minnesota.*

Minneapolis Mill Co. v. Board of Water Com'rs. of City of St. Paul, 56 Minn. 485:

"(488) Plaintiffs are corporations created in 1856 by acts of the Territorial Legislature, and authorized to build and maintain dams in the Mississippi river at the falls of St. Anthony, about ten miles above St. Paul, for the development of a water power, and for the use and sale of such power. One of these corporations, owning the shore on the east side of the river, erected a dam to the proper point in the river channel, and the other, owning the west shore, built its dam so as to connect the two, thus forming a power which has ever since been maintained and used.

In 1883 the Legislature authorized the city of St. Paul to purchase, and there was purchased, the property and franchises of a private corporation theretofore engaged in supplying said city with water. A board of water commissioners was created by the same act, and that board, a branch of the city government, is the present defendant. By the provisions of an amendatory act (Sp. Laws 1885, ch. 110, sec. 5 *et seq.*) the board was authorized and empowered to add to its sources of supply, and to draw water from any lake or creek, and, in general, to do any act necessary in order to furnish an adequate supply of water for the use of the city.

* * * * *

1. The plaintiffs are riparian owners on a navigable or public stream, and their rights as such owners are subordinate to public uses of the water in the stream. And their rights under their charters are, equally with their rights as riparian owners, subordinate to these public uses.

2. There can be no doubt but that the public, through their representatives, have the right to ap-

ply these waters to such public uses without providing for or making compensation to riparian owners.

3. The navigation of the stream is not the only public use to which these public waters may be thus applied. The right to draw from them a supply of water for the ordinary use of cities in their vicinity is such a public use, and has always been so recognized. At the present time it is one of the most important public rights, and is daily growing in importance as population increases. The fact that the cities, through boards of commissioners or officers whose functions are to manage this branch of the municipal government, charge consumers for water used by them, as a means for paying the cost and expenses of maintaining and operating the plant, or that such consumers use the water for their domestic and such other purposes as water is ordinarily furnished by city waterworks, does not affect the real character of the use, or deprive it of its public nature.

4. In thus taking water from navigable streams or lakes for such ordinary public uses, the power of the state is not limited or controlled by the rules which obtain between riparian owners as to the diversion from, and its return to, its natural channels. Once conceding that the taking is for a public use, and the above proposition naturally follows."

Lamprey v. *State of Minnesota,* 52 Minn. 181.

(3) *Michigan.*

Loranger v. *City of Flint,* 185 Mich. 454:

The plaintiff is a mill owner suing to enjoin the city from diverting water for domestic purposes from the Flint River.

"(459) The one nearest in point is the case of *Stock* v. *City of Hillsdale, supra.* The distinctions to be noted between the facts in this case and the one at bar are that Bawbeese Lake, the body of water from which the city of Hillsdale drew its supply, was in a sense private in character, and, in any event, lacked the qualities which are necessarily characteristic of a public navigable river. Again, the city of Hillsdale is not located upon the banks of said lake, whereas the Flint river runs directly through the center of the city of Flint. At this point, and while considering the law as settled by this case, it is well to remark that, if the complainant is entitled to recover at all, the decree entered is wrong in two notable respects: First, under the circumstances of the case, she is not entitled to an injunction; and, second, she is not entitled to recover from the defendant for the value of water taken by it in excess of the prescriptive quantity, except at such times as such excessive use actually causes damage to her. We are of opinion that complainant's right to recover must be wholly denied upon broader grounds.

* * * * *

(4) The rule announced as to small private streams (*Hall* v. *City of Ionia, supra*), or as to small inland lakes (*Stock* v. *City of Hillsdale, supra*), has no application to the case at bar, which involves a public navigable river passing through the heart of defendant city."

(4) *Pennsylvania.*

Appeal of Frank Haupt, et al., 125 Pa. St. 211:

"The law was well stated by Justice Thompson in *Philadelphia* v. *Collins*, 68 Pa. 116, as follows:

'Every individual residing upon the banks of a stream has a right to the use of the water to drink and for the ordinary uses of domestic life; and where large bodies of people live upon the banks of a stream, as they do in large cities, the collective body of the citizens has the same right, but, of course, in a greatly exaggerated degree.'

And it was said by Chief Justice Gibson, in *Philadelphia* v. *Spring Garden*, 7 Pa. 363: 'The inhabitants of the district might have lawfully dipped from the margin of the pool water enough for their several necessities; but instead of drawing it by hand they have combined their funds to produce a cheaper and better transportation,' etc.

In each of these instances the learned Justice was speaking of a stream of water which is a public highway. To some extent the same principle may

> be applied to what may be called a private stream. In the case of a river or public highway, all the people of a State have access to it, may ride over it and use the water. Not so with a private stream. In such case, no one can use it or take the water except at a public crossing. There the traveler may stop, refresh himself and water his horse; the water has no owner, and he impairs no man's right. But except at public crossings, such as a road or a street, no one but a riparian owner can use the water, not because the latter has any ownership in it, but because the stranger has no right of access to it. There can be no such thing as ownership in flowing water; the riparian owner may use it as it flows; he may dip it up and become the owner by confining it in barrels or tanks, but so long as it flows it is as free to all as the light and the air.
>
> It follows from what has been said that dwellers in towns and villages watered by a stream may use the water as well as the riparian owner, provided they have access to the stream by means of a public highway."

In the case of *City of Philadelphia* v. *Collins,* 68 Pa. 106, at page 123, it is said:

> "It was conceded on the trial, that upon taking water for the citizens of the city for domestic purposes, no restriction could be placed by legislation or grant, and none was placed. If it could have been shown that it was this supply for domestic purposes only which occasioned the insufficiency for navigation, then the law of a paramount necessity would have existed, and have brought into play the doctrine of riparian rights, and justified the taking."

City of Philadelphia v. *Comm'rs of Spring Garden,* 7 Pa. 348.

Filbert v. *Dechert,* 22 Pa. Sup. Court 362.

Palmer Water Co. v. *Lehighton Water S. Co.,* 280 Pa. St. 492, 499.

Boalsburg Water Company v. *State College Water Co.,* 240 Pa. State 198.

Scranton Gas & Water Company v. *D. L. & W. R. R. Co.,* 240 Pa. State 604.

(5) *New York.*

Daniel Crill, agt. The City of Rome, 47 Howard's Practice Reports, 398:

> "The plaintiff, having a mill privilege in the city of Rome, supplied by water taken by means of a dam and an artificial channel from the Mohawk river, brings this action to restrain the defendant, the city of Rome, from taking the waters of the Mohawk river at a point called the Ridge, for the purpose of supplying the defendant's 'water-works' with pure and wholesome water.
>
> The city was expressly authorized to construct 'water-works,' and to supply the city with water, by an act of the legislature, passed April 24, 1872, chapter 352, Laws of 1872.
>
> * * * * *
>
> Several cases have arisen in respect to the waters of the Mohawk river, and very much discussion has been had on them in respect to the applicability of the common law of England in respect to navigable streams, and it has been very distinctly held and settled that (1) 'The Mohawk river is a navigable stream, and the title to the bed of the river is in the people of the state. (2) Riparian owners along the stream are not entitled to damages for any diversion or use of the waters of the Mohawk by the state' (*The People ex rel. Loomis agt. The Canal Appraisers,* 33 New York 461).
>
> Such is the doctrine established by the court of last resort in this state, and the same is not open for cavil or discussion in this court.
>
> * * * * *
>
> It is difficult to see any good reason why the people, if regarded as having the sole right to the use of the waters of a river, and authorized to divert them for purposes of artificial navigation, or to lease them to individuals, may not be equally possessed of the power to authorize them to be taken and applied for the 'public use' contemplated by the act authorizing the defendant to construct its waterworks and use the waters for supplying its inhabitants with pure and wholesome water."

The ownership, dominion and sovereignty of the State of Illinois in the lands covered by the waters of Lake Michigan within the State's boundaries and in the waters of the Lake are the same as the ownership, dominion and sovereignty of New York with reference to the lands and waters of the Mohawk and Hudson (*Ill. Central R. R.* v. *Illinois,* 146 U. S. 387, 435).

Strobel v. *Kerr Salt Co.,* 164 N. Y. 303, 320.
United P. B. Co. v. *Iroquois P. & P. Co.,* 226 N. Y. 38, 45.

(6) *Wisconsin.*

In Wisconsin the riparian rights doctrine of the other states is recognized.

Haseltine v. *Case,* 46 Wis. 391.

Riparian owners on navigable streams in Wisconsin own to the center of the stream, but their rights are subject to the superior rights of the public as to navigation, fishing, hunting, etc.

State v. *Sutherland,* 166 Wis. 511.
Metropolitan Investment Co. v. *Milwaukee,* 165 Wis. 216.
Thomas Furnace Co. v. *Milwaukee,* 156 Wis. 549.
Wisconsin River Improvement Co. v. *Lyons,* 30 Wis. 61.
Diana Shooting Club v. *Husting,* 156 Wis. 261.

The City Charter of Milwaukee (Chapter 184 of the Laws of 1874 of Wisconsin, Section 10), provides in substance that it shall be the duty of the Commissioner of Public Works to examine and consider all matters relative to supplying the City of Milwaukee with a sufficient quantity of pure, wholesome water to be taken from Lake

Michigan for the use of its inhabitants. Section 22 of the Charter of Milwaukee empowers the city to furnish water to parties outside the city, and the Commissioner of Public Works, subject to the approval of the Common Council of the City, may issue permits to the County of Milwaukee, National Home for Disabled Soldiers, or any other party to obtain water from the waterworks in the said city for the use outside of the limits of said city. Thus it is apparent that not only do the Wisconsin Acts as to Milwaukee empower the city to take and use water from Lake Michigan for its own domestic purposes, but also to furnish water to various persons and institutions outside the limits of Milwaukee.

ALL OF THE COMPLAINANT STATES, RECOGNIZING THE NECESSITY OF PREVENTING THE POLLUTION OF WATER SUPPLIES BY THE DISCHARGE OF SEWAGE INTO THEM, HAVE ENACTED LAWS FOR THE PREVENTION OF SUCH DISCHARGE THROUGH A BOARD OR DEPARTMENT HAVING JURISDICTION THEREOF, OR BY PROVISIONS FOR DIRECT ACTION BY MUNICIPALITIES TO RESTRAIN AND ENJOIN SUCH DISCHARGE.

Chapter 46, Cahill's Consolidated Laws of New York, Public Health Law, Article 5, Sections 70-87 "Potable Waters";

Page's Annotated General Code, Ohio, State Department of Health, Public Water Supply 1249;

Cahill's Compiled Laws of Michigan, 1922, 783 (6); 7637 (1); 5034 (11);

Wisconsin Statutes of 1923, 144.01, 144.03;

Statutes of Pennsylvania 1920, 18,247-49;

Mason's Minnesota Statutes 1927, Pollution of Water, 5375.

(7) *Illinois.* .

City of Elgin v. *Elgin Hydraulic Co.*, 85 Ill. App. 182:

> "We are therefore of opinion that the right of the public residing along Fox river to take water out of the same for domestic, sanitary and fire purposes, is paramount to the right of the owners of said water power to use the same for the purpose of propelling the machinery of their mills."

(c) *Law of other States is similar.*

Watuppa Reservoir Co. v. *City of Fall River*, 147 Mass. 548:

Plaintiff, a mill owner, on a stream flowing from a great pond, sought to enjoin the defendant city from taking water from the pond for domestic purposes under grant from the state. The court after holding that the State's rights in great ponds were the same as its rights where there was ebb and flow of the tide (which rights are the same that Illinois has in Lake Michigan), said:

> (557) "All who take and hold property liable to be affected by this rule of property, take and hold under and in subordination to it. Each grant carries with it an implied reservation of these paramount rights, unless the terms of the grant exclude such reservation. So that the grant, from the State, of land upon a stream flowing from a great pond did not convey an unqualified fee with the right to enjoy the usual and natural flow of the stream, but a qualified right, subject to the superior right of the State to use the pond and its waters for other public uses if the exigencies of the public, for whom it holds the pond in trust, demand it."

See

Illinois Central R. R. v. *Illinois*, 146 U. S. 387, 435.

Fisk v. *Hartford,* 69 Conn. 375:

The plaintiffs were the owners of a valuable mill property on the Park River in the City of Hartford. Defendant was the owner of a large system of reservoirs for the use of Hartford for domestic and other purposes. The sewage drained into Park River above plaintiff's dams. The city shortly prior to the institution of the suit, became engaged in constructing an intercepting sewer to divert the sewage and surface water away from its original flow in the Park River, to the Connecticut River, thus depriving the plaintiff's mill of a large portion of the sewage and drainage which would have flowed into its reservoir on Park River if this sewer interceptor were not built.

The City Council of Hartford determined that the proper disposition of the sewage required its diversion from Park River. The relief prayed was an injunction against the defendant from diverting into the intercepting sewer the present current and flow of water in Park River, whether such flow of Park River be through drains, pipes, sewers, surface flowage or otherwise. It was shown that the building of the intercepting sewer was to remove "what is called Park River sewer nuisance."

The court observes (page 389):

> "The complaint is not brought to have the city enjoined from diverting the water of Park river or its tributaries into the reservoirs and distributing pipes of the city, or from using the water so diverted, but it is brought to restrain the city from diverting its sewage into the intercepting sewer; and this is the very gist of the complaint."

The court said (page 390):

> "Now, it is quite clear that the city either has, or it has not, the right, as against the plaintiffs, to take and use the water which constitutes its supply, * * *

and in either case, we think it is equally clear that the city has the right * * * to dispose of that water after it enters the sewerage system as sewage * * * as it sees fit. In other words, the plaintiffs may or may not have the right to have the whole or a part of the water supply of the city returned as water to Park river; but in either case they have no right to have it so returned after it has become sewage, or to have it returned through the sewerage system of the city * * * If the city has the right * * * to take and use the water in its reservoirs, then, clearly, it has the further right * * * either before or after it is used, to dispose of it under its charter as it sees fit. If, on the other hand, it has no right * * * to take or use the waters in its reservoirs, * * * this fact of itself does not give the plaintiffs a right to control the disposition of such water after it has entered the sewerage system, and become sewage. That control still remains with the city, and ought to remain with it. * * * In this view of the case, it makes no difference whether the sewage is or is not injurious to health, or whether its open flow has or has not otherwise become a nuisance. In either case the city still has, and ought to have, full control over it, and the pipes, drains and sewers through which it flows, or can be made to flow. If the city wrongfully takes and uses the plaintiff's water, the remedy for such a wrong is ample, either by an action at law for damages, or, in a proper case in equity, by injunction; but where, as in this case, the plaintiffs apparently condone the wrongful taking and using of the water, on condition that it shall be allowed to come back to them in the form of sewage through the city sewers, and assert a right to sewage as such, and to have it flow through the sewers as it has been accustomed to flow, they cannot have the remedy which they now seek, simply because they have not shown that they possess any such right. The complaint clearly shows that it is the sewage of the city, and not the waters of Park river or its tributaries in any proper sense, which the city is about to turn into the intercepting sewer: and it is this precise diversion, and nothing else, which the plaintiffs seek to have enjoined. For the reasons given, we are of opinion that they are not entitled to the injunction."

City of Auburn v. *Union Water Power Co.*, 90 Me. 576.

Barre Water Co. v. *Carnes*, 65 Vt. 626.

(d) DIVERSIONS OF WATER FROM ONE WATERSHED TO ANOTHER HAVE BEEN THE COMMON PRACTICE OF COMPLAINANT STATES.

The feeders of the Erie Canal were installed without regard to watersheds, with the effect of diverting from one drainage area to another. To some extent this practice has continued on the New York State Barge Canal. The waters of Oil Creek, a tributary of the Allegheny River and of the Mississippi, are diverted into the Genesee River and thence to the Erie Canal. Diversions for the Erie Canal took place from the waters of the Ontario Basin into the Mohawk-Hudson Basin. Feeders of the Rome Summit level diverted water from the Susquehanna River into Lake Ontario. At Glen Falls water is diverted from the Hudson River system into the St. Lawrence. In the State of Wisconsin water is diverted from the Wisconsin (a feeder of the Mississippi) into the Fox (a tributary of the Great Lakes (Defendants' Ex. 1203, p. 71).

In Ohio, the Ohio and Erie Canal diverted water from a tributary of the Mississippi into Lake Erie (Ex. 1203, p. 71).

The State of New York has by act of its legislature conferred upon the City of New York power and authority to take from the head waters of the Delaware River a large volume of water for the city's domestic water supply. This water is to be diverted and taken from one watershed to another and will go into the City of New

York's system. It will become sewage along with other materials and will be discharged ultimately into the Ocean. There is no provision by this act for the discharge by pumping or otherwise of a quantity of sewage or a quantity of effluent from sewage purification works to the Delaware River or the head waters of the Delaware River equal to the quantity of water to be taken for domestic purposes. (See page 12, bill of complaint, *State of New Jersey* v. *State of New York and City of New York,* and page 8 of the answer of the City of New York, filed May 27, 1929, No. 20 Original, October Term, 1928).

Section 18,769 of West's Statutes of Pennsylvania, entitled "Railroads and Canals," provides with reference to the construction and operation of the Lake Erie and Ohio River Canal as follows:

> "The Commonwealth of Pennsylvania shall locate, construct, maintain and operate a navigable interstate canal or waterway, having a depth of not less than nine feet, from the junction of the Ohio and Beaver rivers, in the State of Pennsylvania; thence, by way of the Beaver and Mahoning rivers, in the State of Pennsylvania, and the Mahoning river, in the State of Ohio, to a point in Trumbull County, either at or near Niles, Ohio, or a short distance west of Warren, Ohio; thence, northwardly, through the State of Ohio, to a terminal on Lake Erie, at or near the mouth of Indian Creek, in the State of Ohio; together with all such branch canals, locks, dams, tunnels, aqueducts; feeders to supply water from any lakes, rivers, streams or water courses; docks, harbors; reservoirs for the supply of water for the canal or its feeders, or for the regulation of streamflow";

The legislature of Ohio authorized the building of this Canal through the territory of the state (Page's Annotated Statutes of Ohio, Tit. II, Chap. 8, Sec. 13996-1).

Diversions for navigation and power purposes have been made in the Great Lakes system at many places such as St. Mary's River, Welland Canal, New York State Barge Canal and Niagara Falls. All these diversions have had an effect upon navigation and other interests of the complainants similar to the claimed effect of the diversion at Chicago. These diversions have been acquiesced in and were undoubtedly made for the purpose of taking advantage of the natural resources of the states making the diversion.

Wyoming v. *Colorado,* 259 U. S. 419.

The Court said (466):

> "The objection of Wyoming to the proposed diversion on the ground that it is to another watershed, from which she can receive no benefit, is also untenable. * * * The principle of such diversions being recognized in both states, its application to this interstate stream does not, in itself, afford a ground for complaint, unless the practice in both be rejected in determining what as between them, is reasonable and admissible as to this stream, which we think should not be done."

THE ACTS OF CONGRESS OF 1822 AND 1827, AND THE ACTS OF ILLINOIS, HAVE BROUGHT CHICAGO WITHIN THE WATER-SHED OF THE MISSISSIPPI RIVER AT LEAST FOR THE PURPOSE OF DISCHARGING THE RUN-OFF OF THE CHICAGO RIVER DRAINAGE AREA AND SEWAGE.

Missouri v. *Illinois,* 200 U. S. 496:

> "(526) Some stress was laid on the proposition that Chicago is not on the natural watershed of the Mississippi, because of a rise of a few feet between the Desplaines and the Chicago Rivers. We perceive no reason for distinction on this ground. The natural features relied upon are of the smallest. And if under any circumstances they could affect the case, it is enough to say that Illinois brought Chicago into the Mississippi watershed in pursuance not only of its own statutes, but also of the Acts of Con-

gress of March 30, 1822, c. 14, 3 Stat. at L. 659, and March 2, 1827, c. 51, 4 Stat. at L. 234, the validity of which is not disputed. *Wisconsin* v. *Duluth*, 96 U. S. 379. Of course these acts do not grant the right to discharge sewage, but the case stands no differently in point of law from a suit because of the discharge from Peoria into the Illinois, or from any other or all the other cities on the banks of that stream.''

(e) SINCE ABOUT 1865, THERE HAS BEEN DISCHARGED TO THE DES PLAINES RIVER BY WAY OF THE ILLINOIS AND MICHIGAN CANAL OR THE SANITARY AND SHIP CANAL, AND FROM THE CHICAGO RIVER, AN AMOUNT OF SEWAGE AND WATER EQUAL TO THE AVERAGE RAIN WATER RUN-OFF OF THE CHICAGO RIVER DRAINAGE AREA AND THE SEWAGE AND WASTES (CHICAGO'S PUMPAGE).

See *Supra*, 35, 36.

IV.

AFTER THE WORKS RECOMMENDED IN THE SPECIAL MASTER'S REPORT FOR THE TREATMENT OF SEWAGE AND WASTES HAVE BEEN INSTALLED, THEN THERE WILL HAVE BEEN DISPOSED OF AND ELIMINATED ALL THE SEWAGE AND WASTES THAT MAY BE SO ELIMINATED AND DISPOSED OF FROM A PRACTICABLE STANDPOINT. THERE WILL BE LEFT A RESIDUE OF WASTES IN THE EFFLUENTS AND IN STORM WATER AFTER SUCH WORKS ARE PUT IN OPERATION. THEREFORE, A REASONABLE AMOUNT OF WATER WILL BE REQUIRED AND MAY BE DIVERTED FROM LAKE MICHIGAN TO APPROPRIATELY PREVENT NUISANCE TO OR INTERFERENCE WITH NAVIGATION OR NAVIGABLE WATERS IN THE PORT AND HARBOR OF CHICAGO AND IN LAKE MICHIGAN, TO PREVENT POLLUTION AND IMPAIRMENT OF THE DOMESTIC WATER SUPPLY, AND BATHING BEACHES AND TO PREVENT OTHER NUISANCES.

The Master found that

''If the flow at Lockport were entirely stopped, the result would be, as Colonel Townsend, testifying

> for the complainants, said, 'that the only water from the Lake would be that which comes in as the Lake rises and falls.' In that case, with the water held at Lockport, there would be 'absolutely no slope in the river and its connections.' The large sewage treatment works—the West Side and the Southwest Side plants—adjoining the Drainage Canal will pour their effluents into the canal, and if there is no flow at Lockport, these effluents will pass directly into the Chicago River. It is found that one hundred per cent purification of the sewage taken to the treatment works is not practicable with present knowledge. * * * This means that an amount not exactly determinable, which may be less than ten per cent or possibly as high as fifteen per cent, of the sewage will not have been purified and will be represented in the effluent. * * * While the residual organic matter in the effluent may be very different from an equal percentage of the raw sewage as a potential source of nuisance, it is far from demonstrated, in my judgment, that with all flow stopped at Lockport, the concentration of such a vast volume of effluent as will flow from the proposed sewage plants, together with the untreated sewage and wastes carried with the storm flow into the limited channels of the Drainage Canal and Chicago River will not create conditions in these channels seriously detrimental to navigation." (Master's Report, pp. 136-137).

In referring to the request of the complainants that the defendants be enjoined from discharging sewage into the Chicago River in such manner as to create an obstruction to or interference with navigation or navigable capacity, the Master stated (Master's Report, p. 137):

> "It seems to me that the best way, and the reasonably sure way, of accomplishing this result is to permit an outflow from the Drainage Canal at Lockport."

In referring to the complainants' suggestion that outfall sewers or tunnels be built to carry the effluents directly to the Lake, or that circulating water be pumped from the Lake through the channels of the Chicago River, the Master stated:

> "It is not clear that this course would be compatible with the interests of navigation in the Chicago harbor, and that there would be a serious danger of contaminating the water supply and of creating offensive conditions at the bathing beaches of the city is quite evident." (Master's Report, p. 138)

Concerning complainants' suggestion that the water supply be filtered, the Master stated:

> "The fact remains that the effluents from the sewage treatment plants and the storm water must go somewhere, and if they are taken away from the Lake and discharged through the canal at Lockport, both the danger to the water supply will be removed and conditions suitable to navigation can be maintained.
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> *　　*　　*　　*　　*
>
> My conclusion is that so far as the question can be determined at this time, the interests of navigation in the Chicago River as a part of the Port of Chicago, when the above described sewage treatment program has been carried out, will require that the flow of the Drainage Canal be discharged at Lockport, and that for this purpose there will be necessary a diversion of water from Lake Michigan
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> *　　*　　*　　*　　*
>
> This disposition is believed to be in accord with the equitable principles which appropriately govern the exercise of the jurisdiction to determine controversies between States, a jurisdiction which is unfettered by technicalities and in the last analysis is for the purpose of establishing substantial justice. In the present instance, equitable considerations are those applicable with appropriate regard to the substantial rights of the complainants, as determined by this Court, after the Sanitary District has carried out the above described comprehensive program for sewage treatment." (Master's Report, pp. 138-139)

(a) THE COURT IN EXERCISING ITS JURISDICTION IN CONTROVERSIES BETWEEN STATES, WILL APPLY THE PRINCIPLE OF COMITY AND EQUALITY OF RIGHT AND OPPORTUNITY AND SUCH EQUITABLE PRINCIPLES AS WILL EFFECT A JUST AND EQUITABLE SOLUTION OF THE PROBLEM UNDER ALL THE CIRCUMSTANCES OF THE CASE.

Equality of right does not mean an equal division of water, The states stand on an equal level or plane. Each state has the right to take advantage of what nature has by reason of its topography, natural resources and other advantages provided it, even though in putting such resources to the best available use or uses, such state may encroach to some extent upon the solitary rights or the equally full enjoyment of rights of some other state or states. Each state has an equal right not only to utilize the natural advantages within its borders but has an equal right to use those great natural assets which are available to many states in common. And in appropriating part of such natural advantages which are available to other states, the right of one state is not to be limited by technical or narrow rules. Thus generally the public welfare of the people of all the states will be advanced.

The Great Lakes system of waters and waterways furnish great and vast opportunities to the communities and peoples living in that region. It is only necessary to call to mind the various uses to which those waters have been put to illustrate the principle for which we are contending. There is no body of fresh water in the world that can compare with them. In their natural state the waters are pure and available for drinking and other domestic uses and are consumed when so used. They are used for navigation and the development of power. The outflow of Lake Superior is controlled so that Lake

Superior levels are changed from their natural condition and are being artificially regulated. This regulation affects the levels of the lower lakes, oftentimes adversely, making the levels of those lakes much lower than they would be but for the control of the outflow of Superior. The deepening of the channels of the St. Clair and Detroit Rivers has increased the outflow of Lakes Michigan and Huron, thus permanently reducing their levels. At the same time it has permanently increased the levels of Lakes Erie and Ontario.

The utilization of the power at Niagara Falls has likewise affected the natural level of Lake Erie, materially reducing the levels of that Lake and to some extent affecting the levels of Huron and Michigan. The diversion, through the Welland Canal and by way of the New York Barge Canal for navigation and power purposes, has had similar effects.

The building of the Gut Dam in the Galops Rapids of the St. Lawrence in 1903 for navigation purposes has permanently raised the elevation of Ontario about 5 inches. These are some of the illustrations by which the natural conditions have been changed in order to permit a greater enjoyment of the resources present in this great natural asset, the Great Lakes. Of course some states have been benefited more than others by these changes from natural conditions. The benefit obtained by one state has resulted in a corresponding injury to other states. This process necessarily demonstrates that there must be an accommodation of mutual rights in order that the greatest benefit for all may be produced.

The discharge of the effluent and storm water, together with a reasonable amount of water direct from Lake Michigan to the DesPlaines River, constitutes the natural and logical method of disposing of these wastes and protecting navigation. In that way, Lake Michigan, navigable water of the United States, so long kept free from the sewage and waste pollution of the great and vast population of Chicago and vicinity, will continue in the same way to be free of such pollution. Thereby navigation upon Lake Michigan will not be affected materially, no nuisance will result to the numerous bathing beaches along Chicago's Lake front, so necessary for the people and furnishing to many thousands of people every summer much needed recreational facilities. The United States Governmental Naval Training Station and Coast Guard Stations will not be affected. Recreational boating so extensive at Chicago will be permitted to go on free and unimpeded by nuisance from such wastes (Evers, Joint Abst., 262-265).

As to extended use of bathing beaches, see Defts. Exs. 1435-1440. (Joint Abst., 327-333).

On the other hand, the discharge of the effluent and storm water to the DesPlaines and Illinois Rivers will not tend to change the condition of those rivers from what they are now, but to better them. Waters of those rivers have never been used as a water supply by any community. The extent of their use for bathing and recreational purposes is and will be negligible in comparison with such use of Lake Michigan waters at Chicago.

As has been shown, the domestic pumpage or water taken for domestic purposes cannot be complained of, and the complainant states as lower riparian owners, together with their people and citizens, enjoy the Great Lakes subject to this right of Chicago to take from the Lakes and use and consume necessary water for domestic purposes. The ordinary rain water runoff of the Calumet and Chicago River drainage areas must necessarily become mixed with and a part of the sewage. In any event, this ordinary rain water runoff has been discharged to the DesPlaines River substantially continuously since 1865. In this there has been such long acquiescence that there can be no possibility of complaint. The amount of water required from Lake Michigan to protect navigation is small, and the effect, if any, upon the interests of complainant states, is negligible in comparison with the great financial burden that would be placed upon the people of Chicago, (Pearse, Joint Abst., 521-525, Defts. Ex. 1310), and the inconveniences from nuisance to the people living at Chicago, as well as to the persons navigating the Lakes.

Kansas v. *Colorado*, 206 U. S. 46:

> "(100) We must consider the effect of what has been done upon the conditions in the respective States and so adjust the dispute upon the basis of equality of rights as to secure as far as possible to Colorado the benefits of irrigation without depriving Kansas of the like beneficial effects of a flowing stream.
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> * * * * *
>
> But we are justified in looking at the question not narrowly and solely as to the amount of the flow in the channel of the Arkansas River, inquiring merely whether any portion thereof is appropriated by Colorado, but we may properly consider what, in case a portion of that flow is appropriated by Colorado, are the effects of such appropriation upon Kansas territory. For instance, if there be many thousands of acres in Colorado destitute of vegetation, which by the taking of water from the Arkansas River and in no other way can be made valuable as arable lands producing an abundance of vegetable growth, and this transformation of desert land has the effect, through percolation of water in the soil, or in any other way, of giving to Kansas territory, although not in the Arkansas Valley, a benefit, from water as great as that which would inure by keeping the flow of the Arkansas in its channel undiminished, then we may rightfully regard the usefulness to Colorado as justifying its action, although the locality of the

benefit from the flow of the Arkansas through Kansas has territorially changed.

* * * * *

(102) May we not consider some appropriation by Colorado of the waters of the Arkansas to the irrigation and reclamation of its arid lands as a reasonable exercise of its sovereignty and as not unreasonably trespassing upon any rights of Kansas?

* * * * *

(103) And in the opinion, on pages 242, 243, are quoted these observations of Chief Justice Shaw in the case of *Elliott* v. *Fitchburg Railroad Company,*

10 Cush. 191, 193, 196:

'The right to flowing water is now well settled to be a right incident to property in the land; it is a right *publici juris,* of such a character that whilst it is common and equal to all through whose land it runs, and no one can obstruct or divert it, yet, as one of the beneficial gifts of Providence, each proprietor has a right to a just and reasonable use of it, as it passes through his land; and so long as it is not wholly obstructed or diverted, or no larger appropriation of the water running through it is made than a just and reasonable use, it cannot be said to be wrongful or injurious to a proprietor lower down.

* * * * *

(104) It is, therefore, only for an abstraction and deprivation of this common benefit or for an unreasonable and unauthorized use of it, that an action will lie.'

* * * * *

(105) So that, if the extreme rule of the common law were enforced, Oklahoma having the same right to insist that there should be no diversion of the stream in Kansas for the purposes of irrigation that Kansas has in respect to Colorado, the result would be that the waters, except for the meagre amount required for domestic purposes, would flow through eastern Colorado and Kansas of comparatively little advantage to either State, and both would lose the

great benefit which comes from the use of the water for irrigation.

* * * * *

(109) These tables disclose a very marked development in the population, area of land cultivated and amount of agricultural products. Whatever has been effective in bringing about this development is certainly entitled to recognition, and should not be wantonly or unnecessarily destroyed or interfered with.

* * * * *

(113) It cannot be denied in view of all the testimony (for that which we have quoted is but a sample of much more bearing upon the question), that the diminution of the flow of water in the river by the irrigation of Colorado has worked some detriment to the southwestern part of Kansas, and yet when we compare the amount of this detriment with the great benefit which has obviously resulted to the counties in Colorado, it would seem that equality of right and equity between the two States forbids any interference with the present withdrawal of water in Colorado for purposes of irrigation."

North Dakota v. *Minnesota,* 263 U. S. 365:

"(372) The jurisdiction and procedure of this Court in controversies between States of the Union differ from those which it pursues in suits between private parties. This grows out of the history of the creation of the power, in that it was conferred by the Constitution as a substitute for the diplomatic settlement of controversies between sovereigns and a possible resort to force."

Wyoming v. *Colorado,* 259 U. S. 419:

"(464) The decision in *Kansas* v. *Colorado,* 206 U. S. 46, was a pioneer in its field.

* * * * *

In these circumstances, and after observing that the diminution in the flow of the river had resulted in 'perceptible injury' to portions of the valley in Kansas, but in 'little, if any, detriment' to the

> great body of the valley, the court said, 'it would seem equality of right and equity between the two States forbids any interference with the present withdrawal of water in Colorado for purposes of irrigation'; and that, if the depletion of the waters by Colorado should be increased, the time would come when Kansas might 'rightfully call for relief against the action of Colorado, its corporations and citizens in appropriating the waters of the Arkansas for irrigation purposes.' What was there said about 'equality of right' refers, as the opinion shows (p. 97), not to an equal division of the water, but to the equal level or plane on which all the States stand, in point of power and right, under our constitutional system."

Minnesota Rate Cases, 230 U. S. 352, 402:

> "Our system of Government is a practical adjustment by which the national authority as conferred by the constitution is maintained in its full scope without unnecessary loss of local efficiency."

In *Kansas* v. *Colorado,* 185 U. S. 125, the court said:

> "Sitting, as it were, as an international as well as a domestic tribunal, we apply federal law, state law and international law, as the exigencies of the particular case may demand."

In *Kansas* v. *Colorado,* 206 U. S. 46, the court quoted from the opinion in the *Paquette Habana,* 175 U. S. 677, 701, as follows:

> "International law is part of our law, and must be ascertained and administered by the courts of justice of appropriate jurisdiction as often as questions of right depending upon it are duly presented for their determination."

In early times when the civilization and activities of the peoples of the world were primitive, then the great natural resources and advantages due to geographical locations were not required to be used to the greatest extent possible and few occasions arose for contact between the different peoples. Likewise, early in the history of the United States similar conditions existed and the different states of the Union as sovereigns had few occasions for contact, and it was very infrequent when one state in the development of its natural resources would encroach upon the rights or activities of another state. Then the controversies between states were principally over boundaries. This court said in

Kansas v. *Colorado,* 206 U. S. 46, 80:

> "Controversies between the states are becoming frequent and in the rapidly changing conditions of life and business, are likely to become still more so. Involving, as they do, the rights of political communities which in many respects are sovereign and independent, they present not infrequently questions of far-reaching import and of exceeding difficulty."

The Supreme Court had then just decided the case of

Missouri v. *Illinois,* 200 U. S. 496,

wherein the court refused to grant the relief to Missouri even though there was recognized to be an invasion of the legal rights of Missouri by Illinois. But the court, believing that Illinois was conscientiously attempting to take advantage of a great opportunity to keep the water supply of the great commercial center of the United States rapidly growing in population, to become one of the great cities of the world, free from that city's sewage and wastes, upheld Illinois in her worthy endeavors.

In

Kansas v. *Colorado,* 206 U. S. 46,

the court went further and denied to Kansas the relief for invasion of legal rights where Colorado was seeking to use the waters of the Arkansas River for the purpose of irrigation and not for the purpose of protecting health or preserving life. It stated then the principle of equality of right and opportunity between the states.

In

Wyoming v. *Colorado,* 259 U. S. 419, 464,

further applying that principle, the court restated it to be:

> "the equal level or plane on which all the States stand, in point of power and right, under our constitutional system."

This can only mean that each state in performing its duty to its people and the people of the United States in conjunction with its sister states, has the right to go forward and progress by availing itself of those natural opportunities which are before it because of its commercial location and by reason of the natural resources located within its boundaries. Such state will be permitted under international law or interstate law as it has been established by this court, to so progress and go forward, even though by such acts it may, perforce, require limitations in measuring the rights of other states.

In determining the principle or principles of international law applicable to any particular situation, precedents as established by treaties between different nations concerning similar situations, are of great weight. The recent Colorado River compact is excellent authority in support of the doctrine of equal right and opportunity between states, and becomes a persuasive precedent in applying interstate law principles in controversies between the states.

The definitive Treaty of Peace between the Colonies and Great Britain of 1783 provided that the people of the United States should continue to enjoy unmolested the right to fish in various waters along Newfoundland, the St. Lawrence, Nova Scotia, Magdalen Islands and

Labrador. For many years no difficulties arose over this right and liberty to fish while Canada and the United States remained comparatively small in population and in commercial activities. However, later for many years the right to fish and the Behring Sea seal catch became a source of constant controversy, negotiation and treaty between the United States, Great Britain, Japan and Russia. The settlement of these controversies by the different treaties and awards at various times always looked to the working out of a plan by which the aspirations of all parties concerned in the advancement of their public welfare were allowed to be realized.

The Treaty of Amity and Commerce of 1794 between the United States and Great Britain, among other things provided, (Article IV):

> "Whereas it is uncertain whether the River Mississippi extends so far to the northward as to be intersected by a line to be drawn due west from the Lake of the Woods in the manner mentioned in the Treaty of Peace between his Majesty and the United States, * * * if * * * it should appear that the said River would not be intersected by such a line as is above mentioned, the two parties will thereupon proceed by amicable negotiation to regulate the boundary line in that quarter, as well as all other points to be adjusted between the parties *according to justice and mutual convenience.* * * *"

(b) THE "NATURAL AND LOGICAL" PLACE FOR THE DISCHARGE OF THE EFFLUENT AND DRAINAGE OF THE SANITARY DISTRICT, INCLUDING THE UNTREATED SEWAGE IN STORM WATERS WITH A REASONABLE AMOUNT OF LAKE WATER TO AVOID NUISANCE AND IMPEDIMENT TO NAVIGATION, IS THE DESPLAINES RIVER.

The discharge of all effluent, storm water, untreated sewage in such storm waters, and drainage to Lake Michigan, as complainants propose, would cause injury to recreational navigation such as boating, and other navigation, on the Lake front waters. Bathing beaches so extensively used at Chicago would be impaired and nuisance would result on the Lake front to navigators and others using the Lake waters. Flushing the Chicago River would not improve the condition of the Lake front waters. It would merely hurry the pollution to the Lake and more bacterial would reach the Lake, (Gascoigne, Joint Abst., 213; Townsend, Joint Abst., 223), endangering to a greater extent the water supply and creating a more dangerous menace to navigation on the Lake front and to bathing beaches than will exist if there is no flushing. Complainants, however, were put to the necessity of suggesting flushing in order to avoid the insuperable and obvious objection of nuisance that would obtain in the Chicago River, in its branches and in the canals of the Sanitary District and in the harbor and Lake if these wastes were discharged directly into the Lake. The building of tunnels from the different treatment plants to the Lake to carry their effluent, would merely transfer the point of intensity of pollution of the Lake front from the mouths of the Chicago and Calumet Rivers to the outlets of the different tunnels. The storm water with its untreated sewage would still be discharged to the Lake through the Chicago and Calumet Rivers, a very serious condition and admitted to be so by complainants, always present under complainants' program for the turning of Chicago's wastes into Lake Michigan (Master's Report, pp. 136-140).

THE DISCHARGE INTO LAKE MICHIGAN OF EFFLUENT FROM TREATMENT PLANTS, STORM WATER, UNTREATED SEWAGE THEREIN AND DRAINAGE, AS COMPLAINANTS PROPOSE, WOULD FOREVER IMPAIR CHICAGO'S ONLY WATER SUPPLY.

Complainants' witness Ellms stated (Joint Abst., 229):

> "Lake Michigan is the present water supply of Chicago. Assuming the completion of the program as outlined by the Sanitary District Engineers, assuming that the sewage effluent is discharged into the Lake at dry weather times, assuming the diversion of the storm water overflow and sewage effluent at times of storms, and assuming no water filtration works, the quality of the water would not be as good as it is now coming through the intakes for chlorination. In other words, the Lake Michigan water would be affected by the sewage effluent."

Cleveland has the Cuyahoga River and Lake Erie into which the Cuyahoga empties. Chicago has the Chicago and Calumet Rivers and Lake Michigan into which these rivers empty. The program of complainants would place Chicago in the same or worse position than Cleveland is now with the discharge of an immense amount of wastes into its water supply. Cleveland has filtered and chlorinated and is filtering and chlorinating its water supply. It is carrying out a program for the purification of its sewage to alleviate the nuisance conditions in the Cuyahoga River and in Lake Erie and to reduce the danger to its water supply. After the program is carried out there will still be the effluent from treatment works going into the Lake, together with storm water pollution from the Cuyahoga River and other sources

> "which would be unavoidable. There are other methods which include doubling up on coagulation and doubling up on filtration. After all of these things have been done, if it is desired to provide a still better water supply, the only way would be to keep the sewage pollution out of the lake or move the intakes to some other point from where they were located." (Ellms, Joint Abst., 238.)

To move the intakes away from pollution would be practically impossible due to the rapid and extensive travel of pollution in the Lake extending 20 or 30 miles. (Master's Exhibit B, Joint Abst., 164-168; Dr. Evans, Joint Abst., 273; George W. Fuller, Joint Abst., 555.)

Defendants' witness George W. Fuller has had a vast and varied experience, not only in the solution of problems of water supply and sewage disposal (Joint Abst., 548-549) in many cities and localities throughout the United States, but, he, also, has studied particularly for many years the problems confronting the Sanitary District of Chicago. He testified as to the various means to obtain a fairly suitable water supply, as follows (Joint Abst., 550-551):

> "The means available for taking care of the water supply problem at Chicago are related to the five items which are generally available in getting a fairly suitable water supply. One of those barriers against pollution is to start out with pure water which does not need any purification or which is particularly protected by diversion from becoming polluted. Secondly, there is the question of taking advantage of means of purification which are natural agencies, self-purification, which is taking place in lakes and reservoirs and streams within certain conditions. Then there is the sewage treatment method of preventing disastrous effects of a pollution by treating the sewage before pollution gets into the source of water supply. Then there is water filtration, and, finally, there is chlorination. There are five different steps or lines of defense available in different cities and under different conditions."

If Chicago is deprived of the first and foremost barrier, namely, the diversion of the pollution, then it never will be able to obtain that standard of water available to it when the other four mechanical barriers or lines of defense mentioned by Mr. Fuller as above stated are provided.

V.

THE PRACTICABLE MEASURES REQUIRED FOR THE DISPOSITION OF THE SEWAGE AND WASTES OF THE SANITARY DISTRICT OF CHICAGO, DO NOT EMBRACE THE CONSTRUCTION, INSTALLATION AND PLACING IN OPERATION OF FILTER PLANTS BY THE CITY OF CHICAGO FOR ITS WATER SUPPLY, THE EXTENSION OF INTAKE TUNNELS OR THE CONSTRUCTION OF A SUPER TUNNEL OR THE BUILDING OF A SEPARATE SEWER SYSTEM, THE PROVISION BY THE SANITARY DISTRICT FOR THE CHLORINATION OF THE EFFLUENT OF SEWAGE DISPOSAL WORKS AND CONSTRUCTION OF OUTFALL SEWERS OR TUNNELS FROM THE RESPECTIVE SEWAGE DISPOSAL PLANTS TO THE LAKE, OR THE UTILIZATION OF EXISTING PUMPING STATIONS OR CONSTRUCTING OF NEW PUMPING STATIONS TO PROVIDE CIRCULATING WATER FOR THE CHICAGO RIVER AND ITS BRANCHES, OR THE PROVISION BY THE SANITARY DISTRICT FOR PASSING THROUGH IMHOFF TANKS OR PRELIMINARY SETTLING TANKS A VOLUME AT STORM TIMES IN EXCESS OF 150 PER CENT OF THE DRY WEATHER FLOW.

(a) THESE WORKS WERE NEVER URGED BY THE COMPLAINANTS TO BE A PART OF THE PRACTICABLE MEASURES FOR THE DISPOSITION OF THE SEWAGE OF THE SANITARY DISTRICT OTHER THAN BY LAKE DIVERSION.

Complainants find fault with the Master's Report on the ground that these various works, such as filter plants, outfall tunnels, provision for circulating water and the others mentioned above, were not included by the Master as part of the practicable measures to be adopted to dispose of the sewage and waste of the Sanitary District, although in their requested findings submitted to the Master, they said:

> "The construction or installation of any such additional works or structures should be left to the discretion of the defendants." (Joint Abst., 666.)

Requested Finding VIII sets forth

> "the method or program for the complete treatment"

of sewage and industrial waste by means other than Lake diversion. It is so similar to the finding complained of that we set forth below, in juxtaposition, complainants' Requested Finding VIII and the Master's Finding excepted to.

Complainants' Requested Finding VIII—"The completion of the North Side and West Side sewage disposal plants on the activated sludge principle, the completion of the Calumet plant on the trickling filter principle, and the construction of the Southwest Side sewage disposal plant on the activated sludge principle, together with the completion or construction of such additional sewers and pumping stations as may be necessary to convey all of the sewage to said respective sewage disposal plants, will provide a practical method or program for the complete treatment of all of the sewage and industrial waste of the Sanitary District by means other than Lake diversion." (Joint Abst., 665)

Master's Finding to Which Complainants' Except—"That the completion of the North Side, West Side, Calumet, and Southwest Side Sewage Treatment Works, above described, with their appurtenances and the necessary intercepting sewers, and the efficient operation of these plants, will afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes of all the area comprised within the Sanitary District of Chicago." (Master's Report, p. 141)

The construction of filter plants for water supply, extension of intake tunnels, construction of a super tunnel and the building of a separate sewer system costing upwards of $500,000,000, would be required to be done by the City of Chicago, not a party to the suit, and against whom no relief was sought or given by the Court's opinion of January 14, 1929. The relief is against the Sanitary District. The Court said:

> "The situation requires *the District* to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion." (Opinion, Appendix p. 19)

Again the Court said:

> "our decree should be so framed as to accord to the *Sanitary District* a reasonably practicable time within which to provide some others means of disposing of the sewage" (Opinion, Appendix p. 17).

(b) THE FILTRATION AND OTHER WORKS, NOW DEMANDED BY COMPLAINANTS, WOULD NOT PRODUCE A DEPENDABLE WATER SUPPLY AND PROTECT SHORE WATERS AND NAVIGATION (MASTER'S REPORT, PP. 136-140).

Complainants' witness Ellms said (Joint Abst., 632):

> "The pollution affects the use of water for recreational purposes and for bathing, and it affects fish life and recreational boating to some extent. It depends, of course, upon the degree of pollution of the shore waters, but it certainly would become more or less objectionable, I imagine; that is, if very large volumes of untreated sewage are turned directly into the Lake. The floating solids are the things most objectionable from the point of view of boating and bathing. It is true that a person in a launch or sailboat or rowboat is liable to become infected."

Mr. Ellms also testified (Joint Abst., 228) that:

> "The works constructed or to be constructed, as proposed by the Sanitary District under this program, are, from the standpoint of present knowledge of the art of sanitary engineering, the best possible works to be constructed from any practicable standpoint to completely treat the sewage arising within the District. Even though that program is completely carried out, there will be some matter of sewage origin at times in the Chicago River and its branches which has not received treatment."

He also stated (Joint Abst., 229):

> "The Lake Michigan water would be affected by that sewage effluent."

The conditions at Cleveland are described by the report of the Municipal Research Bureau of March, 1926, and the statements made in the report of 1926 are repeated in the similar report of May, 1928. To this statement Mr. Ellms subscribed, and the statement is as follows (Joint Abst., 232):

> "A canvass of those with experience of lake front conditions discloses that deposits of feces and other objectionable animal and vegetable wastes are common on the beach, especially after storms. Similar matter may usually be observed floating and decomposing on the water and matter with finer suspended material causing unpleasant odors. Oil and grease in sufficient quantities to befoul the beaches also are reported. Observations indicate that discharge of storm water from the interceptor system is most responsible for the coarse matter deposited. It is probably true that treatment of sewage now discharged into the river would not eliminate the oil nuisance, but it would put the city in a much better condition to discover and control the sources of such waste."

Mr. Eddy, defendants' witness, in speaking of the plan recommended by the Board of Review of the Sanitary District, which plan was similar to the present sewage disposal program of the Sanitary District, in 1927 said (Joint Abst., 575):

> "The program recommended by the Board of Review, which includes the Canal and River system which was in use and is now in use, in my judgment, will protect the water supply better than any other method, and will also protect the shore waters and bathing waters as well as they can be protected.
>
> * * * * *
>
> In my judgment, there is no other plan which is practicable to adopt, or with which it is possible to secure the same degree of protection, coupling the two words 'practicability' and 'possibility.' The system which has been adopted, coupled with the program, will continue to efficiently divert the sewage and storm water and protect the water supply and the shore water. To abandon the system which has been built and which is capable of performing

> the functions stated, in my judgment, would be a serious backward step from the point of view of sanitary engineering and public health. Failure to take advantage of these natural opportunities, in my judgment, is not justified.
>
> From an engineering standpoint it is necessary, for the protection of the health of the community, to keep the sewage away from the Lake, and it is highly desirable for the protection of the shore waters for recreation and other purposes."

Concerning the effect of storm overflows, Mr. Eddy said (Joint Abst., 577):

> "In times of low or small overflows, the proportion of the total volume of sewage produced, which is discharged into the canal system, is small, whereas, in times of great overflow the proportion of the sewage escaping is very large, and may be as much as 90 or 95 per cent of the total dry weather flow escaping with the storm flow.
>
> These discharges of storm pollution, whether it be from the surface of the streets or from the sewers, are a serious menace to the purity of the waters along the water front. If allowed to be discharged into Lake Michigan they would seriously pollute and contaminate bathing beaches, and would render offensive and objectionable the waters along the parks and in the enclosures at the water front, and seriously pollute the water supply."

Master's Exhibit B, being the report of Alvord, Burdick & Howson, of April 16, 1925, states:

> (Joint Abst., 161) "It must be a part of any scheme for sewage disposal that the water supply should be protected against any possibility of sewage contamination. Unless this is accomplished sewage disposal fails in its principal requirement.
>
> This matter is particularly important to municipalities located on the shores of the Great Lakes. In all of these cities the lakes constitute the only practicable means for municipal water supply. In many instances the lakes are the only practicable means for sewage discharge.
>
> In the Chicago region the means has been pro-

vided through the drainage canal, by which the great majority of all impurities are diverted from Lake Michigan."

(Joint Abst., 165) "The question as to the travel of pollution in the waters of Lake Michigan has been studied very thoroughly upon several occasions covering the Chicago water front, the water front opposite the Chicago north shore suburban towns and further north and along the lake at Racine and Milwaukee. The results of these studies indicate similar conditions wherever sewage contamination reaches the lake and variable winds and waves are available for dispersion. The net results from these studies are well summed up by Major W. V. Judson in his paper on currents in Lake Michigan, (first report Lake Michigan Water Commission, page 67). 'In my opinion the currents of Lake Michigan are so irregular in character that nothing would be gained worth the cost if attempt were made to obtain classified further data of a general nature. If it is a question of protecting the water supply of any particular locality, in any event, special study would have to be made inasmuch as the lake currents, available as they are, are much influenced by local conditions.

We do know, and perhaps it is enough for the purposes of this commission, that occasional currents of considerable velocity, say several miles per hour, may be expected to arrive from almost any direction at any point reasonably near either shore of the lake. It is, therefore, apparent that in a general case if the waters of the lake are polluted by the discharge into it of large quantities of sewage, then, practical localities in the lake, even twenty or thirty miles distant from the point of entrance to the sewage, are not safe places in which to derive water for domestic use.' "

* * * * *

(Joint Abst., 167) "There are certain conditions in storms when pollution may travel with great rapidity to a Water Works intake. The situation is much like the dissipation of smoke from a tall chimney. In relatively calm weather it may disappear within a short distance from the chimney. Under a

> current of wind it may stream out in one direction, traveling for miles. Pollution in a lake may travel in similar manner."

* * * * *

(Joint Abst., 169) "Chicago is entitled to a clean water, safe from a Sanitary standpoint 365 days per year. This standard is generally demanded throughout the United States."

Mr. Fuller stated with reference to effects of storm overflow (Joint Abst., 550):

> "The storm overflow into the Chicago River and into the Calumet River is a very important item in the solution of the problem of water supply, because that method of disposition of sewage in the area of the Chicago Sanitary District, as well as from Lake Michigan, is intricately tied up to the question of water supply and the flow away from the Lake down the Drainage Canal."

Complainants' witness Townsend, concerning the conditions at Milwaukee, where there is complete treatment of the sewage by the activated sludge process, described the pollution which exists there at storm times (Master's Report, p. 133):

> "I have no figures with me upon which I can state the proportion of the sewage in storm flow passing into the river or the lake through the old outfalls at rain and thaw periods. There are overflows at the foot of a majority of the streets passing directly into the three rivers carrying raw sewage. However, the worst of the polluting material from the streets and deposits in the sewers is taken into the intercepting sewer. Afterwards the sewage diluted with storm flow passes directly into the river.
>
> I made no tests to determine the correctness of the statement as to the worst of the sewage going into the plant, except that we have found through operation that on the crest of a great many storms the material received is unusually foul. Lots of that goes directly into the lake or rivers through these outfalls."

Mr. Fuller described the difficulties of obtaining a safe water by the use of mechanical barriers (Joint Abst., 558-560):

> "I am aware that filtration and extension of intakes would handle reasonable loadings as regards pollution, but after installation there are elements coming from flood flows where winds will carry dirty water fifteen or twenty miles and adding to that the question of failures and weaknesses and breaks and lapses incident to operating filtration plants. I am familiar with those faults of operation and know that there are times when the efficiency of filtering falls off materially.
>
> Storms bring to a filtering plant water which needs a change in the amount of chemical treatment. This may happen at three o'clock in the morning with a sleepy attendant, to whom that line of work is an old story. They do not make the adjustment. The pollution gets away and goes into the water supply of the city. They do not know it. The citizens do not know it. They drink it. There are unfortunate results, dependent on whether the water or its bacterial content happens to carry disease germs.
>
> There is another fault that comes from breaks in pipes and connections and arrangements which cannot be immediately corrected and sometimes are not detected. There is the question of efficient maintenance. After a long period of use filters get out of condition. Failure to make current repairs as needed causes a portion of the sand bed to become entirely impervious. Wash and the water fails to clean that sand or disturb that mass, causing the filters to get out of condition. It becomes larger and larger. The water does not penetrate it. The time comes when if the water should go down at the average rate of two gallons per square foot there is a falling off of efficiency.
>
> The people to whom the operator in charge reports do not realize the importance of such conditions, and that raises the fourth weakness, the failure of administrative or executive authority to support the operator.

* * * * *

Referring to the five barriers or lines of defense against infection of water supply, the most nearly

> practicable one is that one which provides naturally pure water protected against pollution, which is better than any line of defense in securing a hygienically safe water supply. Pure water does not carry hazards or lapses due to errors or unavoidable mistakes which occur in the operation of purification plants."

See, also, Mr. Eddy's statement (Joint Abst., 575).

Mr. Eddy also testified that in his judgment, with complete sewage purification works installed, no diversion of any kind from the Lake, but discharge of all wastes to the Lake, with filtration and chlorination of the water supply, the domestic water supply of Chicago would not be as good as under the program for the diversion of the sewage and wastes from the Lake, and under these conditions'

> "the sewage and storm water discharged into the Lake would at times—how often it is impossible to predict—in my judgment reach the intake, even if it were carried as far north and east as off Wilmette" (Joint Abst. 580).

At Detroit in 1926, where the water was filtered and chlorinated, a break occurred in the operation of the filtration plant so that as a result of such break by reason of the filter plant becoming overloaded, 200,000 cases of diarrhea resulted (Joint Abst., 581).

Complainants' witnesses on the subject of sewage disposal and water supply have had little experience as compared with the similar witnesses of defendants. The study and investigations they have made to qualify them to testify concerning the particular problem at Chicago, are meagre and negligible. The only complainants' witness who had made any particular study of the Chicago situation was Howson, and his report made on April 16, 1925, to the Chief of Engineers (Master's Exhibit B, Joint Abst., 114-191), nowhere recommends, but on the contrary condemns, a program of discharging Chicago's drainage and wastes into the Lake after complete treatment of the sewage is obtained and after the water supply is filtered and chlorinated.

Mr. Ellms subscribed to his report published in the Canadian Engineer of April 30, 1926, entitled "Pollution of Boundary Waters — Problems of Cities on Great Lakes," in which it was stated (Joint Abst., 631):

> "that there is no question that the natural sources of dilution should be availed of, but that it should also be realized that there must be a limit to the ability of purification processes to make safe from a sanitary standpoint waters which have once been contaminated."

Mr. Ellms also subscribed to the following statement from his work entitled "Water Purification" (Defts. Abst., 932, 933):

> "that the pollution of the Great Lakes is to a large extent local, but since these communities draw their water supply from the same source the problem of preventing the contamination is a troublesome one; that the common remedy of extending intakes has been resorted to with fair success and with marked decreases in the typhoid rate; that the City of Chicago has diverted a large part of its sewage, thus keeping a constantly increasing volume of sewage from polluting the Lake water farther and farther from the shore; that other large cities are contemplating partial purification of sewage, and that the effect of wind on these large bodies of water is causing currents; that the influence which the shore lines may have on these currents and the movement of ice polluted with sewage from the shores out into the Lakes in the spring months are all factors which may at times be the cause of waterborne epidemics."

Mr. Ellms also stated (Joint Abst., 634):

> "The size of the city has something to do with the question of providing a water supply."

He was there referring to cities located on the Great Lakes.

Dr. Mohlman, a graduate of the University of Illinois in 1912 with the degree of Bachelor of Science, and employed by the Sanitary District of Chicago as director of laboratories for the past ten years, has had very active and extended experience in the investigation and analyses, from a chemical and bacteriological standpoint, of the waters in and about Chicago and elsewhere. He testified as to the conditions that will exist under the various hypotheses presented here for the discharge of sewage effluent, storm water containing sewage and drainage into the navigable waters of the United States, consisting of the Chicago River channels and the Canal System of the Sanitary District, and Lake Michigan waters on Chicago's water front. (Joint Abst., 338.)

As further qualification for the opinions given, he testified to making a most thorough examination and survey of the Menominee, Kinnickinnic and Milwaukee Rivers and the waters of Lake Michigan at Milwaukee.

Chicago has the North Branch of the Chicago River and the South Branch converging about a mile from the Lake, forming the Chicago River proper; the South Fork of the South Branch extending south to the industrial district at the stockyards and Packingtown; the West Fork of the South Branch extending westerly from a point near the junction of the South Fork and South Branch, with various arms and slips in which the water is more or less stagnant.

Milwaukee has the Menominee River, extending westerly from the Milwaukee River above its junction with the Kinnickinnic, the former flowing from the north and the latter from the south. From its junction with the Kinnickinnic the main stem of the Milwaukee River, carrying the waters of all three streams, flows to Lake Michigan.

From the beginning of the taking of testimony in this case on the sanitary phases, the complainants have exhibited Milwaukee as the ideal city, now of unassailable chastity from the sewage pollution standpoint, by the operation of the modern activated sludge plant recently placed in operation there, designed to treat and dispose of all the sewage of the population of Milwaukee proper and of additional population in its suburbs. Dr. Mohlman, in order to place himself in a position to give a more credible opinion as to what will exist at Chicago under the various conditions of discharge of the effluent from purification works, storm water, and drainage, commenced his survey about the first of June, 1929. The following quotation from Joint Abst., 339, shows the extent of this investigation:

> "In laying out this study of Milwaukee conditions I found it desirable, in order to extend our knowledge, to include the whole system as it is now in operation; namely, the sanitary condition of the Milwaukee River System from the standpoint of the oxygen content of the waters; the conditions of whether or not the rivers were flushed; the contrasts in condition of these rivers and all factors that I could find that would give me knowledge of what the conditions would be under such a program of complete treatment of sewage and interception of sewage from the river system and discharge of a sewage effluent and of the river water into the Lake. This required, in addition to the river studies, a careful survey of the bacteriological conditions along the Lake front, and this, in turn, required a subdivision to determine what effect such a program had on the bathing beaches of Milwaukee, and, secondly, on the Lake front and the harbor conditions off the mouth of the Milwaukee River.
>
> Our investigation started early in June, 1929; in fact, late in May. I had samplers on the river, out in the Lake and along the beaches. The river samples were taken in approximately 22 trips, extending from May 28th to August 30th. The samples taken

during these trips amounted to approximately 360, taken in these 22 trips; and these samples were taken from all parts of the Milwaukee River System, the navigable channels of this river system. Now, these, of course, were only the samples from the rivers. The samples from the Lake comprise approximately 400, as I recall it, and the samples from the beaches approximately 140. Somewhere around 900 samples altogether were taken.

Flushing was under way during our investigations, because I saw the water coming into the rivers from the flushing tunnels myself, that is, as to the Kinnickinnic and Milwaukee Rivers. There was no flushing of the Menominee River.

I attempted to estimate the amount of this flushing of the Milwaukee and Kinnickinnic Rivers by visits to the pumping stations that were in operation at the time, and also by having my assistants get what information they could regarding the amount and the time of flushing.

I made an investigation to determine the relation of the conditions of flushing.

I also made an investigation to determine the general trend of the drift of pollution in the lake at Milwaukee during that period.

I determined the B-coli index of water at the different bathing beaches in Lake Michigan along Milwaukee's Lake front.

I determined the dissolved oxygen content of the Menominee River where there was no flushing, and also the dissolved oxygen content of the water of the Kinnickinnic and the Milwaukee Rivers where there was flushing.

The Milwaukee River extends from the junction of the Kinnickinnic and Milwaukee Rivers to the lake. Of course, in all of these determinations I did not take all of these 900 samples personally, but I did take some of them personally, and I supervised carefully the collection, the place of collection, and the manner of collecting samples and the manner and methods of making the analysis of all of these samples.

All of this work was done under my direction by men who had been in the employ of the Sanitary District for some years, and they were competent.

> I traversed these various rivers myself and observed the conditions of the Menominee River on various occasions, as well as the conditions of the Kinnickinnic and the Milwaukee Rivers, and the main stem of the river on four occasions, and collected samples on those same occasions out of the 22 trips I believe I mentioned previously.
>
> On those occasions I observed the conditions of water with reference to odors and ebullition of gas and such things and the appearance of particles in the water, whether they were of sewage origin or not.
>
> I observed everything that would lead me to form an opinion as to the sanitary condition of the entire water system.
>
> Extending along the same period of time with the investigations that were made in Milwaukee, I arranged to have samples taken in Chicago from our beaches in as closely as possible the same manner in which the samples were taken in Milwaukee. I planned to have these samples taken on the same days, if possible, and by making the same analyses I drew comparisons as to the quality of the bathing beach waters in Milwaukee and Chicago.
>
> * * * * *
>
> In my examination of the water at bathing beaches at Chicago I determined the B-coli index of the water, the same as I did at Milwaukee.
>
> By B-coli index, I mean the number of B-coli per hundred cubic centimeters."

After stating his familiarity with the sewage treatment program of the Sanitary District as presented in this case, and the one which complainants' witnesses have stated is a good program, Dr. Mohlman gave an opinion as follows (Joint Abst., 342-343):

> "I have an opinion as to what the conditions would be at Chicago in the Chicago River and its branches and the canals of the Sanitary District if the effluents from these sewage purification works, and storm water, are discharged to the Des Plaines River from the main drainage channel and if there is no water diverted directly from the lake, when these works

are in operation under this Sanitary District program.

* * * * *

I have made many studies of what the oxygen demand of these effluents would be, and I have also given consideration to other factors besides the question of the requirements of the effluents themselves. The complicated factor that makes it impossible for me to judge what the conditions will be in the future, with complete treatment, is that we do not know what the effect of storm water discharge, carrying sewage, will have on these streams. My opinion of the effect of such storm water solids is that they will form septic deposits in the river; that the oxygen will disappear except for a short distance below the activated sludge effluents, and that the condition of the channels will be objectionable. There will be deposits of septic sludge and a condition of pollution that will be highly offensive. That is in the absence of any diluting water from the Lake.

In my opinion there would be no dissolved oxygen in the waters of the Chicago River and its branches and the canal system, under the foregoing assumed conditions, except for a small amount of dissolved oxygen immediately below the discharge of the treatment plant effluents, but in the absence of diluting water, the water would be devoid of oxygen, and there would be objectionable conditions."

Dr. Mohlman further said, (Joint Abst., 343):

"I have an opinion as to the volume of water that will be required to be taken directly from Lake Michigan under conditions of discharge of all effluents, storm flow and drainage to the Des Plaines River, in order to produce unobjectionable conditions in the Chicago River and the canal system, and provide the necessary dissolved oxygen.

My opinion is based to a considerable degree on these studies that I have made in Milwaukee this summer. As I said before, I have made many computations on this question of what water will be required, and all of the estimates have been based on the oxygen requirements of the effluents from the treatment works. I have not known what the effect of all other factors which enter into this will be. For example, we have deposits of solids in storm water discharge. I have not had any direct method of knowing what would be the effect of those solids in the river system, such as our Chicago system is. I have not been able to determine what would be the effect of flushing, if flushing were put into effect, toward the Lake. I have not been able to determine what other conditions would affect the sanitary condition of the Chicago system after our treatment plants are put in operation. But, having gained this knowledge of the effect of some of these other factors from my study in Milwaukee, *I believe that a substantial volume of diluting water will be required after the sewage treatment program of the Sanitary District is completed.* I base this to a considerable extent upon what was found in Milwaukee through our studies this summer, of the effect of those solids.

I believe that any hard and fixed ratio of dilution set at the present time is subject to unavoidable contingencies that make it undesirable to determine the exact amount of water at the present time. I believe that the exact amount can only be determined on the basis of very complete surveys such as we have made at Milwaukee this summer, only on a much more extensive scale. I feel that there are so many unknown factors affecting future conditions, that the exact amount cannot be determined until we know more about these practical, unknowable factors which enter into the problem.

By 'unobjectionable conditions' I mean conditions that will not allow the dissolved oxygen content to be depleted to zero; I mean conditions that will not allow black or septic condition of the river system; I mean conditions that will not permit evidence of sewage matter to be seen on the surface of the rivers.

The ebullition of gases occurs if solids are deposited in the river.

Assuming no discharge of any kind from the Drainage Canal to the DesPlaines River, the completion of the program of sewage treatment and the discharge of the effluents from these plants at

> the places I have described or that have been described in the evidence, and the addition of 2,000 cubic feet per second from the Calumet Sag Channel at its eastern terminus, 2,000 second feet from Lake Michigan to the South Fork of the South Branch of the Chicago River, 1,000 second feet to the North Shore channel at its Wilmette terminus, I have an opinion as to what the condition of the water of the Chicago River and the Canal systems and the waters of Lake Michigan at and near Chicago's lake front will be.
>
> The use of this volume of flushing water toward the Lake under the conditions mentioned would provide conditions in the Canal System such that in my opinion the system, including the channels of the Chicago River and its branches, would not be highly objectionable. On the other hand, the constant flushing of this volume of water, plus the content of the channels, into the Lake would ruin the bathing beaches and make them completely unsafe. I believe that it would contaminate the water supply and be in marked contrast to the present condition.
>
> Based on my experience and my investgation that I have made and described, the B-coli indices at the various bathing beaches, I believe, contrasting our conditions with what I found at Milwaukee, would be a million or more. I have formed my opinion as to that point on the basis of what was found this summer at Milwaukee.
>
> That is a million B-coli per 100 cubic centimeters.
>
> I refer to all bathing beaches within a radius of five miles of the mouth of the Chicago River."

In 1905 the attendance at Chicago's bathing beaches was 51,722 persons. In 1908 and 1909 when the intercepting sewers were placed in operation, picking up the sewage of Chicago which had previously flowed directly into the Lake, the bathing beach attendance increased to approximately 600,000 persons each year. From then on the attendance each year rose by leaps and bounds until in 1928 it reached 8,751,123. This is a staggering number which should cause the stay of the hand of any one, particularly a court of equity, contemplating the taking of any step or the doing of any act which would endanger the health and lives of this vast number of people using bathing beaches each year, or which would ruin the attractiveness of the waters used for such purposes. (Joint Abst., 327-333).

Complainants except on the ground that, as they say, the Master should have found that the preliminary treatment or tanks at each of the plants could be so operated or changed in design so that about 4,000 c.f.s. of sewage flow at storm times could be practicably passed through such preliminary treatment works. Complainants' witness Howson, after stating that he considered the defendants' program to be a "good program," said:

> "It would be wise to give the preliminary treatment to a larger per cent of the storm water overflow; that is, put it through the preliminary tanks and then by-pass it without putting it through the aeration tanks and secondary treatment. The program as a whole, with that modification, which is not essential, but which will somewhat improve it, is well adapted to the situation." (Master's Report, p. 20.)

Thus, Mr. Howson does not recommend such change.

Gascoigne, another witness, said:

> "If it were necessary to enlarge the different parts of the plants mentioned, my statement on direct examination was incorrect." (Joint Abst., 212.)

The Master found (Master's Report, p. 23):

> "The evidence does not, in my judgment, furnish a basis for a finding that enlargements are necessary in the sewage disposal plants as proposed in the program of the Sanitary District. The complainants state that the changes they propose in these plants relate to their operation."

The Master further said (Master's Report, p. 24):

> "As the suggested change does not appear to be regarded as an essential feature, its feasibility may

> be left to be determined in the course of the actual operations."

With reference to chlorination of the effluent, defendants' witness Mr. Fuller stated (Joint Abst., 560-561):

> "I do not know that it has been established that chlorination of such an effluent does substantially and materially reduce the B.O.D demand of that effluent. There is a tendency in that direction, but it has never come within my range of observation."

Concerning outfall sewers the Master found (Master's Report, p. 137):

> "The suggestion that outfall sewers or tunnels might be built to take the effluents directly to Lake Michigan has been made in a general way, but the evidence is by no means convincing that it would be a reasonable requirement to compel the Sanitary District or the city to build such sewers or tunnels to take the effluents from the sewage treatment plants across the city to the Lake (*supra*, p. 134). The problem of the storm flow would still remain and would be especially serious in view of the volume which may be expected in the run-off of this large area with its great and growing population. The pumping of circulating water into the Drainage Canal and the Chicago and Calumet Rivers would, as pointed out in the testimony (*supra*, p. 135) carry whatever filth there would be in these rivers to the Lake more rapidly."

With reference to the separate sewer system mentioned in complainants' exceptions, the Master's findings are likewise conclusive (Master's Report, p. 24):

> "The complainants have not proposed the installation of a separate system of sanitary sewers. When the defendants presented testimony as to their estimates of the extremely heavy, and in their view prohibitive, cost that would be involved in that undertaking (estimated by William R. Matthews, engineer of the Bureau of Sewers of Chicago at over $400,000,000), counsel for complainants stated that complainants' program does not provide for any such sewer system; that the defendants had not ad-

> vanced any program involving the construction of a separate sewer system for Chicago nor had the complainants. 'Nowhere,' says the complainants' brief, 'have any of complainants' witnesses stated that there was any necessity to construct such a system.' No plans have been furnished by the complainants for a different system of interceptors."

Defendants' witness Eddy, concerning the value of the separate sewer system, said (Joint Abst., 576):

> "Those storm flows contain the sewage, as well as the storm water, and the storm water itself, if there were no sewage in it, is seriously polluted and contaminated."

Mr. Eddy further stated on cross-examination (Rec., 5322, Defts. Abst. filed with Master on Re-reference, 796):

> "If there were a separate sewer system and whether the storm sewage or flow were run down the River or into the Lake, is an important point. If you turn storm sewage into Lake Michigan, you have all the filth and contamination from your city streets. It is practically impossible to build in these days in the United States a duplicate system of sewers and keep your sewage out of your storm drains. It simply cannot be done. That means that through your storm sewers going into Lake Michigan, you are going to have sewage discharge in addition to the pollution from your storm water."

ASIDE FROM THE IMPRACTICABILITY OF THE FILTRATION AND OTHER WORKS, COMPLAINANTS SAY THE MASTER SHOULD HAVE INCLUDED AS PART OF THE PRACTICAL MEASURES FOR THE DISPOSITION OF THE SEWAGE AND WASTES OF THE SANITARY DISTRICT, THE FINANCIAL BURDEN WOULD BE UNBEARABLE. SEE DEFTS. EX. 1310 (JOINT ABST., 522-523).

From the above exhibit and the testimony of Matthews as to the cost of a separate sewer system, the following items of financial burden are shown:

Construction Cost		
Chlorination of effluent	$ 2,100,000	
Sanitary sewers	400,000,000	
Water filtration	53,000,000	
Super tunnel and crib	70,000,000	
	$525,100,000	
Interest during construction, upwards of	53,000,000	
Total construction cost		$578,100,000
Capitalized Annual Costs		
Operating, upwards of	$107,000,000	
Depreciation and obsolescence, upwards of	83,000,000	
Overhead, upwards of	28,000,000	218,000,000
Public Utility Damage		186,000,000*
Total		$984,100,000

*Note: See Complts. Ex. 18 (Joint Abst 204).

VI.

THE POLLUTION OF NAVIGABLE WATERS CAUSED BY THE INTRODUCTION OF SEWAGE HAS RELATION TO THE INTERESTS OF NAVIGATION. CONSEQUENTLY, THE DIVERSION FROM LAKE MICHIGAN, WHEN ALL THE SEWAGE TREATMENT WORKS ARE IN OPERATION, SHOULD BE FIXED WITH RELATION TO THE NEEDS AND INTEREST OF NAVIGATION WITH RESPECT TO THE NAVIGABLE WATERS, NOT ONLY, OF THE PORT AND HARBOR OF CHICAGO, BUT ALSO, OF THE DES PLAINES AND ILLINOIS RIVERS.

Wisconsin v. *Illinois,* 278 U. S. 367:

The Court upheld the permit of March 3, 1925, on the ground that it had relation to the interest of navigation and that the purpose of providing the diversion in the amount fixed by said permit was to prevent obstruction to navigation by sewage nuisance. (See Opinion, Appendix pp. 16-17).

New York v. *New Jersey,* 256 U. S. 296:

> "(304) * * * the use of the sewer would result in the *obstruction of navigation by the filling up and shoaling of the channels of the Bay.*

* * * waters would be *rendered unsightly* and *unhealthful* to persons using them *for commerce.*

* * * * *

(306) * * * the stipulation for treatment of the sewage, 'or through requisite lawful additional arrangements,' viz: (1) *There* will be absence in the New York Bay of visible suspended particles coming from this sewage; (2) there will be absence of deposits caused by it objectionable to the Secretary of War of the United States; (3) there will be absence of odors due to the putrefaction of organic matter contained in the sewage; (4) there will be absence on the surface of the bay of any grease or color due to the sewage; (5) there will be no injury to the public health due to the discharge of the sewage, and no public or private nuisance will be created thereby; (6) no injurious effect shall result to the property of the United States situated upon the Bay; (7) there shall not be a reduction in the dissolved oxygen content of the waters, due to this sewage, sufficient to interfere with major fish life. It is agreed that the Government shall have unrestricted opportunity to inspect the workings of the sewer system, by designated officials, and that full compliance at all times with the provisions of the stipulation referred to shall be made an express condition of any permit issued by the Government for the construction, maintenance or operation of the projected sewer system.

* * * * *

(307) * * * and we think the probabilities greatly in favor of this conclusion, having regard to the opportunity secured to the Government for inspection and observation of the treatment plant and and for determining the quality and content of effluent before it is discharged into the Bay and the effect which it may have on the water in the immediate vicinity of the outlet.

* * * * *

The intervention of the Government was allowed upon allegations that the inadequate treatment of the sewage proposed would result in *injury to navigation and commerce: by causing deposits of solid* *matter,* to the extent of thousands of tons annually, which would fill up and shallow the channels of the Bay; by rendering the Port of New York less *serviceable and attractive to commerce* and offensive and *unwholesome* to persons *using* and living near it; and by causing injury to the *hulls* of *vessels* by the character of the *effluent* to be *discharged.*

(308) Having regard to the large powers of the Government over navigation and commerce

* * * we cannot doubt that the intervention of the Government was proper in this case.

* * * * *

(309) * * * the reasons given in the bill to justify the injunction prayed for are restricted * * * to the claims that the addition of the Passaic Valley sewage to the already polluted waters of the Bay would result, in odors offensive and unwholesome to persons bathing in them or *passing over them in large vessels or in small boats* or living and working upon the adjacent shores, in causing unsightly deposits on the surface of the water and chemical action injurious to the wood and metal of vessels navigating the Bay, and in rendering fish and oysters taken from such waters unfit for consumption. The evidence introduced, as to increase of damaging *chemical action upon the hulls of vessels* by the *proposed addition of sewage,* and as to the danger from air-borne diseases to persons using the water in boats and vessels or working or dwelling upon the shore of the Bay, is much too meager and indefinite.

* * * * *

(310) It is much to be regretted that any forecast as to what the effect would be of the treatment and deeply submerged discharge through multiple outlets proposed for this large volume of sewage must depend almost entirely upon the conflicting opinions of expert witnesses, for experience with such treatment and dispersion under even approximately like conditions seems entirely wanting.

* * * * *

(313) We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal presented by the large and

> growing populations living on the shores of New York Bay is one more likely to be wisely solved by co-operative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court however constituted."

(a) THE EVIDENCE IS OVERWHELMING IN SUPPORT OF THE PROPOSITION STATED IN THE HEADING.

In 1929, with reference to the discharge of the effluent from these purification works into the Lake, Defendants' witness, Eddy said (Joint Abst., 75):

> "The discharge of the effluent from the various works to be completed under the program into the Lake, would be detrimental to navigation. The effluent would be devoid of oxygen, black and offensive much of the time. It would tend to discolor light-colored paint on boats. It would be offensive to people riding on boats and having to work on the vessels and along the wharves. This condition would gradually decrease in intensity as the distance from the mouth of the river increased, due to the dilution and oxidation which would take place in the waters of the Lake. And in reaching the above conclusion, I assumed that the storm water would be discharged to the DesPlaines River, and that the effluent from purification works in dry weather time would flow into the Lake."

Mr. Eddy stated his conclusions as to what would represent a reasonable standard for the waters of the Port of Chicago for navigation, as follows (Joint Abst., 76):

> "The *first* is that the water should be practically free from visible suspended particles of sewage matter coming from the sewage treatment plants.
>
> 2, the water should be practically free from oil, grease, color and suspended matter.
>
> 3, the water should not be obnoxious or offensive to, or injuriously affect the health of passengers and persons employed on vessels or other property used in connection with navigation.

> 4, the water should not create odors of putrefaction of organic matter.
>
> 5, the water should not be of such composition as to result in an excessive growth of water plants.
>
> 6, the water should not cause discoloration of paint on, or otherwise injure, vessels and equipment or other property employed in connection with navigation.
>
> 7, the water should contain at least three parts per million of dissolved oxygen."

The table in Defts. Ex. 1413, Doc. 417, 69th Congress, first session, "Pollution affecting Navigation or Commerce on Navigable Waters," shows numerous places where navigation has been seriously affected by the discharge of sewage and wastes into waterways (Joint Abst., 48).

That pollution of navigable waters affects sailors, is apparent from the testimony of Dr. Evans, defendants' witness, to the effect that typhoid rate is much higher among seamen on the Great Lakes than it is among civilians located in cities about the Great Lakes (Joint Abst., 267).

Dr. Knapp, Director of Laboratories and Food and Drug Control for the City of Cleveland, and first assistant to the Health Commissioner of Cleveland, acting in his stead at times, was subpoenaed as defendants' witness. He testified that epidemics of intestinal infection had been traced in the past to bathing in polluted water. While he said "circumstantially," he later stated that it is, only, by circumstances that the health authorities may determine the source of disease. (Joint Abst., 334). He further testified (Joint Abst., 334):

> "During the years 1924 to 1928 all of the typhoid cases which occurred in the City of Cleveland were studied, those in which bathing might

> have been under suspicion, regardless of whether it was in the City of Cleveland or outside of the city—a certain large percentage of cases in our city are so-called nonresident cases. In the study of those cases there were a certain number in which the only lead led to bathing, whether it was in the city or out of the city. A certain percentage showed a condition which we called 'no lead' or 'no lead cases,' but in which bathing might have been a factor. So, they were grouped on a paper which was published this last summer,—two sets of figures—a certain number of cases which were listed on our epidemiological report were traced to bathing. Then in another column was stated as 'bathing under suspicion,' meaning that some time during the incubation period of the disease the particular parties had been in bathing.
>
> In other words, I traced some of these cases to bathing, circumstantially. In other cases they were under suspicion as having contracted typhoid fever at bathing beaches."

He also testified that in this examination and survey of the relation of typhoid fever to polluted bathing beaches, various cases arising during the bathing season at Cleveland for the years 1924 to 1928, both inclusive, were traced to bathing, and various other cases were suspected of being due to bathing; that the results were as follows:—out of 47 cases of typhoid fever during the bathing season of 1924 at Cleveland, 4 were traced to bathing, 9 were under suspicion as having come from bathing; in 1925, out of 29 cases, 1 was traced to bathing and 12 were under suspicion; in 1926, out of 48 cases, 4 were traced to bathing and 6 were under suspicion; in 1928, out of 32 cases, 5 were traced to bathing and 7 were under suspicion; that people were warned on account of pollution not to bathe in Lake Erie this season (1929). (Joint Abst., 335-336).

On August 1, 1912, the Governments of the United

States and of the Dominion of Canada, pursuant to Article 9 of the Boundary Waters Treaty of 1909 between the United States and Great Britain, submitted to the International Joint Commission the following questions, among others (Ex. 1166, Rec., 4995):

> "To what extent and by what causes and in what localities have the boundary waters between the United States and Canada been polluted so as to be injurious to the public health and unfit for domestic and other uses. * * * In what way or manner, whether by the construction and operation of suitable drainage canals or plants at convenient points, or otherwise, is it possible and advisable to remedy or prevent the pollution of these waters."

The Final Report of the International Joint Commission, dated September 10, 1918 (Ex. 1166, Joint Abst., 584-587) on this subject, stated:

(Pages 6-7):

> "Any conclusions the commission may reach and any recommendations it may make, may, if acted upon, affect the physical health of people who dwell along these waters, as well as the financial and other interests of eight States of the United States and three Provinces of the Dominion."

* * * * *

(Page 7):

> "The boundary waters are the natural channels of interstate and international commerce."

* * * * *

(Page 8):

> "In the working out the enormous possibilities of this vast section of the continent the proper observance of international sanitary requirements will be a most essential factor."

* * * * *

(Page 23):

> "The grossly polluted condition of boundary waters is doubtless the cause of the abnormal preva-

lence of typhoid fever throughout the territory bordering thereon."

* * * * *

(Page 24):

"Notwithstanding the general improvement, violent outbreaks of typhoid fever have occurred, and the potential danger must continue to exist in view of the extensive pollution of these waters and the limitations and inefficient operation of water-purification plants. Not only have the border communities suffered from this condition, but navigation interests have also been injured very severely from the disastrous outbreaks consequent on the use of polluted boundary water."

* * * * *

(Page 25):

"The city of Detroit discharges into the former all the raw sewage from its estimated population of 850,000. On the United States' side opposite Amherstburg the pollution of the river reaches the enormous figure of 10,392 B. coli per 100 c.c., and its waters from that point to Lake Erie and the waters of that lake within a radius of about 4 miles from the mouth of that river are very greatly polluted."

* * * * *

(Page 29):

"The pollution of drinking water supplies and of bathing waters at Bois Blanc Island, on the lower Niagara at the Thousand Islands, or at other summer resorts, or of the waters navigated by vessels and yachts, might not only be an injury to the immense number of citizens of both countries who would be brought immediately in contact with the pollution, but would indirectly be a source of great peril to hundreds of thousands more. To illustrate the danger the following citation is made from the United States Public Health Service Report for 1914, volume 29, page 393:

> It is stated that during one short period of the summer's cruise (referring to the voyage of a lake boat) 77 cases of typhoid fever developed as the result of the use of impure drinking

water taken from the Detroit River. * * * Investigations by this service of similar outbreaks on three Great Lakes vessels during the summer of 1913 showed that out of a total of 750 people there were over 300 cases of diarrhea and 52 cases of typhoid with 7 deaths.

The lamentable prevalence of typhoid fever referred to previously calls for consideration in this broad international view of the question of pollution of boundary waters."

* * * * *

(Page 32):

"It must be admitted that the conservation of public health is of paramount importance under the treaty."

* * * * *

(Page 33):

"The harm done by existing pollution to bathing resorts cannot be remedied except by preventing the discharge of sewage into the waters which flow to them. Contamination of the sources of the drinking supplies of these classes of people is a most serious matter. The millions whom it affects or may affect are more exposed to danger than are the urban inhabitants who draw their water supplies from public water systems."

* * * * *

(Page 40):

"Sewage-polluted drinking water constitutes an actual or potential menace to health, so much so that the presence of the bacterial organisms of waterborne diseases in the sewage of an urban community should always be assumed. While bacterial pollution is most serious in the case of waters used as sources of drinking-water supply, it is serious in the case of waters used for bathing, boating and other pleasurable exercise, and also, although to a less degree, in the case of shore waters on account of possible indirect infection through cattle and insects."

(b) CONSIDERING THE INTERESTS OF NAVIGATION ON THE ILLINOIS RIVER, AS WELL AS THAT AT THE PORT OF CHICAGO, THE EVIDENCE IS UNDISPUTED THAT APPROXIMATELY 5,000 C.F.S., INCLUDING DOMESTIC PUMPAGE, DIVERSION IS REQUIRED TO MAINTAIN UNOBJECTIONABLE CONDITIONS ON THE ILLINOIS RIVER.

Important navigation on the Chicago River to be kept up is navigation extending through the Illinois and DesPlaines Rivers to and into the Chicago River and vice versa. These boats, in order to get to the Chicago River, must pass along and through the Illinois and DesPlaines Rivers. If there are impediments to navigation in the Illinois and DesPlaines Rivers due to pollution or to lack of water to actually float the ships, then navigation of the Chicago River is impaired. The report of Alvord, Burdick & Howson (Master's Ex. B, Joint Abst., 114-191) finds that to maintain a proper standard of water for navigation in the Illinois and DesPlaines River, there would be required diversion from the Lake direct of 4,167 second feet. Defendants' witness, Mr. Eddy, in 1927 stated that after the sewage of Chicago was completely treated, a diversion from the Lake of

> "one cubic foot per second per one thousand persons would be satisfactory, possibly somewhat less." (Joint Abst., 584.)

GENERAL JADWIN'S TESTIMONY.

The circumstances under which General Jadwin was called to testify by the Special Master are set forth in the Master's Report, p. 90. It appears that the solution of the problem was presented by General Jadwin, as chief of the Corps of Engineers of the United States Army, who had the benefit of the advice and counsel of his subordinate officers, with due regard to the importance and gravity of the questions propounded by the Master.

The Chief of Engineers', Gen. Jadwin's, conclusions with reference to the question put by the Master's letter, above stated, were that by December 31, 1929, a diversion of 7,250 c.f.s. is necessary "to maintain tolerable conditions of navigation in the Chicago River"; that after sewage purification works were entirely installed, the minimum diversion, including water supply, should be 5,000 second feet or such other flow as may be determined by the Secretary of War and Chief of Engineers; that introduction of deposits of sewage in the Chicago River without dilution would render it foul and putrid, materially impairing the navigable conditions of the river through nuisance to navigators and those engaged in the loading and unloading of vessels; that with the attainment of the maximum practicable treatment of all sewage, some circulation of water will be necessary for navigation; that then the needs of navigation in the Chicago and Calumet Rivers proper may be found not to exceed a flow, directly from the Lake, of 1500 c.f.s. augmented by the natural run-off of the Chicago and Calumet Rivers and the effluents from the treatment plants, making an annual flow at Lockport of approximately 3200 c.f.s.; that 3,200 c.f.s. would not be sufficient to maintain proper conditions for navigation in the navigable waters of the DesPlaines and upper Illinois Rivers; that the term "navigation on the Chicago River" may be applied in a very restrictive sense; that a complete answer in the matter of diversion at Chicago cannot be given without regard to the physical relation which exists between the Port of Chicago and the great inland waterways system made up of the Mississippi, Ohio and Illinois Rivers and their tributaries, and the traditional policy of Congress in improving waterways for commerce; that while the 1927 Rivers and Harbors Act specified that it did not itself authorize a diversion of water, the project directed by Congress provided for a 9-foot channel without specifying the manner in which this depth should be obtained; that the plans presented to Congress upon which said provisions of said Rivers and Harbors Act of 1927 were passed, were designed to provide a channel with the requisite cross section, with diversions from 1,000 to 10,000 c.f.s.; that it is not practicable to state now what the amount of diversion is that may be needed in the Chicago River to meet the requirements of navigation in a broad sense; that in addition to providing water for depths and widths of channels in the Illinois, the water should not be unreasonably offensive; that this subject had been studied by sanitary engineers employed by the Department; that such engineers advised that 4,167 c.f.s. total flow at Lockport was the minimum, assuming activated sludge methods of sewage purification to be installed for Chicago's sewage, to prevent the occurrence of nuisance in the Illinois and DesPlaines Rivers and permit fish life therein; that with too little diversion from Lake Michigan, the water in those rivers would be so foul as to menace the health of workers upon vessels and at terminals; that it is not possible now to specify the precise amount of water required many years hence with the growth of the city, changes in sanitary art and other developments not foreseen; that to allow for contingencies, the diversion was fixed at 5,000 c.f.s., measured at Lockport; that while local navigation on the Chicago River may be safeguarded by a total flow of 3,200 c.f.s. at Lockport, through navigation between Chicago and the Mississippi System will require about 5,000 c.f.s. to keep the water in the channels south of Chicago in acceptable condition with an as yet undetermined but possibly greater flow required for the maintenance of adequate channel depths and widths; that the diversion above stated regarded as necessary for navigation, will reduce by one-half the lowering of the levels of the Lakes and the remaining effect can be cured by the construction of suitable compensating works in the connecting channels of the Great Lakes (Master's Report, pp. 90-96.)

General Jadwin was cross-examined very extensively by various counsel for complainants, and in the course of such cross-examination he stated that in determining the amount of the diversion in answer to the Master's said question put by his letter of February 22, 1929, he considered only the amount needed for navigation of the river, and did not consider the question of the health of Chicago; that people on board boats need substantially the same protection as the people in the city; that the diversion required for navigation on the Chicago River contemplates taking care of the navigation in the upper Illinois, in view of the fact that through navigation on the Chicago River must pass through that place and if navigators are not protected there, it would hamper navigation on the Chicago River; that the engineers who made the report to the Department on April 16, 1925, (Master's Exhibit B, Joint Abst., 114) used the standard for protection of fish life as the measure of suitability of water for navigation. (Joint Abst., 6).

On cross-examination, General Jadwin further stated that if complete treatment of sewage took place, there would still be need for diversion for navigation in the Chicago River; that there is very light draft present navigation from Lake Michigan to the Mississippi (Joint Abst., 13); that large contracts have been made for the improvement of the Illinois River under the Congressional Rivers and Harbors Act of January, 1927 (Joint

Abst., 13-14); that Congress under the 1927 Act provided for 9-foot depths and authorized the expenditure of a sum of money to obtain that depth of about three million as the maximum limit, which would call for a diversion of about 4,500 average c.f.s. (Joint Abst., 15); that his views as to the amount of diversion required to maintain proper standard of water for navigation, were obtained largely from the report of Messrs. Alvord, Burdick & Howson (Masters Ex. B); that if their conclusions are seriously questioned, the Department would be glad to obtain the views of other sanitary engineers; that the standard for thriving fish life was as low as could be gone to be sure that the water did not have so much foul matter in it as to become putrid and unreasonably offensive to navigation; that the standard for fish life was just a gauge and if the water supported fish life, it would be safe for navigators; that sanitary engineers were used in getting information, together with what came through the district and division engineers (Joint Abst., 16.)

General Jadwin, in answer to inquiries on cross-examination, further stated that the Rivers and Harbors Act of January, 1927, directed the Engineer Department to get a channel 9 feet deep and 200 feet wide at an expense of not to exceed 3½ million dollars, which left the Engineer Corps free to use their best judgment in the selection of the plans that could be used for the expenditure of such an amount; that the one selected by the Engineer Corps as the best plan was one which called for a diversion of approximately 4,167 c.f.s., which plan is now being carried out at large expenditure of money; that if less than 4,167 c.f.s. diversion exists, it would be necessary to restore state dams, which would not give what the Department considers to be reasonably free, easy and unobstructed navigation; that each of the dams is an objection (Joint Abst., 18-21).

On cross-examination by defendants' counsel, General Jadwin stated that with the effluent discharged from these different plants flowing into the Chicago River and to the Lake, navigation would not be, according to the wording and spirit of the law, reasonably free, easy and unobstructed (Joint Abst., 22).

On further cross-examination by complainants' counsel, General Jadwin stated that it was his understanding that the effluent from sewage purification plants needs a considerable amount of water to get it out safely; that the amount of water necessary to add to the effluent is 5,000 c.f.s., including the water that is pumped (Joint Abst., 24); that he obtained his figures largely from his conferees; that while none were sanitary experts, they had the report of the sanitary engineers, Alvord, Burdick & Howson; that he obtained the 5,000 second feet by adding a factor of safety to 4,167 second feet which was worked out quite carefully by sanitary engineers, who were employed to find that amount for the Department and to find it in a disinterested way, which is the amount necessary to make navigation reasonably free, easy and unobstructed, which people on the boats are entitled to have; that between the District Engineer and said sanitary engineers, they took the standard of water to support a thriving fish life as a test for water which would be safe and secure for navigators; that storm water overflows into the harbors of other cities on the Great Lakes, some of which harbors General Jadwin's assistants had said were objectionable from a navigation standpoint because of pollution; that if counsel wished the details on that matter, he would be glad to have his assistants, Col. Schulz, division engineer for the entire Lakes, and

Col. Jones, who was formerly district engineer at Buffalo, give the details. (Complainants' counsel did not make any such request—Joint Abst., 22-27.)

On further cross-examination by complainants, General Jadwin testified that his statement as to controlling works with different diversions from 1,000 to 7,000 c. f. s. from the Lake (Master's Report, pp. 108-116) was prepared in co-operation with his associates; that it was assumed that Chicago will continue to discharge its sewage into the DesPlaines River (Joint Abst., 30); that the sanitary engineers, Alvord, Burdick & Howson, employed to make the report, recommended that there would be needed 4,167 cubic feet diversion for navigation; that the District Engineer agreed in that report; that there is no reason for changing it; that while Major Putnam, the District Engineer, was not a sanitary expert, he kept in close touch with the said engineers hired and he made a report based upon the information contained in the report of the engineers and from information he had received from them while in close touch with them, which report is contained in Document Number 4, Complainants' Exhibit 18, where the following is stated (Joint Abst., 36):

> "The consulting engineers are of the opinion that no appreciable nuisance will result if the following standard is maintained: Liquid discharged by the Drainage Canal, as evidenced by the average of representative samples taken for any 30 consecutive days, shall (a) be practically free from solid deposits in two hours; (b) shall contain not less than three parts per million of oxygen, and enough to equal or exceed the biochemical oxygen demand of said liquid for five days, when incubated at 20 degrees C.
>
> Whether adherence to this standard will produce exactly the results desired or not is unknown, but in view of the present extremely unsatisfactory conditions prevailing, with upward of 4,000 cubic yards of settleable solids being dumped into the Illinois

> each day, and with periods of several months each year with no oxygen whatever present in the effluents, there is no question but what conditions will be improved materially.
>
> It should be understood that other sources of pollution are tributary to the Illinois River, and that with no contamination whatever from the Sanitary District of Chicago, conditions in the Illinois will not be satisfactory until the rest of the communities now discharging their sewage in the System carry out satisfactory sewage treatment programs of their own. It so happens that the adoption of a standard that no appreciable nuisance will result, carries with it the restoration of conditions that will permit fish life to thrive."

General Jadwin further testified, on cross-examination by complainants, that Major Putnam had the full advice of these experts and was on the District at the time; that if the conditions would be unsanitary for the people of Chicago, they would certainly be a little more so for the people on boats; that unsanitary conditions interfered with navigation, that is, the unsanitary conditions that will result if you do not dilute the effluent to a certain extent which the said expert engineers have prescribed; that after the effluent has had several days to work, not properly diluted, it will make unsanitary conditions and will give off an odor and some gas; that if complainants' counsel desired, the Engineer Corps would hire some experts to get a formal report on that. (To this latter statement, complainants' counsel replied: "No, I don't want to bother you, General"); that it came to General Jadwin's mind as clearly as it has come and as he had endeavored to express it, finally and fully, in connection with the preparation for this case, that water unpolluted would be polluted after the described effluent had been discharged into it, and that such pollution in the Chicago River would obstruct navigation (Joint Abst., 37-43).

Complainants' witness Ellms testified (Joint Abst., 632):

> "The pollution affects the use of water for recreational purposes and for bathing and it affects fish life and recreational boating, to some extent. It depends, of course, upon the degree of pollution of the shore waters, but it certainly would become more or less objectionable, I imagine; that is, if very large volumes of untreated sewage are turned directly into the Lake. The floating solids are the things most objectionable from the point of view of boating and bathing. It is true that a person in a launch or sailboat or row-boat is liable to become infected."

Gen. Charles E. Keller, witness for complainants, testified on direct examination that:

> "* * * the presence or absence of pollution has nothing whatever to do with commerce or the extent of commerce."

But on cross-examination Gen. Keller said that in giving said answer, he excluded from consideration passenger traffic on the Great Lakes, the use of water for recreational purposes, boating, yachting, etc. (Joint Abst., 406.) He was of the opinion further that an impediment to navigation in the Milwaukee River due to sewage pollution would affect navigation between Milwaukee and Chicago. (Joint Abst., 410.)

(c) CONSIDERING ONLY THE WATERS OF THE PORT OF CHICAGO, 2,000 C.F.S., IN ADDITION TO DOMESTIC PUMPAGE AND RAIN WATER RUN OFF FROM THE LAKE IS REQUIRED FOR NAVIGATION.

See defendants' witness Eddy (Joint Abst., 80-82).

It was the opinion of General Jadwin (Master's Report, pp. 92-93) that 1,500 cubic feet per second direct from the Lake, in addition to the rain water runoff of the Chicago and Calumet River Watersheds and domestic pumpage, should be the amount of the flow at Lockport, having consideration for the waters of the Port of Chicago only. The runoff of the Chicago and Calumet River Watersheds is approximately 500 cubic feet per second (Joint Abst., 86-87), which includes storm flow. This would give a total discharge at Lockport, assuming domestic pumpage to be 1,700 cubic feet per second (Joint Abst., 86-87) of 3,700 cubic feet per second when all the sewage disposal works are put in operation, according to General Jadwin. Mr. Eddy's opinion was that the total discharge at Lockport using the same values for the different elements, except the water to be diverted directly from the Lake, should be 4,200 cubic feet per second. To properly take care of the waters of the Illinois River from a navigation standpoint, according to General Jadwin, there would be required a total discharge at Lockport of approximately 5,000 cubic feet per second. The Master has recommended 3,200 cubic feet per second and has disregarded the waters of the Illinois River, presumably on the theory that he was not permitted by the opinion of the Court to go into that. It is our contention that the difference between the amount recommended by the Master and that required according to Mr. Eddy for the waters of the Port of Chicago, and the amount required according to General Jadwin for the Illinois River, is slight, and that the larger amount recommended by General Jadwin or by Mr. Eddy should be allowed and fixed by the decree.

THE SOLUTION OF THE PROBLEM AT CHICAGO AS PRESENTED BY THE SANITARY DISTRICT ENGINEERS AND AS APPEARS BY THE STATEMENTS OF GENERAL JADWIN, CHIEF OF ENGINEERS OF THE UNITED STATES ARMY, IS FURTHER IN KEEPING WITH THE MODERN TREND OF THOUGHT, CONGRESSIONAL LEGISLATION, AND OFFICIAL ACTION OF GOVERNMENT AND STATE OFFICERS, TO KEEP AND MAINTAIN NAVIGABLE AND OTHER WATERS OF THE UNITED STATES WHICH ARE UNPOLLUTED, IN THE FUTURE FREE FROM SEWAGE AND WASTE CONTAMINATION OF CITIES.

In

Missouri v. *Illinois,* 200 U. S. 496,

Missouri sought to enjoin Illinois and the Sanitary District from discharging Chicago's sewage into the DesPlaines River, and it was claimed that the sewage had the effect of contaminating the waters of the Mississippi River. Mr. Justice Holmes, in referring to the character of the nuisance claimed, took occasion to mention the difference between the sensitiveness of people to nuisances fifty years ago, as compared with their sensitiveness to such nuisances then (1906), and said (p. 522):

> "At the outset we cannot but be struck by the consideration that if this suit had been brought fifty years ago, it almost necessarily would have failed. There is no pretence that there is a nuisance of the simple kind that was known to the older common law. There is nothing which can be detected by the unassisted senses—no visible increase of filth, no new smell."

One need only mention the advancement in public hygiene regulations and in the attitude of people with reference to their private hygiene to immediately call to the mind of the youngest person connected with this case, numerous regulations of state, municipal and federal governments that have been made in the progress of public hygiene, and also to call to mind numerous habits of the people in their private hygiene which tend to greater cleanliness and protection from diseases. The bacteriologists, in recent years, have learned much and have taught much. We find now drinking fountains and individual drinking cups in public places and in offices where there used to be the one drinking cup for all. The one towel for all has gone.

The United States Treasury Department has established a standard for drinking water, and water below such standard will not be permitted to be used by interstate carriers.

In

New York v. *New Jersey,* 256 U. S. 296,

New York sought to enjoin the discharge of sewage into New York Bay by the Passaic Valley Sewage Commissioners because it was claimed that the waters upon and adjacent the wharves and docks of New York City would be so polluted as to render them a public nuisance, offensive and injurious to persons living near or using them for bathing purposes, commerce, etc.

The standard of water for bathing beaches has been established as the standard for swimming pools, which is equivalent to the standard for the drinking water supply of the city, namely, the Treasury Department standard (Ellms, Joint Abst., 624).

Bulletin No. 83, Treasury Department, entitled "Sewage Pollution of Interstate and International Waters, with special reference to the spread of typhoid fever—II. Lake Superior and St. Marys River; III. Lake Michigan and the Straits of Mackinac; IV. Lake Huron, St. Clair River, Lake St. Clair and the Detroit River;

V. Lake Ontario and St. Lawrence River, by Allan J. McLaughlin," states (Ex. 1167, p. 133, Joint Abst., 502):

> "Chicago.
>
> The growth of the city of Chicago finds no parallel in history. From a population of 7,500 in 1843 it has grown to be the second city in the United States with a population in 1910 of more than 2,000,000. No argument is necessary to show the importance to the whole country of sanitary conditions in Chicago. Its vast commerce and giant industries make it the metropolis of an enormous territory and bring thousands of visitors daily from nearly every State in the Union. These visitors drink Chicago's milk and water and eat Chicago's food. Contamination of these articles of food or drink by typhoid fever germs means infection of the transients as well as citizens—transients who go to their homes in other States to establish new foci of typhoid fever. These transients and interstate travelers are less able to protect themselves against contaminated food or drink than the citizen who heeds the warnings of Chicago's excellent department of health. Thousands of interstate travelers drink water on trains which is taken aboard cars in this great railway center, and the character of Chicago's water supply is of vital importance to these travelers and to the States to which they are destined."

Recently by Act of Congress the Secretary of War made a report to the Committee on Rivers and Harbors, Document 417, 69th Congress, 1st Session, entitled "Pollution Affecting Navigation or Commerce on Navigable Waters." (Defts. Ex. 1413; Joint Abst., 45-52.) The Act of Congress directed the Secretary of War

> "to make such investigation as may be necessary to ascertain what polluting substances are being deposited into the navigable waters of the United States or into non-navigable waters connecting with navigable waters, to such an extent as to endanger or interfere with navigation or commerce upon such navigable waters or the fisheries therein." (Joint Abst., 45-46.)

Among other things, the report, June 4, 1926, made pursuant to said Act of Congress states (Joint Abst., 50):

> "The subject of pollution of waterways is one that is engaging the active attention of State and municipal governments throughout the United States. The investigation clearly indicates an awakened interest and an earnest desire to meet and overcome a condition which through lack of adequate control in the past has been permitted to exist and grow until public opinion has become generally aroused."

Lake Michigan has been kept free from contamination by the sewage and wastes of the population of Chicago, which population is substantially equal to the combined population of all cities exceeding 10,000 population on the Great Lakes in the United States. These wastes have always been discharged into the DesPlaines and Illinois Rivers which receive similar wastes from other communities along them. These rivers must be as they always have been, the natural discharge for the wastes of Chicago and those communities located on them. In that way Lake Michigan can be kept free from pollution by the wastes of Chicago providing waters suitable for the maintenance and promotion of navigation, recreational boating and bathing. The water supply of Chicago will not be forever impaired, and Chicago will have the opportunity to obtain the very best water supply possible with no barrier raised against it.

VII.

THE PROVISION FOR CONTROLLING WORKS AT THE MOUTH OF THE CHICAGO RIVER OR AT OR NEAR THE NORTHERN TERMINUS OF THE DRAINAGE CANAL TO PREVENT REVERSALS OF THE CHICAGO RIVER INTO THE LAKE, IS PART OF THE DEFENDANTS' CONSTRUCTION PROGRAM TO PROVIDE PRACTICAL MEASURES IN ORDER THAT THE AMOUNT OF WATER DIVERTED FROM THE LAKE WHEN ALL THE WORKS ARE IN OPERATION, MAY BE REDUCED TO THE LOWEST PRACTICABLE AMOUNT CONSISTENT WITH THE INTERESTS OF NAVIGATION AND PREVENTION OF NUISANCE TO THE VARIOUS INTERESTS INVOLVED.

The controlling works, a part of the defendants' program and recommended by the Master's Report, are to be installed either at the mouth of the Chicago River at or near Lake Michigan or at or near the northern terminus of the Drainage Canal. They have been described in the testimony. (Joint Abst., 283.) Those at the mouth of the Chicago River would consist generally of a lock and movable dam so constructed and operated that it may be closed, forming an absolute barrier to the flow of water into the Lake from the Chicago River at times of storm. At such times boats passing from the Lake into the Chicago River, or vice versa, would be locked through by means of the lock provided in the controlling works.

Those at the northern terminus of the Drainage Canal would consist of a lock and movable dam that would be so operated that at ordinary dry weather times the surface elevation of the water, east of the controlling works and towards the Lake, would be approximately 7 feet higher than the elevation of the water in the canal west of the controlling works and towards Lockport. At ordinary dry weather times there would be a flow through these controlling works towards Lockport to an amount determined by the annual flow of water from the Lake and effluent from sewage disposal works that may be permitted. At storm times the movable dam would be so operated by lowering it that all storm water reaching the channels of the Chicago River and Sanitary District Canals, would be carried by the slope and current thus created away from the Lake and would be, thereby, discharged at Lockport to the DesPaines River. Thus at all times through the operation of these control works there would be no flow from the Chicago River into the Lake. Of course boats, passing from the Chicago River into the Drainage Canal and to Lockport and vice versa, would pass through the lock provided in the controlling works.

The reason for making provision for the installation of controlling works either at the mouth of the Chicago River or in the Drainage Canal is to make possible the control of storm flow more quickly than exists under present conditions with the control at Lockport, 36 miles from the Lake. Under present conditions with the larger diversion the control at Lockport is sufficiently direct to prevent flow from the Chicago River into the Lake, but with the diversion materially reduced, that control will not prevent such flow from the Chicago River into the lake. Hence the controlling works were suggested in order that the diversion may be reduced when all the sewage disposal works are installed to the lowest practicable amount consistent with the interests of navigation and its protection and to prevent nuisance to the other interests involved.

(a) THE COMPLAINANTS NEVER CONTESTED BY EVIDENCE OR OTHERWISE THE PRACTICABILITY OF SAID CONTROLLING WORKS BEING PROVIDED AS A PART OF THE PROGRAM OF PRACTICAL MEASURES FOR THE DISPOSITION OF THE SEWAGE AND WASTES OF THE SANITARY DISTRICT BY MEANS OTHER THAN LAKE DIVERSION.

The Master in his report states (p. 106):

> "Complainants' sanitary experts have not testified that these controlling works would not be needed."

(b) THE COMPLAINANTS FIRST PROPOSED CONTROLLING WORKS AS A PART OF THE PROGRAM FOR PRACTICABLE MEASURES IN THE 1926-27 HEARINGS AND THEIR WITNESSES, IN THE HEARINGS UPON RE-REFERENCE, TESTIFIED ON THE ASSUMPTION THAT SUCH CONTROLLING WORKS WOULD BE PROVIDED.

The question of these controlling works at the head of the Drainage Canal to accomplish the purpose above set forth, was first introduced into the case by the complainants in order to obviate objections to the reduction of the diversion. (Master's Report, p. 106.) Complainants' sanitary witnesses testified at the 1926-27 hearings on the assumption that such control works would be provided. An example of such testimony is as follows (Joint Abst., 640):

> "Assuming complete treatment of all of the sewage of the Sanitary District, no normal or dry weather diversion, but diversion of storm water overflow through the controlling works proposed near Western Avenue, replacement of the present water intakes by a super-tunnel located 4½ miles off-shore, in the vicinity of Wilmette, and 20 miles from the mouth of the Chicago River, with chlorination only of the water supply, the public health conditions of Chicago, with special reference to the public

> water supply, would be better than those presently obtaining."

To the same effect, see Rockwood (Joint Abst., 592), Ellms (Joint Abst., 621) and Gascoigne (Joint Abst., 649).

In the 1929 hearings on re-reference an example of the testimony on this subject by complainants' witnesses is as follows:

> "Assuming the completion of the program outlined by me and the installation and operation of control gates so as to divert all storm water overflow, but with no diversion or flow other than at times of storm, such a program would practically provide for the disposal of the sewage of the Sanitary District of Chicago without detriment to the water supply or the navigation of the Chicago River as a part of the Great Lakes-St. Lawrence system from a nuisance standpoint." (Howson, Joint Abst., 111.)

See, also, to the same effect, Gascoigne (Joint Abst., 208) and Townsend (Joint Abst., 217).

On this subject complainants' witness Ellms in detail described his understanding of the operation of such works, as follows:

> "I have taken into consideration the effect of the operation of controlling works at the North end of the Drainage Canal. I understood that these controlling works were to be operated at storm times so as to cause the discharge of all the sewage effluent and all the storm water into the DesPlaines River from the Sanitary Canal in times of storm. From a sanitary standpoint, having consideration for a water supply and conditions of navigation in the Chicago River, I understood that the storm period when the controlling works would so operate would be from 4 to 5 hours. It would be necessary to put these controlling works in operation some hours before the storm commenced. It would be necessary to keep the controlling works in operation as stated during the period of the storm. I understood the

> purpose of the operation of these controlling works to be to keep the storm water flow out of the lake, and also any other substance that was in the Chicago River or its branches at that time. That was in order to keep the filth or pollution out of the lake due to the storm and to discharge it to the DesPlaines River. It would be necessary to keep these controlling works in operation after the storm only for such length of time as the storm flow was in operation,—that is, as long as the flood flow continued, until it was back into a normal flow. That is, not necessarily back to a dry weather flow but to an average flow that would take away the principal portion of the flood water. That is, it would be necessary to keep the controlling works in operation as long as there was any storm water passing from the sewers directly into the river and that did not go through the sewage purification plants. It would be necessary to keep those controlling works in operation for some time after that in order to remove from the Chicago River and its branches and from the canal the dirty, polluted water that had accumulated there during the period of the storm and the flow due to the storm." (Joint Abst., 229-230.)

Thus it is apparent that these control works were first submitted at the 1926-27 hearings by the complainants as practicable in order to prevent flow of the Chicago River into the Lake at times of storm and to remove the objections to the interests of navigation in Lake Michigan, nuisance to bathing beaches and interference with Chicago's water supply in the event storm water with its untreated wastes were permitted to find their way into the Lake.

In the 1929 hearings on the re-reference, defendants accepted these suggestions and included controlling works as part of their program for practical measures to dispose of the sewage and waste of the Sanitary District. The complainants did not offer any testimony or evidence to the effect that such works "would not be needed". On the contrary, in the 1929 hearings all their sanitary experts drew conclusions as to the effect of the various measures proposed with controlling works installed to be operated for a certain time before, during and after storms, in order to prevent storm water being carried into the Lake.

On the assumption that the controlling works at the north end of the Sanitary Canal should be operated only at storm times in the manner mentioned, with the effluent from sewage purification works going into the Lake at ordinary dry weather times, defendants caused a study to be made of the amount of water that would be required to be taken directly from the Lake to accomplish this purpose, as stated by Ellms above, the results of which were presented by witnesses Ramey and Woodward (Ramey, Joint Abst., 281-294; Woodward, Joint Abst., 295-304).

Mr. Ramey concluded that there would be required in the operation of the control works to accomplish the purposes above stated (Joint Abst., 289):

> "an annual average discharge at Lockport to the DesPlaines River of approximately 4,100 second feet, composed of 2,750 second feet direct diversion from the waters of Lake Michigan, 550 second feet estimated annual average rainwater run-off of the Chicago River Drainage Area, plus a portion of the rainwater run-off of the Calumet River, and in addition approximately 800 second feet of sewage treatment plant effluent."

According to the conclusions above stated by Mr. Ramey, he

> "assumed that save at times of flood run-off, the effluent from sewage purification works would go into Lake Michigan." (Joint Abst., 290.)

The addition of 500 or 600 second feet to the 4,100 second feet flow at Lockport, and a small addition for factor of safety, would keep all storm water and sewage effluent at storm times and at all other times, out of Lake

Michigan; and on this subject Mr. Ramey said (Joint Abst., 290):

> "To keep all effluents out of Lake Michigan, there would be required in addition to the 4,100 second feet flow at Lockport stated by me, some 500 or 600 second feet, on the assumption that the Lake would remain still, which would be the balance of the sewage treatment plant effluent not discharged to the DesPlaines River during flood run-off and during the period of flushing the storm flow out of the different channels, as I have above outlined. But I believe there would be required two or three times that much in order to be sure that you could maintain flow from the Lake and keep that effluent moving towards Lockport.
>
> To keep all storm water and sewage effluent at storm times and at all other times from Lake Michigan, substantially and effectively, there would be required at least 5,000 second feet of water directly from the Lake.
>
> With 5,000 second feet there would be numbers of small reversals when the water that was in the main river would get into Lake Michigan."

Professor Woodward agreed substantially with Mr. Ramey's conclusions as to the results of the operation of controlling works for the purposes above mentioned. But Professor Woodward was of the opinion that to keep all sewage effluent from the Lake, including storm water and drainage, there would be required 5,734 cubic feet per second discharge at Lockport. His estimate exceeded Mr. Ramey's because he believed that the lower estimate was based upon the assumption that there would be

> "the highest degree of skill in operating the gates"

and he felt

> "somewhat doubtful whether they can be operated that skillfully." (Joint Abst., 304.)

It will be observed that the difference between the amount of water that would be taken directly from Lake

Michigan to operate the controlling works for a certain time prior, during and after storms to remove to the DesPlaines River the polluted water flowing into the channels of the Chicago River and its branches and of the canals of the Sanitary District, according to the program of the complainants, (the effluent, however, at dry weather times going into the Lake), and the amount that would be required to keep at all times all effluent from sewage disposal works and storm water and drainage out of the Lake, is only a few hundred cubic feet per second, a very negligible quantity.

(c) UNLESS SUCH CONTROLLING WORKS ARE INSTALLED, IT WILL BE IMPRACTICABLE, AS THE MASTER FOUND, TO REDUCE THE DIVERSION BELOW 6,500 CUBIC SECONDS FEET.

The Master's Report states (p. 107):

> "My conclusion is that there is no adequate basis, so far as the testimony on the hydraulics of the river and canal is concerned, for a finding that pending the completion of the sewage treatment program it would be proper to require a further reduction of the annual average direct diversion below 6,500 c.f.s. without the installation of new controlling works."

(d) THE DRAINAGE CANAL AND THE CHICAGO RIVER ARE NAVIGABLE WATERS OF THE UNITED STATES, AND IT WILL BE NECESSARY, BEFORE SUCH CONTROLLING WORKS MAY BE INSTALLED, THAT THE PLANS THEREFOR SHALL BE APPROVED BY THE SECRETARY OF WAR, ON THE RECOMMENDATION OF THE CHIEF OF ENGINEERS, UNDER SECTION 10 OF THE RIVERS AND HARBORS ACT OF MARCH 3, 1899. (See Master's Report, p. 81.)

The Master's Report requires that the Sanitary District shall immediately submit plans for these controlling works and shall construct the said controlling works within two years after plans therefor have been approved by the Secretary of War, on the recommendation of the Chief of Engineers. Under Section 10 of the Rivers and Harbors Act, all obstructions to any navigable waters are prohibited unless affirmatively authorized by Congress except that the Secretary of War on the recommendation of the Chief of Engineers, may approve certain structures and obstructions in said Act mentioned. Such structures when built with the approval of the Secretary of War are lawful structures. It is obvious that the placing of the control works at the mouth of the Chicago River or in the Drainage Canal, as proposed, will affect the navigable capacity of such navigable waters and will amount to obstructions therein. There seems to be no question that the approval of the Secretary of War of plans for controlling works in the Chicago River is necessary. But complainants have taken exception to the Master's requirement of approval of plans as to the controlling works in the Drainage Canal on the ground that, as they say, the Drainage Canal is not a navigable water of the United States. The Sanitary District Main Channel where these controlling works will go, forms a route of continuous travel by water between the Chicago River and the DesPlaines, another navigable water of the United States. It is the connecting link between the Chicago River and the Illinois and Michigan Canal and the Illinois Waterway now under construction. The Sanitary District Canal between Lockport, its southern terminus, and the Chicago River, its northern terminus, has replaced the old Illinois and Michigan Canal between those two points.

In *Mortell* v. *Clark*, 272 Ill. 201, 214, it is said:

> "The Sanitary's District's main channel as now constructed, practically complies with this Act (speaking of the Illinois-Michigan Canal Act) and furnishes a canal more suitable for navigation than the Illinois and Michigan Canal."

Furthermore, the Sanitary District Act, Section 24, provides that when the channel is completed and the water turned in to the amount of 300,000 cubic feet per minute "the same is hereby declared a navigable stream." *People* v. *Economy Power & Light Company,* 241 Ill. at 329.

In

Ex parte Boyer, 109 U. S. 628,

it was held that the District Court of the United States for the Northern District of Illinois had jurisdiction over a collision between two canal boats on the Illinois and Michigan Canal. The court said that navigable water situated as this canal is, used as a highway for commerce between ports and places in different states, is public water of the United States even though the canal is wholly artificial and wholly within the state and subject to its ownership and control. This case was cited with approval in *U. S.* v. *Cress*, 243 U. S. 316.

In

Perry v. *Haines,* 191 U. S. 17,

it was held that the Erie Canal was navigable water of the United States although it was created by artificial means and wholly within the boundaries of one state. The court pointed out that the only distinction between canals and other navigable waters is that they are rendered navigable by artificial means;

> "We fail to see, however, that this creates any distinction in principle",

as they are usually constructed to connect waters navigable by nature and are usually navigated by the same vessels which ply between the naturally navigable waters at either end of the canal.

The Drainage Canal has been for upwards of 30 years dedicated for and used as navigable waters. For the last 20 years it has been used in place of the old Illinois and Michigan Canal as the link, approximately 28 miles, of the waterway from the Chicago River to the Mississippi.

In

DuPont v. *Miller,* 310 Ill. 140,

the adjoining owners on the DuPont Slip, extending about 900 feet from the Chicago River, filed a bill to enjoin Miller, Director of the Department of Public Works, from interfering with the complainants filling the slip. It had been excavated many years ago and had been used as a place for the anchorge of boats for loading and unloading their cargoes. It of course connected with the Chicago River and boats navigating such river and desiring to obtain cargoes or unload cargoes at the private docks of persons located on the slip passed into and from said slip. The Court held that, while the slip as originally located was upon private property, nevertheless it had become part of the public waters by long use and acquiescence, and said (p. 146):

> "A dedication of land or water to public use is defined as the appropriation or gift by the owner of the land or waterway of an easement therein for the use of the public. The act of dedication may be by deed or by opening the land or waterway without stating for what use, or by offering or permitting a public use with intention to so dedicate it."

(e) THE MASTER HAS FOUND THAT SUCH CONTROLLING WORKS WILL NOT MATERIALLY INTERFERE WITH NAVIGATION, AND HAS PROVIDED BY HIS FORM OF DECREE THAT THE DEFENDANT SANITARY DISTRICT SHALL IMMEDIATELY SUBMIT PLANS TO THE WAR DEPARTMENT FOR SUCH CONTROL WORKS AND THAT THE CONTROL WORKS SHALL BE CONSTRUCTED AND INSTALLED BY THE SANITARY DISTRICT WITHIN TWO YEARS AFTER THE DATE OF THE APPROVAL OF SUCH PLANS BY THE WAR DEPARTMENT. CONSEQUENTLY, AN EXCEPTION ON ANY PROGNOSIS THAT THEY MAY NOT BE BUILT IS WITHOUT MERIT.

Complainants take great exception, and it seems to us improperly, to the Master's report on the ground that the controlling works may not be built unless the Secretary of War, on the recommendation of the Chief of Engineers, approves the plans for such works. As the Master's Report and form of decree does not provide for the reduction of the diversion below 6,500 c.f.s., in addition to pumpage, even after all the sewage disposal works are constructed, until such controlling works are installed, complainants therefore say that the reduction below 6,500 c.f.s. may never take place. This is a hypercritical exception, in view of the Master's finding that

> "the additional controlling works at the head of the Canal would not seem to involve any burden that could not readily be borne in such navigation." (Master's Report, p. 117.)

The attitude of the Engineer Corps is shown by Gen. Jadwin's statement (Master's Report, p. 109):

> "the Department will consider any application for the approval of plans of controlling works, to be constructed by the Sanitary District or other agency, and may be expected to approve these plans if the works are shown to be necessary, to be effective, and to be the minimum detriment to navigation."

The Master has found that the controlling works will not materially interfere with navigation. The Chief of Engineers has stated that it may be expected that plans therefor will be approved by the Engineer Corps if the works are built so as to cause the minimum detriment to navigation. The decree recommended by the Master requires the Sanitary District to immediately submit plans and construct the works within two years after the plans are approved. Therefore, it can hardly be said that the plans for such works will not be approved and that they will not be installed within the 2 year period required. In view of these circumstances, complainants' exceptions to the Master's Report on this proposition should not be given any consideration.

VIII.

THE AMOUNTS OF THE DIVERSION AT VARIOUS TIMES DURING THE PERIOD OF CONSTRUCTION AS THE DIFFERENT IMPORTANT UNITS OF THE SEWAGE DISPOSAL CONSTRUCTION PROGRAM GO INTO OPERATION, AND THE AMOUNT OF DIVERSION AT THE END OF THE PERIOD OF CONSTRUCTION AFTER ALL THE WORKS ARE COMPLETED, SHOULD BE FIXED BY THE SECRETARY OF WAR, ON THE RECOMMENDATION OF THE CHIEF OF ENGINEERS.

(a) THE OPINION OF JANUARY 14, 1929, HEREIN, INTENDS THAT THE SECRETARY OF WAR, ON THE RECOMMENDATION OF THE CHIEF OF ENGINEERS, SHALL CONTINUE THE EXERCISE OF THE FUNCTIONS HERETOFORE EXERCISED IN FIXING THE AMOUNTS OF THE DIVERSIONS IN THE INTERESTS OF NAVIGATION AND ITS PROTECTION AS THE EXIGENCIES OF THE SITUATION MAY PROMPT.

The Court said in its opinion (Appendix, p. 16):

> "Then pending the suit, the Sanitary District disobeyed the restriction of the Secretary of War's per-

> mit and increased the diversion to 8,500 cubic feet in order to dispose of the sewage of that District."
>
> * * * * *
>
> (P. 17) "Merely to aid the District in disposing of its sewage was not a justification, considering the limited scope of the Secretary's authority."
>
> * * * * *
>
> (P. 17) "our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time until it (sewage) is entirely disposed of thereby, when there shall be a final, permanent, operative and effective injunction."
>
> * * * * *
>
> (P. 19) "And in so far as the prior diversion was not for the purposes of maintaining navigation in the Chicago River it was without any legal basis, because made for an inadmissible purpose."

The Court upheld the permit of March 3, 1925, because the diversion under the then present conditions of artificial disposition of the sewage by the Sanitary District was required to protect navigation, but the Court further held that the continuance of the large diversion under permit of the Secretary of War was not justified when it was practicable to construct sewage disposal plants which when operated would not require so much water from Lake Michigan. The condition imposed by the permit the Court considered to be practicable and reasonable, namely, that the Sanitary District should within the period of said permit (from March 3, 1925, to December 31, 1929) carry out a program to be approved by the Engineer Corps for the construction and placing in operatino of artificial sewage disposal plants. It was apparent that the permit of March 3, 1925, was merely one permit in a series of permits that the Secretary of War contemplated issuing to control the diversion in the interest of navigation, appropriately conditioning the permits to bring about construction and placing in operation by the Sanitary District of sewage disposal works, reducing the diversion "to reasonable limits with utmost dispatch." (Master's Original Report, p. 76).

The Supreme Court, not knowing exactly what future Secretaries of War might do in the way of issuing and conditioning permits, considered that (Appendix, p. 17)

> "In these circumstances we think they (complainants) are entitled to a decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end."

The Court perhaps felt that an injunction compelling the construction and placing in operation of all sewage disposal works practicable, with reasonable speed, would be more effective than conditions of permits issued by the Secretary of War to eliminate that portion of the diversion used to oxidize sewage in lieu of artificial sewage disposal plants. In that connection the following from the Court's opinion, preceding the last quotation, is important (Appendix, p. 16):

> "The normal power of the Secretary of War under Section 10 of the Act of March 3, 1899, is to maintain the navigable capacity of Lake Michigan and not to restrict it or destroy it by diversions. This is what the Secretaries of War and the Chiefs of Engineers were trying to do in the interval between 1896 and 1907 and 1913 when the applications for 10,000 cubic feet a second were denied by the successive Secretaries and in 1908 a suit was brought by the United States to enjoin a flow beyond 4,167 cubic feet a second. *Then pending the suit, the Sanitary District disobeyed the restriction of the Secretary of War's permit and increased the diversion to* 8,500 *cubic feet in order to dispose of the sewage of that District.*
>
> * * * * *
>
> It will be perceived that *the interference* which was the basis of the Secretary's permit, and which

> the latter was intended to eliminate, *resulted directly from the failure of the Drainage District to take care of its sewage in some way other than by promoting or continuing the existing diversion.* It may be that some flow from the Lake is necessary to keep up navigation in the Chicago River, which really is part of the Port of Chicago, but that amount is negligible as compared with 8,500 second feet now being diverted. Hence, beyond that negligible quantity, the validity of the Secretary's permit *derives its support entirely from a situation produced by the Sanitary District in violation of the complainants' rights;* and *but for that support complainants might properly press for an immediate shutting down by injunction of the diversion,* save any small part needed to maintain navigation in the river."

In other words, the Supreme Court considered that only the portion of the diversion used for oxidation of sewage when there were means available for artificially purifying it by the construction and operation of sewage disposal plants, was improper and unreasonable and constituted an unreasonable obstruction to navigation, which portion the Secretary of War was not authorized permanently to permit under the 1899 Act "merely to aid the District in disposing of its sewage" (Opin., Appendix, p. 17).

Inasmuch as the record showed that a certain portion of the diversion could be eliminated by the construction of sewage disposal plants, then that portion of the diversion constituted an unreasonable obstruction to navigation, or, rather, it would be an unreasonable obstruction to navigation after a reasonable time had elapsed within which the Sanitary District might construct and put in operation, practicable sewage disposal plants to dispose of Sanitary District sewage. That portion of the diversion thereafter required in the judgment of the Secretary of War to protect navigation would not constitute an unreasonable obstruction to navigation, and the Secretary could properly by permit authorize such diversion.

The Supreme Court said in its opinion (Appendix, p. 13):

> "The true intent of the Act of Congress was that unreasonable obstructions to navigation and navigable capacity were to be prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction."

Therefore, if the Secretary of War authorizes a diversion to protect navigation from nuisances or from other impediments caused by the effluents from sewage disposal works and from the sewage in the storm water overflows, when such effluent is discharged to the DesPlaines River through the Sanitary District channels and works, and if the amount fixed is a reasonable amount, then the diversion will be a valid and proper one. The functioning of the Chief of Engineers and the Secretary of War under Section 10 of the Rivers and Harbors Act of 1899 is not, by the Supreme Court's opinion, displaced. Their power in this respect is clearly sustained by the opinion. The permit of March 3, 1925, was held valid. The conditions of the permit were likewise held to be proper and reasonable, which conditions were intended to bring about the substitution of "some other means of disposal" of the sewage. Consequently,

> "This situation gave rise to an exigency which the Secretary, in the interest of navigation and its protection, met by issuing a temporary permit intended to sanction for the time being a sufficient diversion to avoid interference with navigation in the Port of Chicago." (Opinion, pp. 16, 17).

The Court has merely taken into its own hands the bringing about of the construction and placing in operation of sewage disposal works practicable to dispose of Chicago's sewage. When that is done, there will still remain conditions which the Chief of Engineers and Secretary of War under the 1899 Act will have to meet to protect navigation. The enforcement of the construction and placing in operation of the necessary sewage disposal works is assumed by the Court, of which burden the Chief of Engineers and Secretary of War is relieved.

That the Secretary of War may permit under the 1899 Act a diversion from the Great Lakes watershed to the Mississippi River provided he acts reasonably, is clearly indicated by the Court's opinion. In speaking of the practice of the Chief of Engineers and the Secretary of War under the 1899 Act with reference to the diversion at Chicago, the court said (Appendix, p. 13):

> "The practice is shown by the opinion of the Acting Attorney General, transmitted to the Secretary of War, 34 Opin. Atty. Gen. 410, 416. The Secretary of War acted on this view on May 8, 1899, about two months after the passage of the Act. This was followed by the permits subsequently granted down to March 3, 1925. * * *
>
> But it is said the construction thus favored would constitute it a delegation by Congress of legislative power and invalid. We do not think so. * * *
>
> The construction of Section 10 of the Act of March 3, 1899, was settled by this Court in the decision of the first Chicago Drainage Canal case in 266 U. S. 405, 429. The decision there reached and the decree entered cannot be sustained, except on the theory that the Court decided first that Congress had exercised the power to prevent injury to the navigability of Lake Michigan and the other lakes and rivers in the Great Lakes watershed, and second *that it could properly and validly confer the administrative function of passing on the issue of unlawful injury or otherwise on the Secretary of War, and that it had done so.* To give any other interpretation would necessarily be at variance with our previous decision."

So, after discussing the various grounds for upholding the authority of the Secretary of War to grant a permit and the conditions confronting the Secretary of War on March 3, 1925, the Court sums up its conclusions with reference to this permit in the following language (Appendix, p. 17):

> "He could not make mere local sanitation a basis for a continuing diversion. Accordingly he made the permit of March 3, 1925, both temporary and conditional—temporary in that it was limited in duration and revocable at will, and conditional in that it was made to depend on the adoption and carrying out by the District of other plans for disposing of the sewage."

When the Sanitary District has gone forward and constructed and placed in operation all sewage disposal plants practicable for the elimination or for the treatment of sewage, then Chicago has in that respect taken care of its "local sanitation." Any diversion required in the judgment of the Secretary of War to protect navigation due to effluent from these works and storm overflow, will not be in the interest of "local sanitation," and "local sanitation" would not be "a basis for" continuing that portion of the diversion, but on the contrary the basis would be solely and only protection of navigation. There would be no unreasonable amount diverted. A permit to the Sanitary District authorizing such an amount of diversion would be "lawful." (Opinion, Appendix, p. 14).

(b) THE COURT OUGHT NOT TO TAKE ANY ACTION IN FIXING THE AMOUNT OF THE DIVERSION WHICH WILL INVADE THE SPHERE OF ACTION OF THE POLITICAL DEPARTMENT. THE COURT'S OPINION, OF JANUARY 14, 1929, MUST NOT BE SO CONSTRUED AND, IF IT MAY BEAR SUCH CONSTRUCTION, IT SHOULD BE MODIFIED.

The Court is appropriately and amply equipped to determine what sewage disposal works should be installed to dispose of the sewage and waste of the Sanitary District from a practicable standpoint and the time within which they may be constructed and to enforce by injunctions the installation of such works. The War Department, with its Engineer Corps, is appropriately and amply equipped to determine what diversion may be required to remove objectionable conditions to navigation when these different works are installed. The judgment and decree of the Court, within the sphere above mentioned, will not encroach upon the functions and duties of the Secretary of War on the recommendation of the Chief of Engineers. But if the Court determines what the diversion shall be from time to time in the interest of navigation and its protection, then it will attempt to exercise a judgment and discretion committed to the Secretary of War and Chief of Engineers under Section 10 of the 1899 Rivers and Harbors Act. The Court, referring to the exigency which confronted the Secretary of War and Chief of Engineers when the permit issued March 3, 1925, said (Appendix, p. 16):

> "Had an injunction then issued and been enforced, the Port of Chicago almost immediately would have become practically unusable because of the deposit of sewage without a sufficient flow of water through the Canal to dilute the sewage and carry it away. In the nature of things it was not practicable to stop the deposit without substituting some other means of disposal. This situation gave rise to an exigency

> which the Secretary, in the interest of navigation and its protection, met by issuing a temporary permit intended to sanction for the time being a sufficient diversion to avoid interference with navigation in the Port of Chicago."

As the different sewage disposal works go into operation, and before they are all installed, the amount of pollution of the navigable waters will be correspondingly reduced, but there will still remain an exigency for the Secretary of War to meet. The only difference between the exigency which will then exist and the one which existed on March 3, 1925, is one of degree. There will be the same exigency. In what condition the Secretary may desire the navigable waters to be, in relation to the avoidance of nuisance by the diversion of water, is in the judgment of the Secretary of War. The Court ought not to substitute its judgment for that of the Secretary of War in a matter committed to the Secretary by Congress under the commerce clause of the Constitution. The same situation will exist as more works are put in operation. The degree of the exigency will be different. When all the sewage disposal works are in operation, there will still be an exigency, but it will have been reduced to the minimum. The degree of the exigency will be the smallest practicable, but in any event the judgment of the Secretary of War, in determining the amount of the diversion in the interest of navigation and its protection, must still be exercised.

In

Sanitary District v. *United States,* 266 U. S. 405,

the Sanitary District sought, by appeal to this court, to have set aside the injunction against diverting more than 4167 c.f.s., (the amount of the then existing permit), from Lake Michigan. It urged that a court of equity should temper the relief given by allowing time to the

Sanitary District to build sewage disposal works, on the ground that the enforcement of the injunction immediately would cause not only injury to navigation from a nuisance standpoint in the port and harbor of Chicago, but also pollution of and serious interference with the domestic water supply, endangering the health and lives of the people of Chicago. The Court concluded it was not at liberty to consider this situation in view of the action of the Secretary of War, pursuant to the Act of Congress under the paramount commerce power. The Court said (p. 432):

> "Probably the dangers to which the City of Chicago will be subjected if the decree is carried out are exaggerated, but in any event we are not at liberty to consider them here as against the edict of a paramount power. The decree for an injunction as prayed is affirmed, to go into effect in sixty days—without prejudice to any permit that may be issued by the Secretary of War according to law."

In this controversy the Court dealt with substantially the same situation and exigency, in the following language (Opinion January 14, 1929—Appendix, p. 17):

> "But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent, operative and effective injunction."

The Court also said (Appendix, p. 19):

> "It therefore is the duty of this Court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis and thus to restore the navigable capacity of Lake Michigan to its proper level."

The amount of the diversion in the interest of navigation and its protection, was recognized in

Sanitary District v. *United States,* 266 U. S. 405,

to be lodged in the Secretary of War to determine. The opinion of the Court in this case (January 14, 1929) and all language thereof must be interpreted in connection with the well-known canons of construction, that general expressions in the opinion must be restricted to the particular issue in hand; that it must never be assumed that the Court intended to break with the current of authority unless its intention to do so is expressed by clear and unmistakable language; and that any general expressions in an opinion must always be regarded as qualified by the inevitable limitations upon judicial power and the fine respect that one branch of the Government owes to another. There must therefore be read into the above quoted language of the Court's opinion in this case (January 14, 1929) words to the effect that the reduction of the diversion and the amounts of the diversion should be subject to any action taken by the Secretary of War according to law. In other words, the Court would proceed then within the sphere of its constitutional power and the Secretary of War, representing the political department, would proceed with reference to the subject matter within the sphere of his authority from Congress under the paramount commerce clause.

The Secretary of War under the said Act of Congress, will always be concerned with the amount of the diversion in the interest of navigation and its protection. So any decree of the Court must be subject to such action as the Secretary of War may take.

The Court here is acting under Article III of the Constitution, which defines the judicial power, while the Secretary of War is acting under Articles I and II of the

Constitution, which define the political and executive power.

The language of the Court in

> *Pacific Telephone Company* v. *Oregon,* 223 U. S. 118, 142,

is apt.

> "Do the provisions of Section 4, Art. IV, bring about these strange, far-reaching and injurious results? That is to say, do the provisions of that Article obliterate the division between judicial authority and legislative power upon which the Constitution rests? In other words, do they authorize the judiciary to substitute its judgment as to a matter purely political for the judgment of Congress on a subject committed to it and thus overthrow the Constitution upon the ground that thereby the guarantee to the States of a government republican in form may be secured, a conception which after all rests upon the assumption that the States are to be guaranteed a government republican in form by destroying the very existence of a government republican in form in the Nation."

The inquiry necessarily follows, is the Court to substitute its judgment as to the requirements of navigation in navigable waters of the United States, for the judgment of the Secretary of War exercising his authority under the paramount commerce power of Congress? The fixing of the amount of the diversion, in the interest of navigation and its protection, is not a judicial act. It is the determination for the future of the condition in which the navigable waters shall be maintained in the interest of navigation and the determination of what may or may not be obstructions to navigation. It is in the nature of the fixing of a rate or the fixing of the conditions for the operation of a public utility in interstate commerce.

The Court, in

Prentis v. *Atlantic Coast Line,* 211 U. S. 210, 226,

said:

> "A judicial inquiry investigates, declares and enforces liabilities as they stand on present or past facts and under laws supposed already to exist. That is its purpose and end. Legislation on the other hand looks to the future and changes existing conditions by making a new rule to be applied thereafter to all or some part of those subject to its power. The establishment of a rate is the making of a rule for the future, and therefore is an act legislative not judicial in kind * * *."

So, here, the fixing of the amount of the diversion, during the period of the construction and at the end of the period, is the fixing of the rule for the future for the conduct of or condition in which the navigable waters involved shall exist.

(c) IT IS IMPRACTICABLE NOW TO FIX THE AMOUNT OF THE DIVERSION DURING THE CONSTRUCTION PERIOD AND AT THE END OF THE PERIOD. THE PRACTICAL SOLUTION WITH DUE REGARD TO THE STATUTORY FUNCTIONS OF THE SECRETARY OF WAR ON THE RECOMMENDATION OF THE CHIEF OF ENGINEERS, AND TO THE USUAL JUDICIAL POWERS OF THIS COURT, IS TO PROVIDE BY THE DECREE THAT THE DIVERSION SHALL BE, DURING SAID CONSTRUCTION PERIOD AND AT THE END OF SAID CONSTRUCTION PERIOD, SUCH AMOUNTS AS MAY BE DETERMINED BY THE PERMIT OR PERMITS, (ISSUED ACCORDING TO LAW), OF THE SECRETARY OF WAR ON THE RECOMMENDATION OF THE CHIEF OF ENGINEERS; BUT THAT SUCH PERMITS SHALL BE SUBJECT TO REVIEW BY THIS COURT ON THE EVIDENCE ALREADY SUBMITTED AND ANY FURTHER EVIDENCE THAT MAY THEN BE PRESENTED.

Mr. Eddy, defendants' witness, said (Joint Abst., 85):

"It is my judgment that it would be better to

> fix the amount of reduction after these different works are put in and there has been an opportunity to observe the effect of the operation.
>
> I have made the best estimate that I can; but there are so many undetermined and undeterminable factors in the problem that I think it would be wise, if practicable, to allow them to be determined after the works are in operation."

Defendants' witness Pearse said (Joint Abst., 69):

> "I hesitate to express a definite opinion as to the exact reductions that can be made in the diversions of water from Lake Michigan during the period of construction because of the size of the problem and the unknown features concerning the effect on the waterways of the residual suspended matter that may come from the plants in the 15 per cent purification that cannot be reached; the overflows from the sewers and oil and other matter that may reach the river from different sources. I believe such reductions should be predicated upon the work as accomplished when the treatment works are completed and put into operation, and that a period of observation and definite reduction can then be determined."

* * * * *

> (Joint Abst., 70) "In the operation of the works, while data are available to tell what the probable effect will be of this sewage reaching it, the question will come in the result of the effluent on the waterways of the District and the setting forth of the residual flows that must be allowed to take care of those effluents. That will differ in actual accomplishment, in winter and in summer, according to the condition of the seasons, each year, and will differ in the plants to some extent themselves. And it will differ with the number of storms each year."

See Dr. Mohlman's testimony (*Supra*, 92).

The Court should retain jurisdiction in accordance with the Master's recommendation in his form of decree of the entire matter until all the sewage disposal works are put in operation. Probably one objection which the complainants have to our suggestion that the amounts of the diversion should be determined by the Secretary of War on the recommendation of the Chief of Engineers, is that, if the Secretary of War should by permit fix the diversion either during the period of construction or at the end of the period of construction, at an amount or amounts which the complainants deem to be arbitrary, then complainants, as they fear, would be compelled to institute a new suit or suits to question the validity of the permit or permits. To obviate this objection, it would seem to be appropriate that the jurisdiction retained should extend to the review by the Court of any permits that may be issued by the Secretary of War according to law in the interest of navigation and its protection, by proper petition or petitions filed by complainants. Thereby, it would be unnecessary to offer evidence already presented in this record which might be material or relevant to the determination of such petition or petitions. In that way there will be utilized the instruments of government, (Secretary of War and Chief of Engineers), legally and practically competent and qualified to determine from time to time exactly what the diversions should be in the interest of navigation and its protection. The Engineer Corps is composed of engineers peculiarly versed and experienced in the solution of the problems that will be presented in determining the amounts of the diversions from time to time. It is accustomed to exercise judgment as to the requirements of navigation upon navigable waters. The War Department's judgment is the judgment which Congress has intended should be exercised. Congress has provided the War Department with the means to make investigations to ascertain the facts and circumstances required to properly exercise such judgment. This solution will permit the two branches of government to work in co-ordination and in harmony to solve the problem of the installation of the proper works to dispose of the sewage and wastes of the Sanitary District with due and proper speed and the reduction of the diversion from time to time to the amounts that may appropriately be permitted in view of the elimination of the sewage and wastes by the operation of such sewage disposal and other works.

IX.

THE TIME FIXED BY THE MASTER'S REPORT FOR THE INSTALLATION OF ALL THE DIFFERENT WORKS, IS TOO SHORT.

(a) THE RISE IN LAKE LEVELS SINCE THE INTRODUCTION OF THE EVIDENCE ON WHICH THE COURT'S OPINION (JANUARY 14, 1929) WAS RENDERED, SHOULD HAVE CAUSED THE MASTER TO DISREGARD HIS CONCLUSION THAT THE COURT BY ITS SAID OPINION INTENDED TO IMPOSE "AN IMMEDIATELY HEAVY BURDEN" IN THE INSTALLATION OF SAID WORKS. CONSEQUENTLY, THE REASONABLE TIME FOR COMPLETION SHOULD HAVE BEEN ALLOWED. THE SHORTER TIME WHICH WOULD IMPOSE SUCH IMMEDIATELY HEAVY BURDEN IS INEQUITABLE UNDER THE CIRCUMSTANCES.

See for reasons in support of the above proposition, *supra*, 7-9.

(b) LIBERAL ALLOWANCE FOR UNFORESEEABLE DELAYS, IN THE CONSTRUCTION OF SUCH VAST AND UNUSUAL WORKS, SHOULD HAVE BEEN MADE WHICH WOULD HAVE EXTENDED THE CONSTRUCTION PERIOD BEYOND THE DATE (DECEMBER 31, 1938) FIXED BY THE MASTER.

See for reasons in support of the above proposition, *supra*, 9, 10.

X.

IT IS INAPPROPRIATE AT THIS TIME TO DETERMINE WHICH ONE OF THE PARTIES SHALL PAY THE COSTS.

Complainants except to the following in the Master's Report (p. 145):

> "No recommendation is made as to costs."

The complainants contend by their exceptions that the costs should be borne by the defendants. It is our position that the determination, of who shall pay the costs, should not be made until the decree upon the exceptions to the Master's Report on Re-reference is entered. At that time the matter may be more appropriately argued and determined.

If complainants base their contention that the defendants should pay the costs upon the theory that the losing party should pay them, then their position is without foundation. So far, it cannot be said that defendants are the losing parties. The bills of complaint attacked the validity of the March 3, 1925, permit; but the Court in its January 14, 1929, opinion held such permit to be valid. In other words, upon the hearing on the original reference it was the position of the defendants that the permit of March 3, 1925, was a complete defense to the complainants' bills; that it was a valid permit and that the diversion could not be reduced during the period of that permit which ended on December 31, 1929.

The Master's Original Report, filed March 23, 1927, upon which the Court's opinion, of January 14, 1929, was rendered, recommended the dismissal of the complainants' bills, without prejudice, on the ground that the permit of March 3, 1925, was valid. The Court by its opinion (January 14, 1929) sustained the Master (Appendix, pp. 14-17) and held the permit valid. The said permit of March 3, 1925, contained conditions which required the Sanitary District to install certain sewage disposal works within the period of said permit. It was apparent that the March 3, 1925, permit was one in a series of permits which would be similarly conditioned until practicable works had been installed to dispose of *all* the sewage and wastes of the District, to the greatest practicable extent known in the art, and that the diversion of water would be reduced as the sewage and wastes were eliminated by the installation of such works to the amount or amounts that the interests of navigation and its protection would permit. With such conditions and reductions of diversions as the Secretary of War might provide, the defendants agreed. The Court by its opinion of January 14, 1929, while sustaining the then existing permit, directed an inquiry by the Special Master with reference to the practical measures required to dispose of the sewage and wastes of the Sanitary District, and indicated that likewise there should be accomplished reduction in diversion as such wastes were eliminated by the operation of the sewage disposal works to be installed. In the one case the Secretary of War would determine the works to be installed, and in the other case the Court would determine what works should be constructed and put in operation to dispose of the sewage and wastes from a practicable standpoint. In the one case the Secretary of War would determine the amount of the reductions or the amounts of the diversion from time to time, in addition to the works to be installed and the time therefor, and in the other case, according to the complainants, the Court would determine the amount of the reduction or the amounts of the diversion from time to time, and, according to the defendants, still the Secretary of War would determine the amount of the reductions or the amounts of the diversion from time to time, in addition to determining what sewage disposal works should be constructed and the reasonable time for their construction.

In

North Dakota v. *Minnesota,* 263 U. S. 583, the Court has discussed very extensively the question of who should pay the costs in original suits.

In

Kansas v. *Colorado,* 206 U. S. 46, 117,

and

Wyoming v. *Colorado,* 259 U. S. 496,

where the settlement of the controversy was useful to both sides and involved governmental questions in which each party had a real and vital interest, the Court followed the boundary cases and divided the costs. In the former case the costs were divided equally between the two states. In the latter case one-third was ordered to be paid by Wyoming, one-third by Colorado and one-third by the two corporate defendants at whose expense the case had been defended by Colorado.

In

North Dakota v. *Minnesota,* 263 U. S. 583,

the Court assessed the costs against North Dakota on the ground that the suit had been instituted at the behest of certain alleged injured persons who had raised a fund to conduct the litigation and that, therefore, it was a litigious case.

In order to properly dispose of the question as to the parties who should pay the costs, it may be necessary for the Court to have an inquiry to determine the instigators of this litigation and the persons, firms and corporations other than the parties named as complainants who have contributed money and services and other things to the carrying on of the litigation through complainants.

We suggest, therefore, that the determination of the party or parties, upon whom the costs shall fall in this litigation, be made after the entry of the final decree herein.

CONCLUSION.

Defendants' exceptions relate principally to conclusions of law in the Master's Report, such as the effect that should be given to the rise in Lake levels since the presentation of the evidence upon which the Court's opinion of January 14, 1929, was based, whether the maintenance of unobjectionable conditions for navigation in the DesPlaines and Illinois Rivers should be considered in fixing the amount of diversion, and whether the amounts of the diversion from time to time during the period of construction and at the end of the period should be fixed by the Secretary of War on the recommendation of the Chief of Engineers.

Complainants' exceptions to a great extent relate to conclusions of fact such as the practicability of the installation of filter plants for water supply, of the extension of intake tunnels, of building of super tunnels and a separate sewer system, of the chlorination of effluent, of the construction of outfall sewers and of providing circulating water devices for the Chicago River and its auxiliary channels; whether pollution of navigable waters caused by the introduction of sewage has relation to the interest of navigation; and the effect upon navigable waters and navigation of the discharge of sewage and wastes of Chicago into Lake Michigan, and similar questions.

The determination of the questions of fact

> "depends upon conflicting testimony or upon the credibility of witnesses"

and the Master heard the testimony and observed the witnesses, and his findings

> "must be treated as unassailable." *Davis* v. *Schwartz,* 155 U. S. 631, 636.

The Master also viewed the operation of an activated sludge plant (the North Side Sewage Treatment plant of the Sanitary District) and saw the sludge and effluent derived from such plant in operation, which circumstance lends greater weight to the Master's conclusions of fact.

Respectfully submitted,

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Defendant,

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STATEMENT ON BEHALF OF THE STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI AND ARKANSAS, INTERVENING DEFENDANTS.

The intervening defendant States, known in this case as the Mississippi Valley States, have not conceived that any of the issues concerning which the court directed a re-reference to the Special Master, involve the interest or rights of these intervening defendants. The Mississippi Valley States, however, desire to join with the State of Illinois and the Sanitary District in urging the contentions in this brief concerning the power of the Secretary of War and the propriety and necessity of avoiding, by the terms of the decree to be entered herein, any interference with the future exercise of that power.

Respectfully submitted,

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all ok

Daniel N. Kirby,
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APPENDIX.

SUPREME COURT OF THE UNITED STATES.

Nos. 7, 11, and 12 Original.—October Term, 1928.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
7 *vs.*
State of Illinois and Sanitary District of Chicago, Defendants.
State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.
No. 7, Original.

State of Michigan, Complainant,
11 *vs.*
State of Illinois and Sanitary District of Chicago, Defendants.
No. 11, Original.

State of New York, Complainant,
12 *vs.*
State of Illinois and Sanitary District of Chicago, Defendants.
No. 12, Original.

[January 14, 1929.]

Mr. Chief Justice Taft delivered the opinion of the Court.

These are amended bills by the States of Wisconsin, Minnesota, Michigan, Ohio, Pennsylvania and New York, praying for an injunction against the State of Illinois and the Sanitary District of Chicago from continuing to withdraw 8,500 cubic feet of water a second from Lake Michigan at Chicago.

The Court referred the cause to Charles Evans Hughes as a Special Master, with authority to take the evidence, and to report the same to the Court with his findings of fact, conclusions of law and recommendations for a decree, all to be subject to approval or other disposal by the Court. The Master gave full hearings and filed and submitted his report November 23, 1927, to which the complainants duly lodged exceptions, which have been elaborately argued.

When these bills were filed, there was pending in this Court an appeal by the Sanitary District of Chicago from a decree granted at the suit of the United States by the United States District Court for the Northern District of Illinois, against a diversion from the Lake in excess of 250,000 cubic feet per minute, or 4,167 cubic feet per second. This amount had been permitted by the Secretary of War. In January, 1925, this Court affirmed the decree, without prejudice to the granting of a further permit by the Secretary of War according to law. 266 U. S. 405. On March 3, 1925, the Secretary of War after that decree enlarged the permit for a diversion not to exceed an annual average of 8,500 cubic feet per second, upon certain conditions hereafter to be noted.

The amended bills herein averred that the Chicago diversion had lowered the levels of Lakes Michigan, Huron, Erie and Ontario, their connecting waterways, and of the St. Lawrence River above tide-water, not less than six inches, to the serious injury of the complainant States, their citizens and property owners; that the acts of the defendants had never been authorized by Congress but were violations of the rights of the complainant States and their people; that the withdrawals of the water from Lake Michigan were for the purpose of taking care of the sewage of Chicago and were not justified by any control Congress had attempted to exercise or could exercise in interstate commerce over the waters of Lake Michigan; and that the withdrawals were in palpable violation of the Act of Congress of March 3, 1899. The bills prayed that the defendants be enjoined from permanently diverting water from Lake Michigan or from dumping or draining sewage into its waterways which would render them unsanitary or obstruct the people of the complainant States in navigating them.

The State of Illinois filed a demurrer to the bills and the Sanitary District of Chicago an answer, which included a motion to dismiss. The States of Missouri, Kentucky, Tennessee and Louisiana, by leave of Court, became intervening co-defendants, on the same side as Illinois, and moved to dismiss the bills. The demurrer of Illinois was overruled and the motions to dismiss were denied, without prejudice. Thereupon the intervening defendants and the defendants, the Sanitary District and the State of Illinois, filed their respective answers. The States of Mississippi and Arkansas were also permitted to intervene as defendants, and adopted the answers of the other interveners. The answers of the defendants denied the injuries alleged, and averred that authority was given for the diversion under the acts of the Legislature of Illinois and under acts of Congress and permits of the Secretary of War authorized by Congress in the regulation of interstate commerce. All the answers stressed the point that the diversion of water from Lake Michigan improved the navigation of the Mississippi Valley and was an aid to the commerce of the Mississippi Valley and sought the preservation of this aid. They also set up the defense of laches, acquiescence and estoppel, on the ground that the purposes of the canal and the diversion were known to the people and the officials of the complainant States, and that no protest or complaint had been made in their behalf prior to the filing of the original bills herein.

The Master has made a comprehensive review of the evidence before him in regard to the history of the canal, the extent and effect of the diversion, the action of the State and Federal Governments, the plans for the disposal of the sewage and waste of Chicago and the other territory within the Sanitary District, as well as the character and feasibility of works proposed as a means of compensating for the lowering of lake levels. From this review we shall take what will assist us in the consideration of the issues deemed necessary to be considered on the exceptions to the report.

We shall first consider in brief the parts taken by Congress and the State of Illinois and their respective agencies in the construction of the Sanitary District Canal and the creation of the Lake Michigan diversion.

By the Act of March 30, 1822, c. 14; 3 Stat. 659, Congress authorized Illinois to survey and mark, through the public lands of the United States, the route of a canal connecting the Illinois River with Lake Michigan, and granted certain lands in aid of the project. A further land grant was made in 1827. The canal was completed in 1848. The canal crossed the continental divide between the Chicago and Des Plaines Rivers, on a summit level eight feet above the Lake, and then paralleled the Des Plaines River and the Upper Illinois River to La Salle, Illinois, where it entered the latter stream. The summit of the canal was supplied with water by pumps located in a plant on the Chicago River. Originally, only enough water was pumped to answer the needs of navigation in the canal, but thereafter, in 1861, the Legislature provided for improvement in the canal by excavation and a larger flow of water from Lake Michigan.

Before 1865, the Chicago River, being a sluggish stream in its lower reaches, had become so offensive because of receiving the sewage of the rapidly growing city, that for its immediate relief the municipal authorities and the canal commissioners agreed to pump water from the river in excess of the needs of navigation. By 1872 the summit level of the canal had been lowered, and it was hoped that this would result in a permanent flow of lake water through the South Branch of the Chicago River, sufficient to keep it in good condition, but the plan failed, and the canal again became grossly polluted.

In 1881, the Illinois Legislature passed a resolution authorizing the installation of pumps at the northern terminus of the canal, with a capacity of not less than 1,000 cubic feet a second, to draw water from Lake Michigan through the Chicago River and the canal. Pumps were installed and pumping was begun in 1883. For a few years this afforded sufficient dilution in the canal because of the high stage of Lake Michigan, but in 1886 the lake level began to fall, and continued to fall until 1891 when it was two feet lower than when the pumps were installed. Their capacity was thus reduced to a little more than 600 cubic feet a second. The nuisance along the canal continued to grow. The Drainage and Water Supply Commission of the State recommended, as the most economical method for meeting the requirement, a discharge into the Des Plaines River through a canal across the continental divide, providing a waterway of such dimensions as would furnish ample dilution. The Commission pointed out that the proposed canal would, from its necessary dimensions and its regular discharge, produce a magnificent waterway between Chicago and the Mississippi River, suitable for navigation of boats having as much as 2,000 tons burden, and would give also large water power of great commercial value to the State.

The Sanitary District was organized under the Illinois Act of 1889. It was completed in 1890. It embraced an area of 185 square miles. By later acts it was increased to approximately 438 square miles, extending from the Illinois State line on the south and east to the northern boundary of Cook County on the north, with about 34 miles of frontage on Lake Michigan, embracing the metropolitan area of Chicago, consisting of a total of fifty-four cities, towns and villages.

The main drainage canal was begun in 1892, and was opened in January, 1900. Since that time the flow of the Chicago River has been reversed—that is, it has been made to flow away from Lake Michigan toward the Mississippi. As originally constructed the canal ended in a non-navigable tail-race. There was no lock at the southwestern end. But by the Act of May 14, 1903, the Illinois Legislature gave the Sanitary District the power to construct dams, water wheels, and other works appropriate to render available the power arising from the water passing through the main channel and any auxiliary channels thereafter constructed.

In 1908, the Constitution of Illinois was amended to authorize the legislature to provide for the construction of a deep waterway or canal, from the water-power plant of the Sanitary District of Chicago, at or near Lockport, to a point on the Illinois River at or near Utica, and to provide that this power might be leased for the benefit of the State treasury. Meantime, all the sewage in the drainage district, including Evanston, was turned into the main channel, and the water directly abstracted from Lake Michigan by the Sanitary District was increased from 2,541 cubic feet a second in 1900 to 5,751 in 1909, to 7,228 in 1916, to 6,888 cubic feet a second in 1926, not including pumpage.

The Sanitary District authorities have expended in the construction of works for sewage and the deep waterway canal $109,021,613 including interest on bonds.

In 1888, Congress directed the Secretary of War to make surveys for a channel improvement in the Illinois and Des Plaines Rivers. In 1892, Congress appropriated $72,000 to complete the improvement of the harbor at Chicago, and again $25,000 in 1894. Three engineers appointed by the Secretary of War reported to him that a diversion of 10,000 cubic feet a second through the Sanitary and Ship Canal would lower the levels of the Lakes, except Lake Superior. In 1896, Congress appropriated money for dredging the Chicago River. The Sanitary District in that year asked for a permit from the Secretary of War to enlarge the cross section of the Chicago River, and announced that the work had progressed so far that this must be done to make available the artificial channel under construction from Robey Street, Chicago, to Lockport, twenty-eight miles distant. The Secretary of War granted the permit, but said that this authority was not to be interpreted as an approval of the plans of the Sanitary District of Chicago to introduce a current into the Chicago River; that the United States should not be put to any expense, and that the authority was to expire by limitation in two years. Other permits relating to the same subject were issued by the same officer in 1897, 1898, and twice in 1899. The Act of Congress of 1899 amplified the provisions of an earlier Act of 1890 looking to the regulation, prevention, and removal by Federal authority of obstructions to navigation and alteration of capacity of the navigable waters of the United States by enacting Sections 9 and 10 thereof.

Other permits were allowed by the Secretary of War—one on December 5, 1901 allowing a diversion of 250,000 cubic feet per minute throughout the full 24 hours of each day. And in another instance on January 17, 1903, a diversion of 350,000 cubic feet per minute until March 31, 1903, was permitted, in order to carry off the accumulations of sewage deposit lining the shores along the city, with the provision that after that, the flow should be reduced to 250,000 cubic feet per minute as required by the permit of December, 1901. The Board of Engineers in 1905 reported to Congress that the effect upon the level of Lake Michigan of withdrawing 10,000 cubic feet per second for an indefinite period had been the subject of elaborate investigation and that the conclusion reached was that the final effect would be to lower the level of the Lake six inches.

An application for the flow of more water through the Calumet Sag Channel was declined by the Chief of Engineers, and was refused by the Secretary of War in March, 1907, and as the Sanitary District apparently intended to proceed with the work for which a permit had been refused, the United States brought suit in 1908 to prevent its construction and prevent the increase of the flow. Another application was refused by the Secretary of War in January, 1913, and there seems to have been another denied later.

A second bill to enjoin the Sanitary District from a diversion of more than 250,000 cubic feet per minute or its equivalent 4,167 cubic feet a second of water from Lake Michigan was filed and was consolidated with the earlier suit, and after a long delay of six or seven years an oral opinion was given by Judge Landis of the United States District Court for the Northern District of Illinois in favor of the Government. A decree not having been entered before Judge Landis resigned, a decree was entered by Judge Carpenter in the case which was affirmed by this Court in January, 1925. *Sanitary District of Chicago* v. *United States,* 266 U. S. 405.

This Court's decree provided that the defendant, the Sanitary District of Chicago, its agents, and all other persons acting or claiming or assuming to act under its authority, should be enjoined from diverting or abstracting any waters from Lake Michigan over and above or in excess of 250,000 cubic feet per minute, to go into effect in sixty days, without prejudice to any permit that might be issued by the Secretary of War according to law.

Immediately after this decision, the Sanitary District applied to the Secretary of War for permission to divert 10,000 cubic feet a second. The exigency was set out in the petition. The Secretary of War then issued a permit on March 3, 1925, which cited that the instrument did not give any property rights either in real estate or material, or any exclusive privileges; and that it did not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State or local laws or regulations, or obviate the necessity of obtaining the State's assent to the work authorized. It certified that upon the recommendation of the Chief of Engineers, the Secretary of War, under Section 10 of the Act of 1899, authorized the Sanitary District to divert from Lake Michigan an amount of water not to exceed an annual average of 8,500 cubic feet per second, the instantaneous maximum not to exceed 11,000 cubic feet per second, upon certain conditions.

The conditions of the permit require the City of Chicago to take immediate steps to carry out sewage treatment by artificial processes, so that before the expiration of the permit they should provide the equivalent of 100% treatment of the sewage of 1,200,000 people, or one-third of the population of the city, and that this should be done under supervision of the U. S. District Engineer at Chicago, the permit to be revoked if the conditions were not complied with, and the permit to cease unless renewed on December 31, 1929. In granting the permit, the Secretary of War expressed the opinion that steps should be taken to complete the entire work of providing for disposal of all the sewage in ten years. Colonel Schultz, U. S. District Engineer at Chicago, reported that the conditions of the March 3, 1925 permit have been complied with, and the Master confirms this in his report.

In providing for the improvement of the channel of the Illinois River in the Act of January 21, 1927, c. 47; 44 Stat. 1013, Congress declared that nothing in the Act should be construed as authority for any diversion from Lake Michigan.

The Master's findings on the subject of injury to the complainants are in effect as follows:

The diversion which has taken place through the Chicago Drainage Canal has been substantially equivalent to a diversion of about 8,500 cubic feet a second for a period of time sufficient to cause, and it has caused, the lowering of the mean levels of the Lakes and the connecting waterways, as follows: Lakes Michigan and Huron approximately 6 inches; Lakes Erie and Ontario approximately 5 inches; and of the connecting rivers, bays and harbors to the same extent respectively. A diversion of an additional 1,500 cubic feet per second, or a total diversion of 10,000 cubic feet a second would cause an additional lowering in Lakes Michigan and Huron of about one inch, and in Lakes Erie and Ontario a little less than one inch, with a corresponding additional lowering in the connecting waterways. The Master also finds that if the diversion at Chicago were ended, assuming that other diversions remained the same, the mean levels of the lakes and rivers affected by the Chicago drainage would be raised in the course of several years (about 5 years in the case of Lakes Michigan and Huron, and about one year in the case of Lakes Erie and Ontario) to the same extent as they had been lowered, respectively, by that diversion.

The Master finds that the damage due to the diversion at Chicago relates to navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other enterprises, and to riparian property generally, but does not report that injury to agriculture is established. He says that the Great Lakes and their connecting channels form a natural highway for transportation, having a water surface of over 95,000 square miles, and a shore line of 8,300 miles, extending from Duluth-Superior, and from Chicago and Gary, to Montreal, at the head of deep-draft ocean navigation on the St. Lawrence; that there are approximately 400 harbors on the Great Lakes and connecting channels, of which about 100 have been improved by the Federal Government; that the latter improvements consist in the excavation and maintenance of channels from deep water in the lakes to the harbor entrances; that inner or local harbors are located inside of the Federal channels, and the depths in the inner harbors have been obtained and are maintained at local expense; that inner harbors are necessary to afford practical navigation; that extensive and expensive loading, unloading and other terminal facilities have been constructed in these various ports within the territory of the complainant States, on the Great Lakes, at local expense.

The Master's report says that the water-borne traffic on the Great Lakes for the year 1923 consisted of 81,466,902,000 ton-~~miles~~ of water haul, and that consideration of individual loaded boats and of their respective dimensions shows that, if water had been available for an additional six inches of draft, the fleet could have handled for the year 3,346,000 tons more than was actually transported, or to put the matter in another light, the season's business could have been done with the elimination from service of about 30 freighters of the 2,000-3,000-ton class, and that the lost tonnage of the total through business of the Lakes for 1923, incident to a 6-inch deficiency of draft, exceeded 4,000,000 tons, and that the average water-haul rate for the year was 88 cents per ton.

The great losses to which the complainant States and their citizens and their property owners have been subjected by the reductions of levels in the various Lakes and Rivers except Lake Superior are made apparent by these figures.

The pleadings question the jurisdiction of this Court and the sufficiency of the facts set forth in the bills to constitute a cause of action. These issues, although raised, are not pressed by the defendants and we concur with the Master in his conclusion that they are met completely by our previous decisions. *Missouri* v. *Illinois,* 180 U. S. 208; s. c. 200 U. S. 496; *Hans* v. *Louisiana,* 134 U. S. 1; *Sanitary District of Chicago* v. *United States,* 266 U. S. 405; *Kansas* v. *Colorado,* 185 U. S. 125; s. c. 206 U. S. 46; *New York* v. *New Jersey,* 256 U. S. 296; *Wyoming* v. *Colorado,* 259 U. S. 419; *North Dakota* v. *Minnesota,* 263 U. S. 365; *Pennsylvania* v. *West Virginia,* 262 U. S. 553, 623; 263 U. S. 350; *Georgia* v. *Tennessee Copper Co.,* 206 U. S. 230, 237.

The controversies have taken a very wide range. The exact issue is whether the State of Illinois and the Sanitary District of Chicago by diverting 8,500 cubic feet from the waters of Lake Michigan have so injured the riparian and other rights of the complainant States bordering the Great Lakes and connecting streams by lowering their levels as to justify an injunction to stop this diversion and thus restore the normal levels. Defendants assert that such a diversion is the result of Congressional action in the regulation of interstate commerce, that the injury, if any, resulting is *damnum absque injuria* to the complaining States. Those States reply that the regulation of interstate commerce under the Constitution does not authorize the transfer by Congress of any of the navigable capacity of the Great Lake System of Waters to the Mississippi basin, that is from one great watershed to another; second, that the transfer is contrary to the provision of the Constitution forbidding the preference of the ports of one State over those of another; and, third, that the injuries to the complainant States deprive them and their citizens and property owners of property without due process of law and of the natural advantages of their position, contrary to their sovereign rights as members of the Union. If one of these issues is decided in favor of the complaining States, it ends the case in their favor and the diversion must be enjoined. But in the view which we take respecting what actually has been done by Congress some of these objections need not be considered or passed upon.

The complainants, even apart from their constitutional objections, contend that Congress has not by statute or otherwise authorized the Lake Michigan diversion, that it is therefore illegal and that injuries by it to the complainant States and their people should be forbidden by decree of this Court. The diversion of 8,500 cubic feet a second is now maintained under a permit of the Secretary of War of March 3, 1925, acting under Section 10 of the Act of 1899, which it is contended by the complainants vests no such authority in him. They claim that the diversion is based on a purpose not to regulate navigation of the Lake, but merely to get rid of the sewage of Chicago, that this is a State purpose, not a Federal function, and should be enjoined to save the rights of complainants. If the view urged by the complainants is right, the necessity for the use of the 8,500 cubic feet a second to save the health of the inhabitants of the Drainage District will then present the problem of the power and discretion of a court of equity to moderate the strict and immediate rights of the parties complainant to a gradual one which will effect justice as rapidly as the situation permits. The framing of the decree will then require the careful consideration of the Court.

The complainants contend that Congress has given no authority for the diversion from Lake Michigan, even if it has power so to do by way of regulating interstate commerce. The defendants rely for this authority on the permit of the Secretary of War issued by him March 3, 1925, to the Sanitary District shortly after the decree of this Court in the *Sanitary District* v. *United States,* 266 U. S. 405. That decree forbade the diversion of the waters from Lake Michigan in excess of 4,167 cubic feet a second, but was made expressly without prejudice to any permit issued by the Secretary of War according to law. The complainants contend that the permit which allows a diversion of 8,500 cubic feet a second is not in regulation of interstate commerce, is not according to law and should be declared invalid.

The defendants base their claim of Congressional authority on Section 10 of the Act of March 3, 1899, c. 425; 30 Stat. 1151—

"That the creation of an obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States, is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War, and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same."

The policy carried out in the Act of March 3, 1899, had been begun in the Act of September 19, 1890, c. 907; 26 Stat. 454, 455. Sections 9 and 10 were the re-arranged result of the provisions of Sections 7 and 10 of the Act of 1890. A new classification was made in Sections 9 and 10 of the Act of 1899, and substituted for Section 10 of the Act of 1890. The latter provided that the creation of any obstruction to navigable capacity was prohibited, unless "affirmatively authorized by law" and this was changed so as to read "affirmatively authorized by Congress." The change in the words of the first clause of Section 10 was intended to make mere State authorization inadequate. *Sanitary District* v. *United States,* 266 U. S. 405, 429; *United States* v. *Bellingham Bay Boom Co.,* 176 U. S. 211. It was not intended to override the authority of the State to put its veto upon the placing of obstructing structures in navigable waters within a State and both State and Federal approval were made necessary in such case. *Cummings* v. *Chicago,* 188 U. S. 410. The words "affirmatively authorized by Congress" should be construed in the light of the administrative exigencies which prompted the delegation of authority in the succeeding clauses. Congress, having stated in Section 9 as to what particular structures its specific consent should be required, intended to leave to the Secretary of War, acting on the recommendation of the Chief of Engineers, the determination of what should be approved and authorized in the classes of cases described in the second and third clauses of Section 10. If the section were construed to require a special authorization by Congress whenever in any aspect it might be considered that there was an obstruction to navigable capacity, none of the undertakings specifically provided for in the second and third clauses of Section 10 could safely be undertaken without a special authorization of Congress. We do not think this was intended. The Supreme Court of Maine in *Maine Water Co.* v. *Knickerbocker Steam Towage Co.,* 99 Me. 473, took the same general view in construction of the same section. It held that the broad words of the first clause of that section were not intended to limit the second and third clauses and that Congress's purpose was a direct prohibition of what was forbidden by them except when affirmatively approved by the Chief of Engineers and the Secretary of War. We concur in this view.

The true intent of the Act of Congress was that unreasonable obstructions to navigation and navigable capacity were to be prohibited, and in the cases described in the second and third clauses of Section 10, the Secretary of War, acting on the recommendation of the Chief of Engineers, was authorized to determine what in the particular cases constituted an unreasonable obstruction.

This construction of Section 10 is sustained by the uniform practice of the War Department for nearly thirty years. Nothing is more convincing in interpretation of a doubtful or ambiguous statute. *United States* v. *Minnesota,* 270 U. S. 181, 205; *Swendig* v. *Washington Water Power Co.,* 265 U. S. 322, 331; *Kern River Co.* v. *United States,* 257 U. S. 147, 154; *United States* v. *Burlington & Missouri River R. R.,* 98 U. S. 334, 341; *United States* v. *Hammers,* 221 U. S. 220, 228; *Logan* v. *Davis,* 233 U. S. 613, 627.

The practice is shown by the opinion of the Acting Attorney General, transmitted to the Secretary of War, 34 Op. Atty. Gen. 410, 416. The Secretary of War acted on this view on May 8, 1899, about two months after the passage of the Act. This was followed by the permits subsequently granted down to March 3, 1925. The fact that the Secretary of War acted on this view was made known to Congress by many reports.

But it is said the construction thus favored would constitute it a delegation by Congress of legislative power and invalid. We do not think so. The determination of the amount that could be safely taken from the Lake is one that is shown by the evidence to be a peculiarly expert question. It is such a question as this that is naturally within the executive function that can be deputed by Congress. *Southern Pacific Co.* v. *Olympian Dredging Co.,* 260 U. S. 205, 208; *Sanitary District* v. *United States,* 226 U. S. 405, 428; *Field* v. *Clark,* 143 U. S. 649, 693; *Butterfield* v. *Stranahan,* 192 U. S. 470, 496; *Union Bridge Co.* v. *United States,* 204 U. S. 364, 386; *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177, 192; *Louisville Bridge Co.* v. *United States,* 242 U. S. 409, 424; *J. W. Hampton, Jr. & Co.* v. *United States,* 276 U. S. 394, 407.

The construction of Section 10 of the Act of March 3, 1899, was settled by this Court in the decision of the first Chicago Drainage Canal case in 266 U. S. 405, 429. The decision there reached and the decree entered can not be sustained, except on the theory that the Court decided first that Congress had exercised the power to prevent injury to the navigability of Lake Michigan and the other lakes and rivers in the Great Lakes watershed, and second that it could properly and validly confer the administrative function of passing on the issue of unlawful injury or otherwise on the Secretary of War, and that it had done so. To give any other interpretation would necessarily be at variance with our previous decision.

It is further argued by complainants that while the power of Congress extends to the protection and improvement of navigation, it does not extend to its destruction or to the creation of obstructions to navigable capacity. This Court has said that while Congress is the exercise of its power may adopt any means having some positive relation to the control of navigation and not otherwise inconsistent with the Constitution, *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53, 62, it may not arbitrarily destroy or impair the rights of riparian owners by legislation which has no real or substantial relation to the control of navigation or appropriateness to that end. *United States* v. *River Rouge Improvement Co.,* 269 U. S. 411, 419; *Port of Seattle* v. *Oregon & Washington R. R.,* 255 U. S. 56, 63.

So complainants urge that the diversion here is for purposes of sanitation and development of power only, and therefore that it lies outside the power confided by Congress to the Secretary of War. The Master says:

> "There is no doubt that the diversion is primarily for the purposes of sanitation. Whatever may be said as to the service of the diverted water in relation to a waterway to the Mississippi, or as to the possible benefit of its contribution to the navigation of that river at low water stages, it remains true that the disposition of Chicago's sewage has been the dominant factor in the promotion, maintenance and development of the enterprise by the State of Illinois and the Sanitary District. The purpose of utilizing the flow through the drainage canal to develop power is also undoubtedly present, although subordinated to the exigency of sanitation. So far as the diverted water is used for the development of power, the use is merely incidental. This Court, in *Sanitary District* v. *United States,* 266 U. S. 405, 424, in describing the channel, looked upon its interest to the Sanitary District 'primarily as a means to dispose of the sewage of Chicago,' although it was also 'an object of attention to the United States as opening water communication between the Great Lakes and the Mississippi and the Gulf.'"

The Master then considered whether there was any express authorization of the diversion now permitted, except under Sections 9 and 10 of the Act of March 3, 1899, already referred to. On this subject he said:

> "Consideration by Congress of the advisability of the proposed waterway from Lake Michigan to the Illinois and Mississippi Rivers, demands by Congress for surveys, plans and estimates, the establishment of project depths, and appropriations for specified purposes, did not in my opinion constitute direct authority for the diversion in question, however that diversion, or the diversion of some quantity of water from Lake Michigan, might fit into an ultimate plan."

This conclusion of the Master is fully supported by reference to the already cited Rivers and Harbors Appropriation Act of 1927 declaring that nothing therein should authorize any Lake Michigan diversion.

The Master also says that appropriations for widening and deepening the Chicago River, and the cooperation with the Sanitary District for several years in that improvement, merely committed Congress to the work as thus actually prescribed, but did not go further, whatever the advantages of that work in connection with the purposes of the Sanitary District's Canal.

He then proceeds:

"There is nothing in any of the acts of Congress upon which the defendants rely specifying any particular quantity of water which could be diverted and it could hardly be considered a reasonable contention that the acts of Congress justified any diversion of water from Lake Michigan that the State of Illinois and the Sanitary District might see fit to make. It is manifest that it was the view of the War Department that Congress had not acted directly and whatever the Department did was subject to such action as Congress might take."

He continues:

"This understanding that Congress has not yet acted directly so as to authorize the diversion in question has continued. It was in this view that the United States prosecuted its suit to decree in this Court to enjoin the defendants from taking more water from Lake Michigan than the Secretary of War had allowed."

In this conclusion, which the Court confirms, we are therefore remitted solely to the effect and operation of the permit of 1925 as authority for the maintenance of the diversion.

The normal power of the Secretary of War under Section 10 of the Act of March 3, 1899, is to maintain the navigable capacity of Lake Michigan and not to restrict it or destroy it by diversions. This is what the Secretaries of War and the Chiefs of Engineers were trying to do in the interval between 1896 and 1907 and 1913 when the applications for 10,000 cubic feet a second were denied by the successive Secretaries and in 1908 a suit was brought by the United States to enjoin a flow beyond 4,167 cubic feet a second. Then pending the suit the Sanitary District disobeyed the restriction of the Secretary of War's permit and increased the diversion to 8,500 cubic feet in order to dispose of the sewage of that District. Had an injunction then issued and been enforced, the Port of Chicago almost immediately would have become practically unusable because of the deposit of sewage without a sufficient flow of water through the Canal to dilute the sewage and carry it away. In the nature of things it was not practicable to stop the deposit without substituting some other means of disposal. This situation gave rise to an exigency which the

Secretary, in the interest of navigation and its protection, met by issuing a temporary permit intended to sanction for the time being a sufficient diversion to avoid interference with navigation in the Port of Chicago. See *New York* v. *New Jersey,* 256 U. S. 296, 307, 308. The elimination and prevention of this interference was the sole justification for expanding the prior permit, the limitations of which had been disregarded by the Drainage District. Merely to aid the District in disposing of its sewage was not a justification, considering the limited scope of the Secretary's authority. He could not make mere local sanitation a basis for a continuing diversion. Accordingly he made the permit of March 3, 1925, both temporary and conditional—temporary in that it was limited in duration and revocable at will, and conditional in that it was made to depend on the adoption and carrying out by the District of other plans for disposing of the sewage.

It will be perceived that the interference which was the basis of the Secretary's permit, and which the latter was intended to eliminate, resulted directly from the failure of the Drainage District to take care of its sewage in some way other than by promoting or continuing the existing diversion. It may be that some flow from the Lake is necessary to keep up navigation in the Chicago River, which really is part of the Port of Chicago, but that amount is negligible as compared with 8,500 second feet now being diverted. Hence, beyond that negligible quantity, the validity of the Secretary's permit derives its support entirely from a situation produced by the Sanitary District in violation of the complainants' rights; and but for that support complainants might properly press for an immediate shutting down by injunction of the diversion, save any small part needed to maintain navigation in the river. In these circumstances we think they are entitled to a decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end. But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction.

It is very apparent from the report of the Master and from the state legislation that the Legislature of Illinois and the Drainage District have for a long period been strongly insistent upon such a use of the waters of Lake Michigan as would dispose of the sewage of the District and incidentally furnish a navigable water route from Lake Michigan to the Mississippi basin; and that not until 1903 was the attention of the public, and especially of the District authorities, drawn to the fact that a diversion like that now used would lower the Lake levels with injurious consequences to the Great Lakes navigation and to the complainant States. The Secretary of War and the Chief of Engineers in 1907 refused a permit by which there would be more than 4,167 feet a second diverted. Advised that the District authorities proposed to ignore that limitation, the United States brought suit against the authorities of the District to enjoin any diversion in excess of that quantity, as fixed in an earlier permit. Another application for enlargement was made to Secretary of War Stimson in 1913 and was rejected. For several years, including the inexcusable delays made possible by the failure of the Federal Court in Chicago to render a decision in the suit brought by the United States, the District authorities have been maintaining the diversion of 8,500 cubic feet per second or more on the plea of preserving the health of the District. Putting this plea forward has tended materially to hamper and obstruct the remedy to which the complainants are entitled in vindication of their rights, riparian and other.

The intervening States on the same side with Illinois, in seeking a recognition of asserted rights in the navigation of the Mississippi, have answered denying the rights of the complainants to an injunction. They really seek affirmatively to preserve the diversion from Lake Michigan in the interest of such navigation and interstate commerce though they have made no express prayer therefor. In our view of the permit of March 3, 1925, and in the absence of direct authority from Congress for a waterway from Lake Michigan to the Mississippi, they show no rightful interest in the maintenance of the diversion. Their motions to dismiss the bills are overruled and so far as their answer may suggest affirmative relief, it is denied.

In increasing the division from 4,167 cubic feet a second to 8,500, the Drainage District defied the authority of the National Government resting in the Secretary of War. And in so far as the prior diversion was not for the purposes of maintaining navigation in the Chicago River it was without any legal basis, because made for an inadmissible purpose. It therefore is the duty of this Court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis and thus to restore the navigable capacity of Lake Michigan to its proper level. The Sanitary District authorities, relying on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore they can not now complain if an immediately heavy burden is placed upon the District because of their attitude and course. The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion.

Though the restoration of just rights to the complainants will be gradual instead of immediate it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project.

The Court expresses its obligation to the Master for his useful, fair, and comprehensive report.

To determine the practical measures needed to effect the object just stated and the period required for their completion there will be need for the examination of experts; and the appropriate provisions of the necessary decree will require careful consideration. For this reason, the case will be again referred to the Master for a further examination into the questions indicated. He will be authorized and directed to hear witnesses presented by each of the parties, and to call witnesses of his own selection, should he deem it necessary to do so, and then with all convenient speed to make report of his conclusions and of a form of decree.

It is so ordered.

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4-36

CORRECTED COPY

SUPREME COURT OF THE UNITED STATES.

Nos. 7, 11 and 12, Original.—October Term, 1929.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi and State of Arkansas, Intervening Defendants.

No. 7, Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

No. 11, Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

No. 12, Original.

[April 14, 1930.]

Mr. Justice Holmes delivered the opinion of the Court.

These suits, brought to prevent the State of Illinois and the Sanitary District of Chicago from continuing to withdraw water from Lake Michigan as they now are doing, have passed through their first stage in this Court. The facts were set forth in detail and the law governing the parties was established by the decision reported in 278 U. S. 367. It was decided that the defendant State and its creature the Sanitary District were reducing the level of the Great Lakes, were inflicting great losses upon the complainants and were violating their rights, by diverting from Lake Michigan 8,500 or more cubic feet per second into the Chicago Drainage Canal for the purpose of diluting and carrying away the sewage of Chicago. The diversion of the water for that purpose was held illegal, but the restoration of the just rights of the complainants was made gradual rather than immediate in order to avoid so far as might be the possible pestilence and ruin with which the defendants have done much to confront themselves. The case was referred a second time to the master to consider what measures would be necessary and what time required to effect the object to be attained. The master now has reported. Both sides have taken exceptions, but, as we shall endeavor to show, the issues open here are of no great scope.

The defendants have submitted their plans for the disposal of the sewage of Chicago in such a way as to diminish so far as possible the diversion of water from the Lake. In the main these plans are approved by the complainants. The master has given them a most thorough and conscientious examination. But they are material only as bearing on the amount of diminution to be required from time to time and the times to be fixed for each step, and therefore we shall not repeat the examination. It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defences upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State.

The defendants' exceptions deal with the extent to which the diversion of water should be reduced and to the time at which the reductions should take place. They argue that a recent rise in the level of Lake Michigan should be taken into account. This cannot be done. Apart from the speculation involved as to the duration of the rise, there is a wrong to be righted, and the delays allowed are allowed only for the purpose of limiting, within fair possibility, the requirements of immediate justice pressed by the complaining States. These requirements as between the parties are the constitutional right of those States, subject to whatever modification they hereafter may be subjected to by Congress acting within its authority. It will be time enough to consider the scope of that authority when it is exercised. In present conditions there is no invasion of it by the former decision of this Court, as urged by the defendants. The right of the complainants to a decree is not affected by the possibility that Congress may take some action in the matter. See *Southern Utilities Co.* v. *Palatka,* 268 U. S. 232, 233. *Kansas* v. *Colorado,* 206 U. S. 46, 117.

The master finds that, on and after July 1, 1930, the diversion of water from Lake Michigan should not be allowed to exceed an annual average of 6,500 cubic feet per second in addition to what is drawn for domestic uses. He finds that when the contemplated controlling works are constructed that are necessary for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan, works that will require the approval of the Secretary of War and that the master finds should be completed and put in operation within two years after the approval is given, and probably by December 31, 1935, the diversion should be limited to an annual average of 5,000 c. f. s. "in addition to domestic pumpage." On this point we deal only with the amount and the time. When the whole system for sewage treatment is complete and the controlling works installed he finds that the diversion should be cut down to an annual average of 1,500 c. f. s. in addition to domestic pumpage. This, he finds, should be accomplished on or before December 31, 1938; and the full operation of one of the contemplated works, the West Side Sewage Treatment Plant, which would permit a partial reduction of the diversion is to be not later than December 31, 1935. These recommendations are subject to the appointment of a commission to supervise the work, or, better in our opinion, to the filing with the clerk of this Court, at stated periods, by the Sanitary District, of reports as to the progress of the work, at the coming in of which either party may make application to the Court for such action as may seem to be suitable. All action of the parties and the Court in this case will be subject, of course, to any order that Congress may make in pursuance of its constitutional powers and any modification that necessity may show should be made by this Court. These recommendations we approve within the limits stated above, and they will be embodied in the decree. The defendants argue for delay at every point but we have indicated sufficiently why their arguments cannot prevail. The master was as liberal in the allowance of time as the evidence permitted him to be.

The exceptions of the complainants go mainly to a point not yet mentioned. The sewage of Chicago at present is discharged into a canal that extends to Lockport on the Des Plaines River, (which flows into the Illinois, which in its turn flows into the Mississippi,) from Wilmette on the north and a point on the Lake near the boundary line of Indiana on the south, with another intake midway between these two at the mouth of the Chicago River, which has been reversed from its former flow into Lake Michigan to a flow from the Lake. The change is narrated at length in the former decision of this case. 278 U. S. 367, 401, *et seq.* See also *Missouri* v. *Illinois,* 180 U. S. 208, 211, *et seq.* s. c. 200 U. S. 496. It is partially to oxidize and carry off this sewage that the main diversion of water is made. The complainants demand that this diversion cease, and the canal be closed at Lockport, with an incidental return of the Chicago River to its original course. They also argue that what is called the domestic pumpage after being purified in the sewage works be returned to the Lake. These demands seem to us excessive upon the facts in this case. The master reports that the best way of preventing the pollution of navigable waters is to permit an outflow from the Drainage Canal at Lockport, and that the interests of navigation in the Chicago River as a part of the port of Chicago will require the diversion of an annual average of from 1,000 c. f. s. to 1,500 c. f. s. in addition to domestic pumpage after the sewage treatment program has been carried out. The canal was opened at the beginning of the century, thirty years ago. In 1900 it already was a subject of litigation in this Court. The amount of water ultimately to be withdrawn unless Congress may prescribe a different measure is relatively small. We think that upon the principles stated in *Missouri* v. *Illinois,* 200 U. S. 496, 520, *et seq.,* the claims of the complainants should not be pressed to a logical extreme without regard to relative suffering and the time during which the complainants have let the defendants go on without complaint.

Perhaps the complainants would not be very insistent with regard to the 1,000 or 1,500 c. f. s. which earlier in this case they seemed to admit to be reasonable, if their demand were allowed that the domestic pumpage be purified and returned to the Lake—a demand not contemplated by their bill. But purification is not absolute. How nearly perfect it will be with the colossal works that the defendants have started is somewhat a matter of speculation. The master estimates that with efficient operation the proposed treatment should reach an average of 85 per cent purification and probably will be 90 per cent or more. Even so we are somewhat surprised that the complainants should desire the effluent returned. The withdrawal of water for domestic purposes is not assailed by the complainants and we are of opinion that the course recommended by the master is more reasonable than the opposite demand. If the amount withdrawn should be excessive, it will be open to complaint. Whether the right for domestic use extends to great industrial plants within the District has not been argued but may be open to consideration at some future time.

We see no reason why costs should not be paid by the defendants, who have made this suit necessary by persisting in unjustifiable acts. *North Dakota* v. *Minnesota,* 263 U. S. 583.

A decree will be entered to the effect that, subject to such modifications as may be ordered by the Court hereafter,

1. On and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or ~~of~~ watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 c. f. s. in addition to domestic pumpage.

2. That on and after December 31, 1935, unless good cause be shown to the contrary the said defendants are enjoined from diverting as above in excess of an annual average of 5,000 c. f. s. in addition to domestic pumpage.

3. That on and after December 31, 1938, the said defendants are enjoined from diverting as above in excess of the annual average of 1,500 c. f. s. in addition to domestic pumpage.

4. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for domestic water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area.

5. That the defendant the Sanitary District of Chicago shall file with the clerk of this Court semi-annually on July first and

January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and ~~effects of~~ the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy.

The Chief Justice took no part in the decision or consideration of these cases.

A true copy.

Test:

Clerk, Supreme Court, U. S.

2-3-4-58

4-36

SUPREME COURT OF THE UNITED STATES.

Nos. 7, 11 and 12, Original.—October Term, 1929.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
State of Illinois and Sanitary District of Chicago, Defendants.

State of Missouri, State of Kentucky, State of Tennessee, State of Louisiana, State of Mississippi, and State of Arkansas, Intervening Defendants.

No. 7, Original.

State of Michigan, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, et al., Defendants.

No. 11, Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, et al., Defendants.

No. 12, Original.

[April 21, 1930.]

ORDER.

The Court having considered the suggestions of the several parties does now, in view of its established practice, fix the compensation of Charles Evans Hughes, as Master upon the original and supplemental references in these cases, at thirty thousand dollars ($30,000), and in addition thereto allows his expenses actually incurred for printing, stenography, travel, and other items amounting to $2,775.90, all of the above to be taxed as costs in the causes.

The Chief Justice took no part in the consideration of the matters involved in this order.

A true copy.

Test:

Clerk, Supreme Court, U. S.

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4-36

SUPREME COURT OF THE UNITED STATES.

Nos. 7, 11 and 12, Original.—October Term, 1929.

State of Wisconsin, State of Minnesota, State of Ohio, and State of Pennsylvania, Complainants,
vs.
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No. 11, Original.

State of New York, Complainant,
vs.
State of Illinois and Sanitary District of Chicago, et al., Defendants.

No. 12, Original.

[April 21, 1930.]

DECREE.

These Causes came on to be heard upon the pleadings, evidence, and the exceptions filed by the parties to the Report of the Special Master, as well as on the exceptions filed to the Report of the Special Master on Re-reference, and were argued by counsel. The Court now being fully advised in the premises, and for the purpose of carrying into effect the conclusions set forth in the opinions of this Court announced January 14, 1929, (278 U. S. 367), and April 14, 1930,

It is now here Ordered, Adjudged, and Decreed as follows:

1. On and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and

agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 cubic feet per second in addition to domestic pumpage.

2. That on and after December 31, 1935, unless good cause be shown to the contrary, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 5,000 cubic feet per second in addition to domestic pumpage.

3. That on and after December 31, 1938, unless good cause be shown to the contrary, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage.

4. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for domestic water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area.

5. That the defendant the Sanitary District of Chicago shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation

1

of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy.

AND IT IS FURTHER ORDERED that the costs in these cases shall be taxable against the defendants.

A true copy.

Test:

Clerk, Supreme Court, U. S.

O.T. 1930 ORIGINAL NOS. 6, 10 & 11,

Office Supreme Court, U. S.
FILED
JUN 30 1930
CHARLES ELMORE CROPLEY
CLERK

FILE COPY

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No [redacted]
Or **6**

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

N [redacted]
Original. **10**

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. [redacted]
Ori **11**

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1930, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

IN THE

Supreme Court of the United States

Nos. 7, 11 and 12, Original.

October Term, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.
No. 7, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 11, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 12, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1930, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of Paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1930, as follows:

CONSTRUCTION PROGRAM.

The sewage treatment construction program proposed by the engineering witnesses for The Sanitary District of Chicago in the case of Wisconsin, *et al.* v. The Sanitary District of Chicago, *et al.*, as outlined in Defendants' Exhibits 1385, 1386 and 1387 (Record pages 9863, 9867 and 9882) was as follows:

DEFENDANTS' EXHIBIT 1385.

CONTRACTS COMPLETED DECEMBER 31, 1928.

Des Plaines River Project	$ 3,965,319.53	
Calumet Project	19,157,922.02	
North Side Project	33,487,522.54	
West Side Project	6,242,060.61	
Miscellaneous Plants and Sewers	502,598.06	$ 63,355,422.76

DEFENDANTS' EXHIBIT 1386.

WORKS UNDER CONTRACT DECEMBER 31, 1928.

Expenditures for portions completed:		
North Side Project	$ 1,313,988.89	
West Side Project	17,248,191.18	$ 18,562,180.07
TOTAL COST COMPLETED WORKS DECEMBER 31, 1928		$ 81,917,602.83
Balance required to complete contracts:		
North Side Project	$ 2,270,000.00	
West Side Project	9,203,683.00	$ 11,473,683.00

DEFENDANTS' EXHIBIT 1387.

FUTURE WORK, DECEMBER 31, 1928.

Des Plaines River Project	$ 4,255,000.00	
Calumet Project	20,492,000.00	
North Side Project	4,783,000.00	
West Side Project	61,819,000.00	
Southwest Side Project	70,817,000.00	
Miscellaneous Plants and Sewers	10,000,000.00	
Chicago River Controlling Works	4,000,000.00	$176,166,000.00
TOTAL ESTIMATED COST OF SEWAGE TREATMENT CONSTRUCTION AFTER DECEMBER 31, 1928		$187,639,683.00
GRAND TOTAL COMPLETED WORKS AND PROPOSED CONSTRUCTION		$269,557,285.83

The total amount of sewage treatment accomplished by The Sanitary District of Chicago up to December 31, 1928, as measured by expenditures (From Defendants' Exhibits 1385 and 1386) was as follows:

TABLE 1.

COMPLETED WORK UP TO DECEMBER 31, 1928.

Des Plaines River Project	$ 3,965,319.53	
Calumet Project	19,157,922.02	
North Side Project	34,801,511.43	
West Side Project	23,490,251.79	
Miscellaneous Plants and Sewers	502,598.00	$ 81,917,602.83

The total amount of construction of sewage treatment works proposed by The Sanitary District of Chicago after December 31, 1928, as measured by estimated expenditures (From Defendants' Exhibits 1386 and 1387) was as follows:

TABLE 2.

FUTURE WORK AFTER DECEMBER 31, 1928.

Des Plaines River Project	$ 4,255,000.00	
Calumet Project	20,492,000.00	
North Side Project	7,053,000.00	
West Side Project	71,022,683.00	
Southwest Side Project	70,817,000.00	
Miscellaneous Plants and Sewers	10,000,000.00	
Chicago River Controlling Works	4,000,000.00	$187,639,683.00

The work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December 31, 1928 to April 21, 1930 (the date of the decree of the Supreme Court of the United States) as measured by construction expenditures amounted to $7,895,244.42. This work made the status of the sewage treatment construction program, on the date of the order of the Court, as follows:

TABLE 3.

COMPLETED WORK AS OF APRIL 21, 1930.

Des Plaines River Project	$ 4,005,031.82	
Calumet Project	19,366,410.86	
North Side Project	35,825,822.85	
West Side Project	29,851,207.99	
Southwest Side Project	190,304.53	
Miscellaneous Plants and Sewers	520,655.38	
Chicago River Controlling Works	53,413.82	$ 89,812,847.25

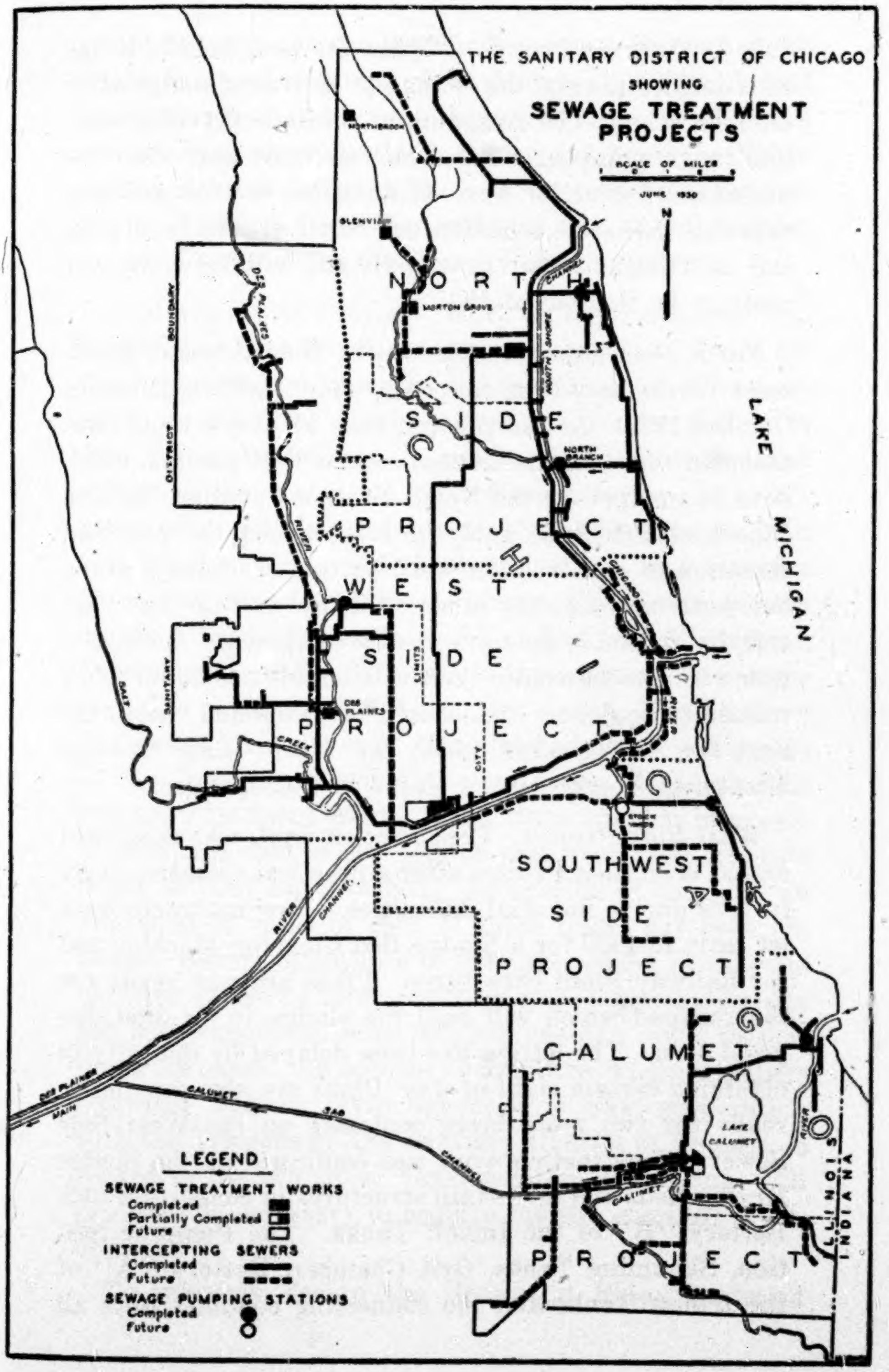
TABLE 4.

FUTURE WORK AFTER APRIL 21, 1930.

Des Plaines River Project	$ 4,215,287.71	
Calumet Project	20,283,511.16	
North Side Project	6,028,688.58	
West Side Project	64,661,726.80	
Southwest Side Project	70,626,695.47	
Miscellaneous Plants and Sewers	9,981,942.68	
Chicago River Controlling Works	3,946,586.18	$179,744,438.58

The construction work outlined in Table 4 includes all work which may be required to conform to the decree of the Supreme Court of April 21, 1930. In the interim of forty days between the date of the decree and June 1, 1930, the date for which construction summaries are made for this report, work was prosecuted diligently on the Calumet, the North Side, the West Side and the Southwest Side Projects and some small items were accomplished on the DesPlaines River Project and on Miscellaneous Plants and Sewers.

Calumet Project. The future work involved in this project includes the enlargement of the present sedimentation plant to provide for about twice the area originally contemplated, taking in the sewage of certain suburban towns to the south for which individual treatment plants had formerly been proposed. It also includes the extension of the whole plant to provide complete sewage treatment for the whole area. Additional land is required for the enlargement. An Ordinance laying out a proposed site, containing approximately 220 acres immediately south of the present Calumet Plant, was passed by the Board of Trustees of The Sanitary District of Chicago on December 26, 1929. Efforts to purchase this property by agreement having proved fruitless, a suit to acquire this site by condemnation was filed on May 22, 1930 and the case is set for hearing in the


THE SANITARY DISTRICT OF CHICAGO
SHOWING
SEWAGE TREATMENT PROJECTS
SCALE OF MILES
0
JUNE 1930
N
NORTHBROOK
GLENVIEW
MORTON GROVE
NORTH SIDE PROJECT
NORTH SHORE CHANNEL
NORTH BRANCH
CHICAGO
RIVER
DES PLAINES RIVER
DISTRICT BOUNDARY
SANITARY
SALT CREEK
WEST SIDE PROJECT
DES PLAINES
CITY LIMITS
STOCK YARDS
SOUTHWEST SIDE PROJECT
LAKE MICHIGAN
CALUMET PROJECT
LAKE CALUMET
CALUMET
ILLINOIS
INDIANA
DES PLAINES
MAIN
RIVER
CHANNEL
CALUMET
SAG
CHANNEL
LEGEND
SEWAGE TREATMENT WORKS
Completed
Partially Completed
Future
INTERCEPTING SEWERS
Completed
Future
SEWAGE PUMPING STATIONS
Completed
Future

July 1930 term of court. Within the past month, it has been decided to treat the sewage by activated sludge after sedimentation. The designing of the Imhoff tanks, aeration tanks, pumping station, blower house and other appurtenances is under way. If financing is arranged it is expected that some contracts can be advertised before the end of 1930 and that practically all will be ready for contract by the end of 1931.

North Side Project. The North Side Sewage Treatment Works have been operating under partial load since October 1928. At the present time all the sewage tributary to this plant is treated except that portion which is to be pumped by the North Branch Pumping Station. Financial difficulties early in 1929 caused the practical cessation of construction work on this pumping station, but work was actively resumed in the fall of that year and the station is now practically completed. A connection with the Lawrence Avenue Conduit and other work remain to be done. This should be completed within the next few weeks, after which the North Side Sewage Treatment Works will be placed in full operation.

West Side Project. Construction work was continued on the West Side Project after a practical cessation early in 1929 due to financial difficulties. New contracts were let early in 1930 for a Sludge Bed Cleaning Machine and for Railway Plant Structures. Plans are now ready for the railroad which will haul the sludge to its final disposal area. The letting has been delayed by difficulty in obtaining certain right-of-way. Plans are also practically ready for two more large contracts on the West Side Sewer. Construction work was continued on the Sludge Drying Beds and on certain structures in connection with Battery "B" of the Imhoff Tanks. The Pumping Station, Skimming Tanks, Grit Chamber, Battery "A" of the Imhoff Tanks and the connecting conduits were all completed and sewage was first pumped through these works for testing purposes on March 17, 1930. Actual operation of the plant was begun on June 2, 1930 and sewage from the Salt Creek Sewer and from the Fifty-second Avenue Sewer area is now treated in Battery "A". Within a few weeks sufficient sewage will be flowing to utilize most of the capacity of this battery.

Southwest Side Project. Work on the Southwest Side Project has been directed to the acquisition of a site for the sewage treatment works and to gain access to various plants in the Stock Yards so that an accurate and up to date determination can be made of the character and volume of these wastes. An Ordinance laying out a proposed site, containing approximately 570 acres of land between Lavergne and Austin Avenues and between Fifty-first Street and the Drainage Canal, was passed by the Board of Trustees of the Sanitary District on December 26, 1929. This site is the same as the one referred to in the case of Wisconsin, *et al.* v. The Sanitary District of Chicago, *et al.* It is located on the south side of the Drainage Canal almost opposite the West Side Sewage Treatment Works. Some of the land has been subdivided and sold in city lots so that over 2400 separate tracts of land are involved. An opinion of title and an appraisal of value of each of these tracts has been obtained. Severe opposition to the acquirement of this site has been raised by local objectors and an alternative site has been suggested, some five and one-half miles further down the canal. An advisory committee, whose members represent various civic agencies, is now cooperating with the Trustees of The Sanitary District of Chicago in regard to the two sites. Condemnation proceedings will probably be necessary to acquire the site specified in the ordinance.

To properly design the Southwest Side Treatment

Works, which are to treat the Stockyards and Packingtown wastes in addition to the domestic sewage in this area, it is essential that up-to-date accurate information be obtained of the character and volume of these trade wastes. Efforts to obtain access to the various packing plants in order to make the proper investigations having proved fruitless, the Board of Trustees of The Sanitary District of Chicago, on April 10, 1930, passed an Ordinance requiring all firms creating trade wastes emptying into the Drainage Canal to permit access to their plants and records so that such before mentioned investigations could be made. This Ordinance is in accordance with an amendment to the Sanitary District Act, passed in 1927, specifically giving the Sanitary District control over industrial wastes. Certain industries have refused to comply with the terms of this Ordinance and denied access to their plants. The Sanitary District of Chicago therefore, on April 30, 1930 filed an amended bill of complaint in the District Court of the United States, Northern District of Illinois, Eastern Division, supplementing a bill previously filed, seeking the enforcement of the above mentioned Ordinance. The time allowed these industries to answer this bill will expire on June 30, 1930. Meanwhile The Sanitary District of Chicago is proceeding with certain tests on the flow in the sewers leading from Packingtown and the Stock Yards in order to determine as accurately as possible under the circumstances the character and volume of most of these wastes.

Financial. The financial condition of The Sanitary District of Chicago is such that at the present time all funds for new construction work must be obtained from the sale of bonds. An amendment to the Sanitary District Act provided that after December 31, 1928 all bond issues for construction purposes should be submitted to a referendum of the voters of the District. The Illinois

General Assembly, by an amendment to the Sanitary District Act in 1929, authorized the issuing of $27,000,000 of bonds without referendum and at the present time $16,850,000 of this remains to be issued. Portions of two bond issues totaling $6,000,000 are being advertised for sale June 26, 1930 to cover the construction needs of the immediate future. The balance available will be required for construction work during the next twelve months. In order to carry out the sewage treatment construction program by the end of 1938 approximately $20,000,000 will be required each year. General elections in The Sanitary District of Chicago are held biennially. The defeat of a bond issue at any one election would seriously hamper the execution of this comprehensive program. The Trustees of The Sanitary District of Chicago, in an effort to avoid this contingency, passed a resolution May 15, 1930, requesting the Governor of Illinois to call a special session of the State Legislature to carefully consider the question of authorizing The Sanitary District of Chicago to issue, without a referendum, bonds for construction purposes to the amount of $20,000,000 per year for the next six years to enable it to carry out the program proposed to the Supreme Court. A special committee waited upon the Governor with this resolution and earnestly urged that he assist in obtaining this financial relief. The Governor refused to call a special session of the Legislature for this purpose.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from April 21, 1930 to June 1, 1930 (the date of the summaries for this report) as measured by construction expenditures was as follows:

TABLE 5.

Des Plaines River Project	$ 811.24	
Calumet Project	8,617.23	
North Side Project	64,009.90	
West Side Project	426,920.23	
Southwest Side Project	2,449.20	
Miscellaneous Plants and Sewers	404.82	
Chicago River Controlling Works	1.92	$ 503,214.54

By adding the various items indicated in Table 5 to corresponding items in Table 3 and substracting them from corresponding items in Table 4, the status of the sewage treatment construction program on June 1, 1930 is as follows:

TABLE 6.

COMPLETED WORK AS OF JUNE 1, 1930.

Des Plaines River Project	$ 4,005,843.06	
Calumet Project	19,375,028.09	
North Side Project	35,889,832.75	
West Side Project	30,278,128.22	
Southwest Side Project	192,753.73	
Miscellaneous Plants and Sewers	521,060.20	
Chicago River Controlling Works	53,415.74	$ 90,316,061.79

TABLE 7.

FUTURE WORK AFTER JUNE 1, 1930.

Des Plaines River Project	$ 4,214,476.47	
Calumet Project	20,274,893.93	
North Side Project	5,964,678.68	
West Side Project	64,234,806.57	
Southwest Side Project	70,624,246.27	
Miscellaneous Plants and Sewers	9,981,537.86	
Chicago River Controlling Works	3,946,584.26	$179,241,224.04

SEWAGE TREATMENT.

The estimated population of The Sanitary District of Chicago for the year 1930 is 3,710,000. The industrial wastes in the Sanitary District are estimated as equivalent to the sewage of 1,732,000 additional persons, hence the total population and industrial wastes equivalent amount to 5,442,000. This includes the Corn Products wastes, equivalent to the sewage of 432,000 persons which wastes have been greatly reduced as a result of certain experimental work initiated by the Sanitary District.

The sewage treatment construction accomplished, in compliance with the March 3, 1925 permit from the Secretary of War, up to December 31, 1929, as reported to the United States District Engineer at Chicago, amounted to the equivalent (100 per cent) sewage treatment of 1,442,000 persons. This included an equivalent of 361,000 for the reduction accomplished on the Corn Products wastes and further included credit (as was agreed upon by the War Department in 1925) for construction accomplished on projects partially completed but not in actual service. For instance, the North Side Project was 96 per cent completed but actually operating to only 40 per cent capacity and the West Side Sedimentation Project was 48 per cent completed but not in operation. The total sewage treatment, referred to a basis of 100 per cent treatment on December 31, 1929 was 366,000 based on actual population treated to which the addition of 361,000 for the work at the Corn Products Plant gives a total equal to the 100 per cent treatment of the sewage of 727,000.

The 1930 total population and industrial wastes equivalent as above indicated are estimated as 5,442,000. Up to date the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence so-called complete treatment for the total 1930 population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 4,625,700 which is 85 per cent of 5,442,000.

The expenditures for sewage treatment have been indicated in Tables 3, 5 and 6. The amounts of actual sewage treatment in operation on April 21, 1930 (the date of the decree of the Supreme Court) and at the present time are shown in Tables 8 and 9 following.

TABLE 8.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF APRIL 21, 1930.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Des Plaines	55,000	85	47,000
Calumet			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	167,000	33⅓	56,000
North Side	344,000	85	292,000
West Side	000	33⅓	000
Miscellaneous (Morton Grove, Glenview, Northbrook)	5,000	85	4,000
Corn Products (Reduction)	432,000		361,000
TOTAL	1,018,000		773,000

TABLE 9.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 24, 1930.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Des Plaines	55,000	85	47,000
Calumet			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	167,000	33⅓	56,000
North Side	681,000	85	580,000
West Side (Sedimentation)	248,000	33⅓	83,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	5,000	85	4,000
Corn Products (Reduction)	432,000		361,000
TOTAL	1,603,000		1,144,000

The figures for population used in the above tables are based on estimates made from the 1920 census. Official figures from the 1930 census are not yet available in sufficient detail for use.

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,144,000 persons out of 4,625,700 which would be the present possible 100 per cent treatment if the sewage of total population and industrial wastes equivalent of 5,442,000 was being treated. This indicates the treatment of 24.8 per cent of the total sewage within the Sanitary District. On April 21, 1930 the treatment was 16.7 per cent of the total.

This operation of the sewage treatment facilities to the extent of relieving the Drainage Canal of 24.8 per cent or about one-fourth of its load, having been put into effect just recently, sufficient time has not elapsed to observe the improvement in the quality of the water in the Drainage Canal or in the rivers below. The operation of the treatment plants as of April 21, 1930, relieving the canal of 16.7 per cent or about one-sixth of its load, was accompanied by a reduction in flow in the Drainage Canal of about the same percentage, hence it is not possible at the present time to show any marked improvement in conditions in the Drainage Canal and the rivers below. The Permit of March 3, 1925 authorized a diversion of 8500 c.f.s. plus domestic pumpage which brought the authorized flow as of 1929 to about 10,200 c.f.s. (actual flow for 1929 being 9450 c.f.s.). The Permit of December 31, 1929 authorized a total flow of only 8500 c.f.s., which is a reduction of some 16 per cent from the amount allowed under the previous permit.

DIVERSION OF WATER.

The average annual diversion of water from Lake Michigan by The Sanitary District of Chicago for the past five and one-half years is indicated in the table following:

Year	Total Flow From Main Channel at Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
1925..............	8278	0	1338	6940
1926..............	8283	15	1395	6873
1927..............	8450	5	1460	6985
1928..............	10010	45	1565	8400
1929..............	9450	70	1680	7700
1930.............. (Jan. to May, incl.)	8495	0	1665	6830

The average monthly diversion of water from Lake Michigan by The Sanitary District of Chicago since January 1, 1930 is indicated in the table following:

Year	Total Flow From Main Channel at Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
Jan. 1930	7745	0	1700	6045
Feb. 1930	7910	0	1685	6225
March 1930	8885	0	1640	7245
April 1930	9745	2	1650	8093
May 1930	8200	0	1650	6550
Average	8495	0	1665	6830

The diversion during the month of June 1930 is being made under the same conditions as the months of January to May, 1930, to comply with the provisions of the Permit of December 31, 1929. Some time is required to collect all the data required to compute the flow, consequently the figures for June cannot be reported at this time. After July 1, 1930 the diversion will be made in compliance with the decree of the Supreme Court, which limits the net diversion to 6500 c.f.s. up to December 31, 1935.

Respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

Howard W Elmore
Its President.

Attest:

Harry E Hoff
Clerk.

Edward J Kelly
Its Chief Engineer.

Its Attorney.

FILE COPY

Office Supreme Court, U. S.
FILED
JUL 1 1931
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~1,~~ 5
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~11,~~ 8
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~12,~~ 9
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1931, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO. 24 PRINTERS, CHICAGO

IN THE

Supreme Court of the United States

Nos. 7, 11 and 12, Original.

October Term, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSLVANIA, *Complainants,* *vs.* **STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,** *Defendants.* **STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,** *Intervening Defendants.*	**No. 7, Original.**
STATE OF MICHIGAN, *Complainant,* *vs.* **STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,** *Defendants.*	**No. 11, Original.**
STATE OF NEW YORK, *Complainant,* *vs.* **STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,** *Defendants.*	**No. 12, Original.**

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1931, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1931, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1931, the status of the sewage treatment construction program involved in this case was stated to be on December 1, 1930, as follows:

TABLE 1.

COMPLETED WORK AS OF DECEMBER 1, 1930.

Des Plaines River Project	$ 4,126,331.02	
Calumet Project	19,712,791.73	
North Side Project	36,678,541.07	
West Side Project	33,753,071.82	
Southwest Side Project	233,879.99	
Miscellaneous Plants and Sewers	594,193.47	
Chicago River Controlling Works	53,415.74	$ 95,152,224.84

TABLE 2.

FUTURE WORK AFTER DECEMBER 1, 1930.

Des Plaines River Project	$ 4,093,988.51	
Calumet Project	19,937,130.29	
North Side Project	5,175,970.36	
West Side Project	60,759,862.97	
Southwest Side Project	70,583,120.01	
Miscellaneous Plants and Sewers	9,908,404.59	
Chicago River Controlling Works	3,946,584.26	$174,405,060.99

During the interim of six months between the date of the last report and the present report, work was prosecuted diligently on the design of the Calumet and West Side Projects. Some work was done on the design of the extension to the North Side Treatment Works.

Des Plaines River Project—There has been no change in the status of the Des Plaines River Project since the time of the last report. The treatment plant is still being operated for the treatment of the sewage of approximately 25,000 people and for conducting experiments and tests on a working scale.

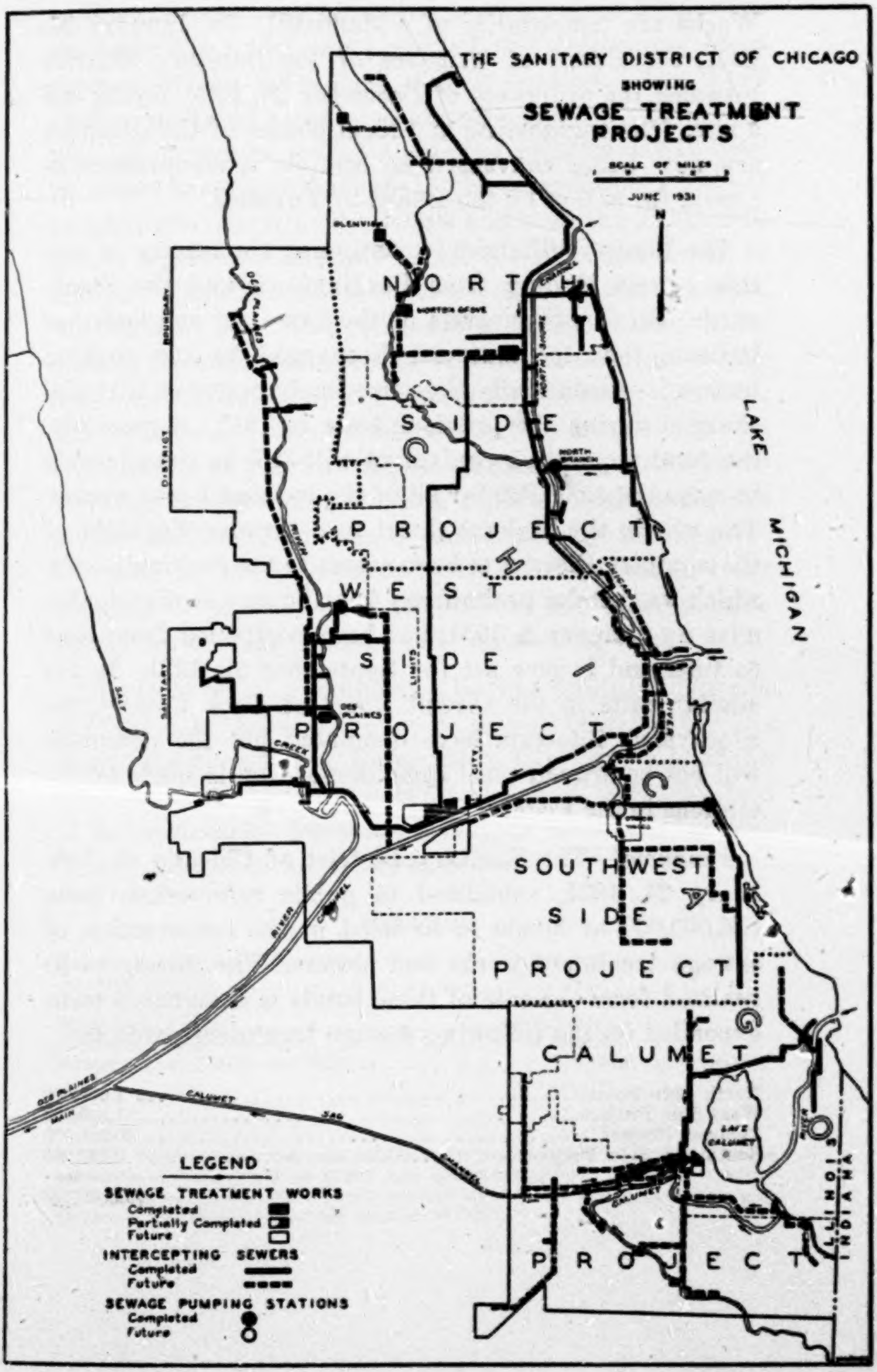
Calumet Project—As was stated in the last report, the suit for the condemnation of sufficient land for the site for the additions to the Calumet Sewage Treatment Works was set for trial in January, 1931. After various negotiations with the defendant property owners, the original ordinance for this site (passed by the Board of Trustees of the Sanitary District December 26, 1929) was amended on February 5, 1931. The original suit in the County Court was dismissed and a new petition filed in the Circuit Court of Cook County in March, 1931. The case came up for trial on June 22, 1931, and an agreement was reached which will result in the final acquisition of the site of approximately 225 acres on or before July 16, 1931.

Plans and specifications have been prepared for the Calumet pumping station and blower house and the work advertised for bids on June 25, 1931. Bids will be received on July 16, 1931, and the actual work started on or before August 1, 1931. Plans and specifications have been practically completed for the aeration and final settling tanks for this project and it is expected that bids will be taken on this contract on August 6, 1931. Contracts were let in May, 1931, for the main sewage pumps and return sludge pumps, for blowers, and for the necessary electrical equipment to operate this machinery.

North Side Project—The North Side Treatment Works have been in full operation since August, 1930. During the past six months some work was done on the design of additional preliminary settling tanks and final settling tanks, made necessary because of the unexpectedly rapid increase in population on the area of the North Side Project.

West Side Project—Construction work was continued on the West Side Treatment Works. The sludge disposal railroad was completed and placed in operation in May, 1931. A contract for the construction of a third battery of Imhoff tanks was awarded in February, 1931. Work was started in March, 1931, and good progress is now being made on the placing of concrete in this battery. A contract was awarded in March, 1931, for the construction of two large heated digestion tanks and two sludge storage tanks providing additional sludge storage and digestion capacity and so that experiments on a working scale could be conducted on separate sludge digestion. This plant is now about 90 per cent completed and operations are planned to start on July 20, 1931. The 25 additional standard gauge dump cars mentioned in the last report were completed and delivered in May, 1931. A contract was awarded for the construction of an additional sludge bed cleaning machine in February, 1931. This machine is now being erected and will be ready for operation by August 1, 1931. A contract for a short section of the Salt Creek sewer was awarded in March, 1931, and the work will be finished before September 1, 1931. The construction of the contract Section 3 of the West Side Sewer, has been continued, although the contractor was delayed for more than a month by a disastrous fire occurring April 14, 1931, which caused the loss of several lives. Plans and specifications for contract Section 4 of the West Side Sewer have been ready since March, 1931, but the letting of this work has been held up because of unacquired right of way. Progress is being made on the design of the sewer to intercept the sewage of the "Loop" District and it is expected that this contract will be ready for advertisement by September, 1931. Batteries A and B of the Imhoff tanks are now operating and treating the sewage of all the area west of Kedzie Avenue.

Southwest Side Project—Negotiations for the acquisition of a site for the Southwest Side Sewage Treatment


THE SANITARY DISTRICT OF CHICAGO
SHOWING
SEWAGE TREATMENT PROJECTS
SCALE OF MILES
JUNE 1931
N
NORTH SIDE PROJECT
WEST SIDE PROJECT
SOUTHWEST SIDE PROJECT
CALUMET PROJECT
LAKE MICHIGAN
ILLINOIS
INDIANA
GLENVIEW
NORTHBROOK
MORTON GROVE
NORTH BRANCH
DES PLAINES
DES PLAINES RIVER
SANITARY DISTRICT BOUNDARY
CITY LIMITS
SALT CREEK
CALUMET SAG CHANNEL
DES PLAINES RIVER
MAIN CHANNEL
LAKE CALUMET
CALUMET RIVER
LEGEND
SEWAGE TREATMENT WORKS
Completed
Partially Completed
Future
INTERCEPTING SEWERS
Completed
Future
SEWAGE PUMPING STATIONS
Completed
Future

Works are temporarily at a standstill. On January 26, 1931, the Board of Trustees of the Sanitary District repealed the ordinance of December 26, 1929, laying out a site. The engineering and legal phases of the situation are now being canvassed to compile a comprehensive report for action by the Board of Trustees.

The Sanitary District is continuing the testing of certain sewers leading from Packingtown and the Stockyards. So far, the results of the gaugings and analyses indicate that the material discharged by the packing houses is substantially the same in character as that discharged during the previous tests in 1917. Apparently, the total population equivalent will still be considerably in excess of 1,000,000 for all of the packing house wastes. The suit in the Federal Court to determine the right of the Sanitary District to have access to the packing plants, which was set for preliminary hearing on a motion to dismiss on January 8, 1931, has been postponed from time to time and is now set for September 21, 1931. In the similar suits in the Circuit Court of Cook County, the Stockyards interests have demurred but the demurrer will not be argued until some disposition is made of the motions in the Federal Court.

Financial—The Sanitary District of Chicago on February 24, 1931, submitted to public referendum some $36,000,000 of bonds to be used in the construction of sewage treatment works and sewers. The money to be realized from the sale of these bonds is designated to be expended on the following sewage treatment projects:

North Side Project	$ 1,600,000
West Side Project	11,000,000
Calumet Project	20,300,000
Southwest Side Project	3,100,000
	$36,000,000

These bonds were approved by the voters by a large majority but a tax payer started suit petitioning for a recount of the votes cast at this election. The Trial Judge appointed a commissioner to supervise the recount and 188 precincts out of a total of approximately 3400 precincts have been recounted. The commissioner has yet to make his report to the Judge and then the Judge will decide whether a recount of all the precincts is to be allowed. Since this would involve a delay of some months, the Sanitary District has caused to be introduced in the Illinois Legislature an Act to validate these bonds which had been approved by the voters on February 24, 1931. This bill passed the Illinois State Legislature in June, 1931, and is now before the Governor. Of the $9,455,000 of bonds mentioned in the last report as remaining out of the $27,000,000 of bonds authorized by the General assembly in 1929 to be issued without referendum, some $535,000 of bonds have been offered for sale to raise money for current contract and engineering work.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December 1, 1930 (the date of the summaries for the last report), and June 1, 1931 (the date of the summaries for this report), as measured by construction expenditures, was as follows:

TABLE 3.

Des Plaines River Project	$ 22,846.61	
Calumet Project	117,404.11	
North Side Project	109,131.75	
West Side Project	798,880.02	
Southwest Side Project	30,996.26	
Miscellaneous Plants and Sewers	110.78	$ 1,079,369.53*

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*This figure represents only **actual** construction work in the period. As a matter of fact, work on plans and specifications has progressed satisfactorily, and a very much larger amount of new work will be under construction during the latter six months of 1931.

By adding the various items indicated in Table 3 to corresponding items in Table 1 and subtracting them from corresponding items in Table 2, the status of the sewage treatment construction program on June 1, 1931, is as follows:

TABLE 4.

COMPLETED WORK AS OF JUNE 1, 1931.

Des Plaines River Project	$ 4,149,177.63	
Calumet Project	19,830,195.84	
North Side Project	36,787,672.82	
West Side Project	34,551,951.84	
Southwest Side Project	264,876.25	
Miscellaneous Plants and Sewers	594,304.25	
Chicago River Controlling Works	53,415.74	$ 96,231,594.37

TABLE 5.

FUTURE WORK AFTER JUNE 1, 1931.

Des Plaines River Project	$ 4,071,141.90	
Calumet Project	19,819,726.18	
North Side Project	5,066,838.61	
West Side Project	59,960,982.95	
Southwest Side Project	70,552,123.75	
Miscellaneous Plants and Sewers	9,908,293.81	
Chicago River Controlling Works	3,946,584.26	$173,325,691.46

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of July 1, 1931, is about 3,982,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed as equivalent to 1,708,000 additional persons. Hence the total population and industrial wastes equivalent amount to 5,690,000. This figure includes the Corn Products wastes, equivalent to the sewage of 393,000 persons, which wastes have been greatly reduced as a result of certain experimental work initiated by the Sanitary District.

The 1930 total population, and industrial waste equivalent, as above indicated, are estimated as 5,690,000. Up to date, the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence, so called complete treatment for the total July 1, 1931, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 4,836,000, which is 85 per cent of 5,690,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on December 25, 1930 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 25, 1930.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Des Plaines	25,000	85	21,000
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	195,000	33⅓	65,000
North Side	980,000	85	833,000
West Side (Sedimentation)	510,000	33⅓	170,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	6,000	85	5,000
Corn Products (Reduction)	422,000		366,000
Total	2,153,000		1,473,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1931.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Des Plaines	25,000	85	21,000
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	190,000	33⅓	63,000
North Side	1,023,000	85	870,000
West Side (Sedimentation)	521,000	33⅓	174,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	6,000	85	5,000
Corn Products (Reduction)	393,000		309,000
Total	2,173,000		1,455,000

The above Table 7 shows an increase in the sewage treatment in operation at the North Side and West Side Plants due to the increase in population since the time of the last report. The decrease in treatment shown for the Calumet Plant is due to a revision of the population estimates for that project. The decrease in the Corn Products Project since the time of the last report is due to the business depression which has caused a material reduction in the amount of corn ground at this plant, as well as to the fact that temporarily certain wastes have been discharged into the channel during the progress of experiments at the plant, made at the request of the Corn Products Company.

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,455,000 out of 4,836,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 5,690,000 was being treated. This indicates the treatment of 30 per cent of the total sewage within the Sanitary District. This is a percentage slightly smaller than was indicated in the last report to the Supreme Court and is due primarily to present temporary conditions at the Corn Products plant.

DIVERSION OF WATER.

As was stated in the last report to the Supreme Court, the net diversion of water from Lake Michigan from January 1 to July 1, 1930, averaged 6819 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1678 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8497 cubic feet per second.

Diversion of water from Lake Michigan by the Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limits the net diversion to an annual average of not more than 6500 cubic feet per second up to December 1, 1935. The average monthly diversion as made under this Permit from July 1 to December 31, 1930, is indicated in the table following:

Month 1930	Total Flow From Main Channel At Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
July	8195	0	1825	6370
August	10370	0	1815	8555
September	8915	0	1765	7150
October	7420	0	1680	5740
November	7160	0	1615	5545
December	7235	0	1615	5620
Average	8216	0	1719	6497

The average monthly diversion as made under the above mentioned Permit from January 1, 1931, to June

15, 1931, is indicated in the table following:

Month 1931	Total Flow From Main Channel At Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	8120	0	1605	6515
February	7655	0	1600	6055
March	7575	0	1605	5970
April	7565	0	1610	5955
May	7990	0	1640	6350
June 1 to 15	8390	0	1695	6695
Average Jan. 1-June 15	7840	0	1620	6220

Respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By THOMAS J. BOWLER,
Its President.

EDWARD J. KELLY,
Its Chief Engineer.

WILLIAM ROTHMANN,
Its Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

FILE COPY

Office Supreme Court, U.
FILED
JAN 2 1931
CHARLES ELMORE CROPL
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~7~~, 6
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~11~~, 10
Original.

STATE OF NEW YORK
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~12~~, 11
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1931, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

GUNTHORP-WARREN PRINTING COMPANY, CHICAGO.

IN THE

Supreme Court of the United States

Nos. 7, 11 and 12, Original.

October Term, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 7, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 11, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 12, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1931, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of Paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of January 1, 1931, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of July 1, 1930, the status of the sewage treatment construction program involved in this case was stated to be on June 1, 1930, as follows:

TABLE 1.

COMPLETED WORK AS OF JUNE 1, 1930.

Des Plaines River Project	$ 4,005,843.06	
Calumet Project	19,375,028.09	
North Side Project	35,889,832.75	
West Side Project	30,278,128.22	
Southwest Side Project	192,753.73	
Miscellaneous Plants and Sewers	521,060.20	
Chicago River Controlling Works	53,415.74	$ 90,316,061.79

TABLE 2.

FUTURE WORK AFTER JUNE 1, 1930.

Des Plaines River Project	$ 4,214,476.47	
Calumet Project	20,274,893.93	
North Side Project	5,964,678.68	
West Side Project	64,234,806.57	
Southwest Side Project	70,624,246.27	
Miscellaneous Plants and Sewers	9,981,537.86	
Chicago River Controlling Works	3,946,584.26	$179,241,224.04

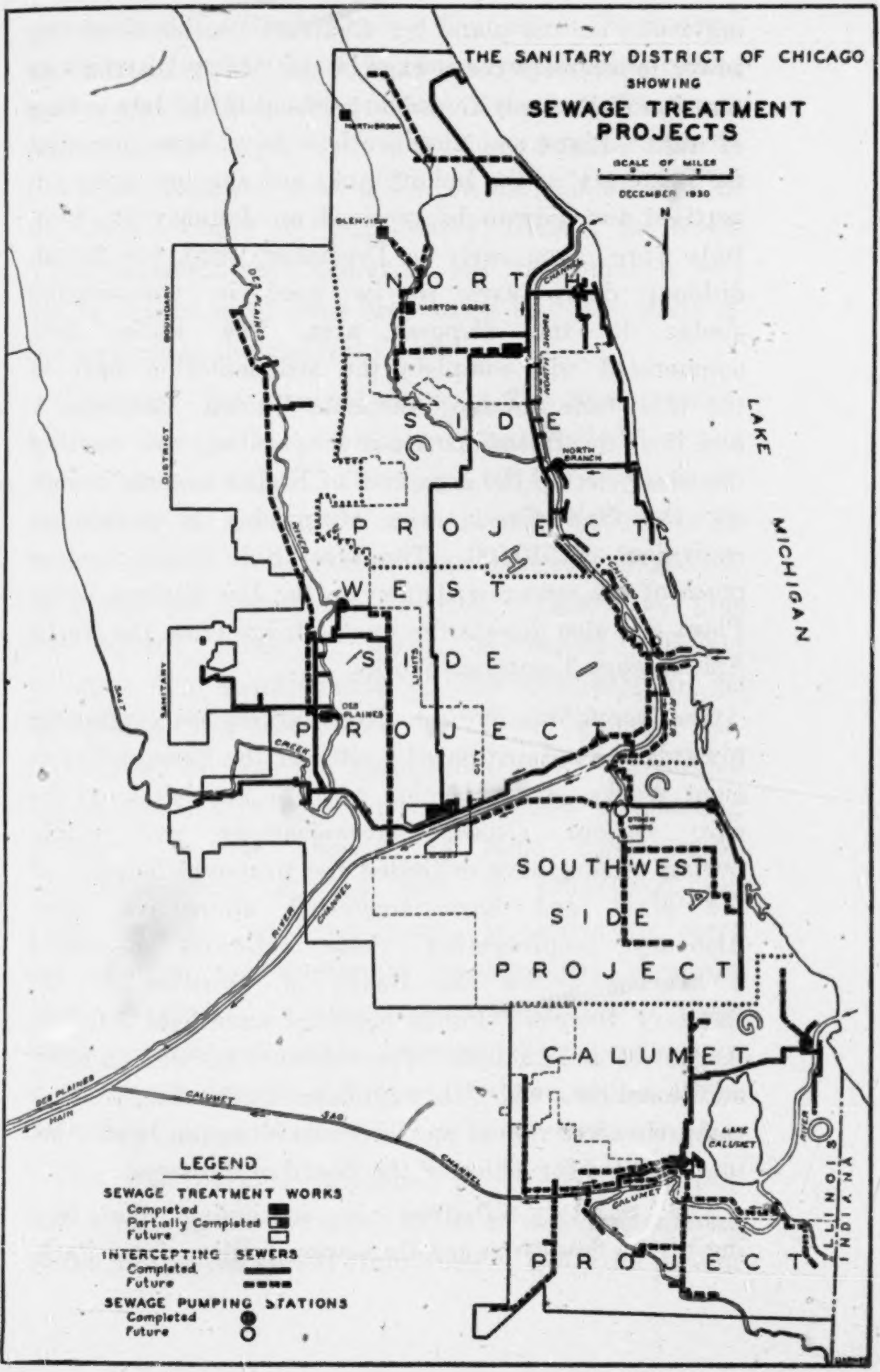
During the interim of six months between the date of the last report and the present report, work was prosecuted diligently on the Calumet, the North Side and the West Side Projects. Considerable preliminary work was done on the Southwest Side Project and some small items were accomplished on the Des Plaines River Project and on Miscellaneous Plants and Sewers.

Des Plaines River Project—The Des Plaines River Sewage Treatment Plant has been operating since August, 1922 and for some years past has been treating sewage to 100 per cent of its capacity. Instead of making additions to this plant to take care of the increasing population, it has been combined with the larger West Side Sewage Treatment Project in the interest of economy in operation. Much of the sewage tributary to the Des Plaines River Plant has been diverted to the sewers leading to the West Side Plant since Batteries A and B of the Imhoff tanks have been placed in operation at said West Side Plant. The Des Plaines River Plant is still being operated for the treatment of a portion of the sewage of approximately 25,000 people and for conducting experiments and tests on a working scale. During the past six months a section of the intercepting sewer, known as the Berkeley-Hillside sewer, has been constructed and placed in operation in connection with this project.

Calumet Project—As stated in the last report, a suit was filed to acquire sufficient land for the site for the additions to the Calumet Sewage Treatment Works. This case was set for trial in August, 1930, but the Defendant property owners objected to the Judge selected to hear the case. The case is now set for trial in the early part of January, 1931. Borings and test pits have been made on the site to determine soil conditions. Considerable progress has been made on the design of the sedimentation tanks, the pump and blower house, the preliminary settling tanks, grit chamber, screens, sludge disposal, etc. Specifications for the pumps, blowers and electrical equipment will be ready within a month and plans and specifications for the other work mentioned herein will be finished progressively during 1931. The letting of contracts on this project is dependent upon financing, authority for which is now being arranged.

North Side Project--At the time of the last report, the North Side Sewage Treatment Works were in operation, treating all the sewage from the North Side area except that from the area served by the North Branch Pumping Station. This Pumping Station was completed and placed in operation before the end of August, 1930. At that time the North Side Works were operating under full load. The preliminary figures of the 1930 census indicate that due to the growth and shift of population a much greater population is tributary to this plant at the present time than had been anticipated. The estimated population equivalent for the North Side Treatment Works was 830,000 for 1930. The actual population figure is approximately 980,000. This increase of 150,000 in the population above the estimate will require immediate construction of certain additions to the plant which otherwise would have been postponed for several years. Additional preliminary settling tanks and final settling tanks are now being designed.

West Side Project—Construction work was continued on the West Side Sewage Treatment Works, the first unit of which was placed in operation on June 2, 1930. Battery B was completed and placed in operation in the early part of July, 1930. Twenty-seven acres of sludge drying beds were completed and a part used. The sludge bed cleaning machine was completed and tested. The contract for Railway Plant Structures was completed and the contract for the Sludge Disposal Railroad was let and is now about 50 per cent completed. Two minor contracts for Roadways and for Grading for Additional Sludge Beds were let and completed. Contract Section 2 of the West Side Intercepting Sewer was completed. A contract for Section 3 (about two miles) of the West Side Intercepting Sewer was let late in November, 1930. The next Section of this sewer (Contract Section 4) will be advertised for bids early in 1931. Progress is be-


THE SANITARY DISTRICT OF CHICAGO
SHOWING
SEWAGE TREATMENT PROJECTS
SCALE OF MILES
DECEMBER 1930
N
NORTH SIDE PROJECT
WEST SIDE PROJECT
SOUTHWEST SIDE PROJECT
CALUMET PROJECT
LAKE MICHIGAN
NORTHBROOK
GLENVIEW
NORTON GROVE
NORTH SHORE CHANNEL
NORTH BRANCH
CHICAGO RIVER
DES PLAINES RIVER
DES PLAINES
SALT CREEK
DISTRICT BOUNDARY
SANITARY DISTRICT
CITY LIMITS
STOCK YARDS
DES PLAINES RIVER MAIN CHANNEL
CALUMET SAG CHANNEL
CALUMET RIVER
LAKE CALUMET
ILLINOIS
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I
LEGEND
SEWAGE TREATMENT WORKS
Completed
Partially Completed
Future
INTERCEPTING SEWERS
Completed
Future
SEWAGE PUMPING STATIONS
Completed
Future

ing made on the plans for Contract Section 6 of this sewer to intercept the sewage of the "Loop District" so that it will be ready for advertisement in the late spring of 1931. Plans and specifications have been prepared for Battery C of the Imhoff tanks and are now being advertised for bids to be received on January 22, 1931. Bids were taken early in December, 1930, for 25 additional dump cars to be used in transporting sludge to the disposal area. The works here enumerated will complete the sedimentation part of the West Side Sewage Treatment Works. Batteries A and B of the Imhoff tanks, now operating, are treating the sewage of all the area west of Kedzie avenue, including the Salt Creek area comprising a population equivalent of 510,000. The West Side Plant receives much of the sewage tributary to the Des Plaines River Plant and also digests the waste sludge from the North Side Sewage Treatment Works.

Southwest Side Project—Negotiations are continuing towards the acquisition of a site for the Sewage Treatment Works. In connection with the acquisition of the site, various citizens, organizations and neighboring owners have criticized the proposed location of the plant and have suggested alternative sites. Attorneys representing these interests requested a hearing before the Board of Trustees of the Sanitary District. Public hearings were held July 31, August 21 and 22, 1930. The objectors insisted on filing additional data which they produced in October, 1930. A comprehensive report on the whole situation is now being compiled for action of the Board of Trustees.

The Sanitary District is continuing the testing of the flow from certain sewers leading from Packingtown and the Stock Yards. The suit in the Federal Court to determine the right of the Sanitary District to have access to the packing plants is set for preliminary hearing on January 8, 1931, in the United States District Court, on a motion to dismiss. In the similar suits in the Circuit Court of Cook County, Illinois, the Stock Yards interests have demurred but the demurrer will not be argued until some disposition has been made of the motions in the Federal Court.

Financial—The financial status of The Sanitary District of Chicago has not changed materially since the time of the last report. Of the $27,000,000 of bonds authorized by the Illinois General Assembly in 1929 to be issued without referendum, approximately $9,455,000 of bonds yet remain to be sold. This sum, plus the current funds on hand, is barely sufficient to meet the requirements of the contracts to be let within the next two or three months. Efforts failed to have the Special Session of the Illinois Legislature in 1930 consider the emergency of granting authority to the District to issue bonds without referendum, at the rate of $20,000,000 per year, for the next two years, in order to carry out the sewage treatment construction program. It is now planned to submit about $40,000,000 of these bonds to public referendum as required by statute at an election to be held in February, 1931, or appeal to the State Legislature which will then be in regular session.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from June 1, 1930 (the date of the summaries for the last report) and December 1, 1930 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Des Plaines River Project	$ 120,487.96	
Calumet Project	3[illegible],763.64	
North Side Project	788,708.32	
West Side Project	3,474,943.60	
Southwest Side Project	41,126.26	
Miscellaneous Plants and Sewers	73,133.27	$4,836,163.05

By adding the various items indicated in Table 3 to corresponding items in Table 1 and subtracting them from corresponding items in Table 2, the status of the sewage treatment construction program on December 1, 1930, is as follows:

TABLE 4.

COMPLETED WORK AS OF DECEMBER 1, 1930.

Des Plaines River Project	$ 4,126,331.02	
Calumet Project	19,712,791.73	
North Side Project	36,678,541.07	
West Side Project	33,753,071.82	
Southwest Side Project	233,879.99	
Miscellaneous Plants and Sewers	594,193.47	
Chicago River Controlling Works	53,415.74	$ 95,152,224.84

TABLE 5.

FUTURE WORK AFTER DECEMBER 1, 1930.

Des Plaines River Project	$ 4,093,988.51	
Calumet Project	19,937,130.29	
North Side Project	5,175,970.36	
West Side Project	60,759,862.97	
Southwest Side Project	70,583,120.01	
Miscellaneous Plants and Sewers	9,908,404.59	
Chicago River Controlling Works	3,946,584.26	$174,405,060.99

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, for the year 1930, is about 3,880,000, according to preliminary figures available from the 1930 census. This exceeds by 170,000 the population previously estimated for 1930. The industrial wastes in the Sanitary District are estimated as equivalent to the sewage of 1,722,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 5,602,000. This figure includes the Corn Products wastes, equivalent to the sewage of 422,000 persons, which wastes have been greatly reduced as a result of certain experimental work initiated by the Sanitary District.

The increase in population of about 170,000 over the previous estimates based on 1920 census figures, has apparently all taken place in the outskirts of Chicago and in the outlying communities. The central portion of Chicago lost in population in the last decade due to the expansion of the business district. The growth in population has been greater than was estimated and likewise the outward shift has been greater. As a result, the North Side Sewage Treatment Plant, which serves an area largely residential, is now treating about 20 per cent more sewage than had been estimated for 1930. The West Side Plant will also be required to handle more sewage than had been originally planned for the first few years.

Official figures of the 1930 census and its detail are not yet available. The table showing the amount of sewage treatment in operation at the present time is based on such figures for the 1930 census as have been published in the local press. The table showing the amount of sewage treatment in operation at the time of the last report (June 24, 1930) was based on estimates made from the 1920 census figures.

The 1930 total population and industrial wastes equivalent as above indicated are estimated as 5,602,000. Up to date the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence so-called complete treatment for the total 1930 population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 4,762,000 which is 85 per cent of 5,602,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on June 24, 1930 (as of the time of the last report to the Supreme Court) and at the present time, are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 24, 1930.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Des Plaines	55,000	85	47,000
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	167,000	33⅓	56,000
North Side	681,000	85	580 000
West Side (Sedimentation)	248,000	33⅓	83,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	5,000	85	4,000
Corn Products (Reduction)	432,000		361,000
Total	1,603,000		1,144,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 25, 1930.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Des Plaines	25,000	85	21,000
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	195,000	33⅓	65,000
North Side	980,000	85	833,000
West Side (Sedimentation)	510,000	33⅓	170,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	6,000	85	5,000
Corn Products (Reduction)	422,000		366,000
Total	2,153,000		1,473,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,473,000 persons out of 4,762,000, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 5,602,000 was being treated. This indicates the treatment of 32 per cent of the total sewage within the Sanitary District. On April 21, 1930 (the date of the Decree of the Supreme Court) the treatment was 16.7 per cent of the total and on June 24, 1930 (as of the time of the last report to the Supreme Court) the treatment was 24.8 per cent of the total.

The operation of the sewage treatment facilities to the extent of relieving the Drainage Canal of 32 per cent, or almost one-third of its load, has not been in effect for sufficient time to observe the improvement in the quality of the water in the Drainage Canal or in the rivers below. The severe and unprecedented drought conditions which have prevailed throughout the Illinois River valley during the past summer and fall have tended to offset whatever improvement has been made by the reduction in the amount of sewage which has been discharged from the Drainage Canal. Under normal conditions next season, the effect will be observed and studied.

DIVERSION OF WATER.

Diversion of water from Lake Michigan by The Sanitary District of Chicago for the five years, 1925-1929, was made in accordance with a Permit from the Secretary of War, dated March 3, 1925, which authorized a net diversion from the Lake of not to exceed 8,500 cubic feet per second, annual average. The annual average diversion as made under this Permit is indicated in the table following:

Year	Total Flow From Main Channel at Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
1925..............	8278	0	1338	6940
1926..............	8283	15	1395	6873
1927..............	8450	5	1460	6985
1928..............	10010	45	1565	8400
1929..............	9450	70	1680	7700
Average 1925-1929.........	8894	27	1488	7379

Diversion of water from Lake Michigan by The Sanitary District of Chicago for the first six months of 1930 was made in accordance with a Permit from the Secretary of War, dated December 31, 1929, which authorized the diversion of water in such an amount that the total flow in the Drainage Canal at Lockport would not exceed an annual average of 8,500 cubic feet per second. The average monthly diversion, as made under this Permit from January 1 to June 30, 1930, is indicated in the table following:

Month 1930	Total Flow From Main Channel at Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	7745	0	1700	6045
February	7910	0	1685	6225
March	8885	0	1640	7245
April	9745	2	1650	8093
May	8200	0	1650	6550
June	8500	0	1745	6755
Average	8497	0	1678	6819

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930 has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limits the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935. The average monthly diversion as made under this Permit from July 1 to date, is indicated in the table following:

Month 1930	Total Flow From Main Channel at Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
July	8195	0	1825	6370
August	10370	0	1815	8555
September	8915	0	1765	7150
October	7420	0	1680	5740
November	7160	0	1615	5545
December 1 to 25..	6845	0	1615	5230
Average	8196	0	1723	6473

The diversion was very materially increased from August 14 to September 18, 1930, in conformity with the known wishes of the War Department, to assist in alleviating abnormally low water conditions in the Illinois and Mississippi Rivers caused by the unprecedented drought. After September 18th it was found possible to temporarily reduce the diversion to a figure lower than 6,500 cubic feet per second so that the annual average did not exceed the permitted 6,500 cubic feet per second.

Respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By THOMAS J. BOWLER,
Its President.

EDWARD J. KELLY,
Its Chief Engineer.

WILLIAM ROTHMANN,
Its Attorney.

Attest:

HARRY E. HOFF,
Clerk.

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JUL 2 1932
~~CHARLES ELMORE~~ CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~7,~~ 5
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~11,~~ 8
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~10,~~ 9
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1932, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO., 24 PRINTERS, CHICAGO.

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IN THE

Supreme Court of the United States

Nos. 7, 11 and 12, Original.

October Term, 1929.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
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STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 12, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1932, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1932, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1932, the status of the sewage treatment construction program involved in this case was stated to be on December 1, 1931, as follows:

TABLE 1.

COMPLETED WORK AS OF DECEMBER 1, 1931.

Calumet Project	$20,764,788.56	
North Side Project	36,881,252.58	
West Side Project (including Des Plaines)	41,272,214.50	
Southwest Side Project	271,291.57	
Miscellaneous Plants and Sewers	595,978.63	
Chicago River Controlling Works	53,415.74	$ 99,833,941.58

TABLE 2.

FUTURE WORK AFTER DECEMBER 1, 1931.

Calumet Project	$18,885,133.46	
North Side Project	4,973,258.85	
West Side Project (including Des Plaines)	61,461,039.82	
Southwest Side Project	70,545,708.43	
Miscellaneous Plants and Sewers	9,906,619.43	
Chicago River Controlling Works	3,946,584.26	$169,718,344.25

During the interim of six months between the date of the last report and the present report, very little construction has been accomplished. Work has been prosecuted diligently with a greatly reduced force (36 per cent of the organization as it was six months ago) on design of the Calumet and West Side Projects and on studies for the Southwest Side Project.

Calumet Project. Construction work on the Calumet Pumping Station and Blower House and on the Aeration Tanks, Operating Galleries and Final Settling Tanks has been discontinued since December, 1931, because of the inability of the Sanitary District to pay the contractors, as was indicated in the last report. Preliminary designs have been made for some of the Calumet Sewers and a comprehensive study and report has been made on the digestion and disposal of sludge for the whole Calumet Project, in which comparative estimates were made between Imhoff Tanks, Sedimentation with Separate Sludge Digestion and Sedimentation with Dewatering and Incineration of the sludge without digestion.

West Side Project. Construction work on the third battery of Imhoff Tanks and on Contract Sections Three and Four of the West Side Sewer has also been discontinued since December, 1931. Plans have been completed for Contract Sections Five and Six of the West Side Sewer but no money is presently available for this construction. A contract was awarded March 24, 1932, for the construction of a Sludge Filtering and Drying Unit at the West Side Works, the financing of which was made possible by the use of tax anticipation warrants. This unit will be completed during July, 1932, and used for the dewatering and incineration of sludge. The results obtained will be helpful in the design of future projects.

Southwest Side Project. There have been no further developments toward the acquisition of the site originally contemplated for the Southwest Side Treatment Works. Preliminary layouts have been made which indicate that these works might be constructed on a portion of the land acquired for the extension of the West Side Works, if dewatering and incineration of sludge proves practicable.

The suit in the Federal District Court to determine the right of the Sanitary District to have access to the packing plants in the Stock Yards district was finally argued on March 18, 1932, on a motion to dismiss. The motion was overruled and the case was referred to a Master in Chancery to take testimony.

Financial. As stated in the last report, a crisis had been reached in the financial affairs of the Sanitary District in December, 1931. In the six months which have intervened since that time, conditions, instead of improving, have steadily grown worse. The Sanitary District has unsold bonds to the amount of $7,614,000 out of the $27,000,000 of bonds authorized by the Illinois General Assembly in 1929, in addition to $36,000,000 of bonds approved by the voters in February, 1931, but these resources for construction, amounting to approximately $43,000,000, are of no avail under present depression conditions, since no reasonable offer from any source can be obtained for the purchase of bonds.

The tax situation in Cook County, Illinois, has not improved since the time of the last report. Approximately 16 per cent of the 1928 taxes are still unpaid, approximately 30 per cent of the 1929 taxes are uncollected and only 50 per cent of the 1930 taxes have been paid to date. Delinquent taxes in Cook County amount to about $220,000,000 which is not much less than a whole year's tax levy. The 1931 taxes, which under ordinary conditions would have been collected by May 1, 1932, have not yet been extended for collection, so the statement can be made fairly that the municipalities in Cook County are now behind in their revenues an amount equivalent to their income for approximately two years. Few privately owned business organizations could survive under such circumstances.

As stated in the last report the Governor of the State of Illinois at the instance of numerous civic organizations and special committees appointed by industrial enterprises and officials of various municipalities, in November, 1931, called the members of the Legislature in special session to act on certain measures to remedy the financial situation confronting the State, its municipalities and various taxing districts therein. In January, 1932, and again in February, 1932, the Governor called the members of the Legislature in special session to consider similar measures, and all three sessions adjourned sine die on May 6, 1932. The full results which were anticipated to materialize from the passage of certain remedial acts have not been realized and the financial status of the State, its municipalities and taxing districts has remained substantially the same.

The Sanitary District has not been able to pay current bills or to make any payments to its contractors for construction work, since November 1, 1931, except in a few cases where the payee succeeded in finding purchasers of tax anticipation warrants the proceeds of which were used in making payments. In the necessary efforts to retrench, the personnel of the Engineering organization which has to do with the Sewage Treatment Construction Program was reduced 64 per cent between December, 1931 and June, 1932. The organization is not broken up, as yet, and can be expanded when the necessary funds become available. Salaries of the force which remains have been reduced since January 1, 1932, and have been unpaid since April 1, 1932.

The Sanitary District has been forced, through lack of normal incoming revenue from taxes, to default in payments of principal and interest on bonds used for construction work in the following amounts:

January 1, 1932	$1,519,965.00
February 1, 1932	469,037.50
March 1, 1932	331,440.00
April 1, 1932	1,090,625.00
April 25, 1932	168,000.00
May 1, 1932	996,312.50
June 1, 1932	582,375.00
Total in default June 15, 1932	$5,157,755.00

A further default in payment of principal and interest on bonds due July 1, 1932 in the amount of $2,438,300 is expected, after which date the total amount in default will be $7,596,055. It is obvious that under such conditions very little progress can be made on the Sewage Treatment Construction Program and adequate progress cannot be expected until there is a return to more nearly normal business conditions throughout the country, unless financial aid can be arranged through some body more authoritative than any local organization, such as the United States Congress. An effort has been made to obtain funds from the Reconstruction Finance Corporation, by pledging as security bonds, already authorized to be issued. Up to the present time, this and all other efforts to provide finances for this construction, made necessary by the order of the Supreme Court, have been unsuccessful.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December 1, 1931 (the date of the summaries for the last report), and June 1, 1932 (the date of the summaries for this report), as measured by construction expenditures, was as follows:

TABLE 3.

Calumet Project	$ 63,898.74	
North Side Project	9,181.36	
West Side Project	206,353.80	
Southwest Side Project	1,304.44	$280.738.34

By adding the various items indicated in Table 3 to corresponding items in Table 1 and subtracting them from corresponding items in Table 2, the status of the sewage treatment construction program on June 1, 1932, is as follows:

TABLE 4.

COMPLETED WORK AS OF JUNE 1, 1932.

Calumet Project	$20,828,687.30	
North Side Project	36,890,433.94	
West Side Project	41,478,568.30	
Southwest Side Project	272,596.01	
Miscellaneous Plants and Sewers	595,978.63	
Chicago River Controlling Works	53,415.74	$100,119,679.92

TABLE 5.

FUTURE WORK AFTER JUNE 1, 1932.

Calumet Project	$18,821,234.72	
North Side Project	4,964,077.49	
West Side Project	61,254,686.02	
Southwest Side Project	70,544,403.99	
Miscellaneous Plants and Sewers	9,906,619.43	
Chicago River Controlling Works	3,946,584.26	$169,437,605.91

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of July 1, 1932, is about 4,084,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed as equivalent to 1,723,000 additional persons. Hence the total population and industrial wastes equivalent amount to 5,807,000. This figure includes the Corn Products wastes, equivalent to the sewage of 393,000 persons, which wastes have been greatly reduced as a result of certain experimental work initiated by the Sanitary District.

The 1932 total population, and industrial waste equivalent, as above indicated, are estimated as 5,807,000. Up to date, the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence, so called complete treatment for the total July 1, 1932, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 4,936,000, which is 85 per cent of 5,807,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on December 25, 1931 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 25, 1931.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	198,000	33⅓	66,000
North Side	1,049,000	85	895,000
West Side (Sedimentation)..	729,000	33⅓	243,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	6,000	85	5,000
Corn Products (Reduction)..	373,000		301,000
Total..............	2,370,000		1,523,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1932.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	202,000	33⅓	67,000
North Side	1,076,000	85	915,000
West Side (Sedimentation)..	736,000	33⅓	245,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	6,000	85	5,000
Corn Products (Reduction)..	393,000		317,000
Total..............	2,428,000		1,562,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,562,000 out of 4,936,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 5,807,000 was being treated. This indicates the treatment of 31.6 per cent of the total sewage within the Sanitary District.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan during the calendar year 1931 averaged 6500 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1680 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8180 cubic feet per second.

The average monthly diversion of water from Lake Michigan from January 1 to June 20, 1932, is indicated in the table following:

Month 1932	Total Flow From Main Channel at Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	8005	2	1595	6410
February	7420	0	1610	5810
March	7155	25	1585	5545
April	7800	1	1575	6225
May	8190	0	1620	6570
June 1 to 20.....	8265	0	1690	6575
Average	7805	5	1610	6190

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By THOMAS J. BOWLER,
Its President.

EDWARD J. KELLY,
Its Chief Engineer.

WILLIAM ROTHMANN,
Its Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

FILE COPY

Office Supreme Court, U. S.
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SEP 22 1932
CHARLES ELMORE CROPLEY
CLERK

IN THE SUPREME COURT
# of the
UNITED STATES

OCTOBER TERM, 1926

No. [illegible], Original [illegible] 6

In Equity

STATE OF MICHIGAN,
Plaintiff,
vs.
STATE OF WISCONSIN,
Defendant.

ANSWER IN OPPOSITION TO MOTION TO MODIFY DECREE and BRIEF IN SUPPORT OF SAID ANSWER

PAUL W. VOORHIES,
Attorney General.

EDWARD A. BILITZKE,
Assistant Attorney General,
For the State of Michigan.

FRANKLIN DEKLEINE CO., PRINTERS AND BINDERS, LANSING

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IN THE SUPREME COURT OF THE UNITED STATES

October Term, 1926

Number 9, Original

In Equity

STATE OF MICHIGAN,
Plaintiff,
vs.
STATE OF WISCONSIN,
Defendant.

ANSWER IN OPPOSITION TO MOTION TO MODIFY DECREE

ANSWER OF THE STATE OF MICHIGAN IN OPPOSITION TO THE MOTION OF THE STATE OF WISCONSIN FOR MODIFICATION OF THE DECREE ENTERED IN THE ABOVE CASE ON NOVEMBER 22, 1926, SO FAR AS SAID DECREE RELATES TO THE GREEN BAY SECTION.

Now comes the State of Michigan, by Paul W. Voorhies, Attorney General, for answer to the motion for modification of the decree made by the State of Wisconsin, appearing specially for the purpose of this answer, and states that said motion should be denied for the following reasons:

I

That the motion made by the defendant herein seeks to secure, after a lapse of upwards of five years, a rehearing of that part of the boundary dispute between the above named states, known as the Green Bay section; the said motion not having been made in the manner nor within the time prescribed by the rules of this court; the time for making such motion having long since elapsed.

II

That the decree announced by Mr. Justice Sutherland and entered on November 22nd, 1926, defining the boundary in said Green Bay section, not only by metes and bounds, but also by reference to fixed channels betwween certain islands therein named, is in complete accord with the decision of this Court delivered by Mr. Justice Sutherland on March 1st, 1926.

III

That after the decree proposed by the State of Wisconsin and the objections thereto made by the State of Michigan, were fully considered and argued before Mr. Justice Sutherland in his chambers, the decree herein was consented to by counsel representing the respective parties thereto.

IV

That the boundary in the Green Bay section as adopted in the decree (with the exception of the one word "by", which is a clear clerical error), was the result of a compromise between the said states, as will appear by the affidavit of Meredith P. Sawyer, counsel for the State of Michigan, hereunto attached and marked "Schedule I", and made a part hereof.

V

That the true boundary in the Green Bay section as defined in said decree, is shown on the attached map and indicated as points "A", "H", "O", "Q", "S", and "R", and is in accord with the decision of this Court. That the erroneous insertion of the word "by" in the printed decree will not at this time enable counsel for Wisconsin to successfully claim that the decree does not carry into effect the decision of this Court. That said error is not fatal to said description for the reason that the metes and bounds description as embodied in the decree is prefaced by reference to fixed monuments which clearly show that the insertion of the word "by", causing the description to read "north by east" instead of "north east" is a clear clerical error.

VI

That the boundary which the State of Wisconsin by this motion asks to have established, shown on the attached map as points "A", "B", "C", "D", "E", "F" and "G', would establish a different and new boundary running through a portion of the middle of said Green Bay. That it was never heretofore contended by the State of Wisconsin that the boundary now here claimed should be the boundary between said states, or that said boundary should run in part through the middle of said Green Bay. This Court in its opinion, emphasized the fact that Michigan and Wisconsin were in agreement on the claim that the boundary through the Green Bay section should be the "most usual ship channel". The Court said:

> "In determining the boundary through this section, the question is not embarrassed by differences of description. The calls of the Michigan Enabling Act are down the channel of the Menominee to 'the center of the most usual ship channel of the Green Bay of Lake Michigan; thence through the center of the most usual ship channel of the said bay to the Middle of Lake Michigan.' The Wisconsin Enabling Act calls for the same boundary."

It will also be noted that in the decree proposed by Wisconsin (attached hereto as "Schedule 2"), Wisconsin asked that the boundary be the "most usual ship channel", rather than the middle of said Green Bay. The State of Wisconsin seeks herein by the formality of a motion, to obtain a rehearing for the apparent purpose of establishing a new and different boundary line inconsistent with the boundary which it proposed to have established as shown by said proposed decree, and inconsistent with the boundary as established and fixed by the decree of this Court, pursuant to the agreement of counsel, for the apparent purpose of securing valuable fishing rights in a part of the waters of Green Bay.

VII

That the new boundary which the State of Wisconsin seeks to have established, as shown by the metes and bounds description on page 8 of its motion, was not claimed by it in the original action before this court, nor was it contended for in the briefs filed by the State of Wisconsin on file in this Court. That in truth and in fact, as will appear by the defendant's proposed decree and objections of the plaintiff thereto (Schedule "3"), the State of Wisconsin proposed a boundary line to be defined as "the most usual ship channel." That the State of Michigan objected thereto, claiming that the proposed boundary line was "too indefinite and uncertain and should be by courses and distances as shown upon the government charts in evidence in the case." That the State of Michigan thereupon proposed an amendment to said decree describing by metes and bounds the boundary through Green Bay, which was the description consented to by the State of Wisconsin and embodied in the decree of this court. That under the heading "ARGUMENT AND BRIEF" in Michigan's Objections to the proposed decree and amendments thereto, counsel for the State of Michigan clearly and concisely set forth their objections to the proposed decree in the following language:

"ARGUMENT AND BRIEF

First Objection

This objection relates to two specific tracts,

First, to the triangle in the waters of Green Bay, lying between the lines of a direct water course from the Menominee Harbor to the sailing objective opposite Chambers Island light and a course from Menominee Harbor to the most usual ship channel of Green Bay, and along that channel to the same sailing objective.

* * *

The language of the Michigan enabling act, 'down the main channel of the Menominee River, to the middle of the most usual ship channel of Green Bay,' is the basis for Michigan's claim.

* * *

Michigan claims for it a construction that the line upon entering Green Bay at the mouth of the Menominee shall pass in a direct course to the middle of the most usual ship channel of the Green Bay.

* * *

The calls of both acts contemplate that the line from the mouth of the Menominee river shall be a straight line, therefore the shortest possible distance from that point to the 'center of the most usual ship channel of Green Bay.' Viewed in the light of the shipping at the time of the admission of both states, as shown by the record, there can be no question but what the 'most usual ship channel of Green Bay' was on the course extending lengthwise of the bay and as shown as the chartered course by plaintiff's exhibits 106 and 107.

Plaintiff therefore asks that the boundary from Menominee Harbor pass along a line at right angles to this Western channel course of the Green Bay as given on the charts, and thence along the chartered course. (Pltf's exbts. 106 and 107.)"

VIII

That at no time since the announcement of said decree have the parties hereto claimed the boundary line to be as indicated by points "A", "H", "O", "K", "J", and "X", on the attached map. That the group of islands lying north of Rock Island passage, consisting in part of St. Martins Island and Summer Island, were never claimed by the State of Wisconsin. That since the adoption of said decree, said islands have concededly belonged to the State of Michigan, the State of Wisconsin making no claim thereto.

This answer is based upon the affidavit of Meredith P. Sawyer, hereunto attached, and upon the records and files in this court.

PAUL W. VOORHIES,
Attorney General,
EDWARD A. BILITZKE,
Assistant Attorney General,
Attorneys for Plaintiff.

IN THE SUPREME COURT OF THE UNITED STATES

STATE OF MICHIGAN,
Plaintiff,
vs.
STATE OF WISCONSIN,
Defendant.

"Schedule I"

COUNTY OF MENOMINEE: ss.

Meredith P. Sawyer, being duly sworn, says:

That he is an attorney of the above entitled Court and acted as special counsel for the State of Michigan in the above entitled cause, in the above entitled Court, during the final arguments and negotiations and hearings upon settlement of the decree, and that he attended said proceedings in behalf of the State of Michigan under the direction of Andrew B. Doughterty, Attorney General of Michigan, with the assistance and counsel of Carl D. Mosier, then the Assistant Attorney General for Michigan.

Deponent further states that after the filing of the opinion of the Court in the above entitled matter, several conferences were held between the attorneys and technical witness for the parties and an expedition was made over the entire lower end of the Menominee River, all with a view to agreeing upon minor matters as to the location of the boundary and determining the necessity for an actual survey, and in this connection, examination was made of the situation in the harbor of Menominee at the mouth of the Menominee River.

Deponent further says that one of the issues raised between the parties by the decree proposed by the defendant and the counter proposals of plaintiff, had to do with the location of the boundary at the lower end of the Menominee River commonly known as the "Harbor", and in the waters of Green Bay directly in front of the City of Menominee, and the State of Michigan took the position that the boundary passed out to Lake Michigan along the middle of the main ship channel in Green Bay from a point in such channel opposite the Menominee River. It was a conceded fact that at the date of the definition of the boundary by Congress, there was no such thing as a ship channel in Green Bay running to the mouth of the Menominee River; there were at that time, two ship channels, both passing from Lake Michigan through Green Bay to the settlement at the foot of the Bay (now the City of Green Bay, Wisconsin). The Court, in its opinion, determined that the western channel was the most usual ship channel. The claims of Michigan in this respect are set forth on page five of the plaintiff's Objection to Proposed Decree on file in the above entitled Court, in the above entitled cause.

Deponent further states that an additional circumstance had to do with the final definition of said boundary at said point; the fact that a line passed down the middle of the main channel of the Menominee River as it existed at the time of the definition of the boundary by Congress, would pass entirely to the south of the present dredged channel and harbor entrance of Menominee. This would further result in throwing into Michigan a considerable amount of dock property which was generally considered to be in Wisconsin.

I have attached hereto a tracing taken from the diagram of the original Government Survey of the mouth of the Menominee River and I have penciled on this tracing in red lines the approximate location of the dock lines and harbor piers of the present harbor, and with a blue line the location of the boundary as it would be if the definition of Congress were followed exactly and it will be noted that the terms of the decree depart from the language of the original definition in that under the decree the boundary passes down the middle of the dredged channel to a point midway between the outer ends of the harbor piers.

THIS LANGUAGE WAS INSERTED IN THE DECREE BY CONSENT OF THE PARTIES WHILE AT WASHINGTON ARGUING THE PROPOSED DECREE AND WAS THE RESULT OF A COMPROMISE BETWEEN THE PARTIES WHEREBY WISCONSIN WAIVED ANY OBJECTION TO THE MICHIGAN CLAIM THAT THE LINE WAS TO PASS OUT FROM THE HABOR EAST BY SOUTH TO THE SHIP CHANNEL AND MICHIGAN WAIVED ANY CLAIM TO THE DOCK PROPERTY SOUTH OF THE PRESENT DREDGED CHANNEL.

Deponent further states that in the decree of this Court as proposed, the line through Green Bay is defined as follows:

"Thence in a direct line to the most usual ship channel of Green Bay, passing to the north of Green Island and westerly of Chambers Island and through the Rock Island passage into Lake Michigan, by courses and distances as follows: From a point midway between the outer ends of the Menominee River piers, thence East by South 7½ miles to the center of the most usual ship channel of the Green Bay; thence along said ship channel North by East ⅛th East, 8⅞ths miles; thence continuing along said ship channel North by East, ⅞ths East, 27 miles; thence, etc."

Deponent states that the last given course contains a typographical error. Deponent believes this occurred through the copying of the language of defendant's proposed amendments to the decree in which the same error appears as shown on page four thereof. These courses and distances were taken from the record of the testimony of Thomas R. Hasley and that in the said testimony the proper course is given as Northeast ⅞ths East, and that this is further shown by reference to the chart exhibit in evidence at the time.

Deponent further states that the said typographical error is apparent upon reference to said chart by reason of the fact that only by reading said course as Northeast ⅞ths East can the monuments referred to in the main definition of this section of the boundary be followed; that is to say, the boundary as defined by monuments "to the North of Green Island and Westerly of Chambers Island and through the Rock Island passage into Lake Michigan" * * * can be readily reconciled with the courses and distances by eliminating this word "by" and can only be reconciled in that way.

The Government charts in evidence in the case, show the courses and distances used with the exception of the first one from the river to the ship channel. The courses and distances given in the decree correspond to those given on the chart except for the word "by". It should be noted here that the bearings given on the chart are for entering the bay and those given in the decree are for an outward course and hence are reversed.

MEREDITH P. SAWYER.

Subscribed and sworn to before me this 3rd day of September, A. D. 1932.

MARION L. GERL,
Notary Public,
Menominee County, Michigan.
My commission expires Oct. 29, 1935.

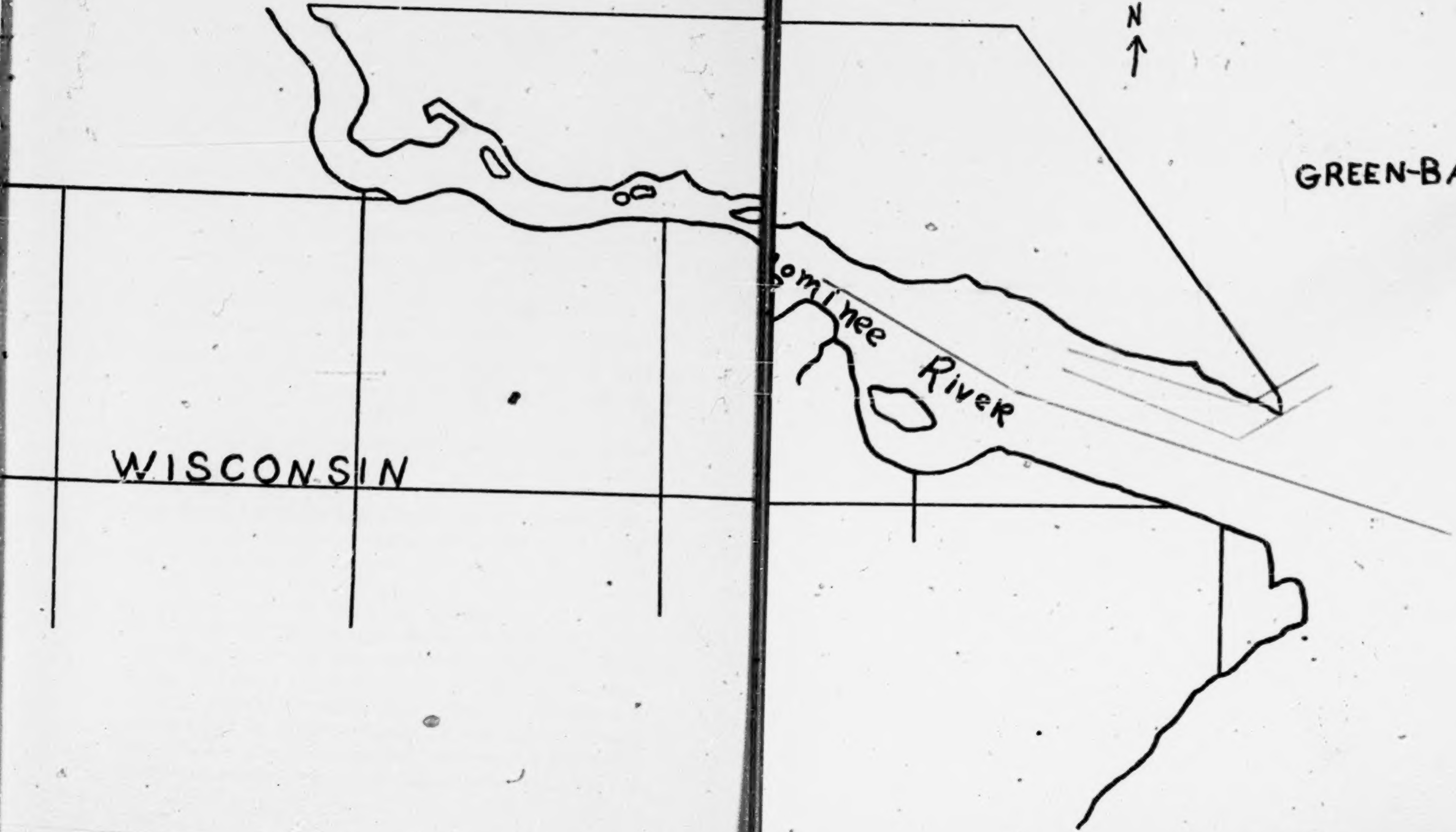
STATE OF MICHIGAN, }
County of Menominee, } ss.

CLERK'S CERTIFICATE

I, Harry N. Gilbertson, Clerk of said County and Clerk of the Circuit Court for the County of Menominee, do hereby certify that Marion L. Gerl whose name is subscribed to the Certificate or Proof of acknowledgment of the annexed Instrument, and therein written, was at the time of taking such proof or Acknowledgment, a Notary Public in and for said County, duly commissioned and qualified to act as such; that his commission was dated on the 30th day of October, A. D. 1931, and will expire on the 29th day of October, A. D. 1935, and further that I am well acquainted with the handwriting of such Notary Public, and verily believe that the signature to the said Certificate or Proof of Acknowledgment is genuine. I further certify, that said instrument is executed and acknowledged according to the laws of this State.

IN TESTIMONY WHEREOF, I have hereunto set my hand, and affixed the seal of said Court, at the City of Menominee, this 3rd day of September, A. D. 1932.

HARRY N. GILBERTSON, Clerk.
By MARGARET EAGEN, Deputy Clerk.


N
GREEN-BAY
ominee River
WISCONSIN

UNITED STATES OF AMERICA

IN SUPREME COURT

STATE OF MICHIGAN, Plaintiff, vs. STATE OF WISCONSIN, Defendant.	Schedule "2"

This cause having been heard and submitted upon certain questions, and the court having considered the same and announced its conclusions in an opinion delivered March 1, 1926, (270 U. S. 295).

IT IS ORDERED, ADJUDGED AND DECREED:

1. That the boundary between the States of Michigan and Wisconsin along the following course be and it is hereby fixed and finally established as follows:

> Beginning at the boundary line between the State of Michigan and the State of Wisconsin in the middle of Lake Michigan and opposite the most usual ship channel leading into Green Bay from said lake, thence in a direct line to the middle of the most usual ship channel into Green Bay, thence along the middle of said channel which is north of Rock Island and north and west of Chambers Island, to the main channel of the Menominee River, thence along the main channel of said Menominee River and the Brule River, wherever the said rivers are free of islands, to Lake Brule, provided, that wherever islands are encountered in either of said rivers, the boundary line follows along the channel nearest the Michigan mainland so as to throw all such islands between the

mouth of said Menominee River and the Quinnesec Falls extending between Section 6, Township 38 North of Range 20 West of the Wisconsin survey, and Section 8, Township 39 North of Range 30 West in the Michigan survey, in said river into Wisconsin, and wherever islands are encountered in said rivers between said Quinnesec Falls and Lake Brule, the boundary follows the channel nearest the Wisconsin mainland so as to throw all such islands into Michigan, thence along the southern shore of Lake Brule in a direct line to the center of the channel between the Middle and South Islands in the Lake of the Desert, thence in a direct line to the headwaters of the Montreal River, as marked upon the survey made by Captain Cram, said line between Lake Brule and the headwaters of said Montreal River to follow the line surveyed, marked, established and identified by William A. Burt in 1847, thence down the main channel of the Montreal River, being sometimes known as the East Branch of the Montreal River, to the mouth thereof.

The costs of this proceeding in this court shall be divided equally between the parties.

The clerk of this court may enter the foregoing decree for record.

By the Court:

Chief Justice.

IN THE SUPREME COURT OF THE UNITED STATES

In Equity

Original Number 9

October Term, 1926.

STATE OF MICHIGAN, Plaintiff, vs. STATE OF WISCONSIN, Defendant.	Schedule "3"

The above named plaintiff now comes and objects to the form and substance of the decree proposed by the defendant in said cause for the reasons that the provisions of said decree are contrary to the manifest intentions of this court as expressed in its opinion and are against the rights of the plaintiff.

FIRST OBJECTION

That the description in said decree is in the reverse order from that given in the opinion and in the statutory enactments and that as a result thereof plaintiff would be deprived of jurisdiction over an area of considerable extent in the waters of Green Bay and in that section of the Menominee River known as the Quinnesec Falls, and that the description of the boundary through Green Bay is too indefinite and uncertain and should be by courses and distances as shown upon the Government charts in evidence in the case.

SECOND OBJECTION

That the said proposed decree does not in any way define what are to be considered islands in the Menominee River and that by the language of said decree the rights of plaintiff to the lands now held by it known as Merrymans Island and Sugar Island are jeopardized.

ANDREW B. DOUGHERTY,
Attorney General of Michigan,
CARL D. MOSIER,
Assistant Attorney General of Michigan,
MEREDITH P. SAWYER,
Special Counsel,
Attorneys for Plaintiff.

IN THE SUPREME COURT OF THE UNITED STATES

In Equity

Original Number 9

October Term, 1926

STATE OF MICHIGAN,
Plaintiff,
vs.
STATE OF WISCONSIN,
Defendant.

MOTION TO AMEND PROPOSED DECREE

Comes now the said plaintiff and moves the court to amend the proposed decree heretofore filed by defendant by striking out that portion of said decree describing the boundary between the plaintiff and defendant states and insert in lieu thereof the following:

> "From Lake Superior through the middle of the main channel of the Montreal River, to the head waters thereof, as established in the survey of Captain Cram at the Junction of Pine River and Lehman's Creek, thence along the line of the survey of William A. Burt, of 1847, to the center of the channel between Middle and South Islands in Lake Vieux Desert, thence continuing along the line of said survey to the shore of Lake Brule, thence along the southerly shore of Lake Brule, to the center of the

main channel of the River Brule, thence down the center of the main channel of the rivers Brule and Menominee, to the center of the harbor entrance of said Menominee River, thence, east by south, seven and one-half miles, to the center of the most usual ship channel of the Green Bay, thence along said channel, north by east, one-eighth east, eight and seven-eighths miles, thence continuing along said ship channel north by east, seven-eighths east, twenty-seven miles, thence continuing along said ship channel, east one-fourth north, ten and one-fourth miles, thence east three-fourths north, to the boundary between the State of Michigan and the State of Wisconsin, in Lake Michigan. Provided, that, that section of the boundary in the Brule and Menominee Rivers, shall follow the main channel thereof, except that where islands occur in the Brule River, and in the Menominee River, down to, and inclusive of the Quinnesec Falls, the line shall pass through the channel nearest the Wisconsin Bank, so as to throw all such islands into Michigan, and where islands occur in the Menominee River below Quinnesec Falls, the line shall pass through the channel nearest the Michigan bank, so as to throw all such islands into Wisconsin. Providing further, that no land now occupied or taxed as a part of the State of Michigan, shall be considered as an island under the provision of the last clause hereof."

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Attorney General of Michigan,
CARL D. MOSIER,
Assistant Attorney General of Michigan,
MEREDITH P. SAWYER,
Special Counsel,
Attorneys for Plaintiff.

ARGUMENT AND BRIEF

First Objection

This objection relates to two specific tracts,

First, to the triangle in the waters of Green Bay, lying between the lines of a direct water course from the Menominee Harbor to the sailing objective opposite Chambers Island light and a course from Menominee Harbor to the most usual ship channel of Green Bay, and along that channel to the same sailing objective.

Second, the Quinnesec Falls section of the Menominee River.

1st Tract,

The language of the Michigan enabling act, "down the main channel of the Menominee River, to the middle of the most usual ship channel of Green Bay," is the basis for Michigan's claim.

This language is the effective grant never having been altered by enactment or use.

Michigan claims for it a construction that the line upon entering Green Bay at the mouth of the Menominee shall pass in a direct course to the middle of the most usual ship channel of the Green Bay.

This construction is in accord with the calls of the Wisconsin enabling act (U. S. Stat. At Large, Vol. 9, Page 7), where in a reverse order the boundary in the Green Bay section is as follows:

> "Thence running with the boundary line of the State of Michigan, through Lake Michigan, Green Bay, to the mouth of the Menominee river."

The calls of both acts contemplate that the line from the mouth of the Menominee river shall be a straight line, therefore the shortest possible distance from that point to the "center of the most usual ship channel of Green Bay." Viewed in the light of the shipping at the time of the admission of both states, as shown by the record, there can be no question but what the "most usual ship channel of Green Bay" was on the course extending lengthwise of the bay and as shown as the chartered course by plaintiff's exhibits 106 and 107.

Plaintiff therefore asks that the boundary from Menominee Harbor pass along a line at right angles to this Western channel course of the Green Bay as given on the charts, and thence along the chartered course. (Pltf's exbts. 106 and 107).

2nd Tract,

Defendant's proposed decree seeks to fix the Division point for the islands in the Menominee at the Upper, or Big Quinnesec Falls.

The language of the Wisconsin enabling act gives to Michigan all islands, "*down to and including* the Quinnesec Falls of the Menominee" opinion. (70 L. Ed. page 274).

Defendant's exhibit 198, sheet 21, shows the location of the Quinnesec Falls. We can see no justification for placing the division point at the Upper Falls.

Second Objection.

This objection involves land known as islands in the Menominee River, below Quinnesec Falls, which is now part of Michigan and would by terms of defendant's proposed decree pass to the jurisdiction of Wisconsin.

In the opinion of this court it is decided that the land commonly known as Merryland Island is not in fact an island, but part of the Michigan mainland.

The opinion adds, "two other so-called islands of small area in the same vicinity are in like situation." (Page 275).

Plaintiff's brief urged the point that three islands below Quinnesec Falls were being held by Michigan.

Joint investigation, by counsel, since the opinion, has developed that there are other tracts of land along the Michigan bank, of which their character as islands or mainland might be drawn in question.

Surely the opinion is inconsistent with the idea that Wisconsin is to have any land now occupied and taxed as a part of Michigan.

"The rule is well settled—that actual possession of a part of a tract by one who claims the larger tract, by color of title describing it, extends his possession to the entire tract, *in the absence of actual adverse possession of some part of it by another.*" (Opinion page 276).

The pleadings in the case would not warrant a decree granting the affirmative relief to Wisconsin, and Michigan has not been put in position to defend its present holdings.

Attention is directed to the answer of defendant wherein no claim is made for affirmative relief and we especially call attention to paragraph 24 and quote therefrom as follows:

> "Defendant alleges * * * that the boundary line claimed by the State of Wisconsin is the true boundary line and always has been such boundary line and the boundary line intended by Congress to mark the limits of sovereignty of the two respective States and that such boundary line has always been accepted by the parties to this controversy strictly in accordance with the claim of the State of Wisconsin. * * * That for the entire period since 1836 and now Wisconsin has openly exercised her right of

> sovereignty over all territory within the line as claimed by said State of Wisconsin."

On page 17 of the Answer and the last paragraph thereof is found the following:

> "Wherefore defendant prays that plaintiff take nothing by this complaint and that this action be dismissed and that it be adjudged that the boundary line as claimed by the State of Wisconsin is the true and correct boundary line between the State of Michigan and the State of Wisconsin."

There is nothing in the record to show that the land known as Sugar Island, which is a part of the city of Menominee, was ever claimed by Wisconsin; that it was ever surveyed and taxed as a part of Wisconsin.

The records in the case, (R. 222), show that the land known as Sugar Island is held and taxed as a part of Michigan.

Plaintiff has attached hereto certified copies of the portions of Assessment Roll of Menominee County, showing the taxation of this land in Michigan for ever sixty years.

Attached also is a map showing the dock line, in Menominee River, established by agreement between the cities of Menominee and Marinette in 1880. Sugar Island is on the Michigan side of the dock line. The other islands shown on this map near the Michigan bank are also taxed in Michigan as shown on the Assessment Rolls.

There is substantial record evidence of the land occupied and taxed as part of Michigan, and plaintiff's proposed amendment protects her interests therein, without jeopardizing the rights of defendant.

ANDREW B. DOUGHERTY,
Attorney General of Michigan,
CARL D. MOSIER,
Assistant Attorney General of Michigan,
MEREDITH P. SAWYER,
Special Counsel,
Attorneys for Plaintiff.

IN THE SUPREME COURT OF THE UNITED STATES

Number 9, Original

In Equity

STATE OF MICHIGAN,
Plaintiff,
vs.
STATE OF WISCONSIN,
Defendant.

PLAINTIFF'S BRIEF IN SUPPORT OF ANSWER IN OPPOSITION TO MOTION TO MODIFY DECREE

The claim now here made by the State of Wisconsin is set forth at the beginning of its brief on page 10 as follows:

> "The motion is based, however, on the assumption that the decree through inadvertence and mutual mistake fails to carry into effect said decision of the court and that the court has the power to modify said decree so as to correct the error and carry into effect the decision of the courts as rendered. We are informed that the plaintiffs herein will not object to the jurisdiction and the power of the court to modify the decree."

The State of Michigan by its answer to this motion denies that the decree of this court settling the boundary dispute in the Green Bay section, fails to carry into effect the decision of the court, and on the contrary contends that the decree of this court is in harmony with said decision.

The defendant is in error in believing that the State of Michigan will not object to the jurisdiction and power of the court at this time, to modify the decree. The State of Michigan in its answer to said motion now here made objects to the jurisdiction of this court to consider said motion, and questions the power of this court at this time to modify the decree.

The decision of this court determining the boundary in the Green Bay section (270 U. S. page 603), can be briefly summarized and stated as follows:

1. The Michigan Enabling Act and the Wisconsin Enabling Act both describe the boundary in the Green Bay section as "the center of the *most usual ship channel*".

2. That the evidence in the case showed two distinct ship channels, the one claimed by Michigan being shown on the attached map as points "A","M","N", and "P", and the one claimed by Wisconsin being described as a course which, after leaving the mouth of the Menominee River, turns to the north and pursues a northerly direction to a point opposite the Rock Island passage which lies between Rock Island and St. Martins Island; thence through the Rock Island passage into Lake Michigan.

3. That the territory in dispute consisted of certain islands known as Chambers Island, Strawberry Island, Rock Island, Washington Island, Detroit Island and Plum Island, the said islands being within the two ship channels above described.

4. That the evidence as to which of the two ship channels was the usual one at the time of the adoption of the Michigan Enabling Act was not convincing.

5. That the title of Wisconsin to the territory which is made up of the islands referred to was established by long possession and acquiescence.

6. That the claim of Wisconsin as to the location of the boundary be sustained.

The court then states that the parties may, if so advised, within thirty days thereafter submit the form of a decree more particularly to carry this opinion into effect.

The following is taken from the "Statement of Facts" found in the brief for the State of Michigan filed in the original cause, (page 33), which relates to the boundary in Green Bay:

> "The boundary in the Michigan Enabling Act is the center of the most usual ship channel.
>
> "The Wisconsin grant here follows the Michigan boundary. The Traverse from Lake Michigan to Green Bay is broken into five principal channels. The question here is as to whether Port des Morte or Rock Island passage was the most usual ship channel in 1836.
>
> "After entering the bay a southerly course permits the choice of either Strawberry passage or the passage west of Chambers Island."

The argument in behalf of the State of Michigan in support of the channel indicated on the attached map as points "A", "M", "N", and "P", is found commencing at page 78 of the brief filed by the State of Michigan in the original cause.

The claim of the State of Wisconsin is set forth on page 34 of its brief filed in the original action, as follows:

> "No apparent excuse is offered to the failure to assert claim to the Islands now claimed in this state throughout the period between 1836 and 1923, except the general allegation of lack of knowledge. * * * .

> (Then follows the following head)
>
> "'The most usual ship channel' means best or main channel."
>
> "The claim of Michigan is based upon the proposition that the usual ship channel at that time lead through Death's Door, a statement which of itself rather negatives this assertion, for the reason that Death's Door was given the name of a dangerous passage and one ordinarily not resorted to. * * * ".

Again at page 61 of Wisconsin's brief filed in the original action, appears the following:

> "An examination of the map of Green Bay shows beyond any question that the passage used in the lake route is the passage on the outside of Rock Island, and that the Port des Mortes passage narrower, and as its name indicates, somewhat more dangerous, would involve an unnecessary detour."

The conclusion of Wisconsin's brief, filed in the original action, is in part as follows:

> " * * * if the court should be of the opinion that there is any doubt about the boundary line in Green Bay or in the Menominee River by reason of the fact that the exact line is not definitely laid out, identified and established by proper monuments, then it is submitted that all that is necessary to be done is to identify and lay out and mark the boundary in the Menominee River and in Green Bay in accordance with the boundaries as claimed by Wisconsin, and so as to include all of the islands and territory now claimed by Wisconsin." (Page 95 of said brief.)

On page 20 of the brief of defendant State of Wisconsin filed in the original action, appears a sketch of the

Green Bay section showing boundaries claimed by Michigan and Wisconsin.

The affidavit of Meredith P. Sawyer, attorney at law, who appeared as special counsel for the State of Michigan in the trial of the original cause, attached to the answer as Schedule 1, shows the following:

1. That after the filing of the opinion of this court, several conferences were held between the attorneys and technical witnesses for the parties and an expedition was made over the entire lower end of the Menominee River and examination was made of the situation in the harbor of Menominee at the mouth of the Menominee River.

2. That one of the issues between the parties raised by the proposed decree and the amendments thereto proposed by the State of Michigan pertained to the location of the boundary at the lower end of the Menominee River known as the Harbor, and in the waters of Green Bay directly in front of the city of Menominee; the State of Michigan taking the position that the boundary line passed out to Lake Michigan along the middle of the main ship channel in Green Bay from a point in such channel opposite the Menominee River. It was conceded that at the time the Act of Congress was passed defining the boundary there was no such thing as a ship channel in Green Bay running to the mouth of the Menominee River; that the only ship channels at that time ran through Green Bay to the foot of the bay which is now the City of Green Bay, Wisconsin.

3. That a new channel had been established at the mouth of the Menominee River by dredging to the north of the old channel which existed at the time the states were admitted to the Union. That the State of Wisconsin was desirous of adopting the new channel as the boundary between Michigan and Wisconsin, thereby acquiring valuable property to the south thereof as will

appear from the sketch attached to Mr. Sawyer's affidavit, (Schedule 1). That the decree as adopted provided that the boundary should run through the center of the "*harbor entrance*" of the Menominee River and thence in a direct line to the most usual ship channel of Green Bay, etc. That this language was inserted in the decree as a result of a compromise, the State of Wisconsin waiving any objection to the Michigan claim that the line was to pass out from the harbor East by South to the ship channel, and Michigan waived any claim to the dock property south of the present dredged channel.

4. That the insertion of the word "by" in that part of the description which reads: "Thence continuing along said ship channel North *by* East, 7/8ths East, 27 miles", was a typographical error. That deponent believes that it occurred through the copying of the language of defendant's proposed amendments to the decree. That the courses and distances were taken from the record of the testimony of Thomas R. Hasley and that in said testimony the proper course is given as "Northeast 7/8ths East", and that this is further shown by reference to the chart exhibit in evidence at the time. Deponent is of the opinion that the said typographical error is apparent upon reference to said chart by reason of the fact that only by reading said course as "Northeast 7/8ths East" can the monuments referred to in the main definition of this section of the boundary be followed; that is to say, the boundary is defined by monuments "to the North of Green Island and Westerly of Chambers Island and through the Rock Island passage into Lake Michigan." That the government charts in evidence in the case, show the courses and distances used with the exception of the first one from the river to the ship channel. That the courses and distances given in the decree correspond to those given on the chart

except for the word "by". That the bearings given on the chart are for entering the bay and those given in the decree are for an outward course and hence are reversed.

The metes and bounds description contained in the boundary line which the State of Wisconsin is seeking to have established as shown on pages 8 and 9 of the motion now before this court, is not supported by the testimony in the original case. The State of Wisconsin does not contend that this new boundary was either suggested or sought by it in the original hearing. On the contrary, the boundary line as established and settled by the decree of this court, with the exception of the first course running from the mouth of the Menominee River to the main channel, was established by government charts, and supported by the evidence in the original case.

The State of Wisconsin now claims (page 11) that it is important to have the boundary definitely fixed in Green Bay for the reason that said bay is recognized as one of the greatest fishing grounds in the United States and the question of jurisdiction on the bay is important to the fishermen in determining whether they are subject to the laws of Michigan or the laws of Wisconsin when engaged in fishing in the bay. We contend that the decree of this court definitely fixes the boundary in the Green Bay section. The decree defines the boundary, by reference to fixed monuments, as follows:

> "To the center of the harbor entrance of said Menominee River, thence in a direct line to the most usual ship channel of Green Bay, passing to the north of Green Island and westerly of Chambers Island and through the Rock Island passage into Lake Michigan, by courses and distances as follows, etc."

The Supreme Court of Michigan has adopted the general rule of construction with reference to descriptions to the effect that courses and distances give away to natural boundaries. See Turner v. Holland, 65 Mich. 463, 33 N. W. 883.

This court is familiar with the general rule of construction, aptly stated in 4 R. C. L. Sec. 34, as follows:

> "Under the priciple that where some particulars of the description in a deed do not agree, those which are uncertain and more liable to error and mistake must be governed by those which are more certain, various rules for the interpretation of descriptions of the location and boundary of lands have been evolved and are now frequently referred to in interpreting grants and deeds. Accordingly an order of precedence has been established among different calls for the location of boundaries of land, and, other things being equal, resort is to be had first to natural objects or landmarks, next to artificial monuments, then to adjacent boundaries, and thereafter to courses and distances."

On page 13 of defendant's brief in support of the motion herein appears the following:

> "The center of said ship channel as above outlined (new proposed boundary) is the one contended for by the defendant was adopted in the decision and is expressly described in the Enabling Act of both Michigan and Wisconsin."

The Enabling Act of Michigan described the boundary to "the center of the *most usual ship* channel of Green Bay". The new boundary line which Wisconsin now seeks to have established would run through the "center of *certain portions* of Green Bay," without regard to the courses shown on the government charts in evidence on the trial of the original cause. Neither the enabling acts nor the testimony at the original hearing support the contention now made that the boundary should run through the center of the bay or equal distance between certain islands or shoals. Wisconsin does not contend that the boundary line sought to have established is in accordance with any government chart or that ships traveled such a course at the time the enabling acts were passed.

On page 13 of Wisconsin's brief in support of its motion, the following conclusion appears:

> "Where rivers or bays having well defined banks and are practically navigable throughout its whole area are the boundaries between states, the boundary runs through the center of the rivers or bays equally distant from the banks thereof."

This rule is foreign to the question which was before the court in the original case, and is not applicable to the issue between Michigan and Wisconsin as to the boundary line in Green Bay. This court based its opinion upon the Enabling Acts of Michigan and Wisconsin which defined the boundary as "the center of the most usual ship channel". The issue before the court in the original case, and the proofs taken in support thereof were for the purpose of determining the boundary as the "center of the most usual ship channel" in Green Bay. Having determined the center of the *most usual ship* channel, it mattered not whether such boundary would run through the center of the bay. Wisconsin cannot at this time by the formality of a motion take a position inconsistent with its position and contention at the time the original cause was argue and submitted.

The State of Michigan has no fear that the harmless error caused by the insertion of the word "by" in the one course referred to in the decree will hinder or prevent prosecution under the game laws of the State of Michigan. However, we do submit that the State of Wisconsin might well stipulate to the effect that the word "by", erroneously inserted in the one course, be stricken from the decree so that a reading of said decree will not confuse the ordinary layman who may not be familiar with the exact and complete language of the decree.

On page 14 of defendant's brief in support of its motion, appears the argument:

> "A great many features of law enforcement point to the conclusion that the line of demarcation between the jurisdiction of the two states should be in the 'center of the main channel'. In this connection it is common knowledge that the expert eye of navigators and fishermen as well as those who are not experts can more easily determine the center of the water than they can a two-thirds distance or any other fraction. * * * It is unfair to fishermen of Washington Island as well as to fishermen of Michigan territory to have the boundary line run close to its territory."

It will be noted from the foregoing that the State of Wisconsin contends that the boundary should be "in the center of the main channel, rather than the 'center of the *most usual ship* channel'." We contend that the boundary as established by the decree is clearly shown on the government's charts and other maps used by navigators. That the boundary line as established is definite, understandable and can be located by a navigator without difficulty. We contend that inasmuch as Congress fixed the boundary with reference to "the center of the *most usual ship* channel" which was later adopted in the opinion of this court and embodied in the decree, that Wisconsin should not be permitted to now ask that a new and different boundary be established with reference to the center of the main channel without regard to the most usual ship channel at the time the act of Congress was passed. As proof that the boundary line as fixed in the decree and indicated on the map as points "A", "H", "O", "Q", "S" and "R", is the true boundary line, and recognized by Wisconsin as such, is shown by the statement of Wisconsin on page 15 of its brief herein as follows:

> "To have the game laws of Michigan enforced within a mile of Washington Island is unthinkable, likewise to enforce the Wisconsin game laws within a short distance of the Michigan line is equally objectionable."

This is further supported by the claim now made by Wisconsin (page 15) that back in 1836 sail boats could not have sailed on the course indicated for the reason that it was too near the shore. Looking through mere words into the substance of this motion this court will see that this is an effort on the part of Wisconsin to establish a new and different boundary line, thereby acquiring for the benefit of its citizens valuable fishing rights in a part of Green Bay.

The argument on page 15 of Wisconsin's brief now before the court, to the effect that the center of the channel should be the boundary rather than that fixed in the decree for the reason that as early as 1836 sail boats necessarily could not pursue a course close to the shore, might properly have been addressed to this court at the time the original case was before it for consideration.

On page 15 of Wisconsin's brief now before this court, the Attorney General contends that this court has the power to modify the decree correcting a former decree inadvertently entered by *mutual mistake* in this case so as to carry out the decision of the court.

We contend that the decree of this court was not inadvertently entered by mutual mistake. The proposed decree on the part of Wisconsin and the proposed amendments thereto by the State of Michigan and objections attached to the motion as Schedule 2, together with the affidavit of Mr. Sawyer, and the long length of time that has elapsed since the decree was entered, conclusively show that the decree in this case was entered after a full and complete hearing before Mr. Justice Sutherland, in his chambers, and that it was consented to by the State of Wisconsin with full knowledge of its consequences. It is not difficult to understand that Wisconsin now complains of the boundary for the reason that certain fishermen of Wisconsin are desirous of obtaining the privilege of fishing in waters which now come under the jurisdiction of the State of Michigan without being required to purchase a Michigan license.

It will be noted that the State of Wisconsin does not seek to correct by this motion a clerical mistake or error claimed to have been made in the entry of the decree but seeks to obtain a review of a portion of the original case and to establish a new and different boundary not contended for by it in the original case and not supported by any testimony.

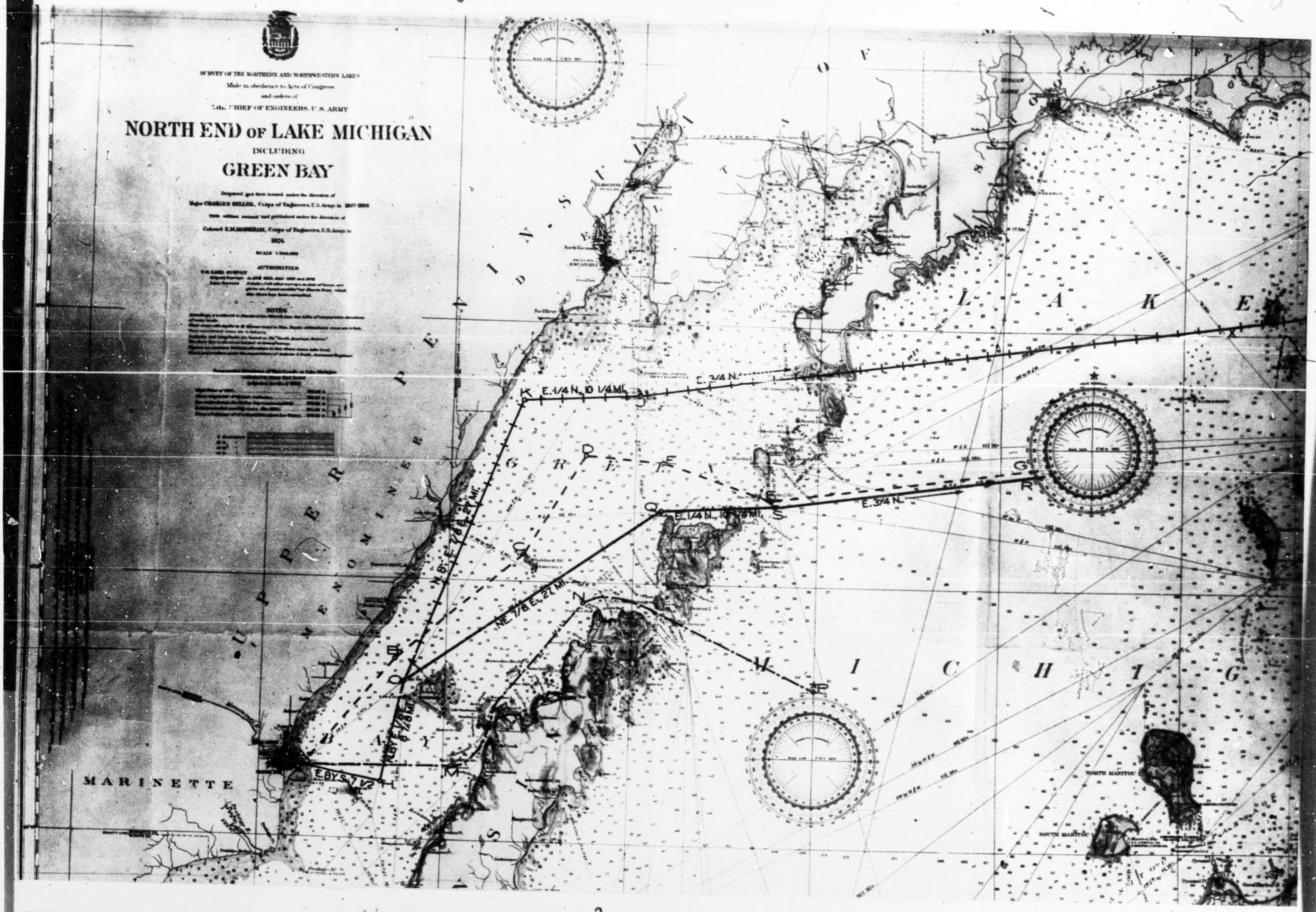
This court is familiar with Equity Rule 69 which requires that every petition for a re-hearing shall be verified by the oath of the party or some other person, and shall not be granted after the term at which the final decree of the court shall have been entered and recorded. That the court may in its discretion allow the petition to be filed at any time before the end of the next term of court. The court is also familiar with Equity Rule 72, which provides that clerical mistakes in decrees arising from any accidental slip or omission, may at any time before the close of the term at which the final decree is rendered be corrected by the order of the court or circuit judge thereof, without expense or re-hearing.

The motion in this case is not supported by any affidavit.

While it is not embodied in the motion itself, yet the brief in support thereof indicates that the Attorney General of Wisconsin was proceeding under the impression that the State of Michigan would consent to the jurisdiction of this court to review that part of the original case as pertained to the boundary dispute in the Green Bay section. We believe that Wisconsin's error arises from the effort made by the State of Michigan to obtain the consent of Wisconsin to a stipulation striking the said word "by" from the metes and bounds description found in the decree. While the State of Michigan has sought Wisconsin's approval to such a stipulation, at no time has it treated the error as fatal. We submit that in fairness to this court, the State of Wisconsin should so stipulate.

For these reasons we respectfully submit that the motion to modify the decree made by the State of Wisconsin be denied.

PAUL W. VOORHIES,
Attorney General of Michigan.
EDWARD A. BILITZKE,
Assistant Attorney General.


SURVEY OF THE NORTHERN AND NORTHWESTERN LAKES
Made in obedience to Acts of Congress
and orders of
the CHIEF OF ENGINEERS, U.S. ARMY
NORTH END OF LAKE MICHIGAN
INCLUDING
GREEN BAY
Prepared and first issued under the direction of
Major CHARLES KELLER, Corps of Engineers, U.S. Army in 1867-1868
AUTHORITIES
NOTES
UPPER PENINSULA OF MICHIGAN
MENOMINEE
SCHOOLCRAFT
MARINETTE
GREEN BAY
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In the Supreme Court of the United States

No. ~~7~~ 5, ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA, COMPLAINANTS,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS, INTERVENING DEFENDANTS.

No. ~~11~~ 8, ORIGINAL.

STATE OF MICHIGAN, COMPLAINANT,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL., DEFENDANTS.

No. ~~12~~ 9, ORIGINAL.

STATE OF NEW YORK, COMPLAINANT,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL., DEFENDANTS.

APPLICATION OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN FOR THE APPOINTMENT OF AN OFFICER, OR OFFICERS, OF THE COURT TO CARRY OUT THE DECREE MADE AND ENTERED IN THE ABOVE-ENTITLED CAUSES ON APRIL 21, 1930, WITH SUPPORTING BRIEF.

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In the Supreme Court of the United States

No. 7, ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA, COMPLAINANTS,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS, INTERVENING DEFENDANTS.

No. 11, ORIGINAL.

STATE OF MICHIGAN, COMPLAINANT,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL., DEFENDANTS.

No. 12, ORIGINAL.

STATE OF NEW YORK, COMPLAINANT,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL., DEFENDANTS.

APPLICATION OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN FOR THE APPOINTMENT OF AN OFFICER, OR OFFICERS, OF THE COURT TO CARRY OUT THE DECREE MADE AND ENTERED IN THE ABOVE-ENTITLED CAUSES ON APRIL 21, 1930.

To the Chief Justice and the Associate Justices of the Supreme Court of the United States:

The application of the State of Wisconsin by John W. Reynolds, her Attorney General, the State of Minnesota by

Henry N. Benson, her Attorney General, the State of Ohio by Gilbert Bettman, her Attorney General and the State of Michigan by Paul W. Voorhies, her Attorney General, respectfully shows to the Court that:

I.

This application is filed under and pursuant to the provisions of paragraphs 6 and 7 of the decree entered in these causes, which paragraphs read as follows:

> "6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above-entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or *the progress of construction,* or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.
>
> "7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy." (Italics ours.)

Under the foregoing provisions of the decree, as your applicants are severally informed and believe, it is their duty, obligation and responsibility to bring to the attention of this Court any failure, neglect or refusal to carry out such decree and to apply for such further action or relief as may be necessary to make the decree effective, and restore to your applicants their just rights as declared by this Court; and in the performance of that duty and the discharge of that responsibility your applicants file this application for further relief.

II.

The State of Wisconsin filed the first of these bills on July 14, 1922. The Wisconsin bill was amended on October 5, 1925, and the States of Minnesota, Ohio and Pennsylvania became co-plaintiffs. The amended bill sought an injunction restraining the State of Illinois and The Sanitary District of Chicago from causing any water to be taken from the Great Lakes-St. Lawrence watershed in such manner as permanently to divert the same from that watershed. On April 8, 1926, the State of Michigan filed a separate bill for the same relief. On October 18, 1926, the State of New York filed a separate bill for the same relief. Subsequently the three suits were consolidated for the purpose of hearing. *Wisconsin v. Illinois*, 278 U. S. 367, 369-70.

III.

After three hearings before this Court and two references to a Special Master, this Court, on April 21, 1930, entered its decree and judgment in said suits as follows:

> "No. 7, original, *Wisconsin, et al. v. Illinois, et al.*;
> No. 11, original, *Michigan v. Same*; and
> No. 12, original, *New York v. Same.* April 21, 1930.
>
> These causes came on to be heard upon the pleadings, evidence, and the exceptions filed by the parties to the Report of the Special Master, as well as on the exceptions filed to the Report of the Special Master on Re-reference, and were argued by counsel. The Court now being fully advised in the premises, and for the purpose of carrying into effect the conclusions set forth in the opinions of this Court announced January 14, 1929, 278 U. S. 367, and April 14, 1930 (*ante*, p. 179),
>
> It is now here ordered, adjudged, and decreed as follows:
>
> 1. On and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago,

their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 cubic feet per second in addition to domestic pumpage.

2. That on and after December 31, 1935, unless good cause be shown to the contrary, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 5,000 cubic feet per second in addition to domestic pumpage.

3. That on and after December 31, 1938, unless good cause be shown to the contrary, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage.

4. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for domestic water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Draingage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water

mains and as so computed will include the run-off of the Chicago and Calumet drainage area.

5. That the defendant, the Sanitary District of Chicago, shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy.

And it is further ordered that the costs in these cases shall be taxable against the defendants." (*Wis. v. Ill.*, 281 U. S. 696-98.)

IV.

The decree, as your applicants are severally informed and believe, provided for a gradual reduction in the unlawful diversion of water and a gradual, rather than immediate, restoration of your applicants' rights in order to permit the defendants to construct works claimed to be necessary to safeguard the health of the residents of the Sanitary District of Chicago; and the dates and amounts of the progressive reductions in the unlawful diversion provided by the decree of this Court were fixed and determined by the findings of fact as to the time within which the various works, claimed by the defendants to be essential to purify the sewage of Chicago and protect the health of its people, could be constructed and placed in operation. (*Wisconsin v. Illinois,* 281 U. S. 179.) The basis and reasons for the progressive rather than instantaneous termination of the unlawful diversion were set forth in the opinion of this Court, rendered by Mr. Chief Justice Taft, in *Wisconsin v. Illinois,* 278 U. S. 367, where the Court said:

> "* * * If the view urged by the complainants is right, the necessity for the use of the 8,500 cubic feet a second to save the health of the inhabitants of the Sanitary District will then present the problem of the power and discretion of a court of equity to moderate the strict and immediate rights of the parties complainant to a gradual one which will effect justice as rapidly as the situation permits. The framing of the decree will then require the careful consideration of the Court." (pp. 410-411.)

And further:

> "* * * In these circumstances we think they are entitled to a decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end. But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so

framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction." (pp. 418-19.)

"* * * The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion.

Though the restoration of just rights to the complainants will be gradual instead of immediate it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project." (pp. 420-421.)

V.

On July 1, 1930, the Sanitary District of Chicago filed its first semi-annual report setting forth the work which remained to be accomplished after April 21, 1930 (the date of the decree) in order to make effective the decree of this Court and restore applicants' rights as defined by this Court, to be as follows:

"TABLE 4

FUTURE WORK AFTER APRIL 21, 1930.

Des Plaines River Project	$4,215,287.71	
Calumet Project	20,283,511.16	
North Side Project	6,028,688.58	
West Side Project	64,661,726.80	
Southwest Side Project ..	70,626,695.47	
Miscellaneous Plants and Sewers	9,981,942.68	
Chicago River Controlling Works	3,946,586.18	$179,744,438.58"

The decree of this Court allowed until December 31, 1938, or a period of 8.7 years from its date, for the construction and placing in operation of the works and structures claimed by the defendants to be essential to protect the health of the people of the Sanitary District of Chicago upon the restoration of the just rights of these applicants. Measured by construction expenditures and accepting the estimates of costs reported by the Sanitary District, the decree required the accomplishment of an average annual construction program of sewage treatment and auxiliary works involving an expenditure of $20,660,280.29. (Semi-annual report of the Sanitary District of Chicago of July 1, 1930, filed June 30, 1930.)

The semi-annual reports of the Sanitary District of Chicago, filed in this Court on July 1, 1930, January 1, 1931, July 1, 1931, January 1, 1932, and July 1, 1932, disclose the following slender record of performance, measured by construction expenditures, under the decree of this Court up to June 1, 1932:

Construction expenditures Apr. 21, 1930 to Jun. 1, 1930	$ 503,214.54 (1)
Construction expenditures Jun. 1, 1930 to Dec. 1, 1930	4,836,163.05 (2)
Construction expenditures Dec. 1, 1930 to Jun. 1, 1931	1,079,369.50 (3)
Construction expenditures Jun. 1, 1931 to Dec. 1, 1931	3,607,347.21 (4)
Construction expenditures Dec. 1, 1931 to Jun. 1, 1932	280,738.34 (5)
Total construction expenditures April 21, 1930 to June 1, 1932	$10,306,832.64

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(1) Semi-annual report of the Sanitary District of Chicago of July 1, 1930, page 10.

(2) Semi-annual report of the Sanitary District of Chicago of January 1, 1931, page 8.

On June 1, 1932, 2.11 years of the period allowed by the decree for the accomplishment of the program claimed to be necessary by defendants had elapsed. The average annual performance had been $4,884,758. Such average annual performance would, if maintained, require over thirty-six years within which to build the works claimed by defendants to be necessary, if no new demands should arise during that period. At the rate of progress maintained during the last six months covered by the semi-annual report of the Sanitary District of Chicago, filed on July 1, 1932, the defendants would take over three hundred and twenty years within which to perform the decree, should no other demands intervene or interfere.

The reports of the Sanitary District of Chicago disclose that its performance under the decree has been at all times meagre and inadequate, and much of the time negligible. The last reports of the Sanitary District filed with this Court show that all performance under this decree has substantially ceased. The semi-annual reports of the Sanitary District of Chicago on file with this Court further disclose, as hereinafter more particularly set forth, that there has been either no effort or progress in the performance on controlling factors in the program required by the judgment, or that such efforts and progress have been wholly inadequate, and that the action of the defendants in those respects has been, whether so intended or not, wholly consistent with an effort to obstruct, avoid and circumvent the performance of the decree.

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(3) Semi-annual report of the Sanitary District of Chicago of July 1, 1931, page 7.

(4) Semi-annual report of the Sanitary District of Chicago of January 1, 1932, page 9.

(5) Semi-annual report of the Sanitary District of Chicago of July 1, 1932, page 7.

VI.

The reduction in diversion provided by the decree for December 31, 1935, was predicated upon the completion of the Calumet, North Side and West Side projects and the installation of controlling works in the Chicago River. *Wisconsin, et al. v. Illinois, et al.*, 281 U. S. 179, 198. The Calumet project has not been completed, and work has in fact been discontinued since December, 1931. (Semi-annual Report of the Sanitary District of Chicago, filed July 1, 1932, pp. 2-3.) The West Side project has not been completed and no contracts have been let for substantial parts of this project. (Semi-annual Report of the Sanitary District of Chicago, filed July 1, 1932, p. 3.) The North Side project, which was substantially completed at the date of the decree, has been finished. In fact, as your applicants are informed and believe, the construction expenditures reported under the North Side project are largely, if not wholly, on construction work completed or under way at the date of the decree. So far as the reports filed by the Sanitary District of Chicago with this Court disclose, no steps whatsoever have been taken to design or construct the controlling works in the Chicago River or to seek or obtain the approval of the War Department for plans and location. The reports disclose that no effort is now being made to accomplish these projects as contemplated by the decree.

VII.

The Southwest Side project or sewage disposal plant has been at all times admitted to be the controlling factor in the construction program from the standpoint of determining the time within which artificial sewage treatment could be provided for all of the sewage and trade wastes of the Sanitary District under the program proposed by the defendants. The Sanitary District of Chicago had selected the site for this project as early as 1926.

Although this project was known to be the controlling factor in the determination of the time within which complete sewage treatment could be provided, no steps were thereafter taken by the Sanitary District throughout this long litigation to acquire the site so selected. The Sanitary District of Chicago on the contrary complacently permitted the site so selected to be sub-divided. It then set forward such subdivision as an additional reason for delay. No condemnation suits were instituted. The semi-annual reports filed July 1, 1931, and January 1, 1932, simply state that negotiations are continuing toward the acquisition of a site for the Southwest Side works. The semi-annual report for July 1, 1931, states that "negotiations for the acquisition of the site of the Southwest Side sewage treatment works are temporarily at a standstill". The semi-annual report of January 1, 1932, states that "negotiations for the acquisition of a site originally contemplated for the Southwest Side treatment works are yet at a standstill". The last report filed July 1, 1932, states that "there have been no further developments toward the acquisition of the site originally contemplated for the Southwest Side treatment works". So far as the reports filed with this Court show, the defendants have made no attempt to perform the decree in this important and controlling particular.

VIII.

The Sanitary District of Chicago made an exhaustive study of the stockyards or Packingtown wastes from 1912-1918 inclusive. In 1928 the Sanitary District of Chicago announced that the program of treating the stockyards wastes had been fully solved. On November 1, 1923, the United States District Engineer at Chicago reported officially that "the officials of the Sanitary District have no grounds for delay on account of lack of complete information as to the processes best suited to the different kinds of sewage produced''. The waste resulting from the slaughter of hogs, sheep and cattle has not changed. The amount of the kill is reported daily in the public press. Nevertheless, the semi-annual report filed July 1, 1930, assigns as a reason for delay on the Southwest Side project the necessity of a determination of the character and volume of the stockyard or packingtown wastes. (Semi-annual Report of the Sanitary District of Chicago, July 1, 1930, pp. 7-8.) The semi-annual report of January 1, 1931, reports a continuation of such tests and alleges impediments thereto by the packing companies. (Semi-annual Report of the Sanitary District of Chicago, January 1, 1931, pp. 6-7.) The semi-annual report of July 1, 1931, gravely reports that the wastes from the slaughter of domestic animals have been found to have substantially the same characteristics as in 1917. (Semi-annual Report of the Sanitary District of Chicago, July 1, 1931, p. 6.) The semi-annual report of the Sanitary District of Chicago January 1, 1932, finally reports that tests on some of the stockyards wastes have been completed ''and the results are being studied''.

The applicants, on information and belief, charge and aver that this claim of a necessity to study the nature and extent of the stockyards wastes as a reason for postponing the commencement of the Southwest Side project can not be made in good faith and must be advanced solely in an effort to delay, avoid and circumvent the performance of the decree of this Court.

IX.

The suit, filed by the Sanitary District of Chicago in the Federal Court against certain of the packing companies, and apparently assigned in the various reports filed by the Sanitary District in this Court as a reason for delay in the performance of this Court's decree, was commenced in 1924. The report of the Sanitary District of Chicago of July 1, 1932, discloses that a motion to dismiss in this suit was finally argued on March 18, 1932.

Petitioners on information and belief charge and aver that this suit seeks no relief which is essential to the performance of this Court's decree, that the suit of the Sanitary District in the Federal Court has not been prosecuted diligently or in good faith, and that the Sanitary District of Chicago, aided and abetted by the State of Illinois, is putting forward such suit merely with the purpose and intent of thereby attempting to delay, avoid and circumvent the performance of this Court's decree.

X.

The Sanitary District of Chicago for many years maintained a large Engineering organization suitable for the accomplishment of the work claimed by that District to be necessary under the Supreme Court decree. After the first decision of this Court rendered on January 14, 1929, and reported in 278 U. S. 367, the Sanitary District materially reduced the personnel of its Engineering organization. The Sanitary District of Chicago now reports that it has made a further reduction in the personnel of its Engineering organization of approximately sixty-four per cent (64%). (Semi-annual Report of the Sanitary District of Chicago, July 1, 1932, p. 5.) The Sanitary District of Chicago now maintains no Engineering organization adequate to proceed with the performance of the decree of this Court.

XI.

The State of Illinois and the Sanitary District of Chicago, through negligence, incompetence or bad faith, have failed, neglected and refused adequately and reasonably to provide for financing the performance of this Court's decree. In 1929 the Illinois General Assembly had authorized the Sanitary District of Chicago to issue $27,000,000 of bonds without referendum; and on June 1, 1930, $16,850-000 remained unissued. On July 1, 1932, $7,614,000 out of the $27,000,000 of bonds so authorized by the Illinois General Assembly in 1929 still remained unissued. (Semi-annual Report of the Sanitary District of Chicago July 1, 1932, p. 4.) These facts thus establish that the total amount of bonds issued by the Sanitary District of Chicago since and in the performance of this decree has not exceeded $10,-236,000. This wholly inadequate provision for financing in compliance with the decree of this Court is coupled with a failure, through neglect, incompetence or bad faith, to levy and collect normal taxes at any time since the decree of this Court became effective.

The report of the Sanitary District of Chicago filed July 1, 1930 (pp. 8-9) discloses that the Governor and General Assembly of the State of Illinois had failed to provide for the issuance of bonds necessary to carry out the decree of the Supreme Court except upon the approval of the voters at a referendum on each issue, and that the Governor of Illinois had refused to call a special session of the State Legislature to authorize bonds for the accomplishment of this decree. The report of January 1, 1931, discloses that although the Legislature of Illinois had been called into special session, the Legislature and/or the Governor had refused to permit the consideration of any proposal for the issuance of the bonds necessary to carry out the Supreme Court decree.

The semi-annual Report of the Sanitary District of Chicago of July 1, 1932, discloses that the voters had approved an additional bond issue of $36,000,000, but that issuance thereof was being prevented by litigation in the State Courts. (Semi-annual Report of the Sanitary District of Chicago, July 1, 1931, pp. 6-9.) The semi-annual report of the Sanitary District of Chicago of January 1, 1932, states that the Sanitary District of Chicago had commenced to experience difficulty in selling its bonds at 4½ per cent interest. This difficulty arose from a self-created obstacle, to-wit, from the fact that, through negligence, incompetence, or bad faith, normal and usual taxes had not been levied and collected. (Semi-annual Report of the Sanitary District of Chicago, January 1, 1932, pp. 7-8.)

Practically since 1928 there has been a failure to assess and collect the normal and proper taxes in Cook County and the Sanitary District of Chicago, by reason of negligence, incompetence or bad faith. The semi-annual report of the Sanitary District of Chicago of July 1, 1932, discloses that the Sanitary District has failed to sell duly authorized bonds in the amount of $43,000,000; that through the failure to assess and collect the proper taxes in Cook County, Illinois, which is substantially co-terminus with the Sanitary District of Chicago, approximately two years' taxes are in arrears; that the Sanitary District has defaulted on current bills and on bond interests and maturities. This negligence, incompetence or bad faith is apparently assigned as an excuse for failing to perform the decree of this Court, and doubtless eventually will be made the basis for an application for relief at the expense of the rights of these petitioners and their peoples, unless there is timely intervention by this Court.

XII.

The difficulty, if it exists, in selling the bonds of the Sanitary District of Chicago for a reasonable price and a reasonable interest rate, rests upon the neglect, failure, and/or refusal of the various authorities of the State of Illinois to levy and collect the proper taxes. This ground of alleged inability presently to proceed with the decree is a self-created disability which, whether the result of neglect, incompetence, or bad faith, can not defeat the performance of the decree. The credit of the Sanitary District of

Chicago is ample to finance these expenditures and the financial stringency of Chicago, which has existed since prior to 1929, is not due to a general depression but to the negligence, incompetence or dereliction of duty of the officers and officials of the State of Illinois and her political subdivisions.

XIII.

The primary obligation and duty to perform the decree rests upon the State of Illinois, of which the Sanitary District of Chicago is a mere political agency. The credit and financial resources of the State of Illinois are more than ample to finance the performance of the decree. If the credit and financial resources of the Sanitary District of Chicago were inadequate for that purpose, as they are not, that would not excuse the State of Illinois for her failure to perform the decree.

XIV.

By a course of conduct characterized by neglect, incompetence, defiance, or bad faith, as the case may be, the Sanitary District of Chicago has wholly failed to make any real, substantial and good faith effort to perform the decree of this Court, and has wholly failed to make reasonable, substantial and bona fide progress in carrying out that decree. The State of Illinois has made no effort on her part to comply with the decree; but on the contrary, for nearly three years has viewed with complacency, if not approval, the neglect, defiance, and/or bad faith of her political subdivision and agency, the Sanitary District of Chicago.

XV.

For many years the Sanitary District of Chicago wilfully disregarded and defied the Federal Government and presumed upon the solicitude of the Federal Government for the health and welfare of the people of Chicago to prevent the Federal Government from enforcing its order and terminating the wrongful action of the District.

Thereafter the Sanitary District of Chicago for many years interposed the claim of necessity of protecting the health of the people of the District to prevent, hinder or impede a restoration to the petitioners and their peoples of their just rights. In *Wisconsin v. Illinois,* 287 U. S. 367, at 419-20, Mr. Chief Justice Taft, rendering the unanimous opinion of this Court, said:

> "* * * The Secretary of War and the Chief of Engineers in 1907 refused a permit by which there would be more than 4,167 feet a second diverted. Advised that the District authorities proposed to ignore that limitation, the United States brought suit against the authorities of the District to enjoin any diversion in excess of that quantity, as fixed in an earlier permit. Another application for enlargement was made to Secretary of War Stimson in 1913 and was rejected. For several years, including the inexcusable delays made possible by the failure of the Federal Court in Chicago to render a decision in the suit brought by the United States, the District authorities have been maintaining the diversion of 8,500 cubic feet per second or more on the plea of preserving the health of the District. Putting this plea forward has tended materially to hamper and obstruct the remedy to which the complainants are entitled in vindication of their rights, riparian and other."

And further:

> "* * * The Sanitary District authorities, relying on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore they can not now complain if an immediately heavy burden is placed upon the District because of their attitude and course."

Your applicants further allege that the facts herein set forth establish that it is the plan, intention and purpose of the Sanitary District of Chicago and the State of Illinois by similar means and similar methods to delay, avoid and circumvent the performance of the decree of this Court and the restoration of the just rights of your petitioners as declared by this Court.

XVI.

It was and is the absolute ministerial duty of the members of the Legislature of the State of Illinois and every officer of the State of Illinois, and of every officer of the Sanitary District of Chicago, and of every officer of every other political subdivision, agency, or instrumentality, of the State of Illinois to take the necessary steps, to enact the necessary laws, and to do all things necessary, convenient and proper to carry out fully, adequately, completely and in good faith the decree of this Court. The State of Illinois, its Legislature, officers, and agents, have failed, neglected and/or refused to carry out the decree of this Court. Your petitioners further aver that the facts herein set forth and further facts in reports on file and the records of this Court establish that it is not the intention of the authorities of the State of Illinois, or of the Sanitary District of Chicago, to carry out and perform this decree as ordered and adjudged by this Court; that it is the intention of the authorities of the Sanitary District of Chicago, aided and abetted by the authorities of the State of Illinois so to obstruct, delay, avoid and circumvent the performance of this decree that when the date fixed by this Court for the full restoration of the rights of these States and their peoples arrives the defendants may again seek to avoid the performance of the decree and the restoration of your petitioners' rights, as they avoided the performance of the orders of the Federal Government for many years, by pleading that the restoration of the just rights of your petitioners will imperil the health of the people of the Sanitary District of Chicago. Your petitioners further aver that the facts set forth show that the Sanitary District of Chicago, aided and abetted by the State of Illinois, hopes thereby to dissuade, prevent and deter this Court from enforcing its decree and restoring your petitioners' rights. Your petitioners further aver that they are without remedy unless this Court, in the exercise of the power conferred upon it under the Constitution in controversies among the States of the Union, shall appoint a Master, Commissioner, Receiver, and/or United States Marshal to perform this decree on behalf and at the expense of the State of Illinois and the Sanitary District of Chicago, with full power to exercise and bind the credit of the State of Illinois and the Sanitary District of Chicago, and to make the expenditures necessary to effectuate the decree a lien upon all of the property in the State of Illinois and upon all the revenues of that State and of the Sanitary District of Chicago, to issue bonds secured by the full faith and credit, the complete taxing power and all of the revenues of the Sanitary District of Chicago and the State of Illinois, to make such bonds a lien upon all of the property in the State of Illinois and upon all of the revenues of the State of Illinois and of the Sanitary District of Chicago, to levy and collect such taxes as may be necessary to provide for payment of the interest upon such bonds as it accrues and to provide a sinking fund to pay the principal of such bonds as said bonds fall due, to refinance outstanding bonds and obligations of the Sanitary District of Chicago as they may severally fall due, and to do everything which may be necessary, convenient or proper to bring about the speedy enforcement of the decree of this Court and the speedy restoration of your applicants' rights, such officer or officers to continue to exercise such powers until the decree has been fully performed and all obligations created on behalf of the State of Illinois and the Sanitary District of Chicago shall have been fully discharged, or until the

State of Illinois and the Sanitary District of Chicago shall have made adequate provision for the performance of the decree and the satisfaction of any obligations created on their behalf by such officers of this Court.

WHEREFORE your applicants, the States of Wisconsin, Minnesota, Ohio and Michigan, pray that a rule be made and issued from this Court directed to the Governor and Attorney General of the State of Illinois, and to the Sanitary District of Chicago, directing the State of Illinois and the Sanitary District of Chicago to show cause, if any either has, why this Court should not appoint a Master, Commissioner, Receiver and/or United States Marshal to perform this decree on behalf and at the expense of the State of Illinois and the Sanitary District of Chicago, with full power to exercise and bind the credit of the State of Illinois and the Sanitary District of Chicago, and to make the expenditures necessary to effectuate the decree a lien upon all of the property in the State of Illinois and upon all the revenues of that State and of the Sanitary District of Chicago, to issue bonds secured by the full faith and credit, the complete taxing power and all of the revenues of the Sanitary District of Chicago and the State of Illinois, to make such bonds a lien upon all of the property in the State of Illinois and upon all of the revenues of the State of Illinois and of the Sanitary District of Chicago, to levy and collect such taxes as may be necessary to provide for payment of the interest upon such bonds as it accrues and to provide a sinking fund to pay the principal of such bonds as said bonds fall due, to refinance outstanding bonds and obligations of the Sanitary District of Chicago as they may severally fall due, and to do everything which may be necessary, convenient or proper to bring about the speedy enforcement of the decree of this Court and the speedy restoration of your applicants' rights, such officer or officers to continue to exercise such powers until the decree has been fully performed and all obligations created on behalf of the State of Illinois and the Sanitary District of Chicago shall have been fully discharged, or until the State of Illinois and the Sanitary District of Chicago shall have made adequate provision for the performance of the decree and the satisfaction of any obligations created on their behalf by such officer of this Court, and for such other and further relief in the premises as shall seem just and meet.

JOHN W. REYNOLDS,
Attorney General of the State of Wisconsin,

HERBERT H. NAUJOKS,
Ass't Attorney General of Wisconsin,

HENRY N. BENSON,
Attorney General of the State of Minnesota,

GILBERT BETTMAN,
Attorney General of the State of Ohio,

PAUL W. VOORHIES,
Attorney General of the State of Michigan,

RAYMOND T. JACKSON,
Special Assistant to the Attorneys General.

Solicitors for the Applicants.

Filed October 3, 1932.

United States of America,
District of Columbia, ss.

Gilbert Bettman, being first duly sworn, on oath says that he is the duly elected, qualified and acting Attorney General of the State of Ohio; that he has read the foregoing application and knows the contents thereof, and that the same is true as he verily believes.

Gilbert Bettman.

Subscribed and Sworn to before me this 3rd day of October 1932.

..................................,

Notary Public in and for the District of Columbia.

In the Supreme Court of the United States

No. 7, ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA, COMPLAINANTS,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, DEFENDANTS.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS, INTERVENING DEFENDANTS.

No. 11, ORIGINAL.

STATE OF MICHIGAN, COMPLAINANT,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL., DEFENDANTS.

No. 12, ORIGINAL.

STATE OF NEW YORK COMPLAINANT,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL., DEFENDANTS.

BRIEF OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN IN SUPPORT OF APPLICATION FOR THE APPOINTMENT OF AN OFFICER OR OFFICERS OF THE COURT TO CARRY OUT THE DECREE MADE AND ENTERED IN THE ABOVE ENTITLED CAUSES ON APRIL 21, 1930.

STATEMENT OF FACTS.

The instant application is filed pursuant to paragraphs 6 and 7 of the decree, which read:

> "6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above-entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or *the progress of construction*, or the method of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.
>
> "7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy." (Italics ours.)

The facts set forth in the instant application and hereinafter discussed in this brief, seem not only to justify but to require the applicants to invoke the aid of this Court, under the foregoing provisions of the decree, to remove the obstacles which have already modified as to time the relief to which they are entitled, as declared by this Court, or to obtain a judicial determination that the relief adjudged to them in the decree will not be further delayed by any failure of the defendants to remove such obstacles; for otherwise applicants will be in exactly the same situation in 1938 that they were when the decree was rendered in 1930.

History of the Litigation.

The State of Wisconsin filed the first of these bills on July 14, 1922. The Wisconsin bill was amended on October 5, 1925, and the States of Minnesota, Ohio and Pennsylvania became co-plaintiffs. The Amended bill sought an injunction restraining the State of Illinois and the Sanitary District of Chicago from causing any water to be taken from the Great Lakes-St. Lawrence watershed in such manner as permanently to divert the same from that watershed. On April 8, 1926, the State of Michigan filed a separate bill for the same relief. On October 18, 1926, the State of New York filed a separate bill for the same relief. Subsequently, the three suits were consolidated for the purpose of hearing. *Wisconsin v. Illinois,* 278 U. S. 367, 369-70.

Pursuant to a hearing upon the First Report of the Special Master, to whom the causes had been referred, this Court in a decision rendered on January 14, 1929, established the facts and declared the law governing the rights of the parties. *Wisconsin v. Illinois,* 278 U. S. 367. This Court held that the diversion of water beyond any negligible amount which might be necessary to maintain navigation in the Port of Chicago was illegal, but the restoration of the just rights of the complainants was made gradual rather than immediate "in order to avoid so far as might be the possible pestilence and ruin with which the defendants have done much to confront themselves." *Wisconsin v. Illinois,* 281 U. S. 179, 196. Thereafter these causes were again referred to the Special Master to determine (1) the practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than Lake diversion; (2) the time required to complete such practical measures and place them in operation; (3) the reductions in diversion immediately practicable, and from time to time, pending the completion and placing in operation of such practical measures; and (4) the amount of the negligible diversions, if any, which might be eventually required to maintain navigation in the Port of Chicago. After the filing of the report of the Special Master on re-reference and on March 14, 1930, this Court rendered its decision. *Wisconsin v. Illinois,* 281 U. S. 179.

The Decree.

The formal decree was announced on April 21, 1930, and is reported in 281 U. S. 696-8. This decree provided three steps in the reduction of the unlawful diversion necessary to restore petitioners' just rights as declared by this Court. The progressive reductions in the unlawful diversion, thus required by the decree were, (1) to 6,500 cubic feet per second by July 1, 1930; (2) to 5,000 cubic feet per second by December 31, 1935; and (3) to 1,500 cubic feet per second by December 31, 1938. The amounts of the diversion so fixed by the decree were in each instance in addition to the domestic pumpage.

Whether the relief provided by the decree was conditioned upon the construction and placing in operation of the program of practical measures for the disposition of the sewage of Chicago without diversion.

While the decree did not in terms require the State of Illinois and the Sanitary District of Chicago to construct and place in operation particular sewage disposal plants on or before the dates fixed by the decree for progressive reductions in the unlawful diversion maintained by such defendants, the reductions in the diversion provided by the decree for July 1, 1930, and for December 31, 1935, were predicated upon the findings of fact reported by the Special Master and confirmed by this Court that certain parts of the practical measures for the treatment of all of the sewage of the Sanitary District of Chicago by artificial processes could be completed and placed in operation on or before such date, and that with the completion and placing in operation of such portions of the practical program for sewage disposal, the reductions provided in the decree could be safely had without hazard to the health of the people of the Sanitary District of Chicago in deference to which the Court had temporarily postponed the restoration of complainants' just rights. Similarly, the ultimate reduction provided for December 31, 1938, was predicated upon the findings of fact that the complete program of practical measures for the treatment of the sewage of the Sanitary District of Chicago by artificial processes could be completed and placed in operation on or before that date, and that thereafter no diversion for sanitary purposes would either be necessary or legally admissible in derogation of complainants' rights.

Clearly, the decree of the Court contemplated either (1) that these various sewage disposal plants and auxiliary structures should be respectively completed and placed in operation before the intermediate and final reductions provided by the decree should be had; or (2) that such postponement in the final termination of the illegal diversion and the final restoration of petitioners' rights afforded ample time within which to construct and place in operation such sewage disposal plants and auxiliary structures, so that the responsibility for any possible detrimental effect which might flow from such intermediate and final reductions without the completion of the contemplated sewage plants and auxiliary structures would rest squarely upon the defendants. If the latter construction be not adopted, the facts set forth in the petition, as hereinafter shown, establish that the defendants are and, unless the Court grants the relief here sought, will continue to avoid, delay and circumvent the restoration of petitioners' rights.

In any event, it is certain that the mercy in the Court's decree was induced by the representations of the Sanitary District that it was progressing and would progress in providing other means than Lake diversion for sewage disposal. The whole case before the Master was to that effect. Since the Sanitary District procured the Supreme Court to modify and postpone relief, which it adjudged to be rightful, by persuading the Court to rely upon these representations, the Sanitary District cannot deny that it is obligated to carry out such program regardless of whether a failure or neglect so to do would postpone the restoration of applicants' rights; and, hence, it seems clear that the Court in any case has the power to require the Sanitary District and the State of Illinois to proceed with the program upon which the decree is based.

The record of performance of the defendants under the decree has at all times been meager and inadequate and has now substantially ceased.

Since the structures deemed essential to the reduction of July 1, 1930, had been completed and placed in operation at the date of entering the decree, no question arises on the performance of that portion of the judgment. However, so far as the work remaining to be accomplished after the entry of the decree and deemed essential to the reduction in the diversion provided for December 31, 1935, and to the ultimate restoration of the plaintiffs' rights on December 31, 1938, the semi-annual reports of the Sanitary District of Chicago, filed as required by the decree, disclose a meager and inadequate record of accomplishment, which has constantly declined until it has reached a point where the activities of the defendants in the performance of the decree have either ceased or become negligible. Their activities at no time have been adequate. (Application, Sec. IV, p. 6.) Work has either been abandoned or else has never been commenced upon the structures claimed to be essential to permit the reduction provided by the decree for December 31, 1935. (Application, Sec. V, p. 7.) It has been at all times admitted that the Southwest Side plant, as proposed in the program submitted by the Sanitary District of Chicago, is the controlling factor in determining the over-all time required for the completion of the program for the treatment of all of the sewage of the Sanitary District by artificial processes. Yet the semi-annual reports of the Sanitary District disclose that no effective steps have been taken or are now being pursued even for the acquisition of a site for this plant. Obviously, if the construction and placing in operation of this plant is to be made a condition precedent of the ultimate restoration of petitioners' rights as defined by this Court, then the failure of the defendants, whether due to negligence, incompetence or bad faith, to take any steps to acquire a site and much less to construct this plant is defeating the rights of the applicants as declared by this Court.

Although the Sanitary District of Chicago made an exhaustive study and full determination of the nature and proper method of treatment of the stockyards or Packingtown wastes during the period extending from 1912 to 1918, inclusive, the defendants in their report filed in this Court have put forward and continue to put forward a specious and unfounded claim of necessity to study the nature of the stockyards or Packingtown wastes as a reason for delay in the performance of this Court's decree. (Application, Sec. VII, p. 10.) Neither can the pendency of a suit by the Sanitary District of Chicago against certain of the Packing Companies, which suit has been pending since 1924, be assigned or accepted as a reason for delay in the performance of the Court's decree. The attempt to do so is a badge of bad faith. (Application, Sec. VIII, p. 11.)

The Sanitary District of Chicago has so reduced the personnel of its Engineering organization that it is no longer adequate to proceed with the performance of the decree of this Court. (Application, Sec. X, p. 13.)

The State of Illinois and the Sanitary District have at all times neglected, failed or refused to make adequate provision for financing compliance with this Court's decree. (Application, Sec. X, p. 13.) Through negligence, incompetence or bad faith, the State of Illinois and the Sanitary District of Chicago have failed for approximately four years to provide for the levy and collection of normal taxes, and these defendants now assign the resulting impairment of their credit, created by their own misconduct, as a reason for delay in the performance of the decree and as a basis of exoneration at the expense of the rights of these petitioners and their peoples. (Application, Sec. X, p. 13.)

The facts clearly establish that further intervention by this Court is necessary to prevent the frustration of applicants' rights as established by the decree.

The facts set forth in the petition and the inferences which necessarily flow therefrom, irresistibly compel the conclusion that the defendants, the State of Illinois and the Sanitary District of Chicago, have wholly failed to make any real, substantial and good faith effort to perform the decree of this Court, and fully support the inference and charge that it is the plan, intention and purpose of the Sanitary District of Chicago and the State of Illinois thereby to delay, avoid and circumvent the performance of the decree of this Court and the restoration of the just rights of your petitioners as declared by this Court. If further support for this conclusion were necessary, it would be found in the history appearing in the records of this Court of the litigation between the Federal Government and these defendants and between the complainants in these suits and these defendants. The whole course of conduct of these defendants, both in their relations with the Federal Government and with the other States of the Union, has been characterized by a persistent and consistent policy of neglecting, failing or refusing, upon one excuse or another, to provide for the disposition of the sewage of Chicago without unlawful diversion of water from the Great Lakes-St. Lawrence watershed, and then interposing, as a shield against retribution for their unlawful acts, the claim of necessity to protect the health of the people of the District. In this way the defendants have for nearly thirty years prevented, hindered and impeded a restoration to the petitioners and their peoples of their just rights. Unless the decree may be properly construed as requiring the defendants to reduce the diversion as therein provided without regard to whether the defendants shall have completed and placed in operation the sewage disposal plants and auxiliary works which they could and should have completed by the date specified in the decree, then your petitioners respectfully submit that the Court has the power and should exercise the power to protect the rights of the complainants already declared by providing such other and further relief as will assure the restoration of the rights of the complainants without regard to the obstruction, negligence, defiance or bad faith of the defendants, as the case may be. Upon the facts herein set forth and the decisions of this Court in this litigation, the equitable right of the complainants to such relief as will effectively prevent the circumvention or defeat of their rights through the negligence, defiance or bad faith of the defendants is clear; and as is hereinafter shown, the power of the court effectively to provide such relief is obvious and well settled.

Certainly if the construction of sewage disposal works is to be made a condition precedent to a restoration of applicants' rights, the Court should grant the relief unless the Sanitary District and the State of Illinois, by a day certain to be fixed by the Court, shall have satisfied the Court, and given adequate assurances, that they are then proceeding and will continue to proceed with a speed which will enable the future clauses of the decree to be applied in accordance with its terms; for unless the applicants secure the Court's aid in removing the obstacles which have already modified as to time the relief to which they are entitled, they will be in exactly the same situation in 1938 that they were when the decree was rendered in 1930.

THE LAW.

I.

THE ADMITTED JUDICIAL POWER OF THE SUPREME COURT TO ENTER THE JUDGMENT IN THE ABOVE ENTITLED SUITS NECESSARILY EMBRACES FULL, PLENARY, ADEQUATE AND COMPLETE POWER AND AUTHORITY TO ENFORCE THAT JUDGMENT AND MAKE IT EFFECTIVE; AND SUCH POWER COMPREHENDS NOT ONLY THE POWER TO COERCE ALL INSTRUMENTALITIES AND AGENCIES OF STATE POWER BUT IT INCLUDES THE POWER DIRECTLY TO ENFORCE AND MAKE EFFECTIVE ITS JUDGMENT THROUGH APPOINTING FOR THAT PURPOSE, WITH ALL NECESSARY POWERS, SUCH OFFICER OR OFFICERS OF THE COURT, WHETHER UNITED STATES MARSHALS, MASTERS, COMMISSIONERS AND/OR RECEIVERS, AS MAY BE NECESSARY, CONVENIENT OR APPROPRIATE TO ACCOMPLISH THAT PURPOSE.

A.

The jurisdiction of this Court in the exercise of the judicial power conferred upon it under the Constitution of the United States to render the judgment in these cases is established beyond debate.

Wisconsin v. Illinois, 278 U. S. 367;
Wisconsin v. Illinois, 281 U. S. 179.

B.

Jurisdiction to enter judgment embraces full, plenary, adequate and complete power and authority to enforce the judgment and make it effective.

It has been said that no principle of Constitutional Law has been more firmly established or constantly adhered to than that wherever this Court has jurisdiction to render a judgment, it has power to enforce the judgment and make it effective. *Gordon v. United States,* 117 U. S. 697, 704. This rule applies with full force and effect to the exercise of the original jurisdiction of this Court in controversies between States. In *Virginia v. West Virginia,* 246 U. S. 565, Mr. Chief Justice White, in rendering the unanimous opinion of the Court, said at page 591:

> "That judicial power essentially involves the right to enforce the results of its exertion is elementary. *Wayman v. Southard,* 10 Wheat. 1, 23; *Bank of the United States v. Halstead,* 10 Wheat. 57; *Gordon v. United States,* 117 U. S. 697, 702. And that this applies to the exertion of such power in controversies between States as the result of the exercise of original jurisdiction conferred upon this court by the Constitution is therefore certain."

When this Court acts in the exercise of its original jurisdiction under the Constitution, it exercises an authority paramount to the States and overrides provisions of State Constitutions and State laws just as effectively as do the direct provisions of the Federal Constitution and of lawful Federal statutes. In *Wisconsin v. Illinois,* 281 U. S. 179, Mr. Justice Holmes, in rendering the unanimous opinion of this Court, said at page 197:

> "It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an

exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defences upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State."

C.

The power of the Supreme Court of the United States to enforce and make effective a judgment rendered in the exercise of its orginal jurisdiction over controversies between States comprehends not only the power to coerce all instrumentalities and agencies of State power, but includes the power directly to enforce and make effective its judgment through appointing for that purpose, with all necessary powers, such officer or officers of the Court, whether Marshals, Masters, Commissioners and/or Receivers, as may be necessary, convenient or appropriate to carry out the decree.

It is well settled that where a duty rests upon any officer of a State, or her political sub-divisions, to perform any acts necessary to the performance of a judgment of a Federal Court, that court has and will exercise the power to compel performance of the judgment by mandamus. Thus where there is a duty to levy or collect a tax to pay a debt which has been merged in a judgment of a Federal Court, the court will mandamus the State or municipal officer to enforce the judgment. *Supervisors v. United States ex rel.*, 71 U. S. (4 Wall.) 435; *Von Hoffman v. City of Quincy*, 71 U. S. (4 Wall.) 535; *City of Galena v. Amy*, 72 U. S. (5 Wall.) 705; *Riggs v. Johnson County*, 73 U. S. (6 Wall.) 166; *Walkley v. City of Muscatine*, 73 U. S. (6 Wall.) 481; *Labette County Commissioners v. Moulton*, 112 U. S. 217.

This power extends to the coercion of officers of a State in aid of the performance of a judgment rendered by this Court in the exercise of its original jurisdiction over controversies between States. *Virginia v. West Virginia,* 246 U. S. 565.

However, courts also have the power directly to enforce their judgments through officers appointed by the court to carry out such judgments. Thus this Court may appoint a Commissioner or Commission to establish a boundary line between States in conformity with its decree. *Arkansas v. Tennessee,* 246 U. S. 158. The judicial power to render a decree for the apportionment of the waters of a river among different appropriators includes the power, without statutory authority, to appoint a River Master or Commissioner to carry out the decree, although the decree requires a variation in the apportionment from time to time under changing conditions, and although it would have been appropriate for the legislature to have provided administrative machinery to supervise the apportionment of the waters of the stream. *Montezuma Canal Co. v. Smithville Canal Co.,* 218 U. S. 371. That this Court, acting without benefit of statute, might appropriately appoint such an officer of the court to carry out a decree apportioning the waters of a river in a suit between States was recognized in *New Jersey v. New York,* 283 U. S. 805. A court, without authority of statute, may appoint a receiver in order to make possible or more convenient the performance or enforcement of a judgment or decree. *Stockton v. New Jersey Central R. R.,* 50 N. J. Eq. 489, 25 Atl. 942; *Mabon v. Ongley Electric Co.,* 156 N. Y. 196, 50 N. E. 805. See 53 *C. J.* 47, Sec. 34.

While the procedure is generally the subject of statute, a court may appoint a Commissioner to execute a deed pursuant to a decree of specific performance. *Langdon v. Sherwood,* 124 U. S. 74, 81. Where a state statute authorizes a court to appoint "a person" to discharge a duty enjoined by a writ of mandamus, which the defendant has refused to perform, a Federal Court may appoint a United States Marshal to levy and collect taxes for the payment of a judgment rendered against a municipal corporation of such State: *Supervisors v. Rogers,* 74 U. S. (7 Wall.) 175.

While it has been held that where there is no effective remedy under State law to collect a money judgment against a municipal corporation, the Federal Courts will empower a Marshal to levy and collect a tax to discharge the judgment, (*Welch v. Ste. Genevieve,* 29 Fed. Cas. 608, No. 17,372; *Garrett v. City of Memphis,* 5 Fed. 860; *Post et al. v. Taylor County,* Fed. Cas. No. 11,302 (19 Fed. Cas. p. 1092); *United States v. Treasurer of Muscatine County,* Fed. Cases No. 16,538 (28 Fed. Cas. p. 213); *Stansell v. Levee Board of Miss. Dist. No. 1,* (D. C. N. D. Miss. 1881) 13 Fed. 846), the Federal Courts have generally held that they could only compel the exercise of such machinery as State law had provided for the levy and collection of taxes to pay a money judgment against a municipal corporation and that if such measures fail, no relief could be had. *Rees v. City of Watertown,* 86 U. S. (19 Wall.) 107 (1873); *Meriwether v. Garrett,* 102 U. S. 472; *South Dakota v. North Carolina,* 192 U. S. 286 (1903); *O'Brien v. Wheelock,* 78 Fed. 673 (C. C. S. D. Ill. 1897, Allen *D.J.*); *Yost v. Dallas County,* 236 U. S. 50.

However, these cases in no way militate against the power of this Court to enforce the instant judgment directly through the appointment of a Master or Receiver with the full powers prayed for by the petitioners. The distinction between those cases and the one at bar is obvious. Suits to enforce bonds of municipal corporations are brought upon obligations issued under and not paramount to the authority of the State. The extent of such an obligation is determined by State statutes and law and not by the Constitution of the United States. A plaintiff by bringing suit in the Federal Courts upon the contract obligation of a municipal corporation acquires no greater rights than are given by the State statutes which measure the extent of the obligation created. Ordinarily, the right given in the bonds issued by municipal corporations, pursuant to State statutes, to have a tax levied, collected and applied to their payment is to have such tax levied and collected in the manner provided by the State statute, and the court in the guise of enforcing the judgment cannot extend the scope of such obligations.

On the other hand, the Supreme Court of the United States is given jurisdiction and power by the Federal Constitution to determine all controversies between States. The authorities establish that the jurisdiction to render judgments necessarily comprehends the power to enforce the judgment. Where the power to enforce does not exist, there is no jurisdiction. Accordingly, whenever a judgment is rendered by the Supreme Court of the United States in the exercise of its original jurisdiction in a controversy between States, that judgment is based upon the Federal Constitution and the extent of its obligation is measured by the Federal Constitution. From this it necessarily follows that unlike the other class of cases, the Supreme Court does have power and authority to enforce such judgments by any appropriate means and this includes the appointment of a receiver, commissioner or other functionary to carry out the judgment even to the extent of issuing bonds and levying taxes, if that should be necessary.

Obviously, the exercise of this original jurisdiction could not be conditioned upon the provision by the State of some machinery to carry out the decree of this Court; for, if that were so, the original jurisdiction of this Court over controversies between States—perhaps the most important power of this Court, since it is designed to settle those controversies which would ordinarily be settled by diplomatic representations or war among independent nations—would be nullified and set at naught. That the power of this Court in the exercise of its original jurisdiction is no such feeble, impotent and futile thing has long since been set at rest by this Court. In *Virginia v. West Virginia*, 246 U. S. 565, the syllabus reads in part:

> "The original jurisdiction conferred upon this court by the Constitution over controversies between States includes the power to enforce its judgment by appropriate remedial processes, operating where necessary upon the governmental powers and agencies of a State.
>
> The authority to enforce its judgment is of the essence of judicial power. That this elementary principle applies to the original jurisdiction in controversies between States has been universally recognized as beyond dispute, as is manifested by the numerous cases of the kind which have been decided, in not one of which hitherto, since the foundation of the Government, has a State done otherwise than voluntarily respect and accede to the judgment." (p. 565)

In that case, Mr. Chief Justice White, rendering the unanimous opinion of this Court, said:

> "That judicial power essentially involves the right to enforce the results of its exertion is elementary. *Wayman v. Southard*, 10 Wheat. 1, 23; *Bank of the United States v. Halstead*, 10 Wheat. 57; *Gordon v. United States*, 117 U. S. 697, 702. And that this applies to the exertion of such power in controversies between States as the result of the exercise of original jurisdiction conferred upon this court by the Constitution is therefore certain. The many cases in which such controversies between States have been decided in the exercise of original jurisdiction make this truth manifest. Nor is there room for contending to the contrary because, in all the cases cited, the States against which judgments were rendered conformably to their duty under the Constitution, voluntarily respected and

gave effect to the same. This must be unless it can be said that, because a doctrine has been universally recognized as being beyond dispute and has hence hitherto, in every case from the foundation of the Government, been accepted and applied, it has by that fact alone now become a fit subject for dispute."

That the enforcement of such a decree cannot be defeated by restrictions in a State Constitution or other State obstructions was forcefully stated by Mr. Justice Holmes in *Wisconsin v. Illinois,* 281 U. S. 179, at 197, as follows:

> "It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defences upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State."

Obviously, if a State cannot defeat the enforcement of such a decree by positive action or self-imposed restrictions, it cannot do so by inaction or refusal to act. Under the Constitution of the United States such a decree becomes part of the supreme law of the land, in effect a part of the Federal Constitution, and overrides every attribute of State sovereignty. When the States of the United States agreed to join together to form a more perfect union under the Federal Constitution, they respectively agreed that the Supreme Court should have jurisdiction to decide controversies among them, that such decisions should be final and that this Court should have full power to enforce them. The obligation of such a judgment is thus measured by the Federal Constitution; and the jurisdiction of this Court to render it carries the power to enforce it through any convenient and appropriate means without aid of statute.

This power includes the power to create such binding obligations on the States as may be necessary to effectuate such a decree and the power to levy and collect such taxes as may be required until the State voluntarily performs her duty.

The fact that the Congress might properly provide suitable administrative machinery for the enforcement of such a decree (*Virginia v. West Virginia,* 246 U. S. 565), in no wise prevents the court in the absence of such administrative machinery from creating such machinery as may be necessary and appropriate to the enforcement of the decree without aid of statute. *Montezuma Canal Co. v. Smithville Canal Co.,* 218 U. S. 371. The Congress could not take such power away from this Court; and no legislation is necessary to make it effective; for otherwise the Congress by failure to pass laws could effectively nullify the jurisdiction of this Court. It is submitted that the power of this Court to give the relief prayed for by these petitioners is too clear for debate.

CONCLUSION.

The facts set forth in the petition or application require a conclusion that without the further intervention of this Court, the defendants will continue to delay, avoid and circumvent the performance of the decree and the restoration of complainants' just rights as declared by this Court. Clearly, this Court should intervene if it has the power to do so. That this Court has the power directly to enforce the judgment is deemed too clear to debate. By just such methods as now appear from the facts set forth in the application filed herewith, the defendants for 25 years have defied the Federal Government and defeated the plaintiffs' rights. No consideration of the dignity of the parties can justify further delay. Throughout the long history of the controversy, every consideration extended to the defendants on the grounds of equity or in deference to the dignity of the State as a quasi-sovereign, either by the executive officers of the Federal Government or by this Court, has been taken advantage of by these defendants to magnify the then existing obstacles or to create further obstacles to the termination of their unlawful conduct and restoration of your petitioners' just rights. Justice imperatively demands the immediate enforcement of this decree. Applicants therefore submit that unless the Sanitary District of Chicago and the State of Illinois, by a day certain to be fixed by the Court, shall have satisfied the Court and furnished adequate assurances that they are then proceeding and will continue to proceed with a speed which will enable the future clauses of the decree to be applied in accordance with its terms, this Court should grant the relief prayed for by these applicants.

Respectfully submitted,

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Filed October 3, 1932.

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CLERK

IN THE

Supreme Court of the United States

STATES OF WISCONSIN, MINNESOTA, OHIO, and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9, Original.

RETURN OF THE SANITARY DISTRICT OF CHICAGO AND THE STATE OF ILLINOIS TO THE RULE TO SHOW CAUSE ENTERED HEREIN ON OCTOBER 10, 1932.

FRED KLEIN CO., 24 PRINTERS, CHICAGO.

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RETURN OF THE SANITARY DISTRICT OF CHICAGO AND THE STATE OF ILLINOIS TO THE RULE TO SHOW CAUSE ENTERED HEREIN ON OCTOBER 10, 1932.

To the Honorable, the Chief Justice and Associate Justices of the Supreme Court of the United States:

Now come THE SANITARY DISTRICT OF CHICAGO, a public municipal corporation, and the

STATE OF ILLINOIS*, by William Rothmann, Frank Johnston, Jr., Joseph B. Fleming and Oscar E. Carlstrom, Attorney-General of Illinois, their solicitors, and submit this, their return to the rule to show cause entered herein on October 10, 1932, and respectfully show to the court:

Paragraph 6 of the decree of this honorable Court, entered herein on April 21, 1930, reads in part as follows:

> "That on the coming in of each of said reports, and *on due notice to the other parties,* any of the parties to the above entitled suits, complainants or defendants, may apply to the court for such action or relief, * * * * as may be deemed to be appropriate."

No notice was given to either the Sanitary District or the State of Illinois of the intended filing by the states of Wisconsin, Minnesota, Ohio and Michigan of their "Application for the appointment of an officer or officers of the court to carry out the above decree made and entered in the above entitled causes on April 21, 1930" (for convenience hereinafter sometimes designated the "application").

Wide publicity was given to the matter in the public press a number of days prior to the actual date of filing, and it was from the public press that the respondents first learned of the intended filing of the application.

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*For convenience, The Sanitary District of Chicago will at times be referred to individually as the Sanitary District or the District, and the State of Illinois and The Sanitary District of Chicago, when referred to collectively, will be called respondents. The Board of Trustees of the Sanitary District will be designated as the Trustees.

The rule to show cause reads in part as follows:

> "THEREFORE, it is ordered by this court that THE SANITARY DISTRICT OF CHICAGO show cause, by printed return, on or before Monday, November 7, 1932, why it has not taken appropriate steps to effect compliance with the requirements of the decree of this court in these causes dated April 21, 1930, (281 U. S. 696)."

A rule similar in all respects to the foregoing was likewise directed to the State of Illinois.

In view of the language of the rule it is conceived by the respondents to be unnecessary to file a detailed answer to the application, but rather that there should be filed a "return" setting forth what has been done by the respondents in furtherance of performance of the requirements of the decree, the reasons why a greater amount of progress has not been made and a statement of what reasonably can be expected to be accomplished within the next 6.16 years.

Nevertheless the application contains some averments to which it is deemed appropriate to make reply.

The application is replete with expressions attributing to the respondents negligence, incompetence, bad faith, and willful obstruction, avoidance and circumvention in the performance of the decree. These expressions are based on nothing more substantial than unwarranted inference and conjecture. In so far (if at all) as it may be necessary to do so, the respondents emphatically deny that there has been on their part or the part of either of them either negligence, incompetence or bad faith.

The respondents further deny that on their part there has been at any time "effort to delay, avoid and circumvent the performance of the decree" as averred in the application. Hereinafter will be set forth in detail just what has been done, together with a full exposition of the circumstances (over which neither of these respondents had any control) which have operated to hinder and delay the execution of the program of construction of sewage treatment and disposal projects.

The District has not been able fully to carry out its original program of construction within the time limits as proposed at the time of the hearings before the Special Master in these causes. Unforeseen obstacles have been encountered which have impeded the execution of the original plan with respect to construction. The causes for the District's inability to adhere to its original construction program hereinafter will be discussed; and it will be shown that such obstacles are being overcome and eliminated, and that sufficient work will be done within the time required to enabled the District to carry out the terms of the decree in every detail.

REQUIREMENTS OF DECREE.

The decree (281 U. S. 696) has for its purpose the carrying out of the conclusions set forth in the opinions of this court announced on January 14, 1929, (278 U. S. 367) and April 14, 1930, (281 U. S. 179). The decree is silent with respect to the specific measures to be taken by respondents to effect compliance with its provisions. In the opinion of April 14, 1930, (281 U. S. 179, 198, 199), the court approved the recommendations of the Special Master relating to the limitations to be put on the quantities of water to be diverted from Lake Michigan, to-wit, (1) On and after July 1, 1930, an annual average diversion not to exceed 6500 cubic feet per second, in addition to that drawn for domestic purposes; (2) on and after December 31, 1935, an annual average limited to 5000 c. f. s., in addition to domestic pumpage; (3) when the whole system for sewage treatment is completed, the average annual diversion should be limited to 1500 c. f. s., in addition to domestic pumpage, which should be accomplished on or before December 31, 1938.

The decree embodies the recommendations of the Special Master of the above program for diminution of diversion with the qualification that the limitation specified to be effective after December 31, 1935, be carried out *"unless good cause be shown to the contrary.*

The court in its opinion approved the recommendation of the Master that the whole sysem of sewage treatment works be completed by December 31, 1938, and that the West Side treatment works be completed and in operation not later than December 31, 1935, subject to *"any modification that necessity may show should be made."* (281 U. S. 179, 199). The decree contains no specific requirements concerning a program of construction. In the opinion of this Court rendered on April 14, 1930, 281 U. S. 179, the Court said (197):

> "The defendants have submitted their plans for the disposal of the sewage of Chicago in such a way as to diminish so far as possible the diver-

sion of water from the Lake. In the main these plans are approved by the complainants. The master has given them a most thorough and conscientious examination. *But they are material only as bearing on the amount of diminution to be required from time to time and the times to be fixed for each step, and therefore we shall not repeat the examination."* (Italics ours.)

The decree contains no directions with respect to the progress of the work necessary to effect compliance with its terms concerning the amount of the diversion except the requirement that the District file semi-annual reports setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the District, and setting forth also the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan, from the time of the decree down to the date of the report. These reports have been duly filed.

In referring to the contemplated controlling works in the Chicago river which the Master found should be completed within a certain time in order to make possible the limited diversion proposed, the court expressly stated that its judgment dealt "only with the amount [of the diversion] and the time". (281 U. S. 179, 198).

COMPLIANCE WITH REQUIREMENTS OF DECREE.

The Sanitary District has complied with the terms of the Decree. The reduction in diversion of water from Lake Michigan to an annual average of not exceeding 6,500 cubic feet per second was made on July 1, 1930. Since that date, the diversion has averaged

6,497 c. f. s. for the last 6 months of 1930,
6,500 c. f. s. for the year 1931, and
6,415 c. f. s. for 10 months (January to October), 1932.

Semi-annual reports were filed with the Clerk of this honorable Court on July 1, 1930, Januay 1, 1931, July 1, 1931, January 1, 1932 and July 1, 1932, setting forth the progress made in the construction of sewage treatment works of The Sanitary District, the extent of operation of the sewage treatment plants, and the average diversion of water from Lake Michigan.

Subdivision IV of the application avers that the dates and amounts of reductions in the diversion were fixed by findings of fact as to the time in which works to purify the sewage of Chicago could be constructed and placed in operation. These dates were (Report of Special Master on Re-reference, pages 142 and 146):

	To be completed
North Side Treatment Works and Batteries A and B of Imhoff Tanks at West Side Treatment Works	July 1, 1930
Calumet Treatment Works	December 31, 1933
West Side Treatment Works	December 31, 1935
Southwest Side Treatment Works	December 31, 1938

In the same report of the Special Master, on the same page, 146, is the statement: "that the foregoing requirements as to times of completion include allowances for ordinary contingencies but not for strikes or *other occurrences beyond the control of the Sanitary District* or its contractors."

The foregoing schedule, so far as it relates to the *Construction* program, was not embodied in the decree.

Though there is in the Decree no absolute requirement of strict adherence to these dates, nevertheless, it has been the endeavor of the Sanitary District to complete these works in the order named and to put them in operation as nearly as possible to the dates specified.

PROGRAM OF CONSTRUCTION ADOPTED AFTER ENTRY OF DECREE.

Prior to the entry of the decree, the engineers of the Sanitary District estimated that 12 years were required for the completion of works of sufficient capacity to treat the sewage originating within the boundaries of the Sanitary District so as to permit of the reduction of the quantity of water withdrawn from Lake Michigan to 1500 second feet without undue pollution of the waters below the southerly end of the District's main channel.

The works which were deemed necessary to effect adequate treatment of sewage were and are (including works then already completed):

(a) 250 miles of intercepting sewers, of which 37 miles are of an internal diameter of 15 feet and over.

Size Equivalent Diameter	Length
3 feet and less	41 miles
4 ft. to 6 ft.	99 miles
7 ft. to 9 ft.	53 miles
10 ft. to 12 ft.	12 miles
13 ft. to 14 ft.	8 miles
15 ft. and over	37 miles
Total	250 miles

(b) Sewage treatment plants known, respectively, as:

1. The North Side Works.
2. The West Side Works.
3. The Southwest Side Works.
4. The Calumet Works.
5. The Desplaines River project.

(c) Sundry pumping stations, miscellaneous plants and sewers.

(d) Chicago River Controlling Works.

The estimated costs of those portions of the foregoing works which were to be completed subsequently to April 21, 1930, was $179,744,438.58.

Upon the entry of the Decree a program was laid out by the engineering department of The Sanitary District for construction of all the sewage treatment works made necessary by the Decree, in a reasonable and orderly sequence, with provision for such rate of progress as would insure completion by December 31, 1938. Under this schedule, the Calumet project was to be completed by the end of 1933, except the Calumet City intercepting sewer, which was to be completed by 1938. Extensions to the North Side plant were to be made in 1931, or 1932, and additional sewers in this project were to be constructed by 1938. The sedimentation part of the West Side treatment plant, with the principal West Side intercepting sewers, were to be completed by the end of 1933. The activated sludge portion (complete treatment) of the West Side plant was to be completed by the end of 1936 and all the West Side sewers were to be completed before the end of 1938. Construction of the Southwest Side treatment plant was to be started in 1935 and completed by the end of 1938. The Southwest Side sewers were to be constructed between 1936 and 1938, inclusive. This program allowed about two years for needed investigation of the Stockyards and Packingtown wastes and for negotiations with industries producing said wastes and allowed ample time for the design of the Southwest Side plant. It provided for a reasonably even distribution of the physical construction and a reasonable distribution of the costs of the same over the 8.7 year period allowed by the Decree.

PROGRESS MADE IN CONSTRUCTION PROGRAM.

The North Side sewage treatment plant was placed in part operation in October, 1928. On April 21, 1930, it was treating the sewage of about 344,000 people. This was increased to 681,000 people by June 24, 1930, and to 980,000 people (the total estimated population in the area) by August, 1930. (Semi-annual report of January 1, 1931).

Battery A of the West Side sewage treatment plant was placed in operation on June 2, 1930, treating the sewage of 248,000 people, and Battery B was completed and placed in operation in the early part of July, 1930, bringing the total treatment in this plant up to 510,000 persons. Sewage from Section 2 of the West Side sewer was added to the plant on October 1, 1931, increasing the amount of treatment to 729,000 persons.

The work above described was accomplished in reasonable compliance with the Master's conclusions, and the District's construction program.

In **Subdivision V** of the application, the District's semi-annual reports of progress are tabulated, and it is stated that progress "has been at all times meager and inadequate and much of the time negligible". What is here said in reply is applicable also to subsequent subdivisions of the application, a large part of which consists of repetition in varied forms of the asserted lack of progress.

At the hearings before the Special Master, in April, 1929, the Sanitary District presented certain figures, contained in defendants' exhibits 1385, 1386 and 1387, showing the costs of sewage treatment construction (a) completed, (b) under contract, and (c) estimated for the future. These figures were as of December 31, 1928, and were as follows:

Defendants' Exhibit 1385:	
Completed Works	$ 63,355,422.76
Defendants' Exhibit 1386:	
Works under contract and completed	18,562,180.07
Total completed	$ 81,917,602.83
Works under contract, but not completed	$ 11,473,683.00
Defendants' Exhibit 1387:	
Future work	176,166,000.00
Total future	$187,639,683.00

The grand total estimated cost of all completed sewage treatment works and all proposed future construction was thus $269,557,285.83 as of December 31, 1928.

During the interim between December 31, 1928, and April 21, 1930, the total design and construction expenditures on both old and new contracts were $7,895,244.42. These expenditures reduced the future estimated expenditures as of April 21, 1930, to $179,744,438.58.

The completed work as of April 21, 1930, the date of the decree, in terms of construction costs, aggregated $89,812,847.25.

During the period between April 21, 1930, and June 1, 1932, expenditures aggregating $10,306,832.67 were made on sewage treatment construction, increasing the total expenditure for completed works to $100,119,679.92 and reducing the future work (according to 1929 estimates) to $169,437,605.91. During this same period contracts were let on the Calumet project, totaling $4,936,000.00 and on the West Side project totaling $8,700,000.00, an aggregate of $13,636,000.00.

The expenditures on sewage treatment construction between June 1, 1932, (the date of cost summaries for the last report filed with this Court) and October 14, 1932, have been as follows:

Calumet project	$ 19,907.03
North Side project	196,307.58
West Side project	164,830.85
Southwest Side project	3,727.80
Total	$384,773.26

The completed work on sewage treatment construction, as of October 14, 1932, is as follows:

Calumet project	$ 20,348,594.33
North Side project	37,086,741.52
West Side project	41,643,399.15
Southwest Side project	276,323.81
Miscellaneous Plants and Sewers	595,978.63
Chicago River Controlling Works	53,415.74
Total	$100,504,453.18

On the basis of these figures $10,691,605.93 has been spent on construction between April 21, 1930, and October 14, 1932, and, as stated, contracts have been let for $13,636,000.00.

Below are tabulated by periods the work accomplished as measured by construction costs:

April 21 to June 1, 1930	$ 503,214.54
June 1 to December 1, 1930	4,836,163.05
December 1, 1930, to June 1, 1931	1,079,369.53
June 1 to December 1, 1931	3,607,347.21
December 1, 1931, to June 1, 1932	280,738.34

At the present time uncompleted work which is actually under contract amounts to $8,793,000.00. Work for which plans and specifications are completed, and which is ready immediately to advertise for bids amounts to approximately $2,500,000.00. Thus it will be seen that if money could be obtained nearly $9,000,000.00 worth of work could be in progress at this minute and an additional $2,500,000.00 within a few weeks. In addition to the foregoing, contracts for additional work aggregating between $2,000,000.00 and $3,000,000.00 can be let within sixty days from the date of assurance that funds will be available.

More progress has been made than is indicated by the figures of actual expenditures submitted in the reports to the Supreme Court. Plans and specifications are ready on Sections 5 and 6 of the West Side sewer, estimated at $2,455,000.00. Plans are practically completed on Sections 7 and 1-A of the West Side sewer and on the Evergreen Park, South Park Avenue, Colfax Avenue, California Avenue and Harvey sewers in the Calumet project, estimated at $5,175,000.00. These figures amount to almost 5 per cent of the total program. Plans were practically completed for Imhoff tanks for the Calumet treatment plant late in 1930 when it was decided to defer this work until a determination was made as to whether Imhoff tanks, heated digestion tanks or incineration of sludge was most feasible for this step in the sewage treatment process. Later developments have proved the wisdom of this decision. If incineration of sludge is the ultimate choice, considerable time and money will be saved on construction. As a result of this delay, the Calumet plant will not be completed by December 31, 1933, but it can be completed before the next reduction in the diversion on December 31, 1935.

In the report to the Supreme Court of July 1, 1932, it was stated that aside from designing and preparation of plans, no construction work was done on the sewage treatment program in six months between December 1, 1931, and June 1, 1932, except on one small contract on the West Side project for a sludge filtering and drying unit. This was a unit for experimenting on the incineration of sludge. The reason for this lack of progress was fully explained. It was solely and simply *lack of money.* Yet this six months' period is selected by complainants (page 9 of application) as a basis for computations of an absurd length of time for the performing of all the work.

In **Subdivision VI** of the application, the statement is made that the reduction in diversion provided by the decree after December 31, 1935, was predicated upon the completion of the Calumet, North Side and West Side projects and the installation of controlling works in the Chicago River. The specific complaint is "that the Calumet project has not been completed, that the West Side project has not been completed, that no contracts have been let for substantial parts of this project, and that no steps have been taken to design or construct the controlling works in the Chicago River or to seek or obtain the approval of the War Department for plans and location."

The sedimentation portion of the West Side treatment plant will be practically completed when the existing contracts are carried out. All the necessary West Side sewers can be completed in two and one-half years from the time of resumption of construction work. Hence, this plant can be ready by December 31, 1935. The activated sludge portion of this plant cannot be completed by December 31, 1935, but it can be completed by the end of 1936.

The Calumet project can be completed by December 31, 1935, which is the date fixed by the decree for diminution of the amount of diversion to 5,000 c. f. s.

As of April 21, 1930, 16.7 per cent of the total sewage originating within the Sanitary District was being treated. The semi-annual report of the District filed on July 1, 1932, shows (page 9) that 31.6

per cent was being treated, showing an increase of approximately 15 per cent of the total sewage treated as of the last mentioned date.

CAUSES OPERATING TO OBSTRUCT AND DELAY PERFORMANCE OF ORIGINAL PROGRAM.

In no wise admitting that appropriate measures have not been taken to effect completion of the construction program by December 31, 1938, and on the contrary insisting that all possible measures have been taken, it is respectfully submitted that lack of funds, due to circumstances beyond the control of these respondents, has for the time being interrupted the execution of the program. The reasons for the lack of funds, affecting the general progress of the work, and other unavoidable causes or alleged causes of delay impeding the progress of specific portions of the work and certain alleged derelictions of the respondents are hereinafter discussed.

(a) Lack of Funds.

In common with practically all sections of the United States, The Sanitary District of Chicago financially is suffering as a result of the existing deplorable business and economic collapse. But, in addition, the Sanitary District is a special sufferer from delay in the collection of taxes and nonpayment thereof, (over which it has no control) which are due mainly to the reasons hereinafter outlined.

The Sanitary District has the power to levy taxes but it is not a collecting body. Section 12 of the act creating the District (Cahills Ill. Rev. Stat. 1931

Chap. 42, Par. 349, page 1208) provides that the Board of Trustees

> "Shall cause the amount to be raised by taxation in each year, to be certified to the county clerk on or before the second Tuesday in August, as provided in section 122 of the general revenue law. All taxes so levied and certified shall be collected and enforced in the same manner and by the same officers as state and county taxes and shall be paid over by the officer collecting the same to the treasurer of the Sanitary District, in the manner and at the time provided by the general revenue law."

Section 3 of the Revenue Act of 1898, (Cahill's Ill. Rev. Stat. 1931, Chap. 120, Par. 314, page 2367), provides for a Board of Assessors of five members for Cook County, in which the Sanitary District is located.

Section 144 of the Revenue Act (Cahill, Ill. Rev. Stat., Chap. 120, Par. 162, page 2336), provides that:

> "The treasurers of counties under township organization and the sheriffs of counties not under township organization shall be ex-officio county collectors of their respective counties."

Cook County, the county within which The Sanitary District of Chicago is included, is under township organization. Its county treasurer is ex-officio county collector. Certain taxes are payable in the first instance to township collectors but ultimately to the county collector. No taxes are paid directly to the Sanitary District except by the county collector. The Sanitary District has no power to collect any taxes directly from the taxpayer.

Thus it will be seen that the Sanitary District possesses no power or authority and no control over the assessing or the collection of taxes.

Since 1898 the assessing machinery of Cook County consisted of an elected board of five assessors and a board of review of three members, likewise elected. (For present purposes it is not important to note that there were also township assessors who were ex-officio deputy county assessors.)

Whether justly so or not, in recent years there has existed a quite general belief that in the valuation of property for tax purposes and in the making of assessments, much discrimination and favoritism were practiced, resulting in great inequalities as between properties similarly situated. So widespread and universal became the distrust of and lack of confidence in these boards that there arose a demand for their abolition, and replacement with some simpler machinery. This demand gradually increased in volume until it resulted in legislation which hereinafter will be adverted to.

For many years taxes on personal property were inadequately assessed and collected. Real estate paid upwards of seventy-five per cent of the total taxes collected in Cook County. Improvidence and extravagance of former city and state administrations resulted in astonishing increases of taxes. Owners of real estate complained bitterly of the tax burden.

Subsequently to the completion of the revaluation and re-assessment hereinafter referred to, organizations of "real estate taxpayers" came into being and by means of extensive mail and radio propaganda acquired a very large membership. The purpose of these associations was to contest the validity of the tax levies for the years 1928, 1929 and 1930, and to procure reductions of the taxes on real estate. Members were advised to refuse to pay their taxes. A great many of them (probably nearly all) did so. This resulted in the withholding of payment of taxes on many thousands of parcels of real estate. The movement became what might be called a taxpayers' "strike." That strike to some extent still persists, although undoubtedly it has disintegrated to a considerable extent and very shortly will be completely broken for reasons which will hereinafter appear.

One or more of these organizations instituted suits of various sorts to prevent the collection of taxes. One of those suits was brought in the Superior Court of Cook County to enjoin the collection of taxes for the year 1930. A decree dismissing the bill for want of equity was affirmed by the Supreme Court of Illinois in December, 1931, *(Bistor, et al. vs. Board of Assessors, et al.,* 346 Ill. 362.) Plaintiffs then filed to the October term of the Supreme Court of the United States a petition for a writ of certiorari, (No. 343). That petition has been denied.

One Cesar resisted an application in the County Court of Cook County for judgment for taxes for the year 1928 and sought to have the entire assessment declared invalid on the ground that large amounts of personal property were omitted from the assessment rolls. A judgment of the County Court, holding the tax levy invalid in its entirety, was reversed by the Supreme Court of Illinois. *(McDonough vs. Cesar,* 349 Ill. 372.) A petition for rehearing was denied at the present October term. Appellee prayed and was allowed a stay of sixty days to enable her to file with the Supreme Court of the United States a petition for certiorari.

Early in 1928 the State Tax Commission of Illinois ordered a revaluation and re-assessment of all the taxable real property in Cook County. It was estimated that this could be completed within six months. As a matter of fact, it required more than two years. During that time no taxes whatever were paid in Cook County. Consequently, *for a period of more than two years all municipalities in Cook County, including the Sanitary District, were without any income whatsoever derived from taxes.*

The revaluation and re-assessment had not been completed when the stock market crash of 1929 came on, followed by the rapidly accelerating general disorganization, disintegration and cessation of business activities, accompanied by a tremendous slump in values of real estate and other property, and the complete or partial destruction of incomes.

An epidemic of bank failures in Cook County of unprecedented magnitude resulted in the loss or tying up of the funds of many thousands of depositors, leaving many of them entirely without available funds.

It resulted that when the time came that taxes again could be received, large numbers of people were unable to obtain funds with which to pay them. That condition still exists to some extent, though a steady and accelerating improvement is in progress.

In consequence of these circumstances large amounts of taxes which the District should have received are unpaid and delinquent. The levies were duly made and filed, but collections were seriously retarded. The amounts levied for the years 1928, 1929 and 1930, and the amounts received by this defendant from the County Collector up to October 26, 1932, pursuant to the levies, are as follows:

Total Amount of Levy		Amount Collected		Percentage Unpaid
1928......	$20,700,455.00	1928......	$15,737,862.80	24%
1929......	24,518,343.75	1929......	17,093,115.82	30%
1930......	21,725,603.75	1930......	11,884,515.56	45%
	$66,944,402.50		$44,715,494.18	

As shown by these figures, the sum of $22,228,908.32 remains unpaid on the levies for the years 1928, 1929 and 1930, an amount exceeding the total amount of the levy in 1928 and the total amount of the levy in 1930.

The 1931 taxes which under ordinary conditions would have been collected by May 1, 1932, have not yet been extended for collection. The amount of the 1931 levy duly filed is $18,875,953.75, which is made up of $5,000,000 for corporate purposes and $13,875,953.75 for bonds and interest. An aggregate of $41,104,862.07, or approximately two years' taxes, which the District should have received were past due and unpaid up to October 26, 1932.

Included in the above mentioned sum of $41,104,862.07 of uncollected taxes, is the approximate amount of $28,400,000 which had been levied for the payment of maturing principal of outstanding bond issues and interest thereon. The non-payment of these taxes left the District without means to pay bond interest and maturing principal, and resulted in defaults which, on November 1, 1932, amounted to $10,972,135.00.

The Sanitary District was forced to suspend payments to its contractors on November 1, 1931, with the result that practically all contract work has stopped, pending the resumption of payments. Regular payments were suspended on salaries to employees as of November 15, 1931. Measures have been taken to reduce expenditures to the minimum, consistent with the continuance of necessary activities. Forces have been drastically reduced. All salaries have been reduced from ten to twenty per cent, and employees have been paid only a portion of their salaries at irregular intervals since November 15, 1931.

As a direct consequence of all of these circumstances, and in sympathy with general market conditions, the bonds of the Sanitary District which heretofore have been considered "gilt-edged," began to slump in price and finally became unsalable at any price which the District felt it would be justified in accepting.

The Sanitary District of Chicago has the power to issue bonds in an aggregate amount not to exceed five per cent of the assessed valuation of the taxable property within the district. The 1930 valuation (latest available) is $4,404,063,447. Based on this valuation the District has power to issue bonds in an aggregate amount of $220,200,000. These bonds cannot be issued, however, without legislative authorization or approval by public referendum, except such as shall be issued for payment of land damages, etc. Outstanding at the present time are bonds aggregating about $107,000,000.

At the present time the Sanitary District has available in its treasury unsold bonds for sewage construction purposes, the issuance of which has been authorized by popular vote or by legislative acts, of an aggregate principal amount of approximately $43,614,000. These bonds consist of $7,614,000 remaining unsold out of a $27,000,000 issue authorized by the General Assembly in 1929, and an entire issue of $36,000,000 remaining unsold which was authorized by legislative action on July 1, 1931. (Section 9 of the Sanitary District Act, Cahill's Ill. Rev. Stat. Chap. 42, Par. 345, pages 1206-1207.)

The latter issue of $36,000,000 of bonds was submitted to public referendum on February 24, 1931, and was approved by the voters, but a petition for a recount was instituted on March 28, 1931 in the Superior Court of Cook County, which presented the possibility of a long delay in the sale of the bonds. The Sanitary District, in order to expedite issuance of the bonds, caused to be introduced in the Illinois General Assembly an act to validate the bonds, which was passed in June 1931 and became effective on July 1, 1931.

Because of the conditions which have been related, the District has been unable to sell the bonds mentioned, aggregating $43,614,000.

By July 1, 1930, the slump in the general business, financial and market conditions had become so serious that the market for Sanitary District bonds had become very unsettled. Up to that time the District's bonds had been readily salable, usually at par and accrued interest and occasionally at a slight premium.

On June 4, 1931, bonds aggregating $535,000.00 par value were advertised for sale. The best offer received was 95.236. This the Trustees considered inadequate and the offer was rejected.

The next offering was $1,680,000 par value of bonds, offered for sale on August 20, 1931, for which the best price obtainable was 95.489, and for which they were sold. For the bonds which were next offered for sale on or about November 5, 1931, no bids whatever were received. Since that date the Trustees have made diligent and vigorous efforts to find purchasers for bonds. Banks in Chicago, New York, Boston and Philadelphia, insurance companies, dealers in investment securities, and others in various cities of the United States were canvassed, without success.

At intervals the Trustees have advertised for bids for the purchase of bonds but none has been received from any responsible bidder.

Quotations appearing in the public press were investigated with a view to getting in contact with parties who might desire to purchase bonds. In every instance, however, the fact proved to be that quotations were based upon gossip of speculators without substantial financial resources, and up to the present time no responsible party has been found who would make a firm offer to purchase any substantial amount of the bonds at any price.

Below is shown a tabulation of the amounts of bonds sold and the prices realized therefor subsequently to April 21, 1930:

June 26, 1930	$6,000,000.00	98.304
August 21, 1930	1,395,000.00	102.667
August 20, 1931	1,680,000.00	95.489

Prior to January 1, 1932, no default in respect to any indebtedness of the Sanitary District ever occurred. Since January 1, 1932, owing to failure of the taxpayers of the Sanitary District to pay their taxes, as hereinafter explained, the District has been compelled to default in the payment of bond principal and interest, aggregating, as of November 1, 1932, the sum of $10,972,135.00.

(b) Minor Causes of Delay.

More than a month's delay in the construction of Contract Section 3 of the West Side Sewer was caused by a disastrous fire occurring April 14, 1931, resulting in the loss of several lives.

A new wage rate law for construction work done by municipalities in Illinois, taking effect July 1, 1931, caused delays approximating a month in the letting of contracts for the Calumet pump and blower house and for the Calumet aeration tanks, operating galleries and final settling tanks. This wage rate law was declared unconstitutional by the Illinois Supreme Court in October 1931, and a further delay of about a month was caused in each of these contracts before proper adjustments could be made. A delay of about a month was also caused in the construction of Contract 4 of the West Side Sewer for the same reason.

Delay was encountered in the acquisition of land for the Calumet sewage treatment plant site. Financial difficulties arose. Efforts to acquire the site for the Southwest Side treatment plant have been actively opposed by owners of the property selected, and owners of other property in the neighborhood. However, any delay which might have resulted to the construction program from these delays in acquisition of sites, was negligible. The only delay which has been really important is that due to lack of money. All of these difficulties have been set forth in semi-annual reports to this honorable Court.

Because of the financial difficulties, approximately one year has been lost in the execution of the construction program. *In spite of these delays, it is believed that it is possible, if finances can be arranged within the next two or three months, to complete the entire sewage treatment construction program by the end of 1938.*

(c) Failure of War Department to Approve Plans for Controlling Works in the Chicago River.

In **Subdivision VI** complaint is made of lack of progress in construction of controlling works in the Chicago river.

The decree makes no mention of controlling works in the Chicago river. The construction of such works, however, was contemplated by the permit of March 3, 1925, from the Secretary of War, for diversion of water from Lake Michigan, which permit expired December 31, 1929. In compliance with the provision of said permit, the Sanitary District submitted plans for controlling works in the Chicago river to the United States District Engineer at Chicago in November, 1926. This was made a matter of record in the trial of the case before the Supreme Court. These plans were transmitted to the Chief of Engineers of the United States Army and to the best knowledge and belief of the Sanitary District no further action has been taken regarding them.

Under the Rivers and Harbors Act of July 3, 1930, all of the waters constituting the Lakes to Gulf waterway, between Chicago and the Mississippi River were made a part of the authorized federal navigation project, including the main drainage canal and the Calumet-Sag canal of the Sanitary District. The War Department is now completing the Lakes-to-Gulf waterway and apparently proposes to use the main drainage canal and Calumet-Sag canal with the water levels as they are at present.

It is respectfully submitted that no further action regarding controlling works which would affect water levels in this government controlled and operated project is incumbent on the Sanitary District until the plans already submitted shall have been approved or rejected or until some official suggestion shall have been made regarding their modification. It is quite possible that the War Department does not wish this obstruction to navigation placed in the Chicago river.

At the hearing of this cause before the Special Master on re-reference, the testimony concerning the quantity of water necessary to be diverted from Lake Michigan so far as the needs of navigation were concerned was limited to the requirements of the port of Chicago, within which were included the Chicago and Calumet rivers. The needs of those rivers were considered only from the standpoint that they were parts of the port of Chicago, and arms of Lake Michigan. The possibility that there was or would be need for water for navigation purposes between the government projects in the Chicago and Calumet rivers and the government project in the Illinois river was excluded from consideration because of the fact that at that time the Illinois and Desplaines rivers between Utica and Lockport, the main channel and the Calumet-Sag channel of the Sanitary District were not included within any authorized federal project.

The basis for the exclusion of the testimony was that the federal government was not concerned with the needs of navigation on waterways which were not parts of a federal project.

Since that hearing and since the decree of April 21, 1930, there has been a very material and important change in the status of those waterways which at that time were not parts of any authorized federal project but which since then have been made so, namely, the main and Calumet-Sag channels of the Sanitary District and those parts of the Illinois and Desplaines rivers between Utica and Lockport.

At the time of that hearing the status of the navigation channels between Lake Michigan and the Mississippi river was as follows:

Congress had passed the act of January 21, 1927, providing for a 9-foot navigation project in the Illinois river from Utica to its mouth and the United

States army engineers were proceeding with its construction.

The state of Illinois, under the Illinois Waterway Act, passed by the state legislature in 1919, was proceeding with the construction of the Illinois waterway, a 9-foot navigation project between Utica and Lockport. An appropriation of $20,000,000.00 was available for this work.

The Sanitary District of Chicago was operating the main sanitary and ship canal and the Calumet-Sag canal, which provided navigation facilities from Lockport to connections with the federal navigation projects in the Chicago and Calumet rivers.

The Chicago and Calumet rivers, in both of which navigation depths were maintained by the United States government, connected with Lake Michigan, forming the port of Chicago.

At the hearing no testimony was admitted concerning the needs of navigation towards the west from the port of Chicago, although General Jadwin, Chief of Engineers of the United States Army, who was called as a witness by Special Master Hughes, in a formal statement to the Court on the question of controlling works in the Chicago river, said:

> "The discussion does not modify in any respect the statement heretofore made that an average diversion of 5000 c. f. s. will be necessary to maintain navigation in the Illinois river as contemplated by existing authority of Congress and under the plans of improvement now under way." (Report of Special Master on re-reference, p. 109).

Also,

"With either of these systems navigation of the Illinois river as contemplated in the existing project will be impracticable unless the "basic diversion is fixed at or above 5000 c. f. s." (Report of Special Master on re-reference, p. 111).

Subsequently to the hearing, Congress passed the "Rivers and Harbors Act" of July 3, 1930, whereby it was provided that those portions of the Illinois and Desplaines rivers between Utica and Lockport, the main channel and the Calumet-Sag channel of the Sanitary District and the Little Calumet river were to become and thereafter be parts of a connected federal navigation project extending to and connecting with the federal projects in the Chicago and Calumet rivers. That act also authorized an appropriation of $7,500,000.00 to complete the construction work on the Illinois waterway, which was begun by the state of Illinois. That work is now being carried on by federal government forces. The completed waterway is expected to be opened in the spring of 1933.

From the foregoing, it is obvious that there has been a very material change in the situation since the hearing of these causes on re-reference. The waters of the Calumet-Sag canal, the main sanitary and ship canal, and of the Illinois waterway have become navigable waters of the United States. The need for protecting these navigable waters of the United States from pollution is probably as urgent now as was the need of protecting the waters of the port of Chicago, considered as an arm of Lake Michigan, at the time of the hearing.

It may be, in view of the very material changes which have occurred, as recited, that before any final disposition shall be made of these cases, not only the question of the controlling works but the entire question of the quantity of diversion from Lake Michigan which should be permitted, should be reconsidered and reviewed, and it may be that it will become the duty of these respondents, under paragraph 7 of the decree, to take the initiative and to make application to this court for such review and reconsideration, in which event, no doubt, a re-reference and a taking of further testimony would be desirable.

(d) Opposition of Property Owners and Others to Site Selected for Southwest Side Treatment Works.

In **Subdivision VII** the complaint is that the site for the Southwest Side sewage treatment works has not been acquired.

As set forth in the District's semi-annual reports to the Court, an ordinance for the acquisition of a proposed site containing approximately 570 acres of land was passed by the Trustees on December 26, 1929. The site was indicated by the engineers of the District as suitable, as shown by the testimony before the Special Master.

Following the passage of that ordinance, numerous complaints were brought to the Trustees by citizens living in the neighborhood, private owners of property near the proposed site, and by the Board of Education of the city of Chicago, which owned and operated a grade school across 57th Street immediately south of the site, and, further, owned an area of some 640 acres more or less about one-half mile south of the site, which at present is used as an aviation field, said School Board alleging that its property would be irreparably injured by the use of the site selected. An alternate site some six miles west was suggested by certain objectors.

The Trustees selected a committee of three disinterested, well known and public-spirited citizens, namely Sewell Avery, Robert Isham Randolph and Albert A. Sprague, and referred the choice of site to them for determination. Said committee brought in a report on or about July 14, 1930, recommending the use of the selected site between the Chicago and Alton Railroad and 51st Street, west of LaVergne Avenue and east of Austin Avenue. This report aroused a storm of protest from citizens, the School Board, and others. Thereupon the Trustees held public hearings, between July 31 and August 22, 1930, occupying four (4) days, at which property owners and their attorneys were heard. Many witnesses were called and testified in behalf of the objectors, including three engineers, Messrs. Howson, of Chicago, Gascoigne, of Cleveland, and Townsend, of Milwaukee. These three witnesses are the identical witnesses who appeared in the hearings before the Special Master and testified therein to their approval of the program of the Sanitary District.

In hearings before the Trustees, Mr. Howson denied that he had approved the particular site and averred he had only approved the type of plant. He further stated, "there are many possible and available sites for the location of the Southwest Side sewage plant," and that in his opinion the site now owned by the District north of the main channel (some 500 acres on which are the West Side sewage treatment works) "is available for forty years to take care of both the west and southwest sides."

Mr. Townsend also stated that the West Side and Southwest Side works could be handled jointly on the West Side site. He admitted he had approved the program of the Sanitary District as presented to the Special Master.

While the matter was being studied in the fall, continued opposition developed. As a result, on January 22, 1931, (Proceedings 1931, pp. 293-294), the Board of Trustees repealed the ordinance of December 26, 1929.

In the meantime, the difficulties in operation found at the West Side works in the digestion of sludge led to the investigation of other means of sludge disposal,—in particular, by dewatering and incineration. The investigation indicated that if the method proved successful and was adopted, a much smaller area of land would be required than previously contemplated, because of the omission of the sludge drying beds. The necessity of a careful reconsideration of all features of the situation became apparent.

Tentative layouts have been made which indicate that the Southwest Side treatment plant might be constructed on a portion of the land heretofore acquired for the extension of the West Side works, if dewatering and incineration of sludge proves practicable. This was set forth in the semi-annual report to the Supreme Court on July 1, 1932, but apparently has escaped the attention of complainants.

In the meantime, also, shortage of funds had developed, so that there were no funds available for the acquiring of a site. Under all the circumstances it is deemed expedient to permit the matter to rest until the terminaion of tests on dewatering and incineration at the West Side, at which time the necessary computations will be made to determine the adaptability and practicability of the new procedure, and the amount of land required, both north and south of the main channel.

The engineers of the Sanitary District are of the opinion that the delay in acquiring this site will not operate to cause delay in the ultimate completion of the construction program by December 31, 1938.

(e) Opposition of Stockyards Industries.

In **Subdivision VIII** of the application the statement is made that an exhaustive study of the Stockyards and Packingtown wastes was made between 1912 and 1918 and that the U. S. District Engineer, on November 1, 1923, reported that the Sanitary District had complete information as to the processes best suited to the different kinds of sewage produced. Complainants criticize because the Sanitary District has not gone ahead with the design of the Southwest Side treatment works on the information gained between 1912 and 1918.

It is respectfully submitted that good engineering practice in the design of a sewage treatment plant involving the expenditure of approximately $36,000,000.00 requires a check upon the information obtained more than 15 years ago, regarding these industrial wastes, both as to quantity and as to quality. A study such as has been made during the past two years is only the exercise of ordinary prudence, and the charge of bad faith and intent to delay is, to say the least, unreasonable.

The respondents deny *in toto* the allegation of complainants that "no attempt has been made to perform the decree in this important and controlling particular" and on the contrary, insist that every possible step has been taken which reasonably could be taken under all the circumstances. And respondents further insist that the District is entitled to sufficient time to permit conservation of resources by taking advantage of the improvements in the art.

Respondents further deny that the waste resulting from the slaughter of hogs, sheep and cattle has not changed, and aver from the best information obtainable that both the quantity and character of the wastes have changed as the processes used in the packing houses have been changed or modified.

Respondents admit that the District made an exhaustive study of the Stockyards and Packingtown wastes from 1912 to 1918, in part under the disadvantages of conditions brought about by the war. The District denies ever having announced that the problem of treating the stockyards wastes had been fully solved.

The history of the situation is as follows:

In 1912, the Sanitary District, with the cooperation of the packers, entered into a joint investigation of the wastes from the industry and its practicable treatment. The various known methods were first tried, and following the introduction of the activated sludge process, the investigations were extended in 1916 to cover the use of activated sludge, and continued up to September, 1918. As a result of these tests, the packers admitted in 1917 that the activated sludge process could handle their wastes. The world war then interrupted the continuity of the work. Following the armistice, protracted negotiations between the packers and the District led to the drafting in 1919 of a tentative agreement for treating wastes in a community plant, the packers to pay sixty per cent of the costs of both construction and operation, the District to pay forty per cent. The negotiations failed in the fall of 1920 because of a disagreement over the details.

In 1921 and thereafter, the packers suffered tremendous inventory losses and for years the majority of them operated with little or no profit, and some of them at great loss, so that when an attempt was made in 1923 to resume negotiations, a flat refusal was met. Thereafter, in 1924, suits were started against all the packers, in both the federal and state courts, to enjoin the discharge of waste. In the state court a demurrer was sustained. On appeal to the Illinois Appellate court *Sanitary District of Chicago vs. Chicago Packing Co.,* 241 Ill. App. 288, the judgment was reversed and the cause remanded to the trial court, in June, 1926.

In the meantime, the General Assembly of Illinois passed an amendment to the Sanitary District charter (Acts 1927, Cahill's Illinois Revised Statutes, 1929, par. 343, sec. 1, p. 1108), empowering the Sanitary District to regulate industrial wastes and make a charge for service. Over the protests of the Illinois Manufacturers Association and others, on July 25, 1929, the Trustees passed an ordinance

(Proceedings 1929, pp. 357-360) for the regulation of industrial wastes, and instructed the District's Attorney to press the suit against the packers.

Various statements have been made from time to time by the packers that by changes in processes the waste material reaching the sewers had been greatly decreased. While the total kill in the Chicago area is approximately known from published compilations from various sources, including the U. S. Department of Agriculture, the proportion of waste and its change from 1917 has not been known, nor could it be ascertained in any other way than by a comprehensive survey of the industry, and accompanying tests.

Efforts were made to enter the various packing houses within the Sanitary District to ascertain the extent and type of the wastes produced. Entrance was denied by all the packers, upon repeated demands. Tests were then inaugurated on the main sewers leading from the area where the principal packing houses were located. These tests were carried on under difficulty in public streets. They began on July 6, 1930, and continued until about July 1, 1931.

The suit in the federal district court, Northern District of Illinois, Eastern Division, in equity No. 3848, (The Sanitary District of Chicago vs. Swift & Company, et al.), was re-opened and briefs filed by both sides in 1930 and 1931. On March 22, 1932, the cause was referred to a Master to take testimony, but owing to extensions of time granted the defendants to file answers, the cause was not at issue until June 1, 1932. It is expected that the taking of testimony shortly will begin. The purpose of this suit is to establish the right of the Sanitary District to enter upon the property of the packers for the purpose of ascertaining the character and volume of wastes discharged into the public sewers, and the right to regulate the discharge of wastes.

The situation of this litigation will occasion no delay in the completion of the construction program.

The effect of the packing house wastes on the sewage treatment works design is important in three ways; the quantity of the waste, the quality of the waste, and the solids which must be handled. The waste from an industry producing a population equivalent of over 1,000,000 as of 1917, is certainly a factor which must be taken into account in the planning of sewage treatment works.

With the information now in hand, the necessary studies and computations are being made to determine the probable effect of Packingtown wastes on the Southwest Works.

What has above been said fully answers (if answer be needed) the averments of **Subdivision IX** of the application.

(f) Reduction of Personnel of District's Engineering Organization.

In **Subdivision X** of the application, the claim is made that the Sanitary District now maintains no engineering organization adequate to proceed with the performance of the decree. It is true, as was reported in the semi-annual report of July 1, 1932, that (due entirely to lack of funds) there has been a reduction in personnel of the engineering organization of the Sanitary District, having to do with the sewage treatment construction program and that this reduction has amounted to 64 per cent between December, 1931, and June, 1932. However, the organization is not broken up. It is now a skeleton organization, composed of the key men in each division, those best acquainted with the work, and can be very quickly expanded into the necessary efficient working organization as soon as finances become available. No delay in the carrying out of the program will be caused by lack of engineering organization if finances are made available.

(g) Alleged Disregard and Defiance of Federal Government.

In **Subdivision XV** of the application, the statement is made that—

> "for many years The Sanitary District of Chicago willfully disregarded and defied the Federal Government and presumed upon the solicitude of the Federal Government for the health and welfare of the people of Chicago to prevent the Federal Government from enforcing this order and terminating the wrongful action of the District",

and from the opinion of Mr. Chief Justice Taft in *Wisconsin vs. Illinois,* 287 U. S., 367, is quoted; (pp. 419-420):

> "The Secretary of War and the Chief of Engineers in 1907 refused a permit by which there would be more than 4167 feet a second diverted. Advised that the District authorities proposed to ignore that limitation, the United States brought suit against the authorities of the District to enjoin any diversion in excess of that quantity, as fixed in an earlier permit."

Apparently much has been forgotten (or perhaps was unknown to the writer of the application) about the circumstances under which the original suit was filed by the United States against the Sanitary District and the purpose for which it was filed. In 1906, the Sanitary District made application to the Secretary of War for permission to construct the Calumet-Sag channel. The Secretary of War in 1907 refused to grant the permit on the ground that he did not believe he possessed the necessary authority. After a conference between officials of the Sanitary District, the President of the United States, and the Secretary of War, it was arranged that this question of authority should be settled in a friendly suit in the courts. Accordingly, on March 23, 1908, a suit was instituted in the Circuit Court of the United States for the Northern District of Illinois, by the United States, as complainant, against the Sanitary District to enjoin and restrain it from proceeding with the construction of the Calumet-Sag channel.

The fact that this was friendly litigation is evidenced by one of the paragraphs of the permit, granted June 30, 1910, by the Acting Secretary of War to the Sanitary District, authorizing the construction of the Calumet-Sag channel. This paragraph is as follows:

> "That this permission shall in no wise affect or in any manner be used in the *friendly* suit now pending in the Circuit Court of the United States for the Northern District of Illinois started by the United States of America against The Sanitary District of Chicago to determine the right of the said Sanitary District to divert from Lake Michigan for sanitary purposes an

> amount of water in excess of that now being diverted, without having first obtained a permit from the Secretary of War."

The fact that the suit was a "friendly" suit was alluded to by Mr. Justice Holmes in his opinion in the case entitled "Sanitary District vs. United States", 266 U. S. 405, at page 432:

> "The permit subsequently granted on June 30, 1910, was with the understanding that it should not affect or be used in the 'friendly suit' then pending to determine rights."

Complainants in stating that the Sanitary District defied the Federal Government overlook the fact that the litigation was an agreed upon, friendly suit, and that it was instituted to determine legal rights concerning which there was doubt. The Sanitary District has not disregarded nor defied the Federal Government.

Subdivisions XI to XIV, inclusive, of the application, purport to deal with the financial situation. Most of the averments are inaccurate; some of them wholly at variance with the facts. This, perhaps, is attributable to lack of information on the part of the complainants. All are hereinbefore fully answered.

(h) Alleged "Neglect, Incompetence or Bad Faith" in Connection with Unsold Bonds.

In **Subdivision XI** of the application the charge is made that of an issue of $27,000,000.00 of bonds authorized by the General Assembly in 1929:

> "On June 1, 1930, $16,850,000.00 remained 'unissued'. On July 1, 1932, $7,614,000.00 * * * * still remained 'unissued'. * * * These facts thus establish that the total amount of bonds 'issued' by The Sanitary District of Chicago since and in the performance of this decree has not exceeded $10,236,000.00. * * *"

From the context or otherwise it is impossible to know in what sense the word "issued" was used. If used as meaning that the bonds were not prepared and executed and were not ready for delivery to purchasers, the statement is not correct. The fact is that not only the entire $27,000,000.00 authorized in 1929 but the $36,000,000.00 authorized in 1931 were "issued". They were ready to be sold and would have been sold so far as necessary if it had been possible to find a purchaser or purchasers. Of the aggregate of $63,000,000.00 so authorized, there were in fact sold an aggregate of nearly $20,000,000.00.

Apparently it is the contention of the complainants that the District should have sold all or a large portion of those bonds while there continued to be a market for them, and thereby have provided itself with the money necessary to continue to prosecute its construction program. To this argument there are at least four good and sufficient answers:

1. The Trustees were not more gifted with ability to see into the future than the general run of mankind. They did not foresee and surely cannot be blamed for failing to foresee what probably no other human being in the United States foresaw, namely, the complete collapse of the economic, financial, industrial and commercial structure, and the complete disappearance of any market for the bonds.

2. *At no time subsequently to June 26, 1930, would it have been possible to sell all of the bonds remaining unsold or any large portion of them.*

As early as midsummer of 1930 the capacity of the market to absorb the securities of the District had become very much limited. Banking houses and others among whom alone purchasers could be looked for were willing to purchase only in relatively small amounts and only upon assurances by the Trustees that no additional bonds would be offered for sale within specified periods and then only in limited amounts. Any effort to sell at one time or within a short period the entire amount of bonds available, would have failed absolutely, and moreover would have demoralized the market for the District's securities and injured dealers and others who had purchased them.

3. While the District's request for authority to issue the $27,000,000.00 of bonds hereinbefore referred to was pending in the general assembly, it was the object of vigorous opposition by the Chicago Bureau of Public Efficiency, the Civic Federation and other organizations of citizens, on the ground that if approved the Trustees might immediately sell the entire amount of $27,000,000.00, thereby causing substantial losses to the taxpayers in interest, etc. It became apparent that in the face of that opposition legislative approval could not be obtained. In order to satisfy the objectors and to cause them to withdraw their objections, the Trustees pledged themselves to sell said bonds, not en masse, but only from time to time and in amounts sufficient to produce moneys as needed. The Trustees were not disposed

to violate that pledge, but as it turned out, they could not have done so if they had chosen.

4. Assuming that it would have been possible to sell the entire amount of bonds available, and that they had been sold, that would have caused a tremendous loss to the taxpayers of the District in that the money would have brought no more than possibly 1½% interest from banks of deposit while the taxpayers would be paying 4½% interest on the bonds during a long period of time before ever the money would be required for the construction program.

(i) Alleged Dereliction of State of Illinois.

In **Subdivision XI** of the application (second paragraph), complaint is made of the fact that bond issues authorized by the general assembly were required to be submitted to referendum vote. If there is any point whatever in the complaint it must be in the implication that the referendum requirement in some way impeded or hindered the District, *subsequently to April 21, 1930,* in making necessary arrangements to finance its construction program. The utter fatuity of this contention must be apparent when it is considered that in the first paragraph of said Subdivision XI the complainants themselves state that:

> "In 1929 the Illinois General Assembly had authorized the Sanitary District of Chicago to issue $27,000,000.00 of bonds without referendum; and on June 1, 1930, $16,850,000.00 remained unissued, and on July 1, 1932, $7,614,000.00 out of the $27,000,000.00 of bonds so authorized by the Illinois General Assembly in 1929 still remained unissued."

The complaint against the State of Illinois becomes still more preposterous when it is considered that in July, 1931, the general assembly authorized the issuance of an additional $36,000,000.00 of bonds without a referendum, all of which still remain unsold.

In **Subdivisions XIII and XIV** of the application it is stated that "the credit and financial resources of the State of Illinois are more than ample to finance the performance of the decree", and it is complained that the state is derelict in not having used its credit and financial resources.

The implication is that the State of Illinois should have come to the aid of the District and supplied it with funds with which to continue the construction program.

In the absence of constitutional prohibitions, the methods by which conceivably this might have been accomplished were the following:

1. An issue and sale of bonds of the State of Illinois and a loan of the money to the District.

2. A guaranty by the State, of the bonds of the District, thereby making them more salable.

3. An appropriation by the general assembly out of general revenues of money to be loaned to the District.

4. The levying of an additional general or special state tax to provide money to be loaned to the District.

5. Authority to the District to levy increased or additional taxes.

6. Authority to the District to issue and sell without a referendum vote bonds for the entire sum of money needed to complete the entire construction program.

The answer to suggestions 1, 2, 3 and 4 above is found in the constitution of the State of Illinois, which among other things contains the following express prohibitions:

> "Article IV. Section 20. The state shall never pay, assume or become responsible for the debts or liabilities of, or in any manner give, loan or extend its credit to, or in aid of any public or other corporation, association, or individual."

Section 18 of Article IV, after making certain provisions not here relevant, provides as follows:

> "No other debt, except for the purpose of repelling invasion, suppressing insurrection, or defending the state in war (for payment of which the faith of the state shall be pledged) shall be contracted unless the law authorizing the same shall, at a general election, have been submitted to the people, and have received a majority of the votes cast for members of the general assembly at such election. The general assembly shall provide for the publication of said law, for three months at least, before the vote of the people shall be taken upon the same; * * * *".

It is respectfully submitted that each and every one of the modes above suggested as numbers 1, 2, 3 and 4 would contravene the provisions of Section 20 of Article IV.

Suggestion number 5 obviously would be futile and ineffective. Inasmuch as a large part of the taxes which the District already has power to levy is delinquent and unpaid, it is perfectly obvious that it would be useless to levy larger amounts.

Likewise, suggestion (6) would have had no effect whatever in preventing the present situation. Obviously, since the District now has more than $40,000,000.00 of bonds which it is unable to sell, the situation could not be improved or remedied by giving it authority to sell an additional amount of bonds.

But it may be argued that in the exercise of the utmost possible diligence the state authorities should have proceeded to bring about such changes by amendment or amendments to the constitution as would have permitted the state to extend financial aid to the District. To this it may be answered that neither the members of the general assembly nor any other state authority are endowed with any greater degree of ability to see into the future than other human beings. We respectfully submit that no one in the State of Illinois or elsewhere foresaw the conditions which now exist.

We respectfully submit also that experience has demonstrated that it is extraordinarily difficult to amend the constitution of Illinois.

Two methods are provided by the instrument itself for its amendment. One is the calling of a constitutional convention. The other requires, first, the approval of a proposed amendment by a vote of two-thirds of all the members elected to each of the two houses of the general assembly, and next, its submission to the electors of the state for adoption or rejection at the next election of members of the general assembly. It must be published in full at least three months preceding the election. Its approval requires the affirmative vote of a majority of all the electors voting at said election (and not merely a majority of those voting for or against the amendment).

A number of proposed amendments to the present constitution have failed because large numbers of voters did not take the trouble to vote at all on the proposition, and thus the proposition did not receive the affirmative votes of a majority of all the voters who voted at the respective elections.

The next election for members of the general assembly will occur on November 8, 1932. The most recent election for members of the assembly prior to the date last mentioned was that of November, 1930.

It is respectfully submitted that the State of Illinois has done all that human foresight reasonably could be expected to consider necessary in the premises. It conferred upon the District powers of taxation which were deemed ample and which under ordinary circumstances would have been ample. In June of 1929 it conferred upon the District power to issue and sell bonds of the par value of $27,000,000.00 without requiring submission to a referendum vote. Similarly, in June, 1931, it empowered the District to issue and sell an additional $36,000,000.00 of bonds.

In anything approximating normal conditions, the powers above mentioned were amply sufficient to enable the District properly to finance its construction program.

CONSTRUCTION PROGRAM CAN BE COMPLETED BY DECEMBER 31, 1938.

(a) Improvement in Tax Situation.

Present indications are that the causes underlying the non-payment of taxes shortly will be removed. In February, 1932, legislation which had the approval of practically all civic and property owners' organizations, business and financial interests and public authorities of Chicago and Cook County, was adopted by the General Assembly whereby the elected boards of five assessors and three reviewers were abolished; in their stead were substituted one County assessor *appointed* by the Governor of the State and the President of the County Board of Cook County, and a Board of Appeals consisting of two members, one of whom was appointed by the President of the Cook County Board and the other by the Governor. These positions have been filled by men possessing the confidence of the public, who are now functioning. It is generally believed that their labors will result in more equitable assessments and in reductions in taxation and will make taxpayers more willing to pay their taxes.

As we have stated, one of the leading "taxpayers' strike" cases, *Bistor et al.* vs. *McDonough, County Treasurer,* 346 Ill. 362, resulted in a decision against the objecting taxpayers and this Court denied a petition for a writ of certiorari. Another suit, *McDon-*

ough, County Collector, vs. *Cesar* (349 Ill. 372) has been decided adversely to the objecting taxpayers by the Supreme Court of Illinois and a petition for re-hearing has been denied. Plaintiff has expressed her intention of seeking a review by this Court, and has obtained a "stay" of sixty days.

At the present time the city of Chicago, in cooperation with the county collector, the Sanitary District, the Board of Education, and other public bodies, is taking drastic measures to enforce collection of taxes now delinquent and has appointed an emergency commission to direct the carrying out of such measures. Among the measures which are proposed are:

1. Applications to the courts wherein receivership proceedings are pending for orders on receivers to pay delinquent taxes on the properties which are the subjects of the receiverships;

2. Applications to the courts for receiverships of properties, the owners of which are able to pay their taxes but refuse to do so;

3. Discontinuance by the city and other public bodies of services such as water supply, etc., to buildings the owners of which refuse to pay their taxes;

4. Investigation by a special grand jury of the doings of so-called "real estate owners" and "taxpayers" associations in advising and counseling the nonpayment of taxes with a view to proceedings against them on conspiracy charges;

5. Proceeding in the County Court to obtain as rapidly as possible the overruling of objec-

tions filed by property owners to the payment of their taxes;

6. Proceedings to levy on properties as to which objections have been overruled and possibly filing bills to foreclose tax liens.

Attorneys representing each of the principal taxing bodies have been detailed to confer and cooperate with the city and to study and devise, if possible, other methods of enforcing payment of taxes.

There is no doubt that in consequence of these activities there is an increasing disposition to abandon resistance and to pay taxes. Results are already evident. It is entirely within reason to believe that within a relatively short time the situation will be restored to approximately normal.

Unquestionably the clearing up of the tax situation will have a beneficial effect upon the market for municipal securities. It is entirely within reason to believe that with the resumption of the payment of taxes and with a refunding of the bonds now in default, it will again be possible for the District to sell its bonds and obtain funds with which to prosecute work on the construction program.

(b) Application for Loan from Reconstruction Finance Corporation.

On or about September 15, 1932, the Sanitary District filed with the Reconstruction Finance Corporation in Washington an application under the provisions of the act of Congress entitled the "Emergency Relief and Construction Act of 1932", for a loan to or contract with the District of $36,450,000.00, such loan to be made by means of the purchase by the Reconstruction Finance Corporation of a like amount of the bonds of the Sanitary District.

Said application was made under the provisions of paragraph 1 of sub-section (a) of section 201 of said act.

The application specifies that the proceeds of the loan are to be used for the purpose of construction of sewage treatment works, intercepting sewers and adjuncts to said works. Specifically the proceeds are to be applied as follows:

The Calumet project	$13,674,000.00
The West Side project	22,426,000.00
The North Side project	350,000.00
Total	$36,450,000.00

In said application there was embodied every item of information called for by "circular number 3" of the Reconstruction Finance Corporation and with it there were filed copies of plans, specifications, contracts, etc., specified in said "circular number 3".

Since the filing of said application on September 15, 1932, the Attorney and other representatives of the Sanitary District several times have conferred with the directors of the Reconstruction Finance Corporation and their attorneys, by telephone and personal interviews and by correspondence. The matter has been diligently "followed up".

The Sanitary District and its representatives have been advised by the legal department of the Reconstruction Finance Corporation that the application is in proper form, that all information required has been furnished, and that all the requirements of the Reconstruction Finance Corporation with respect to the furnishing of information, plans, specifications, contracts and exhibits have been complied with.

At the present time the only question with reference to whether or not the loan shall be made, upon which the Reconstruction Finance Corporation has not reached a definite conclusion is whether or not the project for which the loan is desired can be deemed to be "self-liquidating" within the meaning and intent of said "Emergency Relief and Construction Act of 1932".

The Trustees have been assured that they and their attorneys will be given opportunity by the directors of the Reconstruction Finance Corporation for a full hearing and discussion before the directors shall reach a definite conclusion. The Trustees are now awaiting notification of the time and place when such hearing can be had.

If said loan is granted, work on the construction program can be resumed at once. The amount applied for will be sufficient to finance the program for at least two years.

(c) Estimate of Possible Saving in Cost of Future Work.

(1) Probable Savings Due to Lower Prices of Labor and Material:

The future estimated expenditures as of April 21, 1930, for uncompleted work amounted to $179,744,438.58. This figure has been reduced to the sum of

$169,052,832.65 because of expenditures made up to October 14, 1932. Because of lower prevailing construction costs, the amount required to complete all projects will be considerably less than $169,052,832.65.

During the interim between December 31, 1928, and April 21, 1930, three new contracts were let on the West Side project at contract prices aggregating $868,000.00 on work which had been estimated at $1,123,000.00, at an indicated saving of $255,000.00.

During the period between April 21, 1930, and June 1, 1932, (the date of cost summaries in latest report to the Supreme Court), contracts were let on the Calumet and West Side projects as follows:

Project	Number of Contracts	Costs as estimated in Program 1929	Actual Contract Prices	Indicated Saving
Calumet	6	$ 6,611,000	$ 4,936,000	$1,675,000
West Side	11	12,100,000	8,700,000	3,400,000
Total..........	17	$18,711,000	$13,636,000	$5,075,000

These figures indicate that the total estimate of future work (as of April 21, 1930) could be reduced by $5,075,000.00 plus the $255,000.00 indicated saving prior to April 21, 1930, a total reduction of $5,330,000.00. The estimated cost of the entire sewage treatment construction program remaining to be done after April 21, 1930, on the basis of the 1929 estimates, could thus be reduced from $179,744,438.58 to $174,414,438.58.

The suggestion of a re-estimate of the future work in this construction program was made on page 10 of the semi-annual report of the Sanitary District of January 1, 1932. Such an estimate is submitted herewith, in which proper account has been taken of reasonably reduced construction costs which probably will prevail up to the end of 1938 and in which more definite information as to the amount of sewage to be treated at the various plants has been given due consideration.

The estimated cost of future sewage treatment construction, based on present estimates, as of October 14, 1932, is as follows:

Calumet Project		
Treatment Works	$ 5,054,000.00	
Sewers	7,721,000.00	
		$ 12,775,000.00
North Side Project		
Treatment Works	$ 1,875,000.00	
Sewers	3,625,000.00	
		5,500,000.00
Southwest Side Project		
Treatment Works	$36,061,000.00	
Sewers	8,500,000.00	
Racine Ave. Pump. Sta.	4,000,000.00	
South Side Sewers	15,543,000.00	
		64,104,000.00
West Side Project		
Sedimentation Works	$ 2,185,000.00	
Activated Sludge Works	33,259,000.00	
Sewers	16,517,000.00	
		51,961,000.00
Miscellaneous Plants and Sewers		8,000,000.00
Chicago River Controlling Works		3,200,000.00
Total		$145,540,000.00
Work under contract		
Calumet Project	$ 4,035,000.00	
North Side Project	17,500.00	
West Side Project	4,758,000.00	
		$ 8,810,500.00
Grand Total future work		$154,350,500.00

On the basis of the foregoing revised estimates, the total cost of completed works and estimated future construction (estimated) will be $254,854,953.18, which is $14,702,332.65 less than the total as estimated in 1929.

In this connection, moreover, it should be stated that the works contemplated by this program would have a capacity sufficient to take care of increases in quantity of sewage over a number of years following completion of the program. By including this "excess" capacity in the contemplated construction program, great economies in cost would be effected over the cost of constructing presently only the capacity actually needed and at a later date constructing additional capacity. If, however, it shall become necessary to do so, the construction of this "excess" capacity can be deferred, and thereby time can be saved in the completion of so much of the program as presently shall be actually necessary.

(2) Possible savings due to improved methods of "sludge" disposal.

Since July, 1932, the District has been experimenting with the de-watering and incinerating of sewage sludge at the West Side treatment works, in a specially constructed filtering and drying unit, on a scale never before attempted. ("Sludge" is the solid matter that is removed from sewage in the processes of treatment.) Results from this brief period of operation are satisfactory and indicate the probability that incineration of sludge is feasible and economical where the quantities to be handled are large. This de-watering and incineration of sludge may bring about a major change in the methods of sludge disposal. It will have no effect on the activated sludge plant for the final treatment of the sewage. It may result in considerable saving in construction cost, in economy of space and in time of construction.

Sufficient experience has not yet been gained from the operation of this test incinerating plant to warrant the positive statement that incineration will replace the digestion and disposal of sludge in the future sewage treatment of the Sanitary District, although all indications point to that effect. If such is the ultimate conclusion, the estimated costs of future sewage treatment construction would be reduced by the following estimated amounts:

Calumet Works	$1,775,000.00
West Side Works	3,000,000.00
Southwest Side Works	5,000,000.00
Total	$9,775,000.00

The total estimate of future work, not under contract, would apparently be reduced from $145,540,000.00 to $135,765,000.00.

CONCLUSION.

The numerous charges of negligence, incompetence and bad faith, failure, neglect and refusal to carry out the decree, lack of effort in performance, obstruction, avoidance and circumvention of the performance of the decree, neglect and refusal adequately and reasonably to provide for financing, failure to levy and collect normal taxes, self-created disabilities, dereliction of duty, wilful disregard and defiance of the federal government, etc., etc., contained in the application of the complainants, are wholly without justification. The Sanitary District is not chargeable with the inability of the tax collecting agencies of Cook County to collect taxes and much less with the general business depression. In view of the impossibility of selling bonds which have already been authorized by the general assembly, it is folly to complain at the moment because the District has not the authority immediately to issue more bonds.

These respondents deny each and every of the averments that any act of these respondents has been done for the purpose or with the intent of attempting to delay, avoid and circumvent the performance of the decree of this court.

On the contrary, these respondents aver that at all times since the entry of the decree of this court, they have in good faith complied with the requirements thereof and have in good faith taken every possible step and every possible measure which appeared necessary or expedient to complete the program of construction by the time appointed by the decree for the reduction of diversion to the minimum quantity of 1500 c. f. s., to-wit, December 31, 1938. It is respectfully submitted that the work accomplished constitutes a record of achievement in the face of many and great difficulties and obstacles. Despite the opposition of and legal proceedings instituted by misguided individuals who failed to comprehend the importance of its construction program, the Sanitary District successfully overcame the obstacles and delays incident upon court procedure, injunctions, etc., by procuring legislation authorizing the issuance without a referendum of one bond issue of $27,000,000.00 and the validation of another issue totaling $36,000,000.00.

In spite of shortage of funds due to causes beyond its control and attributable chiefly to the greatest depression known in modern times, the District has made substantial progress in the execution of its construction program. And if present financial difficulties can be overcome within a reasonable time, the District will still be able to complete that construction program by December 31, 1938.

Respectfully submitted,
THE SANITARY DISTRICT OF CHICAGO,
and the
STATE OF ILLINOIS,

By: WILLIAM ROTHMANN,
Attorney for The Sanitary District of Chicago.

FRANK JOHNSTON, JR.,
Senior Assistant Attorney for The Sanitary District of Chicago.

JOSEPH B. FLEMING.
Special Assistant Attorney for The Sanitary District of Chicago.
OSCAR E. CARLSTROM,
Attorney General of Illinois.
SOLICITORS FOR THE RESPONDENTS.

United States of America,
State of Illinois,
County of Cook.
} ss.

THOMAS J. BOWLER, being first duly sworn, on oath says that he is the President of THE SANITARY DISTRICT OF CHICAGO; that he has read the foregoing return to the rule to show cause and knows the contents thereof, and that the same is true as he verily believes.

(sgd) Thomas J. Bowler

Subscribed and sworn to before me this 5th day of November, A. D. 1932.

(sgd) James H. Hartford
Notary Public in and for
Cook County, Illinois.

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CLERK

IN THE

Supreme Court of the United States

October Term, A. D. 1932.

STATES OF WISCONSIN, MINNESOTA, OHIO, and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 5,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8,
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9,
Original.

BRIEF IN OPPOSITION TO COMPLAINANTS' MOTION OF OCTOBER 3, 1932.

OSCAR E. CARLSTROM,
Attorney General of Illinois.

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Special Assistant Attorney for the Sanitary District of Chicago.

Solicitors for the Respondents.

CHAMPLIN-SHEALY COMPANY, CHICAGO

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IN THE

Supreme Court of the United States

October Term, A. D. 1932.

STATES OF WISCONSIN, MINNESOTA, OHIO, and PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, Defendants. STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS, Intervening Defendants.	No. 5, Original.
STATE OF MICHIGAN, Complainant, vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.	No. 8, Original.
STATE OF NEW YORK, Complainant, vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.	No. 9, Original.

BRIEF IN OPPOSITION TO COMPLAINANTS' MOTION OF OCTOBER 3, 1932.

STATEMENT OF THE CASE.

To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

This cause comes before the court upon an application filed October 3, 1932, by the States of Wisconsin, Minnesota, Ohio and Michigan (hereinafter for convenience referred to as the "application"), for a rule

> "directed to the Governor and Attorney General of the State of Illinois, and to the Sanitary District of Chicago, directing the State of Illinois and the Sanitary District of Chicago to show cause, if any either has, why this Court should not appoint a Master, Commissioner, Receiver and/or United States Marshal to perform" the decree of this Court entered herein on April 21, 1930, "on behalf and at the expense of the State of Illinois and the Sanitary District of Chicago, with full power to exercise and bind the credit of the State of Illinois and the Sanitary District of Chicago, and to make the expenditures necessary to effectuate the decree a lien upon all of the property in the State of Illinois and upon all the revenues of that State and of the Sanitary District of Chicago, to issue bonds secured by the full faith and credit, the complete taxing power and all of the revenues of the Sanitary District of Chicago and the State of Illinois, to make such bonds a lien upon all of the property in the State of Illinois and upon all of the revenues of the State of Illinois and of the Sanitary District of Chicago, to levy and collect such taxes as may be necessary to provide for payment of the interest upon such bonds as it accrues and to provide a sinking fund to pay the principal of such bonds as said bonds fall due, to refinance outstanding bonds and obligations of the Sanitary District of Chicago as they may severally fall due, and to do everything which may be necessary, convenient or proper to bring about the speedy enforcement of the decree of this Court and the speedy restoration of your applicants' rights, such officer or officers to continue to exercise such powers until the decree has been fully performed and all obligations created on behalf of the State of Illinois and the Sanitary District of Chicago shall have been fully discharged, or until the State of Illinois and the Sanitary District of Chicago shall have made adequate provision for the performance of the decree and the satisfaction of any obligations created on their behalf by such officer of this Court, and for such other and further relief in the premises as shall seem just and meet."

On October 10, 1932, a rule was entered in which it was ordered by this court

> "that the Sanitary District of Chicago show cause, by printed return, on or before Monday, November 7, 1932, why it has not taken appropriate steps to effect compliance with the requirements of the decree of this Court in these causes dated April 21, 1930 (281 U. S. 696)."

A similar rule was directed to the State of Illinois.

The return of the Sanitary District of Chicago and the State of Illinois (hereinafter at times referred to collectively as "respondents") was duly filed on November 7, 1932.

Pursuant to a further direction in the order of this court entered on October 10, 1932, the respondents submit this brief in opposition to the relief sought in the prayer of the application.

The issues to be determined are presented by (1) the decree entered herein on April 21, 1930, which is to be construed, if such construction is necessary, in the light of the opinions of this court announced on January 14, 1929, 278 U. S. 367, and on April 14, 1930, 281 U. S. 179, and the "Report of the Special Master on Re-reference" filed December 17, 1929; (2) the semi-annual reports of the Sanitary District of Chicago (hereinafter for convenience at times referred to as the "Sanitary District") filed pursuant to the terms of the decree; (3) the application of the complainants filed herein on October 3, 1932; and (4) the return of the respondents. The provisions of the decree, the substance of the reports of the Sanitary District, the substance of the application of the complainants named, and of the return thereto of the respondents in so far as they are regarded material, are set forth at this point for the convenience of the court.

The Decree.

The decree, 281 U. S. 696, provides as follows:

> "These causes came on to be heard upon the pleadings, evidence, and the exceptions filed by the parties to the Report of the Special Master, as well as on the exceptions filed to the Report of the Special Master on Re-reference, and were argued by counsel. The Court now being fully advised in the premises, and for the purpose of carrying into effect the conclusions set forth in the opinions of this Court announced January 14, 1929, 278 U. S. 367, and April 14, 1930 [*ante*, p. 179],
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> "It is now here ordered, adjudged, and decreed as follows:
>
> "1. On and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 cubic feet per second in addition to domestic pumpage.
>
> "2. That on and after December 31, 1935, *unless good cause be shown to the contrary,* the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 5,000 cubic feet per second in addition to domestic pumpage.
>
> "3. That on and after December 31, 1938, *unless good cause be shown to the contrary,* the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any

of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage.

"4. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system of watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for domestic water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area.

"5. That the defendant the Sanitary District of Chicago shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

"6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

"7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy.

"And it is further ordered that the costs in these cases shall be taxable against the defendants." (Italics ours.)

Recommendations of the Special Master (Report of the Special Master on Re-reference, pages 144-149), that the decree should include directions with respect to the time to be given to the Sanitary District to complete the proposed construction program, so as ultimately to dispense with diversion beyond 1,500 cubic feet a second, were not adopted, and the decree contains no coercive or mandatory provision with respect to the time of completion of the various projects and their appurtenances. The dates specified in the decree relating to the amounts of reductions in the diversion of water from Lake Michigan, however, are based upon the time deemed necessary at the date of the decree for the completion of the several projects. (*Wisconsin, et al.* v. *Illinois, et al.*, 281 U. S. 179, 198-199.) The dates suggested by the Special Master (Report of the Special Master on Re-reference, pages 142, 146) for the completion of the various Treatment Works may be summarized as follows:

	To be completed
North Side Treatment Works and Batteries A and B of Imhoff Tanks at West Side Treatment Works	July 1, 1930
Calumet Treatment Works	December 31, 1933
West Side Treatment Works	December 31, 1935
Southwest Side Treatment Works	December 31, 1938

The Special Master further recommended (Report of Special Master on Re-reference, pages 143, 147) that Controlling Works should be constructed near the mouth of the Chicago River by the Sanitary District, within two years after receiving authorization from the Secretary of War, for the purpose of preventing reversals of the Chicago River at times of storm. Such authorization has not been received. (Return of Respondents, pages 26-27.)

The Special Master qualified his recommendations concerning the times of completion for the various projects by stating (Report of Special Master on Re-reference, pages 142, 146)

> "that in the foregoing estimate allowance is made for ordinary contingencies, but not for strikes *or other occurrences beyond the control of the Sanitary District* or its contractors,"

and by stating further (page 144) that

> "it must be assumed that out of respect to the Court the State of Illinois and the Sanitary District will perform what the findings conclude they should do, *unless obstacles arise which make such compliance impossible.*" (Italics ours.)

The decree of this court, in adopting the recommendations of the Special Master regarding the dates for reductions in diversion of water from Lake Michigan, also made provision for unforeseen contingencies as suggested by the Special Master, by expressly providing that the reduction in diversion to 5,000 c. f. s. on December 31, 1935, and to 1,500 c. f. s. on or before December 31, 1938, should be made "unless good cause be shown to the contrary."

It is stated in the opinion of the court, upon which the decree is based (*Wisconsin* v. *Illinois,* 281 U. S. 179, 197) that the plans of the Sanitary District for disposal of the sewage "are material only as bearing on the amount of diminution to be required from time to time and the times to be fixed for each step," and that (page 198) "all action of the parties and the Court in this case will be subject, of course, to * * * any modification that necessity may show should be made by this Court." In speaking of the Controlling Works this court stated further (page 198) "on this point we deal only with the amount [of the diversion] and the time."

The Reports of the Sanitary District Filed Pursuant to the Decree.

In compliance with the requirements of the decree, the Sanitary District has filed with the clerk of this court semi-annually on July first and January first of each year, beginning July 1, 1930, a report setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation of the sewage treatment plants respectively that have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of the decree down to the date of the respective reports.

These reports show that the Sanitary District has complied with the decree by reducing the amount of annual average diversion from Lake Michigan to less than 6,500 cubic feet a second since July 1, 1930. The reports show further that on April 21, 1930, the sewage treatment amounted to 16.7 per cent of the total sewage of the District. On June 24, 1930, there was treatment of 24.8 per cent of the total sewage (semi-annual report of July 1, 1930, page 13). The semi-annual report filed on July 1, 1932, page 9, indicates that on June 25, 1932, 31.6 per cent of the total sewage within the Sanitary District was being treated.

The reports contain an analysis of the amounts expended by the Sanitary District for construction and explain in detail the amount of work done and remaining to be done. Reasons are therein given for a temporary delay in construction work due to occurrences beyond the control of the respondents, which have not as yet prevented compliance with the decree. These matters are summarized and treated more fully in the return that has been filed to the rule to show cause, and will be discussed in greater detail in our comments upon the return of the respondents.

The Application of Complainants.

The application of the complainants complains of lack of progress by the Sanitary District in its construction program which was adopted upon the entry of the decree. The greater part of the application is devoted to charges of negligence, incompetence and bad faith on the part of the respondents, and kindred allegations made chiefly on information and belief; exaggerated deductions based upon the present temporary financial plight of the Sanitary District are made concerning the possible time within which the construction work can be completed.

In the prayer for relief the complainants ask that a rule be issued directing the respondents to show cause why this court should not appoint a Master, Commissioner, Receiver or United States Marshal "to perform this decree" with power to exercise and bind the credit of the respondents and

> "to make the expenditures necessary to effectuate the decree a lien upon all of the property in the State of Illinois and upon all the revenues of that State and

> of the Sanitary District of Chicago, to issue bonds secured by the full faith and credit, the complete taxing power and all of the revenues of the Sanitary District of Chicago and the State of Illinois, to make such bonds a lien upon all of the property in the State of Illinois and upon all of the revenues of the State of Illinois and of the Sanitary District of Chicago, to levy and collect such taxes as may be necessary to provide for the payment of the interest upon such bonds," etc.

The prayer of the application obviously is based upon the assumption that such measures are essential or necessary to effect compliance with the decree.

The decree relates merely to progressive diminution of the diversion and does not attempt to prescribe the precise program to be followed in the construction of the sewage treatment works and appurtenances, nor does it allocate any particular work to any particular period. Failure to comply with any proposed plan of construction does not violate a decree which is solely concerned with the amount of water diverted. In our argument we shall contend that under this view of the decree it is wholly unnecessary for this court to resort in any particular to the means applied for by the complainants for the enforcement of the decree, in the event that compliance is not made with the decree without good cause.

The Return of the Respondents.

The return of the respondents denies all charges relating to a lack of diligence in the performance of the construction program of the Sanitary District, and denies each and all averments charging the respondents with negligence, incompetence, bad faith, lack of effort in performance, obstruction, avoidance and circumvention of the decree, and all similar allegations. The economic depression and financial difficulties of Cook County affecting the Sanitary District, over which the Sanitary District has no control, resulting in a lack of funds, are set up as "occurrences beyond the control of the Sanitary District" operating to delay performance of the original program of construction. (Return of Respondents, page 16.) Accomplishments under the original construction program and reasons justifying the expectation that the construction program can be completed within the time allotted for reductions in diversion of water from Lake Michigan, in spite of the unforeseen delays, are also stated. (Return of Respondents, pages 10, 49.)

The Rule to Show Cause.

The rule of the court entered on the present application does not order the Sanitary District to show cause why the court should not appoint a Master, Commissioner, Receiver or United States Marshal to execute the decree.

The respondents are directed merely to show cause why they have not "taken appropriate steps to effect compliance with the requirements of the decree of the Court in these causes."

Under this rule, the question whether the court has the authority to appoint an officer with the power specified in the prayer of the application does not arise. It is assumed, however, that the court desires a brief upon the facts and legal questions presented by the application, and the argument of the respondents proceeds upon this assumption.

The respondents submit that compliance has been made with the decree of this court, and that continued and ultimate compliance can be effected without the adoption of any part of the relief prayed for in the application of the complainants; that nothing can be accomplished or gained by granting the relief sought; and that in any event this court is without power to grant the relief which the complainants now seek.

SUMMARY OF ARGUMENT.

I.

The Sanitary District has complied with the decree. The nature of the decree is such that it may be enforced without the appointment of a Master, Commissioner, Receiver or United States Marshal to complete the construction program of the Sanitary District.

II.

The facts disclosed by the reports of the Sanitary District and the return of the respondents show that the granting of the relief sought by the complainants would be ineffectual.

III.

The court is without power or jurisdiction to grant the relief sought in the application.

(a) *Under the Constitution of the State of Illinois the court would be precluded from appointing an officer to assess and to collect taxes; and as the power to issue bonds and to bind the credit of the Sanitary District is dependent upon the power to tax, the court lawfully could not appoint an officer to issue bonds and to bind the credit of the Sanitary District.*

Section 9 of Article IX of the Constitution of the State of Illinois which, as construed by the Supreme Court of Illinois, prohibits the Legislature from granting the power to assess and to collect the taxes of a municipality to any other persons than the municipal officers who have been elected by the people or who have been appointed in some mode to which the people have given their assent, would operate as a complete bar to the appointment by the court of any officers with power to assess or to collect taxes.

Since the exercise of the power to issue bonds and the power to bind the credit of the state and of the Sanitary District are dependent upon the power to collect taxes, and since the Sanitary District, being a municipal corporation, can raise money to pay the principal and interest on bonds and to pay other indebtedness only by taxation, it follows that the power to issue bonds and the power to bind the credit of the state and of the Sanitary District lawfully could not be exercised by any of the officers mentioned in the application.

The Supreme Court of the United States will follow the construction which the highest state court gives to the state constitution.

(b) *Under fundamental principles of constitutional law the court is inhibited from exercising any of the powers specifically stated in the prayer of the application.*

The general prayer in the application asking that the officer be directed "to do everything which may be necessary, convenient or proper to bring about the speedy enforcement of the decree of this court" does not, of course, enlarge his power so as to authorize him to perform any of the functions of the *legislative* or *executive* branches of the government.

The Sanitary District is a municipal corporation, a political subdivision of the state, vested by the statutes of the state with power to levy and to collect taxes, to borrow money for corporate purposes, to issue bonds, to incur indebtedness and generally to exercise all powers necessary to carry out the purpose for which the District was organized.

The only method by which municipal corporations can pay the principal and the interest of their bonds is with money raised by taxation; taxation is the principal means by which municipal corporations defray their general corporate expenses.

The power to tax is not a judicial function. It is an inherent power of sovereignty exclusively vested in the legislative department of the government. Courts lawfully cannot be transformed into tax collectors. These principles are of universal application in the Federal and in the state governments.

Each step in the process of taxation from beginning to end can be taken only as the legislature may prescribe. This is true of the levy of the tax, of the assessment of the property subject to the tax, of the collection of the tax, and of the disbursement of the tax after it is collected.

If the court should appoint any of the officers designated in the application to levy, to assess or to collect taxes and to perform the other acts prayed for in the application, the court would be invading the legislative and executive departments of the state and of the Sanitary District, a municipal corporation.

The Sanitary District, being a municipal corporation, is the representative of the state and one of the instrumentalities of the state government.

The court has no power to grant the prayer of the application and to usurp the sovereignty of the state as represented in the Sanitary District, one of the state's political subdivisions, and to erect a super-government over the state and the Sanitary District to bind the credit of the state and the Sanitary District, to issue bonds, to levy and to collect taxes, to decree a lien upon all the property of the state and upon all the revenues of the state and the district, to provide a sinking fund for the bonds, and to refinance outstanding bonds and obligations of the Sanitary District as they may fall due.

The court cannot appoint officers to levy or to collect taxes, because the levy and the collection would fall upon people who are not parties to this suit, and who are entitled to be heard by some procedure which would come within the principle of due process of law.

Taxes are not debts of a municipal corporation. Taxes are in a sense assets of a municipal corporation which are held in trust by the municipal corporation for the people. The court lawfully could not assume custody and control of such trust funds; yet, this is what the court would be doing, if the court directed any officer to levy, collect and disburse taxes. The court would be seizing the trust funds of the Sanitary District, a municipal corporation.

The court has no power to subject the property of the Sanitary District to a lien for taxes. Such liens are not created for the benefit of claimants against a municipal corporation. The liens are created for the benefit of the public authorities to enable them to collect the taxes with greater certainty.

(c) *If the Sanitary District should fail to comply with the decree, the proper method to enforce the decree would be by mandamus.*

The decree can be enforced by mandamus. If the remedy by mandamus is adequate in theory, that is sufficient, even though in a particular case it may be inadequate to produce the desired results. Inadequacy, as a practical question, does not justify the invention of an extrajudicial method by a court to enforce a decree.

The prayer of the present application is premature since there is no showing that a writ of mandamus was issued and was not obeyed.

If the writ of mandamus were issued and proved to be ineffective, the court could not supply the remedy proposed in the prayer of the application because such a remedy is contrary to established procedure and to the fundamental law of the land.

Furthermore, the writ of mandamus will not issue to compel the doing of an act which the person sought to be coerced admits on the record that he is willing to do without coercion.

If the remedy by mandamus were not successful such a situation would not be a case of a wrong without a remedy. It would be a case *without a judicial remedy*. The want of a remedy and the inability to obtain the fruits of a remedy are quite distinct and should not be confused.

The decree of the court can be enforced only to the extent and in the method established by law. If there is no lawful manner in which the decree may be enforced it must remain unexecuted.

The court cannot, by avowing that there is a right but no remedy known to the law, create a remedy in violation of law or without authority of law. The court acts only according to established principles and through established channels.

The doctrine that a want of a remedy to enforce a decree is an impairment or want of jurisdiction, does not imply the right to enforce the decree by extrajudicial methods. The doctrine simply means that a court has the power to use every lawful method to enforce a decree, but not the power to enforce a decree at all hazards.

However urgent the necessity may be, and however hopeless the position of the applicants may be, the court cannot seize the powers which belong to the legislative and executive departments and exercise such powers to enforce the decree.

It is not the province of the court to make laws in order to enforce a decree.

The hardships of a case and the failure of the mode of procedure established by law are not sufficient to justify a court to depart from all precedent and to assume an unregulated power of administering justice at the expense of well settled principles.

If the court were of the opinion that the trustees of the Sanitary District were incompetent or recalcitrant, the court lawfully could not remove them or suspend them and substitute even temporarily officers of the court in their place.

The court could not subvert the governmental structure of a state to enforce a decree.

The judicial department is the weakest of all of the departments. Its commands must be executed through the marshals who are officers of the executive department.

If force should become necessary to enforce a decree, a court could use only the marshal and his deputies for that purpose.

If that force proved to be insufficient the court might call on the President, as Commander in Chief of the Army, to enforce the decree. But the court would have no inherent power directly to control the Army.

If the court should apply to the President for assistance in enforcing a decree, the question then would become a political question for the chief executive, and would no longer be a judicial question.

IV.

No cases are cited by counsel for the applicants that can be accepted as authorities in support of the prayer of the application.

ARGUMENT.

I.

The Sanitary District has complied with the decree. The nature of the decree is such that it may be enforced without the appointment of a Master, Commissioner, Receiver or United States Marshal to complete the construction program of the Sanitary District.

As shown by the semi-annual reports of the Sanitary District and the return of the respondents to the rule to show cause, pages 6 and 7 (hereinafter for convenience referred to as the "return"), the Sanitary District has at all times complied with the terms of the decree by limiting the diversion of water from Lake Michigan to the amount prescribed by the decree, to-wit, 6,500 cubic feet a second in addition to domestic pumpage, since July 1, 1930.

It is stated in the decree that "unless good cause be shown to the contrary," the diversion must be reduced after December 31, 1935, to 5,000 cubic feet a second in addition to domestic pumpage, and to 1,500 cubic feet a second in addition to domestic pumpage on and after December 31, 1938. Respecting these requirements, the return of the respondents (pages 49-57) shows that it reasonably may be expected that reductions in diversion will be made in the future as specified, subject to any subsequent order that this court may make or that Congress may make in pursuance of its constitutional powers. (See *Wisconsin* v. *Illinois,* 281 U. S. 179, pages 198-199.)

If the Sanitary District should fail to limit the diversion as required by the decree, without good cause, this court, if necessary, could proceed directly to enforce its decree by causing the diversion to be reduced. Obviously, this court is not bound perforce to see that the *construction program* of the Sanitary District is carried out. The purpose of the decree can be accomplished by an order directing a negative act, that is, an order to be executed by an officer of the court, if necessary, prohibiting diversion beyond the prescribed amount, rather than by an order directing the performance of positive acts such as building of sewage treatment works and necessary appurtenances.

Moreover, the building of sewage treatment works is primarily the concern of the Sanitary District, and if, in response to the prayer of the application, the Sanitary District indicates its intention and willingness to carry out the contemplated construction program as soon as possible, with a showing of its ability to meet the requirements of the decree, the appointment of an officer of the court or a receiver to execute this function would be futile and useless.

II.

The facts disclosed by the reports of the Sanitary District and the return of the respondents show that the granting of the relief sought by the complainants would be ineffectual.

The semi-annual reports of the Sanitary District and the return of the respondents set forth the causes operating to delay and obstruct the performance of the construction program of the Sanitary District adopted upon the entry of the decree. As previously stated, the principal cause is a lack of funds due to the business depression and the refusal or inability of the taxpayers to pay their taxes which have been levied and assessed, rendering bonds of the Sanitary District unsaleable. It is pointed out in the return (pages 16-18) that the Sanitary District has power to levy taxes but it is not a collecting body. The levies of the Sanitary District for 1928, 1929 and 1930 aggregate $66,944,402.50. Of these levies, $22,228,908.32 remained unpaid up to October 26, 1932. The 1931 taxes, aggregating $18,875,953.75, which under ordinary circumstances would have been collected by May 1, 1932, have not as yet been extended for collection by the county clerk of Cook County. (Return, page 21.) The non-payment of taxes as shown by the return (pages 18-21) may be attributed to the business depression and the so-called "taxpayers' strike." The consensus of opinion is that business conditions are improving, and indications point to an early improvement in the local tax situation in Cook County. (Return, pages 49-51.) The major factors causing delay in the construction program of the Sanitary District are thus being removed.

It is manifest that if business conditions do not improve, and if the taxpayers persist in refusing to pay their taxes, any officer or receiver that this court might appoint will be as helpless as the Sanitary District in obtaining funds for the completion of the sewage treatment works. If financial conditions improve as anticipated, with a consequent removal of the reasons for delay, the appointment of an officer of this court to carry out the construction program would be wholly unnecessary, assuming this court had power to make such appointment, which the respondents deny.

The semi-annual reports filed with this court contain an adequate explanation of the unavoidable financial condition which has operated to impede the progress of the construction program, yet the complainants in their application ascribe the delay to neglect, incompetence, bad faith and circumvention.

The respondents, however, cannot be charged with neglect, incompetence or bad faith because of their failure to foresee and anticipate the business depression.

In *Gold* v. *United States* (C. C. A. 8th Circuit), 36 Fed. (2nd) 16, the court said (32):

> "Business adversity, especially in times of abnormal business conditions, does not necessarily spell fraud."

In *Corliss* v. *United States* (C. C. A. 8th Circuit), 7 Fed. (2nd) 455, the court, in speaking of the deflation following the World War, said (457):

> "The record shows conclusively that the disaster which overtook defendants' business was common throughout the entire industry. A business failure induced by such causes does not convert the enterprise into a scheme to defraud."

The respondents cannot be criticized for failure to foresee the depression and its extent.

In *McRoberts* v. *Spaulding* (Dist. Ct. S. D. Iowa), 32 Fed. (2nd) 315, in a suit brought against certain bank directors seeking recovery for losses sustained by the Merchants National Bank of Grinnell, Iowa, on account of negligent loans, the court said (317):

> "We are not here considering an ordinary bank failure caused by the mismanagement of the directors, but a situation that was caused by extraneous circumstances and conditions that could not be foreseen and the extent of which reasonable men could not at the time anticipate. And where bank officers, as in this case, made every reasonable effort to prevent the failure of their bank, they should not be criticized."

In the case at bar, the causes of delay will not be obviated by the appointment of an officer or a receiver to raise money and construct sewage treatment works, when it is impossible for the immediate present to raise money for this purpose. Under well established principles this court will not grant the relief prayed for in the application which, for the reasons stated, is not only unnecessary but will be wholly ineffective.

III.

The court is without power or jurisdiction to grant the relief sought in the application.

(a) *Under the Constitution of the State of Illinois the court would be precluded from appointing an officer to assess and to collect taxes; and as the power to issue bonds and to bind the credit of the Sanitary District is dependent upon the power to tax, the court lawfully could not appoint an officer to issue bonds and to bind the credit of the Sanitary District.*

Section 9 of Article IX of the Constitution of the State of Illinois provides as follows (Cahill's Ill. Rev. Stat. 1931, p. 22):

> "The General Assembly may vest the corporate authorities of cities, towns and villages with power to make local improvements by special assessment or by special taxation of contiguous property or otherwise. For all other corporate purposes, all municipal corporations may be vested with authority to assess and collect taxes; but such taxes shall be uniform in respect to persons and property, within the jurisdiction of the body imposing the same."

The Supreme Court of Illinois has held that the provision is self-executing and that its directions are mandatory.

The People v. *Louisville and Nashville R. R. Co.,* 300 Ill. 312, 316.

This provision has been construed by the Supreme Court of Illinois to be a limitation upon the power of the Legislature to grant the right of corporate or local taxation of a municipal corporation to any other persons than the corporate or local authorities who have been elected by the people of the municipality or whose appointment has been assented to by the people.

The People v. *Block,* 276 Ill. 286, 289, 290.
Booth v. *Opel,* 244 Ill. 317, 328.
Morgan v. *Schusselle,* 228 Ill. 106, 112.
Cornell v. *The People,* 107 Ill. 372, 380.
Dunham v. *The People,* 96 Ill. 331, 334.
The People v. *Morgan,* 90 Ill. 558, 566.
Updike v. *Wright,* 81 Ill. 49, 53.

In other words, the people of a municipal corporation in Illinois have the constitutional right to select the agency that may levy and collect taxes for the corporate purposes of the municipal corporation.

It has been held explicitly by the Supreme Court of Illinois that the Sanitary District is a municipal corporation.

Judge v. *Bergman,* 258 Ill. 246, 251.
The People v. *Nelson,* 133 Ill. 565, 582, 583.

The Supreme Court of the United States has declared a municipal corporation to be the representative of the state creating it, and to be one of the instrumentalities of the state government.

Pollock v. *Farmers Loan & Trust Company,* 157 U. S. 429, 584.

The phrase "corporate authorities" within the purview of Section 9 of Article IX has been defined to be such municipal officers as have been elected by the people, or appointed in some mode to which the people have given their assent.

Givins v. *City of Chicago,* 188 Ill. 348, 351.
Morgan v. *Schusselle,* 228 Ill. 106, 112.
Wetherell v. *Devine,* 116 Ill. 631, 636.
Cornell v. *The People,* 107 Ill. 372, 380.
Hessler v. *Drainage Commissioners,* 53 Ill. 105, 113.

It also has been held by the Supreme Court of Illinois by express decision that the phrase "municipal corporations" as used in Section 9 of Article IX includes all "public local corporations exercising some governmental function."

Wilson v. *Board of The Sanitary District of Chicago,* 133 Ill. 443, 464.

The Trustees of the Sanitary District are required to be elected by Section 3 of the Act under which the Sanitary District of Chicago was created.

Cahill's Ill. Rev. Stat. 1931, Chap. 42, Par. 339, p. 1201.

By Sections 9 and 10 of the same Act the Trustees are vested with the governmental functions, among others, of the issuance of bonds and of taxation.

Cahill's Ill. Rev. Stat. 1931, Chap. 42, Pars. 345, 346, pp. 1206, 1207.

The construction uniformly given to the Constitution of a state by the highest court of the state is binding on the courts of the United States as a rule of decision.

Barrington v. *Missouri,* 205 U. S. 483, 485.
Post v. *Supervisors,* 105 U. S. 667, 669.

This is the rule although the United States Supreme Court may be of the opinion that a state court has misconstrued its Constitution.

Forsyth v. *Hammond,* 166 U. S. 506, 518, 519.

The powers specified in the prayer of the application with respect to binding the credit of the Sanitary District and the issuance of bonds are powers dependent upon the power of taxation.

Section 12 of Article IX of the Constitution of the State of Illinois provides that municipal corporations shall not incur any indebtedness without providing for the collection of a direct annual tax sufficient to pay and discharge the principal and interest of the indebtedness.

Cahill's Ill. Rev. Stat. 1931, p. 22.

The Supreme Court of Illinois has held that this provision is self-executing and mandatory.

Gates v. *Sweitzer,* 347 Ill. 353, 359.

The Supreme Court of the United States has held that the taxing power of a state is one of its attributes of sovereignty; that it exists independently of the Constitution of the United States, is underived from that instrument, and may be exercised except so far as it has been surrendered to the Federal Government.

Union Pacific Railroad Company v. *Peniston,* 18 Wall. (85 U. S.) 5, 29.

Nathan v. *The State of Louisiana,* 8 How. (49 U. S.) 73, 82.

The Supreme Court of Illinois has held that the power to impose burdens and to raise money is the highest attribute of sovereignty and can be exercised only by or under the authority of the Legislature.

County of Cook v. *Columbia Ins. Co.,* 329 Ill. 189, 193.

The People v. *Sweitzer,* 339 Ill. 28, 43.

The Supreme Court of the United States has held that debts contracted by a municipal corporation, including bonds, must be paid, if paid at all, out of taxes which the municipal corporations lawfully may levy, and that all contracts creating debts to be paid in future not limited to payment from some other source, imply an obligation to pay by taxation; that it follows that the right to contract must be limited by the right to tax; and that when the legislature authorizes a municipal corporation to contract a debt by bond, it intends to authorize it to levy such taxes as are necessary to pay the debt.

Loan Association v. *Topeka,* 20 Wall (87 U. S.) 655, 659, 660.

We submit that since the court would be precluded by the Constitution of Illinois from appointing an officer to assess and to collect taxes, and since the power to issue bonds and to bind the credit of the state and of the Sanitary District by an officer appointed by the court could not be exercised without the power to assess and to collect taxes, it necessarily follows that the court does not possess the power to authorize such officer to issue bonds and to bind the credit of the state and of the Sanitary District.

(b) *Under fundamental principles of constitutional law the court is inhibited from exercising any of the powers specifically stated in the prayer of the application.*

All of those powers that are specifically stated in the prayer of the application are powers of the executive and legislative branches of government and lawfully cannot be exercised by the court.

The power of taxation is legislative.

The power to issue bonds and to create indebtednesses of any kind is dependent upon the power of taxation and cannot be exercised without the power of taxation.

The prayer that the decree be made a lien upon all of the property of the state and of the Sanitary District, and upon all of the revenues of the state and of the Sanitary District, if granted by the court, would be an unlawful invasion of the executive department of the state, and of its political subdivision and representative, the Sanitary District, in that the court would be imposing a burden on property and revenues that are held in trust by the state and by the Sanitary District for the people to be used for public purposes.

The general prayer in the application asking that the court empower the officer "to do everything which may be necessary, convenient, or proper to bring about the speedy enforcement of the decree of this court," obviously would not authorize him to exercise any of the functions of the legislative or executive branches of government.

The case of *Depew et al.* v. *Venice Drainage District,* 158 La. 1099, 105 So. 78, is a closely analogous case in which a receiver for a municipal corporation was requested. The court disposed of the questions involved in a summary way, and expressed the view, with which we agree, that such procedure was "a monstrosity." This was a suit brought by the holders of $43,000 of a series of public improvement bonds issued by the Venice drainage district, and listed by the supervisor of public accounts of the state. The purpose of the suit was to have the Venice drainage district placed in the hands of a receiver. The District Court overruled an exception to the jurisdiction of the court and an exception of vagueness. The defendants answered the petition, and judgment was rendered on the merits in favor of the plaintiffs, appointing a receiver for the Venice drainage district, with full power to hold, administer, manage, and dispose of the property and income of the corporation, to take charge of and manage the affairs of the corporation, to receive from the sheriff the taxes that are annually levied by it, and to distribute the same under the orders, directions and supervision of the court, to the persons entitled to receive them.

In holding that the suit should be dismissed the court said (pp. 1099, 1101, 1102):

> "We know of no authority, and counsel has cited none, in which a receiver was ever appointed, in a contested case by a court of this state, to take over and administer the affairs of a public political corporation.
>
> (2) A public corporation is one that is created for political purposes, with political powers, to be exercised for the public good in the administration of civil government. It is an instrument of government, subject to the control of the Legislature, and its officers are officers of the government for the administration and discharge of public duties.
>
> The sins of commission and omission, which plaintiffs impute to the commissioners of the Venice drainage district, may be urged, in a proper proceeding, as cause for their removal from office, but in this case we

> are concerned only in ascertaining if the courts of this state have jurisdiction to appoint receivers to corporations declared by law to be political subdivisions of the state. If this court should hold that the judiciary may take over and control the agencies of government and substitute its judgment for the discretion vested in the legally constituted authorities, the legislative and executive branches of government might as well cease to function. The contemplation of such a monstrosity is repugnant to common sense.
>
> We are of the opinion that the exception to the jurisdiction of the court should have been sustained, and that the district judge erred in overruling it. The judgment appointing a receiver of the Venice drainage district is therefore reversed, and this suit is dismissed, at plaintiffs' cost."

The question whether the collection of taxes by a receiver appointed by a court would be an invasion of the legislative department was not specifically discussed by the court in the case of *Depew et al.* v. *Venice Drainage District, supra,* but there are numerous authorities in which that question is thoroughly discussed.

The leading case in which the question whether the court has the power to appoint an officer to levy and to collect a tax is the case of *Rees* v. *City of Watertown,* 19 Wall. (86 U. S.) 107. The plaintiff Rees, a citizen of Illinois, being owner of certain bonds issued under authority of an act of the legislature of the State of Wisconsin, by the City of Watertown, brought suit in the United States Circuit Court in Wisconsin and recovered judgments of $10,000. Executions were issued which were returned unsatisfied. Thereupon, Rees procured from the Circuit Court a peremptory writ of mandamus directing the City of Watertown to levy and collect a tax upon the taxable property of the city to pay the said judgments. Before the writ could be served, a majority of the members of the city council resigned their offices. This fact was returned by the marshal and proceedings upon the mandamus thereupon ceased. A second and a third writ of mandamus were issued which likewise were fruitless.

Thereupon Rees filed a bill in equity, praying for a decree subjecting the taxable property of the citizens to the payment of his judgments and that the marshal might be empowered to seize and sell so much of it as might be necessary and to pay over to him the proceeds of such sale.

The two judges before whom the case was tried were divided in opinion and the bill was dismissed.

The case was brought to the Supreme Court on a certificate of division and appeal. In affirming the judgment the court said (p. 116):

> "We are of the opinion that this court has not the power to direct a tax to be levied for the payment of these judgments. This power to impose burdens and raise money is the highest attribute of sovereignty, and is exercised, first, to raise money for public purposes only; and, second, by the power of legislative authority only. It is a power that has not been extended to the judiciary. Especially is it beyond the power of the Federal judiciary to assume the place of a State in the exercise of this authority at once so delicate and so important. The question is not entirely new in this court."

The court further said (pp. 121, 122):

> "The plaintiff invokes the aid of the principle that all legal remedies having failed, the court of chancery must give him a remedy; that there is a wrong which cannot be righted elsewhere, and hence the right must be sustained in chancery. The difficulty arises from too broad an application of a general principle. The great advantage possessed by the court of chancery is not so much in its enlarged jurisdiction as in the extent and adaptability of its remedial powers. Generally its jurisdiction is as well defined and limited as is that of a court of law. It cannot exercise jurisdic-

> tion when there is an adequate and complete remedy at law. It cannot assume control over that large class of obligations called imperfect obligations, resting upon conscience and moral duty only, unconnected with legal obligations."

* * * * * *

> "A court of equity cannot, by avowing that there is a right but no remedy known to the law, create a remedy in violation of law, or even without the authority of law. It acts upon established principles not only, but through established channels."

The court dismissed the bill saying (p. 125):

> "Entertaining the opinion that the plaintiff has been unreasonably obstructed in the pursuit of his legal remedies, we should be quite willing to give him the aid requested if the law permitted it. We cannot, however, find authority for so doing and we acquiesce in the conclusion of the court below that the bill must be dismissed."

The rule of decision in the case of *Rees* v. *City of Watertown, supra,* is well established. It has been adopted in the following cases:

Heine v. *Levee Commissioners,* 19 Wall. (86 U. S.) 655, 658.
Barkley v. *Levee Commissioners,* 93 U. S. 258, 265.
Meriwether v. *Garrett,* 102 U. S. 472, 519, 520.
Thompson v. *Allen County,* 115 U. S. 550, 556.
South Dakota v. *North Carolina,* 192 U. S. 286, 319.
Yost v. *Dallas County,* 236 U. S. 50, 57.
O'Brien v. *Wheelock* (C. C. S. D. Ill.), 78 Fed. 673, 679.
Safe-Deposit & Trust Co. v. *City of Anniston* (C. C. N. D. Ala., S. D.), 96 Fed. 661, 663.
Washington County v. *Williams* (C. C. A., 8th Cir.), 111 Fed. 801, 812.

Preston v. *Chicago St. L. & N. O. R. Co.* (C. C. W. D. Ky.), 175 Fed. 487, 490.

Preston v. *Sturgis Milling Co.* (C. C. A., 6th Cir.), 183 Fed. 1, 4.

Street District No. 60 v. *Hagadorn* (C. C. A., 8th Cir.), 186 Fed. 451, 453.

Road Improvement Dist. v. *Guardian Savings & Trust Co.* (C. C. A., 8th Cir.), 298 Fed. 272, 274.

In the case of *Barkley* v. *Levee Commissioners et al.,* 93 U. S. 258 (*supra*), the nature of the proceeding was as follows: Barkley applied to the court below for a writ of mandamus, to be directed to the Board of Levee Commissioners of the parishes of Madison and Carroll, in the State of Louisiana, to compel such of said board as then survived to proceed to assess and collect a tax for the payment of a certain judgment alleged to have been recovered by the petitioner against the board on the nineteenth day of June, 1872; or, if the court should be of opinion that the survivors did not have such power, and could not fill vacancies in their body, then that the police juries of the parishes of Madison and Carroll should be ordered to perform that duty, and assess and collect sufficient tax to pay the judgment; or, if the court should be of opinion that it had not power to make either of said orders, then that it should order the United States Marshal of the district to assess at once, or by installments, from year to year, and collect sufficient taxes upon the property subject to taxation for levee purposes in the parishes, to pay the judgment, interest and costs; the petition also contained a prayer for general relief.

The petition further stated that a writ of *fieri facias* had been issued on the judgment and returned unsatisfied, after demand made on the secretary and treasurer of the board; that they, as well as the police juries of the parishes, pretended that the board was dissolved and failed to point out any property belonging thereto; that the two parishes were the really interested parties, and that, if the old Board of Levee Commissioners did not act, it was the duty of the police juries to assess and collect sufficient taxes on taxable property of the two parishes to pay the judgment. A rule was taken on the surviving members of the Board of Levee Commissioners and on the police juries of the parishes of Madison and Carroll, to show cause why a mandamus should not issue as prayed. The former, by exception and answer, set up various grounds of defense, the most important to note being that the corporation of levee commissioners was defunct by resignation and death, only three (who were not a quorum) remaining alive; also, that the judgment was void because no service of process had ever been made on the corporation. The police juries answered that they were distinct corporations from that of the Board of Levee Commissioners, and were not vested with power to assess and collect the taxes in question.

After receiving evidence and hearing the parties, the court below refused the mandamus. Barkley sued out a writ of error.

In deciding that the court did not have power to appoint a marshal to assess a tax the court said (pp. 264, 265):

> "The remaining prayer, for an order directing the marshal to assess the tax, is equally inadmissible. It is true, that, in the case of *The Supervisors of Lee County* v. *Rogers*, 7 Wall, 175, we held that the Circuit Court acting in that case, after having issued a *mandamus* to the supervisors of the county, commanding them to levy a tax, and they having refused to obey the writ, was authorized, under the Code of Iowa, which provided for such a proceeding, to issue a writ

> to the marshal commanding him to levy and collect the taxes required. But we have never gone beyond this case, which depended on the special law referred to. The marshal is the executive officer of the court, and can only execute its process; * * *. In the recent case of *Rees* v. *The City of Watertown*, 19 Wall. 107, we decided that the court has no general power to commission the marshal to levy taxes for the purpose of satisfying a judgment, and we refer to that case for a more full explanation of our views on this subject."

In the case of *Meriwether* v. *Garrett*, 102 U. S. 472 (*supra*), Garrett and others filed their bill in the court below against the City of Memphis, Tennessee, setting forth that they were the owners and holders of overdue and unpaid bonds and coupons and other evidences of its indebtedness to the amount of more than $100,000, upon much of which indebtedness they had secured judgments and writs of mandamus to compel the collection thereof; that, owing to *malfeasance, misfeasance,* and *incompetency* of its officers charged with the collection of taxes, a large proportion of taxes levied and assessed for many years past, and amounting to at least $2,500,000, were uncollected and unpaid, by reason of which it was insolvent; that its persistent failure to collect the taxes was a fraud upon its creditors; that during each of the years 1875, 1876, 1877 and 1878 a large levy of taxes was made in obedience to writs of mandamus, but that by reason of its failure during each of those years to collect more than three-fifths of the amounts thereof, and also of the taxes assessed and levied for general purposes, a large amount represented by the judgments remained unpaid; that the special levies so made, in which the complainants had a large interest, constituted a trust fund for the payment of their judgments which could only be used for that purpose, and that the city's neglect and failure to press the collection thereof was a fraud upon them, against which a court of equity would relieve.

In holding that the power of taxation is legislative and that courts have not the power, in the absence of statutory authority, to appoint an officer to levy and to collect taxes the court said (p. 501):

> "The power of taxation is legislative, and cannot be exercised otherwise than under the authority of the legislature.
>
> "Taxes levied according to law before the repeal of the charter, other than such as were levied in obedience to the special requirement of contracts entered into under the authority of law, and such as were levied under judicial direction for the payment of judgments recovered against the city, cannot be collected through the instrumentality of a court of chancery at the instance of the creditors of the city. Such taxes can only be collected under authority from the legisture."

In a concurring opinion, in which the reasons for the judgment were stated, it was said (pp. 513-514, 515-516):

> "* * * we say that the taxes previously levied, but not collected on the dissolution of the corporation, do not constitute its property; and in the absence of statutory authority they cannot be subsequently collected by a court of equity through officers of its own appointment, and applied to the payment of the creditors of the corporation. Taxes are not debts. It was so held by this court in the case of *Oregon* v. *Lane County,* reported in 7th Wallace. Debts are obligations for the payment of money founded upon contract, express or implied. Taxes are imposts levied for the support of the government, or for some special purpose authorized by it. The consent of the taxpayer is not necessary to their enforcement. They operate *in invitum.* Nor is their nature affected by the fact that in some States—and we believe in Tennessee—an action of debt may be instituted for their recovery. The form of procedure cannot change their character. *City of Augusta* v. *North,* 57 Me. 392;

City of Camden v. *Allen,* 2 Dutch. (N. J.) 398; *Perry* v. *Washburn,* 20 Cal. 318. Nor are they different when levied under writs of *mandamus* for the payment of judgments, and when levied for the same purpose by statute. The levy in the one case is as much by legislative authority as in the other. The writs of *mandamus* only require the officers of assessment and collection to obey existing law. In neither case are the taxes liens upon property unless made so by statute. * * * So long as the law authorizing the tax continues in force, the courts may by *mandamus,* compel the officers empowered to levy it or charged with its collection, if unmindful and neglectful in the matter, to proceed and perform their duty; but when the law is gone, and the office of the collector abolished, there is nothing upon which the courts can act. The courts cannot continue in force the taxes levied, nor levy new taxes for the payment of the debts of the corporation. The levying of taxes is not a judicial act. It has no elements of one. It is a high act of sovereignty, to be performed only by the legislature upon considerations of policy, necessity, and the public welfare. In the distribution of the powers of government in this country into three departments, the power of taxation falls to the legislative. It belongs to that department to determine what measures shall be taken for the public welfare, and to provide the revenues for the support and due administration of the government throughout the State and in all its subdivisions. Having the sole power to authorize the tax, it must equally possess the sole power to prescribe the means by which the tax shall be collected, and to designate the officers through whom its will shall be enforced.

"It is the province of the courts to decide causes between parties, and, in so doing, to construe the Constitution and the statutes of the United States, and of the several States, and to declare the law, and, when their judgments are rendered, to enforce them by such remedies as legislation has prescribed, or as are allowed by the established practice. When they go beyond this, they go outside of their legitimate domain, and encroach upon the other departments of the gov-

> ernment; and all will admit that a strict confinement of each department within its own proper sphere was designed by the founders of our government, and is essential to its successful administration.
>
> "This doctrine is not new in this court. It has been repeatedly asserted, after the most mature consideration. It was asserted in *Rees* v. *City of Watertown.*"

The case of *Yost* v. *Dallas County,* 236 U. S. 50 (*supra*), was a suit in equity, and the bill was dismissed by the District Court. The facts alleged were in substance as follows: A statute of Missouri incorporated the Laclede and Fort Scott Railroad and authorized counties to invest in its stock and bonds and to issue county bonds in order to pay for them. The appellee did so, afterwards defaulted upon its bonds, and the appellant recovered judgment upon the bonds in the same District Court for over a million dollars. Under the laws in force when the bonds were issued it was the duty of the county officers to levy and collect annually a tax of thirty per cent of the amount of the bonds issued, but this duty never had been performed and the county officers evaded service of writs of mandamus or if served refused to obey the writs. There was no other mode of obtaining satisfaction, and the duties of levying and assessing the tax were only those of apportioning the tax among the taxable inhabitants on the basis of the last previous assessment which has been made, and of collecting it. The prayer was for the appointment of a commissioner to levy, collect and pay over the tax according to the Missouri law. The questions which were presented by a certificate from the Circuit Court of Appeals were certified as follows (p. 55):

> "1. Has the District Court of the United States, sitting as a court of equity, jurisdiction of such a cause?
>
> "2. When a judgment has been recovered on the law side of a District Court of the United States of

competent jurisdiction, against a county of the State of Missouri, on its bonds issued by authority of law, and the laws of that State in force at the time the bonds were issued authorized such county to levy and collect taxes to pay such bonds, and the county has no funds in its treasury, which can be applied to the payment of the judgment, and its property is, under the laws of the State, exempt from seizure and sale under execution; when the officers charged by the laws of the State with the duty to levy and collect taxes to pay such judgment refuse so to do, when the court in which such judgment was rendered has a number of times issued writs of mandamus commanding such officials to levy the taxes which they are authorized and which it was their duty to levy to pay such judgment, but these officials have, when possible, evaded service of these writs, and when served have wilfully and definitely refused to obey the writs of mandamus, and the fact has been conclusively demonstrated by the proceedings at law that the plaintiff is utterly remediless at law by mandamus or otherwise for the failure of the county to pay, and the refusal of the officers of the county to discharge their duty to levy and collect taxes and therewith to pay his judgment; and when the last previous assessment was made, which, by the statute in force at the time the contract was made, was authorized and made the basis of the levy of the amount to which the plaintiff is now entitled under his judgment and writs of mandamus so that no act of discretion is required to levy and collect it, but only the clerical or ministerial acts of apportioning the amount among the assessed values of the taxables specified in the last previous assessment, placing it on the tax books and collecting it of the persons and property liable therefor, has the Federal Court of the District in which the judgment was rendered, and the futile writs of mandamus issued and, when possible, served, the jurisdiction and authority in equity to appoint a commissioner, receiver or other officer to make the apportionment and to collect the amounts which the owner of the judgment is entitled to have collected from the parties and properties liable therefor.''

In answering the questions in the negative, the court said (pp. 56, 57):

> "The fundamental consideration for answering these questions is that the obligation upon which the judgment was recovered was an obligation under, not paramount to, the authority of the State. It is true that the District Court of the United States had jurisdiction of the suit upon the contract, but the extent of the obligation imposed was determined by the statutes of Missouri, not by the Constitution of the United States or any extraneous source, the Constitution only requiring that the obligation of the contract should not be impaired by subsequent state law. The plaintiff, by bringing suit in the United States court acquired no greater rights than were given to him by the local statutes. The right so given was to have a tax levied and collected, it is true, but a tax ordained by and depending on the sovereignty of the State and therefore limited in whatever way the State saw fit to limit it when, so to speak, it contracted to give the remedy. It is established that 'taxes of the nature now in question can only be levied and collected in the manner provided' by the statute, and therefore that it is impossible for the courts to substitute their own appointee in place of the one contemplated by the act. * * * as the tax depended for its creation upon a sovereign act of the State and was confided for its enforcement to officers of the State it is decided that it cannot be enforced by others."

In *Preston* v. *Chicago, St. L. & N. O. R. Co.* (Cir. Ct. W. D. Ky.), 175 Fed. 487, it appeared that the Caseyville and Lindle Mills districts of Union County Ky., under the provisions of an act to incorporate the Madisonville & Shawneetown Straight Line Railroad Company, each subscribed for and took stock in that company and in payment therefor each district issued its bonds, due 20 years afterwards, with interest thereon payable semi-annually. Coupons for the installments of interest were attached to the bonds. Soon after the issue of the bonds of these districts, the complainant and his wife, for a valuable consideration, purchased a large proportion of the bonds. From time to time, on the interest coupons and later on the bonds themselves, the complainant and his wife jointly obtained judgments for the amounts due thereon. Executions were issued, which were returned *nulla bona,* and the complainant in all other respects seemed to have found utterly ineffectual all the remedies provided by the statute, although the appropriate taxation had been fully levied and assessed upon the property in the districts. The districts had succeeded, by the devices stated in the bill, in repudiating the obligations incurred by them in such apparent good faith as to induce purchasers to invest in their securities. The complainant, a citizen of the State of Iowa, brought this suit in equity against an individual taxpayer, wherein he claimed that there was levied and assessed taxes of the amount of $22,887.65 on the property of the defendant situated in the Caseyville district and taxes to the amount of $4,356.35 on the property of the defendant located in the Lindle Mills district, and sought to compel the defendant to pay its part of the amount due to complainant on his judgments against said districts. It is claimed that by virtue of these facts liens were created in complainant's favor upon the defendant's property described in the bill, and which liens the complainant seeks to foreclose and enforce by this suit. The defendant, by its demurrer to the bill, questioned first, the jurisdiction of the court; and, second, the sufficiency of the bill as not showing any equity or right in complainant to the relief sought.

In dismissing the bill the court said (pp. 489, 490):

> "From a most attentive consideration of the principles upon which three of the cases, *supra,* appear to have been decided (namely, *Rees* v. *Watertown, Heine*

> v. *Levee Commissioners, and Thompson* v. *Allen County*) we have concluded that they foreclose the questions involved in the demurrer to the bill, inasmuch as they seem definitely to hold that, unless a remedy by a suit in equity for the collection of taxes is expressly authorized by legislation, it cannot be maintained. * * *
>
> "The equity jurisdiction of the courts of the United States is fixed by the Constitution and laws of the United States, and while those laws, as construed by the courts, will open up to the recognition and enforcement of certain rights, equitable in character, when given by the state laws, that jurisdiction is otherwise limited by the laws of the United States and the recognized principles of equitable jurisprudence as established in England before the adoption of the Constitution. * * *
>
> "It is not contended that any express statutory authority exists for the institution of an action like this. The contention which has been strongly and ably presented is that the right to come into equity arises out of the justice and necessity of the case, since otherwise the complainant is without adequate remedy, and that equity will never permit a wrong to exist without providing a remedy for its correction. The courts dealt with this very question in the cases of *Rees* v. *Watertown,* 19 Wall., at pages 121 and 122, 22 L. Ed. 72, *Heine* v. *Levee Commissioners,* 19 Wall., at page 658, 22 L. Ed. 223, and in *Grand Rapids Furniture Co.* v. *Trustees, etc.,* 102 Ky. 558, 44 S. W. 98. In each of those cases the contention was overruled. In each of them it was held that equity cannot supply a remedy which the Legislature has not given for the collection of taxes assessed upon property, and that the Legislature alone can do so."

In the case of *Street Dist. No.* 60 v. *Hagadorn* (C. C. A. Eighth Cir.), 186 Fed. 451, *supra,* a bill in equity was filed in which it was sought to have a receiver appointed to collect the annual installments of an assessment which had been duly made and pledged by the defendant as security for the payment of the complainant's bonds. In dismissing the bill the court said (p. 453):

> "The only relief sought by the bill or granted by the decree appealed from was the appointment of a receiver to collect the annual installments of an assessment which had been duly made and pledged by the defendant Grading District as security for the payment of complainants' bonds.
>
> "Is jurisdiction for that purpose vested in a court of equity? In other words, was there an adequate remedy at law?
>
> "We think this question has been conclusively answered by the Supreme Court of the United States in several cases.
>
> "In *Rees* v. *City of Watertown,* 19 Wall. 107, 22 L. Ed. 72, a court of equity was asked to appoint its marshall to levy and collect a tax to pay judgments recovered against a city. Peremptory writs of mandamus had been issued against the officers of the city to compel the levy and collection of the tax; but, before the writ could be served, a majority of the defendants resigned their offices. In other ways the officers of the city had succeeded in preventing the levy and collection of taxes to pay the judgment. The Supreme Court, speaking by Mr. Justice Hunt, in denying the power of the court to grant relief, said: 'We are of the opinion that this court has not the power to direct a tax to be levied for the payment of these judgments. This power to impose burdens and raise money is the highest attribute of sovereignty, and is exercised, first, to raise money for public purposes only. * * * It is a power that has not been extended to the judiciary.'"

The case of *Road Improvement Dist. No. 7 of Poinsett County, Ark.* v. *Guardian Savings & Trust Co.* (C. C. A. Eighth Cir.), 298 Fed. 272, *supra,* was brought by a trustee, for bondholders under a so-called mortgage, to obtain the appointment of a receiver and the payment of past due bonds and interest coupons issued by a road improvement district. The defendant was a road district organized under a special act of the Arkansas Legislature for the purpose of building a road to be paid for from special benefit assessments upon land in the district. Various owners of such land intervened in opposition to the bill. The decree established the validity of the mortgage, the amount and ownership of the bonds outstanding and the delinquency of the district as to interest and adjudged that a receiver should be appointed to collect the assessments theretofore levied on the land in the district. From that decree an appeal was brought.

The jurisdiction of the trial court was challenged on the ground that the contract between the bondholders and the district provided, in case of default in payment, for the appointment of a receiver by the state chancery court for the purpose of collecting assessments to pay the obligations due the bondholders and that such contract made that remedy and that forum the exclusive resort for such relief. The statute, authorizing organization of the districts and the issuance of bonds, provided that the chancery court of Poinsett County might, in case of default on the bonds, appoint a receiver to collect assessments and pay the bonds. The argument was that the remedy became part of the contract with the bondholders. Appellee answered this contention by contending that the statute creating the district provided for the appointment of such receiver by the state chancery court and that "it is elementary law that no jurisdiction can be conferred upon a state court without conferring a similar jurisdiction upon the federal courts." Thus, this contention presented for determination the jurisdiction of the trial court to appoint a receiver.

In denying relief the court said (p. 274):

> "A remedial right to proceed in a federal court cannot be enlarged or diminished by a state statute.
>
> * * *
>
> "We are, therefore, remitted to the inquiry as to whether a federal court of equity has jurisdiction to

> appoint a receiver such as here sought. Of course, the general power to appoint receivers, in proper cases and under proper circumstances, inheres in federal equity jurisdiction. Therefore, the question here is whether federal courts can appoint receivers for the purposes set forth in this bill. Those purposes are to collect and enforce payment of such portion of the benefits assessed against the land in this district as may be necessary to pay the claims of the bondholders. A district such as this is a public corporation or quasi public corporation. * * * This principle has been applied to benefit assessments. *Heine* v. *Levee Com'rs,* 19 Wall. 655, where it was said at page 661 (22 L. Ed. 223): 'It is not only not one of the inherent powers of the court to levy and collect taxes, but it is an invasion by the judiciary of the federal government of the legislative functions of the state government.'
>
> "This principle has, also, been applied where a part of the relief sought was a receiver (*Thompson* v. *Allen County,* 115 U. S. 550, 6 Sup. Ct. 140, 29 L. Ed. 472), and even where the state statute authorized a receiver (*Meriwether* v. *Garrett,* 102 U. S. 472, 26 L. Ed. 197)."

After reviewing numerous authorities, including the case of *Rees* v. *City of Watertown* (*supra*), the court concluded (p. 275):

> "The above citations rule the point before us. The trial court had no jurisdiction to appoint the receiver herein."

The Supreme Court of Illinois has held explicitly that the power of the State to tax implies the power of the State to enforce the collection of the tax and to prescribe the mode by which it should be accomplished.

Elmhurst State Bank v. *Stone,* 346 Ill. 157, 162.
The People v. *Sears,* 344 Ill. 189, 191.

Another ground on which it has been held that courts have not the power to appoint an officer to levy or to collect taxes is that the levy and collection would fall upon people who are not parties to the suit and who are entitled to be heard by some procedure which would come within the principle of due process of law.

In the case of *Rees* v. *City of Watertown,* 19 Wall. (86 U. S.) 107, *supra,* the court said (p. 122):

> "Thus, assume that the plaintiff is entitled to the payment of his judgment, and that the defendant neglects its duty in refusing to raise the amount by taxation, it does not follow that this court may order the amount to be made from the private estate of one of its citizens. This summary proceeding would involve a violation of the rights of the latter. He has never been heard in court. He has had no opportunity to establish a defence to the debt itself, or if the judgment is valid, to show that his property is not liable to its payment. It is well settled that legislative exemptions from taxation are valid, that such exemptions may be perpetual in their duration, and that they are in some cases beyond legislative interference. The proceeding supposed would violate that fundamental principle contained in chapter twenty-ninth of Magna Charta, and embodied in the Constitution of the United States, that no man shall be deprived of his property without due process of law—that is, he must be served with notice of the proceeding, and have a day in court to make his defence. * * *
>
> "Whether, in fact, the individual has a defence, * * * is not important. To assume that he has none, and, therefore, that he is entitled to no day in court, is to assume against him the very point he may wish to contest."

In *Barkley* v. *Levee Commissioners, et al.,* 93 U. S. 258, *supra,* the court said (p. 265):

> "* * * the court * * * cannot enforce its judgments for the recovery of a debt in any other way than by seizing and selling the property of the judgment debtor, or (where imprisonment for debt is authorized) by seizing and detaining his person. Where the debtor is a corporation, it cannot seize the property of its members. This it would do if it should issue

> a writ to the marshal commanding him to levy a tax upon the inhabitants of a municipal corporation, or upon their private property. The court has no more authority, in point of law, to seize the property of citizens for the debt of the corporation in which they reside (except in some of the Eastern States, where a different system prevails) than it has to seize the property of another corporation."

In *Yost* v. *Dallas County*, 236 U. S. 50, *supra*, the court said (p. 57):

> "But as the tax depended for its creation upon a sovereign act of the State and was confided for its enforcement to officers of the State it is decided that it cannot be enforced by others. The fact that it falls upon people who are not parties to the contract or the suit is an additional consideration in favor of the result."

In the case of *The People* v. *Sweitzer*, 339 Ill. 28, a writ of mandamus was sought to compel, among other things, the board of assessors and the board of review to complete the assessment for the year 1928 by using for that purpose the real estate valuations fixed in 1927 without change or revision and to certify the assessment so made to the county clerk. In denying the writ the court said (p. 41):

> "By the exercise of the taxing power private property is appropriated. Every person has the right to be heard before he can be justly deprived of his property. He has the right to be informed of the value placed upon it by the assessor, in order that he may, if aggrieved, appeal to the board which has the power to revise and correct the assessment. (*City of Nashville* v. *Weiser*, 54 Ill. 245.) To levy taxes upon the general assessment throughout the quadrennium without giving the taxpayer an opportunity to be heard concerning substantial changes in the condition and consequently in the value of his property would not only result in a disproportionate assessment but would also deprive him of his property without due process of law."

It is equally well settled that the court has not the authority to grant the prayer of the application to decree a lien upon all of the property of the State and of the Sanitary District, and upon all of the revenues of the Sanitary District.

The real property and the revenues held by the State and by the Sanitary District are not owned in a private capacity as assets of the State and of the Sanitary District. They merely are held in trust by the State and the Sanitary District for the people to be used for public purposes.

> *South Dakota* v. *North Carolina,* 192 U. S. 286, 318, 319.
>
> *Meriwether* v. *Garrett,* 102 U. S. 472, 513.
>
> *Barkley* v. *Levee Commissioners, et al.,* 93 U. S. 258, 264, 265, 266.

In the case of *South Dakota* v. *North Carolina,* 192 U. S. 286, the State of South Dakota filed a bill, making the State of North Carolina and others defendants, to recover the amount due on certain bonds issued by the State of North Carolina. In discussing the question whether a money judgment could be entered against the State of North Carolina, the court said (pp. 318-319):

> "But we are confronted with the contention that there is no power in this court to enforce such a judgment, and such lack of power is conclusive evidence that, notwithstanding the general language of the Constitution, there is an implied exception of actions brought to recover money. The public property held by any municipality, city, county or State is exempt from seizure upon execution because it is held by such corporation, not as a part of its public assets, but as a trustee for public purposes. *Meriwether* v. *Garrett,* 102 U. S. 472, 513. As a rule no such municipality has any private property subject to be taken upon execution."

In *Meriwether* v. *Garrett,* 102 U. S. 472, *supra,* in a concurring opinion it was said (pp. 518-519):

> "On another ground, also, the decree is equally untenable. It adjudges that 'all the property within the limits of the territory of the city of Memphis is liable, and may be subjected to the payment of all the debts' for which the suits are brought, and that 'such liability shall be enforced thereafter, from time to time, in such manner' as the court may direct.
>
> "In no State of the Union, outside of New England, does the doctrine obtain that the private property of individuals within the limits of a municipal corporation can be reached by its creditors, and subjected to the payment of their demands. In Massachusetts and Connecticut, and perhaps in other States in New England, the individual liability of the inhabitants of towns, parishes, and cities, for the debts of the latter, is maintained, and executions upon judgments issued against them can be enforced against the private property of the inhabitants. But this doctrine is admitted by the courts of those States to be peculiar to their jurisprudence, and an exception to the rule elsewhere prevailing. Elsewhere the private property of the inhabitants of a municipal body cannot be subjected to the payment of its debts, except by way of taxation; but taxes, as we have already said, can only be levied by legislative authority. The power of taxation is not one of the functions of the judiciary; and whatever authority the States may, under their constitutions, confer upon special tribunals of their own, the Federal courts cannot by reason of it take any additional powers which are not judicial."

In the case of *Barkley* v. *Levee Commissioners, et al.,* 93 U. S. 258, *supra,* the court said (p. 265):

> "Much reliance is placed by the counsel of the petitioner on the fact that the taxes directed to be imposed by the acts of 1858 and 1859 were made a first lien and privilege upon the property liable thereto. We do not see how this can affect the present application. Liens for taxes are very generally created throughout the country; but it is never supposed that

> the public creditors, to whom the money raised by tax is to be paid, have the benefit of such lien. It is created for the benefit of the public authorities, to enable them with greater certainty and facility to collect the taxes, without the embarrassment of other pretended claims against the property taxed."

(c) *If the Sanitary District should fail to comply with the decree, the proper method to enforce the decree would be by mandamus.*

If the Sanitary District should fail, without reasonable justification, to continue to comply with the decree, the proper method to enforce the decree would be by mandamus.

In the case of *Rees* v. *City of Watertown,* 19 Wall. (86 U. S.) 107, *supra,* the court said (pp. 124-125):

> "The writ of mandamus is, no doubt, the regular remedy in a case like the present, and ordinarily it is adequate and its results are satisfactory. The plaintiff alleges, however, in the present case, that he has issued such a writ on three different occasions; that, by means of the aid afforded by the legislature and by the devices and contrivances set forth in the bill, the writs, have been fruitless; that, in fact, they afford him no remedy. The remedy is in law and in theory adequate and perfect. The difficulty is in its execution only. The want of a remedy and the inability to obtain the fruits of a remedy are quite distinct, and yet they are confounded in the present proceeding. To illustrate: the writ of *habere facias possessionem* is the established remedy to obtain the fruits of a judgment for the plaintiff in ejectment. It is a full, adequate, and complete remedy. Not many years since there existed in Central New York combinations of settlers and tenants disguised as Indians, and calling themselves such, who resisted the execution of this process in their counties, and so effectually that for some years no landlord could gain possession of his land. There was a perfect remedy at law, but through fraud, violence, or crime its execution was prevented.

> It will hardly be argued that this state of things gave authority to invoke the extraordinary aid of a court of chancery. The enforcement of the legal remedies was temporarily suspended by means of illegal violence, but the remedies remained as before. It was the case of a miniature revolution. The courts of law lost no power, the court of chancery gained none. The present case stands upon the same principle. The legal remedy is adequate and complete, and time and the law must perfect its execution."

In the case at bar, the return filed by the respondents to the application (page 21) avers that tax levy ordinances have been duly filed by the Sanitary District, but that the County Collector of Cook County has been unable to collect a sufficient amount of taxes to turn over to the Sanitary District to enable it to proceed with its building program. A tax levy is therefore not required. All that remains to be done is the collection of the tax. Manifestly, mandamus would be a proper remedy if the assistance of a court were needed.

In *Meriwether* v. *Garrett,* 102 U. S. 472, *supra,* the court said (515):

> "So long as the law authorizing the tax continues in force, the courts may, by *mandamus,* compel the officers empowered to levy it or charged with its collection, if unmindful and neglectful in the matter, to proceed and perform their duty; * * *."

To the same effect are the following cases:

Barkley v. *Levee Commissioners,* 93 U. S. 264, 265, 266.

Thompson v. *Allen County,* 115 U. S. 550, 554, 555.

O'Brien v. *Wheelock* (C. C. S. D. Ill.), 78 Fed. 673, 679.

Safe-Deposit & Trust Co. v. *City of Anniston* (C. C. N. D. Ala., S. D.), 96 Fed. 661, 662.

Washington County v. *Williams* (C. C. A. 8th Cir.), 111 Fed. 801, 812.

Preston v. *Sturgis Milling Co.* (C. C. A. 6th Cir.), 183 Fed. 1, 2, 3.

As stated by the court in *Rees* v. *Watertown,* 19 Wall. (86 U. S.), 107, *supra,* even if the legal remedy by mandamus has been exhausted, the court lawfully could not appoint an officer to levy and to collect taxes in order to enforce the decree.

In the case of *Yost* v. *Dallas County,* 236 U. S. 50, *supra,* there is the following statement (p. 57):

> "Of course it does not follow from the fact that a court has authority to issue a writ of mandamus to compel officers to perform their duty that it can perform that duty in their place."

In *Safe-Deposit & Trust Co.* v. *City of Anniston* (C. C. N. D. Ala., S. D.), 96 Fed. 661, *supra,* the court said (pp. 662-663):

> "In a case where the legal remedy by mandamus had been exhausted, proving ineffectual by reason of the refusal of citizens of the municipality to accept office, through which alone the taxes could be collected, it is held by the court of last resort that equity can afford no remedy. *Rees* v. *City of Watertown,* 19 Wall. 107. This being settled, it must follow, for stronger reasons, that equity has no jurisdiction when the usual proceedings at law have not been tried, and when facts are not alleged showing that the judgments cannot be collected by such proceedings. In cases of judgments against municipal corporations, the writ of mandamus is looked on as the final process of the court; it performs, in substance and effect, the office of a writ of execution. 2 Dill. Mun. Corp. (4th Ed.), § 861. Both by statute and by the general principles of law and of equity jurisprudence the federal courts are prohibited from exercising jurisdiction in equity when there is a plain, adequate, and complete remedy at law. Rev.

> St. U. S. § 723. If the remedy at law is adequate in theory, it deprives equity of jurisdiction, although practically it may be inadequate to secure the collection of the claim sued on. 'By inadequacy of the remedy at law is here meant, not that it fails to produce the money,—that is a very usual result in the use of all remedies,—but that, in its nature or character, it is not fitted or adapted to the end in view.' "

It is not the province of the courts to make laws.

The Chinese Exclusion Case, 130 U. S. 581, 603.

The power of the United States Supreme Court is exclusively judicial. It has no extrajudicial powers.

United States v. *Old Settlers,* 148 U. S. 427, 466.

In the case at bar, the prayer of the application is premature, since there is no showing that a writ of mandamus was issued and was not obeyed.

Furthermore, the writ of mandamus will not issue to compel the doing of an act which the person sought to be coerced admits on the record that he is willing to do without coercion. The return of the respondents (pp. 58-59) admits a willingness to comply with the decree at all times in so far as it is posible to do so.

In *The People* v. *Dunne,* 258 Ill. 441, the court said (pp. 446-447):

> "The purpose of the extraordinary writ of *mandamus* is to compel the performance of a ministerial duty which one charged with the duty has refused to perform. The writ can only be issued to compel a party to act when it was his duty to act without it. It confers upon the party against whom it may be issued no new authority, and from its very nature can confer none. * * * If it is the duty of the defendants to do the acts sought to be coerced by the writ, such acts would not be any more valid or legal if done under the command of the court. The office of the writ is to compel action by the unwilling. There must be a

> refusal to perform the act, and if a personal right is involved a refusal must follow a demand. The writ will not issue to compel the doing of an act which the person sought to be coerced admits on the record he is willing to do without coercion."

IV.

No cases are cited by counsel for the applicants that can be accepted as authorities in support of the prayer of the application.

Counsel for the applicants have not cited a single case that could be accepted as an authority in support of the prayer of their application.

The cases of *Welch* v. *Ste. Genevieve,* 29 Fed. Cas. p. 608, No. 17372; *Post, et al.* v. *Taylor County,* 19 Fed. Cas. p. 1092, No. 11302; *United States* v. *Treasurer of Muscatine County,* 28 Fed. Cas. p. 213, No. 16538, cited by counsel, in which receivers were appointed by the court to levy and to collect taxes, were decided by intermediate federal courts. Counsel impliedly concede (applicants' brief, p. 36) that these cases are opposed to the rule of decision of the Supreme Court of the United States.

One of the cases (*Welch* v. *Ste. Genevieve*) was called to the attention of the Supreme Court of the United States in the case of *Rees* v. *City of Watertown,* 19 Wall. (86 U. S.) 107, *supra,* and the court said (p. 118):

> "We are not able to recognize the authority of the case. No counsel appeared for the city * * *; no authorities are cited which sustain the position taken by the court; the power of the court to make the order is disposed of in a single paragraph * * *."

This criticism of the case of *Welch* v. *Ste. Genevieve* is directly applicable to the other two cases.

The case of *Virginia* v. *West Virginia,* 246 U. S. 565, which seems to be the principal case on which counsel rely has no analogy whatever to the case at bar. An entirely different question was presented. The question related to the *issuance of a writ of mandamus.* In this respect the court said (p. 589):

> "A rule allowed at the instance of Virginia against West Virginia to show cause why, in default of payment of the judgment of this court in favor of the former State against the latter, an order should not be entered directing the levy of a tax by the legislature of West Virginia to pay such judgment, and a motion by West Virginia to dismiss the rule is the matter before us."

The court reserved judgment on the specific question presented, upon the assumption that the Congress having the power to act, would exercise its power. Obviously, however, the question whether a writ of mandamus should be issued to compel the legislature of West Virginia to levy a tax, is radically different from the question in the case at bar as to whether the court can appoint an *officer of the court* to levy a tax.

The case of *Virginia* v. *West Virginia, supra,* was one involving the original jurisdiction of this court in controversies between states, and the court went no further than to say that *judicial remedies* may be applied against governmental powers to enforce its judgment; the opinion does not warrant the conclusion that this court may transcend the usual remedial processes of the judiciary and encroach upon legislative or executive branches of the government.

The case of *Garrett* v. *City of Memphis* (C. C. W. D. Tenn.), 5 Fed. 860, 870, cited by counsel, recognized the general rule that a court cannot levy taxes and cited the case of *Rees* v. *City of Watertown,* 19 Wall. (86 U. S.) 107. There are, however, expressions in the opinion which are contrary to the established rule.

The case of *Stansell* v. *Levee Board of Miss. Dist. No.* 1 (D. C. N. D. Miss.), 13 Fed. 846, cited by counsel, is not analogous. The court did not levy a tax (p. 851). The levy was made by the legislature which provided the remedy adopted by the court for the collection of the tax (p. 851).

The case of *Supervisors* v. *Rogers,* 7 Wall. (74 U. S.) 175, cited by counsel, was distinguished in the case of *Rees* v. *City of Watertown,* 19 Wall. (86 U. S.) 107, 117, on the ground that the procedure taken was by the express authority of the statute of Iowa. The court said (p. 117): "The case of *Supervisors* v. *Rogers* is, therefore, of no authority in the case before us."

The other cases cited by counsel are not analogous. They do not involve questions of the power of the court to appoint an officer to levy or to collect taxes or to issue bonds or to exercise any of the governmental functions specified in the prayer of the application in the case at bar. The judgments in those cases were executed by methods which do not constitute an invasion of the legislative or executive branches of government.

Illustrative of those cases is the case of *Montezuma Canal Co.* v. *Smithville,* 218 U. S. 371, cited by counsel. There a commisioner was appointed to supervise the common use of water flowing in a stream. The court held such action did not transcend judicial authority, saying (p. 385) that

> "* * * in view of the absence of legislative action on the subject and of the necessity which manifestly existed for supervising the use of the stream by those having the right to take the water in accordance with

> the decree, which undoubtedly to that extent, the court was authorized to render, we think the action taken by the court did not transcend the bounds of judicial authority * * *."

It is apparent that in that case the court was not exercising the functions of any public official and that there was no invasion of the legislative or of the executive department of government.

Counsel for the applicants impliedly concede that the general rule is that a court lawfully cannot levy or collect taxes. Counsel, however, attempt to distinguish the case at bar from the general rule by contending that the cases in which the courts refused to appoint an officer to levy and to collect taxes were cases brought by bondholders of municipal bonds to enforce the collection of the bonds; that in those cases the extent of the obligation was determined by the state statutes and not by the Constitution of the United States; that the federal courts acquired no greater powers than were given by the state statutes; but that in the case at bar "the Supreme Court of the United States is given jurisdiction and power by the Federal Constitution to determine all controversies between States"; and that "the jurisdiction to render judgments necessarily comprehends the power to enforce the judgments by any appropriate means and this includes the appointment of a receiver, commissioner, or other functionary to carry out the judgments to the extent of issuing bonds and levying taxes, if that should be necessary." (Applicants' Brief, pp. 36, 37.) Because of this contention we have discussed the decisions at length in order to demonstrate that the reasoning of the court not only fails to support counsel's theory but, on the contrary, refutes it.

Since the authorities hold that the power of taxation is legislative and not judicial, it clearly follows that the exercise by courts of the power to levy, to collect or to disburse taxes would be an invasion of the legislative department whether the power was exercised in a suit by a bondholder brought primarily to collect money by taxes to pay his bonds, or whether the power was exercised by the courts as an ancillary power to enforce decrees of the courts. The exercise of such power by the courts would be unlawful regardless of the purpose for which the courts intended to exercise it.

Counsel for the applicants have quoted from the case of *Wisconsin* v. *Illinois,* 281 U. S. 179, the following statement, where the court with reference to the State of Illinois said (p. 197):

> "If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State."

As no attempt has been made by counsel for the applicants to interpret this language which is not wholly clear, we do not know precisely why it was cited. At most it must be construed to mean that this court may, by mandamus, cause the diversion to be diminished to comply with its order in case such action should ever become necessary, which is inconceivable.

The Supreme Court of the United States certainly would not have the power to compel the repeal of any part of the Constitution of the State of Illinois. Nor would that court be the paramount power to which the State of Illinois would have to yield.

Those questions would be purely political questions to be determined by the legislative and the executive branches of the United States government.

The court could not subvert the governmental structure of the State in order to enforce the decree.

There is no such thing as unlimited power in any branch of government. Each branch is of limited and of defined powers.

Loan Association v. *Topeka,* 20 Wall. (87 U. S.) 655, 663.

The judicial department is the weakest of all of the branches. The officers through whom its commands must be executed are Marshals of the United States who belong to the executive department.

United States v. *Lee,* 106 U. S. 196, 223.

If force should become necessary to compel the performance of a decree, the court could use only the marshal and his deputies; and if that force proved insufficient, then if the court were of the opinion that the exigencies of the case required that the decree should be enforced at all hazards, the court might apply to the President for additional force.

The President is the Commander in Chief of the army and the navy.

In re Neagle, 135 U. S. 1, 63.
Kurtz v. *Moffitt,* 115 U. S. 487, 503.
United States v. *Sweeny,* 157 U. S. 281, 284.

Military power may be used to enforce in any part of the land full and free exercise of all national powers.

In re Debs, 158 U. S. 564, 582.

The enforcement of a decree in such circumstances would no longer belong to the judicial department. The question of enforcement would be determined by other branches of government.

With respect to the relationship existing between the Federal and State government, the Supreme Court of the United States has announced general propositions which have become fundamental in our constitutional jurisprudence.

The two governments are each to exercise their powers so as not to interfere with the free and full exercise by the other of its powers. This doctrine was affirmed at an early day in the case of:

McCulloch v. *Maryland,* 4 Wheat. (17 U. S.) 316.

The distinguishing feature of our form of government is the right of the people to choose their own officers for governmental administration.

In re Duncan, 139 U. S. 449, 461.

The public functionaries must be left at liberty to exercise the powers which the people have intrusted to them. The interest and dignity of those who created them, require the exercise of power indispensable to the attainment of the ends of their creation.

Anderson v. *Dunn,* 6 Wheat. (19 U. S.) 204, 226.

In concluding the present discussion we may say that although opposing counsel prematurely have forced us to discuss the question of the compulsory power of the court with respect to the decree, we view the question at this time really as a moot question which never will arise for practical consideration, as the Trustees of the Sanitary District have not refused, and have no intention of refusing to comply with the decree.

The present situation was not caused by the respondents. It was created by circumstances entirely beyond their control.

We submit that the return of the respondents clearly indicates that the Sanitary District has used its utmost efforts to comply with the decree and that it will continue to exhaust all reasonable means to accomplish that purpose (Return, pp. 58-59). In the circumstances, therefore, compulsion will not be necessary.

Respectfully submitted,

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In the Supreme Court of the United States

STATES OF WISCONSIN, MINNESOTA, OHIO, AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,
Intervening Defendants.

No. 5,
ORIGINAL.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *et al.*,
Defendants.

No. 8,
ORIGINAL.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *et al.*,
Defendants.

No. 9.
ORIGINAL.

BRIEF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN AFTER RETURN OF THE SANITARY DISTRICT OF CHICAGO AND THE STATE OF ILLINOIS TO THE RULE TO SHOW CAUSE ENTERED HEREIN ON OCTOBER 10, 1932.

(Names of Solicitors for the Applicants
on inside of front cover)

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In the Supreme Court of the United States

STATES OF WISCONSIN, MINNESOTA, OHIO, AND PENNSYLVANIA, *Complainants,* vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *Defendants,* STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, *Intervening Defendants.*	No. 5, ORIGINAL.
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In the Supreme Court of the United States

STATES OF WISCONSIN, MINNESOTA, OHIO, AND PENNSYLVANIA, *Complainants*, vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *Defendants*, STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, *Intervening Defendants.*	No. 5, ORIGINAL.
STATE OF MICHIGAN, *Complainant*, vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *et al.*, *Defendants.*	No. 8, ORIGINAL.
STATE OF NEW YORK, *Complainant*, vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *et al.*, *Defendants.*	No. 9, ORIGINAL.

BRIEF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN AFTER RETURN OF THE SANITARY DISTRICT OF CHICAGO AND THE STATE OF ILLINOIS TO THE RULE TO SHOW CAUSE ENTERED HEREIN ON OCTOBER 10, 1932.

On October 3, 1932, the States of Wisconsin, Minnesota, Ohio and Michigan filed a joint Application for the appointment of an officer or officers of this Court to carry out the decree made and entered in the above entitled causes on April 21, 1930. With that Application these States filed their brief setting forth the principles and authorities which in their view establish the full, plenary and complete power of this Court to enforce and make effective its decree by any and all means which may be necessary, convenient or appropriate to accomplish that purpose. We shall not repeat those arguments or authorities, but, so far, if at all, as any issue may be raised as to the scope of the power and authority of this Court to enforce its decree and the variety of the means which it may in its discretion employ for that purpose, we will rely upon the brief filed with such Application. This brief will, therefore, be confined to a discussion of the proper interpretation of the decree, the inadequacy of the defendants' past and present performance under the decree as disclosed by the record and the Return of the defendants to the rule issued by this Court on October 10, 1932, and the insufficiency of the supposed excuses advanced in such Return for the inadequacy of past and present performance.

ARGUMENT.

I.

THE APPLICANTS CONTEND THAT THE PROGRESSIVE AND ULTIMATE RESTORATION OF THEIR RIGHTS AT THE TIMES FIXED BY AND IN ACCORDANCE WITH THE TERMS OF THE DECREE, WHEN PROPERLY CONSTRUED, IS NOT DEPENDENT UPON THE CONSTRUCTION AND PLACING IN OPERATION OF THE VARIOUS WORKS CLAIMED BY THE DEFENDANTS TO BE ESSENTIAL TO PREVENT THE POSSIBILITY OF HAZARD TO THE HEALTH OF THE PEOPLE OF THE SANITARY DISTRICT; AND IF THIS CONSTRUCTION OF THE DECREE BE CORRECT, THESE APPLICANTS ARE NOT CONCERNED WITH THE PROGRESS MADE BY THE DEFENDANTS IN THE ACCOMPLISHMENT OF THE PROGRAM ADVANCED BY THEM; BUT IF THE DECREE OF APRIL 21, 1930, MAY PROPERLY BE CONSTRUED TO MAKE THE PROGRESSIVE AND ULTIMATE RESTORATION OF YOUR APPLICANTS' RIGHTS, AS DECLARED BY THIS COURT, CONTINGENT AS TO TIME UPON THE ACCOMPLISHMENT OF THE PROGRAM ON THE SCHEDULE FOUND REASONABLE AND PROPER BY THE SPECIAL MASTER, THEN THESE APPLICANTS HAVE A VITAL INTEREST THAT THE DEFENDANTS SHALL PROSECUTE SUCH WORKS "WITH ALL REASONABLE EXPEDITION."

In *Wisconsin v. Illinois,* 278 U. S. 367, this Court held that the diversion created and maintained by the defendants was illegal but the restoration of the just rights of the applicants and the other complainants was made gradual rather than immediate; and the reason for the mercy thus extended to the defendants was stated by Mr. Chief Justice Taft, speaking for an unanimous court, as follows at pages 418-419:

> "But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so

> framed *as to accord to the Sanitary District a reasonably practicable time* within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction." (Italics ours.)

After a re-reference to determine the extent of the mercy which should thus be granted to the defendants for the reasons stated by Mr. Chief Justice Taft, this Court in *Wisconsin v. Illinois,* 281 U. S. 179, rendered its judgment by which a progressive restoration of the just rights of the applicants and other complainants, as declared by this Court, was provided by a reduction of the diversion to 6500 cubic feet per second by July 1, 1930, to 5000 cubic feet per second by December 31, 1935 and to 1500 cubic feet per second by December 31, 1938. These amounts were in addition to domestic pumpage.

Clearly, the decree contemplated either (1) that various sewage disposal plants and auxiliary structures, as proposed by the defendants and described in detail by the Special Master, should be respectively completed and placed in operation, in accordance with the schedule of performance found to be reasonable by the Special Master and confirmed by this Court, before the intermediate and final reductions provided by the decree should be had; or (2) that the postponements provided for the intermediate reductions and final termination of the illegal diversion and the progressive and final restoration of the complainants' rights afforded ample time within which to construct and place in operation the sewage disposal plants and auxiliary structures proposed by the defendants so that the responsibility for any possible hazard to the health of the people of the District, however remote, which might flow from such intermediate and final reductions without the completion of the contemplated sewage disposal plants and auxiliary structures would rest squarely upon the defendants. If, as applicants contend the proper construction of the decree is that, the defendants having been given "a reasonable, practicable time within which to provide some other means of disposing of the sewage" (*Wisconsin v. Illinois,* 278 U. S. 367, 419), the relief afforded by the decree will become effective at the times and in the manner prescribed by such decree, whether or not the defendants have taken advantage of the opportunity thus afforded to accomplish the works claimed to be essential, these applicants are not concerned with the question of whether progress made and being made by the defendants in the construction of the program proposed by them and accepted by this Court has been or is reasonable and adequate.

It is true, as pointed out by the defendants in their return, that the decree does not in terms require the State of Illinois and the Sanitary District of Chicago to construct and place in operation particular sewage disposal plants on or before the dates fixed by the decree for progressive reductions in and the ultimate termination of the unlawful diversion maintained by such defendants. However, the reductions in the diversion provided by the decree for July 1, 1930 and for December 31, 1935 apparently were predicated upon the findings of fact reported by the Special Master and confirmed by this Court that certain sewage disposal works could be completed and placed in operation on or before such dates and that all of the sewage disposal program proposed by the defendants could be completed by December 31, 1938, when, under the terms of the decree, the whole of the illegal diversion is to be terminated.

Hence, if by reason of such circumstances a proper construction of the decree makes the progressive restoration of the applicants' just rights as declared by this Court in any degree subject to postponement, if the defendants fail to construct and place in operation the sewage disposal works and auxiliary structures proposed in their program at the times found by the Special Master, and confirmed by the Court, to afford reasonable, practicable periods within which such works could be progressively constructed and placed in operation, and with reference to which periods the Special Master fixed and the Court confirmed the dates for the gradual restoration of these applicants' rights, then these applicants have a vital interest that the defendants shall proceed with the construction of such projects "with all reasonable expedition" and that such construction shall be "continuous and as speedy as practicable" (*Wisconsin v. Illinois,* 278 U. S. 367, 420, 421); and the facts appearing in the semi-annual reports filed by the Sanitary District pursuant to the decree and set forth in the Application filed with the Court, together with the facts appearing in the printed return filed by the Sanitary District and the State of Illinois in this Court on November 7th, justify a grave apprehension on the part of these applicants that without the further intervention of the Court to provide the relief prayed for in the Application, the dates fixed for the progressive restoration of the just rights of these applicants will find the defendants in much the same situation as at the date of the entry of the decree and will threaten if not prevent the prompt restoration of your applicants' rights.

II.

ASSUMING THAT THE EFFECTIVE DATES FOR THE RESTORATION OF APPLICANTS' RIGHTS UNDER THE DECREE ACCORDING TO ITS TERMS ARE IN ANY DEGREE SUBJECT TO POSTPONEMENT BY FAILURE OF THE DEFENDANTS TO CARRY OUT THEIR PROGRAM FOR THE CONSTRUCTION OF SEWAGE DISPOSAL WORKS AND AUXILIARY STRUCTURES IN ACCORDANCE WITH THE TIME SCHEDULE FOUND BY THE MASTER TO BE REASONABLE AND ADEQUATE FOR THE PROGRESSIVE CONSTRUCTION OF SUCH WORKS, THE PAST AND PRESENT PERFORMANCE OF THE DEFENDANTS UNDER THE DECREE, AS DISCLOSED BY THE RECORD, THE SEMI-ANNUAL REPORTS OF THE SANITARY DISTRICT AND THE PRINTED RETURN OF THE DEFENDANTS, HAVE BEEN AND ARE SO INADEQUATE AS TO REQUIRE THE CONCLUSION THAT THE INTERVENTION OF THIS COURT TO GRANT THE RELIEF PRAYED FOR IN THE APPLICATION IS NECESSARY TO PREVENT AN UNWARRANTED AND GRAVELY INJURIOUS POSTPONEMENT IN THE RESTORATION OF APPLICANTS' RIGHTS.

The measure of the diligence which is required of these defendants has heretofore been defined by this Court. In *Wisconsin v. Illinois,* 278 U. S. 367 at 420-421, Mr. Chief Justice Taft, speaking for this Court said:

> "The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation *with all reasonable expedition* adequate plants for the disposition of the sewage through other means than Lake diversion.
>
> Though the restoration of just rights to the complainants will be gradual instead of immediate *it must be continuous and as speedy as practicable,* and must include everything that is essential to an effective project." (Italics ours.)

Whether the past and present performance of the Sanitary District and the State of Illinois be tested by the ratable progress made upon their program as a whole or by the progress made upon controlling factors of their program in their relation to the intermediate reduction of December 31, 1935, or the final termination of the illegal diversion on December 31, 1938, it is clear that such performance falls far short of meeting the requirements of diligence laid down by this Court.

A.

The Over-all Performance of the Defendants Falls Far Short of the Ratable Requirements Essential to the Performance of the Decree According to Its Terms if the Execution of the Decree as to Time is in Any Degree Dependent Upon Such Performance.

It is true, as pointed out by defendants in their return, that the decree does not specifically require that the performance of the defendants shall be ratable as measured by annual average performance; and the only concern of these applicants is that, if the previous claims of these defendants in this litigation be entitled to any credence, a substantial failure in average annual performance for a material period of time threatens, if it does not prevent, the accomplishment of that portion of the program which is to be completed by the date of the intermediate reduction of December 31, 1935, and threatens the ultimate completion of the entire program by the date fixed for the ultimate termination of the illegal diversion of December 31, 1938. A reading of the return filed by the defendants with this Court on November 7th, suggests that those now in control of the administration of the Sanitary District are not fully advised of, or have in part abandoned, the pretension of a necessity for extravagant periods of time to design and construct works in the program which has heretofore characterized the attitude of the defendants throughout this litigation, and which led this Court to say in 281 U. S. 179, 199:

> "*The defendants argue for delay at every point*, but we have indicated sufficiently why their arguments cannot prevail." (Italics ours.)

Measured by construction expenditures and accepting the estimates of costs reported by the Sanitary District, an annual average construction program of sewage treatment and auxiliary works involving an expenditure of over $20,000,000 was and is required for the performance of the decree. (Application of Wisconsin, Minnesota, Ohio and Michigan filed Oct. 3, 1932,* pp. 7-8.) The average annual performance of the defendants since the entry of the decree measured by construction expenditures, has been, as is set forth in the Semi-annual Reports of the Sanitary District filed with the Court, less than $5,000,000. (Application 8-9.) It is manifest that such average annual performance is far less than that contemplated by the Report of the Special Master. (Report of the Special Master on Re-reference, pp. 76, 80.) Such an annual average performance would, if maintained, require over 36 years within which to build the works claimed by the defendants to be necessary. (Application pp. 8-9.) But even this meager and inadequate performance is not being maintained. During the six months' period covered by the Semi-annual Report of the Sanitary District filed on July 1, 1932, performance had practically ceased; and at the rate of progress there shown, the defendants would require over 320 years within which to perform the decree.

No doubt this test of performance is to some extent distorted by the grossly excessive estimates of costs which the defendants offered on Re-reference in these causes in an attempt to obtain greater concessions from this Court. Thus on the original reference in 1926-7, the complainants' witnesses estimated the cost of all further works required to provide complete treatment for all of the sewage of the Sanitary District at approximately $82,000,000. In 1924 the Engineering Board of Review of the Sanitary District estimated the cost of works thereafter to be constructed to provide complete treatment for all of the sewage of the Sanitary District of Chicago at $130,000,000. On Original Reference in 1926-7, the defendants' witnesses estimated the cost of the construction of such a program after December 31, 1924, at $157,000,000. At the time of the Re-reference in 1929, notwithstanding the fact that the Sanitary District of Chicago had expended $51,000,000 on sewage disposal works during 1925, 1926, 1927 and 1928, the defendants estimated the cost of that part of the program remaining to be constructed after December 31, 1928 at over $176,000,000. (Report of the Special Master on Re-reference, pp. 72-76.) This estimate has been carried into the Semi-annual Reports of the Sanitary District filed with this Court. When the amount expended from 1925 to 1928, inclusive, ($51,000,000) is added to the defendants' estimate of 1929 on Re-reference, ($176,000,000) we reach a total of $227,000,000 in comparison with the estimate of $130,000,000 made by the Engineering Board of Review of the Sanitary District in 1924, and $157,000,000 made by the Sanitary District on the Re-reference in 1926-7. However, even when the grossly excessive character of the present estimates of cost is considered, it is clear that the past and present record of annual performance by the Sanitary District is wholly inadequate.

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*The application of Wisconsin, Minnesota, Ohio and Michigan, filed October 3, 1932 will hereafter be referred to in this brief as "Application."

1. The general allegations of compliance with the requirements of the decree, adequacy of the construction program adopted by the defendants after the entry of the decree and of adequacy of the progress made on such construction program contained in Defendants' Return do not support the defendants' contention that their performance under the decree up to this time has been adequate. (Defendants' Return, pp. 6-16.)

In support of their allegation that the defendants have complied with the terms of the decree, the defendants point out that the annual average diversion from the Great Lakes-St. Lawrence watershed since July 1, 1930 has not exceeded 6500 cubic feet per second and that, aside from the North Side treatment works and Batteries A and B of the Imhof tanks at the West Side treatment works, the dates fixed for the completion of the other sewage treatment works in the defendants' program have not yet arrived. Disregarding for the moment some inaccuracies or inadequacy in the statement of the times within which the Special Master found that various sewage treatment works or parts thereof should, with reasonable expedition, be completed, neither observation is pertinent to any issue raised by the instant Application. The complaint of the applicants here is not as to the amount of *present* diversion but to the point that the inadequacy of performance by the defendants threatens the intermediate reduction in the diversion in 1935 and the ultimate termination of the illegal diversion in 1938. So far as the adequacy of past and present performance is concerned, it is idle to point out that the dates fixed for the completion of some of the sewage treatment works have not yet arrived; for it is obvious that such an observation might be made a week before the arrival of such dates, but it is equally obvious that if no adequate performance had theretofore been had, the arrival of the date would inevitably be coincident with a default by the defendants.

While it is perhaps unnecessary, we deem it appropriate to point out that the purported statement of the program of construction adopted by the defendants after the entry of the decree (Defendants' Return to Order to Show Cause, pp. 8-10) does not present an accurate picture of the work to be done in the performance of the decree. It should be borne in mind that the Sanitary District of Chicago, perhaps activated to some extent by the insistence of the War Department, had recognized the necessity and made plans for the construction of a comprehensive system of sewage treatment works for the purification of all of the sewage of the Sanitary District of Chicago long prior to the time when the first testimony was taken in these cases in 1926. While the progress which the exigencies of the situation demanded, had not been made, substantial portions of the works and structures involved in such a comprehensive program had been built prior to 1926 and further substantial progress had been made prior to the entry of the decree of this Court on April 21, 1930. The program of construction which was called for by the decree of this Court related to so much of the works and structures necessary to provide treatment for all of the sewage of the Sanitary District of Chicago as had not been completed at the date of the decree. Obviously the performance of the decree did not involve the work already done and the structures already built. Yet the program of construction, described as adopted after entry of the decree, includes all of the sewage disposal plants and auxiliary structures which had been built by the Sanitary District of Chicago since the beginning of time. Thus the 250 miles of intercepting sewers includes the sewers which had been built prior to the entry of the decree, as well as all of those thereafter to be built. The North Side treatment works had been substantially, if not wholly, completed prior to the entry of the decree. (Report of the Special Master on Re-reference, pp. 5, 45-6.) Battery A and nearly all of Battery B of the Imhof tanks at the West Side Works had been completed, together with the pumping station, and many other structures prior to the entry of the decree. (Report of the Special Master on Re-reference, p. 47.) The original Calumet Treatment Works had been completed and in operation since 1922. (Report of the Special Master on Re-reference, p. 46.) There remained the enlargements of those works and the additions necessary to provide complete treatment. The Desplaine River treatment works had been built as an experimental plant many years before the entry of the decree; and with the completion of the West Side Works, it will have no significance in the sewage treatment at Chicago except as it may be used for experimental purposes. (Report of the Special Master on Re-reference, p. 9.) The inclusion in the program as a separate item of "sundry pumping stations, miscellaneous plants and sewers" relates merely to appurtenances to the sewage treatment works. Many of such structures had been built, but so far as they had not been built, it adds nothing to the program or the problem to list them separately, for it would be equally pertinent to list each of the various structures involved in a sewage treatment works. The excessive character of the estimate of costs has already been discussed (pp. 9 and 10, *supra*).

a. Even the construction program adopted by the defendants after entry of the decree was inadequate.

While the progress upon particular plants and their relation to the performance of the decree will hereinafter be more particularly discussed, it may be noted that the program set forth by the defendants as adopted after entry of the decree did not contemplate the completion of the West Side Plant until the end of 1936. (Defendants' Return to the Order to Show Cause, p. 9.) However the Special Master found that the West Side Treatment Plant should be completed and in operation by December 31, 1935. (Report of the Special Master on Re-reference, pp. 48, 142.) Similarly, the Special Master found that all necessary intercepting sewers pertaining to the respective sewage treatment works should be completed within the time allowed for the completion of such respective works (Report of the Special Master on Re-reference, p. 142, Par. (f)), but the program did not provide for the West Side intercepting sewers before the end of 1938. (Defendants' Return to Order to Show Cause, pp. 9-10.) The Special Master found in his Report on Re-reference filed late in 1929 that two and one-half years would be a reasonable time to allow for all necessary preliminary steps, preparations of plans and specifications and for advertising and passing upon bids for the construction of the Southwest Side Treatment Plant (Report of the Special Master on Re-reference, p. 58), that five and one-half years would be a reasonable allowance of time for the physical construction of the Southwest Side Treatment Plant, and that eight calendar years would be a reasonable time for acquisition of a site, preliminary studies, preparation of plans, physical construction and tuning up the Southwest Side Plant. (Report of the Special Master on Re-reference, p. 70.) The program adopted by the defendants after the decree provided that construction should not start on the Southwest Side Treatment Plant until 1935. (Defendants' Return to Order to Show Cause, p. 10.) These allowances of time were made at the urgent insistence of the defendants and with the claim that they were inadequate. While doubtless, as stated by the Court, in *Wisconsin v. Illinois,* 281 U. S. 179, at 199, "The Master was as liberal in the allowance of time as the evidence permitted him to be," the defendants ought not to be surprised if these applicants feel grave apprehension when the defendants in the face of their protestations on the trial and in the face of the findings of the Special Master deliberately adopt a program for the construction of the Southwest Side Treatment Works which does not contemplate the commencement of construction until some time in 1935, less than four years before the date fixed for the completion of the entire program and the termination of the unlawful diversion—especially when they offered testimony that the time of physical construction alone would be approximately eight years. (Report of the Special Master on Re-reference, p. 66.) The subject of the supposed necessity for investigation of the stockyards and Packing Town wastes is hereinafter considered with the other alleged causes of delay.

b.

Defendants' allegations as to progress on their construction program are inaccurate on their faces, and they not only fail to support defendants' contention that their performance under the decree up to this time has been adequate, but they establish the inadequacy of such performance. (Defendants' Return to the Order to Show Cause, pp. 10-15.)

The general statements made in this part of the Return to the Order to Show Cause, while undoubtedly not so intended, are inaccurate and misleading, probably due to a lack of familiarity with the facts of these cases. The Return cites the increase in the sewage treatment at the North Side and West Side sewage treatment works as an evidence of the progress made in the construction program since the entry of the decree. The North Side sewage treatment works had been completed prior to the hearings on Re-reference in 1929, with the exception of a pumping station (then 75% completed), essential to transport part of the sewage of the District to the treatment works; and the pumping station required only a few months more for completion. (Report of the Special Master on Re-reference pp. 45-6.) The progress here reported flows not from construction work in the performance of the decree but merely from placing in operation the construction work performed before the decree. Battery A of the Imhof Tanks at the West Side sewage treatment works had been completed before the hearings on Re-reference; and Battery B was 70% completed and required only a few months to finish. (Report of the Special Master on Re-reference, p. 47.) Thus again the circumstance that these Batteries of Imhof Tanks were placed in operation shortly after the entry of the decree represents not performance on the construction program required by the decree, but merely the placing in operation of structures wholly or substantially completed before the entry of the decree. The same observation applies to the computation of the increased percentage of the sewage treated, which is set forth at pp. 15-16 of Defendants' Return.

So far as the performance under the decree is concerned, it neither aids the Court in determining its sufficiency nor supports any conclusion of satisfactory progress in compliance with the decree to tabulate the cost of sewage disposal works completed before the entry of the decree as is done on pages 11 and 13 of the Defendants' Return to the Order to Show Cause either directly or by inclusion in a general statement or tabulation of the completed work on sewage construction as of October 14, 1932. Indeed the figures of works under contract but not completed show that a large part of the construction expenditures set forth by the Sanitary District of Chicago in its Semi-annual Reports filed with this Court do not relate to progress made subsequent to the decree but to payment for construction let under contracts and probably substantially completed before the entry of the decree. On page 12 of the Defendants' Return, the defendants in an apparent effort to make a better showing in the performance of the decree, attempt to cumulate their construction expenditures since the entry of the decree and the amount of contracts let but not completed since the date of the decree. While doubtless construction expenditures are the better measure of actual progress, it might be debatable whether the defendants might not reasonably use either the yardstick of "construction expenditures" or the test of "contracts let." However, they cannot do both without giving a distorted and unreal picture of the situation. The defendants have consistently adopted the measure of construction expenditures in their reports filed with this Court. They thereby sought and obtained the advantage of contracts which had been let and construction which had been done but not paid for prior to the entry of the decree. When they attempted to add to that figure the sum of contracts subsequently let, they attempt to represent the fruits of that which had already been done at the date of the entry of the decree and that which has been done since the entry of the decree by way of letting of contracts as a measure of their progress under the decree. If it be conceded that they might report under either test, it is obvious that they cannot combine both for the purpose of establishing a larger total. Moreover, contracts let are of little value if no work is being done under them, and similarly, it is immaterial that plans and specifications are ready to advertise for bids on further contracts, if the contracts are not going to be let and the work is not going to go forward.

While the construction of certain intercepting and possibly other sewers are essential elements of the program, they are relatively of little importance in determining whether the decree will be performed with reasonable expedition; for the construction of the sewers is not a controlling factor as to time, since they may be readily built within the time required for the construction of the respective treatment works. (Report of the Special Master on Re-reference, pp. 37, 142 (f).)

B.

The Performance of the Defendants, Measured by a Consideration of Particular Plants or Projects Involved in Their Program, Has Fallen Far Short of the Progress Contemplated by the Decree, and Claimed by the Defendants to be Essential to Its Performance; and This Conclusion Applies With Peculiar Force to the Projects Which Constitute "Controlling Factors" in Relation to the Intermediate Reduction in Diversion Fixed for December 31, 1935, and the Ultimate Termination of the Illegal Diversion Fixed for December 31, 1938.

The applicants have at all times held the view that neither the intermediate reduction nor the final termination of the illegal diversion is subject to any postponement in the event of the failure of the defendants to construct certain or all of the works involved in a program for the complete treatment of all of the sewage of the Sanitary District of Chicago. (See Section I, pp. 3-6, *supra.*) However, the Applicants have at all times recognized that the intermediate reduction fixed for 1935 (because there will still be a large part of the sewage of the Sanitary District untreated until the Southwest Side Treatment Works have been completed) may be considered more or less dependent upon the completion and operation of a certain part of the sewage treatment works, together with a reasonable control of River reversals in time of storm either through the construction of new controlling works or through the operation of the present controlling works at Lockport. The applicants have always contended, and now believe, that with completion of the entire sewage treatment program, no flow at Lockport is justified in the supposed interests of public health and no flow at Lockport other than lockage water is justified in the supposed interests of navigation. But if the construction of certain sewage treatment works and other structures be deemed essential to the intermediate reduction in 1935, pending construction of the whole program, then certain plants and structures become controlling factors; and the degree of progress which has been made and is promised, in the light of the findings of fact by the Special Master as to what would constitute reasonable expedition, become of vital importance. Similarly, if a failure to complete the entire sewage treatment program by December 31, 1938 would result in a postponement of the ultimate restoration of these applicants' rights as declared by this Court, the progress made and the promises for the future with reference to the construction of the Southwest Side Sewage Treatment Works (admittedly the controlling factor in the whole sewage treatment program, Report of the Special Master on Re-reference, p. 48), become of controlling importance.

Without attempting to determine whether each and all of the structures were deemed, or under a proper construction of the decree should be deemed, essential to permit the partial intermediate restoration of your applicants' rights and the final ultimate restoration of your applicants' rights, we point out that the Special Master found that certain sewage treatment works and other structures should be completed before the date fixed by the Court for the intermediate reduction in diversion of December 31, 1935 (Report of the Special Master on Re-reference, pp. 142-3; *Wisconsin v. Illinois,* 281 U. S. 201, 696), and that all other works and structures involved in the sewage treatment program should be completed by December 31, 1938, the date fixed by the Special Master and by the Court for the ultimate termination of the illegal diversion.

The Special Master found (1) that the North Side Sewage Treatment Works *with appurtenances* should be completed on or before July 1, 1930; (2) that the Calumet Sewage Treatment Works *with appurtenances* should be completed on or before December 31, 1933; (3) that Batteries A and B of the Imhof Tanks of the West Side Treatment Works should be completed on or before July 1, 1930; (4) that the West Side Sewage Treatment Works *with appurtenances* should be completed on or before December 31, 1935; (5) that the Southwest Side Sewage Treatment Works *with appurtenances* should be completed on or before December 31, 1938; (6) that the necessary intercepting sewers pertaining to such sewage treatment works should be completed within the time allowed for the completion of the sewage treatment works *respectively;* and (7) that the Sanitary District should immediately submit plans for controlling works to the Chief of Engineers of the War Department, and that such controlling works should be constructed by the Sanitary District within two years after receiving the authorization of the Secretary of War.

Assuming that a failure to construct all or at least the more important of the structures which the Master found should, with reasonable expedition, be constructed and placed in operation before December 31, 1935, would cause a default by the defendants and a postponement in the partial restoration of your applicants' rights, and similarly, that a failure to construct all or at least the major structures of the whole sewage disposal program by December 31, 1938 would produce a default by the defendants and a postponement of the ultimate restoration of your applicants' rights, we proceed to consider whether the progress heretofore made and the progress promised by the defendants, considered in the light of the findings of fact made by the Special Master, establish a failure or inadequacy of performance. The insufficiency of the supposed excuses for delay will be considered in a subsequent section. We proceed to consider whether the progress of the defendants is such as to threaten applicants' rights unless this Court grants the relief prayed for in the pending application.

1.

The program, the performance, and the promises of the defendants as to the West Side Sewage Treatment Works guarantee a default under the decree on December 31, 1935.

With reasonable expedition Batteries A, B and C of the Imhof Tanks at the West Side Sewage Treatment Works should have been completed and placed in operation in 1932; and the West Side Treatment Works with all appurtenances should be completed on or before December 31, 1935. (Report of the Special Master on Re-reference, pp. 47-8, 142.) Battery C of the Imhof Tanks has not been completed and work thereon is at a standstill. (Semiannual Report of the Sanitary District of Chicago filed July 1, 1932, p. 3; Return of Defendants to Order to Show Cause, p. 15.) Defendants by their own admission never planned to complete the West Side Sewage Treatment Works until the end of 1936 (Return of the Defendants to Order to Show Cause, p. 9), and now say that such works cannot be completed until the end of 1936. (Defendants' Return to Order to Show Cause, p. 15.) If, contrary to the contention and belief of these applicants, the completion of the West Side Sewage Treatment Works is essential to prevent a postponement of the intermediate relief awarded these applicants for December 31, 1935, the program, the performance and the promises of these defendants would, alike, guarantee a default of the defendants under the decree on December 31, 1935.

2.

The default of the defendants in failing to take any steps to provide controlling works, as specified in the Report of the Special Master, stands admitted and wholly unexcused in the defendants' Return.

Even the findings proposed by the defendants provided that they should *immediately* submit plans for controlling works to be located either at the mouth of the Chicago River or at or near the junction of the main Drainage Canal with the Chicago River and that such works should be built and in operation within two years of the approval of the War Department. (Report of the Special Master on Re-reference, p. 81.) The Special Master found that the defendants should immediately submit plans for such controlling works to the War Department and should construct and place them in operation within two years of the date of approval. The Special Master found that such controlling works should be built before the intermediate reduction fixed by the Court for December 31, 1935, because at the time of such intermediate reduction much of the sewage of the Sanitary District would necessarily remain untreated, pending the completion of the Southwest Side Plant. (Report of the Special Master on Re-reference, pp. 117-118, 143 (7).) The defendants admit that since the date of the decree they have neither submitted any plans for controlling works at either location to the War Department and have taken no steps to seek or obtain the approval of the War Department. The defendants do not even promise or suggest that they will at this late date take steps to remedy this default. The default stands unexcused. The feeble attempt to explain and mitigate this glaring default will be considered in a subsequent section covering the insufficiency of the supposed excuses for past and present inadequacy of performance (See pages 36-47, *infra*).

3.

The defendants' Return and the Reports filed in this Court by the Sanitary District disclose that defendants have taken no steps toward the construction of, and have not even acquired a site for, the Southwest Side Treatment Works, which is admittedly the controlling factor in the construction program; and the defendants' own allegations compel the conclusion that, without the intervention of this Court, the arrival of the date fixed for the restoration of your applicants' rights will find these defendants in default.

Even the defendants' Sanitary Expert, Mr. Eddy, testified that the sedimentation or preliminary treatment section of this plant should be in operation by January 1, 1936. The Special Master found that this plant with all appurtenances should be completed on or before December 31, 1938. (Report of the Special Master on Re-reference, pp. 70, 142.) This plant is the controlling factor, as to time, in the whole program of sewage treatment at Chicago. (Report of the Special Master on Re-reference, p. 48.) The Special Master found in his Report on Re-reference filed late in 1929, that two and one-half years would be a reasonable time to allow for acquisition of a site, preliminary steps, preparation of plans and specifications and advertising for and letting of bids. (Report of the Special Master on Re-reference, p. 58.) He found that five and one-half calendar years would be a reasonable time for the physical construction of this plant, making a total period for all preliminary steps, design and physical construction of eight calendar years. (Report of the Special Master on Re-reference, p. 70.)

At the date of the Return of the Defendants, nearly two and one-half years after the entry of the decree and almost three years after the Finding and Report of the Special Master, the defendants had not even acquired a site.

So far as appears from the Semi-annual Reports filed with this Court and the Return made by the Defendants on November 7, no plans have been prepared for these works; and, as to this controlling factor in the whole sewage treatment program, the defendants stand for all practical purposes where they stood on the date the decree was entered. The defendants do not even plan to commence construction until some time in 1935. They plan to take over five years for the things necessary to be done before initiating construction in the face of a finding by the Special Master, after exhaustive testimony had been taken, that an allowance of two and one-half years for such purposes would be liberal. They propose to leave less than four years for the physical construction and tuning up of this plant, if they do not intend to commit a default under the decree, in the face of a finding of the Special Master that five and one-half years would be a reasonable period to allow for the physical construction of this plant and in the face of the fact that they sought to persuade the Special Master in the testimony offered in these cases that nearly eight years would be required for the physical construction of this plant. We respectfully submit that this situation compels the conclusion that without the intervention of this Court, the arrival of the date fixed for the restoration of your applicants' rights will find these defendants in default and seeking to make such default the basis of a prayer that the restoration of your applicants' rights, as declared by this Court, be further postponed and subordinated to the supposed interests of these defendants. The insubstantial excuses, offered by the defendants for this situation will be considered in the following section.

III.

MANY OF THE SUPPOSED EXCUSES OFFERED BY THE DEFENDANTS IN THEIR RETURN IN JUSTIFICATION OF PAST AND PRESENT DELAY ARE SELF-CREATED OBSTACLES AND ALL OF THE EXCUSES OFFERED BY THE DEFENDANTS ARE SO INSUBSTANTIAL AS TO CONSTITUTE NO JUSTIFICATION FOR ANY DELAY AT THE EXPENSE OF YOUR APPLICANTS' RIGHTS; BUT, ON THE CONTRARY, THEY SUPPORT THE CONCLUSION, ESPECIALLY WHEN COMPARED WITH PAST CLAIMS AND PROMISES OF THE DEFENDANTS AND THE FINDINGS OF THE SPECIAL MASTER, THAT THE INTERVENTION OF THIS COURT, AS PRAYED FOR IN THE PENDING APPLICATION, IS ESSENTIAL TO COMPEL A PERFORMANCE OF THE DECREE AND THE RESTORATION OF YOUR APPLICANTS' RIGHTS AS DECLARED BY THIS COURT.

As will hereinafter appear, the defendants in many instances contend in their Return that they can construct important sewage treatment works and other structures in a much shorter period of time than that found to be reasonable by the Special Master and in much shorter periods of time than they consistently claimed, throughout this long litigation before the entry of the decree, would be physically possible. The applicants have no doubt that the previous claims of the defendants were grossly extravagant and unsupportable; and no doubt as this Court said, "the Master was as liberal as to time as the evidence permitted him to be." Perhaps those presently in charge of the administration of the affairs of the Sanitary District of Chicago would not have permitted such unreasonable and extravagant claims to be made; but where the present statements of time necessary for the construction of various works and structures are only a fraction of the time previously claimed necessary by the defendants and particularly where they are substantially less than the periods of time found reasonable by the Special Master, there seems to be well-founded grounds for apprehension so far as the present and past delay is sought to be excused upon the ground that much less time is generally needed for important sections of the construction program than allowed by the decree.

We proceed to consider in what seems to be the order of importance attached to them by the defendants the "causes operating to obstruct and delay performance of the original program" as set forth in the Return of these Defendants to the Order to Show Cause. (Return of Defendants to Order to Show Cause, pp. 16-49.)

1.

The defendants have at all times failed, neglected or refused to make adequate provision for financing compliance with the decree; and the supposed excuses of inadequacy of tax collections and difficulty in the sale of bonds, so far as they have any basis in fact, rest squarely upon self-created obstacles and voluntary delinquencies and wholly fail to excuse such default in any degree. (Defendants' Return to the Order to Show Cause, pp. 16-25, 41-49.)

The State of Illinois and the Sanitary District of Chicago have at all times failed, neglected or refused to make adequate provision for financing compliance with this Court's decree. This inadequacy of provision for financing performance of the decree is assigned as the major excuse for the past, present, and possible future inadequacy of performance. The primary obligation for the performance of this decree rests upon the State of Illinois of which the Sanitary District of Chicago is a mere political agency. Whether the cost of performance shall be borne wholly by the Sanitary District, wholly by the State of Illinois, or shared between them is a matter of internal policy with which this Court and these applicants are not concerned. Whether the money shall in the first instance be raised by the State of Illinois and subsequently recouped by that State from the Sanitary District, or whether the money shall first be raised by the Sanitary District, is immaterial so long as the State of Illinois recognizes her primary responsibility to provide the necessary funds either directly or through a political agency; and if she choose the latter method, she must assume responsibility for effective performance by her political agency; and she can base no excuse upon the ground that she has undertaken to delegate her responsibility to a subordinate municipal subdivision. No excuse can be stated by a process of considering the political powers and financial resources of the Sanitary District, and then claim that performance has been obstructed or impeded by restrictions imposed by the State of Illinois and then considering separately the activities of the State of Illinois, and contending that any default in performance arises by reason of the failure or inability of the Sanitary District to perform the duty sought to be delegated to it or by setting up alleged self-imposed restrictions upon the power of the State of Illinois to discharge her obligations under the decree.

From an examination of the Semi-annual Reports of the Sanitary District of Chicago and the Return filed herein by the State of Illinois and that District, it is manifest that the supposed obstacles to financing the performance of the decree are (1) failure to collect normal and usual taxes practically ever since 1927; (2) the refusal of the State of Illinois to permit the Sanitary District of Chicago to issue bonds when and as essential for the performance of the decree without the delay, uncertainty and technicalities incident to a referendum; and (3) the alleged inability of the Sanitary District of Chicago to sell its bonds with a 4½% interest rate for what the Trustees deemed an adequate price. An analysis of these supposed difficulties will reveal among other things that their primary cause is the failure to collect the normal tax levies since 1927. In *Wisconsin v. Illinois,* 281 U. S. 179 at 197, the court said:

> "It (State of Illinois) can base no defenses upon difficulties that it has itself created."

It is idle to point out that the officers of the Sanitary District levy taxes but that the taxes are collected by other officers of the State of Illinois or its political subdivisions. Surely this circumstance cannot be seriously suggested as an excuse for the failure of the State of Illinois to comply with the decree. It was and is the absolute ministerial duty of every officer of the State of Illinois and of every officer of each of its political subdivisions to perform every act necessary, convenient or proper to carry out fully, adequately, completely and in good faith the decree of this Court. If some of the officers of the State of Illinois or its agencies have been derelict in their duty, the responsibility rests upon Illinois to compel the performance of that duty, and the responsibility for their default rests squarely upon the State of Illinois. No division of responsibility for levy and collection of taxes among subordinate officers of political subdivisions of the State can excuse a failure or inadequacy of performance. It is clear on the face of the record that this deplorable situation has been existing since 1927. It is equally clear that it is at the root of all of the supposed financial difficulties advanced as justifications by the defendants. It is clear that the credit and financial resources of the Sanitary District of Chicago are ample to finance the performance of this decree; and obviously no contention can be made that the credit and resources of the State of Illinois, one of the richest States in the Union, are inadequate for that purpose.

While doubtless immaterial, since even on the defendants' own showing the financial resources of the Sanitary District of Chicago are entirely adequate, there is very grave doubt that the 1930 assessed valuation of the Sanitary District, as set forth in the Return, represented 100% valuation of the property of that District. The City of Chicago represents the larger part of the Sanitary District. The 1930 assessed valuation of the City of Chicago was $3,694,499,000. In view of the fact that the 1930 assessed valuation of Philadelphia was $4,841,954,000 and that the 1930 assessed valuation of Detroit was $3,774,861,000, it may well be doubted that the assessed valuation in 1930 of the immensely larger and richer City of Chicago represented 100% valuation. (Financial Statistics of Cities (1930), U. S. Department of Commerce, Table 4, p. 37.)

As to the failure of the State of Illinois to authorize the issue of its own bonds or bonds of the Sanitary District of Chicago in sufficient annual amounts to provide for a prompt and effective compliance with the decree without a referendum, it is true that the applicants would not be concerned if that procedure did not in fact impede or threaten the prompt and expeditious performance of the decree. However, it is clear that the failure of the State of Illinois to authorize the issuance either of State or Sanitary District Bonds for the performance of the decree did impede, and probably will further impede, the prompt and effective performance of the decree. The Sanitary District recognized this fact in its first Semi-Annual Report filed July 1, 1930, at page 9. The importance of this attitude of the State of Illinois as a factor of delay, hampering the officials of the Sanitary District of Chicago in the discharge of their duties under the decree, is shown in further reports of the Sanitary District (Semi-annual Report of the Sanitary District filed January 1, 1931, p. 7; Semi-annual Report of the Sanitary District filed July 1, 1931, p. 7). The latter report well illustrates the probabilities of delay inherent in the course adopted by the State of

Illinois. Thereafter the operation of this factor of delay was not so important but only because all progress on the financing of the program thereafter temporarily ceased.

We now turn to the failure of the defendants adequately to finance the program through the sale of bonds and the cause of the supposed or alleged inability to sell bonds after June 26, 1930. In Section XI of the instant Application, applicants have shown that the total amount of bonds issued and sold by the defendants for the purpose of financing compliance with the decree of this Court only slightly exceeds $10,000,000. At page 42 of the Defendants' Return, it is asserted that the defendants have sold nearly $20,000,000 out of $63,000,000 of bonds authorized to be issued. This, of course, includes approximately $10,000,000 of the $27,000,000 bond issue authorized in 1929 which had been sold prior to the entry of the decree of this Court. We are at a loss to understand this constant effort to include the progress made upon the construction of disposal works at Chicago, either by way of expenditure of money or otherwise, *before* the entry of the decree as constituting part and furnishing a measure of the performance of the defendants *under* the decree. The facts are as stated in Section XI of the instant Application; and they are taken from the Semi-annual Reports of the Sanitary District of Chicago.

At pages 23-24 and page 43 of the Defendants' Return, they set forth the difficulties and alleged impossibility of selling bonds of the Sanitary District to finance a performance of the decree of this Court. An examination of the Return of the Defendants under the Order to Show Cause issued by this Court and of pertinent sections of the Semi-annual Reports of the Sanitary District of Chicago filed with this Court will disclose that the difficulty, if it has existed or now exists, in selling bonds of the Sanitary District of Chicago does not arise from the general depression nor from any inadequacy in past or present markets for municipal bonds, but solely from the failure, neglect or refusal of the State of Illinois to cause normal and proper taxes to be collected in the Sanitary District since 1927. It is, of course, obvious that whenever a State or municipality, however wealthy and however prosperous the times, fails, neglects and refuses to levy or collect taxes adequate to meet its current operating expenses and fixed charges, including interest and principal payments on its bonds, the market for the bonds of such State or municipality will depreciate and in an extreme case may disappear. Such difficulties are, however, self-created difficulties. As stated by this Court, the State of Illinois can base no defense *pro tanto* or *in limine* upon difficulties that it has itself created. As said by this Court in *Wisconsin v. Illinois,* 281 U. S. 179, 197:

> "We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency *to the magnitude of which it seems not yet to have fully awaked.*" (Italics ours.)

Every excuse for delay based upon the insufficiency of the financial program provided for a compliance with the decree of this Court rests primarily upon the self-created difficulty of a failure, neglect or refusal to collect normal and proper taxes to pay the ordinary running expenses of government and the interest and principal due upon bonds. Obviously, neither a State, Nation or individual may fail to make provision for the payment of just debts without an impairment of credit, but just as obviously neither a Nation, State nor individual with ample resources to discharge its obligations may make a disinclination to meet such obligations the basis of defeating the rights of those to whom such obligations flow. While it is apparent upon the face of the record made by the Semi-annual Reports of the Sanitary District and the Return filed with this Court by these defendants that the difficulty in marketing bonds to the extent that it exists rests solely upon the failure of the defendants to collect taxes, the circumstance that such difficulty did not arise from any supposed lack of an adequate bond market subsequent to June 26, 1930 is clearly demonstrated by a consideration of the volume of municipal bond issues marketed by States of the Union and their subdivisions during 1931. We have printed as Appendix A to this brief a Table of the Municipal Bond Sales for the Calendar Year 1931 taken from "State and Municipal Compendium," part 1, published June 30, 1932 by William B. Dana Company which is a regularly recognized and accepted authority in the municipal bond business in the United States. This Table shows that over $1,250,000,000 of the bonds of States and their political subdivisions were sold on the municipal bond market of the United States during the calendar year 1931. The foot-note to the Table, which is a condensation of the detailed statement of the interest rate of the various bond issues in various States, shows that 93.4% of the aggregate amount of these bond issues was marketed at 5% or less, that 85.52% of the aggregate amount of such bond issues was marketed at 4¾% or less and that 81.43% of the aggregate of such bond issues, which include bonds of new and undeveloped sections of the United States were sold with an interest rate of 4½% or less. The second section of Appendix A shows that during 1931 $1,624,000,000 in Federal Bonds were sold and very large amounts of Treasury Certificates, Notes and Bills. Records are not available for 1932, but we are advised that the market for Municipal Bonds in 1932 is better than it was in 1931. Obviously, any difficulty in marketing the defendants' bonds rests solely and squarely upon the self-created obstacles arising out of their failure, neglect and refusal to collect normal taxes or mal-administration.

However, if the 4½% bonds of the Sanitary District of Chicago could not be sold at par on the present market, as would not be the fact but for the self-created obstacles hereinbefore described, that would afford no justification for a failure to comply with the decree. The defendants would still be under obligation to sell bonds at a reasonable discount or a higher interest rate. As measuring the real effort to perform this decree, it is interesting to note that in 1929, before the entry of the decree, the Sanitary District sold bonds on a bid of 93.89. (Master's Report on Re-reference, p. 51.) It appears that after the entry of the decree and on June 4, 1931, the Trustees of the Sanitary District rejected an offer of 95.236 as inadequate, although it later sold bonds on August 20, 1931, for 95.489. (Defendants' Return to Order to Show Cause, p. 24.)

But in any event, if the Sanitary District of Chicago were unable to market the bonds necessary to finance the performance of this decree, it would be the duty of the State of Illinois, upon whom the primary obligation rests, to make adequate financial provision for the performance of the decree through a sale of its own bonds, a loan to the District, a guaranty of Sanitary District bonds or other appropriate means. But it is said that the Constitution of the State of Illinois forbids the State to use or lend its credit for such a purpose. (Defendants' Return to the Order to Show Cause, p. 46.) Such an excuse is ineffective for several reasons. First, the obligation to finance the performance of this decree is, we submit, not governed or restricted by the provisions of the State Constitution. While the provisions of the State Constitution are no doubt effective to control the action of the State in matters of internal and local concern, they are clearly inapplicable to any obligation of the State arising under the Federal Constitution. In the instant case, the obligation was imposed upon the State of Illinois to discharge any judgment rendered by the Supreme Court of the United States in the exercise of its original jurisdiction when Illinois became a member of the Union. Moreover, so far as Article IV, Section 20 of the Illinois Constitution is concerned, the State, in the instant case, would not be assuming or becoming responsible for any debt of a public corporation; for the obligation of the judgment rests primarily upon the State of Illinois and whether it will require reimbursement from one of its political subdivisions is a matter of internal concern. So far as Section 18, Article IV of the Illinois Constitution is concerned, it is clearly inapplicable to the obligation arising out of the judgment of this Court in the exercise of its original jurisdiction over controversies between States. Surely the defendants do not mean to suggest that whether a decree entered against the State of Illinois in the exercise of the original jurisdiction of this Court shall be carried out must be submitted to and determined by a general election.

As pointed out in our brief submitted with the Application, the obligation of such a judgment does not arise under and is not measured by State laws or Constitutions, but the obligation rests upon the Federal Constitution and cannot be restricted or narrowed by the Constitution of any State. We, therefore, submit that the Constitution of Illinois does not and cannot, even though unamended, prevent the State from assuming any obligation necessary to discharge its duty under the judgment of this Court. We, therefore, submit that properly construed, none of the provisions of the Constitution of Illinois prevent that State from discharging its financial obligations under the decree. However, if the contrary be assumed, and if the applicants would otherwise be defeated in their rights by the failure, neglect or self-created disabilities of the State of Illinois, then it seems clear that this Court should intervene in the exercise of its paramount power as prayed for in the instant

Application. That the State Constitution cannot be successfully put forward to nullify the jurisdiction of this Court has already been determined. In *Wisconsin v. Illinois,* 281 U. S. 179, 197 this Court in speaking of the obligation of the State of Illinois under the decree said:

> "If its Constitution stands in the way of prompt action, it must amend it or *yield to an authority that is paramount to the State.*" (Italics ours.)

If there is any substance, as applicants deny, in the contention that the State Constitution stands in the way, then we ask this Court to exercise its paramount authority to enforce this decree.

The defendants assign as a further difficulty in their financial problem the lack of confidence of their citizens in the administration of their government. (Return of the Defendants, p. 43.) If the citizens of the State of Illinois and the Sanitary District of Chicago are unwilling to trust their governmental agencies, it does not seem reasonable for the defendants to expect these applicants so to do.

We submit that this failure to prosecute the performance of this decree with diligence during the period which has just elapsed constitutes not only a wrong to these applicants but an injury to the defendants themselves. Had the work been prosecuted as diligently as possible with adequate financing by the State of Illinois, it would have greatly decreased the demands for relief of the unemployed with consequent diminution of the expenditures of the State for that purpose and attendant stimulation of prosperity. In addition the work would have been performed more cheaply and the general result would have been a great contribution to the local general welfare and a very substantial public economy.

2.

The attempt to excuse the complete failure of the defendants to take any steps to provide for the construction of controlling works, as specified in the program submitted by them and approved by the Special Master, on the ground that the defendants had, four years before the entry of the decree, submitted an immature plan for controlling works at a different place and for a different purpose, is so specious and totally devoid of merit as not only to fail to excuse this flagrant default but also to challenge the good faith of the defendants. (Defendants' Return, pp. 26-31.)

The attempt to excuse the failure to take any steps whatsoever to submit plans for controlling works to the War Department and to seek their approval by referring to the submission of a plan for controlling works at the mouth of the Chicago River in November 1926, pursuant to the requirements of a permit of the Secretary of War dated March 3, 1925, and *expiring December 31, 1929,* is as surprising as it is futile. These plans were for controlling works at the mouth of the Chicago River. They were submitted pursuant to the requirement of Paragraph 6 of the Permit of March 3, 1925. They were designed solely to bring about a reduction in the diversion deemed injurious to the Great Lakes pending the completion of the sewage disposal program at Chicago. When hearings commenced in this case in 1926, nothing further was done about such controlling works, as it became evident that, if built, they should probably be located at the head of the Drainage Canal rather than at the mouth of the River.

It is perfectly clear that this immature plan submitted in 1926 was not intended or understood by the Master, the defendants or the War Department as a compliance with the recommendations of the Special Master. The defendants proposed in their Findings that the Sanitary District should *immediately* submit to the War Department plans for controlling works to be located either at the mouth of the Chicago River or at the head of the Drainage Canal. (Master's Report on Re-reference, p. 81.) The Master's recommendation was that the Sanitary District should be required *immediately* to submit plans for controlling works to the Chief of Engineers of the War Department. (Report of Special Master on Re-reference, p. 143.) The War Department had in 1925 thought it necessary to impose a requirement for construction of controlling works. However, in the hearings on re-reference in 1929, General Jadwin stated the position of the War Department as follows:

> "It is the present attitude of the Chief of Engineers, therefore, that the United States should not require the construction of controlling works, but that the Department will *consider any application for the approval of plans of controlling works, to be constructed by the Sanitary District or other agency,* and may be expected to approve these plans if the works are shown to be necessary, to be effective, and to be the minimum detriment to navigation.
>
> The question of control works is therefore a sanitary matter for solution by the Chicago Sanitary District or the City of Chicago." (Italics ours.) (Report of the Special Master on Re-reference, p. 109.)

The complainants at all times insisted that, while in their opinion controlling works were unnecessary after the completion of the program and would only serve a useful purpose pending its completion, the proper location of such controlling works, if they were to be constructed, was at the head of the Drainage Canal and not at the mouth of the Chicago River. It is thus obvious that there has been a complete failure of the defendants to make the slightest effort to comply with the decree in this particular.

The suggestion that there is any change in situation which could justify this delinquency of the defendants under the decree is without basis in fact or law. The question of the duty of the defendants and the rights of the plaintiffs were resolved in the decision of this Court. Defendants cannot now seek to relitigate such issue. However, the defendants are entirely misinformed both as to the basis of the decision in this case and the facts subsequent to that decision. The attempt of the defendants to base any rights upon an alleged need for diversion of water for navigation purposes other than in the Port of Chicago was excluded not because such diverted water would not flow into any project on which there was a Federal improvement but because the Federal Government had not attempted, if it had the constitutional power, to appropriate the waters of the Great Lakes for such a purpose. The attempt was made to claim that a large diversion would be in the interests of the then Federal improvement on the Illinois River. Such testimony was excluded on the ground that when and if the Federal Government attempted, as it had not, to appropriate any water of the Lakes for such a purpose, it would be time enough to decide the question thus raised. *Wisconsin v. Illinois,* 281 U. S. 179, 197.

So far as any claim of an attempt of the Federal Government to appropriate water in excess of the Court's decree for any purpose of navigation, the situation is the same as when the decree was entered in these cases. The State of Illinois still retains title to the Illinois Waterway. The Sanitary District still retains title to the Drainage Canal. It is true that the Federal Government was persuaded to advance money to complete locks on the Illinois Waterway but title remained in the State of Illinois. However, the matter of title is immaterial for in any event it is perfectly clear that the Federal Government did not attempt, if it had the power, to appropriate any waters to those Waterways or to the Illinois River beyond the amount fixed by the Supreme Court decree. The excerpts quoted from the statement of General Jadwin do not represent findings of the Special Master but merely quotations from the statement filed by General Jadwin; and the statements therein made were found to be immaterial to the case. General Jadwin's testimony so quoted related to the Illinois River and not to the Drainage Canal or the Illinois Waterway.

While the matter sought to be raised by the defendants is entirely extraneous to any question before this Court, the facts about the alleged Federal action subsequent to the decree, which are referred to by the defendants, are as follows. The pertinent provision of the River & Harbor Act of July 3, 1930, reads:

> "Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway: *Provided,* That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000: *Provided further,* That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12, Original—October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway: *Provided further,* That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of

> the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable."

As disclosed by the Act, this action was based upon the report of Major General Brown, Chief of Engineers. His report said in part:

> "The district engineer reports that a potential tonnage amounting to 7,500,000 tons annually would probably use this waterway if it were completed, and that to obtain such a link connecting the extensive Federal waterway systems of the Great Lakes and the Mississippi Valley the United States would be justified in expending $7,500,000 which he estimates to be the amount which will be required for the completion of the waterway after the State has expended the whole of its $20,000,000. He states that the waterway in general is well designed and well suited to serve its intended purpose, except that he believes that a depth of 9 feet should be provided and the small amount of additional dredging necessary to provide such a depth, *even if the flow at Lockport is reduced to 1,000 cubic feet per second,* has been included in his estimate. If the flow should be reduced *below* this amount, the necessary dredging would be somewhat increased, but the increase in cost would be relatively small." (Italics ours.)

And further:

> "As shown by the estimates prepared by the district engineer the 9-foot channel heretofore adopted by Congress can be secured by various flows of water,

> even as low as 1,000 cubic feet per second. Decreasing the flow increases the dredging but not in any serious amount."

It should be borne in mind that the diversion provided by the decree is in addition to the domestic pumpage of about 1800 cubic feet per second so that even after December 31, 1938, the flow at Lockport under the decree will be in excess of 3300 cubic feet per second or well over three times that required by the Federal project. The report of the Committee on Rivers and Harbors discloses that Congress had in mind that the value and utility of this waterway could not be depreciated by any reduction contemplated by the Supreme Court decree, since it would be fully useful with much smaller flow at Lockport. In the Report of the Committee on Rivers and Harbors (House Report 1263, 71st Congress, 2nd Session), it was said:

> "As shown by the estimates prepared by the District Engineer, the 9-foot channel heretofore adopted by Congress can be secured by various flows of water, even as low as 1,000 cubic feet per second. Decreasing the flow increases the dredging but not in any serious amount." (p. 140.)

The same report as well as that of the Chief of Engineers heretofore referred to discloses that an appropriation of $7,500,000 was made (being the amount stated by the Corps of Engineers to be the *maximum* which might be required to provide full channel depths and widths if the flow at Lockport should ever be reduced to 1000 second feet as compared with a minimum of 3300 second feet under the decree) to render it clear beyond debate that adoption of the project could not be construed, even by implication, as any attempt, if Congress had the power, to appropriate any water in excess of the amount fixed by the Supreme Court decree. Congress merely provided for the utilization of *some* of the water which this Court had decreed would flow through the channels in any event.

The foregoing recital of Federal action discloses that the suggestion of the defendants is wholly without foundation. However, there is further Federal action which not only carefully avoids any attempt, if the Congress had the constitutional power, to take any action not in conformity with the decree of this Court but which affirmatively adopts and ratifies the judgment of this Court as the policy of the Federal Government. On July 18, 1932, the Great Lakes-St. Lawrence Deep Waterway Treaty was signed by the Government of United States and Canada. Article VIII of that Treaty reads in part as follows:

> "The High Contracting Parties, recognizing their common interest in the preservation of the levels of the Great Lakes System, agree:
>
> (a) 1. that the diversion of water from the Great Lakes System, through the Chicago Drainage Canal, shall be reduced by December 31st, 1938, to the quantity permitted as of that date by the decree of the Supreme Court of the United States of April 21st, 1930;
>
> 2. in the event of the Government of the United States proposing, in order to meet an emergency, an increase in the permitted diversion of water and in the event that the Government of Canada takes exception to the proposed increase, the matter shall be submitted, for final decision, to an arbitral tribunal which shall be empowered to authorize, for such time and to such extent as is necessary to meet such emergency, an increase in the diversion of water beyond the limits set forth in the preceding subparagraph and to stipulate such compensatory provisions as it may deem just and equitable; the arbitral tribunal shall consist of three members, one to be appointed by each of the Governments, and the third, who will be the Chairman, to be selected by the Governments;" (U. S. Daily, July 19, 1932.)

On July 19th, the same date on which the Treaty was made public, President Hoover made a public official announcement in which he quoted General MacArthur, Acting Secretary of War, as follows:

> "The question of the effect of the treaty provisions covering the diversion of water from Lake Michigan upon the nine-foot waterway from Chicago to the Mississippi has been raised. I may quote the statement from General MacArthur, Acting Secretary of War, which clarified this question:
>
> 'Dear Mr. President: I am in receipt of your request for a statement from this Department in confirmation of the verbal assurances given to you and to the Secretary of State by the Corps of Engineers, that the provisions in respect to the diversion of water from Lake Michigan in the proposed Great Lakes-St. Lawrence deep waterway treaty are sufficient to provide for the maintenance of the nine-foot waterway from Chicago to the Mississippi.
>
> I am glad to confirm that the provision in the treaty does provide the necessary diversion for this purpose.' " (U. S. Daily, July 19, 1932.)

On July 23, 1932, Honorable Patrick J. Hurley, Secretary of War, made public an official opinion of Major General Lytle Brown, Chief of Engineers, as follows:

> "Patrick J. Hurley, Secretary of War, made public on July 22 a memorandum from the Chief of Engineers, Major General Lytle Brown, declaring that the diversion of the waters of Lake Michigan for the Chicago Drainage Canal as permitted under the St. Lawrence waterway treaty will be sufficient for navigation purposes in the Chicago-Gulf of Mexico waterway.
>
> Under the treaty recently negotiated by the Department of State, a water diversion of 1,500 cubic feet per second for drainage purposes was agreed upon. General Brown's memorandum shows that by 1938 Chicago will have an additional domestic pumpage of 1,900 cubic feet per second, making a total eventual flow through the drainage waterway of 3,400 cubic feet per second. (The full text of the treaty was printed in the issue of July 19.)

COURT DECREE OUTLINED.

The memorandum follows in full text:

The following memorandum is submitted on the effect the provision of the St. Lawrence Waterway Treaty will have upon the Illinois Waterway.

The decree of the Supreme Court entered April 21, 1930, in the matter of the diversion of water from Lake Michigan by the State of Illinois and the Sanitary District of Chicago specified:

That on and after July 1, 1930, the State of Illinois and the Sanitary District of Chicago are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system of watershed through the Chicago drainage canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 cubic feet per second, in addition to domestic pumpage;

That on and after Dec. 31, 1935, unless good cause is shown to the contrary, the State of Illinois and the Sanitary District of Chicago are enjoined from diverting as above in excess of an annual average of 5,000 cubic feet per second, in addition to domestic pumpage, and on and after Dec. 31, 1938, are enjoined from diverting as above in excess of an annual average of 1,500 cubic feet per second, in addition to domestic pumpage.

TOTAL PERMISSIBLE FLOW.

It is estimated that by 1938 the domestic pumpage will be approximately 1,900 cubic feet per second in addition to the amount of 1,500 cubic feet per second provided by the decree, giving a total permissible flow through the Drainage Canal and Waterway of 3,400 cubic feet per second. The flow in the Illinois river will be greater.

Article VIII of the Great Lakes-St. Lawrence Waterway Treaty limits the diversion of water from the Great Lakes System through the Chicago Drainage Canal to that decreed by the Supreme Court but provides that in the event of an emergency the United States proposes to increase the diversion of water from the Great Lakes System, through the Chicago Drainage Canal in excess of 1,500 cubic feet per second as decreed by the Supreme Court, and if the Government of Canada takes exception thereto, the matter shall be submitted for final decision to an arbitral, having power to increase the diversion and to stipulate such compensating provisions as may be just and equitable.

No Conflict Seen.

There is no conflict between the decree of the Supreme Court and Article VIII of the treaty. The decree specifies a minimum withdrawal after Dec. 31, 1938, of 1,500 cubic feet per second in addition to domestic pumpage, unless good cause can be shown to the contrary, whereas, the treaty provisions while limiting the diversion to the same amount provides that in an emergency an increase may be permitted.

It has been contended that the flow at Lockport as limited by the treaty will destroy the usefulness of the Illinois Waterway. This contention is without basis of fact as will be seen by a study of the table set forth below:

Total canalized length miles, A; total fall, B; average low water flow, c.f.s., C; average yearly tonnage, D:

	A	B	C	D
Monongahela River	131	153.6	200	25,000,000
Ohio River	981	429.14	1,100	20,000,000
Panama Canal	51	85	1,300	28,000,000
Illinois River	291	165	3,400*	10,000,000**

*At Lockport. **Estimated commerce upon completion of waterway.

Flow Declared More Than Ample.

The flow at Lockport permissible under the treaty will not only be more than three times the average low water flow of the Ohio River at Pittsburgh, and 2.5 times the yearly average amount required for lockages in the Panama Canal, but will be 17 times the low water flow of the Monongahela River which carries an average yearly tonnage two and one-half times that estimated for the Illinois waterway. These facts establish without question that the permissible flow will be more than ample for any commerce that may develop on the Illinois Waterway.

If additional locks and dams in that portion of the Illinois River below Utica are found to be necessary to provide a nine-foot channel during low water stages, the cost thereof will be negligible compared to expenditures made on other waterways and to the advantages resulting to the public from the proposed improvement of the St. Lawrence River.

DIFFERENCE HELD IMMATERIAL.

So far as the Mississippi River is concerned, it is possible that a large diversion in the order of 10,000 cubic feet per second might have a sensibly beneficial effect during extreme low stages. However, such a diversion is unacceptable to the lake States since it materially lowers the level of the lakes, thereby injuriously affecting navigation. The difference between the permissible withdrawal of 3,400 cubic feet per second and 5,000 or 6,000 cubic feet per second which has been advocated, is entirely immaterial, in its effect upon the Mississippi River.

The above facts and opinions do not take into consideration the sanitary situation at Chicago and south of there. It is assumed that it will be safeguarded without requiring more water from Lake Michigan than is specified in the decree of the Supreme Court, and that this will be done in the time allowed for the purpose in that decree.

(Signed) LYTLE BROWN,

Major General,
Chief of Engineers."

It is thus apparent that any change which has occurred in the situation since the decree is in the line of an adoption of the terms of the decree as the official policy of the United

States Government rather than as suggesting any possibility of an attempt of Congress or the Executive Department to take any action, if either had the constitutional power, contrary to the terms of the decree.

It hardly seems fair to the War Department to charge it with a failure to approve plans when none have been submitted and when Chief of Engineers advised these defendants on the record in this case that the Department would be ready and willing at any time to consider and approve any controlling works shown to be properly designed and reasonably necessary.

3.

The reasons assigned by defendants for delay in construction of the Southwest Side Treatment Works, namely, the supposed difficulties in acquiring a proper site for that plant and the alleged necessity of further study of the stockyards wastes and the alleged opposition of the Packing Industry wholly fail to excuse the defendants' past and present default on this important project.

a. The allegations of the return do not excuse the failure to acquire a site for the Southwest Side Treatment Plant.

The complete failure of the defendants to take any effective steps to acquire a site for the Southwest Side Sewage Treatment Works, as disclosed by the Semi-annual Reports of the Sanitary District filed with the Court, is summarized in the Application of Wisconsin, Minnesota, Ohio and Michigan, Section VII, pages 10-11.

These works are admittedly the controlling factor as to time in the completion of the entire sewage disposal program. The only explanation of this inexcusable delay in acquiring a site for these works, which is given by the Return filed by the defendants in this Court, is that various property owners had objected to the site originally selected and to certain alternative sites, and the fact that, pending this delay, the funds of the District were exhausted so that a *bona fide* offer of purchase could not be made as is claimed to be necessary under Illinois Law. (Return of Defendants, pp. 31-34; Master's Report on Re-reference, p. 50.) It must be obvious that no site will probably ever be found where some of the adjacent property owners, whether for good cause or not, will not object and suggest that the plant be located at some other site.

These applicants and their co-complainants have never insisted and do not now insist upon any particular site for the Southwest Side Plant, but they have merely insisted and now merely insist that the defendants select and acquire *some* site. Throughout this litigation it has been the view of the applicants that so long as plans proposed by the defendants would admittedly accomplish the results deemed essential to a restoration of the applicants' rights, it was neither the duty nor the right of the applicants to suggest or insist that the defendants should adopt some other plan even though the applicants should think another plan preferable. The fact is that the Sanitary Experts, who testified for the complainants in this litigation, and particularly Mr. Hawson, at all times expressed the view that the construction of a separate Southwest Side Plant at the location proposed was an economic and scientific mistake from the standpoint of Chicago and that upon both grounds the sewage should be transported across the Drainage Canal and treated in an enlargement of the West Side Plant or in a sister plant located at that site, where adequate land was already owned by the Sanitary District. However, since the defendants appeared to prefer the plan of a separate Southwest Side Plant at a different location and since the location of the plant did not affect the restoration of applicants' rights, the applicants deemed it improper to insist upon their point of view before the Special Master or before this Court. But that fact can furnish no justification for the defendants' failure to select *some* site and proceed with the construction of the plant.

When the defendants at the closing hearings on the Re-reference suggested that they were uncertain whether they should acquire the site previously selected for the Southwest Side Plant or some other site, the Special Master said in his report on Re-reference at page 51:

> "The question must be determined promptly and there seems to be no reason why proceedings for purchase or condemnation should not go speedily forward."

Nevertheless the defendants during nearly three years since the Master filed his report have taken no effective steps to acquire this site. The suggestion that pending this dilatory procedure with reference to the acquirement of a site, the funds of the Sanitary District became exhausted so as to prevent proceedings under the Illinois law condemns rather than excuses the course of the defendants. It establishes that if the defendants had proceeded promptly, as directed by the Special Master, the site would have been acquired while the District had funds. It likewise demonstrates that the gross inadequacy of the provisions made by the State and the District for financing the performance of the decree have been directly responsible for a part of the delay in this important particular.

The defendants now admit that the Southwest Side Plant can be built on the surplus lands owned by the District at the West Side Plant, as applicants have at all times contended; but the defendants apparently have not yet decided to build the plant there. While the applicants join in the hope that the new process of handling the sludge will mark an advance in the art and will curtail the costs of the plant, it must be obvious that the performance of this decree cannot await the time when the art of sewage disposal becomes static, if that day ever arrives.

Defendants also say that the delay in acquiring the site will cause no delay. We hope that is true; but the extreme and fanciful contentions urged by these defendants throughout this long litigation to the effect that the design of the structure could not possibly be initiated until a site had been acquired and tests had been made on the site leaves a perhaps pardonable apprehension in the minds of the applicants as to whether the professions previously made or those now made are the sincere ones.

b. The supposed cause of delay arising out of the alleged necessity to study the stockyards' wastes and the opposition of the packing industry are without substance.

The next suggested excuse for the delay on the Southwest Side Treatment Works is the alleged necessity for a new study of the stockyards and Packing Town wastes and the opposition of the stockyards' industries. (Defendants' Return, pp. 34-38.) The denial that the Sanitary District, as a result of exhaustive studies made between 1912 and 1918, announced that the problem of treating these wastes had been solved must be based upon a misapprehension as to the facts. Such an announcement was made in 1928, and is set forth in the Report of the Special Master on Rereference at page 54. These applicants have at all times contended and they still insist that the claim of the necessity for an extensive study to determine the nature and character of these wastes as is purported to be set forth in the Semi-annual Reports filed with the Court, and summarized in the pending Application (Section VIII, pp. 11-12) is fanciful and unreal. It is clear that if there has been any change in the stockyards' wastes since the former intensive studies, those changes have been in the direction of lessening the quantity of wastes in porportion to the "kill" and the quantity of the objectionable matter in such wastes, so that any change has been in the direction of lessening a problem which the Sanitary District, by its own statement, was prepared to meet in 1928. Any material change in volume could readily be determined by a comparison of the quantity of the "kill" which is known to the public by the day and by the year. The allegation in the Return that the quantity and character of the wastes from packing houses has substantially changed is directly in the teeth of the allegation of the Semi-annual Report of the Sanitary District filed July 1, 1931, page 6. Indeed it seems clear that, if the Sanitary District had proceeded with the construction of the Southwest Side Plant, with no further examination of the stockyards' wastes than that previously made, the greatest error that possibly could have resulted would have been in providing a somewhat surplus capacity beyond what would be presently required in view of some probable decrease in quantity and objectionable character of such wastes for a given "kill," with the only result of projecting the adequacy of the plant for the treatment of the sewage of that section of Chicago slightly farther into the future. The position of the applicants has been and now is that if any further examination were required, it was of a character which could be readily and speedily completed. On this point the Special Master said in his Report on Re-reference at page 55:

> "It seems to me that the Sanitary District should be able to obtain *within a few months, at the most,* whatever information is essential to enable it to proceed with the designing of this plant." (Italics ours.)

As a matter of fact the whole problem of industrial wastes at Chicago has been consistently and grossly exaggerated by the defendants. Every industrial City in United States has industrial wastes, and a large number of them have as large, and some a larger, load of industrial waste per capita than Chicago. Yet no instance was ever disclosed by the Experts on either side where it was ever sought to magnify the extent of the sewage disposal problem of any other city by treating the trade wastes as the equivalent of a theoretical human population. In every other case the trade wastes are treated as a matter of course in connection with other sewage, and the fanciful exaggeration of this phase of the problem at Chicago furnishes adequate grounds for a doubt of the sincerity of such a claim.

The applicants are pleased to note that the litigation which has been pending since 1924 between the packers and the Sanitary District of Chicago will not delay the construction of the Southwest Side Plant. (Defendants' Return to Order to Show Cause, p. 38.) This admission that this litigation seeks no relief essential to the performance of this Court's decree is in accord with the allegations of our Application (Application, Section IX, p. 13), but it leaves us at a loss to know why the circumstances of this litigation have been constantly reported to this Court in the Semi-annual Reports here filed. Obviously none of the allegations set forth in the return furnish the slightest justification for the inexcusable delay in proceeding with the Southwest Side Sewage Treatment Works. This is especially significant in view of the magnitude and controlling character of these works.

4.

The action of the defendants in greatly reducing the personnel of the Engineering Organization of the Sanitary District in the face of former claims that it was previously inadequate and the defendants' long record of maintenance of their illegal diversion in defiance of the Federal Government, considered in the light of the inadequacy of their past and present performance under the decree, justify applicants' apprehension that, in the absence of further intervention by this Court, the action of the defendants subsequent to the entry of the decree forecasts their default in its performance.

a.

While the defendants now apparently admit, as applicants have at all times contended, that the Engineering Organization of the Sanitary District was, prior to the reduction in personnel, adequate for the performance of the decree, the large reduction in its personnel disclosed by the Return, coupled with the defendants' former claims before the Special Master that the then immensely larger Engineering Organization of the District was wholly inadequate to carry out the sewage disposal program even in a time much longer than that found to be reasonable by the Special Master, justifies a conclusion that such reduction threatens a delay in carrying out the decree. (Defendants' Return, pp. 38-9.)

The defendants assert that the reduction of the personnel of the Engineering Organization of the Sanitary District as set forth in the instant application (Section X, p. 13) will occasion no delay in the performance of the decree. The applicants welcome that assurance. We merely point out that at all times during this litigation the defendants strenuously insisted before the Special Master that the then immensely larger Engineering Organization of the Sanitary District was wholly inadequate to carry out the sewage disposal program even in a time much longer than that found to be reasonable by the Special Master. (Report of the Special Master on Re-reference, pp. 36-40, 71.) We then believed and still believe those claims grossly exaggerated, but we feel it a justifiable ground for apprehension when the defendants so greatly reduce an Engineering Organization which they had theretofore at all times claimed to be inadequate and which organization they had claimed could not be built up except over a long period of years. (Report of the Special Master on Re-reference, pp. 36-40, 71.) We, of course, recognize that the affairs of the Sanitary District are now managed by new officials and that such officials may desire to disavow the extravagant and unreasonable claims heretofore made. Of course, there is no reason why the defendants should not, as pointed out by the Special Master, if and to the extent convenient and necessary, employ the services of Engineering Offices to assist in the planning and building of the sewage treatment works necessary to carry out the terms of this Court's decree. This "procedure would not increase the cost, while it would expedite the work." (Report of Special Master on Re-reference, p. 71.)

b.

The defendants' long record of maintenance of their illegal diversion in defiance of the Federal Government justly intensifies the grave apprehension which would necessarily arise in any event from the defendants' record of inadequacy of past and present performance under the decree, that these defendants, in the absence of intervention by this Court, will continue to thwart the restoration of applicants' rights; and the force of this record as characterizing the defendants' past and present default is not lessened by anything set forth in the Return. (Defendants' Return, pp. 39-41.)

We say only a word about this part of the Return and that word only because the defendants seem to imply that the charges in Section XV of the Application were made only as a matter of recrimination. These allegations were inserted in the Application because in our opinion they establish a long course of conduct by the defendants by which the defendants constantly sought to magnify any existing obstacles and to create further obstacles to the termination of their unlawful conduct and the restoration of these applicants' just rights. For many years these applicants relied upon the efforts of the Federal Government to protect and restore some measure of their rights. When the efforts of the Federal Government were successfully thwarted by these defendants, these applicants sought relief in this Court. In our opinion this long course of conduct justly intensifies the grave apprehension of these applicants, which would necessarily arise in any event from the record of inadequacy of performance set forth in the Application, that these defendants, unless there is timely intervention by this Court, will continue to thwart the restoration of your applicants' rights. Such a long course of evasion necessarily gives rise to the presumption of its continuance when the present circumstances are consistent with such a conclusion. While probably immaterial, the defendants are in error in their statement that the litigation between the Sanitary District and the Federal Government was a friendly suit. The drafters of the Return apparently have overlooked, or are not aware, that the original friendly suit instituted in 1908 and mentioned in the Permit of June 30, 1910, was supplemented by another suit commenced in 1913 to compel the obedience of the Sanitary District to the limitations upon the diversion imposed by the War Department and which the Sanitary District persisted deliberately in defying. The history of this litigation is aptly summarized in the report of Major Putnam, entitled "Diversion of Water from Lake Michigan" and dated November 1, 1923, pages 4-5. Major Putnam's statement is printed as Appendix B to this Brief.

The long defiance of the Federal Government was pointed out by General Taylor, Chief of Engineers in Paragraphs 114 and 115, page 55 of the Report entitled "Diversion of Water from the Great Lakes and Niagara River" transmitted by the Secretary of War to the Speaker of the House of Representatives December 7, 1920. (See Appendix C to this Brief.)

IV.

WHILE APPLICANTS BELIEVE, AS STATED IN DEFENDANTS' RETURN, THAT THE CONSTRUCTION PROGRAM CAN STILL BE COMPLETED BY DECEMBER 31, 1938, THE APPLICANTS SUBMIT THAT, IN VIEW OF THE MEAGER AND INADEQUATE RECORD OF PERFORMANCE DISCLOSED TO DATE, THE PREVIOUS PROFESSIONS OF THE DEFENDANTS OF INABILITY TO PERFORM THE REMAINING WORK IN MUCH LONGER PERIODS OF TIME THAN REMAIN UNDER THE DECREE AND THE CIRCUMSTANCE THAT WORK IS STILL VIRTUALLY AT A STANDSTILL, THIS COURT SHOULD GRANT THE RELIEF PRAYED FOR IN THE APPLICATION AND APPOINT A SUITABLE OFFICER OR OFFICERS OF THE COURT TO CARRY OUT THE DECREE AT THE EXPENSE OF THE SANITARY DISTRICT AND THE STATE OF ILLINOIS.

The defendants state in their return that the construction program can be completed by December 31, 1938. (Defendants' Return, pp. 49-57.) We believe that to be true. However, the record of past and present performance does not justify confidence that the decree *will* be carried out within the times therein fixed unless the Court grants the prayer of these applicants to appoint an officer or officers to carry out the decree at the expense of the defendants. The defendants in this part of the Return concede that if they will clear up the difficulties created by their failure to collect normal taxes to pay the usual expenses of government and to meet the interest and principal due upon bonds, there will be no difficulty in marketing such bonds as are required for the performance of this decree. Doubtless as suggested, funds may be obtained from the Reconstruction Finance Corporation. We are certain that the cost of the future work will be much lower than the estimates heretofore reported to the Court by the Sanitary District, not only by reason of the decrease in construction costs, but by reason of the fact that such estimates were grossly excessive.

However, so long as the defendants attempt to excuse themselves upon the ground that the State of Illinois levies taxes with one hand and collects them with the other and that neither hand can be charged with responsibility for the delinquencies of the other, there can be little confidence that a real, substantial, and good faith effort to carry out the decree can be expected. In making this statement, we do not mean necessarily to charge that the defendants either singly or together are conspiring or will conspire deliberately to obstruct, avoid or circumvent the performance of the decree, but we do contend that on the face of the record it is apparent that the State of Illinois and possibly the Sanitary District has failed to appreciate the extent of the obligation of the decree or the degree of exertion and effort which is required upon their part. It is contended that a State which leaves the performance of an obligation under a decree of this Court in the exercise of its original jurisdiction to the chance of a referendum upon the question of whether the performance of the decree will be financed, that permits normal and usual taxes to be uncollected for a period of nearly five years so as to undermine the credit of the agency to which it has sought to delegate the performance of its obligation under the decree, that permits misguided individuals, who fail to comprehend the importance of the construction program, to interfere with and delay the discharge of the obligation of the State, has not exhibited that appreciation of its responsibilities which justifies this Court and these applicants in believing that, without the intervention of this Court, the obligation will be promptly, efficiently and adequately discharged. If such excuses be thought not necessarily to establish any conscious effort to avoid or obstruct the performance of the decree, they at least establish a failure to appreciate the scope of the defendants' duty under the decree and exhibit a cheerful complacency in the face of past and present inadequacy of performance and threatened default. This falls far short of that real, substantial, and whole-hearted effort to comply with the decree of this Court which is the measure of the duty and obligation of the defendants both to this Court and to the applicants whom they have wronged.

The Federal authorities and this Court have had occasion from time to time to comment upon this attitude and to point out that it has for many years wrongfully delayed the termination of the defendants' unlawful acts. In *Wisconsin v. Illinois,* 278 U. S. 367 at 420, Mr. Chief Justice Taft in rendering the unanimous opinion of this Court said at page 420:

> "In increasing the diversion from 4,167 cubic feet a second to 8,500, the Sanitary District *defied* the authority of the National Government resting in the Secretary of War. And in so far as the prior diversion was not for the purposes of maintaining navigation in the Chicago River it was without any legal basis, because made for an inadmissible purpose.
>
> * * * * *
>
> The Sanitary District authorities, relying on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore they can not now complain if an immediately heavy burden is placed upon the District because of their attitude and course. The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion." (Ita'' s ours.)

Again in *Wisconsin v. Illinois,* 281 U. S. 179, this Court said at page 197:

> "It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril.

> We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defences upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State."

The defendants still seem to have something of the attitude stated by Major Putnam in his official report entitled "Diversion of Water from Lake Michigan" dated November 1, 1923 at page 62. (Appendix B, pp. 64-68, *infra* in the record of this case.)

> "* * * The only difference between the problem confronting the Sanitary District of Chicago and any other community facing the necessity of treating its sewage is the magniture of the problem. The local officials assume an attitude of being overawed every time the subject is mentioned. At no time have they taken the position of being in control of the situation or of meeting it squarely. * * *"

In the same official report at page 63, Major Putnam said:

> "The officials of the sanitary district have no grounds for delay on account of lack of complete information as to the processes best suited to the different kinds of sewage produced. For over 10 years their testing laboratories have carefully investigated every kind of sewage, have tabulated characteristics, and determined behavior under every kind of treatment. There is no question but what their engineers have been ready to go ahead with the work for some years, but without the stimulus now produced by a prospective Federal injunction inaction seems to have been the slogan of the trustees, and the valuable investigations of their engineering department have been pigeonholed."

The record of performance since the entry of the decree in these cases at least suggests, and we believe requires the conclusion, that there is still a failure to appreciate the obligations of the defendants to this Court and to the complainants whose rights they have invaded and are still invading. Under these circumstances, it is respectfully submitted that this Court should grant the prayer of the applicants for the appointment of an officer or officers of the Court to carry out the decree at the expense of the defendants.

Respectfully submitted,

John W. Reynolds,
Attorney General of the State of Wisconsin,

Herbert H. Naujoks,
Ass't Attorney General of Wisconsin,

Herman L. Ekern,
Special Ass't Attorney General of Wisconsin,

Henry N. Benson,
Attorney General of the State of Minnesota,

Gilbert Bettman,
Attorney General of the State of Ohio,

Paul W. Voorhies,
Attorney General of the State of Michigan,

Raymond T. Jackson,
Special Assistant to the Attorneys General.

Solicitors for the Applicants.

Filed December 5, 1932.

APPENDIX A.

FEDERAL, STATE, AND MUNICIPAL BOND SALES FOR 1930-1932

1. Analysis of State and Municipal Bond Sales for calendar year 1931

(Taken from State and Municipal Compendium, June 30, 1932.)

STATES AND GEOGRAPHICAL DIVISIONS	*Grand Total.*	*State Bonds.*	*County Bonds.*	*School District Bonds.*	*City, Tow, & Village Bonds.*
	$	$	$	$	$
Maine	6,940,000	4,700,000	......	......	2,240,000
New Hampshire	2,330,000	1,000,000	490,000	100,000	740,000
Vermont	1,556,000	......	......	470,000	1,086,000
Massachusetts	37,095,300	3,000,000	600,000	......	33,495,300
Rhode Island	5,844,500	......	......	......	5,844,500
Connecticut	10,461,500	......	200,000	700,000	9,561,500
New York	398,133,992	74,975,000	30,154,000	11,792,400	281,212,592
New Jersey	111,301,650	23,000,000	21,795,100	3,848,300	62,658,250
Pennsylvania	64,812,200	......	13,730,000	13,172,200	37,910,000
No. Atlantic Div.	638,475,142	106,675,000	66,969,100	30,082,900	434,748,142
Delaware	1,670,638	......	106,000	64,638	1,500,000
Maryland	15,100,000	1,590,000	4,536,000	......	8,974,000
Virginia	3,438,500	......	217,000	174,000	3,047,500
West Virginia	11,769,000	10,000,000	......	400,000	1,369,000
North Carolina	21,771,213	10,457,000	3,952,000	506,000	6,856,213
South Carolina	2,116,500	......	784,500	400,000	932,000
Georgia	3,628,000	2,700,000	350,000	37,000	541,000
Florida	2,437,000	......	8,000	44,500	2,384,500
So. Atlantic Div.	61,930,851	24,747,000	9,953,500	1,626,138	25,604,213
Ohio	57,198,025	......	15,836,442	6,857,760	34,503,823
Indiana	14,193,357	225,000	6,108,586	1,987,305	5,872,466
Illinois	55,778,000	1,000,000	1,200,000	1,950,000	51,628,000
Michigan	71,682,752	......	3,430,532	3,051,000	65,201,220
Wisconsin	14,482,619	......	6,091,000	91,000	8,300,619
Minnesota	21,862,412	10,000,000	2,892,750	984,000	7,985,662
Iowa	20,994,717	1,000,000	13,996,333	1,393,000	4,605,384
Missouri	31,999,000	15,000,000	2,811,000	2,137,000	12,051,000
North Dakota	2,992,159	2,200,000	210,000	391,000	191,159
South Dakota	2,308,000	1,000,000	381,900	......	926,100
Nebraska	4,056,659	......	861,000	677,000	2,518,659
Kansas	4,461,554	......	1,358,979	754,500	2,348,075
No. Central Div.	302,009,254	30,425,000	55,178,522	20,273,565	196,132,167
Kentucky	5,579,600	2,285,000	457,000	67,000	2,770,600
Tennessee	13,791,600	1,031,000	4,519,600	50,000	8,191,000
Alabama	5,658,500	......	3,484,000	......	2,174,500
Mississippi	4,787,517	2,250,000	1,580,000	62,000	895,517
Louisiana	42,721,266	37,000,000	392,000	1,185,000	4,144,266
Texas	40,060,711	......	19,224,217	3,102,300	17,734,194
Oklahoma	4,443,641	......	710,062	342,297	3,391,282
Arkansas	20,197,706	18,500,000	979,706	288,500	429,500
So. Central Div.	137,240,541	61,066,000	31,346,585	5,097,097	39,730,859

Page Tightly Bound

Montana	7,072,889	3,596,500	381,000	630,383	2,465,006
Wyoming	2,579,152	230,000	458,000	887,000	1,004,152
Colorado	6,120,800	......	334,000	1,203,300	4,583,500
New Mexico	2,050,500	1,000,000	......	334,500	716,000
Arizona	2,579,300	......	400,000	206,500	1,972,800
Utah	4,756,000	460,000	......	303,000	3,993,000
Nevada	301,000	......	133,000	......	168,000
Idaho	2,301,800	250,000	1,045,000	705,800	301,000
Washington	12,665,132	......	2,350,250	1,638,434	8,676,448
Oregon	6,338,169	1,000,000	650,000	1,220,000	3,468,169
California	69,834,403	18,182,000	2,115,513	5,053,789	44,483,101
Western Division	116,599,145	24,718,500	7,866,763	12,182,706	71,831,176
Grand total	1,256,254,933	247,631,500	171,314,470	69,262,406	768,046,557
Percentage	100%	19.71%	13.64%	5.51%	51.14%

An extension of the above table shows the interest rates in detail. For the purpose of brevity, we are including in this foot note only the totals sold at the various rates of interest, to wit: $86,081,840 at 3%; $6,151,000 at 3¼%; $100,007,148 at 3½%; $81,323,510 at 3¾%; $241,231,795 at 4%; $311,407,816 at 4¼%; $196,694,379 at 4½%; $51,412,493 at 4¾%; $99,110,959 at 5%; $10,637,587 at 5¼%; $20,253,702 at 5½%; $5,300,077 at 5¾%; $40,383,932 at 6%. Over $206,862 at 6%; Unknown $6,051,833.

2. U. S. Government Securities Issued and Sold 1930-1932.

(Taken from Bankers Trust Company statement dated November 9, 1932.)

Outstanding (Millions)	*Issue*	*Rate*	*Maturity*	*Bid*	*Asked*	*Yield About*	*Corp. Tax Equiv.*
LIBERTY AND TREASURY BONDS							
821	Treasury	3⅛	6/15/49-46	97 26/32	97 27/32	3.30	3.80
803	“	3	9/15/55-51	96 9/32	96 12/32	3.23	3.71
CERTIFICATES AND NOTES							
600	Notes (T.D.)	3¼	12/15/32	100 21/32	100 23/32	3.92	
145	Ctfs. (A.33)	3¾	2/ 1/33	100 26/32	100 28/32	.13	.47
660	Ctfs. (T.M.)	3¾	3/15/33	101 9/32	101 11/32	.13	.47
239	Ctfs. (B.33)	2	5/ 2/33	100 26/32	100 28/32	.17	.49
373	Ctfs. (T.J.)	1½	6/15/33	100 23/32	100 26/32	.13	.37
451	Ctfs. (T.S.)	1¼	9/15/33	100 23/32	100 26/32	.29	.49
244	Notes (A.34)	3	5/ 2/34	102 31/32	103 1/32	.93	1.41
345	Notes (B.34)	2⅛	8/ 1/34	101 21/32	101 24/32	1.09	1.43
416	Notes (A.35)	3	6/15/35	102 18/32	102 21/32	1.94	2.42
365	Notes (A.36)	3¼	8/ 1/36	102 4/32	102 7/32	2.62	3.14
508	Notes (B.37)	3	4/15/37	100 27/32	100 29/32	2.78	3.26
834	Notes (A.37)	3¼	9/15/37	101 17/32	101 19/32	2.90	3.42
TREASURY BILLS							
75	8/17/32		11/16/32	.30%	.10%	.10%	.12
60	8/24/32		11/23/32	.30%	.10%	.10%	.12
100	8/31/32		11/30/32	.30%	.10%	.10%	.12
100	9/28/32		12/28/32	.30%	.10%	.10%	.12
75	10/11/32		1/11/33	.30%	.10%	.10%	.12
75	10/19/32		1/18/33	.30%	.10%	.10%	.12
80	10/26/32		1/25/33	.30%	.10%	.10%	.12
75	11/ 9/32		2/ 8/33	.30%	.10%	.10%	.12

Call Extension 160 or 161

APPENDIX B.

Note: The following history of the litigation between the United States and the Sanitary District is quoted from the report of Major Putnam, entitled "Diversion of Water from Lake Michigan," dated November [illegible], 1923, pages 4 and 5.

"On March 23, 1908, the Attorney General of the United States caused to be filed in the United States Circuit Court, Northern District of Illinois, Eastern Division, a bill of complaint, No. 29019, seeking to enjoin the Sanitary District of Chicago from constructing the Calumet Sag Canal, diverting through it the waters of Calumet River or Lake Michigan and reversing the current in Calumet River.

"It was alleged by the Government that these acts would lessen, impede, and obstruct navigation in the navigable Calumet River, and would lower the level of Lake Michigan and thus decrease its navigability, and therefore were unlawful under section 10 of the river and harbor appropriation act of March 3, 1899, because they had neither been authorized by Congress nor recommended by the Chief of Engineers, United States Army, and approved by the Secretary of War.

"The respondent answered, denying or belittling each allegation, denying that the Calumet River was navigable within the meaning of the term, or that diverting water from Lake Michigan would lower its level, or that the act of March 3, 1899, was applicable or even a constitutional or valid enactment. At the same time the respondent claimed the project would benefit navigation; that State law required it to carry out the project; that it was the only authorized agency for providing the needed drainage and sewerage, and the proposed method was the only lawful one under State enactment; that it made application to the Secretary of War for a permit only as a mere matter of comity; and that the old Illinois and Michigan canal laws constituted authorization by Congress. This answer was filed March 23, 1908.

"Evidence of the complaint was taken from February 15, 1909, to July 8, 1909. The defendant proceeded to again open negotiations with the War Department and did not for a time take testimony on its own behalf. The Government testimony was directed to the questions of the effect of the diversion upon the navigable capacity of the lakes and their connecting waters, and the resulting injury to the interests of navigation. When, finally, on May 31, and June 1, 1911, the defendant took testimony, it was not directed toward meeting the testimony of the Government witnesses, but rather to establishing the desirability of the project from a sanitary standpoint and to showing that while there were other efficient methods for the disposal of the sewage of the Calumet district, the proposed dilution method was the cheapest. Thereupon the case rested while the defendant again negotiated with the Secretary of War. On March 18, 1913, the defendant renewed taking its evidence.

"On October 6, 1913, because of the refusal of the defendant to comply with the terms of the permit of the Secretary of War respecting the diversion through the Chicago River, the Attorney General caused another bill, equity No. 114, to be filed in the same court, praying that the defendant be enjoined from diverting more than 4,167 cubic feet of water per second from Lake Michigan through the Chicago River.

"The two suits were consolidated and heard as one, and the taking of evidence, begun on March 18, 1913, was continued until its final completion on December 19, 1914. Altogether, a large number of expert witnesses was called on each side. The arguments of counsel on the law and facts were presented in 1915.

"On June 19, 1920, Federal Judge Landis rendered an oral opinion in the case, which was in effect a finding that the United States was entitled to an injunction restraining the sanitary district from diverting more than 4,167 cubic feet of water per second from Lake Michigan. Very shortly after this oral opinion was rendered the defendant filed a motion for its reconsideration, July 10, 1920. The court heard the motion on July 12, 1920, and asked both parties to submit authorities.

"Federal Judge Landis resigned his position in March, 1922. Upon representation of the United States attorney the case was transferred to Judge Carpenter, who asked that the complainant submit a brief covering the points brought out by the defendant's motion on July 10, 1920. Briefs were submitted, counter proposals offered and rebutted, and after several hearings before the Federal judge a formal decree was entered on June 18, 1923, finding against the Sanitary District of Chicago and in favor of the Federal Government. (See Appendix X.) The court granted a stay of execution of six months for the purpose of allowing the defendants ample time to seek relief from the Supreme Court of the United States or from Congress. The sanitary district filed an appeal on June 29, 1923.

"As a result of its disregard of Federal jurisdiction the sanitary district has rendered null and void the permits issued for the construction of the Calumet Sag Channel and the construction and operation of the North Shore Channel. Both permits contained the condition that the total diversion of water from Lake Michigan into the Illinois River should be no greater than already authorized by past War Department permits. As the amount withdrawn has exceeded the amount thus authorized, the permits are null and void, and the structures are illegal.

"On November 9, 1921, a resolution was introduced in the House of Representatives, being entitled 'A bill to limit the amount of water which may be withdrawn from Lake Michigan by the Sanitary District of Chicago, giving authority therefor, and fixing conditions of such withdrawal.' This resolution obviously was drawn up by or for the sanitary district, the object being to obtain congressional authorization for a diversion of 10,000 cubic feet per second. The Secretary of War, upon being consulted by the Committee on Rivers and Harbors, advised against the passage of the enactment in a letter of February 2, 1922. His recommendations are set forth clearly in the following extract from the letter referred to:

> " 'It is clear that under the condition of affairs created by the Chicago Sanitary District, the diversion of a certain quantity of water is necessary at present for the proper protection of the health of the citizens of Chicago. It is by no means established, however, that the quantity required for that purpose, either now or in the future, is 10,000 cubic feet per second. I regard it as inadvisable to permit the diversions in that amount, or in any amount exceeding the amount now fixed by the department without full and complete information concerning the necessity therefor. It is my view that the quantity authorized should be limited to the lowest possible for sanitation, after the sewage has been purified to the utmost extent practicable before its discharge into the sanitary canal. I regard it as extremely inadvisable to grant the city of Chicago, or any other agency, the right in perpetuity to take from the lake a definite quantity of water. It is not improbable that within a generation a method may be found to separate the valuable fertilizing elements from sewage, as a consequence of which, the withdrawal of water from the lake to dilute the sewage will no longer be necessary. In view of the substantial and widespread damage done to many activities throughout the United States by the diversion,

> damage which can be but partly compensated for by the construction of the works proposed in the bill, the diversion should not be continued beyond the time when its necessity ceases to exist.'

"A bill was presented to Congress on January 27, 1923, shortly before the closing of its last session, modifying the terms of the House resolution of November 9, 1921, and including provisions for a 9-foot waterway from Utica to Cairo, Ill., by way of the Illinois and Mississippi Rivers. These provisions serve to make the measure more attractive to residents of towns along the Illinois River, but do not alter the primary object of the legislation—that of obtaining congressional authority for a diversion of 10,000 cubic feet per second. This bill is to be reported on by a special committee of the Senate at the next session of Congress."

APPENDIX C.

EXTRACT FROM REPORT OF GENERAL TAYLOR, CHIEF OF ENGINEERS IN REFERENCE TO THE LONG DEFIANCE OF THE FEDERAL GOVERNMENT BY THE DEFENDANTS. (Pars. 114, 115, p. 55 of Report entitled "Diversion of Water from the Great Lakes and Niagara River" transmitted by the Secretary of War to the Speaker of the House of Representatives, December 7, 1920.)

"114. Diversions for water-supply and sewage purposes have already been discussed and, with the exception of the diversion of the Chicago sanitary district, they have been disposed of. We therefore revert to this important permanent diversion at Chicago. The case is so well known and the information in the report so full as to call for little further discussion of its merits. Granting that disposal by dilution was the most practicable plan at the time of its adoption, the fact remains that the Chicago sanitary district has for practically 20 years been on notice that the United States was unwilling to allow the district to divert more water than the limit set in the permit of 1903, namely, 4,167 cubic feet per second. Notwithstanding this, the district has since then greatly expanded its boundaries and enlarged its plans, and from year to year, in the face of the opposition of the United States, has diverted more and more water, until in 1917 the yearly average diversion was 8,800 cubic feet per second, which is more than twice the lawful amount.

"115. The district can no longer fairly plead the absence or the impracticability of other safer methods of handling sewage and of protecting its people from water-borne diseases. Certainly, for the past 20 years, expert opinion has held disposal by dilution to be inferior to other methods of treating sewage, and enlightened public opinion has condemned a policy which, in effect, is the transfer of a nuisance from our own front door to that of our neighbor. Large cities on the Great Lakes cannot safely drink raw lake water, nor should they discharge unscreened and unfiltered sewage either into the lakes or into tributary streams. In 1915, the Chicago Real Estate Board employed three experts, of whom two were of acknowledged eminence in England, and the third a New York expert of well-known authority, to investigate the sewage problem of Chicago and to present their views as to the best way of solving it. Their report entitled "A Report to the Chicago Real Estate Board on the Disposal of the Sewage and the Protection of the Water Supply of Chicago, Illinois," by Messrs. Soper, Watson, and Martin, has been printed, and its conclusions are, therefore, well known to the public in general, and particularly to the people of Chicago whom they advised substantially in accordance with the views above expressed. Chicago is, therefore, debarred from any claim for indulgence as to work done and expenditures incurred in recent years. If, in defiance of the opposition of the Government, and in open disregard of the law, the officials of the Chicago sanitary district have continued to expend the money of their constituents in the prosecution of unwise and illegal plans, these officials and their constituency are to blame, and they should expect no great indulgence from the general public whose government they have ignored and whose interests they have disregarded."

1-36 2 3 4 58

SUPREME COURT OF THE UNITED STATES.

Nos. 5, 8 and 9, Original.—October Term, 1932.

No. 5, Orig.
State of Wisconsin, et al., Complainants,
vs.
State of Illinois and Sanitary District of Chicago, et al.

No. 8, Orig.
State of Michigan, et al., Complainants,
vs.
State of Illinois and Sanitary District of Chicago, et al.

No. 9, Orig.
State of New York, et al., Complainants,
vs.
State of Illinois and Sanitary District of Chicago, et al.

[December 19, 1932.]

Order.

Upon Consideration of the return of the defendants in the above entitled causes to the rule issued October 10, 1932 requiring them to show cause why they have not taken appropriate steps to effect compliance with the requirements of the decree of this Court in these causes dated April 21, 1930 (281 U. S. 696), and of the argument had thereon,

It Is Ordered that these causes be referred to Edward F. McClennen, Esquire, as a special master with directions and authority to make summary inquiry and to report to the Court, on or before April 1, 1933,

(1) as to the causes of the delay in obtaining approval of the construction of controlling works in the Chicago River and the

steps which should now be taken to secure such approval and prompt construction;

(2) as to the causes of the delay in providing for the construction of the Southwest Side Treatment Works and the steps which should now be taken for such construction or, in case of a change in site, for the construction of an adequate substitute;

(3) as to the financial measures on the part of the Sanitary District or the State of Illinois which are reasonable and necessary in order to carry out the decree of this Court.

The special master shall have authority to proceed promptly and summarily in making said inquiry and (1) to employ competent stenographic and clerical assistants, (2) to fix the times and places of taking the evidence, and (3) to issue subpoenas to secure the attendance of witnesses, including those of his own selection, and to administer oaths. When the report of the special master is filed the clerk of the Court shall cause the same to be printed, and the Court, without the filing of exceptions, will appoint a day for hearing the parties thereon, as the Court may be advised.

The special master shall be allowed his actual expenses and a reasonable compensation for his services to be fixed hereafter by the Court. The allowances to him, the compensation paid to his stenographic and clerical assistants and the cost of printing his report shall be charged against and be borne by the parties in such proportions as the Court hereafter may direct.

If the appointment herein made of a special master is not accepted, or if the place becomes vacant during the recess of the Court, the Chief Justice shall have authority to make a new designation which shall have the same effect as if originally made by the Court herein.

Office Supreme Court,
FILED
JAN 3 1933
CHARLES ELMORE CRO
CLERK

FILE COPY

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5 Original.

STATE OF MICHIGAN
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8 Original.

STATE OF NEW YORK
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9 Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1933, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Live Stock 265 Press, Chicago

80

IN THE

Supreme Court of the United States

NOS. 5, 8 and 9, ORIGINAL

OCTOBER TERM, 1932

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5 Original.

STATE OF MICHIGAN
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8 Original.

STATE OF NEW YORK
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9 Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1933, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of January 1, 1933, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of July 1, 1932, the status of the sewage treatment construction program of the Sanitary District was stated to be on June 1, 1932, as follows:

TABLE 1.

COMPLETED WORK AS OF JUNE 1, 1932

Calumet Project	$20,828,687.30	
North Side Project	36,890,433.94	
West Side Project	41,478,568.30	
Southwest Side Project	272,596.01	
Miscellaneous Plants and Sewers	595,978.63	
Chicago River Controlling Works	53,415.74	$100,119,679.92

TABLE 2.

FUTURE WORK AFTER JUNE 1, 1932.

Calumet Project	$18,821,234.72	
North Side Project	4,964,077.49	
West Side Project	61,254,686.02	
Southwest Side Project	70,544,403.99	
Miscellaneous Plants and Sewers	9,906,619.43	
Chicago River Controlling Works	3,946,584.26	$169,437,605.91

During the interim of six months between the date of the last report and the present report, very little construction has been accomplished. Work has been prosecuted diligently with a greatly reduced force on design of the Calumet and West Side Projects and on studies for the Southwest Side Project.

Calumet Project. Construction work on the Calumet Pumping Station and Blower House and on the Aeration Tanks, Operating Galleries and Final Settling Tanks has been discontinued since December, 1931, because of the inability of the Sanitary District to pay the Contractors, as was indicated in the last report to the Court. The manufacturing of pumps, pump motors and large valves has been completed and this machinery is in storage. The fabrication of blowers and blower motors is about 40 per cent completed. None of this machinery work has been paid for. Plans are practically completed for the Harvey sewer and for the sewer in South Park

Avenue. These sewers are estimated to cost about $2,500,000.

No work has been done in the past six months on plans for settling tanks or structures for the digestion and disposal of sludge. The designing of this portion of the treatment plant has been delayed pending the outcome of experiments now being conducted at the West Side Treatment Works on the dewatering and incineration of sludge. If the final results from these tests are as favorable as present indications, the delay in constructing this part of the treatment process will result in a considerable saving of money, without postponing the ultimate completion of the plant to any unreasonable extent.

West Side Project. Construction work on the third battery of Imhoff tanks and on Contract Sections 3 and 4, of the West Side sewer, has also been discontinued since December, 1931. Plans have been completed for Contract Sections 5 and 6, of the West Side sewer, and plans are practically complete for Section 7 of this sewer, but no money is presently available for this construction. These three sections of the West Side sewer are estimated to cost about $3,500,000.

The construction of the sludge filtering and drying unit was completed late in July, 1932, and experiments on the dewatering and incinerating of sludge were started on August 5, 1932. Results from these experiments, so far, are quite satisfactory and indicate the probability that incineration of sludge is feasible and economical where the quantities to be handled are large. It seems probable that the dewatering and incineration of sludge will replace the digestion and disposal of sludge in the future sewage treatment at the West Side, Southwest Side and Calumet plants. This change in the process should result in considerable saving in construction costs, in economy of space and in time of construction.

Preliminary designs have been made for the West Side aeration tanks looking forward to the early construction of the activated sludge portion of this plant and preliminary layouts studied in which these aeration tanks are combined with those of the Southwest Side, locating all on the West Side site.

Southwest Side Project. No further steps have been taken towards the acquisition of the site originally contemplated for the Southwest Side Treatment Works. The layouts already made indicate that these works, or at any rate the major portion of them, may be constructed on a portion of the land acquired for the extension of the West Side Works. This is contingent on the practicability of dewatering and incinerating sludge.

As was stated in the semi-annual report to the Supreme Court of July 1, 1932, the tests on certain sewers leading from Packingtown and the Stockyards were completed and the results are being studied. This information was needed for the proper design of the Southwest Side Works.

A definite conclusion as to the quantity of wastes to be handled in this plant will be made in the very near future. The suit entitled "The Sanitary District of Chicago vs. Swift & Company, et al," in the U. S. District Court, Northern District of Illinois (No. 3848) is now before a Master in Chancery on reference, and the taking of testimony shortly will begin. This suit has been mentioned in one or more previous reports. The relief sought is an injunction to restrain owners of packing houses, etc., from denying to inspectors and representatives of the Sanitary District access to their plants which is deemed necessary for the purpose of obtaining information from which to determine the quantities of wastes discharged into the sewers by each of said industries. Since the information from which a definite determination of the aggregate quantity of these trade wastes can be made has now been obtained through the tests above mentioned, the progress of this litigation can neither expedite nor delay the construction of the Southwest Side Treatment Works.

Financial. As stated in the last two semi-annual reports to the Supreme Court, a crisis had been reached in the financial affairs of the Sanitary District in December, 1931. In the year which has elapsed since that time there has been no appreciable improvement in the situation. The Sanitary District has unsold bonds to the amount of $7,614,000 out of the $27,000,000 of bonds authorized by the Illinois General Assembly in 1929, in addition to $36,000,000 of bonds approved by the voters in February, 1931, but these resources for construction, amounting to approximately $43,000,000, are of no avail under present depression conditions, since no reasonable offer from any source can be obtained for the purchase of bonds.

The last sale of bonds by the Sanitary District was on August 20, 1931. Bonds were offered for sale on November 5, 1931, but no bids whatever were received. Since that date diligent and vigorous efforts to find purchasers for bonds have met with failure. Banks in Chicago, New York, Philadelphia and Boston, insurance companies, dealers in investment securities and others have been canvassed without success.

Since all the sewage treatment construction is financed from the proceeds from the sale of bonds and since the Sanitary District has been unable to sell any bonds whatever during the past sixteen months because of the delay and delinquency in the payment of taxes, it is not surprising that practically all construction work has been shut down for the past year.

The Sanitary District has not been able to pay current bills or to make any payment to its contractors for construction work, since November 1, 1931, except in a few cases where the payee succeeded in finding purchasers for tax anticipation warrants the proceeds of the sale of which were used in making payments.

As was stated in the last semi-annual report to the Court the personnel of the Engineering organization which has to do with the Sewage Treatment Construction Program has been materially reduced, but the organization is not broken up. The key men in each division, those best acquainted with the work, are still retained and the organization can be quickly expanded into the necessary efficient working organization as soon as finances become available. Salaries of the present force have been unpaid since October 1, 1932.

This bad financial condition of the Sanitary District has been brought about by delay in the collection of taxes coupled with the unprecedented depression in business. The delay in the collection of taxes is due to an order of the State Tax Commission of Illinois for a revaluation and re-assessment of all taxable real property in Cook County, issued in July, 1928, and estimated to require six months to complete. It actually required more than two years and 1928 taxes (normally due May 1, 1929) were made payable July 1, 1930. The 1929 taxes (ordinarily due May 1, 1930) were made payable May 1, 1931; the 1930 taxes (normally due May 1, 1931) were made payable April 15, 1932; and the 1931 taxes, which under ordinary conditions would have been collected by May 1, 1932, are just now being extended for collection. For a period of more than two years all the municipalities in Cook County, including the Sanitary District, were without any income whatsoever derived from taxes.

The tax situation in Cook County, Illinois, has not improved appreciably since the time of the last semi-annual report to the Court, but quite recently there have been some indications that considerable improvement may be expected in the near future.

The amounts of taxes levied by the Sanitary District for the years 1928, 1929, 1930 and 1931, and the amounts received by the Sanitary District from the County Collector up to December 12, 1932, pursuant to these levies, are as follows:

Year	Total Amount of Levy	Amount Collected	Amount Unpaid	Percentage Unpaid
1928	$20,700,455.00	$15,748,606.88	$ 4,951,848.12	24%
1929	24,518,343.75	17,120,513.60	7,397,830.15	30%
1930	21,725,603.75	12,243,284.00	9,482,319.75	44%
1931	18,875,953.75	0.00	18,875,953.75	100%
Total	$85,820,356.25	$45,112,404.48	$40,707,951.77	47%

It is generally understood that the 1931 real estate tax bills will be sent out after January 1, 1933, and will be payable in two installments, the first of which will become delinquent on March 1, 1933, and the second on July 1, 1933. The tax levy of the Sanitary District for 1931 amounts to $18,875,953.75, made up of $13,875,953.75 for bond interest and redemption and $5,000,000.00 for corporate purposes, which includes all maintenance and operation expenses.

Included in the $40,707,951.77 of uncollected taxes, shown in the tabulation above, is the approximate amount of $28,400,000.00 which had been levied for the payment of interest and maturing principal of bonds. The non-payment of these taxes has forced the Sanitary District, through lack of revenue, to default in all payments of interest and maturing principal on bonds used for construction work, falling due from January 1, 1932 to December 1, 1932, inclusive. The amounts in default, as of December 20, 1932, are:

Principal	$ 7,597,500.00
Interest	4,555,007.50
Total	$12,152,507.50

A further default in payment of principal and interest on bonds due January 1, 1933, in the amount of $1,020,395.00 may be expected.

In September, 1932, the Sanitary District filed with the Reconstruction Finance Corporation, in Washington, D. C., an application for a loan of $36,-450,000.00, the proceeds of which were to be applied on the construction of sewage treatment projects as follows:

Calumet Project	$13,674,000.00
West Side Project	22,426,000.00
North Side Project	350,000.00
Total	$36,450,000.00

If this loan should be granted, work on the sewage treatment construction program would be resumed at once on the $8,810,500.00 of work already under contract and on $3,500,000.00 to $4,000,000.00 more of work for which plans are ready, as quickly as contracts could be let. The principal question with reference to this loan is whether the sewage treatment construction projects can be deemed to be "self-liquidating" within the meaning and intent of the "Emergency Relief and Construction Act of 1932."

To safeguard against any doubts which might be entertained by the legal advisers of the Reconstruction Finance Corporation as to the eligibility of the proposed loan, the Sanitary District on December 5, 1932, caused to be introduced in the House of Representatives an act to amend the "Emergency Relief and Construction Act of 1932." This amendatory act, if adopted, will eliminate the requirement that the project must be "self-liquidating," through means other than by taxation and should make it possible to obtain favorable action on the Sanitary District application for a loan.

An improvement in the tax situation in Cook County, Illinois, and consequently in the financial affairs of the Sanitary District of Chicago is expected in the near future. The high percentage of delinquent taxes for the years 1928, 1929 and 1930 has, of course, been due in part to the present financial depression, but it has also been due in larg measure to the disaffection of a great number of property owners, holding real estate, upon which has been levied upwards of seventy-five per cent of the total taxes, banded together to resist the payment of taxes. This movement has been called a taxpayers' "strike." The validity of the tax levies for the years 1928, 1929 and 1930 was contested on the grounds that real estate was over-assessed and personal property was under-assessed. Suits were brought to have the entire assessment for 1928 declared invalid, to enjoin the collection of the 1930 taxes, etc. Many of these cases have been recently decided adversely to the objecting taxpayers. The taxpayers' "strike" appears to be broken, the resisting organizations to be disintegrating and owners of large blocks of valuable real estate are paying their taxes. Receivers are being ordered by the courts to pay taxes and applications are being made for receiverships of properties where the owners of property are able to pay taxes, but refuse to do so.

Meanwhile, in February, 1932, the General Assembly of the State of Illinois, enacted legislation abolishing the elected board of five assessors and of three reviewers in Cook County and substituted in their stead one assessor, appointed by the Governor of the State and the President of the County Board and a Board of Appeals of two members, one appointed by the Governor and one by the President of the County Board. Less complaint is expected regarding taxes assessed under the new organization.

Regardless of the improvement confidently expected in the financial affairs of the Sanitary District, it should be noted that the $40,707,951.77 of uncollected taxes, represents the normal income of the Sanitary District for about two years; that this amount should have been available prior to May 1, 1932, which is already eight months past. This is a matter "beyond the control of the Sanitary District" and is a tremendous handicap in carrying out "such a vast and wholly unprecedented scale of sewage treatment."

The total work accomplished by the Sanitary District of Chicago in the construction of sewage treatment works during the period from June 1, 1932 (the date of the summaries for the last report) and December 1, 1932 (the date of the summaries for this report), as measured by construction expenditures, was as follows:

TABLE 3.

Calumet Project	$ 33,447.66
North Side Project	210,789.48
West Side Project	175,268.65
Southwest Side Project	5,015.17
Miscellanous Plants and Sewers	210,23
Total	$424,731.19

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on December 1, 1932, is as follows:

TABLE 4.

COMPLETED WORK AS OF DECEMBER 1, 1932.

Calumet Project	$20,862,134.96
North Side Project	37,101,223.42
West Side Project	41,653,836.95
Southwest Side Project	277,611.18
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$100,544,411.11

Construction expenditures have been used as the measure of accomplishment in the carrying out of the sewage treatment construction program, as indicated in all the semi-annual reports heretofore filed with the Court. This has seemed the simplest way to indicate relative progress and it will be used in future reports. This method however results in no credit being taken for work accomplished but not paid for, and at the present time there is due from the Sanitary District to contractors approximately $1,115,000.00 for completed work in the sewage treatment program. Plans are ready on additional works, not yet under contract, estimated to cost about $6,000,000.00.

In the semi-annual report to the Court of January 1, 1932 (pages 9-10) attention was called to the fact that contracts were being let at prices far below those estimated in the program submitted to the Supreme Court. The total saving in this respect, to date, has amounted to $5,330,000.00. That is, on some twenty contracts, works estimated in the original program to cost $19,834,000.00 have been let for $14,504,000.00. This has been due in large measure to contracts being let during the business depression, but part of it is due to the inevitable change in plans, certain to happen in a project of this magnitude.

In order that the work already accomplished may appear more accurately in its relation to the future work to be done, a revised estimate is submitted herewith, in which proper account has been taken of reasonably reduced construction costs which probably will prevail up to the end of 1938 and in which more definite information as to the amount of sewage to be treated at the various plants has been given due consideration.

This estimated cost of future sewage treatment construction, based on present estimates, as of December 1, 1932, is as follows:

TABLE 5.

FUTURE WORK AFTER DECEMBER 1, 1932

Calumet Project	$16,810,000.00
North Side Project	5,517,500.00
West Side Project	56,719,000.00
Southwest Side Project	64,104,000.00
Miscellaneous Plants and Sewers	8,000,000.00
Chicago River Controlling Works	3,200,000.00
Total	$154,350,500.00

Of this total future work, estimated to cost $154,350,500.00, the following amount is under contract:

Calumet Project	$ 4,035,000.00
North Side Project	17,500.00
West Side Project	4,758,000.00
Total Under Contract	$ 8,810,500.00

This leaves a total of $145,540,000.00 of future work yet to be placed under contract. The experiments which have been conducted at the West Side Sewage Treatment Works on the dewatering and incinerating of sludge, since July, 1932, indicate the probability that this process will replace the digestion and disposal of sludge in the future sewage treatment of the Sanitary District. If such is the ultimate conclusion, the estimated costs of future sewage treatment construction would be reduced by the following estimated amounts:

Calumet Works	$ 1,775,000.00
West Side Works	3,000,000.00
Southwest Side Works	5,000,000.00
Total	$ 9,775,000.00

The total estimate of future work, not under contract, would thus apparently be reduced from $145,540,000.00 to $135,765,000.00.

SEWAGE TREATMENT

The population of the Sanitary District of Chicago, as of January 1, 1933, is about 4,130,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed as equivalent to 1,710,000 additional persons. Hence the total population and industrial wastes equivalent amount to 5,840,000. This figure includes the Corn Products wastes, equivalent to the sewage of 373,000 persons, which wastes have been greatly reduced as a result of certain experimental work initiated by the Sanitary District.

The 1932 total population, and industrial waste equivalent, as above indicated, are estimated as 5,840,000. Up to date, the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total January 1, 1933, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 4,964,000, which is 85 per cent of 5,840,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on June 25, 1932 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7 following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1932.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	202,000	33⅓	67,000
North Side	1,076,000	85	915,000
West Side (Sedimentation)....	736,000	33⅓	245,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	6,000	85	5,000
Corn Products (Reduction)....	393,000		317,000
Total	2,428,000		1,562,000

TABLE 7.
ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1932

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	207,000	33⅓	69,000
North Side	1,083,000	85	921,000
West Side (Sedimentation)	743,000	33⅓	248,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	6,000	85	5,000
Corn Products (Reduction)	373,000		322,000
Total	2,427,000		1,578,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,578,000 out of 4,964,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 5,840,000 was being treated. This indicates the treatment of 31.8 per cent of the total sewage within the Sanitary District.

DIVERSION OF WATER

As was stated in the last report to the Supreme Court the net diversion of water from Lake Michigan during the calendar year 1931, averaged 6500 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1680 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8180 cubic feet per second.

Diversion of water from Lake Michigan by the Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limits the net diversion to an annual average of not more than 6500 cubic feet per second up to December 31, 1935. The average monthly diversion as made under this Permit from January 1 to December 20, 1932, is indicated in the table following:

Month 1932	Total Flow From Main Channel At Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	8005	2	1595	6410
February	7420	0	1610	5810
March	7155	25	1585	5545
April	7800	1	1575	6225
May	8190	0	1620	6570
June	8140	0	1720	6420
July	7735	0	1760	5975
August	8645	0	1775	6870
September	8865	0	1720	7145
October	8835	0	1630	7205
November	8300	0	1575	6725
December 1 to 20	8095	0	1560	6535
Average	8099	2	1644	6453

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By THOMAS J. BOWLER,
Its President.

EDWARD J. KELLY,
Its Chief Engineer.

WILLIAM ROTHMANN,
Its Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

Office Supreme Court, U
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CLERK

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In the Supreme Court of the United States

NO. 5 ORIGINAL.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO AND STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants,
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

NO. 8 ORIGINAL.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

NO. 9 ORIGINAL.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

STATEMENT OF OBJECTIONS AND MOTION TO DISMISS THE APPLICATION OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI AND ARKANSAS FOR A MODIFICATION OF THE DECREE OF APRIL 21, 1930, AND AN ENLARGEMENT OF THE PENDING REFERENCE FILED BY WISCONSIN, MINNESOTA, OHIO AND MICHIGAN.

The Gates Legal Publishing Co., Cleveland, O.

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The Complainants, Wisconsin, Minnesota, Ohio and Michigan file objections to and move the dismissal of the application of Missouri, Kentucky, Tennessee, Louisiana, Mississippi and Arkansas for a modification of the decree of April 21, 1930 (281 U. S. 696), and an enlargement of the pending reference for the following reasons:

First: The defendants are not parties to the pending litigation or to the decree of April 21, 1930 (281 U. S. 696) and, as strangers to such decree, are wholly without right to apply at the foot of said decree under the provisions of Paragraphs 6 and 7 thereof, or otherwise, for any modification of said decree for the following reasons:

(a) Said applicants have no standing as intervening parties or otherwise in this litigation. Their lack of any justiciable interest was adjudicated and they were dismissed from the case by the decision of this Court in *Wisconsin, et al. v. Illinois, et al.*, rendered January 14, 1929 and reported in 278 U. S. 367.

(b) Said applicants, having been dismissed from the litigation by the decision of January 14, 1929 (278 U. S. 367), were and are not parties to the decree of April 21, 1930 (281 U. S. 696).

(c) Since said applicants are not parties to the decree of April 21, 1930, they are not comprehended by and have no rights under Paragraphs 6 and 7 of the decree of April 21, 1930 (281 U. S. 179, 696). Those paragraphs of the decree granted the right to apply for modification or other relief to parties, "complainants or defendants." The applicants had long before been dismissed from the litigation for lack of justiciable interest. None of them were parties to the decree of April 21, 1930. They can not, as they seek to do, apply as a matter of right for a modification of the decree under the provisions of Paragraphs 6 and 7 of said decree.

(d) Even if, contrary to the fact, the applicants were parties to the decree of April 21, 1930, the pending application for modification of such decree and enlargement of the pending reference should be dismissed because the application on its face discloses no Federal action subsequent to the decree contrary to its terms and the facts alleged do not even suggest the possibility of such action, if Congress had the constitutional power (although such a suggestion of *possibility* would be legally immaterial), because the application discloses that the applicants are without legal or justiciable interest in the matters sought to be raised in the application, and because the matters sought to be raised in the application have heretofore been twice determined by this Court in this litigation, and because the matters sought to be raised in the pending application were suggested by the defendants, State of Illinois and the Sanitary District of Chicago, in their Return to the Order to Show Cause filed November 14, 1932, and were excluded from the order of reference made and entered by this Court on December 19, 1932, all of which is more particularly set forth in the Objections to the Application could it be considered as a petition for leave to intervene.

Second: Could the application be treated as a petition to be allowed to intervene, it would have to be denied for many reasons:

(a) It is far too late.

(b) There has been no change in circumstances in the particulars sought to be made the basis of the application by reason of any action of the Federal Government subsequent to the decree of April 21, 1930, as is more particularly shown by the reference to and discussion of the pertinent official documents in the brief filed by these objecting complainants on December 5, 1932, at pages 37 to 47, inclusive.

(c) The application seeks to reopen and relitigate the same matters which were the basis of the original intervention of the present applicants, which matters were settled and determined by the decision of this Court rendered on January 14, 1929 (278 U. S. 367) and which matters are *res judicata* as to these defendants.

(d) The application discloses on its face that the applicant States have no legal or justiciable interest in the pending controversy, as has already been determined by the decision of this Court. The instant reference relates only to the performance of the decree already rendered. The most that could be said for the matters set up in the application is that the applicants suggest the possibility that the Congress, if it has the power, might at some future date attempt to take some action which would provide a diversion different than that fixed by the decree of this Court. While these objecting complainants deny that such action, if ever taken, would create any justiciable interest in the applicant States, it is manifest that unless and until such action is taken no justiciable interest can arise in favor of the applicant States. No facts alleged in the application even suggest the possibility of future congressional action contrary to the terms of the decree of April 21, 1930. See Brief of Wisconsin, Minnesota, Ohio and Michigan after Return of the Sanitary District of Chicago and the State of Illinois to the Rule to Show Cause, filed December 5, 1932, pages 37-47. However, it is obvious that a suggestion of the possibility of future congressional action, even if Congress possessed constitutional power in the premises, could constitute no defense against the performance of the decree or basis for its modification. That such a defense is untenable and raises no issue for this Court has been previously determined in both of the decisions had in this litigation.

(e) The matters set up in the pending application are irrelevant and immaterial.

(f) The pending application seeks to introduce a multitude of issues of fact and law which have been already decided and which are foreign to and would complicate and confuse the simple issues of the pending reference. The matters set up in the application were suggested in the return filed by the Sanitary District of Chicago and the State of Illinois on November 14, 1932. Had such matters raised any issue for present consideration and determination, it must be obvious that the court would have made such issues a part of the reference.

CONCLUSION.

The obvious fact is that this application is part of the studied effort of the defendants to obstruct and delay the performance of the Supreme Court decree, while a constant campaign of guerrilla warfare is carried on against the decree in the hopes that some complacent Congress may be induced to attempt to take some action which the defendants hope will circumvent the performance of the Supreme Court decree. While these complainants now insist, as they have at all times insisted, that any such action would be beyond the constitutional power of the Congress and wholly void, they vigorously protest any attempt to the sabotage of the decree by indirect methods.

The attention of this Court is further directed to the fact that the statements made by applicants in the third paragraph on page three of their application are wholly inaccurate; and so far as these matters have any standing in this case or raise any issue which is material herein, were fully decided by this Court in its opinion dated January 14, 1929 (278 U. S. 367).

The States of Wisconsin, Minnesota, Ohio and Michigan therefore respectfully request that the application of the States of Missouri, Kentucky, Tennessee, Louisiana, Mississippi and Arkansas for a modification of the decree of April 21, 1930 and for an enlargement of the pending reference be denied and disallowed.

Respectfully submitted,

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Office Supreme Court, U. S.
FILED
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CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

No. 5 Original.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA,

Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,

Defendants,

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, AND STATE OF ARKANSAS,

Intervening Defendants.

No. 8 Original.

STATE OF MICHIGAN,

Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.,

Defendants.

No. 9 Original.

STATE OF NEW YORK,

Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.,

Defendants.

APPLICATION OF STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI AND ARKANSAS, INTERVENING DEFENDANTS, FOR MODIFICATION OF DECREE UNDER THE PROVISIONS OF PARAGRAPHS 6 AND 7 THEREOF AND FOR ENLARGEMENT OF PENDING REFERENCE TO REPORT IN CONNECTION WITH SUCH APPLICATION.

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THE GUNTHORP-WARREN PRINTING COMPANY, 210 WEST JACKSON, CHICAGO

IN THE

Supreme Court of the United States

No. 5, Original.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, AND STATE OF PENNSYLVANIA,

Complainants,

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STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,

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STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.,

Defendants.

APPLICATION OF STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI AND ARKANSAS, INTERVENING DEFENDANTS, FOR MODIFICATION OF DECREE UNDER THE PROVISIONS OF PARAGRAPHS 6 AND 7 THEREOF AND FOR ENLARGEMENT OF PENDING REFERENCE TO REPORT IN CONNECTION WITH SUCH APPLICATION.

To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

The States of Missouri, Kentucky, Tennessee, Louisiana, Mississippi and Arkansas, intervening defendants, by their respective attorneys general and special counsel herein, respectfully show to the court that:

1. This application is filed under and pursuant to the provisions of paragraphs 6 and 7 of the decree entered in these causes which paragraphs read as follows:

> "6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above-entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, *or with respect to the diversion of water from Lake Michigan,* as may be deemed to be appropriate.
>
> "7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy."

Under the foregoing provisions of the decree, as your applicants are severally informed and believe, it is their right and responsibility to bring to the attention of this court any change of circumstances which might affect the propriety of the terms of the original decree and which would call for modification thereof. In view of the facts hereinafter set forth and in performance of this duty and within the terms of the decree, your applicants file this application for further relief.

2. After the original bill of the State of Wisconsin in the above-entitled cause was amended on October 5, 1925, by the addition of the States of Minnesota, Ohio and Pennsylvania as coplaintiffs, your applicants, the

States of Missouri, Kentucky, Tennessee and Louisiana, respectively, filed petitions for leave to intervene in this cause and to be made intervening defendants, which was allowed and thereupon filed a joint and several answer and subsequently, on similar petitions, the States of Arkansas and Mississippi became intervening defendants and adopted the answer of the other Mississippi Valley states. The original bill sought to set aside and have declared void, a permit issued by the Secretary of War pursuant to the provisions of Section 10 of the Rivers and Harbors Act of March 3, 1899, authorizing the diversion of water from Lake Michigan through the Chicago Drainage Canal into the Illinois River and thence into the Mississippi. The intervening defendant states presented their answer for the purpose of showing to this court the benefits to navigation both on the Illinois and Mississippi Rivers resulting from such diversion of water from Lake Michigan and for the purpose of showing to the court that such navigation benefits were proper and lawful for the Secretary of War to consider in determining upon the issuance of such permit.

3. The cause being at issue and two later original bills being consolidated therewith for hearing, the consolidated causes were referred to a Special Master of this court, who conducted hearings, received evidence and in due course filed his report.

In reference to the contentions of applicants herein, the intervening Mississippi River states, the Special Master held that with a diversion of approximately 5,000 c. f. s., the depth in the Illinois Waterway connecting Lake Michigan and the Mississippi River on the plans approved by the War Department, which were based on such assumed flow would be approximately 9 feet, and that the then diversion of water contributed about 4 feet of the low water depth of 7 feet in the Illinois River below its improvement by locks and dams; and further held that the diversion of water from Lake Michigan during low water periods to an extent not determined, increased navigable depths over bars on the Mississippi River to an amount to justify consideration by the Secretary of War. The Master recommended that inasmuch as the bills sought to set aside the permit which he held to be valid, the bills should be dismissed for want of equity.

4. Thereupon the case came on before this court and on January 14, 1929, its opinion was handed down in which the contentions of the intervening defendant states, applicants herein, were disposed of in the following expressions:

> "The intervening states on the same side with Illinois, in seeking a recognition of asserted rights in the navigation of the Mississippi, answered denying the rights of the complainants to an injunction. They really seek affirmatively to preserve the diversion from Lake Michigan in the interest of such navigation and interstate commerce though they have made no express prayer therefor. In our view of the permit of March 3, 1925, *and in the absence of direct authority from Congress for a waterway from Lake Michigan to the Mississippi, they show no rightful interest in the maintenance of the diversion.* Their motions to dismiss the bills are overruled and so far as their answer may suggest affirmative relief, it is denied."

5. Pursuant to directions in said opinion a further reference was held which resulted in the entry of the decree of ~~August~~ April 21, 1930, paragraphs 6 and 7 of which are quoted above.

6. In the year 1930 the Congress adopted an act entitled "An Act Authorizing the construction, repair, and preservation of certain public works on rivers and

harbors, and for other purposes" approved July 3, 1930. This Act contains among other provisions the following:

> "*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the following works of improvement are hereby adopted and authorized, to be prosecuted under the direction of the Secretary of War and supervision of the Chief of Engineers, in accordance with the plans recommended in the reports hereinafter designated.
>
> * * * * *
>
> "Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway: *Provided,* That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000: *Provided further,* That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12, Original—October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway: *Provided further,* That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet

> the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable."

Applicants allege that in and by the act aforesaid Congress gave direct authority for a waterway from Lake Michigan to the Mississippi and thereby removed any legal bar to due and proper consideration of the rights of applicants, the intervening Mississippi River states, and thereby made relevant for consideration the findings of the original report of the Special Master first appointed by the court in these cases.

7. Upon the coming in of the report of the Special Master in these causes on the re-reference upon which the said decree of ~~August~~ April 21, 1930 was entered, the court filed an opinion in which the court said:

> "All action of the parties and the court in these cases will be subject, of course, to any order that Congress may make in pursuance of its constitutional powers and any modification that necessity may show should be made by this court." (281 U. S. at 198.)

8. Your applicants herein, the intervening defendant Mississippi River states, show that the works which control and regulate the amount of diversion from Lake Michigan, to be taken therefrom by the Sanitary District of Chicago, are owned, constructed, controlled and operated by the latter, except subject to certain supervision by the District Engineer of the United States at Chicago as provided in said decree and the permit of the Secretary of War; that in and by said decree it is provided that on and after December 31, 1938 the said defendants —the State of Illinois and the Sanitary District of Chicago—are enjoined from diverting, as provided in the decree, in excess of the annual average of 1500 c. f. s. in addition to domestic pumpage and applicants herein al-

lege that the said decree should be modified to conform to the requirements of the foregoing act of Congress. Your applicants allege that they are informed that the waterway connecting Lake Michigan with the Mississippi River by way of the Sanitary Canal of said Sanitary District of Chicago and the Illinois and Desplaines Rivers will be complete and open for navigation in the spring of this year and that after a reasonable period for the experience of such navigation and proper development thereof on said waterway and the period of trial necessary for the successful operation thereof, the Secretary of War will be in a position to make the investigation provided for in said act of Congress aforesaid and determine as therein provided the smallest flow of water from Lake Michigan necessary for the development of a commercially useful waterway, which amount when so determined may call for a diversion in excess of the amount provided under the terms of said decree on and after December 31, 1938; and your applicants allege that as suggested in the opinion of this court, the decree should be modified to accord with the action taken by Congress after the decision of this court had been announced, the opinion last above referred to having been handed down April 14, 1930.

9. Your applicants herein, the intervening Mississippi River states, show to the court that upon the application of the States of Wisconsin, Minnesota, Ohio and Michigan at this term of court for a rule upon the State of Illinois and Sanitary District as to the taking by them of appropriate steps to effect compliance with the requirements of said decree, this court has appointed the Hon. Edward F. McClennen Special Master to consider certain questions raised by said application of the complaining states and report on or before April 1, 1938; and your applicants herein, the Mississippi River states,

suggest that the reference to the said Edward F. McClennen, Special Master, should be enlarged to give consideration to the facts alleged herein with directions to recommend to the court such modification of the decree as the facts require.

10. Applicants herein, intervening defendants, show to the court that in and by the order of reference providing for the hearing about to be conducted by the Hon. Edward F. McClennen, Special Master, he is directed to inquire concerning reasons why plans for control works at the mouth of the Chicago River and steps for the construction thereof have not been taken or approved. Applicants allege and so state the fact to be that the engineering questions involved in deciding the nature and character of such control works depend in a large degree upon the final flow from the lake and further that the necessity for such control works likewise depends to a considerable extent upon the amount of permitted diversion. Applicants, therefore, allege that no consideration of these questions can be given without the question as to the ultimate diversion becoming involved and, therefore, it becomes necessary and appropriate in considering said questions that the decree be modified to comply with the said Act of Congress aforesaid, or at least consideration to said act of Congress be properly and appropriately given by the said Special Master.

WHEREFORE your applicants, the States of Louisiana, Missouri, Kentucky, Tennessee, Arkansas and Mississippi, pray that this court enter an order enlarging the reference heretofore made to the Hon. Edward F. McClennen, as Special Master, to determine what modification of the decree of ~~August~~ April 21, 1930, is required to make the same conform to the action of Congress taken by the said Rivers and Harbors Act of 1930 above set forth with leave to the parties, including the applicants herein, to appear before said Master, introduce any relevant testimony in connection with the allegations hereof and with directions to the said Special Master to report such facts and make such recommendations as equity and justice may require and for such other and further relief in the premises as shall seem just and meet.

James O'Connor,
Attorney General for Louisiana.
L. D. Smith,
Attorney General for Tennessee.
G. L. Rice,
Attorney General of Mississippi.
H. L. Norwood,
Attorney General of Arkansas.
Stratton Shartel,
Attorney General of Missouri.
J. W. Cammack,
Attorney General of Kentucky.

Daniel N. Kirby and
Cornelius Lynde,
Of Counsel for said Intervening defendant Mississippi River States.

U. S. of America,
State of Illinois, } ss.
County of Cook.

Cornelius Lynde being first duly sworn on oath deposes and says that he is solicitor and of counsel for the intervening Mississippi River states, on whose behalf the foregoing application and petition has been prepared and filed; that he has read the foregoing application and petition and knows the contents thereof and that the same is true, except as to the allegations therein made on information and belief and as to such allegations this affiant verily believes the same to be true.

Cornelius Lynde.

Subscribed and sworn to before me this 5th day of January, A. D. 1933.

Jeffrey Shedd,
Notary Public.

(notarial seal)

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MAR 13 1933
~~CHARLES~~ ELMORE CROP
CLERK

BEFORE THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1932.

State of Wisconsin, et al., *vs.* State of Illinois and Sanitary District of Chicago, et al.	No. 5, Original.
State of Michigan, et al., *vs.* State of Illinois and Sanitary District of Chicago, et al.	No. 8, Original.
State of New York, et al., *vs.* State of Illinois and Sanitary District of Chicago, et al.	No. 9, Original.

REPORT OF THE SPECIAL MASTER,
EDWARD F. McCLENNEN

March 13, 1933.

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THE ERRORS CLAIMED.

After hearing all the evidence and arguments of the parties, I submitted a draft of this report substantially in its present form to the parties with a request for their suggestions for changes in substance and language. They made suggestions, some of which I have adopted. They also stated the parts of the report which they claimed were erroneous. Each of these claims is stated in the report at the point of alleged error. No other errors have been brought to my attention.

Edward F. McClennen,
Special Master.

BEFORE THE

SUPREME COURT OF THE UNITED STATES.

October Term, 1932.

State of Wisconsin, et al., *vs.* State of Illinois and Sanitary District of Chicago, et al.	No. 5, Original.
State of Michigan, et al., *vs.* State of Illinois and Sanitary District of Chicago, et al.	No. 8, Original.
State of New York, et al., *vs.* State of Illinois and Sanitary District of Chicago, et al.	No. 9, Original.

REPORT OF THE SPECIAL MASTER,

EDWARD F. McCLENNEN.

March 13, 1933.

In obedience to the Order entered in the above entitled suits December 19, 1932, I have made summary inquiry, including hearings begun at the Federal Building in Chicago, January 12, 1933, and conducted there and at the United States Chamber of Commerce Building in Washington and ended at the Executive Mansion in Springfield February 28, 1933, at which were presented the evidence and arguments of all parties, and I now make this report.

The narrative of this situation and of its causes until the entry of the final decree on April 21, 1930 is stated in order and elaborately in *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, January 5, 1925; the report of the Special Master, now Mr. Chief Justice Hughes, filed November 23, 1927; the opinion of this Court, 278 U. S. 367, January 14, 1929; the report of the same Special Master on Re-reference, filed December 17, 1929; the opinion of this Court, 281 U. S. 179, April 14, 1930; and the final decree, 281 U. S. 696, April 21, 1930. It has become so extensive that repetition adding length and no weight should be avoided. This report is addressed to a Court familiar with what has gone before, and on that assumption.

The present inquiry has been made with the belief that both the law and the facts decided by the former two opinions and by the decree must be taken as unchangeable in this reference and that those found by the former Special Master should be so taken in orderly deference and with no responsibility therefor, on the present Special Master. The defendants claim that this is an error.

The present order when subdivided is to inquire as to six subjects, namely:—

THE QUESTIONS FOR INQUIRY AND REPORT.

1 A: The causes of the delay in obtaining approval of the construction of controlling works in the Chicago River.

1 B: The steps which should now be taken to secure such approval and construction.

2 A: The causes of the delay in providing for the construction of the Southwest Side Treatment Works.

2 B: The steps which should now be taken for such construction or, in case of a change in site, for the construction of an adequate substitute.

3 A: The financial measures on the part of the Sanitary District which are reasonable and necessary in order to carry out the decree of this Court.

3 B: The financial measures on the part of the State of Illinois which are reasonable and necessary in order to carry out the decree of this Court.

The six semi-annual reports filed for July 1, 1930 to January 1, 1933, inclusive, the Application filed by the Complainants October 3, 1932, and the Return filed by the Defendants November 7, 1932 as far as they purport to give primary facts, I find state them correctly except as set forth otherwise hereinafter; but although the various estimates and conclusions in the six semi-annual reports and in the Return filed November 7, 1932 were reached in good faith, yet, as it is unnecessary to determine their accuracy or reasonableness, no finding thereof is made at this point; and on the charges in the Application filed October 3, 1932, of bad faith, obstruction, avoidance, circumvention, delay, negligence, incompetence, dereliction and defiance and on the conclusions therein stated, no finding is made at this point.

1A: THE CAUSES OF THE DELAY IN OBTAINING APPROVAL OF THE CONSTRUCTION OF CONTROLLING WORKS IN THE CHICAGO RIVER.

The cause of this delay is a total and inexcusable failure of the defendants to make an application to the Secretary of War for such approval. The defendants claim that this finding is erroneous.

The complainants charge in substance in their application that this and other failures on the part of the defendants are due to an unfaithful effort to delay, avoid and circumvent the performance of the decree of this Court (Application, pp. 9, 12, 13, 14, 15, 16, 17, 18). The complete failure to do anything about Controlling Works and the small amount done about the Southwest Side Treatment Works warranted a belief on the part of the complainants, in the charge made. The defendants claim that this finding is erroneous. In the light of the evidence, and with regard to the gravity of the charge when levelled at a sovereign State and one of its instrumentalities, I find that the truth of the charge has not been proved and, therefore, that it is not so.

It is true, however, that the decree is painful to the defendants and that they have been influenced by a hope that something would happen so that the flow at Lockport need not go as low as the 1500 c. f. s. to which the decree now limits them after December 31, 1938, and by the opinion of their engineers that if the intercepting sewers parallel to the main Chicago River and to the North Branch of it are completed before December 31, 1935, in accordance with the program submitted to the Special Master in 1929, it will be safe to do without controlling works if the diversion of 5000 c. f. s. continues. They virtually confess to this in their Return (pp. 26-31) and to an increase of this hope, based on the Rivers and Harbors Act of July 3, 1930 (46 Statutes at Large, Part 1, p. 918).

I find that the engineers of the Sanitary District hold this opinion that Controlling Works are not necessary under the conditions stated. I make no finding as to the correctness of this opinion as I regard this question as not before me under the terms of the order of December 19, 1932 but as set at rest for the present inquiry by the findings of the Special Master in 1929.

The Return (p. 26) attempts to excuse the failure to seek approval, by referring to the plans for controlling works submitted without any application by the Sanitary District to the United States District Engineer in November, 1926, not in anticipation of the decree of April 21, 1930, but in compliance with the conditions of the temporary diversion permit signed by the Secretary of War on March 3, 1925.

Constrained by the circumstances and by the direct evidence, I find that no expectation that the Secretary of War was going to approve these plans, entered into the reasons why the Sanitary District has not sought approval of Controlling Works since April 21, 1930. The defendants regarded that old application as not officially but practically dead. One of the engineers for the Sanitary District so testified before me. The old application was dead. The defendants claim that these findings are erroneous.

Secretary of War John W. Weeks, on his own initiative made the requirement which became condition 6 of the permit of March 3, 1925, namely:—

> "6. That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929."

The diversion permit which contained this was by its terms to cease on December 31, 1929.

In 1926 the Sanitary District submitted plans for single-pontoon-gate controlling works at the mouth of the Chicago River. These were revised from time to time in 1927.

March 31, 1927, Colonel Edward H. Schulz, the District Engineer at Chicago, made a progress report to the Chief of Engineers, then Major General Jadwin, which stated that a blue print sketch of this pontoon controlling gate was submitted and that detailed plans would be submitted as soon as the Sanitary District had come to an agreement with the Park Boards as to the exact location of a new bridge to be built, the abutments of which were to be used in connection with the construction of this controlling gate and that failing an agreement shortly it would devolve on the Sanitary District to provide its own location and abutments and present detailed plans. The Sanitary District submitted further details under dates in June and July, 1927.

Communications passed back and forth between the Chief of Engineers and the District Engineer at Chicago.

In December, 1928, the Chief of Engineers desired of the District Engineer a comprehensive study and report at the earliest practicable moment of all feasible methods of preventing reversal of flow in the Chicago River "for the purpose of determining what plan should be adopted to meet the permit condition,"—namely, condition 6 quoted above.

It is to be noted that what was under consideration was not an application by the Sanitary District, but a requirement by the Secretary of War, obviously designed to meet the conditions which would exist, when diversions ceased or were reduced, at the expiration of the temporary permit.

At this time, the decision of January 14 1929, establishing the rights of the complainants, had not been handed down.

The District Engineer at Chicago at this time was Lieutenant Colonel W. C. Weeks of the Corps of Engineers who took up performance of duty there August 4, 1928. He knew that the Sanitary District had made studies of the subject. He sought the aid of these. As a result, the Sanitary District provided him with plans for twelve different methods of controlling works, some of them subdivisions of others. These were not submitted as parts of any application or in anticipation of another application to be made. They were the voluntary assistance given by one engineering force to another.

At this time, the Sanitary District was still under the impulse of the requirement of the Secretary of War. The District did not and does not want controlling works, until it is established that in its opinion they are necessary.

Under date of March 11, 1929, Lieutenant Colonel Weeks, as District Engineer, reported to the Chief of Engineers, Major General Jadwin, on all the various kinds of controlling works in the Chicago River which he deemed feasible for preventing reversal of flow in the Chicago River. These were some seventeen, including the above twelve. In this report, Method C was "By means of controlling works across the main channel of the Chicago Sanitary District near Kedzie Avenue, Chicago, Illinois. Provision is made for navigation at all times." This was near the head of the Sanitary Canal. The report closes thus,—"*RECOMMENDATIONS* It is recommended: (a) That Method C in combination with a pontoon gate at the mouth of the Chicago River (Outer Drive Bridge) be adopted for the control of reversals in the Chicago River. (b) That the pontoon gate at the mouth of the Chicago River (Outer Drive Bridge) be not constructed until the need therefor has been demonstrated."

It does not appear to me that this report as such or the twelve plans as such with which the Sanitary District had assisted the District Engineer were before the Special Master in 1929.

A month later, April 19, 1929, General Jadwin made his statement to the Special Master on Re-reference quoted at page 114 of his report. "The second type of control works", there termed by General Jadwin "an unwarranted obstruction to navigation" was the type, and the only one, set out in the plans of the Sanitary District filed in 1926 and 1927 and was "the pontoon gate at the mouth of the Chicago River (Outer Drive Bridge), which the District Engineer had recommended "be not constructed until the need therefor has been demonstrated."

The prospect that this only plan which the Sanitary District had submitted as its attempt at compliance with condition 6 above, would be "recommended by the Chief of Engineers" was so dim, as the defendants knew, that they were more than warranted in the belief which they had that the old and only plan submitted by the Sanitary District to the Secretary of War or to the Chief of Engineers was practically dead.

Not only this,—but General Jadwin, at the same time (pp. 108, 109) said:—"The need for further control works is not yet established. Control works are not necessary in the interests of navigation . . . Their purpose is to prevent the discharge of polluted water from the river into the lake where it would menace the city water supply and beaches. . . . It is not now considered possible to fix the exact limit of diversion at which the present control at Lockport [some 34 miles away] will become unsatisfactory . . . the present Lockport control may be found satisfactory with a total diversion as low as 5000 c. f. s. annual average and might possibly be satisfactory with a lower diversion. It is the present attitude of the Chief of Engineers, therefore, that the United States should not require the construction of controlling works, but that the Department will consider any application for the approval of plans of controlling works, to be constructed by the Sanitary District or other agency, and may be expected to approve these plans, if the works are shown to be necessary, to be effective, and to be the minimum detriment to navigation. The question of control works is therefore a sanitary matter for solution by the Chicago Sanitary District or the City of Chicago."

The effect on navigation, of controlling works at the head of the Sanitary Canal near Kedzie Avenue would be that only, of one lock to pass through, on a non-Federal waterway.

General Jadwin's statement left the matter on April 19, 1929 so that the Sanitary District did not want to build controlling works, the War Department requirement in the current permit was gone, in effect, and the Chief of Engineers was of opinion that the protection of the Chicago water supply and beaches did not call for controlling works at least for the time being or until the diversion fell below 5000 c. f. s.

The Sanitary District knew all this at the time. Therefore they knew that the War Department intended to do nothing more as to the several methods of control which had been considered, until the Sanitary District made another application.

This left only the attitude of the Court to be considered. Therefore, in 1929, the defendants presented to the Special Master a plan which included controlling works. Major General Jadwin retired in the latter part of 1929, as Chief of Engineers. On December 17, 1929, the Special Master filed his Re-reference Report which said (p. 81):—"In their proposed findings, the *defendants* have provided that the *Sanitary District* shall *immediately* (not italics in original) submit plans to the Chief of Engineers or his representative for such works to be constructed at or near the *mouth of the Chicago River,* or at or near the *northern or eastern terminus of the Main Drainage Canal,* and that they shall be completed and in operation within a period of two years subsequent to the date of the Secretary of War's authorization under the statute."

This request for a finding was addressed to a Special Master who, as the defendants knew, had been informed fully of the plan submitted in 1926 to 1928 (Re-reference Report, p. 105) and who had heard General Jadwin condemn that method. The request meant a *new* submission immediately, to a succeeding Chief of Engineers.

With the death of the old plan and of any present requirement by the War Department, the remaining possibilities then seemed to be (1) controlling works near the mouth of the River, consisting of a lock and sluices, or a combination of lock and gate, instead of a single gate, or (2) controlling works about seven and one-half miles up the River, near the northern or eastern head of the Sanitary Canal (R. R. 112) as the District Engineer had recommended (as quoted above).

It was for one or both of these for which the Sanitary District was to submit plans, *immediately.*

In the judgment of the Special Master, the safe reduction to 5000 c. f. s. was dependent on the completion of these controlling works (R. R. 107, 117, 118). For this, there was required the time for completing plans, their submission to the Chief of Engineers, consideration by him and those under him, required modifications, changes in conformity, reconsideration, approval, and then two or three years for construction (R. R. 81).

The defendants argue now that the judgment of the Special Master in 1929, as to the need of controlling works was one of precaution and not of a final conviction that the hydraulics of the river absolutely required controlling works, and that in the present reference the Special Master has had the benefit of the opinions above described of the engineers of the Sanitary District. This is important, if it is my duty to reexamine the question, set at rest by the Special Master in 1929. If I ought to reexamine that question, I could not do it without hearing further evidence, as the parties were discouraged by me from going into the question as thoroughly as should be, if so serious a matter is to be reexamined. The behavior of the river in times of storm up to 1929, when the average diversion was 8500 c. f. s. or more, was before the Special Master in 1929. Since then there has been an opportunity to observe its behavior with an average diversion of 6500 c. f. s. There has been no opportunity to observe its behavior with an average diversion of 1500 c. f. s. or of 5000 c. f. s. The opinions of the engineers of the Sanitary District given me are no more emphatic than that which Major General Jadwin gave to the Special Master in 1929.

The location of controlling works was a matter of great importance, involving occasion for much difference of opinion. Works near the mouth of the River would be more effective but more expensive and a considerable obstruction to navigation between Lake Michigan and the head of the waters of the port of Chicago. Works at the head of the Sanitary Canal would be less effective but no obstruction to this navigation (R. R. 105-117).

On December 17, 1929, the Special Master filed his Re-reference Report which states it to be his judgment that to reduce the diversion to 5000 c. f. s. without the completion of the sewage treatment works and without controlling works will bring a serious, and not demonstrably unjustified, apprehension as to the pollution of the water supply of the City of Chicago (not a party) by reversals in times of storm (p. 117). This meant the works in the program submitted in 1929, which included the North Side, Calumet, West Side, and Southwest Side Treatment Works.

The Special Master reported his conclusion and recommendation for decree to be (pp. 142, 147):—"(6) That subject to the approval of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to the applicable statute, controlling works should be constructed by the Sanitary District for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan; that for this purpose the Sanitary District should immediately submit plans for such works to the Chief of Engineers of the War Department; and that such controlling works should be constructed by the Sanitary District within two years after receiving the authorization of the Secretary of War."

A reader of this report stating the respective positions of the Chief of Engineers and of the Special Master can see a difference of judgment between them on the question of menace to health and will assume that if the Court confirms the Special Master's judgment on this question, the War Department will defer to that judgment, when called upon to determine whether the remedy puts an undue burden on navigation. The Sanitary District should have assumed this. The Sanitary District claims that there is no basis for this finding.

Concurrently with these suits, there was going on a consideration of the improvement of the Illinois River by the United States.

Under date of December 20, 1929, the District Engineer at Chicago, Lieutenant Colonel Weeks, submitted to the Chief of Engineers, through the Division Engineer, George R. Spalding, Lieutenant Colonel, Corps of Engineers, with the latter's indorsement of its recommendations, an extensive report on the Re-examination of the Illinois and Des Plaines Rivers. This report became subsequently a part of Senate Document 126 hereinafter described. This report was favorable to a Federal waterway from the existing Federal waterway ending at Starved Rock near Utica on the Illinois River to the existing Federal Project at Chicago, by way in part of the Sanitary Canal.

Lieutenant Colonel Weeks personally was reluctant to have navigation over this new project, if it became one, impeded by controlling works at the mouth of the Chicago River or even at the head of the Sanitary Canal. He regarded controlling works unnecessary if a diversion of 5000 c. f. s. plus domestic pumpage was to continue.

On December 31, 1929, the Secretary of War, on the recommendation of Major General Lytle Brown who had then succeeded Major General Jadwin as Chief of Engineers, issued to the Sanitary District a permit to divert until July 1, 1930, 8500 c. f. s. as measured at Lockport, and thereafter 6500 c. f. s. in addition to domestic pumpage. This permit recited the decision of this Court handed down January 14, 1929 (278 U. S. 367) and the filing of the Master's Report (Dec. 17, 1929) and some of its recommendations. The permit was to expire "on the effective date of the decree on the Master's report to be entered by the Supreme Court of the United States."

Consistently with General Jadwin's position announced on April 19, 1929, to the Special Master, as to the requirements of navigation and as to the requirements of the War Department in consequence, this permit contained no condition that the Sanitary District must provide controlling works.

The District Engineer's report of December 20, 1929 as to the Illinois River did not become public before April, 1930.

On March 12, 1930, the State of Illinois and the Sanitary District filed a Brief on the Exceptions to the Special

Master's Report on Re-reference. As to controlling works, this (pp. 131, 132) says:—

"*Controlling Works, Use and Purpose.*

(e) THE MASTER HAS FOUND THAT SUCH CONTROLLING WORKS WILL NOT MATERIALLY INTERFERE WITH NAVIGATION, AND HAS PROVIDED BY HIS FORM OF DECREE THAT THE DEFENDANT SANITARY DISTRICT SHALL IMMEDIATELY SUBMIT PLANS TO THE WAR DEPARTMENT FOR SUCH CONTROL WORKS AND THAT THE CONTROL WORKS SHALL BE CONSTRUCTED AND INSTALLED BY THE SANITARY DISTRICT WITHIN TWO YEARS AFTER THE DATE OF THE APPROVAL OF SUCH PLANS BY THE WAR DEPARTMENT. CONSEQUENTLY, AN EXCEPTION ON ANY PROGNOSIS THAT THEY MAY NOT BE BUILT IS WITHOUT MERIT.

Complainants take great exception, and it seems to us improperly, to the Master's report on the ground that the controlling works may not be built unless the Secretary of War, on the recommendation of the Chief of Engineers, approves the plans for such works. As the Master's Report and form of decree does not provide for the reduction of the diversion below 6,500 c. f. s., in addition to pumpage, even after all the sewage disposal works are constructed, until such controlling works are installed, complainants therefore say that the reduction below 6,500 c. f. s. may never take place. This is a hypercritical exception, in view of the Master's finding that

> 'the additional controlling works at the head of the Canal would not seem to involve any burden that could not readily be borne in such navigation.' (Master's Report, p. 117.).

The attitude of the Engineer Corps is shown by Gen. Jadwin's statement (Master's Report, p. 109):

> 'the Department will consider any application for the approval of plans of controlling works, to be constructed by the Sanitary District or other agency, and may be expected to approve these plans if the works are shown to be necessary, to be effective, and to be the minimum detriment to navigation.'

The Master has found that the controlling works will not materially interfere with navigation. The Chief of Engineers has stated that it may be expected that plans therefor will be approved by the Engineer Corps if the works are built so as to cause the minimum detriment to navigation. The decree recommended by the Master requires the Sanitary District to immediately submit plans and construct the works within two years after the plans are approved. Therefore, it can hardly be said that the plans for such works will not be approved and that they will not be installed within the 2 year period required. In view of these circumstances, complainants' exceptions to the Master's Report on this proposition should not be given any consideration."

On May 15, 1930, the Sanitary District passed a resolution, quoted hereinafter in section 3 A, to induce the Legislature to exempt it from the requirement of a referendum on bonds issued for loans for the construction of the North Side, Calumet, West Side, and Southwest Side Treatment Works. This contained no reference to the Controlling Works.

The District Engineer at Chicago and George M. Wisner, consulting engineer (now dead) in the employ of the Sanitary District, and Horace P. Ramey, Assistant Chief Engineer of the Sanitary District, were among those who read promptly the opinion of this Court handed down April 14, 1930 (281 U. S. 179) and the decree entered April 21, 1930 (281 U. S. 696).

They all had noticed that the Special Master had recommended a decree ordering the Sanitary District to submit forthwith to the Chief of Engineers, plans for controlling works, and to construct them within two years after receiving authorization from the Secretary of War. They all noticed that the decree of the Court did not contain such an order.

These engineers of the Sanitary District, sometimes one and sometimes the other, met Colonel Weeks, the District Engineer, from time to time in relation to other features of the work of the Sanitary District which required these meetings. Soon after the decree was entered they discussed the significance of the absence from the decree, of reference to controlling works. None of the three wished for controlling works or regarded them as necessary, if a flow of 5000 c. f. s. plus domestic pumpage was to continue. Colonel Weeks desired to avoid any unnecessary impediment to navigation. The Rivers and Harbors Act of July 3, 1930 was imminent. The discussions were continued after it passed. The Sanitary District wished to save the expense of controlling works. In this fertile ground of desire, there sprang up a doubt as to whether the Sanitary District was under obligation to go forward with controlling works. In the discussions with Colonel Weeks, he and Mr. Wisner invariably mentioned the lack of action of the Department as to Colonel Weeks' report on controlling works and by tacit agreement they did not press the matter. Colonel Weeks gave Mr. Wisner no encouragement to bring up the subject but on the contrary said that they should let the matter rest until they had some intimation that the War Department wanted something done. Notwithstanding this tacit agreement, Mr. Wisner continued to say, for a year or so, substantially, "when you do hear, let us know, because we are ready and anxious to go ahead." It is matter of conjecture which there is no need to draw, why he said this. The Sanitary District was neither ready nor anxious to go ahead with controlling works. The Sanitary District claims that this finding is not justified. The tacit agreement was reached in April, May or June, 1930. It has never been changed.

On June 26, 1930, the Secretary of War granted the Sanitary District a permit which recited the fact of the Court's decree of April 21, 1930 and authorized diversion "as specified in the said decree." It did not mention controlling works.

At no time in the discussions with the engineers of the Sanitary District did Lieutenant Colonel Weeks attempt to commit the War Department or intimate what might be the attitude of his superiors. In no way, was the Sanitary District given to understand that approval of controlling works would not be recommended by Major General Brown, the Chief of Engineers, or that they would not be authorized by the Secretary of War.

These discussions are referred to, for such extenuation, if any, as they furnish for the failure to seek approval of controlling works in accordance with the proposal submitted to the Special Master and assured in the brief for the defendants, as above quoted; and not as furnishing any justification. The Sanitary District claims that this paragraph is an error.

Neither Lieutenant Colonel Weeks nor the Sanitary District intended to violate the decree of this Court. They took the noninclusion of any reference to controlling works in the decree to indicate that possibly the Court did not insist on them. The Sanitary District, in view of the opinion of the Court (281 U. S. 179) and of the defendants' proposal to the Special Master and in their brief was not justified in lying back silently and unadvised, on any such doubt. The District now claims that it resolved the doubt against the construction that the decree required controlling works. No such action by the Sanitary District has been shown.

The Sanitary District did not seek or receive the advice of counsel as to their obligation either to apply for authority for controlling works, or to construct them.

The tacit agreement was to refrain from doing, what the defendants had informed the Special Master at the hearings and the court, by their brief, would be done immediately.

The recommendation of Colonel Weeks for a controlling lock and gates at the head of the drainage canal near Kedzie Avenue with sufficient plans to show the outline of its structure and its effect on navigation had been in the hands of the Chief of Engineers since March, 1929. The Sanitary District had plans for such works on its own files. An application could be filed within a few days. The attitude of Major General Brown could be ascertained quickly. His inclinations appear later.

The Sanitary District, after the entry of the decree of April 21, 1930, charted the work to be done on the entire program which had been submitted to the Special Master, into periods. This chart was completed in September, 1930. The main chart did not appoint any period for the controlling works. A separate chart set the total expenditure of $4,000,000 for them in 1935. The District knew that it was virtually impossible to build them without the use of two summer seasons. This chart if followed meant that they would not be completed at the earliest before autumn of 1936, nearly a year behind the requirements of the Special Master's conclusions.

The defendants claim in their Return (p. 30) and now persist in the claim that the Act of July 3, 1930 has made a change which may call for a review of the decree as to controlling works. This claim is not borne out by the Act. The only pertinent parts are these:—

"The following works of improvement are hereby adopted and authorized, to be prosecuted under the direction of the Secretary of War and supervision of the Chief of Engineers, in accordance with the plans recommended in the reports hereinafter designated."

(Here follow several pages of names of places, within which is the following:—)

"Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway: *Provided,* That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000: *Provided further,* That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12, Original, October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway: *Provided further,* That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable."

"Preliminary Examinations and Surveys

Sec. 2. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following-named localities, the cost thereof to be paid from appropriations heretofore or hereafter made for such purposes: *Provided,* That no preliminary examination, survey, project, or estimate for new works other than those designated in this or some prior Act or joint resolution shall be made: *Provided further,* That after the regular or formal reports made as required by law on any examination, survey, project, or work under way or proposed are submitted no supplemental or additional report or estimate shall be made unless authorized by law: *And provided further,* That the Government shall not be deemed to have entered upon any project for the improvement of any waterway or harbor mentioned in this Act until the project for the proposed work shall have been adopted by law."

(Here follow several pages of names of places, and then —)

"Calumet River, Little Calumet River, Lake Calumet, and the Sag Channel, Illinois, with a view to providing a connection with, and terminal transfer harbors for, the waterway from Chicago to the Mississippi River."

"Chicago Harbor, Illinois."

"Calumet Harbor and River, Illinois and Indiana."

(Here follow several pages of names of places.)

This language used after the entry of the decree in these cases, is significant:—"the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway" . . . "the water authorized at Lockport" [by the decree in this case, namely, 6500 c. f. s. until December 31, 1935, 5000 c. f. s. until December 31, 1938, and 1500 c. f. s. thereafter, plus pumpage estimated at 1700 c. f. s.] is hereby authorized to be used for the navigation of said waterway" . . . "the Government shall not be deemed to have entered upon any project for the improvement of any waterway or harbor mentioned in this Act until the project for the proposed work shall have been adopted by law."

Senate Document Numbered 126 above mentioned, is in eighty-seven pages composed of a letter dated April 3, 1930 to the Chairman of the Senate Committee on Commerce from Major General Lytle Brown, Chief of Engineers, and an accompanying report of the Board of Engineers for Rivers and Harbors, and supporting documents including Lieutenant Colonel Weeks' report of December 20, 1929 above mentioned. This letter of the Chief of Engineers responds to a resolution requesting a review of reports submitted to the second session of the Fifty-sixth Congress (expiring March 4, 1901) "with a view to the extension of free navigation with a 9-foot channel from Utica to Lake Michigan."

The letter refers to the existing project for the improvement of the Illinois River from Utica to its mouth on the Mississippi and continues "There are also Federal projects in the Chicago and Calumet Rivers which provide depths suitable for large lake vessels for some distance above the mouths of these streams. These Federal projects are connected by a system of waterways constructed by non-Federal interests. The Sanitary District of Chicago has constructed an artificial canal, usually referred to as the Chicago Sanitary Canal, which extends from the West Fork of the Chicago River to the Des Plaines River near Lockport, and has also done considerable work in enlarging the channel of the South Branch and West Fork of the Chicago River between the head of the Federal project on that river and the head of the Sanitary Canal." In short, the letter states that there is then no Federal project in this waterway between the Port of Chicago and Utica on the Illinois River. It describes the proposal of the State of Illinois to turn over to the United States this project from Utica to Lockport on conditions therein set forth and "if the United States undertakes to complete, maintain, and operate the waterway." It says that the district engineer [Lieutenant Colonel Weeks] reports "that to obtain such a link connecting the extensive Federal waterway systems of the Great Lakes and the Mississippi Valley the United States would be justified in expending $7,500,000. . . . he believes that a depth of 9 feet should be provided and the small amount of additional dredging necessary to provide such a depth, even if the flow at Lockport is reduced to 1000 cubic feet per second, has been included in the estimate. If the flow should be reduced below this amount, the necessary dredging would be somewhat increased, but the increase in cost would be relatively small." The letter then says that the district engineer recommends that the authorized project be extended from Starved Rock near Utica to the existing Federal Projects at Chicago, and that the division engineer and Board of Engineers for Rivers and Harbors concur that it is advisable for the United States to undertake to complete this waterway and "After due consideration of these various reports, I am of the opinion that there should be a Federal Waterway as the connecting link between the Mississippi River System of Waterways and the Great Lakes system via the Illinois River, the Des Plaines River, the Chicago River, and certain waterways improved or under improvement by the State of Illinois and the Sanitary District of Chicago or other political subdivisions of the State and that such waterway should have a depth of 9 feet. . . . That the project thus adopted shall be in all its parts a navigable waterway of the United States . . . the 9-foot channel heretofore adopted by Congress can be secured by various flows of water even as low as 1000 cubic feet per second. Decreasing the flow increases the dredging but not in any serious amount."

The accompanying report dated April 1, 1930 of the Board of Engineers says. . . . "The district engineer considers that the waterway should have a depth of 9 feet to correspond with that of the existing Federal project in the Illinois, Mississippi, and Ohio Rivers. The amount of additional dredging required to produce such a depth will depend somewhat on the amount of water diverted through the Sanitary Canal. He recommends that sufficient additional dredging be done to provide a channel 9 feet deep when the flow at Lockport is 4000 cubic second-feet. If the flow should be reduced below this amount the necessary dredging would be somewhat increased, but the increase in cost would be relatively small."

The decree, allowing 1500 c. f. s. plus pumpage estimated at 1700 c. f. s., in substance allowed 3200 c. f. s. at Lockport.

On April 4, 1930, Brigadier General Herbert Deakyne, Chief of The Board of Army Engineers for Rivers and Harbors, testified before the Committee on Rivers and Harbors of the House of Representatives that:—You need a certain amount of flow for the operation of the locks. Every time a ship goes through that takes a lock full of water to let that ship go through, so you need some water, but you can adapt your improvement as far as depths are concerned to the amount of flow that comes, provided it is enough to furnish all the necessary water for locking. At the point where the Sanitary District connects with the Des Plaines River, that stream has not enough water to supply locks and dams below that point without any diversion from Lake Michigan. I think we would need some water out of the lake if we are going to have commerce clear up to the capacity of the waterway. I would say that we would find a thousand cubic feet per second necessary. That would be sufficient to make the connection between the Mississippi River and the Lake, navigable from the commercial viewpoint. (This is in addition to upwards of 740 cubic feet per second furnished by the Des Plaines River and the Kankakee River, which join below Lockport to form the Illinois River.) As a matter of fact, the present project with this expenditure of $7,500,000 and a thousand feet of water will take care of the improvement.

On May 16, 1930, Major General Brown, in ans~~wer to~~ questions testified before the Senate Committee on Commerce. An abbreviated paraphrase of what he said is as follows:—

Mr. Chairman and members of the committee, I understand that the proposition on which we are trying to arrive at a decision is that of limiting by this bill the diversion from Lake Michigan for the purpose of this Lakes-to-the-Gulf waterway to 1500 cubic feet per second. My view of the matter, briefly, is this: That there are many uncertainties in regard to this project still outstanding, and we, who are willing to be responsible for the work, desire as much latitude in the amount of water available as is possible for Congress to give us. The policy of the War Department is very clearly outlined as to the diversion of water from the lake, and that is as little water shall be diverted from the Great Lakes as is practicable to get along with. There are two phases to the question: The amount of water that it would take to accommodate by flotation of commerce, as we expect; and it has been stated by the authorities heretofore that in this waterway they thought they could get along with as little as 1,000 cubic feet per second. There is another condition that is going to be there that we have to confront, in order to make a practicable waterway, and that is the pollution of water in that densely populated area around Chicago. It is a practical question that has to be met. It is my present judgment, as to the smallest flow of water that is necessary to develop a commercially useful waterway at this point, the indications are, with everything in view,—is that something like 5000 feet per second should be held available for that purpose. When I said in my letter of May 1 to Senator Vandenberg "It is my impression that satisfactory navigation can be secured in the proposed Illinois waterway with a flow of 1,000 cubic feet per second," I meant on the sole consideration of lockages, seepage, and leakage, without reference to anything else that people have had in view right along in the study of this measure. That is the statement that is made by previous chiefs of engineers, that 1,000 feet, the total channelization of the Illinois River, would be the amount that would be sufficient for lockage. Navigation, as we see it, is likely to be influenced by pollution. I agree with the statement about a thousand feet and stand by it. I am familiar with and have no quarrel with the report of my own board, printed in Document 126, which says a 9-foot channel can be secured by various flows of water, even as low as a thousand cubic feet. There are a number of other eminent engineers who have said the same thing. It is pretty well settled that a thousand feet ought to produce this net result, if you understand what they mean when they say that, with a flotation only in view. My only objection to a fixed limitation is that we want some latitude. The testimony that General Jadwin gave the Supreme Court was based on Chicago Harbor only, and that was 1,500 cubic feet per second. We have got an entirely different proposition now than Chicago Harbor only; we have got the waterway all the way from the Lakes to the Mississippi River. The project authorized by Congress about three years ago for the lower Illinois from Utica to Grafton was a 9-foot channel and the flow was 5,000 cubic feet per second and the dredging being done there was done with that end in view. The development of a 9-foot channel in my judgment at the present time only requires a 1,000-foot diversion, under the conditions stated. A thousand cubic feet per second provides a 9-foot channel in the project that is now being executed on the lower Illinois from Utica to Grafton, with only one provision we would resort to complete channelization of the Illinois River. That would require some more expense, not very much more excavation. It would require locks and dams in large number, lots of things.

It was with the above-quoted engineering information virtually incorporated by reference in the Act, that Congress provided, either because of or nothwithstanding it, that "the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway" but as much as the decree of April 21, 1930 allows. In other words, it amounts to saying, "dredge to such a depth that there will be a depth of 9 feet when only 1500 c. f. s. plus 1700 c. f. s. pumpage—3200 c. f. s.—comes down at Lockport."

The Act by adopting the report of the Chief of Engineers provided for no larger flow than the decree allows. There is no present Federal project requiring more diversion than the decree allows. There is no indication that Congress will hereafter allow a greater diversion. The provision of the Act for the smallest flow leaves no discretion to the Secretary of War to permit a larger diversion for this project. Congress has exercised its full authority directly, without leaving a part in the hands of the Secretary. The Sanitary District claims that this statement is erroneous.

With this definite indication by Congress and with its knowledge that this Court has decided that any greater diversion invades the rights of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan, and New York, and also causes them serious damage, it should not be anticipated that Congress, even if it has the power, is going to change its attitude and to continue to inflict that damage in order to save some dredging for which, in the judgment of the Chief of Engineers, the "cost would be relatively small."

This makes it unnecessary to consider whether Congress has the power to take the navigable capacity of the Great

Lakes and to add it to the tributaries of the Mississippi River, that is, whether so doing is but regulating interstate commerce. The report of the Special Master filed in October Term 1927 deals exhaustively with the subject (pp. 152-165) and the Court found it unnecessary to decide the question (278 U. S. 367) because "it will be time enough to consider the scope of that authority when it is exercised" (281 U. S. 179).

Since July 3, 1930, the War Department has done some dredging within the Sanitary Canal just above the dam at Lockport. Also, it has issued some bridge permits for bridges over the Canal.

A Federal waterway between Lake Michigan and the Illinois River, may follow both or either the Chicago River and the Main Drainage Canal to Lockport or the Calumet River and the Calumet Sag Channel to its confluence with the Main Drainage Canal. This point is about twenty-four miles southwest of the mouth of the Chicago River and about sixteen miles southwest of the head of the main canal near Kedzie Avenue. A lock near this head of the main canal would not interfere with navigation by the Calumet way. Neither would the many bridges in the city of Chicago.

The Act of July 3, 1930 furnishes no justification for the failure of the defendants to move for authorizatoin of controlling works. The Sanitary District claims that this finding is erroneous.

A new reason to the contrary has now arisen, in the relations with the Dominion of Canada. The Sanitary District claims that this finding is erroneous.

It should not be anticipated that Congress will lower the level of Lake Michigan by diversion at Chicago, hereafter, in view of the possible unfriendliness of so doing to the Dominion of Canada (First Report, pp. 83-85, 95, 96, 118). The treaty recently negotiated and now awaiting the advice and consent of the Senate provides that

"Article IV

"The High Contracting Parties agree:

"(b) that during the construction and upon the completion of the works provided for in Article III the flow of water out of Lake Ontario into the St. Lawrence River shall be controlled and the flow of water through the International Section shall be regulated so that the navigable depth of water for shipping in the Harbor of Montreal and throughout the navigable channel of the St. Lawrence River below Montreal, as such depths now exist or may hereafter be increased by dredging or other harbor or channel improvements shall not be lessened or otherwise injuriously affected."

"Article VIII

"The High Contracting Parties, recognizing their common interest in the preservation of the levels of the Great Lakes System, agree:—

"(a) 1. that the diversion of water from the Great Lakes System, through the Chicago Drainage Canal, shall be reduced by December 31st, 1938, to the quantity permitted as of that date by the decree of the Supreme Court of the United States of April 21st, 1930.

(2. This subsection provides for an emergency diversion if approved by an arbitral tribunal.)

"(b) that no diversion of water other than the diversion referred to in paragraph (a) of this Article, from the Great Lakes System or from the International Section to another watershed shall hereafter be made except by authorization of the International Joint Commission."

After such a negotiation, and after this Court has decided that the diversion is damaging to the Great Lakes System, even if the treaty obligation does not ripen, it is not to be anticipated that Congress will authorize the damage.

No improbability of authorization of controlling works justified the defendants in failing to seek it. There was no indication that the Chief of Engineers was averse to recommending such works, already found necessary in the Rereference Report of the Special Master.

On December 28, 1932, I requested the Secretary of War to authorize a report. In compliance, on January 4, 1933, Major General Lytle Brown, Chief of Engineers, wrote as follows:—

"The Secretary of War has referred to me your letter of December 28, 1932, in which you request an authoritative report from this Department on just what has been done (in chronological order) to secure the approval of the construction of controlling works in the Chicago River by way of formal applications, correspondence, interviews, and any other follow-ups, and the present attitude of this Department toward such controlling works as have been planned in the Chicago River, as contemplated when the decree of April 21, 1930 was entered in the Supreme Court. You further request an authoritative report on whether anything is in contemplation from the standpoint of the requirements of navigation which would affect in any way the prospect of an increased diversion of water from Lake Michigan.

"No recent application for the approval of controlling works in the Chicago River has been presented to this office. It is my understanding that such applications were presented prior to my appointment as Chief of Engineers. I have directed that a search of the records be made and the report which you request be prepared. Its preparation will probably require some days.

"The Department is prepared to approve plans for any controlling works presented by the Sanitary District, provided these works do not constitute an unreasonable obstruction to navigation.

"The river and harbor act approved July 3, 1930 directs that as soon as practicable after the Illinois Waterway shall have been completed in accordance with that act, the Secretary of War shall cause a study of the amount of water that will be required as an average annual flow to meet the needs of a commercially useful waterway, as defined in Senate Document No. 126, 71st Congress, 2d session, and shall, on or before January 31, 1938, report to Congress the results of such studies with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation of the Great Lakes, to the end that Congress may take such action as it may deem advisable.

"Since the Illinois Waterway is not as yet fully completed or in operation, the study directed is yet to be made. I may however advise you that it is the present attitude of the Department that the eventual reduction in the diversion from Lake Michigan provided in the decree of the Supreme Court will entail the construction of certain locks and dams on the Illinois River. The Department is not however now prepared to furnish you with an authoritative report on this subject.

"I am advised that the duties of the Secretary of War may require his absence from Washington on January 7th, the date which you suggest for a conference.

"This Department is however prepared to afford you all information within its records bearing on any phases of the matter toward which you may desire to direct your inquiry."

On January 9, 1933, Brigadier General G. B. Pillsbury, Acting Chief of Engineers, sent a detailed report which is the basis of several of the findings hereinbefore stated.

This information was available at all times to the defendants. Largely it was known to the defendants, before the entry of the decree on April 21, 1930 (Re-reference Report, pp. 107-116). It was furnished in twelve days after it was requested.

The letter of the Chief of Engineers shows clearly how dead was any old application of the Sanitary District and also his readiness "to approve plans for any controlling works presented by the Sanitary District, provided these works do not constitute an unreasonable obstruction to navigation." The navigation question appears to be the only one on which he deems that he should exercise his judgment, in view of the action of the Judicial branch of the Government on the question of need of controlling works to prevent a menace to health.

The prospect now is that the Chief of Engineers in determining whether or not to recommend controlling works, when the defendants apply for authorization, in conformity to the program before the Special Master in 1929, will act on the assumption that the flow at Lockport is to be limited permanently to 1500 c. f. s. plus domestic pumpage, estimated by the end of 1938 at 1900 c. f. s. The Sanitary District claims that this finding is erroneous. On July 21, 1932, the Chief of Engineers submitted to the Secretary of War, this memorandum:—

"War Department,
Office of the Chief of Engineers,
Washington, July 21, 1932.

Memorandum for the Secretary of War.

The following memorandum is submitted on the effect the provision of the St. Lawrence waterway treaty will have upon the Illinois Waterway.

The decree of the Supreme Court entered April 21, 1930, in the matter of the diversion of water from Lake Michigan by the State of Illinois and the Sanitary District of Chicago specified:

That on and after July 1, 1930, the State of Illinois and the Sanitary District of Chicago are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system of watershed through the Chicago drainage canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 cubic feet per second, in addition to domestic pumpage;

That on and after December 31, 1935, unless good cause is shown to the contrary, the State of Illinois and the Sanitary District of Chicago are enjoined from diverting as above in excess of an annual average of 5,000 cubic feet per second, in addition to domestic pumpage, and on and after December 31, 1938, are enjoined from diverting as above in excess of an annual average of 1,500 cubic feet per second, in addition to domestic pumpage.

It is estimated that by 1938 the domestic pumpage will be approximately 1,900 cubic feet per second, in addition to the amount of 1,500 feet provided by the decree, giving a total permissible flow through the drainage canal and waterway of 3,400 cubic feet per second. The flow in the Illinois River will be greater.

Article VIII of the Great Lakes-St. Lawrence Waterway treaty limits the diversion of water from the Great Lakes system through the Chicago Drainage Canal to that decreed by the Supreme Court but provides that in the event of an emergency the United States proposes to increase the diversion of water from the Great Lakes system, through the Chicago Drainage Canal in excess of 1,500 cubic feet per second as decreed by the Supreme Court, and the Government of Canada takes exception thereto, the matter shall be submitted for final decision to an arbitral, having power to increase the diversion and to stipulate such compensating provisions as may be just and equitable.

There is no conflict between the decree of the Supreme Court and Article VIII of the treaty. The decree specifies a minimum withdrawal after December 31, 1938, of 1,500 cubic feet per second in addition to domestic pumpage, unless good cause can be shown to the contrary, whereas, the treaty provision while limiting the diversion to the same amount provides that in an emergency an increase may be permitted.

It has been contended that the flow at Lockport as limited by the treaty will destroy the usefulness of the Illinois waterway. This contention is without basis of fact as will be seen by a study of the table set forth below:

Waterway	*Total canalized length*	*Total fall*	*Average low-water flow*	*Average yearly tonnage*
	Miles		C. f. s.	
Monongahela River	131	153.6	200	25,000,000
Ohio River	981	429.14	1,100	20,000,000
Panama Canal	51	85	1,300	28,000,000
Illinois River..........	291	165	[1] 3,400	[2] 10,000,000

[1] At Lockport.

[2] Estimated commerce upon completion of waterway.

The flow at Lockport permissible under the treaty will not only be more than three times the average low-water flow of the Ohio River at Pittsburgh, and two and one-half times the yearly average amount required for lockages in the Panama Canal, but will be seventeen times the low-water flow of the Monongahela River, which carries an average yearly tonnage two and one-half times that estimated for the Illinois waterway. These facts establish without question that the permissible flow will be more than ample for any commerce that may develop on the Illinois waterway.

If additional locks and dams in that portion of the Illinois River below Utica are found to be necessary to provide a 9-foot channel during low-water stages, the cost thereof will be negligible compared to expenditures made on other waterways and to the advantages resulting to the public from the proposed improvement of the St. Lawrence River.

So far as the Mississippi River is concerned, it is possible that a large diversion in the order of 10,000 cubic feet per second might have a sensibly beneficial effect during extreme low stages. However, such a diversion is unacceptable to the Lake States since it materially lowers the level of the lakes thereby injuriously affecting navigation. The difference between the permissible withdrawal of 3,400 cubic feet per second and 5,000 or 6,000 cubic feet per second which has been advocated is entirely immaterial, in its effect upon the Mississippi River.

The above facts and opinions do not take into consideration the sanitary situation at Chicago and south of there. It is assumed that it will be safeguarded without requiring more water from Lake Michigan than is specified in the decree of the Supreme Court, and that this will be done in the time allowed for the purpose in that decree.

LYTLE BROWN,
Major General,
Chief of Engineers."

The defendants by their Return filed November 7, 1932 (p. 27) say in substance that nothing should now be done by them about controlling works and they persist in this contention. They intend and propose to do nothing about controlling works.

At the hearings in January and February, 1933, before me, the attitude of the Sanitary District was that they do not propose to do anything about controlling works unless the War Department deems it necessary, unless obliged to, in order to make compliance with the decree of this Court. In the semi-annual reports filed with the Clerk of this Court, by the Sanitary District, nothing is said about the abandonment of the plan for immediate application for authorization of controlling works. They do not show anything done about them, except by inference. The report for July 1, 1930 showed among "Future Work December 31, 1928 . . . Chicago River Controlling Works $4,600,000"—"Completed Work as of April 21, 1930 . . . Chicago River Controlling Works $53,413.82"—"Future Work after April 21, 1930 . . . Chicago River Controlling Works $3,946,586.18". The same figures are carried through to the report for January 1, 1933, except that one dollar and ninety-two cents has been added to the completed work and subtracted from the future work.

It did not occur to the compiler of the reports, that he should include a statement of the abandonment of controlling works. Its non-inclusion was not with an intention to deceive.

The financial strains on the Sanitary District were no part of the reason for not applying for approval of controlling works. Sufficient money in hand would not have caused such an application.

It is on consideration of this entire record that I find the almost three years of non-attempt by the defendants to obtain approval of the construction of controlling works to be an inexcusable delay.

1 B: THE STEPS WHICH SHOULD NOW BE TAKEN TO SECURE SUCH APPROVAL AND CONSTRUCTION.

The most effective step is an enlargement of the decree of April 21, 1930 by the addition of a paragraph enjoining the State of Illinois to provide forthwith the necessary money for, and through the Sanitary District of Chicago or through other instrumentality chosen by the State to submit plans forthwith to the Chief of Engineers of the War Department, for controlling works for the purpose of preventing reversals of the Chicago River at time of storm and the introduction of storm flow into Lake Michigan and to make application forthwith to the Secretary of War for authorization of such works and diligently to pursue such application with all necessary modifications to secure within four months if possible the recommendation of the Chief of Engineers and the authorization of such Works by the Secretary of War, and immediately thereafter to begin and to continue to construct such works to completion within two years.

No proceeding is pending for any change in the cessation dates, decreed. Therefore, in determining what steps should now be taken it is to be assumed that the diversion will recede to 5000 c. f. s. on December 31, 1935 and to 1500 c. f. s. on December 31, 1938, in addition to domestic pumpage now estimated at 1700 c. f. s.

The postponement of the cessation, it has been decided, was in order to avoid so far as might be, the possible pestilence and ruin with which the defendants have done much to confront themselves (This case, 281 U. S. 179).

The continued deposit of untreated sewage in the Chicago River, a part of the navigable waters of the United States, without adequate water to flush it away through the Sanitary Canal, it has been decided would be likely to render the Port of Chicago practically unusable (Report of Special Master on First Reference, pp. 169, 170; and 278 U. S. 367, 417). This if done, would be an obstruction to navigable capacity in violation of Section 10 of the Act of March 3, 1899, c. 425, 30 Stat. 1151, U. S. Code, Title 33, sec. 403, unless recommended by the Chief of Engineers and authorized by the Secretary of War.

To reduce the diversion to 5000 c. f. s. on December 31, 1935 without completion of the Southwest Side Treatment Works and without Controlling Works will bring a serious and not demonstrably unjustified, apprehension as to the pollution of the water supply of the City of Chicago (not a party) by reversals in times of storm (Re-reference Report, p. 117).

The defendants urge that nothing be done. If no order is entered, nothing will be done and there will be no controlling works for years to come, if ever.

The complainants urge that the Court should appoint a special officer of this Court to perform the decree on behalf of the State of Illinois and of the Sanitary District and at their expense, with extensive powers to contract, and to issue bonds of both and to levy and to collect taxes. The steps so urged are so inexpedient if not futile that they should not be taken, even if this Court has the power.

This makes it unnecessary to decide whether the Court has this power. If I am in error, and the Court deems that it should take the steps urged, a memorandum on the subject of power is included hereinafter for the convenience of the Court.

There is no reason to think that if the State of Illinois is ordered to do this work, any more will be necessary, or that a commissioner would be any more effective than an order of this Court.

The construction of the Controlling Works should be begun this year, if authorization can be obtained. For reasons given hereinafter, neither the State nor the Sanitary District now has available money for this purpose this year. A commissioner exercising all the powers of the General Assembly of Illinois and all the powers of the Sanitary District under the existing constitution and legislation cannot raise money this year for this particular purpose, until this Court has by its decree imposed a duty upon the State of Illinois to do this work. If the commissioner is to exercise direct powers of this Court superior to those of the Sanitary District and of the General Assembly to levy and to collect taxes and to issue bonds the necessary machinery cannot be set up in time. The commissioner would be received in Illinois as a carpet-bagger. He would need an army of subordinates to make the valuations, the assessments, and the collection of taxes from a reluctant people. His bonds would not find a ready market in Illinois and would be viewed with hesitation as a novelty elsewhere. He should not be vested with Governmental discretion by the Court for such a huge Governmental project. It would be a serious task for the Court to draft a code of laws to govern his operations. He would have to build up an engineering staff and to exercise a judgment as to what particular kinds of structures should be built and what methods should be used for their construction. These and many more considerations of impracticability condemn the method.

On the other hand, this Court can accomplish the result by its decree against the State of Illinois.

The Report on Recommittal contained recommendations and a proposed form of decree which orders the Sanitary District to complete the several Treatment Works and, if authorized, the Controlling Works within stated times preceding the dates at which the successive reductions in diversion are to take place. The Court deemed that the decree should not contain these commands but that it should be confined mainly to an injunction against the diversion. It is to be assumed that this was because the complainants' rights were protected by stopping the diversions and their interests were not affected by what was done about sewage treatment or about controlling works. By the decree thus limited, if it is carried out, the complainants' rights except for postponing the time and for allowing diversion of 1500 c. f. s. permanently, are protected fully.

A new situation has arisen. It has become apparent that the proposed plan of the Sanitary District will not be carried out before 1936 at the earliest as to the controlling works or on time as to the intercepting sewers and treatment works unless there is a decree which makes progress possible. If the Sanitary District were the only one to suffer the consequences, the warning of the Court that "they must find out a way at their peril" (281 U. S. 179) would seem to leave the complainants secure of their injunction. Then probably they would not find it necessary to make their present application. As it is, doubtless they are apprehensive that the menace to health which will result from diminishing the diversion, without Controlling Works and without sufficient Treatment Works will persuade the Court to give the defendants more time. If the Court does not grant it, the Court in affording the complainants no more remedy than they are entitled to, will be exposing others to a menace to health which the Court can avoid by forcing the construction of the Controlling Works, if authorized, and the construction of the Treatment Works.

The persons whose health in the judgment of the Court will be menaced are not the State of Illinois and not the Sanitary District of Chicago. They are the inhabitants of the District, many of them citizens of the United States and travelers, some of them in interstate commerce. They are many of them entirely innocent. They are not parties to the suit. They can be protected by an effective decree that the works be built.

The defendants in their Brief filed March 12, 1930 on Exceptions to the Re-reference Report (p. 139) say:—

"The Court is appropriately and amply equipped to determine what sewage disposal works should be installed to dispose of the sewage and waste of the Sanitary District from a practicable standpoint and the time within which they may be constructed and to enforce by injunction the installation of such works."

The State of Illinois should now be enjoined to install such works.

It will be convenient to deal, in part, with the construction of the controlling works and with the construction of the Southwest Side Treatment Works together.

A decree ordering the Sanitary District to proceed now as rapidly as should be to complete construction of controlling works would be impossible to perform because of the financial condition of the District, which is considered hereinafter. The order should be to the State of Illinois.

The General Assembly of Illinois is now in regular session. Past experience indicates that this session will last into June, 1933, and then end.

The Constitution of Illinois, adopted in 1870, provides:—

"Article IV

"Legislative Department.

"Sec. 1. The legislative power shall be vested in a general assembly, which shall consist of a senate and house of representatives, both to be elected by the people."

The Supreme Court of Illinois (*The People* v. *Barnett*, 344 Illinois 62, 66, 76) has defined this section emphatically:—"Thus all the legislative power inherent in the people of the State of Illinois has been vested in the General Assembly, except in those cases in which the power has by express limitation or necessary implication been withheld. Since it alone has the power, the General Assembly has also the duty, and upon it alone rests the full responsibility of legislation. This power it may not delegate to any other officers or persons or groups of persons, or even to the whole body of the people, or to a majority of the voters of the state voting at a general election or at a special election. The constitution has made no general provision for a referendum of any act of the General Assembly to a vote of the people of the whole State to determine whether or not that act shall become a law."

"We hold that, under the constitution of Illinois, the General Assembly is the sole depository of the legislative power of the State; that it has no power to delegate its general legislative power, and may not refer a general act of legislation to a vote of the people of the State to decide whether it shall have effect as a law except where the constitution requires such reference."

The constitution of Illinois does not require a vote of the people to validate an act of the General Assembly to raise at once in the only possible way and to expend the money directed by a valid decree of the Supreme Court of the United States and necessary for the performance of that decree. Indeed, the decision quoted indicates that because the General Assembly cannot delegate its legislative power and duty to have the State perform its obligation under the Constitution of the United States, such a vote of the people would be unconstitutional under the constitution of Illinois.

When the State of Illinois became a part of the United States and a party to its constitution, the people of the State retained no right to vote that the State should not use its necessary means to perform its duties to other States as the Supreme Court of the United States within its jurisdiction has adjudged those duties to be and as it has enjoined the State to perform them.

It has come to pass that the only way in which the State of Illinois can perform those duties is by becoming indebted. Construction contracts and bond issues are the necessary means.

The State of Illinois is under a liability which it is within the jurisdiction of the Supreme Court of the United States to compel it to satisfy out of the resources of the State. The State has among its resources, the inherent power to contract for construction and to borrow money. When the Constitution of the United States by the judgment of its Supreme Court obliges the State to use that resource, any self-imposed prohibition to perform that obligation is repugnant to the supreme constitution and falls. A vote of howsoever large a number of people would be unconstitutional.

The Constitution of Illinois contains some commands as to what the General Assembly shall or shall not do in the exercise of the legislative power of the State, but it contains no provision reserving any part of that legislative power, to the people or cutting down this complete grant. The people cannot legislate.

Two things among others which the General Assembly may not do for internal purposes, are described in later sections of the Constitution, namely:—

"Section 18. Each General Assembly shall provide for all the appropriations necessary for the ordinary and contingent expenses of the government, until the expiration of the first fiscal quarter after the adjournment of the next regular session, the aggregate amount of which shall not be increased without a vote of two-thirds of the members elected to each House, nor exceed the amount of revenue authorized by law to be raised in such time; and all appropriations, general or special, requiring money to be paid out of the State treasury, from funds belonging to the State shall end with such fiscal quarter: *Provided,* the State may, to meet casual deficits or failures in revenues, contract debts, never to exceed in the aggregate $250,000; and moneys thus borrowed shall be applied to the purpose for which they were obtained, or to pay the debt thus created and to no other purpose; and no other debt, except for the purpose of repelling invasion, suppressing insurrection, or defending the State in war (for payment of which the faith of the State shall be pledged), shall be contracted, unless the law authorizing the same shall, at a general election, have been submitted to the people, and have received a majority of the votes cast for members of the General Assembly at such election. The General Assembly shall provide for the publication of said law, for three months, at least, before the vote of the people shall be taken upon the same; and provision shall be made at the time for the payment of the interest annually, as it shall accrue, by a tax levied for the purpose, or from other sources of revenue; which law, providing for the payment of such interest by such tax, shall be irrepealable until such debt be paid: *And, provided further,* that the law levying the tax shall be submitted to the people with the law authorizing the debt to be contracted."

"Section 20. The State shall never pay, assume, or become responsible for the debts or liabilities of, or in any manner give, loan or extend its credit to, or in aid of any public or other corporation, association or individual."

If it is the duty of the State of Illinois to build works necessitated by its adjudged violation of the rights of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York, in order, under tolerable conditions, to restore the enjoyment of those rights to the complainant States, the incurring of liabilities therefor, will not be an assumption of responsibility for the liabilities of the Sanitary District of Chicago, even if the State chooses to re-coup itself thereafter from the Sanitary District. The liabilities will be direct, of the State itself.

If, instead of this injunction, this Court had deemed the effect on third parties so intolerable, that the injunction must be denied and the Court, in the common way, had retained the bill for the assessment of damages sustained by the complainants and had entered a decree for payment of the amount, by the wrongdoers, that decree would be a debt of the State of Illinois, as well as of the Sanitary District. The duty to pay damages for future wrongful diversions would continue, as a duty of the State. These works are to render the injunction tolerable and so to prevent a liability for continued diversions. Therefore Section 20 does not stand in the way, if this Court enters a decree that the State complete the works.

The record ending in the final decree of April 21, 1930, shows that the wrong was done and is being done by the State. This has become *res adjudicata.* The postponement of the remedy did not make the continued diversion less of a wrong.

"In 1861, the Legislature [of Illinois] provided for improvement in the [Navigation] canal by excavation and a larger flow of water from Lake Michigan." (278 U. S. 367, 402).

"In 1881, the Illinois Legislature passed a resolution . . . to draw water from Lake Michigan through the Chicago River and the canal" (p. 402).

"The Sanitary District was organized under the Illinois Act of 1889" (Laws 1889, p. 125) (p. 403).

Section 23 of this act expressly provided that "If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute" [5000 c. f. s.] . . . "If the population of the district drained into such channel shall at any time exceed 1,500,000, such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district" [For a population of 3,500,000 (Re-reference Report, p. 5) 11,666 c. f. s.] (Original Report of Special Master, p. 15).

The Act of the Legislature of Illinois of June 10, 1895 (Ill. Laws 1895, p. 168) provided that the sanitary district constructing the channel shall at the time any sewage is introduced therein, turn into said channel not less than 20,000 cubic feet of water per minute [333 c. f. s.] for every 100,000 inhabitants of said district [for 3,500,000 people 11,666 c. f. s.] and "shall thereafter maintain the flow of such quantity of water" (Orig. Report, p. 17).

The State of Illinois commanded the Sanitary District of Chicago to do this wrong to the complainant States.

"The exact issue is whether the State of Illinois and the Sanitary District of Chicago by diverting 8,500 cubic feet from the waters of Lake Michigan have so injured the riparian and other rights of the complainant States bordering the Great Lakes and connecting streams by lowering their levels as to justify an injunction to stop this diversion" (278 U. S. 367, 409).

"The Legislature of Illinois and the Sanitary District have for a long period been strongly insistent upon such a use of the waters of Lake Michigan as would dispose of the sewage of the District and incidentally furnish a navigable water route from Lake Michigan to the Mississippi basin." (278 U. S. 367, 419).

"These suits, brought to prevent the State of Illinois and the Sanitary District of Chicago from continuing to withdraw water from Lake Michigan as they now are doing" (281 U. S. 179, 196).

"It was decided that the defendant State and its creature the Sanitary District were reducing the level of the Great Lakes, were inflicting great losses upon the complainants and were violating their rights, by diverting from Lake Michigan 8,500 or more cubic feet per second" (281 U. S. 179, 196).

"The defendants have submitted their plans for the disposal of the sewage" (281 U. S. 179, 197).

"It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defences upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State." (281 U. S. 179, 197).

"The defendants, the State of Illinois and the Sanitary District of Chicago, . . . are enjoined" (281 U. S. 696).

As an original fact and as *res judicata,* the State of Illinois did the wrong. The State of Illinois "must find out the way" to remedy the wrong. The State and the Sanitary District have presented only one way, the construction of controlling works if authorized and the construction of treatment works. They say in their brief that this court has power to enjoin the installation of such works.

The State of Illinois should be so enjoined.

Such an injunction will be a help and not a hindrance to the State. It will remove all doubt as to the liability of the State. When the matter comes before the General Assembly, it will not be the political question of building works for the Sanitary District. It will be the one-sided question—shall the State of Illinois perform its adjudged duties or shall it be in contempt of a decree of the Supreme

Court of the United States, and subject to the pecuniary or other penalties thereof as well as to the odium of disrespect.

Unless the State of Illinois is given the assistance of this conclusive determination of its duties, it cannot be known what time will be required for legislation.

There is an announced inability on the part of the spokesmen for the State of Illinois, to accept the language of the opinions and of the decree in these suits. They are quoted three pages back. Notwithstanding all there said, it is argued that the independent municipal corporation, the Sanitary District was and is the one which diverts this water and that the necessary measures now presented are devised as an unwise expedient to make the innocent State provide money for the Sanitary District. The opinions and the decree both show that this is not so. The State did this thing. The Court has decided so. It is the present duty of the State to hasten to right the adjudged wrong. It must be that if this is set out in the decree itself, the terms can be made unmistakable. I have heard and read no less than four arguments for the State on this point.

Even, it was argued graciously but insistently that the State was in a way but a jurisdictional party and that the Sanitary District was the substantial party.

With earnestness and with obvious sincerity the Governor of Illinois, February 28, 1933, testified that:—"It is of course, difficult for me to comprehend how it is possible for any court to impose upon our State responsibility for the obligations of a local tax spending municipality like the self-controlling Sanitary District.—Surely, no incident in the long history of our State has given any justification for the thought of any fair mind that our State, as a sovereign member of the Union, has failed to carry out any valid obligation to any sister state and to the nation. We do not consider the obligation of the Sanitary District of Chicago the obligation of the State of Illinois."

This statement ignores the obligation and the duty of the State already adjudged, to stop diverting water contrary to the rights of the Complainant States and to make the cessation tolerable to health.

The Governor had been in office fifty days only. He had been burdened with grave responsibilities. He had felt it necessary to call out militia to prevent possible riots. He estimated the daily cost of this to be between three thousand and four thousand dollars. He had had no opportunity to read the extensive record in these cases. Doubtless he was not aware that it was the State which commanded the Sanitary District to divert 11,666 c. f. s. of water which did not belong to it and that in obedience to that command the District is continuing to divert this water to the extent of 6,500 c. f. s.

There is another respect in which the State will be assisted by the determination of its duties, by decree. The latest estimate of the Sanitary District, February 1, 1933, calls for $139,000,000 to complete the work still to be done. It is unnecessary to determine how accurate this is. The complainants admit that it is enough and contend that it is too much. For the tolerable performance of the decree of April 21, 1930, the actual cost must be expended before December 31, 1938 or within five years and eight months of the earliest date at which a decree on this report may be expected. This is at the rate of approximately $25,000,000 a year. Contracts for this must be made. This amount must be available in money, if contracts are to be made.

The State may be expected to prefer to raise this by issues of bonds rather than wholly by taxation. The money required for the current year cannot be collected in taxes soon enough.

Under section 18 above quoted of the Constitution, "no other debt, except for the purpose of repelling invasion, suppressing insurrection, or defending the State in war (for payment of which the faith of the State shall be pledged) shall be contracted, unless the law authorizing the same shall at a general election, have been submitted to the people, and have received a majority of the votes cast for members of the General Assembly at such election."

It is assumed that this prevents any contracts and any bonds for internal purposes without such a popular vote. The next general election is to be held in November, 1934.

If a decree of the Supreme Court of the United States imposes a duty upon the State, for the performance of which it is necessary to contract and to borrow money, the General Assembly, possessed of the legislative power of the State, may exercise that power to contract and to borrow the necessary money. It seems untenable that the people, by vote or by not voting, could prevent the State from performing a decree of the Supreme Court of the United States. This Court has already said in this case, "It can base no defences upon difficulties that it has itself created. If its Constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State" (281 U. S. 179, 197). This seems to be tantamount to saying that for this Federal purpose the State without a popular vote may contract and may borrow money, if ordered by this Court to do so. A State may not avoid the performance of its duties imposed by this Court, by providing for such avoidance in its constitution.

The defendants contend that a popular vote is necessary and also that bonds of the State cannot be marketed advantageously unless supported by the opinion of counsel that they are legal and that no counsel would take the responsibility of saying that the legality of an issue without popular vote was free from doubt. This last probably is so.

The contention of the defendants brings the question before the Court for decision *inter partes.*

The decision of this Court will set all doubts at rest and will enable counsel to certify to the legality in this respect of the bond issues and so will improve their marketability.

Counsel have been requested to furnish any opinions, of the Courts of Illinois particularly, which are apposite. They have been unable to find any.

I have assumed that the defendants are right in contending that the Constitutional provisions under discussion are not only directory but also mandatory, when operative. They are not operative when forwarded to defeat or to impede the effectiveness of a decree of the Supreme Court of the United States entered at the suit of other States for a noncontractual wrong done them by the State of Illinois. The State of Illinois has legislative power to right that wrong. Its whole legislative power is vested in the General Assembly. Its obligation under the Constitution of the United States is to exercise that power to perform the decree of this Court entered against the State, within the jurisdiction of the Court under the paramount Constitution.

I find that the steps which should now be taken to secure such approval and construction of controlling works in the Chicago River are the enlargement of the decree of April 21, 1930, by the addition set forth at the beginning of this section 1 B, above.

2 A: THE CAUSES OF THE DELAY IN PROVIDING FOR THE CONSTRUCTION OF THE SOUTHWEST SIDE TREATMENT WORKS.

The causes of this delay are (1) an inexcusable and planned postponement of the beginning of construction of these Works to January 1, 1935 which left an inadequate time for their completion before December 31, 1938, at the rate of progress expected or to be expected under the methods pursued by the Sanitary District, and (2) the failure to proceed to a definite decision as to a site and to the acquisition of the site so chosen, and (3) the failure to proceed with reasonable diligence to prepare designs, plans, and specifications for the Works at this site or on the site of the West Side Works. The Sanitary District claims that this whole finding is erroneous.

It has been found that two years and six months would be a reasonable time to allow for the necessary preliminary steps for preparing plans and specifications and for advertising and passing upon bids (Re-reference Report, p. 58) and five and a half years for physical construction including tuning up, making a total of eight years (p. 70), and that the Southwest Side Treatment Works, with appurtenances should be completed on or before December 31, 1938 (p. 142).

This was the work which was to require the longest time. The diversion was to go to its permanent low of 1500 c. f. s. on December 31, 1938. This postponement was to give time for this longest job.

The eight years which were allowed were on the assumption of continuous progress beginning in 1930. The defendants contended for more time.

The Sanitary District passed an ordinance to acquire a specific site for this plant, on December 26, 1929, nine days after the Re-reference Report was filed. It proceeded with diligence to get the necessary information to make purchases or to condemn. Complaints arose from the neighborhood. The Sanitary District appointed a proper citizens' committee to report on the site. They reported in favor, within three months after the decree was entered in these cases. Public hearings were held promptly. Protestants presented respectable evidence that the ordained site was unnecessary and that the West Side site was large enough for both works.

On August 15, 1930, the Sanitary District prepared a plan for a layout of the entire West Side Works and Southwest Side Works on the present 501-acre site of the West Side Works and on about 200 acres contiguous thereto on the west, not owned by the Sanitary District. This layout included sludge drying beds. It provided definitely for the expected sewage until 1945 and tentatively for that up to 1970.

Nothing was done toward acquiring the 200 acres.

Opposition to the ordained site continued. On January 22, 1931 the Sanitary District repealed the ordinance of December 26, 1929.

One of the reasons, why the Sanitary District repealed this ordinance, was that the District was about to submit a bond issue to popular vote, and it was thought advisable not to have the prospect of success dimmed by this particular site protest.

In view of the protest and if the West Side site is adequate, this repeal was a proper exercise of judgment. In view of the obligation of the Sanitary District to proceed with all proper speed to provide Southwest Side Treatment Works, the ordinance should not have been repealed, until the Sanitary District had decided that the West Side site was adequate for both or that a better site was obtainable promptly. The Sanitary District claims that this finding is erroneous. The Sanitary District, then, had not decided that the West Side site was adequate for both or that a better site was obtainable promptly.

The impediments in the way of acquisition of a site and the repeal of the ordinance were outlined in the reports of the Sanitary District to this Court for July 1, 1930, January, 1, 1931, and July 1, 1931.

In May, 1932, the Sanitary District, for the first time, prepared a plan for a layout of a combined West Side Works and Southwest Side Works, on the present site of the West Side Works, with an incineration plant substituted for any sludge drying beds, not already built.

Turn, now, from the selection of a site to measures for construction.

On September 10, 1930, the engineers of the Sanitary District completed a chart, assigning periods for the construction of each major part of each of the Treatment Works and of the intercepting sewers to serve each, namely, except for controlling works, the projects set out in the Re-reference Report (pp. 10, 11) as estimated for the future, by the defendants to cost as of December 31, 1928,

$172,166,000. In the chart, the classifications differed somewhat from those in the estimates to the Special Master in 1929. Those estimates carried a catch-all item for the unforeseen of $10,000,000. This was really a safety range, and not an estimate. In the September 10 chart this item as such disappears. The amount is spread ratably over the detailed items, making them each, generally, about 106% of actual estimates. It does not appear how much had been included already for contingencies, in the items of the original estimate.

In the September 10 chart the divisional totals were:—

Calumet		$21,106,000
North Side		2,500,000
West Side		58,592,000
Southwest Side	$49,940,000	
Racine Ave. Station	4,968,000	
South Side Sewers	19,429,000	74,337,000
Des Plaines		4,025,000
Other Intercepting Sewers		9,483,000
		$170,043,000

The chart assigns to each item an engineering cost and a construction cost. The total of these items for engineering is $8,117,000. The chart does not assign a time for the expenditure of this engineering cost. It is included in the $170,043,000. The separate total for construction cost is the balance of $161,926,000. It is this total, which the chart assigns by items to periods.

The chart carries an additional item "Controlling Works, $4,000,000", not assigned to any period.

The chart is entitled "Dates for Awarding Contracts for the Complete Sewage Treatment Program." It is blocked into quarter years. It carries a note "The time for construction is shown only to the nearest three month period."

As to the Southwest Side Treatment project of $49,940,000, the chart assigns December 1, 1930 to March 31, 1932 for land at a cost of $3,000,000, and no construction work before January 1, 1935. The construction work begins with Imhoff Tanks. The other items are progressively deferred by quarter years. They gradually overlap to nearly full concurrence in the latter part of 1937. The whole is completed December 31, 1938.

The Racine Avenue Pumping Station ($4,968,000) is placed for construction ($4,758,000) between January 1, 1932 and June 30, 1934.

The South Side Sewers ($19,429,000) are placed for construction ($18,247,000) between October 1, 1933 and December 31, 1938.

Each construction, is preceded by a chart symbol for three months for "Advertising and Awarding Period."

If it be assumed that the uncharted preliminary steps for preparing plans and specifications, requiring two years and six months (Re-reference Report, p. 58) were taken promptly and to a conclusion on all the items before advertising for any bids, the whole Southwest Side Project would be ready for bids by January 1, 1933 and not much before. If construction on the project generally, requiring five and a half years (p. 70), were then advertised, contracted for, and begun, it would be done June 30, 1938.

The Sanitary District had contended that more time would be necessary.

In actual operation, there would not be this marked division between total design and total constructions. The Re-reference Report contemplates some concurrence of design and construction.

Whichever way is pursued, the charted apportionment of the Southwest Side Project is well in arrears of the program required by the indications of the Re-reference Report.

Reference to the work if any done on the North Side, West Side, Calumet, and Des Plaines Projects and on the other intercepting sewers is omitted at this point, as it appears to be not within the Order of December 19, 1932, appointing me.

In attempted justification of the complete postponement of charted construction of the Southwest Side Treatment Works, the Sanitary District asserted its desire to have the cost of the whole Treatment Project fall somewhat reasonably evenly over the years from 1931 to 1938 inclusive.

The chart does not support the assertion. The charted division of the construction cost is:—

1930	$419,000
1931	16,208,000
1932	17,786,000
1933	17,697,000
1934	14,143,000
1935	17,178,000
1936	22,960,000
1937	23,813,000
1938	31,722,000
	$161,926,000

When attention was called at the hearings, to the disparity of charted costs in the respective years, it was stated that the Sanitary District had other large obligations expected to mature in the early years. It may be assumed that this is true. No finding on it is called for or made.

As the Re-reference Report contemplates that largely the construction of the Controlling Works and of the North Side, West Side, Calumet, and Des Plaines Projects shall be completed by December 31, 1935 at a cost of approximately 42% of the cost of all the Projects, the Sanitary District was right in giving timely precedence to those other Projects, in case it was impossible to deal concurrently with all the Projects.

The Re-reference Report indicates that the Southwest Side Project should go forward promptly during the progress on the other Projects and without delaying until the completion of the latter.

Turning, now, from the postponement planned in September, 1930, by the Sanitary District, to the actual performance, it is clear that it has been almost negligible when compared with such a huge project.

According to the Semi-annual Reports of the Sanitary District, the expenditures on the Southwest Side Project have been:—

April 21 to December 1, 1930	$43,575.46
December 1, 1930 to December 1, 1931	37,411.58
December 1, 1931 to December 1, 1932	6,319.61
	$87,306.65

These were made in the efforts at acquisition of a site, in reinvestigation of the Stockyards and Packingtown wastes, and in studies for the Southwest Side plant and in some adaptations of West Side plant designs to Southwest Side uses.

Lack of money has been no part of the cause of postponement of the construction of the Southwest Side Treatment Works. That construction did not overtake the money available.

The investigation into the Stockyards and Packingtown wastes, the Sanitary District at no time has contended, justified a delay as a single factor until January 1, 1936, in the construction of the Southwest Side Treatment Works. A further investigation into these wastes did not justify a delay until January 1, 1935, in the construction of the Southwest Side Treatment Works. A few months at most was deemed by the Special Master enough for this in 1929 (Re-reference Report, p. 55). There has been no change since, as to this.

The Sanitary District if investigating on its own time while in the rightful use of its own water and continuing no wrong to the complainants, could be commended for taking reasonable steps to bring its information concerning these wastes to the best point attainable, before designing these huge works. This was not the situation. The wrong to the complainants was continuing. The information wanted was largely to enable the Sanitary District to design works, the most unobnoxious to the neighborhood, in operation and the most economical to construct and to operate, with due regard for efficiency. The information was wanted for the benefit of the Sanitary District and not for the benefit of the complainants.

The other delays were so effective, that the halting search for information concerning these wastes has not delayed construction.

As it now turns out, the failure to purchase or to condemn a site for the Southwest Side Treatment Works has not delayed construction. This is because the Sanitary District has altered its plans.

The Re-reference Report (p. 12) outlines the process of treatment and disposal under the program which the defendants submitted to the Special Master in 1929, from the arrival of the raw sewage at the intake pumps of the Works to the departure of the effluent, from 85% to 90% purified, to the Sanitary Canal and of the dried sludge to fertilizer or to land dumps.

The Sanitary District now brings forward new methods, which it asserts to be more economical both for construction and for operation. These do not affect the character of the effluent to the Sanitary Canal. They are for the disposal of the solids and of the sludge containing them.

In general, the new method follows the old for the effluent and for the accumulation or settlement of the sludge, except that the Imhoff tanks need not be installed and less expensive sedimentation tanks omitting the digestive features, take their place.

The departure from the process considered in 1929 is in the method of handling the wet sludge from the tanks. The 1929 process took it after digestion, to open air drying beds to be dried by drainage and by evaporation and to be removed mechanically when dried. The new process dewaters and incinerates the sludge without digestion.

The avoidance of grounds for complaint from the neighborhood, the reduction in drying area and the lessened cost to construct and to operate are the objects sought.

The new process conditions the wet sludge by chemicals and conveys it to a revolving drum filter which removes a large amount of water. The remaining cake is stripped off and conveyed to a rotary heat drier to reduce the moisture to a low point. The nearly dried cake then is conveyed to a furnace which burns it as fuel to produce the heat for the drier. This leaves for disposal, only the ash or clinker, inert and practically free from organic matter.

A life-sized experiment begun in a practical way in August, 1932, is now going on at the West Side Treatment Works. The engineers of the Sanitary District believe that it is a success but that it will take an entire year from August, 1932, with its seasonal changes, to prove it.

Already, a sub-experiment is going on, to substitute roller presses for the drying drum, sufficiently to expel the moisture to reduce the sludge to burnable condition. Comparative economy is the object.

Under the program of 1929, the North Side Treatment Works was to pump its sludge to the West Side Works. This is done now. Extensive acreage was necessary at the West Side site for drying the sludge to be produced at the two plants and for a reserve for future growth. The same was true for the site of the contemplated Southwest Side Treatment Works.

If this can be avoided by the new process, then, the West Side site is large enough to incinerate the sludge from the North Side Treatment Works and to accommodate the West Side Treatment Works and the Southwest Side Treatment Works; and the two can be operated to some extent as one plant. The construction of the West Side Treatment Works has advanced too far, for a complete economical consolidation of the two.

From the standpoint of saving expense to the Sanitary District, further experimentation before decision, design, and construction is reasonable, but not so, with regard for the rights of the complainants and for the decree of April 21, 1930.

The opinion of the engineers of the Sanitary District now is that the incinerating process is a success and that the District will provide no more sludge digestion tanks and no more drying beds unless something appears before next summer to change this opinion and that the Southwest Side Treatment Works should be placed wholly on the present West Side site.

The Trustees of The Sanitary District, without as such taking any action, have decided virtually, to place the Southwest Side Treatment Works wholly on the presently owned West Side site, and to incinerate the greater part of the sludge from the North Side, West Side and Southwest Side Works.

It is only by the exercise of unusual diligence that the time already lost to progress on the Southwest Side Treatment Works can be counteracted and the Works completed before December 31, 1938. They can be completed by that date if the work of design and construction begins before July 1, 1933, and is pressed vigorously. It is doubtful whether otherwise, they can be completed before 1939.

Although the scope of the Order of December 19, 1932, discourages any detailed reference to the West Side, Calumet, and Des Plaines Projects, it is to be noted for its bearing on the program for the Southwest Side Project, that all are far behind schedule. Measured by expenditures in comparison to total estimates, about 16% of what should be done on these other projects before December 31, 1935, has been done. Unless effort and expense are enlarged concurrently on all the Projects, the decreed reduction in diversions will produce conditions the avoidance of which was the sole object of the time indulgences by the Court.

Returning now to the September 10, 1930 charted plan, of the Sanitary District to postpone the beginning of construction of the Southwest Side Treatment Works to January 1, 1935, and assuming sincerity in the representations of the Sanitary District to the Special Master in 1929, of the time required to complete, I am forced to find and do find that there was not a reasonable prospect that such a plan would result in the actual completion of the Southwest Side Treatment Works on or before December 31, 1938.

For these several reasons, I find the causes of the delay in providing for the construction of the Southwest Side Treatment Works to be as stated above in the first paragraph under heading 2 A, of this section.

2 B: THE STEPS WHICH SHOULD NOW BE TAKEN FOR SUCH CONSTRUCTION OR, IN CASE OF A CHANGE IN SITE, FOR THE CONSTRUCTION OF AN ADEQUATE SUBSTITUTE.

The most effective step is an enlargement of the decree of April 21, 1930 by the addition of a paragraph enjoining the State of Illinois to provide forthwith the necessary money for, and through the Sanitary District of Chicago or through other instrumentality chosen by the State, forthwith to determine upon and secure the site for the Southwest Side Treatment Works, if the site is not owned already by the Sanitary District and forthwith to design and to construct said Southwest Side Treatment Works of the kind proposed to the Special Master of this Court in 1929 or of a kind no less efficient for the purification of the effluent to be discharged to the Sanitary Canal and at a rate of progress forthwith that except for casualties not now foreseeable will result in the completion of said Works and the beginning of their operation in ordinary course before December 31, 1938.

The reasons in support of this step are set out under section 1 B of this report. Some of them apply with greater force here because it will be more difficult for the Sanitary

District to raise more than $60,000,000 for the construction of the Southwest Side Treatment Works than $4,000,000 for the construction of the Controlling Works.

The Sanitary District opposes an order to the State of Illinois to provide the necessary money and to construct the Southwest Side Treatment Works, on the alleged grounds that the obligation is not the State's and that the Sanitary District has determined to construct these works on the West Side site which it now owns and is prepared to construct these Works as soon as the necessary funds which the District is endeavoring to get are available, and ample time remains for this construction assuming that funds will be available and that a finding that the District will not obtain the necessary funds or will not construct these Works by December 31, 1938 is premature and unwarranted.

I find that the steps which should be taken now for the construction of the Southwest Side Treatment Works or in case of a change in site, for the construction of an adequate substitute, are the enlargement of the decree of April 21, 1930, by the addition set forth at the beginning of this section 2 B.

3 A: The Financial Measures on the Part of the Sanitary District Which are Reasonable and Necessary in Order to Carry out the Decree of this Court.

Hereinafter, I refer to financial measures which are open to the Sanitary District for later years. The urgency for money at once, makes it desirable to deal first with what should be done before July 1, 1933.

If the financial measures hereinafter set out are required of the State of Illinois, it is not reasonable to require the Sanitary District to take any financial measures now, in addition to those which it is taking.

The financial problem now before the District is to get enough money to complete, largely before December 31, 1935, and wholly before December 31, 1938, works which will cost hereafter $139,000,000 according to the latest estimate made by the Sanitary District. No finding is made as to the correctness of this estimate.

According to the estimate of 1929, the cost for work after April 21, 1930, the date of the decree, was to be $179,744,-438.58 (Return filed Nov. 7, 1932, p. 12). From that date to October 14, 1932, there was expended against this $10-691,605.93 (p. 13). The cost of the work still to be done October 14, 1932 was re-estimated at $154,350,500 (p. 55). The substitution of incineration for sludge drying is estimated to reduce this by $9,775,000 (p. 57). The original estimate for Miscellaneous Plants and Sewers $10,000,000 was reduced October 14, 1932 to $8,000,000 (p. 55). The estimate of February 1, 1933 reduces this to $2,000,000. The difference of $6,000,000 plus the $9,775,000 taken from the $154,350,500 leaves approximately $139,000,000.

The Sanitary District has no way to get money now except from taxes or from loans. It has resources in rentals from leased lands, in saleable lands, in saleable stone from spoil banks, and in electrical energy sold to others. As a present source of ready money in a large way these are negligible. The current rents are $65,000 annually. The gross revenue from electrical energy sold is estimated for 1932 at $1,100,000; but it costs about that amount to produce it.

Before the Sanitary District can make any contract for design or for construction of any works it must comply with the following conditions:—

1 The Constitution of Illinois and the governing statute each limits the indebtedness of the District, as a municipal corporation (*Judge* v. *Bergman,* 258 Illinois 246, 251; *The People* v. *Nelson,* 133 Illinois 565, 582, 583, 590, 595, 598), to five percent in the aggregate on the value of the taxable property therein, to be ascertained by the last assessment for State and county taxes, previous to the incurring of such indebtedness (*Constitution,* Article IV, section 12; *Cahill's Illinois Revised Statutes,* 1931, Chapter 42, Para. 345).

2 The District may levy taxes for corporate purposes upon the property within the territorial limits of the district not to exceed in the aggregate in any one year, exclusive of the amount levied for the payment of bonded indebtedness and interest thereon, one third of one percent of the value of the taxable property within the corporate limits as the same shall be assessed and equalized for the county taxes for the year in which the levy is made (Chapter 42, Para. 349), or approximately, now $12,666,666, subject to a down-scaling requirement which may reduce it to $5,700,000.

3 The District may not, with exceptions immaterial here, issue bonds unless the proposition to issue such bonds shall have been first submitted to the legal voters of the District and shall have been approved by a majority of those voting upon the proposition. This restriction does not apply to bonds for $7,614,000 unsold balance of an issue of $27,000,000 authorized without referendum, in 1929 by the General Assembly or to bonds of $36,000,000 authorized in 1931 by the General Assembly, in confirmation of a referendum, questioned by a recount petition (Chapter 42, Para. 345).

4 The District must make its annual appropriation ordinance in January. It shall not make any appropriations thereafter (Chapter 42, Para. 341, (6) Sec. 5 f.).

5 The District has no power to make any contract or to do any act which shall add to the District expenditures or liabilities in any fiscal year, any thing or sum over and above the amount provided for in the annual appropriation ordinance for the fiscal year. There are exceptions not material here (Same Section).

6 No Contract shall be made or expense liability incurred by the board of trustees or any member or committee thereof, or any person or persons, for or in its behalf, notwithstanding the expenditure may have been ordered by the board unless an appropriation therefor shall have been previously made by said board in manner aforesaid. Any contract verbal or written, made in violation of this section shall be null and void. Nothing herein contained shall prevent the making of contracts for the lawful purposes of the district, the terms of which contracts may be for periods of more than one year, but any contract so made shall be executory only for the amounts for which the said district is lawfully liable in succeeding fiscal years (Chapter 42, Para. 341 (7), Sec. 5g).

7 In no event shall the total aggregate expenditures in the budget exceed the total means of financing the said budget (Chapter 42, Para. 341 (6), Sec. 5f).

For the reasons hereinafter stated, the Sanitary District is powerless in March 1933, to contract for the design or for the construction of Controlling Works, or for the construction in a large way of the Southwest Side Treatment Works. It is powerless to contract for the design or for the construction of any Works, at a cost, including contracts already made, in excess of $38,086,950.81.

The prerequisite ordinance, for January, 1933 has been passed. This closes down the contractual powers until 1934, to the items therein. This ordinance confines the appropriations for these works to bond issues and their proceeds. Nothing is to come out of the annual tax levy. The amounts appropriated are these:—

Controlling Works, nothing	$0.00
Southwest Side Treatment Works, for Engineering and Designing	57,580.00
Acquisition of land for site	505,940.00
Acquiring land and construction	30,700.00
West Side, North Side, Calumet, Salt Creek Intercepting Sewer, Ninety-fifth Street Pumping Station, North Side Intercepting Sewers, North Branch Pumping Station, West Side Intercepting Sewer, Residue Extension Enlargements and Betterments —many items amounting in the aggregate to	24,822,716.45
	$25,416,936.45

Of these appropriations, the only ones available for the design or for the construction of the Southwest Side Treatment Works amount to $88,280.

The many items making up this $24,822,716.45 are for the detailed purposes stated and to be met from the proceeds of particular bond issues authorized for those particular purposes only, so that the amounts are not interchangeably available.

Of the $24,822,716.45, contracts already let and not yet fully performed will absorb $8,810,500 for work to be done. In addition, there is due, for work already performed, for which payment has not been made, approximately $1,115,000.

The foregoing shows the 1933 limit upon contractual power for additional work, assuming that money could be made available by the sale of bonds.

The tax limit of one third of one percent of $3,800,000,000 valuation is $12,666,000. The 1933 levy for corporate purposes is $4,000,000. No more can be levied now for 1933. This levy is not payable until April 1934 in ordinary course. It cannot be known when it will be made payable under present conditions.

Next to be considered, is the debt limit.

The gross debt limit of the Sanitary District in March, 1933, is not safely over $190,000,000.

The District's valuation for purposes of 1930 taxation was:—

Real Estate	$3,373,275,520
Personal	831,374,743
Railroad's Corp., etc	199,413,184
	$4,404,063,447

This was the last assessment before February, 1933. It is expected that the assessment for 1931 is now completed or about to be, and that it will fix a valuation of approximately $3,800,000,000.

Real estate has been valued for purposes of taxation throughout the State since 1928 at thirty-seven percent of its estimated fair cash market value. The assessed valuation and not the actual, determines the debt limit (*City of Chicago* v. *Fishburn,* 189 Illinois 367, 377).

The Constitutional five percent of this $3,800,000,000 makes the gross limit of $190,000,000.

The Sanitary District, on January 12, 1933, at my request submitted a list of its debts as follows:—

Bonds outstanding:		
Overdue	$8,014,500.00	
Unmatured	99,018,500.00	$107,032,000.00
Interest on overdue bonds	$284,451.07	
Interest on unmatured bonds	5,158,402.50	5,442,853.57
Tax Anticipation Warrants	$8,736,200.00	
Interest thereon	499,938.00	9,236,138.00
Unpaid bills, salaries and wages		1,475,000.00
Construction contracts		8,700,000.00
Electric power contract during remaining 16 of 20 years		29,108,523.00
Lease of General Offices		149,682.72
Lease of Laboratories		4,989.80
Total		$161,149,187.09

These I find to be the debts of the Sanitary District, subject to the qualification that the Supreme Court of Illinois has said that tax anticipation warrants, whereby a municipality promises to pay out of a particular tax already levied are not to be reckoned as debts in determining the existing debts of the municipality, to arrive at the net limit of its borrowing power (*Booth* v. *Opel,* 244 Illinois 317, 327; *Holmgren* v. *City of Moline,* 269 Illinois 248; *City of Chicago* v. *McDonald,* 176 Illinois 404, 418; *Fuller* v. *Heath,* 89 Illinois 296; *City of Springfield* v. *Edwards,* 84 Illinois 626, 633). The warrants issued by the Sanitary District met this requirement.

Deducting this item $9,236,138 from the $161,149,187.09 leaves $151,913,049.09. Deducting this from the gross limit of $190,000,000 leaves the unexhausted power of the Sanitary District to incur debts, limited to $38,086,950.81.

The complainants contend that the deduction of $29,108,523 for the power contract should not be made. The defendants claim that a deduction should be made but that it should be refigured at $19,000,000. The facts follow.

Under date of December 22, 1927, the Sanitary District made a contract with the Public Service Company of Northern Illinois whereby the District agreed to take and the Company agreed to supply electric power for all the work of the District both construction and operation, with exceptions immaterial here, over a period of twenty years from a fixable date between May 1, 1928 and May 1, 1929 at a stated unit price, slightly variable by a definite formula, based on the cost to the Company of the coal used to generate the power. For present purposes the only element of uncertainty was as to the amount of power which the work of the District would require. This would determine the amount to become payable under this contract.

The Supreme Court of Illinois has held that, for debt limit purposes, such a contract liability if sufficiently certain in amount, expressly or computably in advance, is an indebtedness for the full amount that will become payable under it, throughout the period covered (*Wade* v. *East Side Levee and Sanitary District,* 320 Illinois 396, 403-405; *Evans* v. *Holman,* 244 Illinois 596; *Schnell* v. *City of Rock Island,* 232 Illinois 89, 97; *City of Chicago* v. *Galpin,* 183 *Illinois* 399, 404, 407; *Law* v. *The People ex rel. Huck, Collector,* 87 Illinois 384, 396; *City of Springfield* v. *Edwards,* 84 Illinois 626, 632; but see *East St. Louis* v. *The Coke Company,* 98 Illinois 415, 430, and *City of Carlyle* v. *Carlyle Water, Light and Power Co.,* 140 Illinois 445, as explained in later decisions).

The degree of uncertainty as to the amount to become payable under the present electric power contract is greater than in the nearest of the decisions cited; but no prudent lender would hazard the chance that the Supreme Court of Illinois would hold this contractual obligation to be a debt. No financial measure now is reasonable that does not treat this obligation as a debt.

The amount of this debt cannot be demonstrated now. It must be estimated. In 1929, an estimate was made by the Sanitary District, of upwards of $33,000,000. This amount has been reduced by payments for use to January 1, 1933, so that it has become $29,108,523. On December 27, 1932, I requested the Sanitary District to furnish evidence of its present debts. On January 12, 1933, in response, the Sanitary District furnished the list which included this item in this amount. On January 30, 1933, the Sanitary District presented a schedule, to show its contention as to its ability to finance the treatment and controlling works program. In this schedule the electric power contract obligation is included as a debt of $19,000,000 and no more. The decline of $10,000,000 invited attention.

On January 13, 1933, the Chairman of the Committee on Finance of the District and the Assistant Chief Engineer of the District set themselves to forecasting a way to finance this project. For some time, the Engineering Division of the District had observed that some of the major processes of disposal were requiring less electric power than had been estimated. The electric power contract obligation was reestimated in the light of this information, and at $19,000,000. It is futile to determine now, which estimate is the nearer right. The future may support either or one between. An estimate born so suddenly and under such stress has not matured long enough to make it a safe one to take, in determining what now are reasonable or necessary financial measures. On present appearances, no prudent lender will rate this obligation at less than $29,108,523.

Accordingly I find that in March, 1933, the unexhausted power of the Sanitary District to incur debts is limited to $38,086,950.81. If I am in error, and the electric power contract liability should be reckoned at $19,000,000 only, the limit is $48,195,473.81.

This sum is not to be increased by cash on hand or by taxes levied, due and uncollected (*Wade* v. *East Side Levee and Sanitary District,* 320 Illinois 396, 415).

In consuming this borrowing capacity of $38,086,950.81, a revolving sum must be kept in reserve to cover periods of duplication. If the District sold bonds now for $38,086,950.81, it could make no more contracts for design or for construction, because these contracts would become at once, debts, contingent on performance by the contractor, notwithstanding the fact that the bonds had been sold and that the money proceeds were in hand to meet the contract obligations when they became payable. On the other hand, if contracts for design or for construction are made in the amount of $38,086,950.81, no more bonds can be sold. Both contracts and bond sales must fall enough short of the limit at all times to avoid this. A close approach to the limit can be attained by selling the bonds in small quantities and applying the proceeds at once to reducing the contract obligations until the contract amounts have been paid and the bond debts to the limit have taken their place. The Supreme Court of Illinois has said that if bonds were sold to the limit for a building fund and then a contract for building is made, by which the contract price is to be paid only from that fund, the contract is not invalid (*Hartmann* v. *Pestotum School District,* 325 Illinois 268, 279).

There is a possibility that the Sanitary District may acquire more bonding power later, by paying off existing debts, from collections of delinquent and future taxes, as far as they are applicable to such a purpose.

On January 1, 1933, the Sanitary District had in its treasury $88,457.80. The delinquent taxes due it were:—

For 1928	$3,670,957
1929	7,317,089
1930	9,985,440
	$20,973,486

The Sanitary District in January of each year, 1930 to 1933 inclusive, levied taxes as follows:—

	Bonds		*Corporate*
	Principal	*Interest*	*Purposes*
1930	$8,937,500	$7,080,391.25	$7,098,900
1931	9,330,500	7,972,713.75	8,000,000
1932	9,429,500	5,511,961.25	7,000,000
1933	9,493,500	5,473,738.75	4,000,000
(on defaulted bonds)		170,625.05	
(on defaulted coupons)		112,941.73	

In 1930, the Sanitary District levied also $600,000 for water power improvements. On March 12, 1931, this levy was cancelled.

On March 12, 1931, the bond levy of 1930 was reduced to $8,497,500 for principal and $6,129,203.75 for interest.

On October 6, 1932, the bond levy of 1931 was reduced to $8,208,500 for principal, and $5,667,453.75 for interest, and the corporate levy for 1931 was reduced to $5,000,000.

These reductions in the bond levies were against bonds which ~~have been~~ ordained for issue but which have not been sold.

These taxes when received will be available for the particular purposes only for which they were levied. Subject to this, from them, there should be paid:—

Tax anticipation warrants (the payment of which will not release any bonding power, because they have not been deducted)	$9,236,138.00
Bonds—principal in default January 1, 1933	8,014,500.00
Bond interest in default January 1, 1933	5,442,853.57
Unpaid bills, salaries and wages	1,475,000.00

These items call for more than $24,000,000. If this were paid, it would lift the bonding power about $15,000,000.

The Sanitary District states that the amounts which will be available for payment of defaults of principal and of interest on bonds, if and when delinquent and 1931 taxes are paid in full, are as follows:—

From delinquent taxes for 1928-30	$10,716,715.29
From taxes for 1931	9,520,953.75
	$20,237,669.04

This is not enough to cure past and 1933 coming defaults. They are:—

January 1, 1933 principal	$8,014,500.00
Interest	5,442,853.57
1933 maturities principal	6,840,500.00
Estimate for interest	5,000,000.00
	$25,297,853.57

The only resource to cover the $5,000,000 shortage, is tax anticipation warrants against taxes already levied for 1932 and 1933. The prospect for the sale of these in any such amount is very poor.

The Sanitary District represents that it is about to apply to the General Assembly for authority to issue bonds, without a referendum, to refund its bonds and coupons now in default. On February 16, 1933, the Board of Trustees approved a draft of an amending act for this purpose and instructed the Law Department to cause its introduction in the General Assembly. This draft provides for refunding bonds at not exceeding six percent, to be issued and sold or exchanged at par for maturing bonds, without a referendum.

Each year should reduce the electric power contract obligation to the extent of the power used and paid for. This has been estimated at $700,000 a year during the next five years. It does not appear how accurate this estimate is.

If money could be obtained from new bond sales to pay for the unperformed balance of the outstanding construction contracts it would lift the bonding power $8,700,000.

Liability for the rents under leases should be diminished annually by payment.

Outstanding unmatured bonds are to mature in

1933	$6,840,500
1934	7,209,500
1935	7,211,500
1936	7,109,500
1937	7,103,500
1938	6,934,500

These should be paid as they mature. If they are paid they will release a corresponding amount of borrowing power.

Meanwhile, new bonds for more must take their place, for money to carry out the construction project. The new bonds must be made payable within twenty years. They need not be made payable in equal amounts annually.

Any improvement in the borrowing limit is dependent on getting payment of taxes. The prospect for this is colored by the situation not only in the District itself but in Cook County with which the District is nearly coterminous.

Within this County, there are about four hundred and twenty tax levying bodies, the largest of which is the City of Chicago which is almost wholly within the Sanitary District.

Within the County as of January 1, 1933 there are funded debts about as follows:—

Cook County	$35,000,000.00
City of Chicago	136,147,400.00
Board of Education of Chicago	30,500,000.00
Forest Preserve Commissioners	13,594,000.00
Commissioners of Lincoln Park	18,552,000.00
West Chicago Park Commissioners	11,475,000.00
South Park Commissioners	56,607,000.00
Sanitary District	107,032,000.00

A partial list of current liabilities is about as follows:—

Cook County	$30,000,000.00
City of Chicago	144,955,311.00
Sanitary District	16,153,991.57

Bonds of Cook County are in principal default for $1,398,500, and those of the Sanitary District for $8,014,500.

For this region there is needed, not including payment of maturing bonds and interest, for current corporate operations, annually about as follows:—

Cook County	$18,000,000.00
City of Chicago	82,600,000.00
Board of Education	78,000,000.00
Sanitary District	7,500,000.00

This incomplete statement does not include any bonded debts, current debts, or operating requirements for the other contained municipalities, some sixty within the Sanitary District alone (Re-reference Report, p. 5).

The Chairman of the Illinois Emergency Relief Commission, created by an act of the legislature as of February 6, 1932 has estimated the needs for unemployment relief in Cook County for 1933 at $80,000,000.

A two percent retail sales tax is under consideration for this purpose, and estimated to yield for the State $40,000,000. Cook County has obtained or is to obtain in 1933 from the Reconstruction Finance Corporation $17,000,000 on Poor Relief Bonds, not included in the above funded debt of Cook County for January 1, 1933. These Poor Relief Bonds are payable out of one cent of a three cent gasoline sales tax.

For Cook County and its contained municipalities the total direct taxes, levied, collected or delinquent for 1928-30, are as follows:—

	1928	1929	1930
Tax Spread	$233,162,829.54	$260,544,670.22	$290,284,505.85
Collections	187,096,429.20	193,556,235.57	174,170,703.51
Delinquent	$46,066,400.34	$66,988,434.65	$116,113,802.34
Percent delinquent	19 plus	25 plus	40

The taxes levied for 1931, are just going into collection in February or March, 1933.

The total tax spreads above, include the portion of the State tax which falls on Cook County.

There is a plan afoot to spread payment of two years back taxes over a period of five years.

For five years, the constituted authorities in Cook County have encountered great difficulties in collecting taxes. The validity of the levies has been in litigation (*Bistor* v. *Board of Assessors*, 346 Illinois 362, certiorari denied in United States Supreme Court; *People ex rel McDonough County Collector* v. *Cesar*, 349 Illinois 372, certiorari denied February 6, 1933 in United States Supreme Court). This is not all ended. It is believed locally, that payment of taxes is improving. Even so, the prospect is not bright for the collection of taxes fast enough to enable the Sanitary District greatly to improve its borrowing power soon, through reducing its existing debts by payments.

Its present gross debt limit of $190,000 is dependent on a valuation for 1931 of $3,800,000,000 as compared with $4,404,063,447, for 1930. A reduced valuation for 1932 and later years is not improbable.

The Sanitary District contends that it can carry out the construction program within its debt limit. To support this contention the District on January 30, 1933 submitted a schedule dated January 24, 1933 to show its future financial capacity. The testimony is that the work on this schedule was begun on January 13, 1933. This is the schedule:—

"January 24, 1933.

Capacity of The Sanitary District of Chicago to finance the Government Sewage Treatment Program by the end of 1938, amounting to $139,000,000.

Total Debt Incurring Capacity 5% of $3,800,000,000. (Estimate for 1931 valuation, final figure not as yet available			$190,000,000
Encumbered Debt Incurring Capacity			
Bonds Outstanding		$107,032,000	
Other Liabilities—			
Power Contract	$19,000,000		
Construction Contracts	8,810,500		
Miscellaneous	1,000,000	28,810,500	
Total Encumbered Debt Incurring Capacity			135,842,500
Unencumbered Debt Incurring Capacity			$54,157,500
Increase in Debt Incurring Capacity during 1933 to 1938, inclusive, through Retirement of part of Present Outstanding Bonds—			
Year	*Retirement of Principal*		
1933	$14,853,000		
1934	7,209,500		
1935	7,211,500		
1936	7,109,500		
1937	7,103,500		
1938	6,934,500	50,421,500	
Through Reduction of Power Contract Liability at annual rate of $500,000		3,000,000	
Through completion of existing contracts		8,810,500	
Through retirement of part of $139,000,000 of new bonds to be sold—			
Year	*Retirement of Principal*		
1934	$700,000		
1935	1,700,000		
1936	2,750,000		
1937	3,950,000		
1938	5,200,000	14,300,000	
Increase in Debt Incurring Capacity, 6 years at Annual Rate of $4,000,000		24,000,000	
Total Increase in Debt Incurring Capacity—1933-1938			100,532,000
Total Debt Incurring Capacity Available			$154,689,500"

The unwarranted optimism which gave birth to this schedule renders it unconvincing. It omits debts for overdue interest	$5,442,906
It shortens unpaid bills, salaries and wages	475,000
It shortens the estimate on the electric power contract	16,108,523
	$16,026,423
It assumes that all defaults will be cured without incurring further interest liability. It assumes that all maturities 1933 to 1938 will be met as they come. So it assumes that outstanding bonds will be paid off to the extent of	$50,421,500
It assumes that bonds hereafter sold will be paid off before January 1, 1939 to the extent of	14,300,000
It assumes that assessed values in the District will increase by $480,000,000, thus increasing the gross debt limit by	24,000,000
Thus the hopes exceed the prospects by a sum that, if times remain evil,—possibly may come to be	$104,747 923

The prospect, highly colored by the best hopes within reason, is that the Sanitary District will be unable financially to construct these Works before December 31, 1938.

This is so, because of the legal limit on its borrowing power. Next to be considered is the market limit.

Even if within the legal limit, the only unsold issues which have been authorized are:—

Unsold balance of $27,000,000 authorized in 1929	$7,614,000
Authorized in 1931	36,000,000
	$43,614,000

Even within the limit of $38,086,950.81, these are the only bonds which can be sold without a further ordinance of authorization and a popular vote or an enabling act of the General Assembly.

The authorized but unsold bonds are not saleable except at a very heavy discount. Since the default on the bonds, they have sold in the fifties. It would not be possible to obtain as much as seventy for any considerable block of them. Until all defaults of principal and interest are cured, these bonds are not normally marketable, even at a considerable discount.

The Sanitary District has applied to the Reconstruction Finance Corporation to buy bonds for $36,450,000, of those already authorized for issue. This is for specified uses:—

Calumet Project	$13,674,000	
West Side Project	22,426,000	
North Side Project	350,000	$36,450,000

This application has been denied on the ground that the project is not self-liquidating.

On December 6, 1932, a bill was introduced in the House of Representatives of the United States (H. R. 13315) and referred to the Committee on Banking and Currency, to amend Paragraph 1, Section 201, Title 2 of The Emergency Relief and Construction Act of 1932 to dispense with the self-liquidating requirement, in loans to municipalities and certain others on certain conditions, "to aid in financing projects necessary to public health or welfare, heretofore authorized under Federal, State, or municipal law." On February 3, 1933, the Committee held a hearing on this bill.

On January 27, 1933, in reply to my inquiry, the Chairman of the Board of the Reconstruction Finance Corporation wrote as follows:—

"I have your letter of January 20, 1933 requesting information with regard to an application for a loan submitted to this Corporation by the Sanitary District of Chicago.

"Section 201 (a) of the Emergency Relief and Construction Act of 1932 expressly prohibits taxation as a source of revenue for the purpose of rendering a project financed by this Corporation self-liquidating. In view of the fact that the Sanitary District is financed almost entirely by revenues directly derived from taxes imposed by such District, therefore, this Corporation is without authority under the statutes defining its powers to make a loan of the kind requested by the District.

"Any amendments to the legislation controlling the functions of this Corporation are, of course, a matter entirely for the determination of the Congress and it would, therefore, be impracticable for officials of this Corporation to attempt to express any opinion as to the prospects for the success of the application in question as a result of any changes in the present law which the Federal Legislature may see fit to make."

The Representative who introduced House Bill 13315 stated that the prospect is poor for getting the bill out of committee in the Seventy-second Congress but that there is some reason to believe that the Senate may pass a similar measure in time for concurrence by the House. March 6, 1933 he advised that the House had not acted on concurrence.

The complainants contend that the financial plight of the Sanitary District rests squarely upon self-created or self-controllable obstacles on the part of the defendants particularly in that the District's financial difficulties rest upon a failure to collect normal taxes, as were collected elsewhere in the State of Illinois, by officers or political agencies of the State of Illinois for the performance of which duties the responsibility rests squarely upon that State.

I find that the Sanitary District is not responsible for this.

The unmarketability of its bonds is due to the default of principal and interest. They were regarded as triple A bonds, by reliable bankers, before the default. The default is due to the nonpayment of taxes assessed for their payment. The Sanitary District has no powers of collection. The treasurer of Cook County is the collector (Cahill's Ill. Rev. St., Ch. 120, Par. 162, p. 2336). He is required to pay over the collections of the District's taxes to the treasurer of the District (Cahill's Ill. Rev. St. 1931, Ch. 42, Par. 349, p. 1208).

The Constitution fixed the gross debt limit beyond the control of the Sanitary District. Before the end of 1928, the General Assembly took away the authority of the Sanitary District to issue bonds, after December 31, 1928 without a referendum. In 1929, the General Assembly provided that the Sanitary District of Chicago may from time to time issue bonds, without submitting the issuance thereof to the voters of said district for approval, for an amount not to exceed in the aggregate twenty-seven million dollars ($27,000,000) (exclusive of any other bonded indebtedness of said district) for the completion, enlargement and/or construction (including the payment of existing contract liabilities and the acquisition of sewer easements) of the several Treatment Works, now under consideration. This contained no authorization of the use of any of this $27,000,000 for Controlling Works.

The Sanitary District made an attempt to obtain from the Legislature, an unlimited exemption from the requirement of a referendum, before issuance of bonds for loans to be applied exclusively to the construction of these Treatment Works. On May 15, 1930, the District passed the resolution following:—

"Whereas, the Supreme Court of the United States, on April 14, 1930, rendered an opinion in the case of *Wisconsin, et al*, v. *Illinois, et al*, which requires The Sanitary District of Chicago to reduce its diversion of water from Lake Michigan through the Chicago River on July 1, 1930, to 6500 cubic feet per second plus pumpage, and on December 31, 1935, to further reduce said diversion to 5000 cubic feet per second plus pumpage, and on December 31, 1938, to still further reduce said diversion to 1500 cubic feet per second plus pumpage; and

Whereas, The Sanitary District of Chicago is required under said opinion to file with the Clerk of the Supreme Court of the United States semi-annually on July 1 and January 1 of each year, beginning July 1, 1930, a report adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in its sewage treatment program, and also setting forth the extent and effects of the operation of the sewage treatment plants respectively that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of its decree to the date of such report; and any of the parties to the above suit may apply to the court for such action or relief as may be deemed to be appropriate with respect thereto; and

Whereas, the said sewage treatment program consisted of the construction of the following plants and structures:

(a) The North Side Sewage Treatment Works, with appurtenances.

(b) The Calumet Sewage Treatment Works, with appurtenances.

(c) The West Side Sewage Treatment Works, with appurtenances.

(d) The Southwest Side Sewage Treatment Works, with appurtenances.

And Whereas, the Supreme Court of the United States held:

> 'The defendants have submitted their plans for the disposal of the sewage of Chicago in such a way as to diminish so far as possible the diversion of water from the Lake. In the main these plans are approved by the complainants. The master has given them a most thorough and conscientious examination. But they are material only as bearing on the amount of diminution to be required from time to time and the times to be fixed for each step, and therefore we shall not repeat the examination. It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the State of Illinois devotes all its

powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defenses upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State.'

And Whereas, The Sanitary District of Chicago in its relations with the United States Government has reached a crisis which requires that it expend millions of dollars to acquire the necessary sites for said sewage treatment plants, to construct and complete the same, with appurtenances thereto and sewers connected therewith, and incur the necessary engineering and other expenses, which sum of money must be obtained from time to time by bond issues as required, on or before December 31, 1938; and

Whereas, under existing laws, The Sanitary District of Chicago cannot pass ordinances for the issuance of bonds and obtain money thereunder without obtaining authority from the people by a referendum vote on each bond issue; and

Whereas, under the mandatory requirements of the Supreme Court of the United States, such a referendum would answer no useful purpose, inasmuch as now the people have no discretion whatever in the premises and such sewage treatment plants must be constructed; and

Whereas, The Sanitary District of Chicago has not sufficient funds to proceed with and carry out that part of its sewage treatment program which embraces the year 1930, and will not have any money which would enable it to carry out said sewage treatment program during the year 1931 without submitting the same to a referendum of the people, and as a result, no contracts can be awarded to carry out said program for the year 1931 and succeeding years; and

Whereas, to carry out the sewage treatment program of The Sanitary District within the time required by the Supreme Court decision, The Sanitary District of Chicago will be required, for the next 6 years, to sell bonds for and expend an average of $20,000,000.00 per year.

Now, Therefore, be it Resolved, That the Board of Trustees of The Sanitary District of Chicago, in regular meeting assembled, request that the Governor of the State of Illinois call a special session of the General Assembly of the State of Illinois, and include in his call a provision to revise the existing laws governing The Sanitary District of Chicago, so that it will be able to procure the necessary funds to carry out its sewage treatment program above set forth, and to issue bonds therefor without submitting the issuance of said bonds to a referendum of the people, and that The Sanitary District of Chicago can issue such bonds for said sewage treatment program to comply with the decision of the Supreme Court above referred to."

This contained no provision for Controlling Works.

This attempt failed.

In July, 1931, the General Assembly, in confirmation of a successful referendum, questioned by a recount petition, authorized an issue of bonds for $36,000,000 without popular vote, but only for these purposes, including appurtenances, namely:—

West Side Sewage Treatment Works	$11,000,000
Calumet Sewage Treatment Works	20,300,000
Southwest Side Sewage Treatment Works	3,100,000
North Side Sewage Treatment Works	1,600,000
	$36,000,000

The Sanitary District has tried to get the money to design and to construct the Treatment Works, but not the Controlling Works.

But responsibility or none does not change the situation of impotence for the time being, of the Sanitary District.

In the conditions which now exist, there is no reasonable financial measure which The Sanitary District can take, which it is failing to take.

Sources for Financing in Later Years.

Under existing legislation, the possible financial resources of the Sanitary District are:—

1. Borrowings within The Constitutional debt limit,
2. General tax levies,
3. Special assessments,
4. Service charges.

1. BORROWINGS WITHIN THE CONSTITUTIONAL DEBT LIMIT.

It is possible (a) that the constitution of Illinois may be amended, if an amendment is submitted and adopted at the general election in November, 1934 to increase the debt limit of the Sanitary District for this particular purpose, and (b) that under existing law the actual limit can be more than doubled by a true valuation of real estate for purposes of taxation.

It is obvious that neither of these methods is within the control of the Sanitary District and that the first is not within the control of the General Assembly. There is no present prospect that either will be pursued voluntarily.

If the Supreme Court of the United States could and did enjoin the Sanitary District or the General Assembly to advocate or to submit an amendment for this purpose, it is not likely that it would produce the adoption of the amendment unless at least this Court had made clear that the cost of this project will fall on the State, if it is not met by the Sanitary District. It is not the best method of financing within sight, and it is not a reasonable method and it is not necessary.

The valuations of real estate for purposes of assessment could be more than doubled without any change in the law, if the public officials charged with the duty of making the valuations were persuaded or were forced to increase them. The existing statute (Cahill's Illinois Revised Statutes (1931), Chap. 120, Para. 1-4, Secs. 1-4, Para. 329, Sec. 18) provides that property "shall be valued" personal property at its fair cash value and real estate "at its fair cash value, estimated at the price it would bring at a fair, voluntary sale".

Notwithstanding these statutes, real estate is valued systematically for assessment, at thirty-seven percent of its value. Any attempt to change this policy would involve a survey of the general legislation and economics of the State. Debt limits within the Constitution and tax limits have been fixed by the General Assembly at percentages set with regard to the way in which valuations were being made for purposes of taxation. At times there have been attempts at legislative direction that assessed values should be fixed at one-fifth of the full values (*City of Chicago* v. *Fishburn*, 189 Illinois 367, 375).

In order to get these works constructed, it is not necessary to invade this state-wide policy of the State. A financial measure which required such an excursion would not be reasonable. Such a measure is not necessary.

2. GENERAL TAX LEVIES.

The prospect is that within its taxing limit as now set by statute, the Sanitary District can acquire by future tax levies, little if any money for this project. This limit is within the control of the General Assembly and can be raised indefinitely, as far as appears. The District is confronted by two statutory limits, the first express and the second finally ascertainable when other taxing bodies within Cook County have made their levies. By the first, the District is limited to one-third of one percent of the assessed value of the taxable property in the District in addition to bond principal and interest requirements (*Infra*, Para. 349). On the expected valuation of $3,800,000,000 for 1931, this limit would be $12,666,666. By the second, with many exceptions, the levy by all assessing bodies on taxable property within any part of Cook County is limited to one percent in the aggregate of the assessed value of the property in that part (*Infra,* Para. 362). Under this law, after the levies are made, they must be scaled down far enough to come within the limit. This scaling as to the Sanitary District must stop so that its levy is not forced below fifteen cents on each one hundred dollars of assessed valuation, in addition to bond principal and interest requirements. Until the levies for a given year have been made by all the tax levying bodies in the County, the Sanitary District cannot be sure of more than the fifteen cents. On the expected valuation for 1931, this would be $5,700,000. This sum appears to leave no margin above normal annual requirements, for this construction project. If the State is required to meet the cost of this project, it will rest in the discretion of the General Assembly to determine whether the Sanitary District should be given a greater taxing power, to reimburse or to exonerate the State.

3. SPECIAL ASSESSMENTS.

For any improvement, the Sanitary District may levy a special assessment upon property within the District but only to the extent to which the property will be benefitted by the improvement (*Infra,* Para. 350). The proceedings are to conform to Article nine of the Cities and Villages Act of April 10, 1872. (Cahill's Illinois Revised Statutes, 1931, Chapter 24, Article IX). The text of this is so extensive that it is not included hereinafter. There are many reasons which render this special assessment power not a large financial resource for this project. The ordinance under which the improvement is made must provide that it is to be made under the special assessment laws. Liberal time is allowed for publication, public hearings, objections and trial by jury as to amount of benefit to any particular property.

None of the present project has been ordained for special assessment. It would be very difficult if not impossible to separate future work under the project and relate it in benefit to any particular parcels of property. The best chance for this would be in the case of the Southwest Side Treatment Works and the intercepting sewers to reach them, because this separable part of the project has not yet been undertaken. As to this, it is impossible to say now what if any benefit will come to any particular property from this part of the project. The properties within the Southwest Side area drain through primary sewers, constructed not by the Sanitary District but generally by other municipalities, into the Sanitary Canal, which, as far as it has been constructed by the Sanitary District, has been paid for by general taxation of all the taxable property within the Sanitary District or by proceeds of bond issues met or to be met by general taxation. The intercepting sewers and the treatment works are not to provide any better drainage for any particular properties. They are to make it possible, with protection to health and to public welfare, for the State of Illinois and the Sanitary District to stop its unlawful diversion of water from Lake Michigan.

The Stockyard and Packingtown wastes are discharged in the Southwest Side area. This will call for larger intercepting sewers than otherwise would be necessary but they are the same sewers which are to receive the flow from the primary sewers, which serve the area generally.

It is not reasonable to rely in advance on special assessments as a financial resource available in time for the required completion of this project.

4. SERVICE CHARGES.

The Sanitary District has no present power under the Statutes to make service charges for receiving from the primary sewers or for treating ordinary sewage in common quantities. All its facilities have been paid for or are to be, by general taxation.

The Sanitary District asserts that before the entry of the United States into the Great War, negotiations were had between the District and the Packers, toward voluntary agreements for the handling or treating of packers' wastes but that these lapsed after April 6, 1917 and that they have not been resumed.

Something more than seven years ago, the Sanitary District proceeded against twenty-three of the packers (*The Sanitary District of Chicago* v. *Chicago Packing Company,* 241 Illinois Appeals 288, June 23, 1926) to enjoin them from disposing of their trade wastes through the Sanitary Channel. A demurrer was sustained. On appeal, the Appellate Court for the First District, Third Division, composed of three Justices, held two to one that the decision below should be reversed because (298) "The proper disposal of sewage by the Sanitary District of Chicago being the primary purpose for which the District was created, authorized the defendants to turn their sewage into the channel of the Sanitary District but does not authorize them to turn into the channel any of their trade wastes that may not be properly designated as sewage" . . . "garbage, offal, flesh, blood, hair, bone, parts of dead animals" are not all of them "sewage". At this point, in 1926, the case fell asleep. Thereupon, the Sanitary District sought and obtained an act of the General Assembly (*Infra,* Para. 343) which empowered the District (a) to regulate and to control the discharge of so-called factory or industrial wastes directly or indirectly into the sewers or works of the District and (b) to contract with industries as to the amount of treatment which the industries shall give their wastes and as to what payments the industries shall make to the District for treatment.

On July 25, 1929, a regulating ordinance was considered by the Sanitary District and it was voted that it be published and deferred. No contracts have been negotiated with industries for treatment of their wastes or for payment to the Sanitary District for such treatment.

It does not appear that the Sanitary District now has power to impose a service charge for treatment. It is dependent on obtaining contracts with industries, entered into voluntarily or under the fear of regulation.

It is stated by the Sanitary District that the Southwest Side area is the only one containing any producers of industrial wastes in unusual quantities. The prospect is that the Sanitary District will not be in a position to furnish treatment to industrial wastes, in any large way, in this area before 1938. Therefore, service charges for treating industrial wastes, are not for some years to come a financial resource.

Even then, the prospect of income from this source is poor, unless legislation is obtained which will empower the District to impose a charge without contract. Any such legislation may encounter the claim that it is the dictum in 241 Illinois Appeals 288, 298, *supra,* that, notwithstanding large volume, only what is not sewage is outside the right of discharge of property owners within the District.

Whether it is a right policy to make a charge to the owners of real estate for the use or for the disproportionate use of works which have been provided in whole or in part by taxation of that real estate, is a question to be settled by the policy-controlling part of the government of the State, until, at least, it appears that the interposition of the Court is required in order to prevent an injustice.

TEXT OF SECTIONS OF THE CONSTITUTION AND OF THE STATUTES.

This is a repetition of provisions summarized above in Section 3 A of this report:—

THE CONSTITUTION.

Article IX.

"Section 12. No county, city, township, school district, or other municipal corporation, shall be allowed to become indebted in any manner or for any purpose, to an amount, including existing indebtedness, in the aggregate exceeding five percentum on the value of the taxable property therein, to be ascertained by the last assessment for State and county taxes, previous to the incurring of such indebtedness. Any county, city, school district, or other municipal corporation incurring any indebtedness as aforesaid, shall before, or at the time of doing so, provide for the collection of a direct annual tax sufficient to pay the interest on such debt as it falls due, and also to pay and discharge the principal thereof within twenty years from the time of contracting the same. . . ."

THE STATUTES.

(Cahill's Illinois Revised Statutes 1931.)

[Chapter 42.]

"Para. 341 (6). § 5f. *Enactment of annual appropriation ordinance:* The board of trustees of the district shall consider the budget estimates as submitted to it by the committee on finance and may revise, alter, increase, or decrease the items contained in the budget; *provided, however,* that in no event shall the total aggregate expenditures in the budget exceed the total means of financing the said budget.

The board of trustees shall, within the first thirty (30) days of each fiscal year, adopt the budget and shall finally pass an ordinance, to be termed the annual appropriation ordinance, together with such other ordinances as may be required in and by which appropriation ordinance the said board of trustees shall appropriate such sums of money as may be necessary to defray all necessary expenses and liabilities of said district to be by said board of trustees paid or incurred during and until the time of the adoption of the next annual appropriation ordinance under this section; provided, that the said board of trustees shall appropriate such sums of money as shall be necessary to pay the principal and interest on bonds for the current fiscal year and the next succeeding year; *provided, further,* that said board shall not expend any money or incur any indebtedness or liability on behalf of said district in excess of the percentage and several amounts limited by law, and based on the limit prescribed in the constitution, when applied to the assessment of the current fiscal year. Said appropriation ordinance shall specify the several funds, organization units, purposes and objects for which such appropriations are made, and the amount appropriated for each fund, organization unit, object or purpose. The revenues of the district as estimated in the budget and as provided for by the tax-levy ordinance and other revenue and borrowing acts or ordinances, shall be and become applicable in the amounts and according to the funds specified in the budget for the purpose of meeting the expenditures authorized by the appropriation ordinance. The vote of said board of trustees upon said appropriation ordinance shall be taken by yeas and nays, and the same shall be entered in the proceedings of the said board of trustees.

Such appropriation ordinance may be amended at the next regular meeting of the board of trustees occurring not less than five days after the passage thereof, in like manner as other ordinances; and in case any items of appropriation contained therein are vetoed by the president of the board, with recommendations for alterations or changes therein, the adoption of such recommendations by a yea and nay vote shall be regarded as the equivalent of an amendment of such annual appropriation ordinance with like effect as if an amendatory ordinance had been duly passed.

Such appropriation ordinance shall not take effect until after it shall have been once published in a newspaper having general circulation in the district, and said board shall provide for and cause said appropriation bill to be published as aforesaid within ten days after final passage of such appropriation ordinance.

The clerk of the said board of trustees shall certify that such appropriation ordinance as published is a true, accurate and complete copy of the appropriation ordinance as passed and approved by the said board of trustees. The board of trustees shall also make public, by publication or otherwise, at this time, the tax rate necessary or estimated to be necessary to finance the budget as adopted.

After the adoption of such appropriation ordinance, the board of trustees shall not make any further or other appropriations prior to the adoption or passage of the next succeeding annual appropriation ordinance, and the said board shall have no power, either directly or indirectly, to make any contract or to do any act which shall add to the district expenditures or liabilities in any fiscal year, anything or sum over and above the amount provided for in the annual appropriation ordinance for that fiscal year, *provided, however,* the board of trustees shall have the power, anything in this Act to the contrary notwithstanding, if and when the voters have approved a bond ordinance for a particular purpose, which bond ordinance shall not have been passed at the time the annual appropriation ordinance was passed, to pass a supplemental appropriation ordinance (in compliance with the provisions of this Act as to publication and voting thereon by the board of trustees) making appropriations, for the particular purpose only as set forth in said bond ordinance, of the proceeds of the said bond ordinance or any part thereof required to be expended during the fiscal year; *and provided further, however,* that nothing herein contained shall prevent the board of trustees, by a concurring vote of two-thirds of all the trustees, (said votes to be taken by yeas and nays and entered in the proceedings of the said board of trustees) from making any expenditure or incurring any liability rendered necessary to meet emergencies such as epidemics, floods, fires, unforseen damages or other catastrophies, happening after the annual appropriation ordinance shall have been passed or adopted. Nor shall anything herein contained be construed to deprive the board of trustees of the power to provide for and cause to be paid from the district funds any charge upon said district imposed by law without the action of said board of trustees."

"Para. 341 (7). § 5g. *When expenditures are prohibited:* No contract shall hereafter be made, or expense or liability incurred by the said board of trustees, or any member or committee thereof, or by any person or persons, for or in its behalf notwithstanding the expenditure may have been ordered by the said board of trustees, unless an appropriation therefor shall have been previously made by said board in manner aforesaid. No officer, head of a department, or commission shall, during a fiscal year, expend or contract to be expended any money or incur any liability, or enter into any contract which, by its terms, involves the expenditure of money for any of the purposes for which provision is made in the appropriation ordinance in excess of the amounts appropriated in said ordinance. Any contract, verbal or written, made in violation of this section shall be null and void as to the district, and no moneys belonging thereto shall be paid thereon; *provided, however,* that nothing herein contained shall prevent the making of contracts for the lawful purposes (5) of said district, the term of which contracts may be for periods of more than one year, but any contract so made shall be executory only for the amounts for which the said district is lawfully liable in succeeding fiscal years."

"Para. 343 (1). *Disposal of Industrial Waste.* § 7a. The Sanitary District, in addition to the other powers vested in it, is empowered:

"(a) To regulate and control the discharge of so-called factory or industrial wastes, either in solution or suspension, into the sewers or works of said sanitary district, whether said discharges are made directly into the works or sewers of said sanitary district or indirectly through the sewer systems of a municipality or other area lying within the boundaries of said district;

"(b) To contract with the industry or industries producing wastes for the purpose of determining the amount of treatment which said industry or industries shall give the wastes at the point of origin, and also for the purpose of determining what payment said industry or industries shall make annually or otherwise for the treatment which may be given its wastes by the works of said sanitary district;

"(c) To require any occupant of any industrial premises inside or outside of the boundaries of any established municipality within the area of said sanitary district engaged in discharging factory or industrial wastes into any river, canal, ditch or other waterway within the boundaries of said sanitary district to construct new sewage disposal plants and to so change or re-build any outlet, drain or sewer as to discharge said factory or industrial waste or trade waste into the sewers of such municipality or into such intercepting sewers as may be established by said sanitary district under such regulations as said sanitary district may determine;

"(d) To make, promulgate and enforce such reasonable rules and regulations for the supervision, protection, management and use of any system of intercepting sewers and treatment works as it may deem expedient, and such regulations shall prescribe the manner in which connections to the main sewers or intercepting sewers shall be made and may prohibit discharge into said sewers of any liquid or solid waste deemed detrimental to the sewerage system or treatment works of said sanitary district."

"Para. 345. *Corporations under this Act may borrow money — Bonds — Limitation — Referendum — Exception — Ballot.* § 9. The corporation may borrow money for corporate purposes and may issue bonds therefor, but shall not become indebted in any manner, or for any purpose to an amount in the aggregate to exceed five (5) per centum of the valuation of taxable property therein, to be ascertained by the last assessment for State and county taxes previous to incurring of such indebtedness. No ordinance providing for the issuance of bonds of any sanitary district organized under this Act shall be valid, unless it specifically states the purpose for which such bonds are to be issued and the funds derived from the sale of any such bonds shall be used solely for the purpose stated in such ordinance. Such bonds may be sold and delivered as and when the proceeds thereof shall be deemed necessary by the board of trustees. Bonds shall be of the form and tenor and shall be executed for and on behalf of such sanitary district by such of its officers as may be specified in the bond ordinance. The validity of every bond so executed shall remain unimpaired by the fact that one or more of the subscribing or attesting officers shall have ceased to be such officer or officers before the delivery of said bonds to the purchaser.

After December 31, 1928, no such sanitary district shall issue bonds for any purpose, except for the purpose of paying lawful claims against such sanitary district for damage to land or for damage to or destruction of other property, where such damage or destruction is caused or occasioned by such sanitary district, unless the proposition to issue such bonds shall have been first submitted to the legal voters of such sanitary district, and shall have been approved by a majority of those voting upon the proposition. *Provided,* the Sanitary District of Chicago may from time to time issue bonds, without submitting the issuance thereof to the voters of said district for approval, for an amount not to exceed in the aggregate twenty-seven million dollars ($27,000,000) (exclusive of any other bonded indebtedness of said district) for the completion, enlargement and/or construction (including the payment of existing contract liabilities and the acquisition of sewer easements) of the intercepting sewers, tunnels, conduits, sewage treatment plants, and pumping stations of said district, together with equipment and appurtenances necessary thereto, commonly known and described as follows: Calumet Sewage Treatment Works, North Side Sewage Treatment Works, North Branch Pumping Station, West Side Sewage Treatment Works, West Side Intercepting Sewer, and Salt Creek Intercepting Sewer; for the acquisition of land for an additional site for said Calumet Sewage Treatment Works and for a site for a proposed new sewage treatment plant to be known as the 'Southwest Side Sewage Treatment Works'; for engineering expenses for designing such Southwest Side Sewage Treatment Works, the intercepting sewers connecting therewith, and a new sewage pumping station to be known as the 'Racine Avenue Pumping Station'; for the reconstruction and rehabilitation of the electrical terminal station of said district located at Thirty-first Street and Western Avenue, in the city of Chicago; and for the purpose of paying existing contract obligations arising and growing out of the construction by said district of its North Side Intercepting Sewer and its Ninety-fifth Street Pumping Station and sewers connecting therewith.

Also further provided the Sanitary District of Chicago from time to time may issue and sell bonds as authorized in and by certain ordinances of the board of trustees of said district, adopted January 16, 1931, for an amount not to exceed $11,000,000 for paying the cost of the construction and enlargement of the sewage treatment works and additions thereto, pumping stations, tunnels, conduits and intercepting sewers connecting therewith, together with equipment and appurtenances necessary thereto, commonly known and described as the West Side Sewage Treatment Works; for an amount not to exceed $20,300,000 for paying the cost of the construction and enlargement of the sewage treatment works and additions thereto, pumping stations, tunnels, conduits and intercepting sewers connecting therewith, together with equipment and appurtenances necessary thereto, commonly known and described as the Calumet Sewage Treatment Works; for an amount not to exceed $3,100,000 for paying the cost of acquiring the land for the site and of the construction and enlargement of the sewage treatment works and additions thereto, pumping stations, tunnels, conduits and intercepting sewers connecting therewith, together with equipment and appurtenances necessary thereto, commonly known and described as the Southwest Side Sewage Treatment Works, and for an amount not to exceed $1,600,000 for paying the cost of the construction and enlargement of the sewage treatment works and additions thereto, pumping stations, tunnels, conduits and intercepting sewers connecting therewith, together with equipment and appurtenances necessary thereto, commonly known and described as the North Side Sewage Treatment Works. Said bonds may be issued without submitting propositions therefor to the voters of said district for approval and shall be in addition to any other bonded indebtedness which said district is authorized by law to incur; and all proceedings heretofore taken by the board of trustees of said district in adopting said ordinances on January 16, 1931, authorizing said several issues of bonds, publication of such ordinances and filing of certified copies thereof in the office of the county clerk of Cook County are hereby confirmed.

Whenever the corporate authorities of any such sanitary district desire to issue bonds for any of its corporate purposes, except as hereinabove provided, they shall by ordinance direct that the ordinance or ordinances for the issuance of such bonds be submitted to the legal voters of such sanitary district at any general election or at a special election to be held for such purpose. Such ordinance shall prescribe the form of the ballot, fix the date of the election, and direct the clerk of such sanitary district to publish a notice of the submission of the ordinance or ordinances, to issue such bonds once a week for three consecutive weeks prior to such election, in a secular newspaper of general circulation within the territorial limits of such sanitary district. The ballot to be used at any such election shall state the purpose for which it is proposed to issue such bonds and the amount thereof, as set forth in each ordinance authorizing the issuance thereof, and shall be in substantially the following form:

Shall bonds for the purpose of (State purpose)	Yes	
in the sum of .... be issued by the Sanitary District of	No	

It shall not be necessary to print in full on the ballot any such ordinance authorizing the issuance of bonds.

Any such election for the submission of a bond ordinance or ordinances shall be conducted by the election officials authorized by law to conduct elections for trustees for such sanitary district. Said election officials shall fix the polling places at which any such election is to be held and select the judges and clerks therefor. Any such election shall be conducted, the vote canvassed, and the result thereof declared in the same manner as is provided by law in the case of elections for trustees for such district; and the laws in force relating to the conduct of general elections shall govern any such election."

"Para. 349. *Taxes — Levy by trustees — Limitation — Bridges not to interfere with navigation — Mode of construction.* § 12. The board of trustees may levy and collect taxes for corporate purposes upon property within the territorial limits of such sanitary district, the aggregate amount of which in any one year exclusive of the amount levied for the payment of bonded indebtedness and the interest on bonded indebtedness shall not exceed one-third of one per centum of the value of the taxable property within the corporate limits as the same shall be assessed and equalized for the county taxes for the year in which the levy is made. Said board shall cause the amount to be raised by taxation in each year, to be certified to the county clerk on or before the second Tuesday in August as provided in section one hundred and twenty-two of the general revenue law. All taxes so levied and certified shall be collected and enforced in the same manner and by the same officers as State and county taxes, and shall be paid over by the officer collecting the same to the treasurer of the sanitary district, in the manner and at the time provided by the general revenue law: *Provided,* that no part of the taxes hereby authorized shall be used by such drainage district for the construction of permanent, fixed, immovable bridges across any channel constructed under the provisions of this Act: *And provided further,* that all bridges built across such channel shall not necessarily interfere with or obstruct the navigation of such channel, when the same becomes a navigable stream, as provided in section 24 of this Act, but such bridges shall be so constructed that they can be raised, swung or moved out of the way of vessels, tugs, boats, or other water craft navigating such channel: *And provided further,* that nothing in this Act shall be so construed as to compel said district to maintain or operate said bridges, as movable bridges, for a period of nine years from and after the time when the water has been turned into said channel pursuant to law, unless the needs of general navigation on the Des Plaines and Illinois Rivers, when connected by said channel, sooner require it."

"Para. 350. *Taxation by special or general assessment —Manner of assessing and collecting taxes.* § 13. The board of trustees shall have power to defray the expenses of any improvement made by it in the execution of the powers hereby granted to such incorporation, by special assessment, or by general taxation, or partly by special assessment and partly by general taxation as they shall by ordinance prescribe. It shall constitute no objection to any special assessment that the improvement for which the same is levied is partly outside the limits of such incorporation, but no special assessment shall be made upon property situated outside of such sanitary district, and in no case shall any property be assessed more than it will be benefited by the improvement for which the assessment is levied. The proceedings for making, levying, collecting and enforcing of any special assessment levied hereunder shall be the same as nearly as may be as is prescribed by article nine of an Act entitled 'An Act to provide for the incorporation of cities and villages,' approved April 10, 1872. Whenever in said act the words "city council" are used, the same shall apply to the board of trustees constituted by this Act, and the words applying to the city or its officers in that article shall be held to apply to the corporation hereby created and to its officers."

[Chapter 120.]

"Para. 362. *Rate — Extension — Levy — Reduction — Minimum Rate — Distribution of Reduction.* § 2. The county clerk in each county shall ascertain the rates per cent required to be extended upon the assessed valuation of the taxable property in the respective towns, townships, districts, incorporated cities and villages in his county, having a population of over 200,000, as equalized by the State Tax Commission for the current year, to produce the several amounts certified for extension by the taxing authorities in said county (as the same shall have been reduced as hereinbefore provided in all cases where the original amounts exceed the amount authorized by law); *provided, however,* that if the aggregate of all taxes (exclusive of State taxes, township taxes, village taxes, levy taxes, public tuberculosis sanitarium taxes, pension fund taxes, library taxes, school building taxes, high school taxes, district school taxes, road and bridge taxes, judgment taxes, working cash fund taxes, and taxes levied for the payment of the principal of and the interest on bonded indebtedness of cities and school districts and for the payment of the principal of and the interest on park bonds hereafter issued, and exclusive of taxes levied pursuant to the mandate or judgment of any court of record on any bonded indebtedness), certified to be extended against any property in any part of any taxing district or municipality, shall exceed 1% of the assessed valuation thereof upon which the taxes are required to be extended, the rate per cent of the tax levy of such taxing district or municipality shall be reduced as follows: The county clerk shall reduce the rate per cent of the tax levy of such taxing district or municipality in the same proportion in which it would be necessary to reduce the highest aggregate per cent of all the tax levies (exclusive of State taxes, township taxes, village taxes, levee taxes, public tuberculosis sanitarium taxes, library taxes, pension fund taxes, school building taxes, high school taxes, district school taxes, road and bridge taxes, judgment taxes, working cash fund taxes, and taxes levied for the payment of the principal of and the interest on bonded indebtedness of cities and school districts and for the payment of the principal of and interest on park bonds hereafter issued, and exclusive of taxes levied pursuant to the mandate or judgment of any court of record on any bonded indebtedness), certified for extension upon any of the taxable property in said taxing district or municipality, to bring the same down to one per cent of the assessed value of said taxable property upon which said taxes are required by law to be extended: *Provided, further,* that in reducing the tax levies hereunder the rate per cent of the tax levy for county purposes for the year 1929 shall not be reduced below a rate of thirty-one (31) cents on each one hundred dollars valuation, and for the year 1930 and each even numbered year thereafter shall not be reduced below a rate of thirty-two (32) cents on each one hundred dollars valuation and for the year 1931 and each odd numbered year thereafter shall not be reduced below a rate of twenty-eight (28) cents on each one hundred dollars valuation, exclusive, respectively, of taxes for the payment of indebtedness existing at the adoption of the present State constitution, and taxes for the payment of interest on and principal of bonded indebtedness heretofore duly authorized for the construction of State aid roads in the county, and taxes for the payment of interest on and principal of bonded indebtedness duly authorized without a vote of the people of the county, and taxes for working cash fund purposes, and taxes authorized as additional by vote of the people of the county, and county highway taxes as authorized by section 14 of an Act entitled, 'An Act in relation to State highways,' approved June 24, 1921, in force July 1, 1921, and the rate per cent of the tax levy for city or village purposes, (exclusive of library, public tuberculosis sanitarium, pension fund, school, park, judgment tax, and working cash fund purposes, and exclusive of the taxes levied for the payment of the principal of and interest on bonded indebtedness) in cities and villages shall not be reduced below a rate of one dollar and thirty-three cents ($1.33) for the year 1929, one dollar and thirty-seven cents ($1.37) for each of the years 1930 and 1931, one dollar and thirty-five cents ($1.35) for the year 1932, one dollar and thirty-two cents ($1.32) for the year 1933, and one dollar and twenty-nine cents ($1.29) for each year thereafter, on each one hundred dollars assessed value, and the rate per cent of the school tax levy for educational purposes, for free text book purposes, for school playground purposes and for public school teachers' pension and retirement fund purposes, respectively, in any district, city or village, shall not be reduced below the maximum rate allowed by law, and the rate per cent of the tax levy for park purposes in districts organized and existing under an Act entitled, 'An Act to provide for the creation of pleasure driveway and park districts,' approved June 19, 1893, in force July 1, 1893, shall not be reduced below a rate of twenty cents on each one hundred dollars assessed value (exclusive of levies to pay the principal and interest on bonded indebtedness and judgments), and the rate per cent of the tax levy for park purposes in districts, created, organized and existing under and by virtue of an Act entitled, 'An Act to amend the charter of the city of Chicago to create a board of park commissioners, and authorize a tax in the town of West Chicago, and for other purposes,' approved and in force February 27, 1869, and all Acts amendatory thereof, shall not be reduced below a rate of twenty-seven and one-half cents in the year 1929 and thirty-three cents in the years 1930 and each year thereafter on each one hundred dollars assessed value (exclusive of levies to pay the principal of and interest on bonded indebtedness and judgments, and levies for employees' annuity and benefit funds, policemen's pension funds and policemen's annuity and benefit funds), and the rate per cent of the tax levy for park purposes in districts organized and existing under an Act entitled, 'An Act to provide for the organization of park districts, and the transfer of submerged lands to those bordering on navigable bodies of water,' approved June 24, 1895, in force July 1, 1895, shall not be reduced below a rate of fifteen cents on each one hundred dollars assessed value (exclusive of levies to pay the principal of and interest on bonded indebtedness and judgments), *provided* that whenever the voters of any park district shall have heretofore or hereafter approved, in accordance with the provisions of section 22 of said Act, an increase in the authorized tax levy to not more than two mills on each dollar of taxable property in said district, the rate per cent of the tax levy for park purposes in such district, shall not be reduced below the rate per cent on each one hundred dollars assessed value levied by such park district, but not in excess of twenty cents on each one hundred dollars assessed value (exclusive of levies to pay the principal of and interest on bonded indebtedness and judgments), and the rate per cent of the tax levy for park purposes in districts comprising any three towns organized and existing under and in pursuance of any Act or Acts of the General Assembly of this State, which has or have been submitted to the legal voters of such three towns and by them respectively adopted, for the purpose of locating, establishing, enclosing, improving or maintaining any public park, boulevard, driveway, highway or other public work or improvement, shall not be reduced below a rate of twenty cents on each one hundred dollars assessed value for the year 1929 and twenty-three cents on each one hundred dollars assessed value for the year 1930 and each year thereafter (exclusive of levies for employees' annuity and benefit funds, policemen's pension funds, policemen's annuity and benefit funds, levies to pay the principal of and interest on bonded indebtedness and judgments and levies for the maintenance and care of aquariums and museums in public parks), and the rate per cent of the tax levy for park purposes in townships of this State, levied under an Act entitled, 'An Act authorizing townships to acquire and maintain lands for park purposes,' approved and in force June 23, 1915, as subsequently amended, shall not be reduced below a rate of five cents on each one hundred dollars assessed value, and the rate per cent of the tax levy for sanitary district purposes in sanitary districts organized and existing under an Act entitled, 'An Act to create sanitary districts and to remove obstructions in the Des Plaines and Illinois Rivers,' approved May 29, 1889, and in force July 1, 1889, shall not be reduced below a rate of fifteen cents on each one hundred dollars assessed value (exclusive of levies to pay the principal of and interest on bonded indebtedness, and exclusive of levies for employees' annuity and benefit funds or pension funds), and the rate per cent of tax levy for forest preserve district purposes, in forest preserve districts of two hundred thousand population or more, exclusive of levies for zoological park purposes and exclusive of levies necessary to pay the principal and interest of bonded indebtedness, and also exclusive of levies for employees' annuity and benefit funds or pension funds, shall not be reduced below a rate of one and one-half cents on the one hundred dollars valuation, and the rate per cent of the tax levy for working cash fund purposes levied under authority of 'An Act to provide for the creation, setting apart, maintenance and administration of a working cash fund in counties having a population of five hundred thousand or more inhabitants,' enacted by the Fifty-sixth General Assembly in special session, in force July 1, 1930, levied under authority of 'An Act to provide for the creation, setting apart, maintenance and administration of a working cash fund in cities having a population of one hundred and fifty thousand or more inhabitants,' enacted by the Fifty-sixth General Assembly in special session, in force July 1, 1930, and levied under authority of section 134½ of 'An Act to establish and maintain a system of free schools,' approved and in force June 12, 1909, as amended, which said section 134½ was added thereto by the Fifty-sixth General Assembly in special session, shall not be reduced below the maximum rate allowed by law, and the rate per cent of the tax levy for judgment tax purposes under authority of 'An Act authorizing cities having a population of one hundred and fifty thousand or more inhabitants to levy a tax for the payment of judgments,' enacted by the Fifty-sixth General Assembly in special session, shall not be reduced below the maximum rate allowed by law, but the other taxes which are subject to reduction under this section shall be subject only to such reductions, respectively, as would be made therein under this section if this proviso were not inserted herein: *And, provided, further,* that in reducing tax levies hereunder, no levies for school purposes shall be diminished. The term 'park purposes' as used in this section shall be deemed to include all purposes of locating, establishing, improving and maintaining all public parks, boulevards, driveways, highways, and other public works and improvements within the control of boards of park commissioners.

The rate per cent of the tax levy of every county, city, village, town, township, park district, sanitary district, road district, and other public authorities, (except the

State), having a population of more than 200,000, shall be ascertained and determined (and reduced when necessary as above provided) in the manner hereinbefore specified, and shall then be extended by the county clerk upon the assessed value of the property subject thereto (being the full value thereof) as equalized according to law. In reducing the rate per cent of any tax levy as hereinbefore provided, the rates per cent of all tax levies certified to the county clerk for extension as originally ascertained and determined under section 1 of this Act shall be used in ascertaining the aggregate of all taxes certified to be extended without regard to any reduction made therein under this section: *Provided,* that no reduction of any tax levy made hereunder shall diminish any amount appropriated by corporate or taxing authorities for the payment of the principal or interest on bonded debt, or levied pursuant to the mandate or judgment of any court of record. And to that end, every such taxing body shall certify to the county clerk, with its tax levy, the amount thereof required for any such purpose.

In case of a reduction hereunder, any taxing body whose levy is affected thereby and whose appropriations are required by law to be itemized, may, after the same have been ascertained, distribute the amount of such reduction among the items of its appropriations, with the exceptions aforesaid, as it may elect. If no such election is made within three months after the extension of such tax, all such items, except as above specified, shall be deemed to be reduced pro rata."

3 B: THE FINANCIAL MEASURES ON THE PART OF THE STATE OF ILLINOIS WHICH ARE REASONABLE AND NECESSARY IN ORDER TO CARRY OUT THE DECREE OF THIS COURT.

In order to carry out this decree with tolerable conditions for the health of those living in the Sanitary District, it is both reasonable and necessary that the State of Illinois, already adjudged responsible for this continuing wrong to the complainants, should meet that responsibility without delay by providing at once the money necessary for the works which will remove or prevent the injurious conditions. The occurrences since the decree was entered show that specific measures are necessary.

The Sanitary District has represented to the Reconstruction Finance Corporation what, otherwise, those conditions will be, namely:—

> "should the District's construction program not be completed at that time [December 31, 1938], pestilence and disease might result, which, because of Chicago's pivotal position in the nation, might spread and grow into a nationwide calamity . . . . The construction program is absolutely essential and necessary to the preservation and safeguarding of the health and lives of the people of the second largest metropolitan area of the United States. Should the Sanitary District of Chicago, through lack of financial ability or otherwise, fail to comply with that decree, it would subject the people of Chicago and adjacent communities to all the evils, many times magnified, which afflicted them prior to the opening of the Sanitary Canal. It would mean renewal of the contamination and poisoning of their source of drinking water, with accompanying increase of illness and probable deaths of hundreds of innocent victims."

An effective measure would be to enlarge the decree by adding to it a paragraph providing that the State of Illinois be enjoined to appropriate through its General Assembly, before July 1, 1933, the sum of thirty-five million dollars to be expended before the end of the first fiscal quarter after the adjournment of the next regular session or in any event before October 1, 1934 and the same amount per year for each year ending on September thirtieth thereafter for the designing and the securing of authorization from the War Department and for construction of Controlling Works for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan and for sites for, and for the engineering expenses of designing, and for the construction, enlargement, alteration and completion of the intercepting sewer tunnels, conduits, sewage treatment plants and pumping stations commonly known as the Calumet Treatment Works, North Side Treatment Works, West Side Treatment Works and Southwest Side Treatment Works and all things appertaining thereto within the Sanitary District of Chicago, until all the same shall have been fully completed; and to incur indebtedness therefor and for the purposes aforesaid and no other to issue and to sell bonds of the State of Illinois for the amounts so appropriated and on such terms of payment and maturity and at such rates of interest as the General Assembly shall determine and without the laws authorizing the same being submitted to the people of Illinois and the said laws shall be valid and the bonds so issued if in other respects conforming to the Constitution and laws of the State of Illinois shall be valid obligations of the State of Illinois notwithstanding the fact that said laws have not been submitted to the people of Illinois either theretofore or thereafter and any sums expended for said works by the Sanitary District of Chicago, hereafter, from its own funds in any year ending September thirtieth shall reduce by so much the amount of the appropriation for said year which the State of Illinois is hereby required to expend.

The reasons why this measure is both reasonable and necessary are set out in the main, hereinbefore in Sections 1 B and 3 A.

The necessity for the State to provide the money is evident from the financial condition of the Sanitary District.

If the General Assembly decides to pay for the construction of these works from annual tax levies and not from proceeds of bonds, this may be done under the terms of the addition to the decree, as fast as taxes can be levied and collected. Any bonds issued may be made payable or callable as fast as collections are made. If tax collections are brought in fast enough, bonds not sold, need not be offered. If tax anticipation warrants are in the judgment of the General Assembly, a better method to obtain this money, this way will be open.

The State of Illinois contends that the Supreme Court of the United States has not the power to issue an injunction in the tenor outlined and that, if it had, it should not exercise it.

If the Court decides otherwise and such an injunction is issued the dignity and the history of the State of Illinois assure its prompt compliance.

The Sanitary District opposes any order that the State of Illinois provide any of the necessary money. The District claims that the Reconstruction Finance Corporation and not the State should provide the money to the extent of $36,450,000. This is for the Calumet, West Side, and North Side Projects. The District claims that no more money should be provided now for the Southwest Side Treatment Works or for the Controlling Works. The District represents that if the necessary intercepting sewers parallel to the main Chicago River and to the North Branch of it are built, it is ready to accept a reduction to 5000 c. f. s., without Controlling Works and that these works, if found necessary can be completed before December 31, 1938 if begun by January 1, 1937.

The defendants when requested on February 15, 1933 felt unable to assert and therefore declined to assert and do not assert and cannot assert a confident hope that ever, the Sanitary District will be able financially to resume construction in a large way on this project.

Outside sources without the State should not be drawn upon, to pay what is tantamount to a judgment debt of the State of Illinois and its instrumentality the Sanitary District of Chicago.

The defendants concede that there is no way of getting money for this project within the year 1934, without a bond issue by the State of Illinois.

No way has come to light, whereby this decree can be performed under tolerable conditions, unless the State of Illinois meets its responsibility and provides the money.

The measure dispensing with the popular vote is chosen because (a) in the absence of a liability of the State of Illinois for expenditure, adjudged by the Supreme Court of the United States to be the duty of the State, the General Assembly is powerless to make a debt-incurring contract for the construction of these works, without a popular vote, (b) the making of contracts should not be delayed until after November 1934, the first time at which a vote can be obtained, (c) there is no reason to anticipate that, if the opportunity were possible, the people of Illinois would not vote to have the State perform its adjudged duty, and (d) the popular vote is futile in the face of the duty of the State.

The Sanitary District soon after the decision of this Court, January 14, 1929 (278 U. S. 367), issued a pamphlet in a campaign to get authority from the Legislature to issue bonds for $45,000,000 without referendum. In this pamphlet, the District said: "The purpose of a referendum vote on bond issues is to submit to the people the opportunity to say whether the public improvement, the expense of which the particular bond issue is intended to defray, is from the people's standpoint advisable. *The public works required* to be installed *to meet the decree of the Supreme Court* or the directions of the Secretary of War, *must be constructed and put in operation.*"

On May 15, 1930, the Sanitary District in its resolution, quoted hereinbefore in Section 3 A, said: "Under the mandatory requirements of the Supreme Court of the United States, such a referendum would answer no useful purpose inasmuch as now the people have no discretion whatever in the premises and such sewage treatment works must be constructed."

A decree of this Court enjoining the State to make the appropriations to contract for construction and to issue the bonds without popular vote does not invade the discretion of the General Assembly. This Assembly, chosen and sworn to support the Constitution of the United States, never possessed a discretion to defeat or to obstruct the performance of a decree of the Supreme Court of the United States entered in the exercise of its jurisdiction conferred by that Constitution, over controversies between States, however sovereign they were before entering that compact, by which, by so much, they curtailed their own sovereignty. The decree takes away no discretion which was in existence before its entry. A State, in howsoever august a branch of its government, has no discretion to escape the performance of a duty imposed upon it by the Constitution of the United States.

In reporting what measures are in fact reasonable and necessary, I am bound to assume the law to be settled as to the State of Illinois that "if its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State" (281 U. S. 179, 197). The implication is inescapable that the authority meant is the Supreme Court of the United States, engaged in the necessary performance of its duty to give effect to the Constitution of the United States.

The validation clause is chosen because it is necessary as a measure to remove doubt from the minds of investors.

The time limit on each appropriation is chosen because of the clause in Article IV, section 18, hereinbefore quoted, of the Constitution of Illinois, that appropriations shall be for expenses of the government "until the expiration of the first fiscal quarter after the adjournment of the next regular session."

The time for making the first appropriation is chosen as before July 1, 1933 because of the prospect that the General Assembly will adjourn in June, 1933. Its next regular session will convene in January, 1935.

The annual amount of the appropriation is at a rate which would yield the whole amount of future cost as estimated by the Sanitary District, before October 1, 1938.

The deduction of actual expenditures of the Sanitary District on the same works will give a means of relief to the State if a way can be found for the Sanitary District to obtain its own money either by taxation or by borrowing. It is unnecessary to take part in this internal adjustment between the State and the Sanitary District. The Supreme Court of Illinois has indicated that the General Assembly has power to place the final incidence of this burden on the Sanitary District (*City of Chicago* v. *Manhattan Cement Co.,* 178 Illinois 372, 382). The valuation for 1930 tax purposes, of the property in the District is between fifty-three and fifty-four percent of the valuation of the property within the State.

The language in the case cited tends to indicate that inasmuch as this project is one for which as between the Sanitary District and the State, the District ought to pay, the General Assembly in its discretion may levy the taxes for the payment of the principal and interest of the bonds directly upon the taxable property within the Sanitary District to the exclusion of property elsewhere. If this may be done, these bonds will take nothing from taxes on property outside the District.

In fixing the amount at $35,000,000 in the first year account is taken that (1) there is past due to contractors already under way on contracts $1,115,000 (Report for January 1, 1933, p. 10), (2) contracts already let are for $8,810,500 (same Report, p. 12), (3) the latest estimate of the Sanitary District for controlling works is $3,200,000 (Return filed November 7, 1932, p. 11), which should all be contracted for before January 1, 1934, (4) the Sanitary District has represented to the Reconstruction Finance Corporation that plans are completed ready to advertise for about $2,500,000 of additional construction and that (5) other contracts can be let within sixty days from the date of assurance that funds will be available, and (6) about $27,657,000 will be required to place under construction and complete contracts originally planned to be let up to January 1, 1934, (7) the request to the Reconstruction

Finance Corporation was for $36,450,000 at once, (8) nothing was included in this for the Southwest Side Treatment Works or for the Controlling Works, (9) the Sanitary District represented to me on February 16, 1933 that, if funds are made available, it will be able to let contracts for new work totalling approximately $19,538,000, within nine months thereafter, for West Side intercepting sewers, Calumet intercepting sewers, Calumet Treatment Works, West Side Treatment Works, in addition to the unperformed contracts for about $8,800,000 already let and (10) sufficient appropriation is necessary as a basis for valid contracts even if dilatory performance does not ripen them into obligations to pay at once, the contract price, within the period covered by the appropriation.

These figures indicate that contracts should be made before January 1, 1934 for at least $35,000,000. This sum is fixed as the smallest that is necessary. In the two years and a half from July 1, 1933 to December 31, 1935, there is required the entire sum necessary to complete the Controlling Works, the Calumet Project, the North Side Project, the West Side Project now estimated by the Sanitary District to cost in the aggregate for future work $73,436,000 (Return filed November 7, 1932, p. 55). This includes nothing for progress on the Southwest Side Treatment Works now estimated by the Sanitary District to complete at $64,104,000 and for miscellaneous plants and sewers, so estimated at $8,000,000.

The financial position of the State of Illinois warrants these measures. At the last assessment valuation, that for 1930, the valuations for the whole State were:—

Real Estate	$6,149,215,816
Personal	1,309,693,942
Railroads Corp., etc.	790,519,403
	$8,249,429,161

At the 37% rate systematically employed for 1930, this indicates in the estimation of the valuers, a real estate full value of over $16,600,000,000.

An official publication entitled "The Blue Book of the State of Illinois, 1931-1932" edited by the Secretary of State of Illinois describes the resources of the State thus: "The State of Illinois takes high rank among the commonwealths of the nation in population, in wealth, in agriculture, in manufacturing industries, in commerce and in mining. Only New York and Pennsylvania exceed Illinois in population, which on April 1, 1930 was 7,630,654. This was an increase of 1,145,374 over the federal census of 1920. Chicago, the second largest city in the United States and the fourth largest in the world, has a population of 3,376,438, an increase of 674,733 in ten years. The metropolitan area of Chicago has a total population of 4,675,877. Illinois ranks third in wealth with total property valued at $24,356,000,000. The state's wealth is one-fourth as large as the total wealth of Great Britain, one-third as great as that of France; it almost equals that of Italy and Spain and exceeds most of the other countries of Europe. It is greater by several million dollars than the total wealth of the Dominion of Canada. The best balanced state in the Union in its production of manufactured goods and farm products. Illinois holds third place in manufacturing and fourth in agriculture. With farm crops valued in 1929 at $460,465,000, Illinois is exceeded in farm production only by Texas, Iowa and California. The value of livestock on Illinois farms January 1, 1931, was $221,994,000.

"MINES AND FACTORIES.

"The value of manufactured products of the State in 1929 amounted to $6,232,438,498, an increase in two years of $846,435,263, and giving Illinois third place among the States in the value of manufactured products. Total wages paid in the manufacturing industries of the State exceed $1,000,000,000 annually. Illinois ranks seventh in mineral production with an average yearly production of nearly one-quarter billion dollars. The State is the second largest producer of fluorspar, tripoli and sulphuric acid from copper and zinc smelters, and is third among the States in the production of silica sand, sand and gravel, bituminous coal, Portland cement, pig iron and mineral paints and pigments. It holds fourth place in clay products, and fifth place in the production of fuller's earth. The principal mineral products of the State in the order of their value are coal and coke, clay and clay products, cement, petroleum and natural gas, gasoline, sand and gravel, stone, paints and pigments, fluorspar and lime.

"INDUSTRIAL LEADERSHIP.

"In the front rank of industrial States, Illinois produces 8 per cent of the electricity of the United States, 10 per cent of the manufactured gas, has 9 per cent of the telephones and a greater railroad mileage than any State except Texas. Illinois leads the world in the production of farm machinery and the manufacture of stoves. The largest lumber yard in the world is located in Chicago. Sixty-five per cent of the pianos manufactured in the United States are produced in Illinois. The largest glass-sand deposits in the world are located near Ottawa and the wall paper trade is centered in Joliet where more than 272,000 miles of wall paper are produced yearly. The greatest corn canning center in the world is at Hoopeston where more than 50,000,000 cans and bottles of food products are packed and canned annually."

The State, as of January 1, 1933, had a gross and net debt of $236,261,500, namely:—

Bonded Debt	$209,701,500
Emergency Relief Notes	18,750,000
Tax Anticipation Notes in Motor Fuel Tax Fund...	7,510,000
Tax Anticipation Notes in Agricultural Premium Fund	300,000
	$236,261,500

The bonds of the State of Illinois have a high standing in the opinion of competent bankers. They have a ready market at an income basis ranging not to exceed a quarter per cent below those of the Sanitary District when those of the District were in good credit. The District bonds sold, in the five years 1927 to 1931, to yield from a low of $4.072 plus, in April, 1926, to a high of $4.792 plus, in August, 1929, with the last sale of $4.712 plus in August, 1931. These bankers rate the bonds of the State of Illinois as easily triple A. The State readily marketed bonds to the extent of $20,000,000 in January, 1933.

These were sold to a syndicate at 100.4599. The financial condition and repute of the State have not been lowered since this sale. Bonds of the State have been selling to yield from 3.8% to 4%. Bonds of very few States are rated any higher than those of Illinois.

On February 28, 1933, the Governor of Illinois testified that unless conditions rapidly and marvelously change for the better, it will be impossible for the State to find a market during each of the next four years for $35,000,000 of bonds. This opinion appears unduly gloomy. It is at variance with the very recent experience of the State. It is contrary to the opinion of those presented by the defendants as competent investment bankers and who appeared to be such.

The State has no other general bond issue authorized or in contemplation.

The principal of the $35,000,000 need not affect the tax rate for some years to come, if the General Assembly decides against early maturities.

The State Treasurer of Illinois in his printed monthly report for January 1, 1933, gave his cash account as follows:—

Cash and monies in State Depositories—	
Inactive	$12,361,499.10
Active (Reserve for outstanding)	27,056,455.84
Cash in Vault	67,653.20
Coupons	116,156.54
Federal funds	109,517.02
Tax Anticipation Notes	7,810,000.00
	$47,521,281.70

The evidence does not give the reconciliation of these figures with the next to come. It is unnecessary.

On instructions of the Governor of the State, the Director in the Department of Finance, appointed January 26, 1933, has made a survey of the cash resources of the State as of December 31, 1932. This was submitted to the Governor on February 18, 1933. It was furnished to me on February 27, 1933.

December 31, 1932, there was cash on hand		$14,738,000
Road and Motor Fuel Fund should be	$17,936,000	
Waterway Bond Fund should be	6,000	
All other Funds should be	4,952,000	
General Revenue Fund deficit		4,450,000
University of Illinois Fund deficit		290,000
Soldiers' Compensation Bond Interest and Retirement Fund deficit		3,416,000
	$22,894,000	$22,894,000

These deficits have been met by the purchase of tax anticipation warrants, with the moneys of the above funds. In consequence, when the taxes come in, they must be used to that extent to redeem the warrants from the funds. The State has not sold tax anticipation warrants except to itself. The warrants sold to itself for these funds amount to $7,810,000. These are:—

General fund tax anticipation warrants	$3,600,000
University of Illinois tax anticipation warrants	350,000
Waterway Bond Fund tax anticipation warrants	260,000
Soldiers' Compensation, etc., tax anticipation warrants	3,600,000
	$7,810,000

The State tax levies not collected on December 31, 1932, were:—

From Cook County for	1929	$4,932,000
	1930	9,154,000
	1931	15,056,000
	1932	19,305,000
From other Counties for	1929	0
	1930	0
	1931	1,999,000
	1932	15,914,000
Due to the State before or in 1933		$66,360,000

This sum belongs to—

General Fund	$26,345,000
School Fund	21,682,000
University of Illinois Fund	5,007,000
Waterway Bond Fund	2,972,000
Soldiers' Compensation, etc., Fund	8,852,000
Blind Relief Fund	1,502,000
	$66,360,000

Against some of these, it is not lawful to sell tax anticipation warrants. Deducting these and also warrants already sold, there remain available for sale from:—

General Fund	$16,159,000
University of Illinois Fund	3,407,000
Waterway Bond Fund	1,969,000
Soldiers' Compensation, etc., Fund	3,039,000
	$24,574,000

It does not appear that the State will find it necessary in 1933 to sell any tax anticipation warrants except to its own funds.

From the resources in taxes already levied and unpaid	$66,360,000
should be deducted the warrants already sold, as above set out, to particular funds	7,810,000
Leaving net uncollected levies	$58,550,000

It is not expected that this all will come in during 1933. The Director has estimated that receipts from these property tax levies will be in 1933:—

General Fund	$8,060,000
School Fund	6,544,000
University of Illinois Fund	1,442,000
Waterway Bond Fund	910,000
Soldiers' Compensation, etc., Fund	2,612,000
Blind Relief Fund	432,000
	$20,000,000

This estimate assumes that forty percent of the 1931 levy from Cook County and nothing from the 1932 levy from Cook County and eighty-five percent of the 1932 levy from all other counties, will come in, during 1933.

It is noteworthy that of the unpaid levies to December 31, 1932, in amount $66,360,000, the part due from Cook County is $48,447,000. Of the $17,913,000 from other counties, only $1,999,000 is overdue.

These tax delinquencies are alone what necessitates the inter-fund transfers of money which the State has made.

The Cook County delinquencies and sluggish extensions appear to be the only thing abnormal in Illinois State finances.

The Court is aware of the present evil times. Illinois is not shown to have more of them than the Complainants or than some other States.

The Director estimates that the cash receipts in 1933, without borrowing, will be:

General Tax levy as above	$20,000,000
Sundry general fund sources	18,135,000
Road and Motor Fuel Tax Funds—	
Motor Fuel Tax	18,000,000
Motor Fuel Tax Allotments to Counties	8,100,000
Motor license fees	18,000,000
United States aid	9,000,000
Miscellaneous	250,000
Miscellaneous Funds	2,130,000
	$93,615,000

The Director estimates that the cash disbursements in 1933, will be:

From General Fund—		
Salaries and Wages	$13,800,000	
Operating Expenses	13,200,000	
Improvements	750,000	
General Assembly	875,000	
University of Illinois	2,625,000	$31,250,000

From University of Illinois Fund		1,575,000
From School Fund Distribution to Counties		6,544,000
From Waterway Bond Fund		1,260,000
From Soldiers' Compensation, etc., Fund		4,222,650
From Blind Relief Fund		432,000
From Road and Motor Fuel Tax Funds—		
Salaries and Wages	$5,304,000	
Operating	2,502,000	
Improvements	29,745,000	
Distribution to Counties	8,100,000	
Finance Department	1,500,000	
Debt Service	8,364,053	55,515,053
From Miscellaneous Funds		2,947,200
From Emergency Relief Funds Debt Service		900,000
		$104,645,903
Deduct estimated receipts in cash		93,615,000
Leaves cash deficit		$11,030,903
If this deficit is met from above cash in the treasury		14,738,000
It will leave in the treasury December 31, 1933		3,707,000

If the cost of construction of the Controlling Works and of the Sewage Treatment Works, were to be met from the annual levies of the next four years, it would present the question whether the expenditures for other purposes must be cut or whether the levies must be increased or whether the State must take effective steps to overcome sluggish tax collecting in Cook County. It might then be necessary to weigh Road Improvements $29,745,000 against performance of duty by Sanitary Improvements $35,000,000. On the other hand, if this cost is to be met over twenty or more years in the payment of bonds issued now, from time to time, for the money borrowed for this purpose, the current expected disbursements and receipts are less important.

As to these, the showing is not such as to create apprehension of an impending default on bond maturities or on bond interest.

The prospect now is that bonds of the State for $35,000,000 a year supported by the requisite tax levy before issue, can be marketed in the normal manner and without difficulty. Due consideration has been given to the effect of increased issues, on the market.

The need of borrowings for other purposes is not to be overlooked. This cannot be brought into confinement without a political survey. No necessity for these borrowings appears to be greater than the one before the Court.

If it were thought advisable by the State to raise the money for these works, in later years, directly by taxation, the powers of the General Assembly are broad.

The Constitution of Illinois does not fix a limit on the amount of the general property tax, which the General Assembly may levy.

The levy for 1932 on each one hundred dollars of assessed valuation was for:—

General Fund	21	cents
School Fund	16	"
University of Illinois Fund	3½	"
Waterway Bond Fund	2⅓	"
Soldiers' Compensation, etc., Fund	6⅓	"
Blind Relief Fund	1	"
	50 1/6	"

For the fiscal year ending June 30, 1932, exclusive of borrowings, the revenues actually received in money, notwithstanding the large tax delinquencies, were approximately:—

	%	
Motor Fuel Tax	31	$30,462,000
Motor Vehicle and Chauffeurs' Licenses	17	17,124,000
Federal Aid	10	9,545,000
General Property Tax	18	17,782,000
Inheritance Tax	6	6,356,000
Insurance Premium Taxes	6	6,044,000
Corporation Franchise Tax	3	3,547,000
Illinois Central Charter Tax	2	1,866,000
All other Sources	7	5,788,000
	100	$98,514,000

These went into the funds as follows:

Motor Fuel Tax Fund	$30,462,000
Road Fund from licenses and Federal aid	26,268,000
General Revenue Fund	27,643,000
School Fund	5,861,000
Soldiers' Compensation, etc., Fund	2,521,000
University of Illinois Fund	1,529,000
All other Funds	4,230,000
	$98,514,000

The Motor Fuel Tax is three cents a gallon. After cost of administration, one-third is apportioned to the counties and two-thirds to the State.

The counties may use their portions to retire certain road bonds and to construct certain roads. The State may use its portion in a similar manner.

The State's portion, the General Assembly may turn to other uses in subsequent years.

The Senate of Illinois has passed a three-cent sales tax. The action of the House remains to be taken. The project is to make this available for Unemployment Relief and for School Funds.

Whether the $35,000,000 annually for these Works shall be raised annually by taxation in place of borrowings, is for the General Assembly to determine. It is not to be anticipated that the General Assembly will wish to cover so large an amount in so short a time, when it can be spread over a longer period.

I find that the measures which are reasonable and necessary are the enlargement of the decree in the way set out in the third paragraph under section 3 B of this report.

POWERS OF THE COURT.

The defendants concede and assert the ample power of the Court to enforce by injunction the installation of the sewage treatment works (Defendants' Brief filed March 12, 1930 on Exceptions to Re-reference Report, p. 139).

The Controlling Works if authorized by the War Department would come within the same power.

The power to enforce the installations necessarily includes the power to enforce provision for paying for them.

The point of question is the power of the Court (1) to order the State or the District to tax or to issue bonds necessitating a tax levy or (2) to appoint its own commissioner with power to construct the Works and to issue bonds of the defendants and to tax for payment for the Works or of the bonds issued to provide the money.

When the Court is exercising the jurisdiction which Article III, section 2 confers over controversies between two or more States, the most complete definition of the extent of its power which this Court has given is in *Virginia* v. *West Virginia*, 246 U. S. 565, 591-605.

Theretofore it had been held that:—

The Supreme Court on original application will not issue a writ of mandamus to the governor of a State to compel him to render the aidor of the escape of a fugitive slave, as provided by Act of Congress because (Taney, C. J.) although but a ministerial act, the words of Congress were not mandatory but declaratory of a moral duty with no compulsive or punitive provisions "and we think it clear, that the Federal Government, under the Constitution, has no power to impose on a State officer, as such, any duty whatever, and compel him to perform it."

Ex parte Kentucky v. *Dennison,* 24 How. 66, 106, 107.

The Circuit Court which has entered judgment against a county on defaulted coupons, does right in granting mandamus directed to the County Supervisors to levy a special tax under a state statute which provides that if the county owes debts for the payment of which the current revenues are insufficient, the supervisors "may if deemed advisable levy a special tax."

Supervisors v. *United States,* 4 Wall. 435.

Von Hoffman v. *City of Quincy,* 4 Wall. 535, semble.

City of Galena v. *Amy,* 5 Wall. 705, semble.
Riggs v. *Johnson County,* 6 Wall. 166, semble.
Labette County Commissioners v. *United States,* 112 U. S. 217, semble.

But merely because mandamus has failed through the resignations of the officers commanded, the court will not enter a decree in equity to subject the taxable property of the citizens to the payment of the judgment and empower the marshal to seize and sell.
Rees v. *City of Watertown,* 19 Wall. 107.

The failure of the common-law remedy of mandamus, does not confer on a court of equity the power to levy the tax.
Heine v. *The Levee Commissioners,* 19 Wall. 655.

The extinction of the debtor public corporation, does not justify an order to the marshal to levy a tax.
Barkley v. *Levee Commissioners,* 93 U. S. 258.

A bill will not lie, at the suit of a judgment creditor, after mandamus has failed because of noncollection of taxes, to obtain the appointment of a receiver of tax books and past due tax bills.
Meriwether v. *Garrett,* 102 U. S. 472.
Thompson v. *Allen County,* 115 U. S. 550, semble.

The District Court of the United States in equity has no jurisdiction of a bill by bond holders for the appointment of a commissioner to levy a tax, when the taxing authorities had not performed their duty to levy a tax as required by the laws in force when the bonds were issued; because the obligations held by the creditors were under and not paramount to the authority of the state and "The right so given was to have a tax levied and collected, it is true, but a tax ordained by and depending on the sovereignty of the State and therefore limited in whatever way the State saw fit to limit it when, so to speak, it contracted to give the remedy."
Yost v. *Dallas County,* 236 U. S. 50, 56.

The marked difference between *Virginia* v. *West Virginia* and the decisions granting mandamus to compel the empowered officers to levy a tax to pay a judgment debt, is that here it is the State itself that is the judgment debtor and the State itself and its legislature, to whom it is sought to have the command given. The petitioner did not seek action except under the laws of the debtor state and by its authorities. The defence was the defendant's inviolable sovereignty. The comprehensive opinion of the Court disposes of this in this language:—

> "That judicial power essentially involves the right to enforce the results of its exertion is elementary. And that this applies to the exertion of such power in controversies between States as the result of the exercise of original jurisdiction conferred upon this court by the Constitution is therefore certain" (591).
>
> "As it is certain that governmental powers reserved to the States by the Constitution—their sovereignty—were the efficient cause of the general rule by which they were not subject to judicial power, that is, to be impleaded, it must follow that, when the Constitution gave original jurisdiction to this court to entertain at the instance of one State a suit against another, it must have been intended to modify the general rule, that is, to bring the States and their governmental authority within the exceptional judicial power which was created. No other rational explanation can be given for the provision. And the context of the Constitution, that is, the express prohibition which it contains as to the power of the States to contract with each other except with the consent of Congress, the limitations as to war and armies, obviously intended to prevent any of the States from resorting to force for the redress of any grievance real or imaginary, all harmonize with and give force to this conception of the operation and effect of the right to exert, at the prayer of one State, judicial authority over another" (595).

"As the powers to render the judgment and to enforce it arise from the grant in the Constitution on that subject, looked at from a generic point of view, both are federal powers and, comprehensively considered, are sustained by every authority of the federal government, judicial, legislative or executive, which may be appropriately exercised" (601).

As to the remedy of mandamus to compel taxation regardless of the claimed discretion of the Legislature to refuse to tax—(604) "we are of opinion that we should not now dispose of such question and should also now leave undetermined the further question, which, as the result of the inherent duty resting on us to give effect to the judicial power exercised, we have been led to consider on our own motion, that is, whether there is power to direct the levy of a tax adequate to pay the judgment and provide for its enforcement irrespective of state agencies."

The need of an announced decision was ended by the action of the parties (*Acts of West Virginia, Extraordinary Session,* April 1, 1919, Chapter 10; *Johnston* v. *Brown,* 300 Fed. 737, 739; 6 Fed. (2d) 372, 373).

Except for the pregnant language of the opinion, the questions remain open.

CONCLUSIONS.

As a repetition in summary form, I find that:—

1 A: The causes of the delay in obtaining approval of the construction of Controlling Works in the Chicago River are a total and inexcusable failure of the defendants to make an application to the Secretary of War for such approval.

2 A: The causes of the delay in providing for the construction of the Southwest Side Treatment Works are (1) an inexcusable and planned postponement of the beginning of construction of these Works to January 1, 1935 which left an inadequate time for their completion before December 31, 1938, at the rate of progress expected or to be expected under the methods pursued by the Sanitary District, and (2) the failure to proceed to a definite decision as to a site and to the acquisition of the site so chosen, and (3) the failure to proceed with reasonable diligence to prepare designs, plans, and specifications for the Works at this site or on the site of the West Side Works.

3 A: The Sanitary District is not failing now to pursue the reasonable financial measures now within its control, which are necessary in order to carry out the decree of this Court.

1 B: The step which should now be taken to secure approval of Controlling Works is in an enlargement of the decree of April 21, 1930 by the addition of a paragraph enjoining the State of Illinois to provide forthwith the necessary money for, and through the Sanitary District of Chicago or through other instrumentality chosen by the State to submit plans forthwith to the Chief of Engineers of the War Department, for Controlling Works for the purpose of preventing reversals of the Chicago River at time of storm and the introduction of storm flow into Lake Michigan and to make application forthwith to the Secretary of War for authorization of such Works and diligently to pursue such application with all necessary modifications to secure within four months if possible the recommendation of the Chief of Engineers and the authorization of such Works by the Secretary of War, and immediately thereafter to begin and to continue to construct such Works to completion within two years.

2 B: The step which should now be taken for the construction of the Southwest Side Treatment Works or in case of a change in site for the construction of an adequate substitute, is in an enlargement of the decree of April

21, 1930 by the addition of a paragraph enjoining the State of Illinois to provide forthwith the necessary money for, and through the Sanitary District of Chicago or through other instrumentality chosen by the State, forthwith to determine upon and secure the site for the Southwest Side Treatment Works, if the site is not owned already by the Sanitary District and forthwith to design and to construct said Southwest Side Treatment Works of the kind proposed to the Special Master of this Court in 1929 or of a kind no less efficient for the purification of the effluent to be discharged to the Sanitary Canal and at a rate of progress forthwith that except for casualties not now foreseeable will result in the completion of said Works and the beginning of their operation in ordinary course before December 31, 1938.

The omission of reference at this point to the Calumet, West Side and North Side Treatment Works is because they are not within the Order appointing me.

3 B: The financial measures on the part of the State of Illinois which are reasonable and necessary in order to carry out the decree of this Court are in the enlargement of the decree by adding to it a paragraph providing that the State of Illinois be enjoined to appropriate through its General Assembly, before July 1, 1933, the sum of thirty-five million dollars to be expended before the end of the first fiscal quarter after the adjournment of the next regular session or in any event before October 1, 1934 and the same amount per year for each year ending on September thirtieth thereafter for the designing and the securing of authorization from the War Department and for construction of Controlling Works for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan and for sites for, and for the engineering expenses of designing, and for the construction, enlargement, alteration and completion of the intercepting sewer tunnels, conduits, sewage treatment plants and pumping stations commonly known as the

Calumet Treatment Works, North Side Treatment Works, West Side Treatment Works and Southwest Side Treatment Works and all things appertaining thereto within the Sanitary District of Chicago, until all the same shall have been fully completed; and to incur indebtedness therefor and for the purposes aforesaid and no other to issue and to sell bonds of the State of Illinois for the amounts so appropriated and on such terms of payment and maturity and at such rates of interest as the General Assembly shall determine and without the laws authorizing the same being submitted to the people of Illinois and the said laws shall be valid and the bonds so issued if in other respects conforming to the Constitution and laws of the State of Illinois shall be valid obligations of the State of Illinois notwithstanding the fact that said laws have not been submitted to the people of Illinois either theretofore or thereafter and any sums expended for said Works by the Sanitary District of Chicago, hereafter, from its own funds in any year ending September thirtieth shall reduce by so much the amount of the appropriation for said year which the State of Illinois is hereby required to expend.

Respectfully submitted,

EDWARD F. MCCLENNEN,
Special Master.

Office Supreme Court,
FILED
APR 10 1933
CHARLES ELMORE CRO
[illegible]

FILE COPY

In the Supreme Court of the United States

STATES OF WISCONSIN, MINNESOTA, OHIO, AND PENNSYLVANIA, *Complainants,* vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 5, ORIGINAL.
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(Names of Solicitors for the Complainants on inside of front cover)

Dated April 10, 1933.

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a doubt, undisclosed to this Court for nearly three years 27

4. The alleged excuse that the defendants performed or were excused from performing their obligation under the decree immediately to make application to the War Department for approval of controlling works by casual and offhand conversations with the United States District Engineer at Chicago, during visits to his office for other purposes, is without merit; and it is inconceivable that such an excuse can be seriously advanced by responsible and intelligent officials of a great State and an important municipality 31

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HISTORY AND STATEMENT OF THE CASE.

Since the long history of this litigation is well known to this Court, we deem it unnecessary to restate it. The pending phase of this litigation is concerned solely with what should now be done to enforce the decree of April 21, 1930 (281 U. S. 696) and secure to the complainants the rights heretofore adjudged to them by this Court; and our statement of the case will, therefore, be confined to those matters deemed material for its consideration in that aspect.

On October 3, 1932, the States of Wisconsin, Minnesota, Ohio and Michigan, in a Joint Application, invited the attention of this Court to the circumstance that the facts then before this Court, through the Report of the Special Master on the 1929 Re-reference and the Semi-annual Reports filed by the defendants, disclosed that the general over-all or ratable performance by the defendants under the decree had been and was grossly inadequate; that there are certain projects in the program, for the construction of which the defendants sought and obtained the indulgence of this Court, which constitute "controlling factors" in relation to the intermediate reduction in diversion fixed for December 31, 1935 and the ultimate termination of the illegal diversion fixed for December 31, 1938; that, as to some of such projects or controlling factors, there had been a complete failure of performance; that, as to others of such controlling factors, there had been and was a gross inadequacy of performance; and that these facts justified and required a conclusion that without the further intervention and aid of this Court to secure to the complainants the rights heretofore adjudged to them, the arrival of the dates fixed by the decree for the intermediate and ultimate restoration of complainants' rights would inevitably be coincident with a default by the defendants.

These complainants in their Application and supporting brief urged that the facts therein recited from the records of this Court established that unless these complainants secure the Court's aid in removing the obstacles which had already modified as to time the relief to which they are entitled, these complainants will be in exactly the same situation in 1935 and in 1938 that they were when the decree was entered in 1930.

Specifically, the complainants' Application pointed out that the records of this Court disclosed a failure or inadequacy of performance in the following respects among others:

1. Whereas the average annual over-all expenditure required for the performance of the decree under the findings of the Special Master in 1929 was in excess of $20,000,000, the average annual performance since the entry of the decree had been less than $5,000,000, and that, during the preceding six months, performance had practically ceased. (Application, Sec. V, pp. 7-9.)

2. Whereas the intermediate reduction fixed by the decree for December 31, 1935 was predicated upon the completion of the Calumet, North Side and West Side Sewage Treatment Works, the Semi-annual Reports filed by the defendants with this Court indicated that the Calumet and West Side Sewage Treatment Works would not be completed by that date at the rate of progress theretofore had and then being made. (Application, Sec. VI, p. 10.)

3. Whereas the intermediate reduction fixed by the decree for December 31, 1935, was predicated upon the installation of controlling works in the Chicago River or at the head of the Drainage Canal, the Semi-annual Reports filed by the defendants did not disclose any steps whatsoever on the part of the defendants to secure a permit for such works or to proceed with their construction. (Application, Sec. VI, p. 10.)

4. Whereas the Southwest Side Sewage Treatment Works is admittedly the controlling factor in the over-all time required for the construction of the program for the treatment of the sewage of the Sanitary District of Chicago, the Semi-annual Reports disclosed that no site had yet been acquired for such works and that the negotiations for the acquisition of a site were then at a standstill. (Application, Sec. VII, pp. 10-11.)

5. Whereas the primary obligation for the performance of the decree rests squarely upon the State

of Illinois, the State of Illinois has neither properly cooperated with the Sanitary District nor taken any steps to finance or otherwise discharge its obligation under the decree. (Application, Sec. XIII, p. 16; Sec. XII, pp. 14-15.)

6. The State of Illinois and the Sanitary District had failed, neglected or refused adequately and reasonably to provide for financing the performance of the decree. (Application, Sec. XI, pp. 13-15.)

7. The non-salability of Sanitary District bonds and the other financial difficulties of the Sanitary District, to the extent, if at all, that they existed, rested squarely upon the neglect, failure or refusal of the defendants to levy and collect normal taxes and constituted a self-created obstacle. (Application, Sec. XII, pp. 14-16.)

The Application also pointed out that the Semi-annual Reports filed with this Court had consistently reported for over two years the pendency of alleged studies of stock-yards wastes notwithstanding the fact that Mr. Chief Justice Hughes as Special Master on the 1929 Re-reference had found that in this matter "the Sanitary District should be able to obtain *within a few months, at the most,* whatever information is essential to proceed with the designing of this Plant (the Southwest Side Treatment Works)"; that such Semi-annual Reports had consistently reported the pendency of a suit filed in 1924 by the Sanitary District against certain packing companies, although that suit sought no relief essential to the performance of this Court's decree; and that such Semi-annual Reports disclosed that the personnel of the Sanitary District Engineering Organization had been so reduced as no longer to be adequate to perform the decree. The Application prayed for the issuance of a Rule to the Defendants to Show Cause why the Court should not appoint a Mandatory to carry out the decree at the expense of the defendants.

Upon consideration of complainants' motion and the Reports filed by the defendants, this Court, on October 10, 1932, directed to the defendants, the State of Illinois and the Sanitary District of Chicago, a Rule to Show Cause "why they have not taken appropriate steps to effect compliance with the requirements of the decree of this Court."

In compliance with this Rule, the defendants filed a Joint Return on November 7, 1932.

The Return admitted that the average annual expenditures had been, as set forth in the Application, less than 25% of the average annual expenditure required for the performance of the decree. The allegations advanced to minimize or excuse this general failure or inadequacy of performance were all without substance and largely so specious as to challenge their sincerity. Thus, in this connection the Return made irrelevant reference to expenditures for sewers and sewage treatment works which were made by the Sanitary District prior to the entry of the decree and which in no way represented performance under the decree. It pointed out that the diversion had been and then was restricted as required by the decree when the only issue then was and now is not the amount of the present diversion, but whether the failure and inadequacy of performance by the defendants threatens the intermediate reduction in the diversion fixed for December 31, 1935, and the ultimate termination of the illegal diversion fixed for December 31, 1938. The Return, in support of the claim of general performance, cited the increase in the percentage of sewage treatment when that increase arose merely from placing in operation works largely, if not wholly, constructed before the entry of the decree and not by reason of performance under the decree. The Return referred to the construction of intercepting sewers when it had been admitted before and found by Mr. Chief Justice Hughes as Special Master in 1929 that such sewers, though necessary, were not controlling factors in determining the time within which the various sewage treatment works embraced in the program could be constructed and placed in operation. The Return, however, did disclose that the defendants had, after the entry of the decree, adopted a program of construction which amounted to a planned default under the decree. (See Brief of these Complainants Filed December 5, 1932, pp. 13-15.)

The Return admitted that the West Side Sewage Treatment Works, which Mr. Chief Justice Hughes as Special Master had found in 1929 should be completed with appurtenances and in operation by December 31, 1935 and prior to the reduction of that date, would not be completed before the end of 1936. The Return also disclosed that shortly after the entry of the decree, the defendants had adopted a plan which deliberately postponed the completion of the West Side Sewage Treatment Works until the end of 1936 and of some of the intercepting sewers until 1938. This planned default represented the difference between providing a treatment of 33⅓% for something less than all of the sewage of the West Side area by December 31, 1935 and a treatment of 85% to 90% for all the sewage of that area as required by the finding of the Special Master in 1929.

The Return admitted that the defendants had taken no steps whatsoever since the entry of the decree to secure a permit for and much less to construct controlling works. The Return sought to excuse this complete failure to do anything about controlling works on the ground that in 1926, more than four years before the entry of this decree, the defendants, in compliance with the requirement of Condition 6 of the Permit of the Secretary of War dated March 3, 1925, the defendants had submitted a preliminary and immature plan without application for a permit for a flood gate at the mouth of the Chicago River. The Return also stated, apparently as a further excuse, that in view of the

River & Harbor Act of July 3, 1930, "it is quite possible that the War Department does not wish" controlling works in the Chicago River.

The Return admitted the complete failure of the Defendants to acquire a site for the Southwest Side Sewage Treatment Works. It cited no excuse for this delinquency except that certain property owners had objected to the acquisition of a proposed site on the ground that the West Side area already owned by the Sanitary District was sufficient for both the West Side and Southwest Side Plants. The Return did state that tentative lay-outs had been made which indicated that the Southwest Side Treatment Plant *might* be constructed on a portion of the land heretofore acquired for the extension of the West Side Works if certain processes of disposal should prove practical, but the Return did not state that any decision had been reached upon that point.

The Return necessarily admitted the limited expenditures theretofore made and the inadequacy of the financing theretofore provided for the performance of the decree. It sought generally to excuse non-performance on the ground of financial difficulties. The Return confirmed the fact that such financial difficulties, to the extent that they existed, are applicable only to the Sanitary District and not to the State of Illinois and that as to the Sanitary District they rest solely upon an inexcusable failure to levy and collect usual and normal taxes. The Return in the view of the complainants confirms the conclusion that the financial difficulties of the Sanitary District, to the extent that they exist, are self-created obstacles in that they rest upon the incompetence, negligence or maladministration of officers for whom at least the State of Illinois is responsible.

These matters were heard by this Court on brief and oral argument on December 5th and 6th, 1932. "Upon consideration of the Return of the Defendants in the above entitled Causes to the Rule issued October 10, 1932 * * * and of the argument had thereon," this Court under date of December 19, 1932, referred this cause to Honorable Edward F. McClennen, as Special Master, with directions and authority to make summary inquiry on three particular subjects therein described and to report to the Court on or before April 1, 1933.

With the exception of the subjects of inquiry referred to Special Master McClennen, the complainants take the other matters of failure and inadequacy of performance set forth in their Application as established and therefore will not reargue them in this brief. So far, if at all, as any issue may be raised with respect to them, these complainants will rely upon their brief filed with this Court on December 5, 1932.

THE QUESTIONS SUBMITTED FOR DETERMINATION ON THE RE-REFERENCE OF DECEMBER 19, 1932.

The nature and extent of the inquiry to be made on the Re-reference now under review was defined by the Order of this Court dated December 19, 1932, in the following language:

> "(1) as to the causes of the delay in obtaining approval of the construction of controlling works in the Chicago River and the steps which should now be taken to secure such approval and prompt construction;
>
> (2) as to the causes of the delay in providing for the construction of the Southwest Side Treatment Works and the steps which should now be taken for such construction or, in case of a change in site, for the construction of an adequate substitute;
>
> (3) as to the financial measures on the part of the Sanitary District or the State of Illinois which are reasonable and necessary in order to carry out the decree of this Court."

By this Order of Reference there was, therefore, submitted to the Special Master for determination the following questions:

> *First.* What are the causes of the delay in obtaining approval of the construction of controlling works in the Chicago River?
>
> *Second.* What steps should now be taken to secure such approval and prompt construction?
>
> *Third.* What are the causes of the delay in providing for the construction of the Southwest Side Treatment Works?
>
> *Fourth.* What steps should now be taken for the construction of the Southwest Side Treatment Works either on the site originally indicated or a new site?
>
> *Fifth.* What financial measures on the part of the Sanitary District are reasonable and necessary in order to carry out the decree of this Court?
>
> *Sixth.* What financial measures on the part of the State of Illinois are reasonable and necessary in order to carry out the decree of this Court?

THE FINDINGS OF THE SPECIAL MASTER.

After extended hearings, the Master made and filed his Report (hereinafter called Report of Special Master McClennen in contra-distinction to the Report of the Special Master on the 1929 Re-reference), answering the foregoing questions as follows:

In answer to the *First* Question, the Master found:

> "The causes of the delay in obtaining approval of the construction of Controlling Works in the Chicago River are a total and inexcusable failure of the defendants to make an application to the Secretary of War for such approval." (Report of Special Master McClennen, p. 125, 5.)

In answer to the *Second* Question, the Master found:

> "The step which should now be taken to secure approval of Controlling Works is in an enlargement

of the decree of April 21, 1930 by the addition of a paragraph enjoining the State of Illinois to provide forthwith the necessary money for, and through the Sanitary District of Chicago or through other instrumentality chosen by the State to submit plans forthwith to the Chief of Engineers of the War Department, for Controlling Works for the purpose of preventing reversals of the Chicago River at time of storm and the introduction of storm flow into Lake Michigan and to make application forthwith to the Secretary of War for authorization of such Works and diligently to pursue such application with all necessary modifications to secure within four months if possible the recommendation of the Chief of Engineers and the authorization of such Works by the Secretary of War, and immediately thereafter to begin and to continue to construct such Works to completion within two years." (Report of Special Master McClennen, p. 126, 36.)

In answer to the *Third* Question, the Master found:

"The causes of the delay in providing for the construction of the Southwest Side Treatment Works are (1) an inexcusable and planned postponement of the beginning of construction of these Works to January 1, 1935 which left an inadequate time for their completion before December 31, 1938, at the rate of progress expected or to be expected under the methods pursued by the Sanitary District, and (2) the failure to proceed to a definite decision as to a site and to the acquisition of the site so chosen, and (3) the failure to proceed with reasonable diligence to prepare designs, plans, and specifications for the Works at this site or on the site of the West Side Works." (Report of Special Master McClennen, pp. 125-6, 50.)

In answer to the *Fourth* Question, the Master found:

"The step which should now be taken for the construction of the Southwest Side Treatment Works or in case of a change in site for the construction of an adequate substitute, is in an enlargement of the decree of April 21, 1930 by the addition of a paragraph enjoining the State of Illinois to provide forthwith the necessary money for, and through the Sanitary District of Chicago or through other instrumentality chosen by the State, forthwith to determine upon and secure the site for the Southwest Side Treatment Works, if the site is not owned already by the Sanitary District and forthwith to design and to construct said Southwest Side Treatment Works of the kind proposed to the Special Master of this Court in 1929 or of a kind no less efficient for the purification of the effluent to be discharged to the Sanitary Canal and at a rate of progress forthwith that except for casualties not now foreseeable will result in the completion of said Works and the beginning of their operation in ordinary course before December 31, 1938.

The omission of reference at this point to the Calumet, West Side and North Side Treatment Works is because they are not within the Order appointing me.'' (Report of Special Master McClennen, pp. 126-7, 60.)

In answer to the *Fifth* Question, the Master found:

''The Sanitary District is not failing now to pursue the reasonable financial measures now within its control, which are necessary in order to carry out the decree of this Court.'' (Report of Special Master McClennen, p. 126, 61.)

In answer to the *Sixth* Question, the Master found:

''The financial measures on the part of the State of Illinois which are reasonable and necessary in order to carry out the decree of this Court are in the enlargement of the decree by adding to it a paragraph providing that the State of Illinois be enjoined to appropriate through its General Assembly, before July 1, 1933, the sum of thirty-five million dollars to be expended before the end of the first fiscal quarter after the adjournment of the next regular session or in any event before October 1, 1934 and the same amount per year for each year ending on September thirtieth thereafter for the designing and the securing of authorization from the War Department and for construction of Controlling Works for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan and for sites for, and for the engineering expenses of designing, and for the construction, enlargement, alteration and completion of the intercepting sewer tunnels, conduits, sewage treatment plants and pumping stations commonly known as the Calumet Treatment Works, North Side Treatment Works, West Side Treatment Works and Southwest Side Treatment Works and all things appertaining thereto within the Sanitary District of Chicago, until all the same shall have been fully completed; and to incur indebtedness therefor and for the purposes aforesaid and no other to issue and to sell bonds of the State of Illinois for the amounts so appropriated and on such terms of payment and maturity and at such rates of interest as the General Assembly shall determine and without the law authorizing the same being submitted to the people of Illinois and the said laws shall be valid and the bonds so issued if in other respects conforming to the Constitution and laws of the State of Illinois shall be valid obligations of the State of Illinois notwithstanding the fact that said laws have not been submitted to the people of Illinois either theretofore or thereafter and any sums expended for said Works by the Sanitary District of Chicago, hereafter, from its own funds in any year ending September thirtieth shall reduce by so much the amount of the appropriation for said year which the State of Illinois is hereby required to expend." (Report of Special Master McClennen, pp. 127-8, 105-6.)

COMPLAINANTS' STATEMENT IN LIEU OF EXCEPTIONS.

The Order of Reference of this Court, dated December 19, 1932, provided that these causes should come on for hearing on the report of the Special Master without the filing of exceptions by either party. Complainants believe, however, that it may be helpful to the Court to state, in lieu of exceptions, their position with respect to the answers made by the Special Master to the six questions submitted to him for determination.

First. Complainants take no exception to the findings and conclusion of the Special Master in answer to the first question.

Second. Complainants take no exception to the correctness of the findings and conclusions of the Special Master in answer to the second question, so far as they go but contend that the Special Master should also have found that, in addition to the steps recommended in the Special Master's Report, the decree should be further enlarged to provide for the appointment of a Mandatory of this Court, without further hearing or notice, to do the things therein described for, on behalf of and at the expense of the defendants, in the event that such things should not be done by the defendants at the times fixed in the decree.

Third. Complainants take no exception to the findings and conclusions of the Special Master in answer to the third question.

Fourth. Complainants take no exception to the correctness of the findings and conclusions made by the Special Master in answer to the fourth question, so far as such findings and conclusions go, but complainants contend that the Special Master should further have found that the decree should be enlarged to provide for the appointment of a Mandatory, without further hearing or notice, to take the steps therein indicated as necessary and proper for the construction of the Southwest Side Treatment Works at the expense of the defendants in the event of future default.

Fifth. The complainants take exception to the finding of the Special Master, if material, in answer to the Fifth Question, to-wit, as to the financial measures on the part of the Sanitary District which are reasonable and necessary in order to carry out the decree of this Court, on the ground that such finding is merely that the District "is not failing *now* to pursue the reasonable financial measures *now* within its control." Whereas the question, if material, would be what financial measures on the part of the District should reasonably be required. However in the view of the complainants the finding is immaterial to a proper disposition of the matters before the Court, but, were the issue material, there are additional financial measures which should be required of the Sanitary District.

Sixth. The complainants take no exception to the correctness of the findings and conclusions of the Special Master in answer to the Sixth Question, so far as such findings and conclusions go, but complainants contend that the Special Master should also have found that the decree should be further enlarged to provide for the appointment of a Mandatory of this Court, without further hearing or notice, in the event of a failure by the State of Illinois to take the financial measures enjoined upon it at the times and in the manner prescribed by the enlarged decree.

ARGUMENT.

THE FACTS.

I.

THE INSTANT RECORD CONCLUSIVELY ESTABLISHES THE CORRECTNESS OF THE FINDING AND CONCLUSION OF THE SPECIAL MASTER THAT "THE CAUSES OF THE DELAY IN OBTAINING APPROVAL OF THE CONSTRUCTION OF CONTROLLING WORKS IN THE CHICAGO RIVER ARE A TOTAL AND INEXCUSABLE FAILURE OF THE DEFENDANTS TO MAKE AN APPLICATION TO THE SECRETARY OF WAR FOR SUCH APPROVAL."

The analysis of the evidence on this point by the Special Master (Report of Special Master McClennen, 5-36) so overwhelmingly sustains this finding that argument seems unwarranted, and is only indulged because the Special Master indicates in his report that the defendants challenge this finding.

A.

It is uncontroverted on the record that the defendants have taken no steps since the entry of the decree either to apply to the Secretary of War for a permit for the construction of controlling works or to finance or otherwise provide for the construction of such Works.

The records of the War Department, which were placed in evidence on the instant Reference by the Special Master, conclusively establish that between the date of the decree of April 21, 1930 and the present time, the defendants never filed any application with the Chief of Engineers or the Secretary of War, never submitted any plans for controlling works which the defendants proposed or desired to construct in the Chicago River or at the head of the Drainage Canal, and never addressed any communication whatsoever to the Chief of Engineers or the Secretary of

War or any subordinate officer of the War Department urging or seeking authorization for the construction of controlling works at the mouth of the Chicago River or at the head of the Drainage Canal. (Records of War Department, R. 32-120.) The State of Illinois has made no pretense of action of any kind in this matter. The Sanitary District admits that from the entry of the decree to date, it has never addressed any communication to the Secretary of War or to the Chief of Engineers urging or seeking authorization for the construction of controlling works as contemplated by the decree. (Ramey, R. 660.) No application for a permit to construct such controlling works was ever presented to the District Engineer at Chicago. (Weeks, R. 779, 802.)

Nor has either of the defendants at any time since the entry of the decree made or sought to make any provision for financing the construction of controlling works. When the Sanitary District in 1929 sought and obtained from the General Assembly of Illinois authorization for the issuance of bonds not to exceed in the aggregate twenty-seven million dollars without referendum for the prosecution of Sewage Treatment Works at Chicago, this authorization contained no provision for, and by appropriation to other purposes precluded, the use of any of this money for controlling works. On May 15, 1930, the Sanitary District passed a resolution petitioning the State Legislature to exempt it from the requirement of a referendum on bonds issued for the construction of the North Side, Calumet, West Side and South Side Treatment Works. This memorial sought no authority to issue bonds for the construction of controlling works. (Report of Special Master McClennen 79, 80.) On February 24, 1931, the Sanitary District submitted a bond issue of thirty-six million dollars for Sewage Treatment construction to public referendum. This bond issue made no provision for the construction of controlling works. (R. 283-5.) Although this Court on December 19, 1932, had ordered a reference in these causes to make summary inquiry, among other things, as to the causes of delay in obtaining approval of the construction of controlling works and the steps which should now be taken to secure such approval and prompt construction, the Board of Trustees of the Sanitary District on January 12, 1933 adopted the 1933 budget without making any provision for financing the construction of controlling works. (Exhibit 50; Woodhull R. 1333-4.)

It is thus conclusively established that the State of Illinois and the Sanitary District have taken no action whatsoever to perform this requirement of the decree of April 21, 1930. We now turn to a consideration of the excuses advanced by the defendants for this total failure of performance.

B.

The defendants attempt to justify their failure to make application to the Secretary of War for controlling works in the Chicago River by advancing four excuses; but these supposed excuses not only leave their flagrant default wholly unexcused, but involve so many changes in position and are so utterly without substance as to challenge their sincerity.

On this Reference the defendants have advanced four inconsistent excuses for their default in the matter of controlling works. We proceed to discuss them *seriatim*.

1.

The defendants' contention that they thought the submission of certain plans (without any application for permit) for a pontoon gate at the mouth of the Chicago River in 1926 and 1927 in compliance with the requirement of the permit of March 3, 1925, constituted a performance of the decree of April 21, 1930, in this particular is wholly unsupported by the record and so specious as to lead inevitably to the conclusion that the contention cannot be seriously made.

The excuse advanced by the defendants for their failure to proceed with the construction of controlling works in their Return to the Order to Show Cause, filed in the Supreme Court on November 7, 1932, was that "*in compliance with*" the *Permit of March 3, 1925*, the District had submitted plans for controlling works in the Chicago River to the United States District Engineer at Chicago in *November, 1926.* (Return of the Sanitary District of Chicago and the State of Illinois to the Rule to Show Cause entered herein on October 10, 1932, pp. 26-27; Report of Special Master McClennen, p. 6).

This was the first of the four excuses which the defendants sought to put forward on this Re-reference as the lack of substance and factual basis for such alleged excuses became progressively transparent. In November 1926, the defendants submitted a mere sketch of a pontoon gate to be installed at the mouth of the Chicago River. (Ramey, R. 664-5.) It was submitted solely in compliance with the requirement of Condition 6 of the Permit of March 3, 1925 (Report of Special Master McClennen, p. 6), which expired December 31, 1929, before the instant decree was entered. In or before July 1927, the defendants submitted more detailed plans for this pontoon gate on the request of the District Engineer (Report of Special Master McClennen,

p. 7). No application for a permit accompanied either the sketch or plans. No further plans and no applications were ever submitted by the defendants even in connection with the Permit of March 3, 1925, and much less pursuant to the decree of April 21, 1930.

In December 1928, the Chief of Engineers directed the District Engineer to make a comprehensive study of all feasible methods of preventing reversal of flow in the Chicago River "for the purpose of determining what plan should be adopted to meet the Permit Condition," to wit, Condition 6 of the Permit of March 3, 1925. (Report of Special Master McClennen, pp. 7, 8.) The District Engineer, knowing that the Sanitary District had made studies of the subject, requested that such studies be made available to him. In response to this request, the Sanitary District supplied him with twelve plans of controlling works, many of them sub-divisions of others. The plans were not submitted as parts of any application or any anticipation of an application to be made, but merely as the voluntary assistance given by one engineering force to another. (Master's 1933 Report, p. 8; Weeks, R. 774.) The basis of the defendants' contention on this point necessarily rests upon the claim that the foregoing constituted a compliance on the part of the defendants with this requirement of the decree and that the defendants believed that they were merely awaiting the action of the War Department. The factitious character of this contention is overwhelmingly manifest from an examination of the facts.

The first decision of this Court (278 U. S. 367) was rendered on January 14, 1929. The evidence on the Re-reference to settle the terms of the decree was taken in March, April and September of 1929. On this Re-reference General Jadwin, Chief of Engineers in April 1929 stated the position of the War Department as follows:

> "It is the present attitude of the Chief of Engineers, therefore, that the United States should not *require* the construction of controlling works, but that the Department will *consider any application for the approval of plans of controlling works, to be constructed by the Sanitary District or other agency,* and may be expected to approve these plans if the works are shown to be necessary, to be effective, and to be the minimum detriment to navigation.
>
> The question of control works is therefore a sanitary matter for solution by the Chicago Sanitary District or the City of Chicago." (Italics ours.) (Report of the Special Master on 1929 Re-reference, p. 109.)

It is manifest that the position of the War Department was that, since controlling works were not required as an aid to navigation and since the interests of navigation were the only ones with which the Department was officially concerned, the Department would impose no mandatory requirement for the construction of controlling works but that the Department stood ready to consider and approve plans for controlling works if properly designed, as a sanitary measure, the responsibility for which rested upon the defendants. The Department, therefore, made plain that the initiative properly rested not with the War Department, but with the defendants.

After the War Department had thus clearly placed the initiative in this matter squarely upon the defendants, the defendants proposed in their findings submitted to Chief Justice Hughes, as Special Master, in September 1929 that they should immediately prepare plans, file an application and press for its approval for the construction of proper controlling works either at the mouth of the Chicago River or at the head of the Drainage Canal. (Report of Special Master on 1929 Re-reference, pp. 81, 106, 117; Report of Special Master McClennen, p. 11.) Thereafter Chief Justice Hughes, as Special Master, after having heard exhaustive testimony, found that controlling works properly designed would constitute no unreasonable interference with navigation (Report of Special Master on 1929 Re-reference, p. 117), and provided both in his Conclusion and his recommendations for a decree that "the Sanitary District of Chicago shall forthwith submit plans for such Works to the Chief of Engineers of the War Department." (Report of Special Master on 1929 Re-reference, pp. 143, 147.) The defendants did not except to this finding or proposed form of decree, but on the contrary, in their brief before the Supreme Court on the hearing pursuant to which the decree of April 21, 1930 was entered, vigorously asserted that any exception or criticism by the complainants on the ground that these defendants would not file a proper application and press for its approval, in view of the finding of the Chief Justice that such controlling works would constitute no interference with navigation, and in view of the clearly stated attitude of the War Department that it would consider and approve plans presented for controlling works provided they were designed to cause the minimum interference with navigation, was captious and inadmissible and that the objections of the plaintiffs in that respect should be disregarded as without substance. (Report of Special Master McClennen, pp. 14-16.)

In passing it may be noted that the instant record discloses that there has been no change in the position of the War Department since the foregoing statement of General Jadwin and the foregoing conclusion of the Chief Justice. The present Chief of Engineers, Major General Lytle Brown, advised Special Master McClennen in January 1933 as follows:

> "The Department is prepared to approve plans for any controlling works presented by the Sanitary District, provided these works do not constitute unreasonable obstruction to navigation." (R. 33.)

The official position of the War Department, stated by General Jadwin before the Chief Justice in April 1929, and restated by General Brown in the instant Reference, was never changed during the interim. (Weeks, R. 488, 493, 494, 709.)

On this record it is unbelievable that the defendants could have thought that the things hereinbefore recited constitute a compliance with this requirement of the decree or that *they were awaiting the approval by the War Department of an application never filed.* The defendants knew that in the opinion of the War Department the plan for a pontoon gate, submitted in response to a requirement of the Permit of March 3, 1925, was not a satisfactory plan. (Ramey, R. 651.) On their own admission they knew that these immature plans submitted in 1926 and 1927 for a purpose wholly unrelated to the performance of the instant decree and not accompanied by any application were "practically dead." (Ramey, R. 658; Report of Special Master McClennen, p. 7.) All of these things now sought to be relied upon had been done prior to July 1927. The testimony before Chief Justice Hughes, as Special Master, in 1929 was, as shown by his Report, that controlling works should take the form of a lock with appropriate gates and that probably such controlling works should be placed at the head of the Drainage Canal. From what has been recited of the evidence, it is of course clear that the defendants never submitted any plan and application for authorization of controlling works containing a lock or for controlling works of any character at the head of the Drainage Canal. (Ramey, R. 660; Exs. 25, 26, 27.)

The defendants knew that Colonel Weeks, the District Engineer, acting under instructions from the Chief of Engineers, had prepared and filed a report upon suitable kinds of controlling works on April 11, 1929. The defendants never even examined that report until it was placed in this record by Special Master McClennen on January 12, 1933. (Ramey, R. 398.) The defendants, represented by intelligent and experienced men, knew that on application to the proper authority in the War Department in Washington, they could secure permission to examine the report which Colonel Weeks, as District Engineer, would, of course, have no authority to release. The defendants never prepared any plans or submitted any application for authority to construct the type of controlling works which Colonel Weeks reported to be most desirable. (Ramey, R. 407.) Yet in the face of this record, the defendants now contend that this immature plan submitted in 1926 and 1927, *unaccompanied by any application* and for a purpose wholly unrelated to the performance of the instant decree, with knowledge that the form of proposal so submitted was considered unsatisfactory by the Chief of Engineers, with knowledge that there was no pending application upon which the War Department could act, with knowledge that they had assured the Chief Justice and the Supreme Court that they would forthwith prepare plans and press an application for authority to construct suitable controlling works, with knowledge that the Chief of Engineers had stated that henceforth the initiative on this matter rested squarely with the defendants, constituted a compliance with the decree of April 21, 1930.

The defendants were and are represented by intelligent and experienced men. These men have had wide experience in filing and pressing applications with the War Department for those things which they wanted. We respectfully submit that an attempt to excuse this flagrant default upon this flimsy basis cannot be sincere. The obligation imposed by the decree of this Court is a solemn obligation. We submit that it will not do to permit intelligent defendants to discard or treat their obligations under such a decree in any such fashion. It is inconceivable that the defendants believed either that this old submission of plans without application for an entirely different purpose, long antedating the decree and known to have been found unsatisfactory by the War Department, constituted a compliance with the decree or an excuse for non-compliance.

2.

The alleged excuse that the absence of any specific provision for controlling works in the decree of April 21, 1930 (281 U. S. 696) created a doubt whether the defendants were required to construct such works and that such doubt justified the defendants both in refraining from taking any action whatsoever in the premises and from bringing the alleged doubt to the attention of this Court, not only affords no excuse but exhibits a highly culpable course of conduct.

It is a startling thing that a party under obligation to perform a judgment of this Court should assign, as an excuse for a three-years' failure to perform an important requirement of such a judgment, a claim that the party was in doubt whether the particular matter of performance was encompassed by the decree and therefore sat complacently inactive for three years (until the particular matter should have been actually performed) without even bringing to the attention of this Court such alleged doubt of the scope of the litigants' obligation. A mere statement of the position is sufficient to establish that the contention is not only without merit, but a proper subject for the most severe criticism. It can hardly be tolerated that litigants under the compulsion of a judgment of this Court may sit by until performance should have been accomplished and then for the first time advise the Court that they were in a state of uncertainty whether they should in fact perform.

Let us examine the facts advanced in support of this specious excuse. It is unnecessary to repeat, but it is necessary to bear in mind, the representations of the defendants on the Re-reference for formulating the decree, the findings of Chief Justice Hughes, as Special Master, and the action of this Court upon those findings, which were more particularly set forth in the preceding section. In the face of that record, the defendants assert that the absence of a specific provision for controlling works in the decree of April 21, 1930, created uncertainty in their minds whether they were required to construct such works. (Ramey, R. 399, 661-674.) The decree made no specific provision for *particular* or *any* sewage disposal works. Could these defendants be heard to say that they therefore doubted whether they were to proceed any further with construction of sewage disposal works? (Ramey, R. 662.) If not, how can they be heard to say that they were in doubt whether they were required to proceed with the construction of controlling works which occupied exactly the same status under the findings and conclusions of Mr. Chief Justice Hughes, then Special Master, as the sewage disposal works, and occupied exactly the same status in reference to the terms of this Court's decree? If the defendants could have had an honest doubt, which is inconceivable on the record, could they be heard to say that they refrained from taking any action on the basis of such a doubt without even reporting their alleged uncertainty to this Court? And this in the face of the fact that their Semi-annual Reports consistently listed controlling works as part of their program.

If the defendants had entertained an honest doubt, it would have been their duty to apply to this Court for instructions or a construction of the decree. These controlling works were part of the program submitted by the defendants as the one which they desired the Court to give them time to construct before the restoration of complainants' rights, which the court in its first decision (278 U. S. 367) had held should otherwise be restored immediately. (Report of Special Master on 1929 Re-reference, pp. 81, 106, 117; Report of Special Master, McClennen, p. 11.) Can these defendants, after seeking the favor of the Court for postponement of the termination of their wrongdoing, excuse the failure to go forward with one of the elements of the program submitted by them as a basis for the Court's compassion on the ground of an *undisclosed* doubt? While it seems difficult to fix responsibility for anything among the defendants, the defendants and some of their officers were responsible for adopting the program to comply with the Court's decree. In the face of this pretended doubt, no responsible official of the Sanitary District even requested an opinion of its legal department as to the meaning of the decree in this respect. (Ramey, R. 669; Report of Special Master McClennen, p. 19.) In the face of its pretended doubt, the Sanitary District of Chicago filed its Semi-annual Reports with this Court which not only failed to disclose this pretended doubt, but which consistently included the construction of control works as part of defendants' program; and this Court had every reason to believe, as it doubtless did believe, that the defendants fully understood that they were required to proceed with the construction of controlling works just as they were required to proceed with all of the other features of the program submitted by them for the construction of which this Court had granted an indulgence of nine years.

No responsible official of the defendants ever took any action subsequent to the entry of this decree, either to resolve this pretended doubt or to go forward with this item of the program. That is true of the whole program of the Sanitary District. (Woodhull, R. 1281-1282.) In fact it is apparent from the whole record that no responsible official of the Sanitary District or the State of Illinois ever made any real or substantial effort to investigate and determine whether the Sanitary District had laid down a program, and much less whether it was carrying out a program, which would accomplish the performance of the court decree. It is submitted that the indifference, to say the least, with which the responsible officials of the Sanitary District and the State of Illinois treated the question whether a program had been adopted and was being carried out conformable with the decree is inexcusable and intolerable. If this pretended doubt had in fact existed, it would be inconceivable that a defendant could be permitted to take advantage of such supposed doubt after it had delayed performance for three years without any disclosure to this Court. We submit that this excuse deserves the most severe condemnation.

3.

The alleged excuse that the Rivers and Harbors Act of July 3, 1930 created a doubt in the minds of the defendants whether they should proceed with the construction of controlling works, though required by the decree, has no substantial basis; but, if such alleged doubt had in fact arisen, the defendants could not be heard to excuse their non-performance on the ground of such a doubt, undisclosed to this Court for nearly three years.

The suggestion that the Rivers and Harbors Act of July 3, 1930 might affect the obligation of the defendants to go forward with the construction of controlling works, was made in the Return of the Sanitary District of Chicago and the State of Illinois to the Rule to Show Cause entered herein on October 10, 1932, which was filed in this Court on November 7, 1932. (See pages 27-31.) This suggestion was again urged by both defendants before the Special

Master on this Reference either as an excuse for, or in extenuation of, their default in the matter of controlling works. The Master's Report overwhelmingly refutes this contention of the defendants and clearly demonstrates that it is wholly without substance. (Report of Special Master McClennen, pp. 19-35.) In our brief before this Court upon Defendants' Return to the Rule to Show Cause, we pointed out that the Congress had not attempted to take any action since the date of the decree, if it has any power so to do, inconsistent with the decree, and that by the Great Lakes-St. Lawrence Deep Waterway Treaty, the Federal Government had adopted the decree of this Court as a Federal policy. All official Federal action was cited and discussed in our brief. (Brief of Wisconsin, Minnesota, Ohio and Michigan after Return of the Sanitary District of Chicago and the State of Illinois to the Rule to Show Cause, pp. 39-47.)

The inquiries thereafter ordered by this Court under the Re-reference of December 19, 1932 were, First, "the causes of the delay in obtaining the approval of the construction of the Controlling Works," and Second, "the steps which should now be taken to secure such approval and prompt construction." On January 12, 1933, the so-called Mississippi Valley States filed in this Court an Application for a Modification of the Decree of April 21, 1930, and an enlargement of the pending reference on the ground that the Rivers & Harbors Act of July 3, 1930 had created a changed situation. This Court denied the Application of the Mississippi Valley States on January 16, 1933. Under these circumstances a further extended discussion of this unsubstantial contention seems unwarranted.

Moreover, it is inconceivable on this record that the Rivers & Harbors Act of July 3, 1930 could have created or did create any honest doubt in the minds of the defendants as to their obligation under this requirement of the decree. Indeed the most defendants claim is not that they had such a belief, but that they speculated about it.

The Federal project for the Illinois River from Utica or LaSalle to its mouth is the identical Federal project which was in effect when the hearings were had before Chief Justice Hughes, as Special Master, in 1929, before the formulation of the decree. The Rivers and Harbors Act of July 3, 1930, so far as it relates to any waters between Lake Michigan and the Mississippi River, relates only to the Illinois Waterway. The State of Illinois retained title to the Illinois Waterway. The project was based not upon Senate Document 126, 71st Congress, Second Session, but solely upon the Report of the Chief of Engineers as set forth in that document. (R. 129-130; Ex. 11, pp. 1-6.) That report disclosed that the utility of the project would not be affected by reduction in the flow at Lockport as low as a thousand second feet in comparison with the thirty-three or thirty-four hundred second feet which will flow at Lockport when the decree of this Court is fully in effect after December 1, 1938.

General Deakyne, Assistant Chief of Engineers, testified before the Rivers and Harbors Committee that an appropriation of $7,500,000 would construct the project channel so as to provide the full channel depths and widths, even though the flow at Lockport should be reduced to a thousand second feet as compared with the minimum of thirty-three hundred second feet under the decree. (R. 1844.) Contrary to the usual practice, an appropriation of $7,500,000 was made concurrently with the adoption of the project, so as to make it clear beyond debate that the adoption of the project could not be construed, even by implication, as any attempt, if Congress had the power, to appropriate any water in excess of the amount fixed by this Court.

The Congress required the project to be constructed in such a way as to require the smallest flow of water with which said project could be practically accomplished. It had before it the opinion of the Chief of Engineers that this could be at least as low as a thousand second feet. The provision for a survey was not with the view of increasing the flow, but with the view of seeing how small a flow would be adequate, "for, with further developments in the art of sewage disposal, a lower flow than that provided at Lockport for sanitation under the court decree may become sufficient.

Of course in any event the most that could be said of the provision for a future survey would be that it is in the realm of speculation and possibility that the Congress, if it has the power, might at some future date, attempt to take some action which would provide a diversion different than that fixed by the Supreme Court. That alleged possibility had been consistently urged by these defendants throughout this litigation. That such an alleged possibility had any legal significance had been expressly repudiated by this Court in both decisions. (*Wisconsin v. Illinois,* 281 U. S. 179 at 197-8; Same, 278 U. S. 367 at 420.) It is submitted that the defendants cannot in good faith seek to excuse their default on the basis of an alleged possibility of congressional action twice before urged before this Court and twice repudiated by this Court.

Hence it is clear on this record that there could have been no real doubt created in the minds of the defendants by the Rivers and Harbors Act of July 3, 1930. The defendants did not even claim that they had decided or believed that it *would* be unnecessary to build controlling works because of the Rivers and Harbors Act of July 3, 1930, but at the most merely claimed that they thought it *might* be unnecessary ever to build controlling works. (Ramey, R. 405.) In short the defendants seek to excuse non-performance on the basis of an *undisclosed speculation.*

However, conceding for the sake of argument that an actual doubt, however unwarranted, arose in the minds of defendants, it would have been the imperative duty of the defendants, had they really had such an alleged doubt, to have brought it to the attention of this Court and asked this Court to determine whether such Federal action affected defendants' obligation under the decree. Assuming such alleged doubt to have existed, the action of the defendants in utterly disregarding this requirement of the decree for nearly three years on the basis of an undisclosed doubt, would not excuse, but condemn, the course of action followed.

4.

The alleged excuse that the defendants performed or were excused from performing their obligation under the decree immediately to make application to the War Department for approval of controlling works by casual and off-hand conversations with the United States District Engineer at Chicago, during visits to his office for other purposes, is without merit; and it is inconceivable that such an excuse can be seriously advanced by responsible and intelligent officials of a great State and an important municipality.

We have hereinbefore reviewed the record on this Reference and shown that no application whatsoever for a permit for the construction of controlling works was ever made even prior to the date of the entry of the decree of April 21, 1930 and much less since. (See Sects. I, A and B1, pp. 15-24 *supra.*) The only action of the defendants either before or after the decree may be briefly summarized. In 1926 and 1927, the Sanitary District submitted, without application, tentative plans for a pontoon gate at the mouth of the Chicago River. These plans were submitted solely in compliance with the mandatory requirement of Paragraph 6 of the Permit of March 3, 1925. (Report of Special Master McClennen, p. 6.) Late in 1928 or early in 1929, the District Engineer, who had been directed by the Chief of Engineers to make a study and report of the possible kinds of controlling works other than those which would constitute a complete bar to navigation (as was the case with the pontoon gate submitted by the Sanitary District) requested of and received from the Sanitary District Engineers copies of such plans and studies of controlling works as had theretofore been made in the Sanitary District offices. These plans and studies were not submitted by the Sanitary District as parts of any application or in anticipation of any application to be made, but merely as the voluntary assistance given by one engineering force to another. (Report of Special Master McClennen, p. 8; Weeks, R. 774, 779, 802.)

In this state of the record the defendants offered testimony that certain Engineers in the employ of the Sanitary District, while conferring with Colonel Weeks, the District Engineer, from time to time in relation to other features of the work of the Sanitary District which required these meetings, had engaged in casual and off-hand conversations about controlling works with that officer. The defendants now apparently put forward these casual and off-hand conversations either as a performance of their obligation under the decree forthwith to make application to the War Department for a permit authorizing controlling works or as an excuse for non-performance in that regard. The utter lack of substance in the contention is thoroughly established by the Master's analysis of the evidence (Report of Special Master McClennen, pp. 16-18.) A detailed review of that evidence by the complainants would be unwarranted. The specious character of the excuse is too manifest. All of Colonel Weeks' statements were mere expressions of his personal opinion and were made to the defendants in the form of mere statements of his personal opinions. (Weeks, R. 488.) The position of the War Department had been authoritatively stated by General Jadwin and was well known to the defendants. It is amazing that the defendants should claim that these casual and off-hand conversations constituted an honest and *bona fide* attempt to make an application for a permit for the construction of controlling works or an excuse for not doing so.

These gentlemen were not in ignorance of how to apply to the Secretary of War for a permit. The Sanitary District has applied for many permits, when it suited its purpose, during the course of its existence. No case was brought to the attention of the Master where the Sanitary District had failed to file a proper official application when it sought sanction for a further diversion. It was admitted by Mr. Ramey, Principal Assistant Chief Engineer of the Sanitary District, that were he seriously trying to obtain a permit he would file an official application, and if it were disapproved by the District Engineer he would press it with the Chief of Engineers and the Secretary of War. (R. 834.) Here we have these defendants faced with the solemn obligation of this Court's decree requiring them forthwith to proceed to prepare plans and file an application for proper controlling works with the War Department. How can it be sincerely contended that these defendants believed that an honest, wholehearted effort to comply with this decree was satisfied by casual, off-hand conversations with a District Engineer?

II.

THE FINDINGS AND CONCLUSIONS OF THE SPECIAL MASTER AS TO THE STEPS WHICH SHOULD NOW BE TAKEN TO SECURE APPROVAL OF CONTROLLING WORKS AND THEIR PROMPT CONSTRUCTION ARE CORRECT AND ABUNDANTLY SUPPORTED BY THE RECORD; BUT THE SPECIAL MASTER SHOULD ALSO HAVE FOUND THAT THE DECREE SHOULD BE FURTHER ENLARGED TO PROVIDE FOR THE APPOINTMENT OF A MANDATORY OF THIS COURT, WITHOUT FURTHER NOTICE OR HEARING, TO TAKE SUCH STEPS FOR, ON BEHALF AND AT THE EXPENSE OF THE STATE OF ILLINOIS IN THE EVENT OF DEFAULT.

After reviewing the evidence and the various contentions of the parties, the Special Master concluded on this branch of the case as follows:

> "The step which should now be taken to secure approval of Controlling Works is in an enlargement of the decree of April 21, 1930 by the addition of a paragraph enjoining the State of Illinois to provide forthwith the necessary money for, and through the Sanitary District of Chicago or through other instrumentality chosen by the State to submit plans forthwith to the Chief of Engineers of the War Department, for Controlling Works for the purpose of preventing reversals of the Chicago River at time of storm and the introduction of storm flow into Lake Michigan and to make application forthwith to the Secretary of War for authorization of such Works and diligently to pursue such application with all necessary modifications to secure within four months if possible the recommendation of the Chief of Engineers and the authorization of such Works by the Secretary of War, and immediately thereafter to begin and to continue to construct such Works to completion within two years." (Report of Special Master McClennen 126.)

The soundness of the foregoing conclusion as far as it goes is abundantly supported by the record. Neither the

Sanitary District nor the State of Illinois has, during the three years which have elapsed since the entry of the decree, made any application whatsoever for a permit of the Secretary of War authorizing construction of controlling works. Neither the Sanitary District nor the State of Illinois from the entry of the decree to date has ever made or sought to make any provision for financing such an application or for financing the construction of such works. Even after this Court by its order of Reference dated December 19, 1932 directed a summary inquiry as to what steps should now be taken to secure approval of controlling works and their prompt construction, the Sanitary District, when adopting its 1933 budget on January 12, 1933, made no provision whatsoever for financing the making of an application to the Secretary of War or for financing the construction of controlling works. Thereafter during this Reference, the defendants stated to Special Master McClennen that they do not intend to do anything about controlling works unless this Court should specifically order them so to do. Throughout the pending Reference the defendants persistently urged, as hereinbefore shown, specious claims of doubt as to whether they were under any obligation under the decree to go forward in the matter of controlling works. (See Facts, Section I, B, 2, 3, 4, pp. 24-33, *supra.*) It is therefore manifest that it is both reasonable and necessary that the decree should be enlarged in accordance with the finding of the Special Master.

The reasons why this duty should be specifically imposed upon the State of Illinois are overwhelming. They are ably stated by Special Master McClennen (Report of Special Master McClennen, pp. 36-50.) While the Sanitary District and the State of Illinois are both obligated to perform this Court's decree and restore complainants' rights, the primary obligation necessarily rests upon the State of Illinois of which the Sanitary District is a mere arm or agency. In the past the State of Illinois has made no pretense of assuming or performing this obligation. It has sought to excuse its own default and the default of the Sanitary District upon the ground of lack of capacity and power in the Sanitary District when such lack of capacity and power, if they existed at all, rested upon restrictions imposed upon the Sanitary District by the State of Illinois, arose from a lack of powers which had not been but could have been conferred upon the District by the State of Illinois, or arose from the negligence, incompetence or maladministration of officers of other political subdivisions and agencies of the State over which the Sanitary District had no power or control, but over which the State of Illinois had and has power and control and for the discharge of whose duties the State of Illinois has the responsibility. As will appear more clearly hereafter from a discussion of the financial measures which should be taken now, the Sanitary District, not through lack of financial capacity or resources but through the negligence, incompetence or maladministration of tax collecting officers of the State of Illinois in Cook County, has been placed temporarily in a condition where the abundant financial capacity of the District to perform the decree cannot for the time be made available. That the State of Illinois is abundantly able to finance performance and to perform this decree cannot be questioned upon the instant record. (See Facts, Section VI, C, pp. 58-9, *infra.*) Under these conditions it is clear that the decree should be enlarged to impose a specific duty upon the State of Illinois to assume and discharge its obligation to perform the decree. This conclusion is based not only upon the present inadequacy of the *immediately available* financial capacity of the Sanitary District, in the existing state of its affairs as affected by collateral matters such as negligent failure of tax collections, under the jurisdiction and control of the

State of Illinois, but upon the fact that the measures which might properly be taken to increase and make immediately available the financial capacity of the Sanitary District are all things which might properly be authorized or properly be imposed upon the Sanitary District by the State and are dependent upon State action. The extent, if at all, to which the State of Illinois will require the Sanitary District currently or eventually to reimburse the State of Illinois for the cost of performance of the decree is a question of internal policy with which the complainants, and we assume this Court, is not concerned. Certainly the defendants must not be permitted longer to juggle the responsibility between them. The State of Illinois should not be permitted to delegate, as it has attempted to do in the past, its responsibility for the financing and the performance of this Court's decree.

The State of Illinois has sought to raise technical legal obstacles, allegedly based upon its Constitution, to the discharge of its obligation under the decree. The Special Master has fully demonstrated the unsoundness of such technical legal contentions in his Report. (Report of Special Master McClennen, pp. 36-50.) We shall reserve our discussion of those questions for the Section of our brief devoted to the law. (See Law, Section II, pp. 93-97, *infra.*)

However complainants submit that the Special Master should also have found that the decree should be further enlarged to provide for the appointment of a Mandatory of this Court, without further notice or hearing, to take the steps set forth by the Special Master, for, on behalf and at the expense of the State of Illinois in the event the State does not proceed promptly with the duties specifically to be imposed upon it by the recommendation of the Special Master. The Special Master erred in holding that such a procedure would be inexpedient if not futile.

We agree that if Illinois proceeds promptly with the discharge of its duty, it would be neither reasonable nor necessary to substitute a Mandatory of this Court. The past record of the defendants, however, furnishes just ground for apprehension whether the State of Illinois will go forward promptly and expeditiously with the performance of its duties so declared. The decision of this Court on this hearing should not be such as to require another hearing in such an eventuality. It should provide for the appointment of a Mandatory without notice in case of such a default; for under such circumstances the appointment of a Mandatory would be reasonable, necessary and practicable. No difficulty is perceived in authorizing such a Mandatory to levy taxes upon the last available assessment roll in the State of Illinois and to collect such taxes through United States Marshals. No extensive machinery would be required. If such last available assessment roll were not satisfactory to Illinois, the responsibility would rest upon the State. Hence, the Mandatory would need no army of subordinates to make valuations or assessments. Nothing in the record supports a conclusion that such a Mandatory would be received as a "carpetbagger," and on the contrary, speaking off the record, we have reason to believe that he would be welcomed by the thinking citizens of Illinois. Such a Mandatory could proceed to supervise the carrying out of the program by the Engineering Organization of the Sanitary District as well as the non-technical offices of that District. We reserve further consideration of this matter for our discussion of the financial measures.

III.

THE SPECIAL MASTER'S FINDINGS AND CONCLUSIONS "AS TO THE CAUSES OF THE DELAY IN PROVIDING FOR CONSTRUCTION OF THE SOUTHWEST SIDE TREATMENT WORKS" ARE OVERWHELMINGLY SUSTAINED BY THE EVIDENCE IN THIS CASE.

After reviewing the evidence and the contentions of the parties, the Master concluded on this branch of the case as follows:

> "The causes of the delay in providing for the construction of the Southwest Side Treatment Works are (1) an inexcusable and planned postponement of the beginning of construction of these Works to January 1, 1935, which left an inadequate time for their completion before December 31, 1938, at the rate of progress expected, or to be expected under the methods pursued by the Sanitary District, and (2) the failure to proceed to a definite decision as to a site and to the acquisition of the site so chosen, and (3) the failure to proceed with reasonable diligence to prepare designs, plans and specifications for the Works at this site or on the site of the West Side Works." (Rep. of Special Master McClennen 125-126.)

The Special Master's conclusion is abundantly supported by the evidence set forth in his Report (Rep. of Special Master McClennen 50-60). However, in view of the fact that the defendants claim this finding to be erroneous we discuss the evidence briefly.

A.

The Record Establishes that "The Cause of the Delay in Providing for the Construction of the Southwest Side Treatment Works" Was the Deliberate Adoption by the Defendants of a Program, in Utter Disregard of the Findings of Chief Justice Hughes, as Special Master, as to the Steps Which, With Reasonable Expedition, Should be Taken for the Construction of This Controlling Factor Within the Time Fixed by the Decree, Which Program Allowed Such Inadequate Time for the Construction of the Plant as to Constitute a Planned Default Under the Decree.

After hearing exhaustive testimony, Chief Justice Hughes, as Special Master, found, on filing his report in December 1929, that two and one-half years would be a reasonable time to allow for selection and acquisition of a site, necessary preliminary steps, preparation of plans and specifications and advertising and passing upon bids for the construction of the Southwest Side Treatment plant (Report of the Special Master on 1929 Re-reference, page 58), and that five and one-half years thereafter would be a reasonable allowance of time for the physical construction of the Southwest Side Treatment plant. (Report of the Special Master on 1929 Re-reference, page 70.) The program adopted by the defendants in 1930 utterly disregarded these findings and conclusions. Under the defendants' program construction was not to begin upon any part of this controlling factor until 1935. (Ex. 22. Ramey, R. 563, 565-566; Pearse, R. 994.) The defendants thereby deliberately and with knowledge, and without any intention of complying with the findings and conclusions of Chief Justice Hughes as Special Master, adopted a program under which they proposed to take five years, (1930 to 1934, inclusive,) for the things which Chief Justice Hughes as

Special Master had found, with reasonable expedition, should be accomplished in two and one-half years. (Ramey, R. 564, 566.) This program also postponed commencement of construction on this controlling factor until 1935 and allowed only four years or less for physical construction and tuning up the Southwest Side Plant. (Ex. 22. Ramey, R. 384, 563, 565-566, 568.)

In determining the sincerity of this program we must not only compare the period of *four years* thus allowed for the *construction and tuning* up of the Southwest Side Plant with the finding of Chief Justice Hughes, as Special Master, that *five and one-half years* would be required for *physical construction* of the plant, but also with the claims advanced by the defendants before Chief Justice Hughes, as Special Master, to the effect that the *physical construction* of this plant would require *nearly eight years.* (Report of the Special Master on 1929 Re-reference, p. 66.) Indeed, it is significant that the program adopted by the District (Ex. 22) was adopted both in relation to the works to be accomplished by December 31, 1935 and in relation to the provision made for the construction of the controlling factor, the Southwest Side Treatment Plant, with knowledge that such program did not comply with the findings of Chief Justice Hughes, as Special Master, as to what should be done by the District with reasonable expedition and without any intention to adopt a program that would comply with such findings. (Ramey, R. 557-562, 566; Woodhull, R. 1374-1376.)

From a consideration of the foregoing facts, it is incontrovertible that the prime cause of delay in providing for the construction of the Southwest Side Treatment Works is the deliberate adoption of a program which, without any adequate cause, provided for substantial, and in many cases very great, delay in the program for the construction of the Southwest Side Treatment Works that had been found to be reasonable and proper by Chief Justice

Hughes, as Special Master, on the 1929 Re-reference. This program utterly disregarded the findings of Chief Justice Hughes as Special Master as to what would be reasonable and proper performance. It deliberately postponed the commencement of construction of the Southwest Side Plant until so late a date as to amount to a planned default.

The adoption of this program by the defendants in 1930 establishes a lack, from the very date of the entry of this decree, of any real, substantial and *bona fide* effort and intent to perform the decree according to its terms. The only excuse offered was, that it was desired to average the annual expenditures in such a way as to equalize them as nearly as possible from year to year. But, as Special Master McClennen points out, the program adopted by the Sanitary District, with knowledge that if their professions and estimates of cost were even approximately correct an annual expenditure of over $20,000,000 would be required, failed to provide for anywhere near ratable expenditures on construction progress in the earlier years of the period (Report of Special Master McClennen, page 55), and accumulated excessive expenditures and construction progress for the last years of the period, so that the slightest derangement in finances or construction progress would inevitably lead to default, even if it were assumed that, contrary to the claims of defendants before Chief Justice Hughes as Special Master, and contrary to his findings, the construction work left for the last four years of the period under the defendants' program, could be physically performed within that time, should unlimited finances be available.

In passing we invite the Court's attention to the fact that the defendants' program likewise planned a postponement of the completion of the West Side Plant until the end of 1936, and indeed of some of the intercepting sewers, until 1938. This was incontrovertibly a planned default as to that part of the decree which required the defendants to complete and place in operation the West Side Plant before the interim reduction of the diversion on Dec. 31, 1935. It is further to be noted that the work which under the decree should be done on the West Side, Calumet and Des Plaines projects before December 1, 1935, the date of the interim reduction in diversion, is only 16% completed, and far behind what Chief Justice Hughes, as Special Master, found in 1929 should be accomplished on these projects with reasonable expedition. (Report of Special Master McClennen, page 59.)

B.

The Defendants Have Neither Acquired Nor Definitely Selected a Site for the Southwest Side Treatment Works; They Stand Today in the Same State of Indecision as to Where the Southwest Side Treatment Works Will be Finally Located as They Stood Before Chief Justice Hughes, as Special Master, in 1929; and on This Reference the Matter of the Selection and Acquisition of a Site for the Southwest Side Treatment Works by the Defendants, as a Matter of Determination and Accomplishment, Stands Exactly Where It Stood on the 1929 Re-reference When the Defendants Presented Their Evidence on the Subject to Chief Justice Hughes, as Special Master.

After the defendants, at the close of the 1929 hearings, had professed an uncertainty whether they should acquire the site previously selected for the Southwest Side Plant or some other site, Chief Justice Hughes, as Special Master, in his report on Re-reference, at page 51, said:

> "The question must be determined promptly, and there seems to be no reason why proceedings for purchase or condemnation should not go speedily forward."

Since that evidence was taken before Chief Justice Hughes, as Special Master, in September 1929, approximately *three and one-half years* have passed and the performance of the decree is still threatened by the indecision and inability of the defendants to select and acquire a site. It is manifest from the evidence on this Reference that there is the same lack of a definite decision and the same absence of a definite official action for the selection and acquisition of a site which characterized the position of the defendants on the Re-reference in 1929. (Ramey, R. 582-5, 591-2, 597, 598; Woodhull, R. 1319-1320; Pearse, R. 971-2.) The Sanitary District had studied this problem with a large and highly competent corps of engineers for many years. It is unbelievable that the Sanitary District was either unable or incompetent to select a site for this plant.

In September 1929 the Sanitary District had funds with which to go forward immediately with the acquisition of a site. (Woodhull, R. 1303.) An ordinance for the acquisition of a site was not adopted until December 26, 1929. (Woodhull, 1305, 1308, 1314.) No offers were ever made to property owners and no condemnation suits were ever filed. (McCarthy, R. 1412, 1413.)

The defendants offered evidence that thereafter some adjoining property owners protested against the acquisition of the site selected and, at a public hearing, offered evidence that the acquisition of the proposed site was unnecessary for the reason that the West Side area, already owned by the Sanitary District, was adequate for the construction of both the West Side and Southwest Side Treatment Works. Thereupon the Sanitary District repealed its ordinance for the acquisition of the proposed site and remained in the same state of uncertainty as to the location of the Southwest Side Treatment Works as before. If the Sanitary District, after studying both the West Side and proposed Southwest Side sites for many years, with a large and highly trained corps of engineers, could not reach a decision as to the proper location of these sewage treatment works or whether the West Side area was large enough for both plants, that circumstance furnishes an abundant reason why the performance of this decree must be taken out of such uncertain and incompetent hands and placed under the strict jurisdiction of this Court.

Finally, in 1932, the Sanitary District reached a state of mind where they thought that if a new process for disposing of the sludge proved successful, the Southwest Side Treatment Works could be built on the West Side area now owned by the District. No definite or final decision has been made. No official action has been taken. (Woodhull, R. 1319-20; Pearse, R. 971-2; Ramey, R. 582-5, 591-2, 597, 598.) The District stands in exactly the same state of indecision and uncertainty as to where, if at all, the Southwest Side Sewage Treatment Works will be built as it stood on the Re-reference in 1929. It requires no argument to show that three and one-half years of continued indecision as to where this plant shall be built has been and is a prime and inexcusable cause of the delay.

C.

A Further Cause of the Delay in Providing for the Construction of the Southwest Side Treatment Works is the Complete Failure of the Defendants to go Forward With the Preparation of Designs, Specifications, and Plans With Reasonable Expedition in Accordance With the Requirements of the Findings of Chief Justice Hughes, as Special Master.

No contract plans have been prepared for any of the structures involved in the Southwest Side Treatment Works. (Ramey, R. 637-643; Pearse, R. 1069.) Chief Justice Hughes, as Special Master, found that complete contract plans should, with reasonable expedition, be prepared in two and one-half years. (Report of Special Master on 1929 Re-reference 58.) It is now approximately three and one-half years since that finding was made. The 1933 budget includes no substantial, if indeed it includes any, appropriation for the preparation of contract plans and the completion of designs for any of the large structures of the Southwest Side Treatment Works. (Ex. 50. Pearse, R. 1042-43.) The complete failure of the defendants to proceed with reasonable diligence to prepare designs, plans and specifications for the Southwest Side Treatment Works is manifest from the fact that the total expenditures on that project to date have been $87,306.65. (Report of Special Master McClennen, 56.) Even these meagre expenditures were made in efforts at acquisition of the site, in reinvestigation of the Stockyards and Packing Town wastes, and in other purely preliminary and unfruitful studies. (Report of Special Master McClennen, 56.) As stated by Special Master McClennen, no new reason for extended reinvestigation of the Packing Town wastes has arisen since the Re-reference in 1929 when Chief Justice Hughes, as Special Master, found that a few months at most were enough for any necessary reinvestigation. (Report of Special Master on 1929 Re-reference 55.) It is thus manifest that an important cause of delay has been the complete failure of the defendants to go forward with the preparation of plans for the Southwest Side Treatment Works.

IV.

THE FINDINGS AND CONCLUSIONS OF THE SPECIAL MASTER AS TO THE STEPS WHICH SHOULD NOW BE TAKEN FOR THE CONSTRUCTION OF THE SOUTHWEST SIDE TREATMENT WORKS ARE NOT ONLY FULLY SUSTAINED BUT IMPERATIVELY REQUIRED BY THE EVIDENCE. AS INDICATED BY THE SPECIAL MASTER, THE ENLARGEMENT OF THE DECREE SHOULD ALSO INCLUDE THE OTHER SEWAGE TREATMENT WORKS IN THE PROGRAM. HOWEVER, THE SPECIAL MASTER SHOULD ALSO HAVE FOUND THAT THE DECREE SHOULD BE FURTHER ENLARGED TO PROVIDE FOR THE APPOINTMENT OF A MANDATORY OF THIS COURT, WITHOUT FURTHER NOTICE OR HEARING, TO CARRY OUT THE DESIGNATED STEPS, FOR, ON BEHALF AND AT THE EXPENSE OF THE STATE OF ILLINOIS IN THE EVENT OF A DEFAULT.

On this branch of the case the Special Master concluded as follows:

> "The step which should now be taken for the construction of the Southwest Side Treatment Works or in case of a change in site for the construction of an adequate substitute, is in an enlargement of the decree of April 21, 1930 by the addition of a paragraph enjoining the State of Illinois to provide forthwith the necessary money for, and through the Sanitary District of Chicago or through other instrumentality chosen by the State, forthwith to determine upon and secure the site for the Southwest Side Treatment Works, if the site is not owned already by the Sanitary District and forthwith to design and to construct said Southwest Side Treatment Works of the kind proposed to the Special Master of this Court in 1929 or of a kind no less efficient for the purification of the effluent to be discharged to the Sanitary Canal and at a rate of progress forthwith that except for casualties not now foreseeable will result in the completion of said Works and the beginning of their operation in ordinary course before December 31, 1938.

> The omission of reference at this point to the Calumet, West Side and North Side Treatment Works is because they are not within the Order appointing me." (Report of Special Master McClennen, pp. 126-7.)

Special Master McClennen points out in his Report that this conclusion is sustained by the same reasons which require the enlargement of the decree to enjoin the State of Illinois to take the necessary steps to secure approval for the construction of controlling works and their prompt construction. (Report Special Master McClennen, pp. 60-61; 36-59.) While we should regard it self-evident in any event, this Court has already decided that the primary obligation for the performance of this decree rests upon the State of Illinois of which the Sanitary District is a mere political agency. (See Law, Section II, p. 93, *infra.*) Up to date the State of Illinois has utterly disregarded its obligation under the decree. We have already set forth the reasons why it is essential that the decree should be enlarged to impose a specific duty upon the State of Illinois to take the steps necessary for obtaining approval of the construction of controlling works and for their prompt construction. (See Facts, Section II, p. 34, *supra.*) Those reasons apply with equal force to the performance of this vital requirement of the decree. The abundant financial capacity of the State of Illinois to perform the decree must be admitted. (See Facts, Section VI, C, p. 58, *infra.*) The State of Illinois has complete control over the Sanitary District and therefore is in a position to require currently or ultimately such reimbursement of the cost from that District as the State desires. If the State of Illinois with complete control over the Sanitary District is unwilling to rely upon the Sanitary District to perform so as to exonerate Illinois, the State of Illinois can not fairly ask the Complainant States, which exercise no power or control over the Sanitary District, to disregard the obligation of Illinois to them and rely solely upon that District to right their wrongs and perform this decree. The restrictions upon the Sanitary District are imposed by the State. (Report of Special Master McClennen, pp. 62-64.) As will hereafter appear, there are many powers which could be conferred upon the Sanitary District to make more immediately available its great financial capacity and there are other requirements which could be imposed upon the Sanitary District for the purpose of financing this decree. (See Facts, Section VI, G, p. 66, *infra.*) These matters are all within the control of the State. The State should be specifically required to assume and discharge its obligation to perform this decree, and it can then do as it sees fit in relation to the Sanitary District.

The finding of the Special Master on this point hereinbefore quoted indicates that the only reason he does not find that the decree should be enlarged to impose a specific duty upon the State of Illinois with reference to the completion of the Calumet, West Side and North Side Treatment Works is because they are not within the Order of Reference. Complainants submit that this Court should include the imposition of that duty on the State in respect to those projects in this enlargement of the decree. This conclusion is supported by the same compelling reasons which require this enlargement of the decree in relation to the Southwest Side Treatment Works.

Complainants also submit that the Special Master should have found that this enlargement of the decree should provide for the appointment of a Mandatory of this Court, without further notice or hearing, to perform the things to be enjoined upon the State of Illinois, at its expense in the event that the State fails to proceed to discharge the duty so enjoined with reasonable expedition.

The defendants have neither acquired nor selected a site for the construction of the Southwest Side Treatment Plant as originally planned, or an adequate substitute. (Woodhull, R. 1319-1320; Ramey, R. 582-585, 597-598.) The program adopted by the defendants (Ex. 22) for the construction of the Southwest Side Treatment Works not only flagrantly departed from what Chief Justice Hughes, as Special Master, found reasonable expedition would require, but was such as inevitably to produce a default by the defendants in the performance of the decree. The program amounted to a planned default. No contract plans have been prepared for any of the structures involved in the Southwest Side Treatment Works. (Ramey, R. 637-643; Pearse, R. 1069.) The 1933 budget includes no appropriation for the preparation of contract plans and the completion of designs for any of the large structures of the Southwest Side Treatment Works. (Ex. 50; Pearse R. 1042-43.)

Under these circumstances it is not only clear that there has been a flagrant default in the performance which reasonable expedition required, but that the defendants did not even plan to conform to that course. With this record of default, which involves not only a failure to proceed "with all reasonable expedition" but even a failure to *plan* so to proceed, there can be little confidence that these defendants, if left to their own initiative and devices, will proceed with that real, substantial and *bona fide* effort to comply with the terms of this Court's decree "with all reasonable expedition" which this Court found to be the measure of the diligence required of the defendants. (278 U. S. 367, 420-421.) Practically all, if not all, of the contract plans which have been prepared in relation to *any* of the plants in the program and which are ready to let when funds are available, relate to sewers. (Ramey, R. 631-633.) While the sewers are essential, Chief Justice Hughes, as Special Master, found that they are not a controlling factor in the time required for the construction of these works. (Report of Special Master on 1929 Re-reference, 37, 142 (f).) Hence to the extent that any work has been carried on in the matter of design and contract ~~plans~~ in relation to *any* of the plants in the program, it has not been for the material structures from the standpoint of performance of the decree.

The past default of the defendants has greatly prejudiced the complainants and threatened the prompt restoration of their rights as declared by this Court. Hence, complainants submit that the decree should be enlarged to provide for the appointment of a Mandatory without further notice or hearing in the event of further default.

V.

THE FINDING OF THE SPECIAL MASTER AS TO THE FINANCIAL MEASURES ON THE PART OF THE SANITARY DISTRICT WHICH ARE REASONABLE AND NECESSARY IN ORDER TO CARRY OUT THE DECREE OF THIS COURT IS NOT RESPONSIVE TO THE ORDER OF REFERENCE. HOWEVER, IN THE VIEW OF THE COMPLAINANTS THE FINDING IS NOT MATERIAL TO A PROPER DISPOSITION OF THE MATTERS BEFORE THE COURT, BUT, WERE THE ISSUE MATERIAL, THERE ARE ADDITIONAL FINANCIAL MEASURES WHICH SHOULD BE REQUIRED OF THE SANITARY DISTRICT.

On this branch of the case the Special Master found:

> "The Sanitary District is not failing *now* to pursue the reasonable financial measures *now* within its control, which are necessary in order to carry out the decree of this Court." (Italics ours.) (Report Special Master McClennen, p. 126.)

In his discussion of this question, the Special Master conditions this finding as follows:

> "*If the financial measures hereinafter set out are required of the State of Illinois,* it is not reasonable

> to require the Sanitary District to take any financial measures now, in addition to those which it is taking." (Italics ours.) (Report Special Master McClennen, p. 61.)

When the finding is so conditioned, the complainants take no exception. In our view the responsibility for financing the performance of this decree should be imposed directly and specifically upon the State of Illinois. The State of Illinois has full control over the Sanitary District. The State defines the District's powers. It can *confer any powers* upon the District essential or appropriate to make the large financial capacity of the District immediately available. The State may impose requirements upon the District. It can *impose all requirements* upon the District deemed necessary or appropriate for that purpose. This Court, in order to take similar measures to make immediately available the financial capacity of the District, would necessarily have to act through compulsion upon the State of Illinois which is the source of the Sanitary District's powers.

Moreover, the record discloses that the financial difficulties of the District, to the extent that they exist, rest upon the negligence, incompetence or misconduct of other agencies, subdivisions or officers of the State over which the State has control and for which it is responsible. The State does not confer the power to collect taxes on the Sanitary District but provides for the collection of Sanitary District taxes through other officers. The State does not empower the Sanitary District to assess property for purposes of taxation but provides for the assessment of the property upon which the Sanitary District's tax levies are operative by other officers. All of the financial difficulties of the Sanitary District flow from the negligence, incompetence or misconduct of the agencies provided by the State for the assessment of property and the collection of taxes and from restrictions imposed upon the Sanitary District by the State. The correction of these conditions rests in actions by the State. In our view of the proper disposition of this litigation, these matters have no relevancy except as an added reason why the State of Illinois must be required to assume and discharge its primary responsibility to finance performance of the decree and may not be permitted to delegate, as it has attempted to do in the past, its responsibility for such financing and performance to the Sanitary District. For all of these reasons the complainants submit that it should be left to the State to determine to what extent, if at all, the State will require the Sanitary District currently or eventually to exonerate the State from the cost of financing this decree and to determine what machinery the State will provide to make the large financial capacity of the Sanitary District available for that purpose.

Otherwise, however, it would be both reasonable and necessary to require the Sanitary District to take additional financial measures to carry out this Court's decree. That conclusion would not be affected by the fact that the adoption of these measures would require either the grant of power to or the imposition of requirements upon the Sanitary District. The circumstance, however, that such measures necessarily depend upon State action makes it difficult, if not impossible, to discuss financial measures on the part of the Sanitary District separately from the measures which should be required of the State of Illinois.

We will, therefore, discuss those measures in our consideration of the financial measures which are reasonable and necessary on the part of the State of Illinois. (See Facts, Section VI, E, F, G, pp. 60-68, *infra.*) We merely point out that, were the issue material, the finding of the Special Master would not be responsive, for it merely says that the District is not failing *now* to pursue the reasonable financial measures *now* within its control. The question, if material, would be what financial measures *should reasonably be required.*

At and after the date of the entry of the decree of April 21, 1930 and before its present financial difficulties flowing from obstacles created by other agencies of the State of Illinois arose, the Sanitary District did not pursue the reasonable financial measures within its control which were necessary in order to carry out the decree of this Court. The finding of the Special Master on this point clearly so implies. However, complainants are interested not in condemnation for past delinquencies but in future performance and therefore refrain from discussion of the evidence on that subject.

VI.

THE FINDINGS OF THE SPECIAL MASTER AS TO THE FINANCIAL MEASURES ON THE PART OF THE STATE OF ILLINOIS WHICH ARE REASONABLE AND NECESSARY IN ORDER TO CARRY OUT THE DECREE OF THIS COURT ARE CORRECT AND SHOULD BE AFFIRMED; BUT THE MASTER SHOULD ALSO HAVE FOUND THAT THE DECREE SHOULD BE FURTHER ENLARGED TO PROVIDE FOR THE APPOINTMENT OF A MANDATORY OF THIS COURT, WITHOUT FURTHER HEARING OR NOTICE, WITH FULL POWER TO CARRY OUT THESE FINANCIAL MEASURES AT THE EXPENSE AND ON THE CREDIT OF THE STATE OF ILLINOIS IN THE EVENT OF A DEFAULT.

As to the financial measures on the part of the State of Illinois which are reasonable and necessary in order to carry out the decree of this Court, the Special Master found:

> "The financial measures on the part of the State of Illinois which are reasonable and necessary in order to carry out the decree of this Court are in the enlargement of the decree by adding to it a paragraph pro-

viding that the State of Illinois be enjoined to appropriate through its General Assembly, before July 1, 1933, the sum of thirty-five million dollars to be expended before the end of the first fiscal quarter after the adjournment of the next regular session or in any event before October 1, 1934 and the same amount per year for each year ending on September thirtieth thereafter for the designing and the securing of authorization from the War Department and for construction of Controlling Works for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan and for sites for, and for the engineering expenses of designing, and for the construction, enlargement, alteration and completion of the intercepting sewer tunnels, conduits, sewage treatment plants and pumping stations commonly known as the Calumet Treatment Works, North Side Treatment Works, West Side Treatment Works and Southwest Side Treatment Works and all things appertaining thereto within the Sanitary District of Chicago, until all the same shall have been fully completed; and to incur indebtedness therefor and for the purposes aforesaid and no other to issue and to sell bonds of the State of Illinois for the amounts so appropriated and on such terms of payment and maturity and at such rates of interest as the General Assembly shall determine and without the laws authorizing the same being submitted to the people of Illinois and the said laws shall be valid and the bonds so issued if in other respects conforming to the Constitution and laws of the State of Illinois shall be valid obligations of the State of Illinois notwithstanding the fact that said laws have not been submitted to the people of Illinois either theretofore or thereafter and any sums expended for said Works by the Sanitary District of Chicago, hereafter, from its own funds in any year ending September thirtieth shall reduce by so much the amount of the appropriation for said year which the State of Illinois is hereby required to expend." (Report of Special Master McClennen, pp. 127, 128.)

That the financial measures on the part of the State of Illinois, which the Special Master finds should be enjoined by an enlargement of the decree, are reasonable and necessary to carry out the decree of this Court, is fully established by the considerations set forth by the Special Master in his Report. (Report of Special Master McClennen, pp. 105-121.) However, since the defendants challenge the correctness of this finding, we proceed to discuss it.

The considerations which establish the reasonableness and necessity of this recommendation of the Special Master are numerous and conclusive. *First,* the primary obligation for the performance of this decree rests upon the State of Illinois which commanded and directed the wrong and caused the still continuing damage to the complainant States. *Second,* the State of Illinois has completely failed to take any steps to finance the performance of the decree and to discharge its obligation under the decree, but on the contrary denies its obligation. *Third,* the past and present financial resources of the State of Illinois have been at all times and now are more than adequate to finance performance of this decree. *Fourth,* the State of Illinois has failed to cooperate and has in fact impeded the financing of the performance of the decree by the Sanitary District to which agency the State apparently sought to delegate, if it, did not entirely disregard, the performance of its obligation under the decree. *Fifth,* the financial difficulties of the Sanitary District, to the extent that they exist or have existed, rest upon obstacles created by the State or political subdivisions, agencies or officers of the State for which the State is responsible. The State has thus caused the default of the Sanitary District, and the remedy lies within its control. *Sixth,* the restrictions upon the present availability of the large financial capacity of the Sanitary District are imposed by the State and their removal lies within the control of the State. *Seventh,* the powers which might properly be conferred upon the Sanitary District and the requirements which might properly be imposed upon the Sanitary District to increase and make available the large financial capacity of the Sanitary District are wholly within the control of the State of Illinois and dependent upon its action.

A.

The primary obligation for the performance of this decree rests upon the State of Illinois which commanded and directed the wrong and caused the now continuing damage to the Complainant States.

This Court in this litigation has already determined that the State of Illinois is directly and primarily responsible for the illegal diversion and for undoing the wrong. *Wisconsin v. Illinois,* 281 U. S. 179, 196, 197; Same, 278 U. S. 367, 409, 419. That question is *res judicata,* but were the question open, as it is not, the same decision would necessarily be reached on fact and law. (Report of Special Master McClennen, pp. 44-46.) Since the question is one more largely of law than fact, it will be discussed in the Section of this brief devoted to the law. (See Law, Section II, p. 93, *infra.*)

B.

The State of Illinois has completely failed to take any steps to finance the performance of the decree and to discharge its obligation under the decree, but on the contrary denies liability.

It is uncontroverted on this record that the State of Illinois has wholly neglected to make any provision, financial or otherwise, for the discharge of its obligation under the decree, unless it be to attempt to delegate the performance of its duty to the Sanitary District. The State cannot thus shed its obligation either to this Court or to these complainants.

C.

The past and present financial resources of the State of Illinois have been and are more than adequate to finance performance of this decree.

It is uncontradicted on this record that the bonds of the State of Illinois have been at all times since the entry of the decree and now are readily marketable as Triple A investments. (Gordon, R. 746-3, 752-3; Report of Special Master McClennen, 114-115.) The market will readily absorb all bonds of the State of Illinois which can be validly issued. (Gordon, R. 747-748.) It is a matter of common knowledge that the State of Illinois is one of the richest States in the Union. The great wealth of the State is eloquently but fairly set forth in "The Blue Book of the State of Illinois, 1931-1932." (Report of Special Master McClennen, pp. 113-114.) This official publication of the State of Illinois fixes the value of the property in the State at $24,356,000,000. The assessed value of property in the State of Illinois for 1930 was $8,249,429,161. The assessed value of the real estate alone in 1930 was $6,149,251,816. (Exhibit 14, p. 1.) This assessment represented only 37% of the true value of the real estate. (Christie, R. 206-207; Bell, R. 1619; Petterson, 1669.) The true value of the real estate alone in 1930 thus exceeded $16,600,000,000. (Report of Special Master McClennen, p. 112.) It is, therefore, clear that at no time since the entry of this decree, or now, has there been, or is there, any adequacy of financial resources and financial ability on the part of the State of Illinois to discharge every obligation imposed upon that State by the instant decree. As said by this Court (*Wisconsin v. Illinois,* 281 U. S. 179, 197):

"We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency *to the magnitude of which it seems not yet to have fully awaked.*" (Italics ours.)

D.

The State of Illinois has failed to cooperate and in fact impeded the financing of the performance of the decree by the Sanitary District to which agency the State apparently sought to delegate, if it did not entirely disregard, the performance of its obligation under the decree.

When this decree was entered on April 21, 1930, this Court had already decided that the defendants were doing wrong and that they must stop it. *Wisconsin v. Illinois,* 281 U. S. 179, 197. The Trustees of the Sanitary District correctly took the view that no question of policy was thereafter involved in the matter of the construction of the program required to carry out the decree, and that the obligation had been placed squarely upon the defendants to proceed expeditiously in the performance of the decree with adequate and proper financing. The Board of Trustees recognized that this required (if the State expected to delegate performance of this duty to the District), unencumbered control by the District over the issuance of the necessary bonds to the end that dependable financial resources might be provided. (Woodhull, R. 1133-5; 1236-1237.) The Sanitary District on three separate occasions pressed the State of Illinois for a grant of authority to issue without referendum such bonds as might be found necessary for the performance of the decree of this Court. (Woodhull, R. 1112, 1130-1133, 1253, 1254.) Nevertheless the State of Illinois in each instance refused to grant that authority. (Woodhull, R. 1236-7, 1252, 1253, 1254.) The State refused to give the Sanitary District a Civil Service

Law in the interests of more efficient operation. (Woodhull, R. 1344.) It is certain that the lack of authority to issue bonds without referendum impeded construction work in 1929. (Report of the Special Master on 1929 Re-reference, p. 45.) Other delays incident to the referendum requirement appear in the record. (R. 1140-1141, 1276.) Delay is inherent in the issuance of bonds depending upon referenda. (Woodhull, R. 1276.) Of course, no attempt to delegate performance to the District could excuse non-performance by Illinois, if the obligation were not in fact, for any reason, fully and effectively discharged by the District.

E.

The financial difficulties of the Sanitary District, to the extent that they exist or have existed, rest upon obstacles created by the State or political subdivisions, agencies or officers of the State for which the State is responsible. The State has thus caused the default of the Sanitary District, and the remedy lies within its control.

It is not only admitted but asserted by the defendants that the financial difficulties of the Sanitary District arise from a failure to collect normal and ordinary taxes in Cook County, as were collected in the rest of the State of Illinois, from 1929 to date. This condition arose from the following circumstances:

A re-assessment of all of the property in Cook County was ordered by the State Tax Commission in 1928. It was planned to take six months, and should not have occasioned any delay in the levying and collection of taxes. The re-assessment was actually accomplished within the six months' period. (Bell, R. 1609.) The subsequent delay in certifying the assessment was occasioned by the misconduct of the Board of Review of Cook County. (Bell, 1609-1610.)

It thus appears that the much-talked-of two years' delay was due entirely to maladministration in the State of Illinois. Thereafter it appears that there was an inexcusable delay both in sending out the tax statements and in pressing tax collections. An aggressive campaign to collect taxes was not begun in Cook County until October, 1932. (Christie, R. 240-241.)

While it would be clear from these facts that the failure to collect normal and proper taxes in Cook County and the Sanitary District was due solely to maladministration or misconduct, there is other evidence which conclusively establishes that fact, and which shows that any claim that such failure to collect normal taxes in Cook County was a mere incident of the depression is without substance and untrue. The record establishes normal collection of taxes in the whole of the State of Illinois outside of Cook County. (Christie, R. 233.) There are no delinquent taxes in the State of Illinois outside of Cook County. (Christie, 1768.) That the tax delinquencies in Cook County are not due to the depression is further emphasized by the fact that less than 3 per cent of the delinquent taxes are owed by taxpayers whose taxes were $500.00 or less. (Bell, 1628-9.) In other words, the delinquent taxes are owed by persons of large property and means. It appears that there are no adequate laws to enforce payment of taxes in Illinois (Bell, R. 1642-1645), and nothing appears to have been done to strengthen these laws during this period of alleged inability to function for lack of tax collection. From the foregoing it is clear that the State has caused the default of the Sanitary District. The remedy lies within its control. It can not be that a State under the obligation of a decree of the Supreme Court can excuse failure to perform upon the ground that it has permitted government to break down in the locality to which the State has sought to delegate its duty of performance. If government is broken down in Cook County then it is the more essential that the State be required directly to assume its primary obligation to perform the decree.

It is uncontradicted on the record that bonds of the Sanitary District have been Triple A securities, commanding ready sale upon the bond market. (Gordon, 746.) It is not only admitted but asserted by the defendants that the only reason why there has been any default in principal or interest on Sanitary District bonds is the failure to collect normal taxes. It is uncontradicted on the record that if normal taxes had been collected the Sanitary District bonds would have been at all times during the past three years Triple A securities commanding a ready market, and that if this default in the collection of taxes, which arises from the foregoing maladministration, be corrected, the only limit to the amount of Sanitary District bonds which could be absorbed yearly by the market would be the amount which could be legally issued—and it is specifically stated that the market could readily absorb $25,000,000 of Sanitary District bonds per year. (Gordon, R. 752, 726-728.) There was a good and extensive municipal bond market in 1930, 1931, and 1932. (Gordon, R. 727, 728.) Exhibits 78, 79, and 80 disclose that there was a wide market for municipal bonds for 1930, 1931, and 1932 in which states and municipalities with resources far below those of Illinois and the Sanitary District found a ready market at reasonable interest rates. Under these circumstances we submit that it is incontrovertibly true that any difficulty which has existed, or now exists, in the salability of Sanitary District bonds rests upon maladministration and self-created difficulties of the State of Illinois or its political subdivisions over which the State of Illinois has jurisdiction, and for which the State of Illinois has responsibility. In the words of this Court in 281 U. S. 179, at 197, "It, (the State of

Illinois) can base no defense upon difficulties that it has itself created.'' Of course the wide sale of bonds of states and municipalities, much less wealthy than Illinois or the Sanitary District, which appears from Exhibits 78, 79, and 80 during 1930 to 1932 inclusive, conclusively establishes that the difficulty at Chicago did not, and does not, rest upon the general depression, but upon self-created local difficulties.

One of the difficulties in making available the vast financial capacity of the Sanitary District is the constitutional limitation upon its debt incurring or bonding capacity. This has been discussed at length by the Special Master. (Report of Special Master McClennen, pp. 65-69.) A brief examination of the facts demonstrates that this difficulty is a self-created obstacle, an obstacle created by the State of Illinois. The bonding limit of a municipal corporation is fixed by the Constitution of Illinois at 5% ''on the value of the taxable property therein, to be ascertained by the last assessment for State and County taxes.'' (Art. IX, Sec. 12, Ill. Constitution; R. 262-3.) In 1930 the assessed value of the real estate alone in the Sanitary District was $3,373,275,520. It is uncontroverted on the record that real estate in the Sanitary District was in 1930 and now is assessed at only 37% of its true value. (Christie, R. 206; Petterson, R. 1669; Bell, R. 1619.) Hence, in 1930 the true value of the real estate alone in the Sanitary District was $8,995,401,386. A debt limit of 5% on the true value of the real estate alone would give a bonding power for the Sanitary District of approximately $450,000,000. With the inclusion of personal property, its debt limit would equal or exceed $500,000,000. The legal requirement in Illinois is that property shall be assessed at full value. (Exhibit 64; Art. IX, Sec. 12, Illinois Constitution; Cahill's Illinois Revised Statutes (1931), Chap. 120, Para. 1-4, Secs. 1-4, Para. 329, Sec. 18; Report of Special Master McClennen, pp. 83-84; Christie, R. 207; Bell, R. 1619.) Allowing for some reduction in 1930 values, it is obvious that if the property in the Sanitary District were assessed at its true value, as required by law, the bonding capacity of the District would so far exceed any requirement for financing the instant decree as not to be a subject for discussion. The present policy pursued is one solely within the control of the State. It is contrary to the law of the State. It requires no constitutional amendment to conform to that law; and, with conformance, there could be no question of the adequacy of the bonding capacity of the Sanitary District. The State has apparently sought to delegate its duty to perform this decree to the Sanitary District. Yet in violation of its own laws, the State has restricted the ability of the District to perform. We submit that it cannot be tolerated that the performance of the decree of this Court can be delayed because a State, having an obligation under that decree, in defiance of its own law, persists in assessing property in such a way as to limit the bonding capacity of the agency to which the State has sought to delegate its duty of performance while, at the same time, the State seeks to avoid performing its obligation directly. Of course, accurately speaking, the State has no right, as against this Court or these complainants, to delegate its duty of performance, and what is here said is solely for the purpose of emphasizing the reasonableness and necessity of requiring the State directly to assume and discharge its own obligation.

F.

Other restrictions upon the availability of the financial capacity of the Sanitary District are imposed by the State; and their removal lies wholly within the control of the State.

The State has in many ways restricted the powers of the Sanitary District in such a way as to prevent the Sanitary District from making available for the performance of this decree its large financial resources and credit. Some of these restrictions are set forth in the Report of the Special Master. (Report of Special Master McClennen, pp. 63, 64, 65, 84, 105.) They include, among many other things, very rigid limitations upon the District's power of taxation. However, it is unnecessary to enumerate these restrictions. The point is that they are imposed by the State. Their removal lies within the control of the State. If the State is required, as it should be, to assume its primary obligation to finance the performance of and to perform this decree, the State may exercise its own discretion in removing such restrictions. It may take such steps as it sees fit to make available the large financial capacity of the Sanitary District for the reimbursement of the cost to the State. It should not be permitted, however, to avoid its own obligation by delegation to the Sanitary District and then to restrict the power of the Sanitary District to perform.

G.

There are many powers which might properly be conferred upon the Sanitary District and many requirements which might properly be imposed upon the Sanitary District to increase and make available the large financial capacity of the District. These measures are wholly within the control of the State of Illinois and depend upon its action.

The supposed excuses and difficulties advanced on behalf of the Sanitary District relate largely, if not wholly, to a lack of powers which might properly be conferred upon the Sanitary District by the State, a lack of performance of duty by other officers for whom the State is responsible and a failure to take steps which the State might properly authorize and impose upon the Sanitary District. The record discloses among others the following powers which might properly be conferred upon the District by the State, the following requirements which might be imposed by the State upon the District and the following duties which might properly be imposed upon, or the performance of enforced by, officers of the State or its sub-divisions to whom the State has entrusted the performance of functions essential to the realization of the large financial capacity and credit of the Sanitary District. Thus the State might among other things:

(1) Authorize the Sanitary District to issue without a referendum such bonds as are required, and it can sell, for financing the construction program.

(2) Cause the property in the Sanitary District to be placed upon the assessment roll at its true value so that there can be no question of the sufficiency of its bonding power.

(3) Require the Sanitary District to levy the full amount of taxes which it is permitted to levy under existing or subsequent State law to finance reimbursement of the State so far as possible on the "pay as you go" plan.

(4) Repeal or enlarge the limitations upon the taxing power of the Sanitary District.

(5) Authorize the Sanitary District to collect taxes levied by it.

(6) Authorize and require the Sanitary District to establish a utility system of sewage disposal for financing a part, either of the operations of the District, or of the cost of the construction program.

(7) Require the Sanitary District to levy special assessments for the purpose of financing in part the construction program.

(8) Make adequate provision for utilizing resources of the Reconstruction Finance Corporation under existing or future Federal legislation.

(9) Provide adequate laws for the collection of taxes, to the end that a breakdown in government in Cook County shall no longer exist or be tolerated by the State.

(10) Pass suitable legislation to correct the present tax muddle which the State has caused, or permitted to develop in Cook County.

The foregoing and similar considerations constitute compelling reasons why the State should be specifically required to assume and discharge its primary obligation to perform this decree. All of these matters and many others lie within the exclusive control of the State. If the State assumes its primary obligation, it can take such measures and establish such machinery as it thinks wise or proper to make available the large financial resources and credit of the Sanitary District for the purpose of exonerating the State from the cost of performance. The State should not be heard to say to this Court or to these complainants that it should be excused from direct performance of its obligation under the decree and permitted to delegate that performance to the Sanitary District because it fears that the Sanitary District, over which the State has complete control, will not perform so as wholly to exonerate the State from the burden of performance. If the State is unwilling to rely upon performance by the District, it cannot fairly ask this Court or these complainants to rely upon such performance. The State of Illinois has full control over the Sanitary District; the complainants have no control over it. If the State contends that performance by the District will be adequate, then the State will suffer no hardship from assuming its obligation for it can confidently rely upon exoneration by the District.

H.

The decree should be further enlarged to provide for the appointment of a Mandatory of this Court, without further hearing or notice, with full power to carry out these financial measures at the expense and on the credit of the State of Illinois in the event of a default.

While it seems unbelievable that a great State will fail voluntarily to comply with an adjudged duty and obligation found to rest upon it by this Court, the past record of failure and inadequacy of performance is such as to require a conclusion that the decree should be so enlarged as to preclude the further prejudice of complainants' rights by any voluntary failure of performance.

We, therefore, submit that the decree should be further enlarged to provide for the appointment of a Mandatory of this Court, without further hearing or notice, in the event that the State of Illinois defaults in the performance of the duties enjoined upon it. The Mandatory should be vested with full power to carry out the construction program and, in the event of inaction by the State of Illinois, to levy taxes upon the current assessment roll of the State of Illinois; with full power to collect such taxes through United States Marshals, and in the event the State should elect to use bonds for financing, to issue such bonds upon the full faith and credit of the State of Illinois when and as needed to finance the performance of the decree; with full power to levy taxes to pay interest and maturities of such bonds upon the current assessment roll in the State of Illinois; with full power to collect such taxes through United States Marshals and with full power, in the event of a default by the State of Illinois to make provision for interest or maturities of such bonds, thereafter to levy and collect such taxes as would be required to meet such bond interest and maturities. Such a provision would not only protect complainants' rights, but would be beneficial to the State of Illinois in financing the performance of the decree. Such bonds would be immune from the uncertain action of local authorities in the levying and collection of taxes which has produced the present muddle so costly to the taxpayers of Illinois and to the complainant States. Such bonds would carry the confidence which would flow from the assurance that they would be paid in full and that the levying and collection of the necessary taxes for that purpose would be assured by the prestige and authority of this Court over which local officials would have no control. The carrying out of the program under a Mandatory would assure the efficient expenditure of the funds and economical construction of the project. This would not only aid in financing the decree but would be of great benefit to the citizens of Illinois.

Further reasons why the inclusion of a provision in the enlargement of the decree for the appointment of a Mandatory of this Court, without further notice or hearing, to perform the decree at the expense of the defendants in the event of a further default, is reasonable, necessary and practicable, have already been stated at pages 37 and 38, *supra,* and therefore are not repeated. The decision of this Court on this hearing should not be such as to require another hearing in the event of a further default by the defendants but should provide for the performance of the decree at their expense in such an eventuality.

THE LAW.

I.

THE ADMITTED JUDICIAL POWER OF THE SUPREME COURT TO ENTER THE JUDGMENT IN THESE CAUSES NECESSARILY EMBRACES FULL, PLENARY, ADEQUATE AND COMPLETE POWER AND AUTHORITY TO ENFORCE THAT JUDGMENT AND MAKE IT EFFECTIVE; AND SUCH POWER COMPREHENDS NOT ONLY THE POWER TO COERCE ALL INSTRUMENTALITIES OR AGENCIES OF STATE POWER BUT IT INCLUDES THE POWER DIRECTLY TO ENFORCE AND MAKE EFFECTIVE ITS JUDGMENT THROUGH THE APPOINTMENT FOR THAT PURPOSE, WITH ALL NECESSARY OR CONVENIENT POWERS, OF SUCH MANDATORY OR MANDATORIES AS MAY BE NECESSARY, CONVENIENT OR APPROPRIATE TO ACCOMPLISH THAT PURPOSE. THE JURISDICTION TO ENTER THIS JUDGMENT AND THE POWER TO ENFORCE IT IS CONFERRED BY AND RESTS DIRECTLY UPON THE FEDERAL CONSTITUTION; AND NEITHER THE JURISDICTION TO ENTER THE JUDGMENT NOR THE POWER TO ENFORCE IT CAN BE SUBORDINATED TO STATE CONSTITUTIONS OR STATE STATUTES WHICH, IF THEY STAND IN THE WAY, MUST YIELD TO A PARAMOUNT AUTHORITY.

A.

This Court has full, complete and plenary power to enforce and make effective any judgment rendered by it in the exercise of its original jurisdiction in controversies between States.

The history of the jurisdictional clause in the Federal Constitution which vests in the Supreme Court jurisdiction over controversies between two or more States amply sustains the view that this Court has full, complete and plenary power to enforce its judgment against a State, and that it may take such measures to attain that end as it may deem expedient in order to coerce the State to comply with a judgment rendered against it.

Precedent for such power is found in the practice which antedates the American Revolution. Long before this nation attained its independence, the King of England in Privy Council decided disputes between colonies both at the instance of a colony and at the instance of an individual. In touching upon this subject, Chief Justice White, in delivering the opinion of this Court in *Virginia v. West Virginia* (246 U. S. 565, 597-598) said:

> "Bound by a common allegiance and absolutely controlled in their exterior relations by the mother country, the colonies before the Revolution were yet as regards each other practically independent, that is, distinct one from the other. Their common intercourse, more or less frequent, the contiguity of their boundaries, their conflicting claims, in many instances, of authority over undefined and outlying territory, of necessity brought about conflicting contentions between them. As these contentions became more and more irritating, if not seriously acute, the necessity for the creation of some means of settling them became more and more urgent, if physical conflict was to be avoided. And for this reason, it is to be assumed, it early came to pass that differences between the colonies were taken to the Privy Council for settlement and were there considered and passed upon during a long period of years, the sanction afforded to the conclusions of that body being the entire power of the realm, whether exerted through the medium of a royal decree or legislation by Parliament. This power, it is undoubtedly true, was principally called into play in cases of disputed boundary, but that it was applied also to the complaint of an individual against a colony concerning the wrongful possession of property by the colony alleged to belong to him, is not disputed. This general situation as to the disputes between the colonies and the power to dispose of them by the Privy Council was stated in *Rhode Island v. Massachusetts,* 12 Pet. 657, 739, *et seq.,* and will be found reviewed in the authorities referred to in the margin."

At the close of the Revolution, when the relations of the American Colonies with England were severed, the Ninth Article of the Articles of Confederation made an attempt to provide for the amicable settlement of disputes between States. This Article conferred upon Congress the power to act as arbiter of controversies between States. However, the weakness of this scheme was in its failure to make adequate provision for the enforcement of the decrees made and entered by Congress in controversies between States.

In discussing this phase of the subject, Chief Justice White (in *Virginia v. West Virginia,* 246 U. S. 565, 598) noted:

> "When the Revolution came and the relations with the mother country were severed, indisputably controversies between some of the colonies of the greatest moment to them, had been submitted to the Privy Council and were undetermined. The necessity for their consideration and solution was obviously not obscured by the struggle for independence which ensued, for, by the Ninth of the Articles of Confederation, an attempt to provide for them as well as for future controversies was made. Without going into detail it suffices to say that that article in express terms declared the Congress to be the final arbiter of controversies between the States and provided machinery for bringing into play a tribunal which had power to decide the same. That these powers were exerted concerning controversies between the States of the most serious character again cannot be disputed. But the mechanism devised for their solution proved unavailing because of a want of power in Congress to enforce the findings of the body charged with their solution, a deficiency of power which was generic because resulting from the limited authority over the States conferred by the Articles of Confederation on Congress as to every subject. That this absence of power to control the governmental attributes of the States for the pur-

> pose of enforcing findings concerning disputes between them, gave rise to the most serious consequences and brought the States to the very verge of physical struggle, and resulted in the shedding of blood and would, if it had not been for the adoption of the Constitution of the United States, it may be reasonably assumed, have rendered nugatory the great results of the Revolution, is known of all and will be found stated in the authoritative works on the history of the time."

With the break-up of the Confederacy the Constitutional Convention was called upon, among other things, to provide a substitute or new scheme of settling controversies between States. It was realized that the machinery set up in the Articles of Confederation was wholly inadequate. The result was the provision in the Federal Constitution giving to the Supreme Court of the United States original jurisdiction to entertain suits involving controversies between two or more States. The condition of affairs at that time which led to the creation of the Federal Constitution may be ascertained from the views expressed in the debates on the adoption of the Federal Constitution. Thus James Wilson of Pennsylvania, in 1787, in the Convention of the State of Pennsylvania on the adoption of a Federal Constitution, in referring to the extension of the judicial power in the Constitution to controversies between two or more States, said:

> "This power is vested in the present Congress; but they are unable, as I have already shown, to enforce their decisions. The additional power of carrying their decree into execution, we find, is therefore necessary, and I presume no exception will be taken to it."
>
> (*Elliot, Debates on the Federal Constitution,* Vol. 2, p. 490.)

And again Mr. Wilson said:

> "Do we wish a return of those insurrections and tumults to which a sister state was lately exposed, or a government of such insufficiency as the present is found to be? Let me, sir, mention one circumstance in the recollection of every honorable gentleman who hears me. To the determination of Congress are submitted all disputes between states concerning boundary, jurisdiction or right of soil. In consequence of this power, after much altercation, expense of time, and considerable expense of money, this state was successful enough to obtain a decree in her favor, in a difference then subsisting between her and Connecticut; but what was the consequence? The Congress had no power to carry the decree into execution. Hence the distraction and animosity, which have ever since prevailed, and still continue in that part of the country. Ought the government, then, to remain any longer incomplete? I hope not. No person can be so insensible to the lessons of experience as to desire it."
>
> (*Elliot, Debates on the Federal Constitution,* Vol. 2, p. 462.)

The security and stability of government which would follow the adoption of the Constitution was pointed out by Mr. Wilson in the following language:

> "If we adopt this system of government, I think we may promise security, stability, and tranquillity to the governments of the different states. They would not be exposed to the danger of competition on questions of territory, or any other that have heretofore disturbed them. A tribunal is here found to decide, justly and quietly, any interfering claim; and now is accomplished what the great mind of Henry IV of France had in contemplation—a system of government for large and respectable dominions, united and bound together, in peace, under a superintending head, by which all their differences may be accommodated, without the destruction of the human race. We are told by

> Sully that this was the favorite pursuit of that good king during the last years of his life; and he would probably have carried it into execution, had not the dagger of an assassin deprived the world of his valuable life. I have, with pleasing emotion, seen the wisdom and beneficence of a less efficient power under the Articles of Confederation, in the determination of the controversy between the states of Pennsylvania and Connecticut; but I have lamented that the authority of Congress did not extend to extinguish, entirely, the spark which has kindled a dangerous flame in the district of Wyoming.
>
> "Let gentlemen turn their attention to the amazing consequences which this principle will have in this extended country. The several states cannot war with each other; the general government is the great arbiter in contentions between them; the whole force of the Union can be called forth to reduce an aggressor to reason. What a happy exchange for the disjointed, contentious state sovereignties!"
>
> (*Elliot's Debates,* Vol. 2, 527.)

Chief Justice White summarized the situation in his opinion in the case of *Virginia v. West Virginia,* (246 U. S. 565, 599-600) as follows:

> "Throwing this light upon the constitutional provisions, the conferring on this court of original jurisdiction over controversies between States, the taking away of all authority as to war and armies from the States and granting it to Congress, the prohibiting the States also from making agreements or compacts with each other without the consent of Congress, at once makes clear how completely the past infirmities of power were in mind and were provided against. This result stands out in the boldest possible relief when it is borne in mind that, not a want of authority in Congress to decide controversies between States, but the absence of power in Congress to enforce as against the governments of the States its decisions on such subjects, was the evil that cried aloud for cure,

> since it must be patent that the provisions written into the Constitution, the power which was conferred upon Congress and the judicial power as to States created, joined with the prohibitions placed upon the States, all combined to unite the authority to decide with the power to enforce—a unison which could only have arisen from contemplating the dangers of the past and the unalterable purpose to prevent their recurrence in the future. And, while it may not materially add to the demonstration of the result stated, it may serve a useful purpose to direct attention to the probable operation of tradition upon the mind of the framers, shown by the fact that, harmonizing with the practice which prevailed during the colonial period in the Privy Council, the original jurisdiction as conferred by the Constitution on this court embraced not only controversies between States but between private individuals and a State—a power which, following its recognition in *Chisholm v. Georgia,* 2 Dall. 419, was withdrawn by the adoption of the Eleventh Amendment."

In the proceedings of the Virginia Convention for the ratification of the Federal Constitution, Edmund Randolph, in 1788, in speaking of the Federal judiciary as an agency in promoting harmony between states and between foreign states and the United States, said:

> "Harmony between the states is no less necessary than harmony between foreign states and the United states. Disputes between them ought, therefore, to be decided by the federal judiciary. Give me leave to state some instances which have actually happened, which prove to me the necessity of the power of deciding controversies between two or more states. The disputes between Connecticut and Pennsylvania, and Rhode Island and Connecticut, have been mentioned. I need not particularize these. Instances have happened in Virginia. There have been disputes respecting boundaries. Under the old government, as well as this, reprisals have been made by Pennsylvania and

> Virginia on one another. Reprisals have been made by the very judiciary of Pennsylvania on the citizens of Virginia. Their differences concerning their boundaries are not yet perhaps ultimately determined. The legislature of Virginia, in one instance, thought this power right. In the case of Mr. Nathan, they thought the determination of the dispute ought to be out of the state, for fear of partiality.
>
> "It is with respect to the rights of territory that the state judiciaries are not competent. If the claimants have a right to the territories claimed, it is the duty of a good government to provide means to put them in possession of them. If there be no remedy, it is the duty of the general government to furnish one."
>
> (*Elliot's Debates,* Vol. 3, p. 571.)

And again, Mr. Randolph still speaking of the judiciary, alluded to the necessity of vesting power in that body to enforce its judgments. Mr. Randolph, in answer to a question, said:

> "An honorable gentlemen has asked, Will you put the body of the state in prison? How is it between independent states? If a government refuses to do justice to individuals, war is the consequence. Is this the bloody alternative to which we are referred? Suppose justice was refused to be done by a particular state to another; I am not of the same opinion with the honorable gentleman. I think, whatever the law of nations may say, that any doubt respecting the construction that a state may be plaintiff, and not defendant, is taken away by the words *where a state shall be a party.* But it is objected that this is retrospective in its nature. If thoroughly considered, this objection will vanish. It is only to render valid and effective existing claims, and secure that justice, ultimately, which is to be found in every regular government."
>
> (*Elliot's Debates,* Vol. 3, p. 573.)

It is apparent that, viewed in the light of history, as indicated by the foregoing quotations, the framers of the Federal Constitution sought to remedy the weakness of the Ninth Article of the Articles of Confederation by conferring upon the Supreme Court of the United States both a power to hear and adjudicate controversies between states, and also the power to enforce any judgment which might be entered against a State.

The fundamental theory of the Federal Constitution and of the powers of the Supreme Court of the United States, as advanced by James Wilson and others, is amply sustained by decisions of this Court.

It has been said that no principle of Constitutional Law has been more firmly established or constantly adhered to than that wherever this Court has jurisdiction to render a judgment, it has power to enforce the judgment and make it effective. *Gordon v. United States,* 117 U. S. 697, 704. This rule applies with full force and effect to the exercise of the original jurisdiction of this Court in controversies between States. In *Virginia v. West Virginia,* 246 U. S. 565, Chief Justice White, in rendering the unanimous opinion of the Court, said at page 591:

> "That judicial power essentially involves the right to enforce the results of its exertion is elementary. *Wayman v. Southard,* 10 Wheat. 1, 23; *Bank of the United States v. Halstead,* 10 Wheat. 57; *Gordon v. United States,* 117 U. S. 697, 702. And that this applies to the exertion of such power in controversies between States as the result of the exercise of original jurisdiction conferred upon this Court by the Constitution is therefore certain."

When this Court acts in the exercise of its original jurisdiction under the Constitution, it exercises an authority paramount to the States and overrides provisions of State Constitutions and State laws just as effectively as do the direct provisions of the Federal Constitution and of lawful Federal statutes. In *Wisconsin v. Illinois,* 281 U. S. 179, Justice Holmes, in rendering the unanimous opinion of this Court, said at page 197:

> * * * "It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defences upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State."

It is well settled that where a duty rests upon any officer of a State, or its political sub-divisions, to perform any acts necessary to the performance of a judgment of a Federal Court, that court has and will exercise the power to compel performance of the judgment by mandamus. Thus where there is a duty to levy or collect a tax to pay a debt which has been merged in a judgment of a Federal Court, the court will mandamus the State or municipal officer to enforce the judgment. *Supervisors v. United States ex rel.,* 71 U. S. (4 Wall.) 435; *Von Hoffman v. City of Quincy,* 71 U. S. (4 Wall.) 535; *City of Galena v. Amy,* 72 U. S. (5 Wall.) 705; *Riggs v. Johnson County,* 73 U. S. (6 Wall.) 166; *Walkley v. City of Muscatine,* 73 U. S. (6 Wall.) 481; *Labette County Commissioners v. Moulton,* 112 U. S. 217.

This power extends to the coercion of officers of a State in aid of the performance of a judgment rendered by this Court in the exercise of its original jurisdiction over controversies between States. *Virginia v. West Virginia,* 246 U. S. 565. The distinction between such a case and *Kentucky v. Dennison,* 65 U. S. (24 How.) 66, is manifest. In the *Dennison* case the Congress sought to impose a duty by statute which it had no power to impose upon a State official as such. On the other hand, every State official owes a duty by virtue of the provisions of the Federal Constitution to perform every act essential or proper to enable his State to perform a judgment of this Court entered in the exercise of its original jurisdiction over controversies between States. In relation to such a judgment every State officer has a Federal duty. This distinction was well pointed out in *Ex Parte Siebold,* 100 U. S. 371 at 391.

However courts also have the power directly to enforce their judgments through officers appointed by the court to carry out such judgments. Thus this Court may appoint a Commissioner or Commission to establish a boundary line between States in conformity with its decree. *Arkansas v. Tennessee,* 246 U. S. 158. The judicial power to render a decree for the apportionment of the waters of a river among different appropriators includes the power, without statutory authority, to appoint a River Master or Commissioner to carry out the decree, although the decree requires a variation in the apportionment from time to time under changing conditions, and although it would have been appropriate for the legislature to have provided administrative machinery to supervise the apportionment of the waters of the stream. *Montezuma Canal Co. v. Smithville Canal Co.,* 218 U. S. 371. That this Court, acting without benefit of statute, might appropriately appoint such an officer of the court to carry out a decree apportioning the waters of a river in a suit between States was recognized in *New Jersey v. New York,* 283 U. S. 805. A court, without authority of statute, may appoint a receiver in order to make possible or more convenient the performance or enforcement of a judgment or decree. *Stockton v. Central R. Co. of New Jersey,* 50 N. J. Eq. 489, 25 Atl. 942; *Mabon v.*

Ongley Electric Co., 156 N. Y. 196, 50 N. E. 805. See 53 *C. J.,* 47, Sec. 34.

While the procedure is generally the subject of statute, a court may appoint a Commissioner to execute a deed pursuant to a decree of specific performance. *Langdon v. Sherwood,* 124 U. S. 74, 81. Where a state statute authorizes a court to appoint "a person" to discharge a duty enjoined by a writ of mandamus, which the defendant has refused to perform, a Federal Court may appoint a United States Marshal to levy and collect taxes for the payment of a judgment rendered against a municipal corporation of such State. *Supervisors v. Rogers,* 74 U. S. (7 Wall.) 175.

While it has been held that where there is no effective remedy under State law to collect a money judgment against a municipal corporation the Federal Courts will empower a Marshal to levy and collect a tax to discharge the judgment (*Welch v. Ste. Genevieve,* 29 Fed. Cas. 608, No. 17,372; *Garrett v. City of Memphis,* 5 Fed. 860; *Post et al. v. Taylor County,* Fed. Cas. No. 11,302 (19 Fed. Cas. p. 1092); *United States v. Treasurer of Muscatine County,* Fed. Cases No. 16,583 (28 Fed. Cas. p. 213); *Stansell v. Levee Board of Miss. Dist. No. 1* (D. C. N. D. Miss. 1881), 13 Fed. 846), the Federal Courts have generally held that they could only compel the exercise of such machinery as State law had provided for the levy and collection of taxes to pay a money judgment against a municipal corporation and that if such measures fail, no relief could be had. *Rees v. City of Watertown,* 86 U. S. (19 Wall.) 107 (1873); *Meriwether v. Garrett,* 102 U. S. 472; *South Dakota v. North Carolina,* 192 U. S. 286 (1903); *O'Brien v. Wheelock,* 78 Fed. 673 (C. C. S. D. Ill. 1897, Allen *D.J.*); *Yost v. Dallas County,* 236 U. S. 50.

However, these cases in no way militate against the power of this Court to enforce the instant judgment directly through the appointment of a Master or Receiver with the full powers prayed for by the petitioners. The distinction between those cases and the one at bar is obvious. Suits to enforce bonds of municipal corporations are brought upon obligations issued under and not paramount to the authority of the State. The extent of such an obligation is determined by State statutes and law and not by the Constitution of the United States. A plaintiff by bringing suit in the Federal Courts upon the contract obligation of a municipal corporation acquires no greater rights than are given by the State statutes which measure the extent of the obligation created. Ordinarily, the right given in the bonds issued by municipal corporations, pursuant to State statutes, to have a tax levied, collected and applied to their payment is to have such tax levied and collected in the manner provided by the State statute, and the court in the guise of enforcing the judgment cannot extend the scope of such obligations.

On the other hand, the Supreme Court of the United States is given jurisdiction and power by the Federal Constitution to determine all controversies between States. The authorities establish that the jurisdiction to render judgments necessarily comprehends the power to enforce the judgment. Where the power to enforce does not exist, there is no jurisdiction. Accordingly, whenever a judgment is rendered by the Supreme Court of the United States in the exercise of its original jurisdiction in a controversy between States, that judgment is based upon the Federal Constitution and the extent of its obligation is measured by the Federal Constitution. From this it necessarily follows that unlike the other class of cases, the Supreme Court does have power and authority to enforce such judgments by any appropriate means and this includes the appointment of a receiver, commissioner or other functionary to carry out the judgment even to the extent of issuing bonds and levying taxes, if that should be necessary.

Obviously, the exercise of this original jurisdiction could not be conditioned upon the provision by the State of some machinery to carry out the decree of this Court; for, if that were so, the original jurisdiction of this Court over controversies between States—perhaps the most important power of this Court, since it is designed to settle those controversies which would ordinarily be settled by diplomatic representations or war among independent nations—would be nullified and set at naught. That the power of this Court in the exercise of its original jurisdiction is no such feeble, impotent and futile thing has long since been set at rest by this Court. In *Virginia v. West Virginia*, 246 U. S. 565, the syllabus reads in part:

> "The original jurisdiction conferred upon this court by the Constitution over controversies between States includes the power to enforce its judgment by appropriate remedial processes, operating where necessary upon the governmental powers and agencies of a State.
>
> "The authority to enforce its judgments is of the essence of judicial power. That this elementary principle applies to the original jurisdiction in controversies between States has been universally recognized as beyond dispute, as is manifested by the numerous cases of the kind which have been decided, in not one of which hitherto, since the foundation of the Government, has a State done otherwise than voluntarily respect and accede to the judgment." (p. 565)

In that case, Chief Justice White, rendering the unanimous opinion of this Court, said, at p. 591:

> "That judicial power essentially involves the right to enforce the results of its exertion is elementary. *Wayman v. Southard*, 10 Wheat. 1, 23; *Bank of the United States v. Halstead*, 10 Wheat. 57; *Gordon v.*

> *United States,* 117 U. S. 697, 702. And that this applies to the exertion of such power in controversies between States as the result of the exercise of original jurisdiction conferred upon this court by the Constitution is therefore certain. The many cases in which such controversies between States have been decided in the exercise of original jurisdiction make this truth manifest. Nor is there room for contending to the contrary because, in all the cases cited, the States against which judgments were rendered conformably to their duty under the Constitution, voluntarily respected and gave effect to the same. This must be unless it can be said that, because a doctrine has been universally recognized as being beyond dispute and has hence hitherto, in every case from the foundation of the Government, been accepted and applied, it has by that fact alone now become a fit subject for dispute."

That the enforcement of such a decree cannot be defeated by restrictions in a State Constitution or other State obstruction was forcefully stated by Justice Holmes in *Wisconsin v. Illinois,* 281 U. S. 179, at 197, as follows:

> * * * "It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defences upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State."

Obviously, if a State cannot defeat the enforcement of such a decree by positive action or self-imposed restrictions, it cannot do so by inaction or refusal to act. Under the Constitution of the United States such a decree becomes part of the supreme law of the land, in effect a part of the Federal Constitution, and overrides every attribute of State sovereignty. When the States of the United States agreed to join together to form a more perfect union under the Federal Constitution, they respectively agreed that the Supreme Court should have jurisdiction to decide controversies among them, that such decisions should be final and that this Court should have full power to enforce them. The obligation of such a judgment is thus measured by the Federal Constitution; and the jurisdiction of this Court to render it carries the power to enforce it through any convenient and appropriate means without aid of statute. This power includes the power to create such binding obligations on the States as may be necessary to effectuate such a decree and the power to levy and collect such taxes as may be required until the State voluntarily performs her duty.

The fact that the Congress might properly provide suitable administrative machinery for the enforcement of such a decree (*Virginia v. West Virginia,* 246 U. S. 565) in no wise prevents the court in the absence of such administrative machinery from creating such machinery as may be necessary and appropriate to the enforcement of the decree without aid of statute. *Montezuma Canal Co. v. Smithville Canal Co.,* 218 U. S. 371. The Congress could not take such power away from this Court; and no legislation is necessary to make it effective, for otherwise the Congress by failure to pass laws could effectively nullify the jurisdiction of this Court. It is submitted that the power of this Court to give the relief prayed for by these petitioners is too clear for debate.

B.

The Raising of Funds by the State of Illinois to Discharge Its Liability and Duty Under the Decree of April 21, 1930, is not the Contracting of a Debt Within the Meaning of Section 18, Article IV of the Illinois Constitution nor is it the Assumption of a Debt of a Municipality Within the Purview of Section 20, Article IV of the Illinois Constitution. Assuming for Purposes of Argument that either Section 18 or Section 20 of Article IV of the Illinois Constitution is Applicable, Any Such Provision would be Void as Applied to a Judgment Rendered by This Court in the Exercise of its Jurisdiction in Controversies between States, for the Federal Constitution is the Supreme Law of the Land Upon Any Subject Upon Which it Speaks.

The defendants assert that the State of Illinois is disabled from performing its obligations under this decree by Sections 18 and 20 of Article IV of the Illinois Constitution. We think it manifest that no self-imposed restriction in the Constitution of the State of Illinois could be valid to affect either the duty of the State under a judgment of the Supreme Court in the exercise of its original jurisdiction in controversies between States or the power of the State to perform the judgment. However, we deem it clear that Article IV, Section 18 of the Illinois Constitution is not applicable to a case where the State raises funds to discharge its liability and duty under a judgment rendered by the Supreme Court of the United States in the exercise of its original jurisdiction in controversies between States.

The pertinent provision of Section 18, Article IV of the Illinois Constitution is as follows:

> * * * "Provided, the state may, to meet casual deficits or failures in revenues, contract debts, never to exceed in the aggregate $250,000; and moneys thus borrowed shall be applied to the purpose for which they

> were obtained or to pay the debt thus created, and to no other purpose; and no other debt, except for the purpose of repelling invasion, suppressing insurrection, or defending the state in war, (for payment of which the faith of the state shall be pledged) shall be contracted, unless the law authorizing the same shall, at a general election, have been submitted to the people, and have received a majority of the votes cast for members of the general assembly at such election." (Report of Special Master McClennen, 42-43.)

As is shown hereinafter in this brief (Law Section II, pp. 93-97, *infra*), the actions of the State of Illinois in commanding and directing the illegal diversion of water from Lake Michigan have rendered the State of Illinois liable to the complainant states for the wrong caused by this tortious conduct. Since the decree and decision of the United States Supreme Court is a mandatory order upon the State of Illinois specifically to remedy this continuing tort by constructing disposal plants and controlling works, the legal obligation thus imposed is valid and binding upon the State irrespective of constitutional limitations. Obviously, however, Section 18 which prohibits the contracting of indebtedness has no application to a liability arising involuntarily on account of tortious conduct. *Bloomington v. Perdue*, 99 Ill. 329; 5 *McQuillin, Municipal Corporations,* Section 2217:

> "Provisions as to debt limits, apply only to indebtedness which arises *ex contractu* and do not apply to involuntary liability arising *ex delicto*. Hence, the fact that a municipality has exceeded its debt limit is no defense to an action based on a tort. * * *"

and cases cited.

The State of Illinois faced with this obligation has alternative ways and means of satisfying the same. It may with undoubted propriety levy sufficient taxes to carry out the decree on a "pay as you go" basis. Under that policy it need contract no debts. The annual amounts required for such a policy are not so large when compared with the financial capacity of Illinois, as to render such a policy overly burdensome. However, we here consider the validity, assuming the Illinois Constitution to be applicable, of funding the obligation by means of the issuance of state bonds or other evidences of indebtedness. This alternative, it is contended by the defendants, runs afoul of Section 18 of Article IV of the Illinois Constitution.

Since the primary obligation to construct the plants and works is valid and uncontestable, it is submitted that the funding of the obligation, which in effect merely extends its ultimate payment over a period of years, is not in itself the contracting of indebtedness within the meaning of the constitutional limitation. The liability of Illinois for its tortious conduct is already adjudicated and existing; and hence, no question of "contracting" the liability, already validly existing without contract, is involved in the issuance of bonds to satisfy such liability. Whether the issuance of bonds to fund or refund a valid liability existing outside of the constitutional limitation constitutes the creation of indebtedness within the meaning of the Constitution has not been passed upon by the Illinois courts so far as we can discover, although the question was presented but not passed upon by the court in *Stone v. Chicago,* 207 Ill. 492, 69 N. E. 970. However, it has been universally held in other jurisdictions that the issuance of such evidences of indebtedness for the purpose of funding or refunding valid obligations already existing does not fall within the constitutional prohibition, even though the underlying obligation, had it not already been in existence, would have been void as in excess of the debt power if it had been voluntarily contracted at the time the funding or refunding was contemplated.

The principle that the issuance of bonds to satisfy a previously existing debt or liability is not "the contracting of a debt," within the meaning of such constitutional restrictions, is fully established both by the Federal and State decisions. *Maish v. Arizona,* 164 U. S. 599, 609; *Board of Commissioners of Lake County v. Platt,* (C. C. A. 8), 79 Fed. 567 at 569; *Board of Commissioners v. Keene Five Cents Savings Bank,* 108 Fed. 505, 514; *Independent School District v. Rew,* 111 Fed. 1, 7; *Fairfield v. Rural Independent School District,* 116 Fed. 838, 844; *In Re Menefee,* 22 Okla. 365, 97 Pac. 1014 at 1017; *State ex rel. Board of Education v. West,* 29 Okla. 503, 118 Pac. 146, 149; *Veatch v. City of Moscow,* 18 Idaho 313, 109 Pac. 722 at 723, 724; *City of Cedar Rapids v. Bechtel,* 110 Ia. 196, 81 N. W. 468, 469; *City of Los Angeles v. Teed,* 112 Cal. 319, 44 Pac. 580, 582; *Farson, Leach & Co. v. Board of Commissioners,* 97 Ky. 119, 30 S. W. 17; *Palmer v. City of Helena,* 19 Mont. 61, 47 Pac. 209; *Powell v. City of Madison,* 107 Ind. 106, 8 N. E. 31, 35; *Nat. Life Ins. Co. v. Mead,* 13 S. D. 37, 82 N. W. 78, 81; *Hyde v. Ewert,* 16 S. D. 133, 91 N. W. 474, 479; *Schuldice v. City of Pittsburgh,* 234 Pa. 90, 82 Atl. 1125, 1128. This principle is peculiarly applicable to the issuance of bonds to satisfy a non-contractual liability for tortious wrongs, such as are involved in the case at bar, for otherwise debt limitations might free states and municipal corporations from all liability for torts, which is obviously not the purpose or intention of such constitutional provisions.

It is manifest that the citizens and taxpayers of Illinois are privies to and bound by the judgment rendered against the State as their governmental agency. They are bound by a judgment against their governmental agency. *Freeman on Judgments,* Vol. 1, at 1090; *Pear v. City of East St. Louis,* 273 Ill. 501, 113 N. E. 60 at 62; *Healy v. Deering,* 231 Ill. 423, 83 N. E. 226, at 228.

The debt limitations of the Illinois Constitution were imposed by the people upon the state and municipal legislators solely in order to protect the taxpayers from wanton expansion of the public debt by unbridled legislators. *Law v. The People,* 87 Ill. 385. If the broader purpose, as urged by the defendants, is imputed to the people of Illinois in drafting and passing this provision of the constitution, it would follow that the people intended to place restrictions upon the power of the Legislature to meet obligations of the people themselves. It would be unreasonable to infer such a proposition and it is submitted that such a construction would invalidate the section or at least render it inoperative so far as the financing of an obligation to a sister State is concerned. Since the judgment of the United States Supreme Court runs against and is binding upon the people of the State themselves, they cannot by purporting to require a plebiscite to pass on the question of whether or not they will honor that judgment, prevent the governmental authorities of their State, in effect their trustees, from raising sufficient funds to carry out that judgment. If it were otherwise, it would follow that the Supreme Court is helpless to enforce its orders against a State or its citizens in any case in which the people of a State have rendered their Legislature powerless to raise money without a popular vote. To permit the people of a State so to shield themselves or raise the barrier of such a self-made limitation upon the enforceability of judgments against them would completely defeat the jurisdiction of the Supreme Court in controversies between States.

It necessarily follows therefore that Section 18 of Article IV must be so construed or so disregarded as to permit the State Legislature to provide by any reasonable means, including the issuance of bonds, for the satisfaction of all liabilities or obligations which are binding upon the people themselves.

It is also clear that, since the State of Illinois directed and commanded the diversion of the waters of Lake Michigan and since the State is therefore primarily responsible for the damage caused, the discharge of the judgment of the Supreme Court by the State will not be assuming the debt of any municipal corporation within the provisions of Section 20, Article IV of the Illinois Constitution, but will merely be a discharge of the State's primary obligation. The State will only be assuming its own individual liability, and hence, it is clear that Section 20, Article IV of the Illinois Constitution has no application. (See Report of Special Master McClennen, 43-44.)

However, it is immaterial whether Sections 18 and 20 of Article IV of the Illinois Constitution are or are not in terms applicable. We have already seen that the obligation of a judgment rendered by the Supreme Court of United States in the exercise of its original jurisdiction in controversies between States is measured by and rests upon the Federal Constitution. It is, of course, axiomatic that the Federal Constitution is the supreme law of the land upon any subject upon which it speaks. It is manifest, therefore, that were either Section 18 or Section 20 of Article IV of the Illinois Constitution in terms applicable, such State constitutional provisions, when put forward and sought to be applied to nullify or prevent the enforcement of a judgment of the Supreme Court of the United States in its original jurisdiction of controversies between States, would be null and void as though they had never been. (See Report of Special Master McClennen, 40-50.) When the States of the Union gave up the right to settle controversies among them by diplomacy and resort to war, it was not the intent of such States nor of the framers of the Constitution that these rights should be surrendered in return for a mere mockery or pretense.

When the States became members of the Union, they agreed that the Supreme Court of the United States should adjudicate their controversies between themselves and their obligations to each other, and that this Court should have the power to enforce their just obligations to each other. This is the paramount power to which Justice Holmes refers in *Wisconsin v. Illinois,* 281 U. S. 179 at 197.

II.

THE PRIMARY LIABILITY AND DUTY OF THE STATE OF ILLINOIS HEREIN IS INCONTROVERTIBLE.

The primary liability of the State of Illinois for this illegal diversion of the waters of Lake Michigan and the consequential lowering of the levels of the Great Lakes has been adjudicated by this Court and is therefore *res judicata.* The Special Master, in his report of March 13, 1933, discusses this phase of the case very fully and clearly demonstrates both that the State of Illinois is doing the wrong herein and that it has been so decided by this Court and is therefore *res judicata.* (See Report of Special Master McClennen, pp. 42-46.) Thus it is the law of this case that the State of Illinois is itself directly liable, irrespective of any duty or liability on the part of the Sanitary District. (*Wisconsin v. Illinois,* 278 U. S. 367, 409, 419; The Same, 281 U. S. 179, 196, 197, 696.)

However, were the question of responsibility for the wrong an open one, the primary liability of the State of Illinois is incontrovertible.

It may be of interest to the Court to cite again the pertinent statutes and actions of the State of Illinois which establish that the diversion instituted and maintained by the Sanitary District of Chicago was directed and required by the State of Illinois.

Section 23 of the Act of May 29, 1889, (Ill. Laws 1889, p. 125) directed and required the Sanitary District to institute and maintain a diversion in an amount which today would be in excess of the capacity of the main drainage canal. (See Report of Special Master on Original Reference, 1927, pp. 14-15; Report of Special Master McClennen 44-45.) The Illinois Act of June 10, 1895 (Ill. Laws 1895, p. 168) expressly required that the Sanitary District should, on the opening of the channel, turn into said channel "not less than 20,000 cubic feet of water per minute for every 100,000 inhabitants of said District, and shall thereafter maintain the flow of such quantity of water." (See Report of Special Master on Original Reference, 1927, p. 17.) The Act of the Illinois Legislature of May 14, 1903 authorized the construction of works by the Sanitary District for the development of water power. In 1908 the State of Illinois adopted separate Section III of the Illinois Constitution (see Joint Abstract of Record filed on January 24, 1928, p. 115) appropriating the diversion in part for an artificial waterway and in part for the development of water power for the profit of the State. On June 17, 1919 the State of Illinois enacted the so-called Illinois Waterway Act which authorizes the construction of power plants along the so-called Illinois Waterway to utilize the abstracted water for the development of power for profit. The Governor of Illinois, in his message of May 10, 1907, stated that the use of this abstracted water for power by the State of Illinois would afford a minimum annual income of $3,000,000.00. (See Joint Abstract of Record filed on January 24, 1928, pp. 113-115.) That the State so directed the diversion also appears from the decision in *Sanitary District vs. United States,* 266 U. S. 405, at page 424.

As we have indicated heretofore, it is the law of this case that the State of Illinois is itself directly liable. However, irrespective of any such adjudication the primary liability of the State is well established. It follows from the legal relationship between the State and its municipal agencies. As was stated in the case of *Ward vs. Field Museum of Natural History,* 241 Ill. 496, 89 N. E. 731, 736:

> "* * * The city and the South Park Commissioners are creatures of the Legislature for the purposes of administering certain functions of local government within specified territory. *People v. Walsh,* 96 Ill. 232, 36 Am. Rep. 135; *West Chicago Park Com'rs v. City of Chicago,* 152 Ill. 392, 38 N. E. 697. 'The city of Chicago, to the extent of the jurisdiction delegated to it by its charter, is but an effluence from the sovereignty of Illinois, governs for Illinois, and its authorized legislation and local administration of law are legislation and local administration by Illinois through the agency of that municipality.' *Byrne v. Chicago General Railway Co.,* 169 Ill. 75, 85, 48 N. E. 703, 705. * * * The Legislature may create, annul, and change municipal corporations and control and dispose of their property, subject only to the constitutional provision relating to local or special legislation. Subject to that condition they may be changed, modified, enlarged, restrained, or abolished to suit the exigencies of the case, and the powers and duties with which they are invested may be imposed upon others. *Wilson v. Board of Trustees,* 133 Ill. 443, 27 N. E. 203; *Town of Cicero v. City of Chicago,* 182 Ill. 301, 55 N. E. 351; *City of Chicago v. Town of Cicero,* 210 Ill. 290, 71 Ill. 356; *People v. Walsh, supra.* * * *"

It is seen from the foregoing that the relationship of privity and agency between the state and its municipal subdivisions, within the limits of authorized action on the part of such subdivisions, is recognized and applied by the Supreme Court of Illinois. Such relationship is indeed the basis of original jurisdiction on the part of the Supreme Court in this case. If the Sanitary District were a purely private corporation not purporting to act as an agency of the state, or if the Sanitary District in the operation of its properties were acting wholly without legislative or state approval and authority, under the rule of

Louisiana v. Texas, 176 U. S. 1, 16, the original bill in this case would have been dismissed. This subject was considered by the Supreme Court in *Missouri v. Illinois,* 180 U. S. 208, 242, in which the State of Illinois sought to have the bill dismissed on the ground that the complaint related to acts by the Sanitary District of Chicago and that the controversy involved was accordingly not a controversy between states. This contention was disposed of by Justice Shiras at page 242 of the opinion:

> "It can scarcely be supposed, in view of the express provisions of the Constitution and of the cited cases, that it is claimed that the State of Illinois is exempt from suit because she is a sovereign State which has not consented to be sued. The contention rather seems to be that, because the matters complained of in the bill proceed and will continue to proceed from the acts of the Sanitary District of Chicago, a corporation of the State of Illinois, it therefore follows that the State, as such, is not interested in the question, and is improperly made a party.
>
> "We are ~~unable to~~ see the force of this suggestion. The bill does not allege that the Sanitary District is acting without or in excess of lawful authority. The averment and the conceded facts are that the corporation is an agency of the State to do the very things which, according to the theory of the complainant's case, will result in the mischief to be apprehended. It is state action and its results that are complained of—thus distinguishing this case from that of *Louisiana v. Texas,* where the acts sought to be restrained were alleged to be those of officers or functionaries proceeding in a wrongful and malevolent misapplication of the quarantine laws of Texas. The Sanitary District of Chicago is not a private corporation, formed for purposes of private gain, but a public corporation, whose existence and operations are wholly within the control of the State.
>
> "The object of the bill is to subject this public work to judicial supervision, upon the allegation that

> the method of its construction and maintenance will create a continuing nuisance, dangerous to the health of a neighboring State and its inhabitants. Surely, in such a case, the State of Illinois would have a right to appear and traverse the allegations of the bill, and having such a right, might properly be made a party defendant."

For the purpose of the question here involved it is immaterial whether the building of the Sanitary Canal and the diversion of water from Lake Michigan had been accomplished by the direct action of the State of Illinois and by means of funds supplied by the State itself or, as the facts stand, by means of a municipal agency created by the State for the express purposes shown to have been accomplished. The elementary and applicable rule of agency, if any authority need be cited, is stated in *Mechem on Agency,* Vol. 2, Section 1873:

> "For injuries which occur to third persons as the natural, direct and proximate result of an act which the principal has expressly directed or authorized his agent to do, the principal is clearly and unquestionably liable. Such results are the direct outgrowth of the deliberate intention of the principal, and he is as much to be charged with the responsibility as if he had performed the act in person."

CONCLUSION.

We submit that upon the entire record in these causes the findings and conclusions of the Special Master must be confirmed. We urge, however, that in addition to the recommendations of the Special Master the decree of April 21, 1930 be further enlarged to impose a specific duty upon the State of Illinois in relation to the other Sewage Treatment Works embraced in the program of the defendants but not included in the present Order of Reference and to provide for the appointment of a Mandatory of this Court to do the things therein described, for, on behalf of, and at the expense of the defendants, in the event that such things should not be done by the defendants at the times and in the manner fixed in the decree.

This Reference has been occasioned by the non-performance of the defendants. In accordance with the well-settled rule costs should, therefore, be taxed against the defendants, including the fees of the Special Master. *Wisconsin et al. v. Illinois et al.*, 281 U. S. 179, 200. *North Dakota v. Minnesota*, 263 U. S. 583. *South Dakota v. North Carolina*, 192 U. S. 286, 321.

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Dated April 10, 1933.

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Office Supreme Court,
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CHARLES ELMORE CR

BEFORE THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1932.

STATE OF WISCONSIN, et al., *vs.* STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.	No. 5 Original.
STATE OF MICHIGAN, et al., *vs.* STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.	No. 8 Original.
STATE OF NEW YORK, et al., *vs.* STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.	No. 9 Original.

BRIEF ON BEHALF OF THE STATE OF ILLINOIS IN OPPOSITION TO REPORT OF SPECIAL MASTER McCLENNEN.

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BRIEF ON BEHALF OF THE STATE OF ILLINOIS IN OPPOSITION TO REPORT OF SPECIAL MASTER McCLENNEN.

Introduction and Outline of Brief.

Before explaining the nature of the brief herein submitted on behalf of the State of Illinois, comment on the state of the record is required. The Special Master introduces his report by the statement that he has noted therein the objection of the parties. The court directed in this case a summary proceeding and interpreting this requirement, the Special Master allowed counsel an opportunity to see a tentative draft of his proposed report. This was submitted immediately upon conclusion of the oral argument and many of its provisions and recommendations were necessarily not considered by counsel in that argument. He allowed five days in which counsel could send to him in Boston suggestions for modification of his tentative report. The argument took place in Washington. Counsel for the State of Illinois therefore was unable, within the time permitted, to submit specific suggestions for modification. As a result the statement that the objections on behalf of the State of Illinois have been noted is not entirely accurate. In the main the report is correct as to our objection but the State objects to the report generally and should not be precluded on this record from pressing for consideration any contention.

The first two questions submitted by the order of reference to the Special Master deal with performance by the Sanitary District and particularly with details in its construction program. They also peculiarly involve consideration of the charges of bad faith pressed by the complainants. The State of Illinois joins with and affirms the contentions submitted as to the Master's conclusions on these two questions by the Sanitary District, and particularly desires to repudiate the implications of bad faith, which we submit are unfairly suggested in the Master's Report. But the State in this brief will not discuss these two questions except as they are necessarily involved in the choice of remedies—a matter definitely comprehended in the third question.

The third question in the order of reference directed the Master to report:

"(3) As to the financial measures on the part of

> the Sanitary District or the State of Illinois which are *reasonable* and necessary in order to carry out the decree of this court." (Italics ours.)

In considering this question the Master has found an interruption to the going forward by the Sanitary District in carrying out of its program for artificial treatment of sewage, and has further found that this interruption has occurred from causes not within the control of the Sanitary District. *The Master has, however, wrongly assumed that the mere existence of this interruption presents an emergency.* His assumption is that the restoration of the rights of the complaining states is so imperative as to compel, in dealing with this emergency, any remedy, however extraordinary or doubtful, which might conceivably lie within the authority of this court.

In this brief we propose, first, to direct the court's attention to certain facts apparent in this record to which, as we contend, the Master has failed to give sufficient or any consideration. These facts demonstrate, as we see it, that notwithstanding the interruption to the program, the "just rights of the complainant states," limited solely to the restoration of lake levels, will be produced by other agencies at a time sooner than if the original decree herein were fully and completely complied with. This situation, to which the Master gave no attention, entirely changes the character of any claimed emergency.

We shall then discuss the impractical nature of the recommendations submitted by the Master, which we contend are entirely unreasonable, and particularly so when contrasted with the extent of the actual emergency as affected by the facts last above referred to. We shall then discuss the question as to whether the State of Illinois is primarily liable; whether this case has involved a fair and final determination of such liability, and shall urge the constitutional right of the State of Illinois to leave financial responsibility for the acts of the Sanitary District solely upon the District.

Finally we shall discuss the very grave questions presented by the Master's Report as to the nature of the power of the Supreme Court, which he recommends should now be asserted.

I.

FACTS OF RECORD GIVEN INSUFFICIENT OR NO CONSIDERATION BY THE SPECIAL MASTER, SHOW THAT LAKE LEVELS WILL BE RESTORED BY OTHER AGENCIES SOONER THAN IF THE ORIGINAL DECREE HEREIN WERE FULLY CARRIED OUT. THERE EXISTS, THEREFORE, NO PRESENT EMERGENCY CALLING FOR THE IMMEDIATE APPLICATION OF ADDITIONAL OR EXTRAORDINARY EQUITABLE REMEDIES. ON THE CONTRARY THE DECREE SHOULD NOW BE MODIFIED TO ALLOW TO THE SANITARY DISTRICT REASONABLE OPPORTUNITY TO AWAIT THE END OF THE DEPRESSION.

The Special Master's report finds that the Sanitary District, through causes not under its control, has been compelled to interrupt progress of its sewage disposal construction program for more than one and a half years. These causes—the failure to collect taxes and the inability to sell bonds—are clearly the consequences of the business depression. Postponement in enforcing an immediate injunction stopping all diversion by the Sanitary District for sanitation purposes was originally allowed and required by the Court in this case, solely for the reason that such immediate cessation of diversion would endanger the lives and health of the people of Cook County. Clearly the decree must be modified to accommodate its requirements to the delay which has already taken place and the further delay which is inevitable. This accommodation is required by the same compelling humanitarian necessity which originally induced the Court to postpone the final stoppage of diversion.

We point out below that the ultimate result of stopping the diversion—the restoration of lake levels—is required to be accomplished by other agencies, under appropriate action of Congress; and, if adopted, under the express provisions of the pending Canadian-St. Lawrence Seaway Treaty, and at a date sooner than would be accomplished if the decree had in all particulars been met. We assert therefore, there does not at present exist any emergency whatever calling for the adoption of extraordinary remedies, since the accomplishment of this ultimate result is the entire measure of the relief allowed the complaining states herein.

We also point out below that the jurisdiction of this Court has been altered and limited by an Act of Congress adopted since the decree. This statute compels legal attention to navigation benefits resulting from the diversion which the Court held originally, because of failure of Congress to act, could not be given consideration. The action whose omission so resulted has now taken place. The Court's original decree gave consideration only to the navigation requirements of the Chicago harbor. By subsequent act of Congress other navigation requirements now must be considered.

By way of emphasizing this requirement, we call the Court's attention to the position taken recently in this case by the original intervening defendant states, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana, who applied for leave to appear before the Special Master in this reference and present their contentions in reference to this very issue, with an opportunity upon the record so made subsequently to ask a modification of the original decree herein. This Court summarily disposed of this application by an order which read: "The motion to modify the decree is denied." The motion, however, was in effect for an enlargement of the reference to permit consideration of this issue. The Special Master has, as we point out below, made a finding on this very point—the extent to which diversion from Lake Michigan will benefit navigation on the waterway from Lake Michigan to the Mississippi below the Sanitary District Canal. These benefits have heretofore been excluded from consideration because of the failure of Congress up to that time to act. The record, therefore, presents this anomalous and, we respectfully submit, improper situation. Not only the State of Illinois but six other states, by formal application, press for consideration navigation benefits resulting from the diversion and point to an act of Congress which eliminates any bar to consideration of these benefits. These intervening defendant states have been denied an opportunity to present their rights. Yet the Special Master has made a finding on this point. As we point out below this finding was improper and obviously the result of misconstruction of the Act of 1930, but in any event the issue, we respectfully suggest, should not be disposed of now without due and proper allowance of an opportunity to the intervening defendant states to present fully their contentions.

For the reasons pointed out below we also respectfully suggest that the jurisdiction of this Court has been modified in the premises, its power to control the diversion is affected by an exercise of the paramount authority of Congress and on this further ground its decree should now be modified.

A.

THE PROVISION OF THE RIVERS AND HARBORS ACT OF 1930 IN REFERENCE TO THE ILLINOIS WATERWAY IS AN EXERCISE OF THE PARAMOUNT AUTHORITY OF CONGRESS AND CALLS UPON THIS COURT TO SO MODIFY ITS DECREE AS TO AVOID ANY POSSIBLE INTERFERENCE THEREWITH. THE SPECIAL MASTER HAS MISCONSTRUED AND MISUNDERSTOOD THE EFFECT OF THIS STATUTE.

In the original opinion herein written by the late Chief Justice Taft the Court affirms the authority of the Secretary of War, on recommendation of the Chief of Engineers, under Section 10 of the Act of March 3, 1899, to authorize a diversion from Lake Michigan which has a reasonable relation to benefits to navigation. The court held that in the absence of a congressional project for the development of a waterway from Lake Michigan to the Mississippi and thence to the Gulf of Mexico, navigation benefits from the diversion to the Illinois and Mississippi Rivers, concerning which adequate findings were made in the Special Master's first report, could not be a legal basis for a permit by the Secretary of War for such diversion. On rereference, therefore, the Special Master was specifically directed to give consideration to the navigation requirements of the Chicago harbor only, and his report on rereference very clearly and definitely shows that his recommendations were made solely from this standpoint, and in strict compliance with the court's direction.

As might be expected in view of the original assertion of the Secretary of War's power, in the second opinion herein written by Mr. Justice Holmes the court makes it clear that its decree and any of the action of the parties shall be subject to any subsequent assertion of the paramount power of Congress or its lawfully delegated agent, the Secretary of War. The decree herein contains numerous and definite reservations obviously designed to permit this principle to apply.

By the Rivers and Harbors Act of 1930, approved July 3, 1930, Congress adopted what was called the Illinois River item reading as follows:

> "Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway: Provided, That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000; Provided further, That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12, Original—October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway; Provided further, That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on

the Great Lakes to the end that Congress may take such action as it may deem advisable."

This adopts as a Federal project the waterway from Lake Michigan to the Mississippi (there being prior projects covering all of the balance of the waterway not specifically described in the above expressions). *As the result of this enactment, applying the theory upon which the court originally acted, it thereby became the duty of the Secretary of War as a matter of law in deciding upon the issue of any permit under Section* 10 *of the Act of* 1899 *to give consideration not only to the navigation benefits resulting from the diversion in the harbor of Chicago, but also in the Illinois waterway.*

This statute specifically directed the Chief of Engineers, *after the project was completed and actual navigation had begun,* to investigate and determine the navigation needs in the waterway for water from Lake Michigan. The Special Master, we submit, in dealing with the effect of this statute has entirely misunderstood its provisions. He says (Report, p. 27):

> "The Act by adopting the report of the Chief of Engineers provided for no larger flow than the decree allows. There is no present Federal project requiring more diversion than the decree allows. There is no indication that Congress will hereafter allow a greater diversion. The provision of the Act for the smallest flow leaves no discretion to the Secretary of War to permit a larger diversion for this project. Congress has exercised its full authority directly, without leaving a part in the hands of the Secretary. * * *"

Each statement above is erroneous.

The first sentence is a complete misconception of what the Act provides. The Act adopts the flow permitted under the decree, but, clearly, only until subsequent action may be taken as a result of the report of the Chief of Engineers called for by the Act. The Act does not adopt the contemplated report of the Chief of Engineers but leaves action thereon either to Congress itself or to the Secretary of War under the statute of 1899.

The second sentence in the quotation above is an assertion as to the ultimate fact to be determined by the Chief of Engineers in the report directed by the Act. The entire question to be decided by that report is the amount of diversion required for this waterway adopted by the Act. The Master gives no reason for his assertion of this conclusion of fact, and since Congress reserves the question until the report comes in, it would be clearly improper for this Court or the Master now to consider it. As to the third sentence above, it will be sufficient to point out that there is no indication that Congress will not hereafter allow a greater diversion.

As pointed out above six sovereign states have reasserted rights to a lawful consideration of these benefits to navigation. This act of Congress has removed what this court heretofore considered a bar to such consideration.

The most material error, however, is the Master's complete failure to properly interpret the provision in the language above as to the smallest flow required for the diversion. In this connection we contend and have contended before him that it was incumbent upon the Master, and now upon this court, in construing the above provisions of this Act, to give proper consideration and effect to other language in the same statute reading as follows:

> "Great Lakes connecting channels: The existing projects are hereby modified so as to provide a channel suitable for vessels of 24-foot draft when the ruling lake is at its datum plane, *and including the construction of compensation works, as set forth in paragraphs 30, 31, 48, 67, 69, 70, 71, 76, and 77 of the report of the special board of engineers dated*

February 14, 1928, and submitted in House Document Numbered 253, Seventieth Congress, first session. The amount hereby authorized to be expended upon said channels is $29,266,000."

The engineers' report, House Doc. No. 253, contains a letter from Gen. Jadwin, then Chief of Engineers. Sections of the report specifically referred to in the above provision of the statute were offered and received in evidence before the Special Master. The letter of Gen. Jadwin, a part of House Document No. 253, reads in part as follows:

> "The Special Board agrees with the Joint International Board that compensating works should be constructed in Niagara and St. Clair Rivers to compensate for diversion and for enlargement of the lake outlets. The works proposed in the St. Clair River are a series of submerged rock sills, the exact number to be determined as the work progresses, estimated to cost $2,700,000.00. Contraction works are proposed in the Niagara River just above Ft. Erie. They would consist of a rock filled timber crib, a stone weir, and submerged sills, estimated to cost $700,000.00 with $5,000 annually for maintenance. Further enlargement of the St. Clair River to provide for 24 foot or 22 foot navigation would necessitate additional compensating works estimated to cost $200,000.00 for 24 foot navigation and $100,000.00 for 22 foot navigation. The Special Board estimates on the basis of a diversion at Chicago of 8500 second feet that the Chicago Drainage District should contribute $1,750,000.00 to the cost of the compensating works, as contemplated in the permit granted by the Secretary of War. It further states that while the amount of the Chicago diversion may be changed before the compensating works are constructed, the cost of such works to the United States would not be materially affected."

The recommendation of the Chief of Engineers as shown by this letter is for the construction of compensation works as described, and this was, as shown by the quotation from the statute above, the project adopted.

We direct the attention of the court also to the provision contained in the same statute last above-quoted, providing for an improvement to a 24 foot navigable depth. The original report of the former Special Master stated (pp. 113, 114) that vessels on the Great Lakes are designed to navigate to 24 feet.

That Master's report places the great damage from the diversion, and its resulting lowering of levels, almost exclusively upon its interference with the capacity of the large ore-carrying vessels on the Great Lakes. As a result of the project above provided by Congress in the Act of 1930 the depth is increased from the previous limiting depth of from 19 to 21 feet to 24 feet, thus almost entirely minimizing the navigation damage from the diversion.

7.

Aside from that, however, the requirement of compensating works restores the levels. If it be possible to restore the levels with a diversion of 8,500 second feet as is contemplated and recommended by the Chief of Engineers, can there be any question about the fact that in relating the amount of diversion down the Illinois waterway for the navigation benefits thereby to be derived on that waterway to the maintenance of lake levels on the Great Lakes the War Department is given a wide discretion? *Within the requirements as set forth in the Illinois River item above, that the diversion be the least possible without harmful effect upon lake levels, there is in fact a wide range.*

The Special Master has entirely overlooked the effect of these other two provisions of the same statute which must be read in conjunction with the Illinois River item. If the levels are to be restored, and this restoration contemplates a diversion of 8,500 second feet, as is shown by Gen. Jadwin's letter, clearly the War Department without any harmful effects to the levels of the lakes, after the restoration, could recommend for the benefit of Illinois River navigation a diversion up to that amount.

This restoration of levels, it must be understood, clearly restores all the "just rights" of the complainant states. When this is accomplished the purpose of the decree herein is achieved. But this statute, with due regard to the complainant's rights, indicates the interest of Congress to use to a reasonable extent, later to be determined, Lake Michigan water to benefit navigation on the waterway to the south. We here point out the wide discretion the facts necessarily allow for this future determination, while still allowing for the maintenance of lake levels.

These necessarily are complicated engineering questions, and with entire propriety left to the discretion of the War Department. The Special Master must, we assume, have misunderstood their relation and effect upon the controversy here involved.

But, as a result of this statute, we insist in the first place that the ultimate determination of the amount of diversion for navigation on the waterway is reserved. That fact is to be determined by the Chief of Engineers after operations have begun on a completed channel. Within the power vested in the Secretary of War to act upon the recommendation of the Chief of Engineers under Section 10 of the Act of 1899, as clearly and definitely interpreted and asserted by this court in this case, upon the coming in of the report of the Chief of Engineers called for by this statute, the Secretary of War on such recommendation could approve the diversion so determined. We submit this conclusion cannot be escaped.

The decree of this court is based, as stated above, solely upon the navigation requirements of the Chicago harbor and without contemplation of the actual restoration in fact of lake levels, and limits the diversion in 1938 to 1,500 second feet. We have no means of knowing now what the determination of the Chief of Engineers in the required report will be. But if his recommendation calls for a diversion in excess of 1,500 second feet, clearly the decree of this court is a bar to giving effect to what the court has already held in this case is and would be a lawful exercise of authority by the War Department. We, therefore, respectfully suggest that this court should modify its decree so that it in no way interfere with the future full and free exercise of the discretion lawfully imposed upon the War Department.

There is apparent in the Special Master's discussion of this statute, as well as in his comments upon the controlling works issue, a strong suggestion to this court that it should now express its own opinion concerning these complicated engineering questions. We respectfully urge that such suggestions are improper, and should be entirely disregarded by the court. The power of the Secretary of War upon recommendation of the Chief of Engineers has been settled, not only in this proceeding but in numerous other cases. It is a power to determine, upon experience and expert capacity, questions of fact as to the reasonableness or not of contemplated constructions in navigable channels or alterations thereof. This court surely will not attempt to influence in advance determinations which, under the express mandate of Congress, are to be made within this authority by the Chief of Engineers and submitted to the Secretary of War for his action.

B.

BY THE ACT OF CONGRESS OF 1930 AND ALSO CONTEMPLATED UNDER THE PENDING TREATY WITH CANADA CONCERNING THE ST. LAWRENCE SEAWAY PROVISION IS MADE FOR COMPENSATION WORKS TO RESTORE THE LEVELS OF THE GREAT LAKES. THIS RESULT UNDER BOTH THE STATUTE AND THE TREATY WILL OCCUR AT A DATE SOONER THAN IF THE ORIGINAL DECREE HEREIN WERE CARRIED OUT. WE INSIST THAT IF THE LEVELS ARE TO BE RESTORED AT A TIME SOONER THAN PERFORMANCE OF THE ORIGINAL DECREE WOULD PRODUCE, THERE IS IN FACT NO EMERGENCY PRESENT CALLING FOR THE EXERCISE BY THIS COURT OF ANY ADDITIONAL OR EXTRAORDINARY REMEDY TO ASSIST THE COMPLAINING STATES TO THEIR RELIEF.

We have referred above to the provisions of the Act of 1930 providing for the restoration of the levels of the Great Lakes by compensating works and have pointed to the specific item in the statute designed to produce this result.

There was introduced in evidence before the Special Master, (*and his attention was directed to them on oral argument and in brief*) the sections of House Document No. 253 referred to in the Great Lakes item above quoted dealing with compensating works, the numbers of which are set forth in the item. These state (Sec. 68):

> "It is estimated that the contraction furnished by the structures will raise the low levels of Lake Erie by 0.7 foot and the high levels by a slightly less amount."

Section 70, likewise in evidence, says in part:

> "The approximate locations of the sills which were computed as necessary to effect a rise of 1 foot in the levels of Lakes Michigan and Huron, the backwater effect of the Niagara works considered, are shown on drawing No. 3."

Section 71 recommends that in order to avoid any bad effects on the St. Lawrence River the construction works should be spread over about four years and suspended during extreme low water periods.

There is pending before the Senate of the United States with the recommendation by the Foreign Relations Committee that it be adopted, what is known as the Great Lakes St. Lawrence Deep Waterway Treaty between the United States and Canada. Under Paragraph (e) of Article VIII thereof the following provision for compensation works is made:

> "(e) that compensation works in the Niagara and St. Clair Rivers, designed to restore and maintain the lake levels to their natural range, shall be undertaken at the cost of the United States as regards compensation for the diversion through the Chicago Drainage Canal, and at the cost of Canada as regards the diversion for power purposes, other than power used in the operation of the Welland Canals; the compensation works shall be subject to adjustment and alteration from time to time as may be necessary, and as may be mutually agreed upon by the Governments, to meet any changes effected in accordance with the provisions of this Article in the water supply of the Great Lakes System above the said works, and the cost of such adjustment and alteration shall be borne by the Party effecting such change in water supply."

Upon the adoption of this treaty the appropriation made for the projects authorized in the Rivers and Harbors Bill of 1930, including compensation works, by the War Department Appropriation Bill of 1931, becomes immediately available for carrying out this treaty requirement. So far as this litigation is concerned, this court must assume that the proper officers of the Government, charged with official duty in the premises, will act, and either under the treaty or under the Act of 1930 will go forward and perform those things necessary to restore the levels of the lakes to a point higher than before they were reduced by the effect of the maximum diversion at Chicago.

These matters were pointed out on oral argument to the Special Master, but his tentative report had been prepared before he heard the oral argument, and quite obviously their effect had theretofore escaped his consideration.

We now insist the provision for the restoration of the lake levels is of the utmost importance in its relation to the present issue before the court.

Under the original opinion the complaining states are held entitled to the restoration of their just rights—the restoration of lake levels to result through the forces of nature from a cessation of the diversion. Cutting down or stopping the diversion is, therefore, no more than the means or instrumentality selected by this Court to restore the complainant's "just rights." This court, however, under times such as these and circumstances to be hereafter noted, will not do a useless thing. It may, with propriety, affirm its original injunction against further wrongful acts by the defendant Sanitary District. It may also enjoin any act by the State of Illinois, if such act be designed to assist the District in any wrongful action by it, and from doing anything which will repeat what the court has held in this litigation to have resulted in a wrong to the complaining states. **But if those states are about to receive, by act of Congress lawfully adopted under its paramount power to regulate commerce and control navigation or by the treaty, all of the benefit which the complaining states were seeking in this litigation, what emergency now confronts the court, even though the defendants, through causes beyond their control, have**

stopped doing those things for their own protection which will permit them safely to adjust themselves to the decree? Is there any emergency whatever to justify any extraordinary procedure?

The record shows clearly, and the Special Master so found, that the Sanitary District has stopped going forward with its construction program solely through lack of funds and as a result of causes beyond its control. The same is true as to the State of Illinois to any extent (even under the Master's theory), for which the state may be held responsible herein. There is, therefore, only an emergency for the protection of the citizens of Cook County. There are 4,000,000 people whose lives and health will be endangered, as this court has found, if the diversion be reduced below the danger point, as a result of the court's decree, in the absence of the completion of this program of artificial protection. But this emergency is not an emergency jeopardizing, for the reasons above pointed out, the receiving of the desired remedy by the complaining states. The lake levels will be restored in another way. Under these circumstances, instead of this record calling upon this court to grant extraordinary remedies of the utmost harshness in view of economic conditions and for the exercise of a power never heretofore seriously contemplated, the record demands a modification of the decree by postponement of the several dates for reducing diversion until the economic depression has abated, tax collections in Cook County have become normal and funds are available for the completion of the protective program.

II.

THE RECOMMENDATIONS OF THE SPFCIAL MASTER HEREIN FOR THE SUGGESTED EXTRAORDINARY REMEDIES UNDER PRESENT CONDITIONS ARE UNREASONABLE AND IMPRACTICAL. THEY COMPLETELY FAIL TO MEET THE REQUIREMENT OF THE COURT THAT HE SHOULD NOW SUGGEST FINANCIAL MEASURES ON THE PART OF THE SANITARY DISTRICT OR THE STATE OF ILLINOIS WHICH ARE REASONABLE. JUSTIFIABLE ONLY THROUGH WHAT THE SPECIAL MASTER DEEMED WAS A COMPELLING NECESSITY TO MEET AN EMERGENCY CALLING FOR SPEED, IN FACT THEY WOULD PRODUCE GREATER DELAY THAN IF NO FURTHER ORDER WERE ENTERED.

We shall only briefly discuss under this heading a few of the practical considerations which occur, and these comments are submitted on the assumption that the court deems it within its power to adopt the extraordinary procedure of first seeking to control the legislative discretion of the General Assembly of Illinois by its mandate and then in controlling such discretion to force the General Assembly of Illinois to disregard the Constitution of Illinois. We do not however admit this court's power can be carried so far.

As shown by the Master's Report, the General Assembly of Illinois is required by the State Constitution to adjourn on or before the first of July next, and customarily it adjourns about the middle of June in order to allow the Governor sufficient time to exercise his constitutional function of approving or disproving statutes adopted by the Legislature. Quite clearly, in view of the effects of the depression upon the financial condition of the State, the constant necessity for unemployment relief, and other matters suggested in the Master's Report, there is no likelihood of an adjournment by the General Assembly of Illinois this year until after this court will have concluded its sessions for the present term. The court, therefore, can not have its attention directed to any failure to comply with the suggested mandate recommended by the Special Master until it reconvenes in next October.

We assume that if at the beginning of the next October term the court's attention were directed to a failure on the part of the General Assembly of Illinois to comply with its mandate, the precedents heretofore followed in litigation of this kind will still prevail. The State of Illinois and its responsible officials will be allowed an opportunity to present relevant contentions before the Court. The usual and fair method of this legal procedure, which this court so strikingly demonstrated in the long drawn out controversy between Virginia and West Virginia, we assume will still prevail and further legal delays will therefore follow. The court will then finally confront the serious problem as to how its mandate may be enforced.

We assume the court will not read from this discussion any lack of respect upon the part of the State of Illinois to the dignity of this court, nor any suggestion of disloyalty by the State to the fundamental obligations of the Constitution of the United States. We find it very difficult to suggest to the court with sufficient emphasis and gravity a proper understanding of the facts, the practical difficulties which will confront the General Assembly and the Governor of Illinois, if the recommendations of the Special Master should be adopted. From the beginning Illinois has followed the procedure usual in this country of organizing government by leaving to local municipalities a wide discretion. Our State Constitution requires that the taxing power which may be delegated by the Legislature to local municipalities, must be given to corporate authorities and the Supreme Court of Illinois in interpreting this requirement has held that such corporate authorities must be elected by the people. (See *Wetherell* v. *Devine,* 116 Ill. 631, 635, 638.) Our Constitution in effect embodies to a marked degree the right and obligation of local self-determination or, as it is called in the politics of Illinois, the principle of home rule.

In furtherance of the most praiseworthy object of preserving the health of citizens in Cook County and to afford a means of meeting an acute and dangerous situation, in 1889 the Legislature of Illinois authorized by general statute the formation of a sanitary district and as a result the people of the Sanitary District of Chicago availed themselves of this privilege and by lawful election created the Sanitary District. This creation, therefore, was only in part the act of the State. This again illustrates the nature of the process of the erection of governmental structure determined by the people of Illinois for themselves by their Constitution and laws. From the beginning the Sanitary District has been locally autonomous except, and this the Special Master entirely failed to note, the Legislature eventually modified the original act by imposing upon the Sanitary District the legal obligation to create plants for the artificial treatment of sewage in substitution of the original program of diversion and did this at a date preceding the beginning of these cases.

State governments and institutions necessarily reflect the social and economic situation of the people in the State. Illinois has within Cook County more than 50 per cent of the people and a still greater percentage of the taxable wealth of the State. Inevitably the interests of the balance of the State and of Cook County do not always seem to their respective representatives in the

5

General Assembly identical. Whether such conflicts as have arisen in point of view be selfish or appropriate need not be considered, but this difference in attitude has served to keep alive and enforce to a marked degree the principle of local autonomy above referred to. It is not in Illinois a mere theoretical political doctrine, but is an ever present principle which comes into play and has an effect upon almost every proposition of state-wide importance.

This principle, as stated, has entirely controlled the growth, creation and conduct of the Sanitary District. *The recommendation of the Special Master is in effect that this court by mandatory injunction set aside this controlling constitutional principle and direct the General Assembly of Illinois completely to disregard it.*

In times such as the present the burden of local taxation is almost unbearable. Where in fact it has proved unbearable to such an extent in Cook County as to be the sole cause for this pending proceeding, it is peculiarly the obligation of each member of the General Assembly, an obligation reflected in constant and repeated demands of his constituents, to minimize and avoid any increase of tax burden. The mandate suggested by the Special Master in directing an issue of bonds by the State of Illinois would require the members of the General Assembly of Illinois from districts outside of Cook County to voluntarily assume, by their vote for the suggested statutes, the assumption of an additional tax burden. The Special Master suggests the possibility of postponement of the payment of these taxes and erroneously says (McClennan Report, p. 115):

> "The principal of the $35,000,000 need not affect the tax rate for some years to come if the General Assembly decide against early maturities."

This entirely overlooks the annual interest requirements which must be made from taxation, even if early maturities of principal be avoided.

These observations suggest only a few of the difficulties which the proposed mandate if entered by this court would impose upon members of the Illinois General Assembly.

By Article III of the Illinois Constitution, the powers of the government of the State are divided into three distinct departments—the legislative, executive and judicial—and it is specifically provided that no person or collection of persons being one of these departments may exercise any power properly belonging to either of the others, except as expressly directed or permitted by the Constitution.

Even if the present counsel for the State of Illinois possessed a definite and decided opinion as to how the General Assembly of Illinois would deal with the proposed mandate, clearly, under this constitutional provision, it does not lie within our authority to speak for the Legislature in advance of its consideration of this problem. We can only suggest here a few of the difficulties involved. We submit, however, that whether the possibility be remote or be a very practical and pressing consideration, this court in deciding upon whether it will adopt the unheard of recommendations of Special Master McClennen should, with propriety, seriously contemplate the possibility that the General Assembly of Illinois will not obey the mandate of this court.

There is also necessarily presented by the mandate recommended by the Special Master, the function of the Governor of Illinois in this connection. Section 16, Article V of the Constitution of the State of Illinois provides in part as follows:

> "Every bill passed by the General Assembly shall,

> before it becomes a law, be presented to the Governor. If he approve, he shall sign it, and thereupon it shall become a law; but if he do not approve, he shall return it, with his objections, to the house in which it shall have originated, which house shall enter the objections at large upon its journal and proceed to reconsider the bill. If then two-thirds of the members elected agree to pass the same, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered; and if approved by two-thirds of the members elected to that house, it shall become a law, notwithstanding the objections of the Governor; but in all such cases the vote of each house shall be determined by yeas and nays, to be entered upon the journal * * *
>
> Any bill which shall not be returned by the Governor within 10 days (Sundays excepted) after it shall have been presented to him, shall become a law in like manner, as if he shall have signed it, unless the General Assembly shall, by their adjournment, prevent its return, in which case it shall be filed with the objections in the Office of the Secretary of State, within 10 days after such adjournment, or become a law."

The Governor of Illinois, therefore, in this particular, as required by the Constitution, must exercise an essential part of the function of the enactment of statutes in determining whether or not to utilize his right and responsibility to veto bills he does not approve.

The mandate recommended by Special Master McClennen involves, therefore, the requirement that the proposed legislation when and if adopted by the General Assembly be submitted to the Governor after his approval. If he should disapprove, a two-thirds vote of the Legislature by yeas and nays recorded in the journal is required.

In effect, therefore, the proposed mandate would seek to control the legislative discretion of the General Assembly of Illinois and the legislative discretion of the

Governor of Illinois. Here again counsel for the State may not with propriety express any opinion as to the action the Governor may take under these possible circumstances. But even if the Legislature should deem it necessary to override every controlling political and constitutional principle which has for a century guided legislative action in the State, and to overlook self-interest, as well as the definite requirements of their constituents, the Governor still must meet his constitutional responsibility.

There was introduced in evidence before Special Master McClennen a few of the details in connection with the problem of unemployment relief in the State of Illinois. There is in evidence, before the court, reports of the State Commission dealing with this problem under state statute, and it is there stated that there are in Illinois, as shown by those reports, a total of 146,000 families dependent upon public funds for the bare necessities of life. As testified, for relief purposes a family is taken as constituting approximately 4⅓ persons. These people are entirely dependent upon public funds for the bare necessities of existence. With tax collections delinquent in Cook County, the source of more than 50 per cent of the tax revenue of the State, with estimated requirements to care for these people, as testified, exceeding eighty million dollars for the year 1933, the gravity of the problem, by these bare figures, stands revealed.

We print as an appendix to this brief in full the testimony of Governor Horner given in this proceeding. He said in dealing with this phase of the existing difficulties in Illinois:

> "Another great problem which confronts the State of Illinois at the present time is the unemployment relief. We are doing our utmost in this respect, but our financial capacity under existing conditions to meet bare necessities of human needs, seems utterly

insufficient. So far, we have been able to do so by the help of the federal government. The nature of this problem, the constant appeal which must be made to the legislature in this connection, makes it one which every person in official responsibility knows. Without regard to any other consideration, in my opinion, it must come first.

Approximately 800,000 persons throughout our state, by reason of widespread unemployment, have become entirely dependent upon private and public relief, and, of course, have enlisted the sympathetic interest and concern of both state and federal governments. At first, our efforts in Illinois were made to give aid through private subscriptions and agencies, and through local public charities. When those resources were exhausted, and they were shortly, every possible method was devised to meet the almost ghastly situation. Through the Illinois Emergency Relief Commission, with the aid of the Reconstruction Finance Corporation, public funds have been used to an almost fabulous extent. More than thirty odd million dollars have been furnished alone by the Reconstruction Finance Corporation.

Our relief representatives are now in Washington, seeking some six and one-half millions, or thereabouts, which, as I understand it, is the last moneys Illinois will be entitled to receive under the provisions of the present Reconstruction Finance Corporation fund. * * *

It is not difficult to imagine the possibility of bread riots, and like difficulties, in the large centers of this state, where relief is not available and unemployment still continues. * * *

With these difficulties facing the state entirely on the problem which deals so intensely with human sympathies, you can well imagine the insurmountable difficulties our state would have in carrying an additional burden resulting from asking the entire state to bear the cost of an obligation which the Supreme Court has fixed upon a limited locality in the state, such as the Sanitary District.

Of course, we cannot permit our fellow-citizens to starve, nor to deny them shelter, clothing and the mere sustenance of life. And, mind you, they are

> not those that are usually dependent upon charity; they represent hundreds of thousands of fine men and women, who are well and anxious to work, but who are so situated because of general unemployment. Notwithstanding what the record in this case may have implied, I cannot believe that the sister states of Illinois are willing to destroy entirely the hope of our state in our effort to extricate ourselves from our present catastrophe. * * *" (Tr., 1977-1980.)
>
> (NOTE: The numbers of those requiring relief given by Gov. Horner are actual, but as of a much later date than the reports above referred to.)

The sales tax referred to by the Governor has with difficulty, been passed and unless prevented from collection by pending litigation, it is anticipated that it will produce approximately fifty million dollars of revenue. By the statute the entire receipts of the tax are to be devoted to unemployment relief.

If $35,000,000 of bonds are to be voted under the mandate of this court by the General Assembly, and such legislative enactment approved by the Governor, the financial capacity of the State to meet these pressing and not to be exaggerated humanitarian necessities is limited to that extent. Under existing conditions it cannot be disputed that there is a very definite and fixed limit to that capacity. We shall discuss this further as it is our contention that under existing circumstances the state's credit is insufficient to make salable these bonds, even if they be authorized. But what we here stress is the nature of the choice which the facts of the matter would impose upon the members of the General Assembly and the Governor if the Master's recommendations be adopted. Humanitarian considerations, the necessity of caring for our own people must be given first consideration. This compelling necessity may well, if that be the choice, even come ahead of measures designed to prevent epidemics, disease and death. Even though the analysis made by the Special Master, who has ventured to assert that the Governor of Illinois, informed as he is, takes "too gloomy" a view of the situation, be correct, reaching a contrary conclusion cannot be a basis for criticism. Let the court assume for a minute that the members of the General Assembly and the Governor should honestly believe, if they should approve the bonds recommended, that they would in truth and in fact divert funds which otherwise would be unavailable for the care of persons, citizens of the State of Illinois, otherwise without relief. Such a conclusion is far from unlikely as demonstrated by the testimony in this record. We need say no more, we submit, to press upon the court's attention the practical necessity of now giving consideration to at least the possibility, if no more, that the responsible officers of the government of Illinois cannot meet the obligation the Special Master asks this Court to impose upon them.

We, therefore, ask the Court to assume for the sake of analyzing the situation that its mandate will not be followed. The Court must then adopt some procedure of enforcement. The Special Master himself rejected a suggestion of the complainant states that an officer of the Court be appointed for the purpose of carrying out the decree. He said (McClennen Report, p. 37):

> "The complainants urge that the Court should appoint a special officer of this Court to perform the decree on behalf of the State of Illinois and of the Sanitary District and at their expense, with extensive powers to contract, and to issue bonds of both and to levy and to collect taxes. The steps so urged are so inexpedient if not futile that they should not be taken, even if this Court has the power. This makes it unnecessary to decide whether the Court has this power. If I am in error, and the Court deems it should take the steps urged, a memorandum on the subject of power is included hereinafter for the convenience of the Court.

> There is no reason to think that if the State of Illinois is ordered to do this work, any more will be necessary, or that a commissioner would be any more effective than an order of this Court.
>
> The construction of the Controlling Works should be begun this year, if authorization can be obtained. For reasons given hereinafter, neither the State nor the Sanitary District now has available money for this purpose this year. A commissioner exercising all the powers of the General Assembly of Illinois and all the powers of the Sanitary District under the existing constitution and legislation cannot raise money this year for this particular purpose, until this Court has by its decree imposed a duty upon the State of Illinois to do this work. If the commissioner is to exercise direct powers of this Court superior to those of the Sanitary District and of the General Assembly to levy and to collect taxes and to issue bonds the necessary machinery cannot be set up in time. The commissioner would be received in Illinois as a carpet-bagger. He would need an army of subordinates to make the valuations, the assessments, and the collection of taxes from a reluctant people. His bonds would not find a ready market in Illinois and would be viewed with hesitation as a novelty elsewhere. He should not be vested with Governmental discretion by the Court for such a huge Governmental project. It would be a serious task for the Court to draft a code of laws to govern his operations. He would have to build up an engineering staff and to exercise a judgment as to what particular kinds of structures should be built and what methods should be used for their construction. These and many more considerations of impracticability condemn the method.''

These comments are pertinent observations upon the practical nature of the problem this court would confront in attempting to enforce this suggested decree.

Aside from the obvious difficulties so suggested, there are social and individual phases of the problem which, although suggested in argument to the Special Master, have not, we submit, received sufficient consideration.

The country at large and the State of Illinois peculiarly is suffering the effects of the depression. The minds of citizens are easily affected by any abnormal disturbance of the conditions we have become accustomed to in our daily life. We venture to suggest that grave consequences would follow any attempt by the Supreme Court through any agency whatsoever to take over the exercise of governmental authority in the State of Illinois for the purpose of carrying out this proposed decree.

These comments only suggest a few of the possible evils which might result from the adoption of Special Master McClennen's recommendations. The gravity of these possibilities should, we submit, be contrasted with the purpose to be achieved by these doubtful, harsh and impracticable remedies. We have not a situation where the State of Illinois is called upon to raise funds which can be utilized by other states for their benefit and from which use the State of Illinois or the Sanitary District has been wrongfully depriving such states. The decree herein in its essence enjoined the continuance of acts by a local municipality of Illinois, which resulted in injury to the complaining states by reducing the levels of the Great Lakes. The Court did not direct an immediate injunction, but postponed the performance of its injunction for one purpose only,—to prevent the evil results to the health and lives of 4,000,000 people, which the Court itself found would follow from an immediate shutting off of the diversion. The Court postponed performance in order to give the people affected an opportunity through expenditure of money in the creation of sewage disposal plants to protect themselves. The entire purpose of the Special Master's recommendations, therefore, is solely to force the people of Cook County or their fellow-citizens in Illinois to do certain things in order to accommodate for themselves the

Court's original requirements as to the date diversion should be stopped. The sole benefit to the complainant states is to be the ultimate restoration of lake levels following the cessation of diversion. We ask the Court to contrast the evils pointed out above with the ultimate benefit to the complainants—the addition of four inches of water on top of the vast surfaces of the Great Lakes. This result and this alone is the only result the complainant states are entitled to receive in this case.

When, as we have shown above, the remedy the complainants seek—the addition of this four inches of water—is to be provided for them by other agencies, the contrast between the relatively slight benefit to result from this remedy and the dangerous and, we submit, inequitable consequences to follow the proposed means to achieve this remedy becomes sharper. This contrast demonstrates that the Special Master's recommendations are unreasonable.

EVIDENCE IN THE RECORD DEMONSTRATES THAT DUE TO THE EFFECTS OF THE BUSINESS DEPRESSION THE STATE OF ILLINOIS DOES NOT POSSESS AT THE PRESENT TIME SUFFICIENTLY ASSURED FINANCIAL CAPACITY TO JUSTIFY THE ADOPTION OF THE SPECIAL MASTER'S RECOMMENDATIONS.

After an opportunity to examine the recommendations contained in the tentative report which, it should be mentioned, are those now before the Court, counsel for the State of Illinois sought and obtained an opportunity to present the facts as to the existing financial condition of the State. Although relevant to the inquiry before, this evidence had not been presented because of its obvious embarrassment to important and delicate problems then demanding attention. There was offered the testimony of Director of Finance Rice, an officer of the State at the head of the Financial Department of the State, and also the testimony of Gov. Henry Horner, which we print in full as an appendix hereto and respectfully urge the Court to consider and weigh most carefully.

The Director of Finance testified as did the Governor that immediately upon the Governer's taking office early in January, he directed an inquiry in the nature of a survey as close, however, in manner, form and thoroughness as possible to an audit, designed to reveal the financial status of Illinois.

The Special Master comments at pages 114 to 121 of his report upon this evidence. Many of his comments seem to us unjustified. The statement, for instance, that the bonds of the State have a high standing and are readily marketable, is clearly not justified by the present condition of the State. From this it appears that the State began the year 1933 with a cash deficit of slightly exceeding $8,000,000. It was testified by the Director of Finance that allowing for economies already affected of over $3,000,000, and estimating revenues upon what was definitely testified to be a somewhat optimistic basis, the State would have a cash deficit at the end of the year exceeding $15,000,000. The deficit in cash arose very largely from the inability to collect taxes in Cook County. These tax delinquencies had already necessitated inter-fund borrowings through the process of selling to funds tax anticipation warrants. The margin, as shown by the survey of the Director of Finance, based on the estimated revenue and necessities for expenditures as outlined, was the dangerously small amount of $3,707,000. The deficit of over $15,000,000 would have to be made by inter-fund borrowings. It is necessary to suggest that this process may be subject to interruption or entirely prevented by litigation. It is equally apparent that tax collections may not come in the amount estimated and recent figures of collections in Cook County indicate grave doubt as to the basis taken in preparing these figures.

5 Since bonds can only be issued as the result of a popular vote at a general election, and since under the law of Illinois the next General Election does not occur until November, 1934, the only means by which the State can finance itself, except by some new process of taxation, is the sale of tax anticipation warrants. These warrants are mere promises to pay out of tax collections when, as and if received. Interest is paid upon them but only at the time of payment of principal. These warrants are not held to be debts. They may be sold, however, if the credit of the State is good, and, to an even greater extent than bonds, their salability depends upon the way in which the bond market regards tax collections as reasonably certain within a reasonable period. Recent experiences in Illinois as set forth in the Master's Report indicate grave doubt as to whether the State could sell such warrants and certainly it could not sell them in any large amount.

The Master's approach to this situation is well illustrated by the following paragraph (p. 119 of his report):

> "If the cost of construction of the Controlling Works and of the Sewage Treatment Works, were to be met from the annual levies of the next four years, it would present the question whether the expenditures for other purposes must be cut or whether the levies must be increased or whether the State must take effective steps to overcome sluggish tax collecting in Cook County. It might then be necessary to weigh Road Improvements $29,745,000 against performance of duty by Sanitary Improvements $35,000,000. On the other hand, if this cost is to be met over twenty or more years in the payment of bonds issued now from time to time, for the money borrowed for this purpose, the current expected disbursements and receipts are less important."

When taxpayers have not funds available for tax collection and as a result their properties are sold or they have defaulted upon mortgages upon their homes, it is difficult to understand what further "effective steps" can be taken by the State "to overcome sluggish tax collecting in Cook County." When, as is such a matter of public information that this court can take judicial notice of it, the school teachers of Cook County have not been paid for many months, when firemen and policemen have their wages and salaries in arrears, when the bonds of the Sanitary District are in default and the bonds of Cook County are in default and the City of Chicago can not sell any more bonds, a situation of the utmost gravity is presented. The Court will remember that more than 50 per cent of the taxable property, consequently more than 50 per cent of the general property tax, is located in and collected from Cook County. The direct effect upon the revenues and financial condition of the State is apparent.

The Special Master in the above statement suggests that road improvements, an item of $29,745,000, should be weighed against his recommendation of an additional expenditure by the State of $35,000,000. It was specifically testified by the Director of Finance that actual improvements were contemplated in a much less amount than $29,000,000, in the total of which administration, maintenance, highway police, expense of collecting taxes and many other items were also included. It is also pertinent to observe that it was testified by the Director of Finance that contracts had been let prior to the beginning of the year in such a way as to be valid obligations of the State, calling for the use of most of the revenue in this item. There would be little, if any, available for any Sanitary District construction within the year 1933, even if the Legislature of the State should desire to go counter to what is now required by law to be expended for this purpose.

The Governor of the State testified:

> "I have no hesitancy in saying that, unless conditions rapidly and marvelously change for the better, the capacity of our State to find a market during each of the next four years for thirty-five millions of bonds, if such an unusual thing were required by the Court, is an impossibility. This would be so even without the other present and future financial necessities of the State."

The Director of Finance expressed the same opinion. This Court, therefore, is given the choice between the conclusion of the Special Master and the testimony given under oath of the two men, the responsible officials, whose character and capacity cannot be challenged. On the one hand is the Special Master of this Court, who, in a summary way, as directed by this Court, conducted this investigation. He was without knowledge of conditions in Illinois as is shown by many of his misconceptions as to the law of the State, upon which there is not in this brief adequate opportunity to comment. The problem presented involves intangibles which can only be properly appraised by long experience and close familiarity. These, the witnesses in question possess. The Special Master did not. There was no testimony whatever controverting their conclusions. We respectfully submit the Special Master's opinion on this point cannot be accepted.

It surely must be admitted whatever view may be taken of this issue of fact, an issue, however, not presented by conflict of testimony, that there is doubt and will continue to be doubt as to the financial capacity of the State of Illinois to carry out the program of money-raising recommended by the Special Master. If the depression rapidly diminishes, this program might be carried out. If it long continues or becomes worse, it clearly cannot be carried out. This, we confidently assert.

We respectfully suggest that this doubt—what we believe is no doubt but a certainty—as to the incapacity of the State to issue and market bonds in the required amounts, is a most important factor to which this Court must give serious consideration.

As we have pointed out above, the estimated requirements for unemployment relief for the year 1933 in the State of Illinois, an official and considered estimated amount which is not challenged in the slightest by any evidence in this record, is the staggering total of $80,000,000.00. We have further shown, and here again the testimony is unchallenged, that the revenue to be derived from the recently adopted sales tax, all of which is to be devoted to relief, is $50,000,000.00. The State of Illinois, therefore, has been unable so far to provide by the amount of $30,000,000.00 the estimated requirements for unemployment relief. These are the facts, undisputed, shown by this record. Is this Court to assume that the State has easily available resources which can be devoted, through the sale of bonds, to unemployment relief, which have not been exhausted in the face of these compelling necessities? The conclusion of the Special Master that bonds in the sum of $35,000,000.00 could be readily sold by the State is clearly contradicted by these facts.

III.

THIS LITIGATION HAS HERETOFORE PROCEEDED WITH A COMPLETE ACQUIESCENCE BY THE COURT AND OPPOSING COUNSEL IN THE FACT THAT THE SANITARY DISTRICT IS THE RESPONSIBLE DEFENDANT AND PROPERLY CHARGEABLE WITH PERFORMANCE OF THE REQUIREMENTS, DIRECT OR IMPLIED, OF THE DECREE HEREIN. NO ISSUE HAS HERETOFORE BEEN PRESSED OR ADEQUATELY DECIDED INVOLVING A COMPLETE DETERMINATION OF THE LEGAL LIABILITY OF THE STATE OF ILLINOIS. THE SPECIAL MASTER'S RECOMMENDATIONS ARE BASED UPON AN ASSUMPTION AS TO THE DECISION OF SUCH ISSUE AND ARE, THEREFORE, PREMATURE.

We assume it will be unnecessary to cite to the court the now numerous decisions in which the court has exercized its extraordinary jurisdiction to settle controversies between states. In all of those cases, we respectfully suggest, the utmost deference is shown to the rights of the sovereign states defendants therein. In none of them is there any summary disposition of the determination of the liability, its nature and extent, of the defendant state.

In these cases the State of Illinois is made a defendant to bills in equity seeking an injunction to stop acts claimed to result in a nuisance. Since the active defendant—The Sanitary District of Chicago—is a municipal corporation of the State and in some ways subject to the control of the General Assembly of Illinois, with propriety the State was made defendant in order that the injunction sought should afford complete protection, if granted, against acts resulting in nuisance whether performed by the Sanitary District, the actual defendant, or by any other person or agency within the territory of the limits of the State.

The State of Illinois has not heretofore sought to object to its having been joined with the Sanitary District as defendant *for this purpose.* It does not now so object.

The Special Master's recommendations, however, submitted by him in response to the question of the Court as to what are the reasonable financial measures necessary in order to carry out the decree of the Court to be undertaken on the part of the Sanitary District or the State of Illinois seem to us, with the utmost deference, to involve the consideration of an issue not heretofore made or presented, nor heretofore considered.

In view of the nature of the Court's question, as is apparent throughout his report, the Special Master has assumed this issue has been decided—the issue as to the exact nature and extent of financial and legal liability of the State of Illinois as separate and distinct from the liability of the Sanitary District. For instance at page 44 of his report, Special Master McClennen says:

> "The record ending in the final decree of April 21, 1930, shows that the wrong was done and is being done by the State. This has become *res adjudicata.* The postponement of the remedy did not make the continued diversion less of a wrong."

And, in support, the Special Master quotes a number of expressions from the Court's opinions in this case and from the different Master's reports. But whatever the language used, these expressions were realistic in their approach to the question presented. The entire case has been heretofore presented and discussed with a complete recognition of and acquiescence in the existing structure of government in Illinois. Under this the Sanitary District is a separate municipal corporation empowered, it is true, in part by act of the Legislature, but, and this should not be overlooked, essentially empowered by the vote of the people of the District. This corporation has possessed ample financial capacity in the right to levy taxes and issue bonds, to enable it, as previously expressly found by the Special Master on re-reference, to accomplish those measures of self-protection needed to adjust the injunction allowed against the acts creating nuisance to proper protection of the health and lives of the people of the District. *Whatever language has been used, we insist that no particular consideration, no determination as of a separate and distinct issue, has been made in this proceeding up to this point as to the exact nature of the legal liability of the State of Illinois for the acts of the Sanitary District.*

Special Master McClennen may have been justified in regarding this issue as previously decided, in view of the nature of the Court's direction to him. Whatever the fact be, however, we point to the rights of sovereign states as asserted by this Court in numerous proceedings and suggest that any such conclusion is premature until this issue has been given the separate, distinct and careful consideration a sovereign state is entitled to ask at the hands of this Court.

This is not a mere technical assertion made for purposes of delay, but one of fundamental right.

In order that the Court may see that there are factors bearing upon this issue which have not received adequate consideration, we shall briefly analyze the history of the state's actions in the premises and discuss the nature of its constitutional limitations. We will show that what Illinois did in bringing into existence the Sanitary District and giving it the powers embodied in the Act of 1899 was fully within the then existing lawful authority and power of the State of Illinois; that Congress, by the exercise of paramount authority, later adopted regulations affecting the acts of the Sanitary District and no further action was thereby rendered necessary by the State of Illinois to control such acts of the District as have been found by this Court to have produced an actionable nuisance. We will further show that the nature of the decision herein when analyzed demonstrates the rights of the State of Illinois have not been adjudicated.

A.

IN AUTHORIZING THE CREATION OF THE SANITARY DISTRICT OF CHICAGO IN 1889 THE STATE OF ILLINOIS PROCEEDED COMPLETELY WTHIN THE LIMITS OF ITS LAWFUL ANTHORITY, NOT ONLY AS CONCERNS DOMESTIC MATTERS BUT TO THE EXTENT THIS ACTION INVOLVED INTERSTATE COMMERCE OR AFFECTED THE RIGHTS OF THE COMPLAINANT STATES HEREIN.

As found by the Special Master in his first report in these cases, the Sanitary District was created under an act of Illinois authorizing the creation of the type of district therein provided for by vote of the people within the proposed district, primarily for the purpose of solving the sewage problem in the City of Chicago, but secondarily for the purpose of creating an artificial navigable channel, the water in which should be derived by diversion from Lake Michgan. No one, so far as any of the findings in the two reports of the Special Master in this case or the opinions of the court show, had ever suggested or foreseen that the diversion of water from Lake Michigan, in the amount contemplated by the permissive act of the State Legislature of Illinois, could have such an effect upon the lake levels as would either interfere with interstate commerce or produce injury to neighboring states. At that time Congress had not exercised its power under the commerce clause of the Constitution to regulate by any general enactment the alteration of the navigable capacity of navigable waters of the United States. Clearly, so far as interstate commerce is concerned therefore, under recognized doctrine, in the absence of an occupation of the field by Congress, a state, acting as to domestic matters, could lawfully affect such a portion of the field of interstate commerce.

The first congressional enactment in this field occurred in provisions of the Rivers and Harbors Act of September 19, 1890. Section 10 of the Act began as follows:

> "SECTION 10. That the creation of any obstruction not affirmatively authorized by law, to the navigable capacity of any waters, in respect of which the United States has jurisdiction, is hereby prohibited * * *."

This act in other provisions authorized and directed the Secretary of War to issue permits for certain kinds of obstructions to navigation, which, on the same theory of interpretation subsequently applied to the analogous Act of 1899, gave in effect to the Secretary of War power to permit and authorize reasonable obstructions to navigation.

The Sanitary District of Chicago was created pursuant to the permission in the act of the Illinois Legislature above referred to by vote of the people of the district, and the canal was constructed very largely after the adoption by Congress of the act of 1890.

In the case of *United States* v. *Bellingham Bay Boom Company*, 176 U. S. 211 the words in the portion of Section 10 in the Act of 1890 above quoted, "affirmatively authorized by law," were held to be satisfied with regard to obstructions to navigation authorized by the authorisation of a state. So far as any possible effect upon interstate commerce was involved, therefore, the State of Illinois proceeded fully within its lawful and constitutional powers as long as the act of 1890 remained in force and effect, in permitting the creation of the Sanitary District of Chicago.

On March 3, 1899, the Rivers and Harbors Act of that year became effective, and by Section 10 of that act it was provided:

> "That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; * * *"

This act became effective a few months before the connection between the then constructed artificial channel of the Sanitary District and the Chicago River was made, as the result of which connection water first became diverted from Lake Michigan. In exercising its power under the commerce clause to fully regulate this phase of interstate commerce, Congress necessarily imposed a paramount limitation upon the regulations theretofore adopted by the states, but the regulation, when adopted by Congress, did not have the effect of declaring void and unlawful what the State had done, but merely imposed an additional requirement which had to be complied with. As is shown by the first report of the Special Master, the Sanitary District promptly applied for a permit under the provisions of Section 10 of the Act of 1899 to authorize the diversion it desired and this was issued. The limitations of this permit were exceeded by some 200 cubic feet per second in 1903, thereafter remaining within the permit allowance until the year 1907 (Special Master's first report, p. 22).

The regulation of this subject matter by Congress under the provisions of the Act of 1899 here referred to was self-executing, and in the hands of federal officials, and as subsequently occurred was in fact enforced upon the Sanitary District. At no time during this period of enforcement was it ever suggested that any legislation from the State of Illinois was needed to make effective such enforcement. It is true that the Sanitary District in good faith resisted the enforcement. The first opinion of the court in this case indicates the legal questions which necessarily arose in interpreting the confusing and complicated language employed by Congress in the act of 1899, and the right of the Sanitary District to present its legitimate contentions as to the meaning and effect of that statute in the courts of the United States cannot be challenged or denied. Certainly there devolved upon the State of Illinois no duty with which we are familiar to control or limit the assertion of such right.

In proceeding as it did in authorizing the creation of the Sanitary District, the State of Illinois did not exceed its powers insofar as the rights of the complaining states were involved.

As a matter of fact there is no basis for any claim on the record in this case that the State was advised in 1889 that diversion in the amount contemplated by the state's statute could produce injury to the rights of the complainant states. Although not referred to in detail in the first report of the Special Master, there was introduced in evidence before him a report of a Board of United States Engineers in 1895 which, so far as we are advised, raised for the first time a question as to the effect of the contemplated diversion upon the levels of the Great Lakes. The act only contemplated a 10,000 second foot diversion when the population of the Sanitary District should be 3,000,000 and in 1900 the population only slightly exceeded half of that figure and was, of course, materially less in 1890 when the statute was adopted.

Without seeking to examine the extent to which the Supreme Court, through the exercise of its jurisdiction to settle controversies between states, had established in 1889 any rule for the apportionment of the waters of interstate streams, the rule has since that time become clearly settled. Since this case was decided on the merits, the Supreme Court in the case of *Connecticut* v. *Massachusetts,* 282 U. S. 660 has said (p. 670):

> "The determination of the relative rights of contending states in respect to the use of streams flowing through them does not depend upon the same considerations and is not governed by the same rules of law that are applied in such states for the solution of similar questions of private right. * * * It seems that the principles of right and equity shall be applied having regard to the 'equal level or plane on which all the states stand, in point of power and right, under our constitutional system,' and that, upon a consideration of the pertinent laws of the contending states and all other relevant facts, this court will determine what is an equitable apportionment of the use of such waters."

Again in the still later case of *New Jersey* v. *New York,* 283 U. S. 336, the court said (page 343):

> "The different traditions and practices in different parts of the country may lead to varying results but the effort always is to secure an equitable apportionment without quibbling over formulas."

And again in the same opinion at the same page the court said:

> "The removal of water to a different watershed obviously must be allowed at times unless states are to be deprived of the most beneficial use on formal grounds. In fact it has been allowed repeatedly and has been practiced by the states concerned."

The State of Illinois, therefore, could to some extent utilize the waters of Lake Michigan. It was entitled to an "equitable apportionment" of these waters. If it exceeded a fair use, it would be subject to control through the power of this court, but in authorizing a diversion, even of great magnitude, the State proceeded within its lawful authority, subject, however, to the exercise of the controlling power of this court to prevent, through the use of such authority, an unreasonable injury to neighboring states.

These are the rights of the State of Illinois if it be regarded as the active defendant in the litigation and primarily responsible and also if the rule invariably adopted by this Court in all other the cases be applied to Illinois.

Is the decision heretofore made in this case inconsistent with this assertion of right?

The Special Master in his first report held that the Sanitary District was justified in the actions complained of because a permit had been issued to it covering such acts by the Secretary of War under Section 10 of the Act of 1899. *We call the Court's attention to the fact that this permit was issued to the Sanitary District and not to the State of Illinois.* This Court refused to follow the recommendation of that report. It held the permit was justified because of an emergency condition created by the wrongful acts of the Sanitary District. The Court said (Opinion Chief Justice Taft, *Wisconsin* v. *Illinois*, 278 U. S. at 420):

> "It, therefore, is the duty of this Court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis and thus to restore the navigable capacity of Lake Michigan to its proper levels."

The Court's definition of what would be a legal basis for subsequent diversion by the Sanitary District is clearly and definitely shown in the preceding sentence in which the Court says:

> "And in so far as the prior diversion was not for purposes of maintaining navigation in the Chicago

> River, it was without any legal basis because made for an inadmissible purpose."

The direction to the Special Master for the rereference which followed, is indicated in the following concluding expressions from this opinion (278) U. S. at 421):

> "Though the restoration of just rights to the complainants will be gradual instead of immediate, it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project. * * *
>
> "To determine the practical measures needed to effect the object just stated and the period required for their completion, there will be need for the examination of experts; and the appropriate provisions of the necessary decree will require careful consideration. For this reason the case will be again referred to the Master for a further examination into the questions indicated."

Beyond question the Court was dealing solely with the Sanitary District and with the diversion permitted under the permit of the Secretary of War to the Sanitary District, but particularly with the necessity resting upon the Sanitary District of eliminating the emergency which was held within the law temporarily to justify the Secretary of War's permit.

If the Court had been dealing with the State of Illinois as the active defendant, we see no reason for the application to the State of any different or other rule than the usual and invariably rule heretofore adopted in all other similar cases—the doctrine of equitable apportionment. The rule is not discussed in the opinion and no reason for its not being applied is given.

As is clearly shown by the quotations from the opinion above, the case was not considered as one to which this doctrine applied. This is definitely shown by the following quotation from the brief (pp. 177-179) filed before the Court on the first report of the Special Master on behalf of the defendants, Illinois and the Sanitary District of Chicago:

"VI.

"DEFENDANTS DO NOT ABANDON, AND UNDERSTAND THAT THEY DO NOT LOSE THE OPPORTUNITY, IF THE OCCASION ARISES, LATER TO PRESS, CERTAIN DEFENSES WHICH ARE NOT ARGUED HERE BECAUSE THEY ARE NOT MATERIAL TO SUPPORT THE FINDINGS AND CONCLUSIONS OF THE SPECIAL MASTER.

"The Master has rested the determination of this case on his interpretation of Section 10 of the Act of March 3, 1899, that this statute reposes in the Secretary of War the absolute discretion to authorize defendants' acts as not constituting such an obstruction to the navigable waters of the United States as is inhibited by the statute, and has therefore found it unnecessary to consider the contentions made before him by complainants and now repeated in their briefs:

(a) That the permit of the Secretary of War was permissive merely, and that, therefore, the court should consider the mutual obligations and duties as between complainants and defendants, and, on a sort of modified doctrine of the case of *Cummings* v. *Chicago,* 188 U. S. 410, should conclude that whatever may be the authorization defendants hold from the *United States,* yet as *against complainants* the diversion would be unlawful if the effect of it in any way impairs any rights of complainant states.

(b) That the governing law of this case is the doctrine of riparian rights at common law, and, therefore, if defendants, in any degree diminish the flow of waters to complainants, as lower riparian owners, a cause of action accrues to complainants regardless of the permit of the Secretary of War.

(c) That in this view, whatever authorization may be found in the permit of March 3, 1925, it has no effect on rights and duties as between complainants and defendants, and that, therefore, regardless of the permit, the court is put to the determination of the relative rights of quasi-sovereign states as between each other.

"On this aspect of the case, defendants contended—

(a) That the governing rule in international law as between sovereign states is that there is no servitude in an upper riparian state in favor of a lower state, and that the various treaties creating limited servitude in this regard represent concessions as matters of comity.

(b) That under the doctrine of *Kansas* v. *Colorado,* this court will require such comity as between the quasi-sovereign states of the Union.

(c) That what will thus be required is not, however, an application of the common law of riparian rights, but a fair division of benefits and burdens and as an example that, in *Kansas* v. *Colorado,* although Colorado was taking practically the entire low water flow of the river, and this taking seriously impaired agriculture in the western tier of Kansas counties, yet the court, considering the great benefit to Colorado and the *relatively* small burden to the Arkansas Valley in the State of Kansas, balanced the equities and denied the relief.

(d) That similar consideration should govern here and, regarding the relatively small damage to complainants, and the economic catastrophe to defendants certain to result from injunction, the court should here also deny relief.

"Defendants also showed and urged that the acquiescence of complainants for over a quarter of a century while the great complex sewage, water and electrical system of Chicago was created around and in reliance on this diversion was a bar to the relief sought. Many cases in American and English law were cited in support of this contention.

"Defendants also showed the impairment of these waters for navigation by complainants and the Dominion of Canada chiefly by pollution, but also by

> diversions. Defendants also demonstrated that economic requirements of a rapidly expanding population in all states littoral of the lakes had resulted in many artificial changes in terrain and surface covering that had greatly and adversely affected the levels of the lake. On this basis, defendants advanced the defense of unclean hands.''

If Illinois is to be regarded as the principal defendant in this case, we respectfully point out that its rights have not been fully determined or decided in anything that has heretofore occurred. The doctrine of equitable apportionment has not been applied as between the complaining states and the State of Illinois.

The Court will bear in mind that defendants are not taking water which otherwise the complaining states would take. They have all of the water they need or require or seek to use. The complaining states are damaged solely by an effect produced by the Chicago taking, upon the levels of the Great Lakes. As between sovereign states of the United States standing, as this Court has so sedulously asserted in all of these cases, upon a plane of equality, before the rights of the sovereign state of Illinois are to be foreclosed, this Court should apply here, as it has in all other cases, the process of determining what is a fair and equitable apportionment of the waters of this great interstate stream. In every other case the rule of the common law which would deny any taking to the upper riparian states has not been applied. Some taking, in each case definitely measured to a large extent by the requirements of the upper riparian state, has been allowed.

We assert with all due deference that before a financial or other obligation may be imposed upon the State of Illinois as distinguished from the Sanitary District of Chicago, the actual extent of wrong claimed to be perpetrated by the State must be measured in accordance with the judicial process applied by this Court in all other cases. *Illinois as a sovereign state can only be regarded as wrongfully taking water when the taking is in excess of the share which a fair and considered judicial determination allots to it under the doctrine of equitable apportionment, and no such determination has taken place in these proceedings.*

We also assert that insofar as any limitation imposed by the power of Congress to regulate commerce is concerned, the State of Illinois proceeded lawfully in bringing about the existence of the Sanitary District of Chicago and likewise did not exceed its authority in law insofar as the rights of the complainant states were concerned. Since subsequently Congress enacted comprehensive legislation regulating the entire subject matter, no further action was required from the State to direct this municipal corporation, its creature, to comply with the Act of Congress. That law applied directly to the municipality and needed no authority for such application from the State of Illinois.

There are no later enactments of the Legislature of Illinois upon which can be based any assertion of such action by the State as might lead to a claim of injury under the circumstances here to the complaining states.

In 1903 by the Act of May 14th (session laws of Illinois, 1903, p. 92) referred to in the Special Master's first report at p. 19, the Legislature of Illinois extended the corporate limits of the Sanitary District of Chicago to include the Calumet Sag Channel and authorized a diversion from Lake Michigan through this channel, to be included, however, within the original authority. As we have pointed out above, at that time the Sanitary District was in fact complying with the federal regulation, and although at the end of 1903 it had exceeded the permitted average for the year by some 200 c. f. s. it remained within the permit allowance until the end of 1907. Obviously the Legislature of Illinois in adopting the Act of 1903 had no occasion to assume that any violation of federal regulation was either required or contemplated, particularly in view of the fact that the Act of Congress permitted the federal requirements to be changed from time to time as occasion might demand.

Certain acts of the Legislature of Illinois to which reference has been made upon the hearing before the present Special Master include a number of enactments, either increasing the tax rate of the District or authorizing the issuance of bonds without referendum, all clearly adopted for the purpose of facilitating the construction program needed to permit compliance with the decree in this case. We assume no contention will be based upon these enactments, that as a result thereof the State of Illinois became responsible for any alleged injury to the complaining states.

Our position, therefore, is that what Illinois did by legislative act in authorizing the creation of the Sanitary District was lawfully within its constitutional power and within its right insofar as its obligation to sister states was concerned. In view of the fact that the acts of its municipal corporation, the Sanitary District, were subject to comprehensive regulation by Congress, designed to protect the rights of the complainant states in this proceeding, we likewise urge that Illinois cannot be criticized for any failure by its own Legislature to so limit the powers of the Sanitary District as to compel the latter to avoid the possibility of injury either to commerce or the rights of the complainant states.

B.

UNDER THE LIMITATIONS OF THE CONSTITUTION OF THE STATE OF ILLINOIS THE STATE HAS DONE EVERYTHING IT CAN DO OR COULD BE REQUIRED TO DO TO FACILITATE THE CARRYING OUT OF THE DECREE IN THIS CASE.

In the first place, it should be noted that there are not here involved any constitutional provisions which were adopted after the date of the creation of the Sanitary District in 1889. There was an amendment to the Constitution in 1908 dealing with the Illinois waterway which was adopted by popular vote and authorized a $20,000,000.00 bond issue for the construction of the waterway. This is not involved in the discussion here. It is plain, therefore, there is no basis for any suggestion that Illinois has so modified its constitutional limitations as to warrant any claim that by such constitutional change the State has attempted to avoid the carrying out of the decree in this case or to prevent its full capacity being so exerted.

The provisions of the Illinois Constitution which impose definite limitations upon the capacity of the State to expend its own funds or in any way incur obligations to carry out the duty of the Sanitary District of Chicago or to issue bonds or impose a State tax for such purposes, are as follows:

Section 18 of Article IV provides in part as follows:

> "* * * the State may, to meet casual deficits or failures in revenues, contract debts, never to exceed in the aggregate $250,000.00; and moneys thus borrowed shall be applied to the purpose for which they were obtained, or to pay the debt thus created and to no other purpose; *and no other debt, except for the purpose of repelling invasion, suppressing insurrection, or defending the State in war (for payment of which the faith of the State shall be*

> *pledged), shall be contracted unless the law authorizing the same shall, at the general election, have been submitted to the people,* and have received a majority of the votes cast for members of the General Assembly at such election. The General Assembly shall provide for publication of said law, for three months, at least, before the vote of the people shall be taken upon the same; and provision shall be made at the time for the payment of the interest annually, as it shall accrue, by a tax levied for the purpose, or from other sources of revenue; which law, providing for the payment of such interest by such tax, shall be irrepealable until such debt be paid: *and, provided further,* that the law levying the tax shall be submitted to the people with the law authorizing the debt to be contracted." (Italics ours.)

Section 20 of Article IV reads in full as follows:

> "The State shall never pay, assume, or become responsible for the debts or liabilities of, or in any manner give, loan or extend its credit to, or in aid of, *any public* or other corporation, association or individual." (Italics ours.)

Section 8 of Article IX (Revenue) reads in full as follows:

> "County authorities shall never assess taxes, the aggregate of which shall exceed 75c per $100 valuation, except for the payment of indebtedness existing at the adoption of this Constitution, unless authorized by the vote of the people of the county."

Section 9 of Article IX reads in full as follows:

> "The General Assembly may vest the corporate authorities of cities, towns and villages with power to make local improvements by special assessment or by special taxation of contiguous property, or otherwise. For all other corporate purposes, all municipal corporations may be vested with authority to assess and collect taxes; but such taxes shall be uniform in respect to persons and property within the jurisdiction of the body imposing the same."

Section 10 of Article IX reads in full as follows:

> "The General Assembly shall not impose taxes

> upon municipal corporations, or the inhabitants or property thereof, for corporate purposes, but shall require that all the taxable property within the limits of municipal corporations shall be taxed for the payment of debts contracted under authority of law, such taxes to be uniform in respect to persons and property, within the jurisdiction of the body imposing the same. Private property shall not be liable to be taken or sold for payment of the corporate debts of a municipal corporation."

Under the provisions of Sections 18 and 20 of Article IV above quoted as construed by the courts of Illinois, the General Assembly cannot authorize the assumption by the State of the debt of a municipal corporation of the State, lend the credit of the State to such municipality nor in anywise pay or assume such debts. And the General Assembly cannot even of its own act authorize any indebtedness for any purpose without a majority vote of the people at a general election.

In *Fergus* v. *Brady,* 277 Ill. 272, at page 278, the Supreme Court of Illinois says:

> "These provisions of the constitution and statute are clear and unambiguous in terms and their purpose and object can not be misunderstood. Section 18 prohibits appropriations in excess of the revenue authorized by law to be raised in the period for which appropriations are made, but necessarily revenue, whether derived from one source or another in the future, must always be estimated and never can be a fixed and certain sum. Circumstances may occur that will cause the reasonable expectations of the General Assembly as to the amount of revenue to miscarry or not to be fulfilled, so that there may be a temporary deficiency. To meet that condition which may arise from failure in making collections of taxes or result from decreased revenue from other sources, the section provides that in case of failure of revenue the General Assembly may contract debts, never to exceed $250,000. This debt is only to be created by borrowing money,—not by incurring debts or making contracts,—since the sec-

> tion requires that the moneys thus borrowed shall be applied to the purpose for which they were obtained or to pay the debt thus created, and to no other purpose. No other debt can be contracted, except for the purpose of repelling invasion, suppressing insurrection or defending the State in war, except upon a vote of the people at a general election."

In the case of *Madison County* v. *The People, ex rel.* 58 Ill. 456, the court construed a provision of the prior constitution of Illinois, adopted in 1848, which preceded the present constitution (Section 38, Article III), which declared:

> "The credit of the State shall not, in any manner, be given to, or in aid of, any individual, association or corporation."

This language is less definite in its terms than the provisions of Section 20 which practically repeats the earlier provision but uses the expression "any public or other corporation, association, or individual". The particular act in question in the Madison County case was not held to violate the constitutional provision, but the court clearly indicates that under that provision there would be a limitation upon the State's using its credit in aid of a county. The court said:

> "The first question thus presented, is, whether there is any warrant in the constitution of 1848, for the legislation under which this subscription was made. The first portion of that instrument, referred to as being violated, is the 38th sec. Art. 3, which declares, 'The credit of the State shall not, in any manner, be given to, or in aid of, any individual, association or corporation.' It will be perceived that this law does not purport to give the State's credit to this company, but simply to authorize a small district of the county to give its credit and aid to the corporation. It neither gives directly nor indirectly, money from the treasury, or bonds, or property of the State, to this road. We fail to see that this section has any bearing on the validity of the law under consideration. The State in nowise became

> liable for the payment of the county bonds or the interest thereon, but leaves the persons and property of the district liable for their payment."

In the case of *Wetherell* v. *Devine,* 116 Ill. 631, decided in 1886, the court construed Sections 9 and 10 of Article IX of the Constitution of Illinois, above quoted. The court said:

> "These sections in the constitution of 1870, or a similar section in the constitution of 1848, have been frequently construed by this court, and by the Supreme Court of the United States. *Updike* v. *Wright,* 81 Ill. 49, and cases there cited; *Weightman* v. *Clark,* 103 U. S. 256; *County of Livingston* v. *Darlington,* 101 id. 407; *Hackett* v. *Ottawa,* 99 id. 86; *Township of Elmwood* v. *Marcy,* 92 id. 289; *Cornell* v. *The People,* 107 Ill. 372. The decisions in these cases law down three propositions, as clearly deducible from the sections here quoted: First, the General Assembly can not grant the right to assess and collect taxes to any other than the corporate authorities of the municipalities or districts to be taxed; second, taxation by such municipal or corporate authorities must be for corporate purposes; and third, such taxation can not be imposed without the consent of the taxpayers to be affected.
>
> "The expenses incurred by the election commissioners, which the city is required to pay, are for office rent, clerk hire, stationery, printing, books, registers, poll lists, blanks, ballots, ballot-boxes, etc. These expenses are *incurred* by the election commissioners. They are *audited* by the county judge, and warrants for them are drawn by the county judge, but it is 'the governing authority' of the city, which is intrusted with the duty of *providing for their payment.* (Art. 7, sec. 277.) The assessment and collection of taxes for the payment of these expenses are not taken out of the hands of the corporate authorities of the city, but are expressly left with those authorities.
>
> "But it may be said that the power to impose a tax, and the power to create a debt to be discharged by the levy of a tax, are substantially the same thing, and that, therefore, the election commission-

> ers who incur these expenses, and thereby create the debt to be discharged by taxation, are the authorities, who impose the tax. If this be so, then the question arises, who are the 'corporate authorities,' referred to in the constitution? We have defined them to be those authorities, who are either directly elected by the population to be taxed, or appointed in some mode, to which they have given their assent. (*Harward* v. *St. Clair Drain. Co.* 51 Ill. 130; *Hessler* v. *Drainage Comrs.* 53 id. 105; *Cornell* v. *The People, supra.*)"

These decisions are definite interpretations of the constitutional provisions in question. We assume in this proceeding the ordinary rule of the Supreme Court of the United States will be followed and that the court will be bound by the interpretation placed upon the Constitution of Illinois by its Supreme Court.

It is thus apparent that the Legislature of Illinois in authorizing the creation of the Sanitary District of Chicago complied with these provisions, particularly Section 9 of Article IX above, in providing that only by an election of the people within the district could the district come into existence. In effect this allowed the people of the district to decide whether to authorize and create the "corporate authorities" of the district. The taxing power of the district must be exercised by those authorities and cannot be exercised by the Legislature of Illinois.

The Legislature could authorize the Sanitary District to impose taxes at a higher rate than those now imposed but in the face of existing circumstances, particularly the inability at present to collect present taxes, the wisdom of not having authorized an increase in the district's tax rate is apparent. There has been no claim or suggestion so far as we are advised in this case, that taxes in sufficient amounts have not been levied by the district and we assume there will be no claim made of any possible failure on the part of the Legislature of Illinois to amply provide a sufficient use of the taxing power within the district to be exercised as is required by the above provision of the constitution by the corporate authorities for carrying out the provisions of the decree in this case.

Under the constitutional provisions above the Legislature of Illinois could not itself incur or create a State debt and even if it were to submit the creation of such a debt to referendum vote of the people, it would not have authority to submit to popular vote the creation of a debt for the purpose of the Sanitary District of Chicago. So far as finances are concerned, therefore, the Legislature of Illinois has no power in the premises.

It seems to us idle speculation to suggest that the Legislature might at some period in the past have limited the powers of the Sanitary District in reference to the diversion or in reference to a more mandatory requirement compelling compliance by the district with regulation to the federal government. Even if it be assumed that some obligation along this line rested upon the Legislature of Illinois, we know of no way under which the performance of such an obligation could be enforced. Article 3 of the constitution of Illinois reads as follows:

> "The powers of the government of this State are divided into three distinct departments—the legislative, executive and judicial; and no person, or collection of persons, being one of these departments shall exercise any power properly belonging to either of the others, except as hereinafter expressly directed or permitted."

The doctrine therein set forth of the strict division of powers is universally followed by the courts of Illinois. Even did this not exist, it has always been a rule of government in the United States that the judicial department cannot control the exercise of legislative discretion.

There is no power, therefore, in the courts of Illinois to interfere with, control or force an exercise of discretion by the Legislature of the State in dealing with the problems of the Sanitary District of Chicago and that lack of power results from specific limitations in the constitution of the State. Even if it be assumed that the Supreme Court of the United States in this proceeding might define some obligation resting upon the Legislature of Illinois not performed, if that court should seek by judicial process to compel such performance, it would be violating the fundamental laws of the State and would be exercising a power which the courts of the State clearly could not use.

We have pointed out above very briefly, first, the history of the acts of the State of Illinois, particularly some of those facts which have never received separate consideration at the hands of this Court, indicating clearly, as we contend, that the State proceeded within its full right and power in authorizing the creation of the Sanitary District. We have shown by an analysis of the decision herein that the sovereign rights of the State of Illinois have never been considered nor decided, and that under settled rules of this court the State is entitled to have made an equitable apportionment of the waters of Lake Michigan before any of its acts can be held to be unlawful. We have also pointed out the essential limitations adopted by the people of Illinois embodied in their Constitution, all of which were in existence long prior to any of the circumstances leading to this litigation. We respectfully suggest that this Court should not now assume the existence of a legal liability on the part of the State of Illinois. We ask on behalf of the State the customary consideration before separate and distinct liability be imposed upon it.

The recommendations of the Special Master in effect changed these proceedings from bills in equity seeking injunctions to legal actions seeking to collect a money judgment.

This is well suggested by the following statement of Special Master McClennan (McClennen Report, p. 44):

> "If, instead of this injunction, this Court had deemed the effect on third parties so intolerable, that the injunction must be denied and the Court, in the common way, had retained the bill for the assessment of damages sustained by the complainants and had entered a decree for payment of the amount, by the wrongdoers, that decree would be a debt of the State of Illinois, as well as of the Sanitary District. The duty to pay damages for future wrongful diversions would continue, as a duty of the State. These works are to render the injunction tolerable and so to prevent a liability for continued diversions. Therefore Section 20 does not stand in the way, if this Court enters a decree that the State complete the works."

From this aspect we also assert the right of the sovereign State of Illinois to have its legal liability expressly and separately considered, before this Court, in this proceeding, should impose upon it a financial obligation.

IV.

WE RESPECTFULLY INSIST THE SPECIAL MASTER RECOMMENDS THAT THIS COURT SHOULD EXERCISE POWERS NOT POSSESSED BY IT UNDER ITS JURISDICTION TO SETTLE CONTROVERSIES BETWEEN STATES.

In dealing with the very grave questions of constitutional power presented by the extraordinary recommendations of the Special Master we approach a field where precedents are few. No case whatever so far as we have been able to find presents any similarity to the recommendations here involved. We suggest that this fact alone casts a doubt upon these recommendations. A mere reading of the summary of previous authorities and decisions involving this fundamental question as outlined at pages 122 to 125 of the Special Master's report indicates the hesitation the courts have displayed, and particularly this court, in seeking to exercise powers of the nature here involved.

The recommendations of the Special Master transcend the limits of judicial authority in that:

(a) It is recommended that the court by mandatory decree control and direct an exercise of legislative discretion by the Legislature of Illinois and also by the Governor of Illinois.

(b) It is recommended that the court direct the Legislature of Illinois to exercise a portion of the legislative authority of the people of Illinois which the people by their Constitution have not delegated to the Legislature but have expressly reserved to themselves.

(c) It is recommended that the court direct the Legislature of Illinois to disregard and set aside clear and specific commands of the Constitution of Illinois.

We respectfully submit that in these respects and in many others the recommendations of the Special Master ask this court to go beyond the limits of its constitutional judicial power.

A.

THE RECOMMENDATION THAT THIS COURT DIRECT, CONTROL AND COMMAND AN EXERCISE OF CONSTITUTIONAL LEGISLATIVE DISCRETION BY THE GENERAL ASSEUBLY OF ILLINOIS AND BY THE GOVERNOR OF ILLINOIS IS BEYOND THE POWER OF THIS COURT IN THAT IT SEEKS TO HAVE THE COURT INVADE THE PROVINCE OF A LEGISLATIVE FUNCTION AND THEREFORE WOULD INVOLVE AN EXERCISE OF POWER ESSENTIALLY NOT JUDICIAL IN ITS NATURE.

We assume there can be no doubt about the fact that the Master's recommendations include the suggestion that this court direct and control an exercise of legislative authority by the General Assembly of Illinois and by the Governor of Illinois. His report says in part in summarizing his conclusions at page 27:

> "The financial measures on the part of the State of Illinois which are reasonable and necessary in order to carry out the decree of this court are in the enlargement of the decree by adding to it a paragraph providing that the State of Illinois be *enjoined to appropriate through its General Assembly before July 1st, 1933 the sum of thirty-five million dollars* * * * and the same amount per year for each year * * * until all the same shall have been fully completed; and to incur indebtedness therefor and for the purposes aforesaid and no other to issue and to sell bonds of the State of Illinois for the amounts so appropriated and *on such terms of payment and maturity and at such rates of interest as the General Assembly shall determine.* * * *"

The decree is to enjoin the State to appropriate through its General Assembly. This is the only way in which the State can appropriate money and requires a legislative act by the General Assembly. The decree is specifically to direct action by the General Assembly including an admitted exercise of discretion of that body in determining the "terms of payment and maturity * * * and rates of interest." The fact that the recommended decree is not mandatory as to terms of payment, maturity and interest makes it clear that in directing action by the General Assembly, since these terms of the required bonds must be specific in order to be salable, to comply with the decree the General Assembly must exercise an uncontrolled discretion as to these matters. The decree does require such action.

At page 42 of his report the Special Master says:

> "The State of Illinois is under a liability which it is within the jurisdiction of the Supreme Court of the United States to compel it to satisfy out of the resources of the State. The State has among its resources, the inherent power to contract for construction and to borrow money. When the Constitution of the United States by the judgment of its Supreme Court obliges the State to use that resource, any self-imposed prohibition to perform that obligation is repugnant to the supreme constitution and fails. A vote of howsoever large a number of people would be unconstitutional."

By the same reasoning a vote of the Legislature refusing to adopt a measure meeting the terms of the proposed decree would be unconstitutional. But what would be substituted for such action, whether void or not, required to create an obligation of the State of Illinois? It can only come into existence by legislative act. The decree requires such act. A legislative act can only be performed by the vote of Legislators. The right to vote implies the right to vote for or against. The decree would deny the essence of the right to vote in that the right to vote against such a measure would be denied. *We submit it would be impossible to find a more complete invasion of the legal constitutional discretion imposed upon each member of the General Assembly of Illinois than in this recommended decree.*

The extent to which the judiciary may invade the province of the Legislature was carefully considered by the Supreme Court of Illinois in the case of *People* v. *Thompson,* 155 Ill. 451. In this case the court reviewed the constitutionality of an act of the Legislature apportioning the State into senatorial districts. Section 6 of Article IV of the State Constitution directed the General Assembly to apportion the State every ten years in a manner in some particulars definitely prescribed. Among other provisions as to the nature of apportionment so provided the Constitution required that "senatorial districts shall be formed of contiguous and compact territory bounded by county lines and contain, as nearly as practicable, an equal number of inhabitants. * * *" The Act before the Court was attacked as failing to comply with these requirements. The court held the Constitution imposed in the Legislature a discretion in applying the requirements of compactness, etc., although on the facts involved doubt as to the way in which these requirements were met was clearly proper. The fundamental question discussed in the case was the extent to which courts could review an exercise of legislative discretion. The court said at page 474:

> "That there are many constitutional duties imposed upon other departments of the government which cannot be enforced by the courts, and the manner of compliance with which is left to the sole and final determination of the department upon which the duty is imposed, will not be denied. The provision relating to senatorial apportionment required the legislature to apportion the State in 1871 and every ten years thereafter. But the first act was not passed until 1872 and the last in 1893, but it is not contended that these statutes are unconstitutional because not passed within the years prescribed. The constitution of the State of New York contained similar provisions, and the Court of Appeals held that an apportionment act was not in-

valid because passed some years later than the prescribed time, but that the constitution was so far mandatory as to make the duty a continuing one, which, upon failure of one legislature to discharge it, was cast upon its successor. (*Rumsey* v. *People*, 19 N. Y. 41; *People* v. *Rice*, 135 id. 473.) Nor have the courts any power to compel the legislature to act in any case, however imperatively the duty may be imposed upon that body to act, so that if the legislature should wholly neglect or refuse to pass an apportionment act after the lapse of ten years, and should leave in force an act under which the districts had become grossly unequal in population, the people would have no remedy, outside of a constitutional amendment, except to elect a General Assembly which would perform the duty. *Giddings* v. *Blacker*, 93 Mich. 1; *People ex rel.* v. *Bissell*, 19 Ill. 229; *People ex rel.* v. *Cullom*, 100 id. 472; *Myers* v. *English*, 9 Cal. 341.

Section 22 of article 4 prohibits the General Assembly from passing any local or special laws in any of twenty-three enumerated cases, and then provides that 'in all other cases where a general law can be made applicable no special law can be enacted'; and it is decided by this court that the question whether or not a general law can be made to apply in a case not falling within those specifically enumerated is addressed to the legislature, and not to the courts, and that its decision in that respect, involved in the passage of the act, is final, and the courts have no power to revise, reverse or annul it. (*Owners of Lands* v. *People*, 113 Ill. 296; *People* v. *Harper*, 91 id. 357; *Johnson* v. *Joliet and Chicago Railroad Co.* 23 id. 124.) Again, section 12 of article 5 provides that 'the Governor shall have power to remove any officer whom he may appoint, in case of incompetency,' etc., and it is decided that, this power being vested in the Governor, he alone has the power to determine the question of incompetency, and may make such determination from the best light he can get, 'and that it is not for the courts to dictate to him in what manner he shall proceed in the performance of his duty, his action not being subject to their revision.' *Wilcox* v. *People*, 90 Ill. 186; *People, ex* *rel.* v. *Cullom*, 100 id. 472; *People ex rel.* v. *Bissell*, 19 id. 229.

Many other instances might be cited, were it necessary, where the decision of the other departments of the State government are not subject to reversal by the courts. Full power and final authority to perform the different governmental functions must be lodged somewhere, and it is the duty of all public functionaries to respect the disposition of the several powers of government as made by the constitution. It would be a new doctrine, and one fraught with much danger, to hold that the courts may reverse or annul acts of the other departments in matters committed by the constitution to the judgment and determination of such other departments, or in matters where it is a question of serious doubt whether they are so committed or not, even although the courts might be satisfied that in the determination of the question by the department to which it is committed the constitution has not been properly observed. The only remedy for dereliction of duty in such cases lies in the frequency of elections, by which the people may choose others to serve them, and in the impeachment and removal from office of those made subject to that punishment. This view does not deny the jurisdiction of the court to pass upon the constitutionality of a statute making a senatorial apportionment, to the same extent as in other cases, but it does deny the power of the court to follow the statute any further than the boundary line enclosing the discretionary power of the legislature, and to invade that discretion, in any case.

It was not discretionary with the legislature whether it would, or not, comply with the four restrictions before mentioned, upon its power, respecting the observance of county lines, the division of counties, the minimum number of inhabitants necessary to form a district, and the contiguity of territory in forming districts. Nor was it discretionary as to whether or not that body would, subject to said limitations, apply the principles of compactness of territory and approximate equality in population in making the apportionment; but we do hold that it was a question for its final determination as to what

> approximation could or should be made toward perfect compactness of territory and equality in population,—and this, too, though treating this requirement of the constitution as mandatory on the legislature. In other words, if it clearly appeared that in the formation of any district the requirement of compactness of territory and equality in population had been wholly ignored, had not been considered or applied at all, to any extent, then the statute would be clearly unconstitutional. But if it has been considered and applied, though to a limited extent only, subject to the other more definitely expressed limitations, then the General Assembly has not transcended its power, although it may have very imperfectly performed its duty, and the act is valid. That no department of the State government has any discretion as to whether or not it will perform a constitutional duty, and that constitutional provisions are to be treated as mandatory rather than as directory, do not militate against the position here assumed, for however peremptorily the performance of the duty may be enjoined by the constitution, it cannot be enforced, or the manner of its performance be revised, by the courts, in a matter committed by the constitution to the final decision of such department. (Cooley's Const. Lim. 78-83.) The same eminent authority above quoted from says: 'Where the power which is exercised is legislative in its character, the courts can enforce only those limitations which the constitution imposes, and not those implied restrictions which, resting in theory, only, the people have been satisfied to leave to the judgment, patriotism and sense of justice of their representatives.' Cooley's Const. Lim. 129."

In its essence the exercise of power recommended by the Special Master is exercise of the power of taxation, since bonds are the mere postponement of taxes. That judicial power, because of the lack of right to invade legislative discretion, does not extend to the exercise of the right to tax has been frequently decided. We need no other authority for this statement than the case of

Meriwether v. *Garrett,* 102 U. S. at 472; 47 L. ed. 197. In the opinion in that case the court said:

> "So long as the law authorizing the tax continues in force, the courts may, by *mandamus,* compel the officers empowered to levy it or charged with its collection, if unmindful and neglectful in the matter, to proceed and perform their duty; but when the law is gone and the office of the collector abolished, there is nothing upon which the courts can act. The courts cannot continue in force the taxes levied, nor levy new taxes for the payment of the debts of the corporation. The levying of taxes is not a judicial act. It has no elements of one. It is a high act of sovereignty, to be performed only by the Legislature upon considerations of policy, necessity and the public welfare. In the distribution of the powers of government in this country into three departments, the power of taxation falls to the legislative. It belongs to that department to determine what measures shall be taken for the public welfare, and to provide the revenues for the support and due administration of the government throughout the State and in all its subdivisions. Having the sole power to authorize the tax, it must equally possess the sole power to prescribe the means by which the tax shall be collected, and to designate the officers through whom its will shall be enforced.
>
> It is the province of the courts to decide causes between parties and, in so doing, to construe the Constitution and the Statutes of the United States, and of the several States, and to declare the law and, when their judgments are rendered, to enforce them by such remedies as legislation has prescribed, or as are allowed by the established practice. When they go beyond this, they go outside of their legitimate domain, and encroach upon the other departments of the government; and all will admit that a strict confinement of each department within its own proper sphere was designed by the founders of our government, and is essential to its successful administration.

This doctrine is not new in this court. It has been

> repeatedly asserted, after the most mature consideration. It was asserted in *Rees* v. *Watertown*. * * *
>
> In disposing of it (a question certified to this court) we said: 'We are of the opinion that this court has not the power to direct a tax to be levied for the payment of these judgments. This power to impose burdens and raise money is the highest attribute of sovereignty, and is exercised, first, to raise money for public purposes only; and, second, by the power of legislative authority only. It is a power that has not been extended to the judiciary. Especially is it beyond the power of the federal judiciary to assume the place of a State in the exercise of this authority at once so delicate and so important.' 19 Wall. 116 (86 U. S., XXII., 74)."

The same opinion states, in discussing the previous decision in *Heine* v. *Levee Commissioners*, 19 Wall. 655 (86 U. S. XXII 223):

> "And when the case came before this court, we here said, Mr. Justice Miller delivering the opinion: 'The power we are here asked to exercise is the very delicate one of taxation. This power belongs, in this country, to the legislative sovereignty, state or national. In the case before us the national sovereignty has nothing to do with it. The power must be derived from the Legislature of the State. So far as the present case is concerned, the State has delegated the power to the levee commissioners. If that body has ceased to exist, the remedy is in the Legislature, either to assess the tax by special statute, or to vest the power in some other tribunal. It certainly is not vested, as in the exercise of an original jurisdiction, in any Federal Court. It is unreasonable to suppose that the Legislature would ever select a Federal Court for that purpose. It is not only not one of the inherent powers of the court to levy and collect taxes, but it is an invasion of the judiciary of the Federal Government of the legislative functions of the State Government. It is a most extraordinary request, and a compliance with it would involve consequences no less out of the way of judicial procedure, the end of which no wisdom can foresee.'

> When creditors are unable to obtain payment of their judgments against municipal bodies by execution, they can proceed by *mandamus* against the municipal authorities to compel them to levy the necessary tax for that purpose. If such authorities are clothed by the Legislature with the taxing power, and such tax, when collected, cannot be diverted to other uses; but if those authorities possess no such power, or their offices have been abolished and the power withdrawn, the remedy of the creditors is by an appeal to the Legislature, which alone can give them relief. No Federal Court, either on its law or equity side, has any inherent jurisdiction to lay a tax for any purpose, or to enforce a tax already levied, except through the agencies provided by law. However urgent the appeal of creditors and the apparent hopelessness of their position without the aid of the Federal Court, it cannot seize the power which belongs to the Legislative Department of the State and wield it in their behalf."

The court said further:

> "The federal judiciary has never failed, so far as it was in its power, to compel the performance of all lawful contracts, whether of the individual, or of the municipality, or of the State. It has unhesitatingly brushed aside all legislation of the State impairing their obligation. When a tax has been authorized by law to meet them, it has compelled the officers of assessment to proceed and levy the tax, and the officers of collection to proceed and collect it, and apply the proceeds. In some instances, where the tax was the inducement and consideration of the contract, all attempts at its repeal have been held invalid. But this has been the limit of its power. It cannot make laws when the State refuses to pass them. It is itself but the servant of the law. If the State will not levy a tax, nor provide for one, the federal judiciary cannot assume the legislative power of the State and proceed to levy the tax. If the State has provided incompetent officers of collection, the federal judiciary cannot remove them and put others more competent in their place. If the State appoints no officers of collection, the fed-

> eral judiciary cannot assume to itself that duty. It cannot take upon itself to supply the defects and omissions of state of state legislation. It would ill perform the duties assigned to it by assuming power properly belonging to the Legislative Department of the State."

These statements are not in conflict with the assertions and definitions of the peculiar judicial power here involved set forth in the opinion of this court in *Virginia* v. *West Virginia,* 246 U. S. 565. In asserting the power 7. to enforce its judgments in controversies between states, the court discusses at length arguments to show either limitations upon or lack of such power.

Power to enforce an injunction to prohibit acts which result in a nuisance, which is the only character of decree heretofore entered in this case, is *res adjudicata* in this proceeding and has been so frequently asserted and exercised by this court as not to be open to further doubt under circumstances proper for its application. The power which we challenge here, however, is the exercise of what might be termed an ancillary authority to control the legislative discretion of the General Assembly of Illinois by requiring that body to vote and approve an issue of bonds *not for the purpose of paying a judgment* or *answering an obligation defined by this court in the exercise of its jurisdiction to settle controversies between states.* On the contrary it is merely an ancillary authority to compel the State of Illinois to expend money through or for one of its own municipal corporations in order that the people of that corporation may be protected from evil results inevitably to follow if the injunction heretofore allowed be enforced according to its terms.

The decision last referred to is distinguishable from the instant case because the obligation involved arose prior to the creation of the defendant state and was incurred as an inseparable part of the bringing into being of the state, and in addition was embodied in an act of Congress. The court in the opinion referred to concluded its discussion of the nature of powers in the following expressions:

> "The State, then, as a governmental entity, having been subjected by the Constitution to the judicial power under the conditions stated, and the duty to enforce the judgment by resort to appropriate remedies being certain, even although their exertion may operate upon the governmental powers of the state, we are brought to consider the second question, which is:
>
> 2. What are the appropriate remedies for such enforcement?
>
> Back of the consideration of what remedies are appropriate, whether looked at from the point of view of the exertion of equitable power or the application of legal remedies extraordinary in character (mandamus, etc.), lies the question what ordinary remedies are available, and that subject must necessarily be disposed of. As the powers to render the judgment and to enforce it arise from the grant in the Constitution on that subject, looked at from a generic point of view, both are Federal powers, and, comprehensively considered, are sustained by every authority of the Federal government, judicial, legislative, or executive, which may be appropriately exercised. And confining ourselves to a determination of what is appropriate in view of the particular judgment in this cause, two questions naturally present themselves: (a) the power of Congress to legislate to secure the enforcement of the contract between the states; and (b) the appropriate remedies which may by the judicial power be exerted to enforce the judgment. We again consider them separately."

After asserting the power of Congress to legislate as to the enforcement of a contract to which it was a party, the court discusses "the appropriate remedies under existing legislation."

The court said:

> "The remedy sought, as we have at the outset seen, is an order in the nature of mandamus commanding the levy by the legislature of West Virginia of a tax to pay the judgment. In so far as the duty to award that remedy is disputed merely because authority to enforce a judgment against a state may not affect state power, the contention is adversely disposed of by what we have said. But this does not dispose of all the contentions between the parties on the subject, since, on the one hand, it is insisted that the existence of a discretion in the legislature of West Virginia as to taxation precludes the possibility of issuing the order, and, on the other hand, it is contended that the duty to give effect to the judgment against the state, operating upon all state powers, excludes the legislative discretion asserted and gives the resulting right to compel. But we are of opinion that we should not now dispose of such question, and should also now leave undetermined the further question, which, as the result of the inherent duty resting on us to give effect to the judicial power exercised, we have been led to consider on our own motion,—that is, whether there is power to direct the levy of a tax adequate to pay the judgment and provide for its enforcement irrespective of state agencies. We say this because impelled now by the consideration of the character of the parties which has controlled us during the whole course of the litigation, the right judicially to enforce by appropriate proceedings as against a state and its governmental agencies having been determined, and the constitutional power of Congress to legislate in a twofold way having been also pointed out, we are fain to believe that if we refrain now from passing upon the questions stated, we may be spared in the future the necessity of exerting compulsory power against one of the states of the Union to compel it to discharge a plain duty resting upon it under the Constitution. Indeed, irrespective of these considerations, upon the assumption that both

the requirements of duty and the suggestions of self-interest may fail to bring about the result stated, we are nevertheless of the opinion that we should not now finally dispose of the case, but, because of the character of the parties and the nature of the controversy,—a contract approved by Congress and subject to be by it enforced,—we should reserve further action in order that full opportunity may be afforded to Congress to exercise the power which it undoubtedly possesses.

Giving effect to this view, accepting the things which are irrevocably foreclosed,—briefly stated, the judgment against the state, operating upon it in all its governmental powers, and the duty to enforce it, viewed in that aspect,—our conclusion is that the case should be restored to the docket for further argument at the next term after the February recess. Such argument will embrace the three questions left open: 1. The right, under the conditions previously stated, to award the mandamus prayed for. 2. If not, the power and duty to direct the levy of a tax, as stated. 3. If means for doing so be found to exist, the right, if necessary, to apply such other and appropriate equitable remedy by dealing with the funds or taxable property of West Virginia, or the rights of that state, as may secure an execution of the judgment. In saying this, however, to the end that if, on such future hearing provided for, the conclusion should be that any of the processes stated are susceptible of being lawfully applied (repeating that we do not now decide such questions), occasion for a further delay may not exist, we reserve the right, if deemed advisable, at a day hereafter, before the end of the term or at the next term before the period fixed for the hearing, to appoint a master for the purpose of examining and reporting concerning the amount and method of taxation essential to be put into effect, whether by way of order to the state legislature or direct action, to secure the full execution of the judgment, as well as concerning the means otherwise existing in the state of West Virginia, if any, which, by the exercise of the equitable powers in the discharge of the duty to enforce payment, may be available for that purpose.

And it is so ordered."

This court, therefore, expressly refused to assert that it had power to control the discretion of the Legislature of West Virginia involved in the levy of a tax by that state to pay the judgment. The court also did not decide whether judicial power to settle controversies included the power and duty to direct the levy of a tax.

In connection with other contentions involved in the present proceeding, it should be clearly and definitely noted that there was no suggestion or claim on the part of the State of West Virginia that the proposed mandamus to compel its Legislature to levy a tax would require the Legislature of West Virginia to violate any of the provisions of the Constitution of that State, or to exercise any portion of legislative power reserved by the Constitution to the people of the State and not granted to the Legislature.

We respectfully submit on the authorities cited above and for the reasons therein set forth, judicial power does not include the power to control legislative discretion, it does not comprehend the power to tax, and still less may a Federal Court invade the unquestioned legislative authority of State government.

B.

THE RECOMMENDATION OF THE SPECIAL MASTER THAT THIS COURT CONTROL BY MANDATORY DECREE AN EXERCISE OF LEGISLATIVE DISCRETION OF THE GENERAL ASSEMBLY OF ILLINOIS IS BASED UPON A COMPLETE MISCONCEPTION BY THE SPECIAL MASTER OF THE CONSTITUTION OF ILLINOIS THAT ALL LEGISLATIVE AUTHORITY UNDER THAT CONSTITUTION IS VESTED BY THE PEOPLE IN THE GENERAL ASSEMBLY. THIS BASIC MISCONCEPTION INVALIDATES HIS ENTIRE CONCLUSION. THE CONSTITUTION OF ILLINOIS RESERVES TO THE PEOPLE LEGISLATIVE POWER TO INCUR A DEBT AND LEVY A TAX FOR PAYMENT THEREOF.

Special Master McClennen in his report (pp. 40 and 41), interprets Section 1 of Article IV of the Illinois Constitution which reads:

> "SEC. 1. The legislative power shall be vested in a general assembly, which shall consist of a senate and house of representatives, both to be elected by the people."

He bases his interpretation upon the decision of the Supreme Court of Illinois in the case of *People* v. *Barnett,* 344 Ill. 62, 66, 76. We quote below in parallel columns on the right the portion of this opinion cited by the Special Master; on the left the complete language of this part of the opinion which, we submit, requires a directly contrary construction of the constitutional provision in question to that adopted by the Special Master:

"Thus all the legislative power inherent in the people of the State of Illinois has been vested in the General Assembly, except in those cases in which the power has by express limitation or necessary implication been withheld. Since it alone has the power the General Assembly has also the duty, and upon it alone rests the full responsibility, of legislation. This power it may not delegate to any other officers or persons or groups of persons, or even to the whole body of the people, or to a majority of the voters of the State voting at a general election or at a special election. The constitution has made no general provision for a referendum of any act of the General Assembly to a vote of the people of the whole state to determine whether or not that act shall become a law. By section 5 of article II of the constitution it is provided that no act of the General Assembly authorizing or creating corporations or associations with banking powers, nor amendments thereto, shall go into effect or in any manner be in force unless the same shall be submitted to a vote of the people at the general election next succeeding the passage of the same and be approved by a majority of all the votes cast at such election for or against such law. By the amendment of the constitution which became section 34 of article 4 of the constitution it was provided that no law based on that amendment affecting the municipal government of the city of Chicago should take effect until such law should be consented to by a majority of the legal voters of the city voting on the question at any election, general, municipal or special. In cases of this kind the General Assembly was not only permitted, but was required, to submit its action by a referendum to the people of the city or the State, and its acts in such cases could not go into effect or in any manner be in force until the required majority of voters had consented."

"The Supreme Court of Illinois (*The People* v. *Barnett*, 344 Illinois 62, 66, 76) has defined this section emphatically: 'Thus all the legislative power inherent in the people of the State of Illinois has been vested in the General Assembly, except in those cases in which the power has by express limitation or necessary implication been withheld. Since it alone has the power, the General Assembly has also the duty, and upon it alone rest the full responsibility, of legislation. This power it may not delegate to any other officers or persons or groups of persons, or even to the whole body of the people, or to a majority of the voters of the state voting at a general election or at a special election. The constitution has made no general provision for a referendum of any act of the General Assembly to a vote of the people of the whole State to determine whether or not that act shall become a law."

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> "We hold that under the constitution of Illinois the General Assembly is the sole depository of the legislative power of the State; that it has no power to delegate its general legislative power, and may not refer a general act of legislation to a vote of the people of the State to decide whether it shall have effect as a law except where the constitution requires such reference; that the rule against the delegation of legislative power is not violated by vesting in municipal corporations certain powers of legislation on subjects of purely local concern connected with their municipal affairs, nor by local option laws the application of which to particular localities is made dependent upon their adoption by the voters of such localities, and that the act of June 14, 1929, to amend section 2 of an act to authorize judges of courts of record to appoint jury commissioners and prescribing their powers and duties, is an unconstitutional delegation of legislative powers and had no effect to change the Jury Commissioners act or to authorize the selection of women as jurors."

> "We hold that, under the constitution of Illinois, the General Assembly is the sole depository of the legislative power of the State; that it has no power to delegate its general legislative power, and may not refer a general act of legislation to a vote of the people of the State to decide whether it shall have effect as a law except where the constitution requires such reference."

With all due deference to the Special Master we respectfully suggest that in the very opinion upon which he relies, the Supreme Court of Illinois clearly shows the existence of limitations upon the legislative power of the General Assembly. These are limitations which in their essence are reservations of legislative power to be exercised solely by the people of Illinois. The expressions that the Legislature is the sole repository of legislative power are obviously in general correct, but this opinion especially recognizes existing exceptions to this general statement.

We deal in this case with one of those exceptions. Section 18 of Article 4 of the Illinois Constitution is an express limitation on the power of the Illinois Legislature to create debts. And in defining the process and nature of such debt creation, the Constitution expressly provides:

> "* * * The State may, to meet casual deficits or failures in revenues, contract debts, never to exceed in the aggregate $250,000.00. * * * And no other debt, except for the purpose of repelling invasion, suppressing insurrection or defending the State in war (for payment of which the faith of the State shall be pledged), shall be contracted unless a law authorizing the same shall, at the general election, have been submitted to the people and have received a majority of the votes cast for the members of the General Assembly at such election * * * The General Assembly shall provide for the publication of said law and for three months at least before the vote of the people shall be taken upon the same; a provision shall be made at the time for the payment of the interest annually, as it shall accrue, by a tax levied for the purpose, or from other sources of revenue; which law, providing for the payment of such interest by such tax, shall be irrepealable until said debt be paid, and, provided further, that the law levying the tax shall be submitted to the people with the law authorizing the debt to be contracted."

We respectfully submit there can be no doubt as to the proper interpretation of these provisions. The Constitution denies to the General Assembly the power to create a debt or power to authorize a tax for the payment of a debt. The sole legislative function of the General Assembly is to adopt for submission to the people laws providing for these objections. The General Assembly may decide in its legislative discretion not to adopt such laws but it possesses no legislative authority to enact such laws. They come into existence and become legally effective only when approved by the required vote of the people. This is a reservation of legislative power by the people of Illinois.

The Special Master states his interpretation of the decision in *People* v. *Barnett* above as follows:

"The constitution of Illinois does not require a

> vote of the people to validate an act of the General Assembly to raise at once in the only possible way and to expend the money directed by a valid decree of the Supreme Court of the United States and necessary for the performance of that decree."

As shown by the quotation from the Constitution of Illinois above, no debt can be created except in the manner therein specified and no assertion can change the clear meaning of this language.

After the sentence just quoted, the McClennen report goes on:

> "Indeed the decision quoted indicates that because the General Assembly cannot delegate its legislative power and duty to have the State perform its obligation under the Constitution of the United States, such vote of the people would be unconstitutional under the Constitution of Illinois."

The decision in the Barnett case, even in the language quoted by the Special Master, states that all legislative power has been vested in the General Assembly "except in those cases in which the power has by express limitation or necessary implication been withheld." The constitutional provision above noted is clearly and definitely one of the exceptions referred to in this expression.

An analysis of the Master's Report will show that his entire reasoning as to the propriety of an injunction controlling the legislative discretion of the General Assembly of Illinois in the manner indicated, is based and founded completely upon his erroneous assertion that all legislative power of the State is vested in its Legislature. Since this premise is wrong, his conclusion cannot be accepted. If the court is to adopt the remedy recommended by the Master, it must direct the exercise of the legislative power of the State in the manner in which the people of the State have expressly and definitely decided in their constitution it must be exercised. Legislative power in Illinois for the creation of a debt and provision for its payment is to be exercised in part by the General Assembly and in part by the people of the State. From mere considerations of convenience, this court possesses no judicial authority to set aside this provision; if the court desires to adopt this recommendation it must modify the Master's recommendation and make its mandate run not only against the General Assembly of Illinois, but also against the people of Illinois. The utter impracticability of attempting to coerce and control a popular vote of the people of Illinois eliminates this suggestion from serious consideration, but this court, even though the method embodied in the Illinois Constitution may seem in this instance impracticable, has no power to rewrite the Constitution and substitute some other mechanism for the method chosen by the people of Illinois within their exclusive sovereign right.

C.

SPECIAL MASTER MC CLENNEN RECOMMENDS THAT THIS COURT, BY MANDATORY INJUNCTION, DIRECT THE GENERAL ASSEMBLY OF ILLINOIS TO DISREGARD AND DISOBEY CLEAR AND SPECIFIC REQUIREMENTS OF THE CONSTITUTION OF ILLINOIS. THIS INVOLVES THE EXERCISE OF POWER NOT CONFERRED UPON THIS COURT AND BEYOND THE LIMITS OF JUDICIAL AUTHORITY.

As shown by the summary of conclusions in the report at page 128, the Special Master recommends an addition to the decree providing that the State of Illinois be enjoined to appropriate $35,000,000.00 for purposes stated "and to incur indebtedness therefor and for the purposes aforesaid and no other to issue and to sell bonds of the State of Illinois for the amount so appropriated and on such terms of payment and maturity and at such rates of interest as the General Assembly shall determine and without the laws authorizing the same being submitted to the people of Illinois and the said laws shall be valid and the bonds so issued if in other respects conforming to the Constitution and laws of the State of Illinois shall be valid obligations of the State of Illinois notwithstanding the fact that said laws have not been submitted to the people of Illinois either theretofore or thereafter. * * *''

In view of the provisions of Section 18 of Article IV of the Illinois Constitution above quoted requiring the submission to vote of the people at a general election of a law providing for the creation of a debt and for the levy of a tax to pay the same, and in view of the statements in the report, there can be no question about the specific fact that the Special Master recommends this Court direct and require a violation of the Constitution of Illinois. The reasoning of the Special Master is, that all legislative power is reserved to the Legislature and, therefore, that the constitutional requirement in question should be disregarded, since, as he views it, it is appropriate and necessary that the legislative power be exercised to meet what he calls an obligation arising under the Constitution of the United States. This is, we submit, a fair paraphrase of his reasoning.

In the first place, we are not aware of any judicial process which permits discriminating between constitutional provisions and classifying those which must be regarded and those which can be rejected because of inconvenience. Certainly no such authority or power has ever been asserted by this court.

We repeat the only excuse for the suggested assertion of power the Special Master urges upon this Court is the claim by him that, since all judicial power is vested in the Legislature, the requirement of popular vote, even though specifically demanded by the Constitution can be disregarded. As might be expected, he cites no authority whatever in support of this reasoning.

Frequently throughout his report, however, Special Master McClennen refers to the expressions contained in the last opinion in this case written by Mr. Justice Holmes in which he said (281 U. S. at p. 197:

> "It already has been decided that the defendants are doing a wrong to the complainants, and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the state of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defenses upon difficulties that it has itself created. If its Constitution stands in the way of prompt action, it must amend it or yield to an authority that is paramount to the state."

These expressions, broad as they are, and with all due deference to the illustrious Justice, for whom the State of Illinois has a peculiar respect, far beyond any assertion of power ever heretofore uttered by this Court, do not necessarily involve any such claim of power as would support the suggestions of the Special Master.

Mr. Justice Holmes was dealing with the case as it then stood. The Sanitary District had defended its acts as justified under a permit from the War Department running to the Sanitary District, not to the State of Illinois. The Court had found the permit valid, but based upon a self-created emergency resulting from wrongful acts. The Court was contemplating the issuance of an injunction against the Sanitary District to prevent the continuance of these wrongful acts any longer than was needed to meet equitable and humanitarian requirements. The acts were those of the Sanitary District in making the diversion. This was a bill to enjoin a nuisance, and the State of Illinois related to the Sanitary District as the source in part of its powers and authority, was properly joined as a co-defendant in order that any injunction allowed should afford complete and comprehensive protection from wrongs determined. It was in the light of these circumstances that the above remarks, clearly *dicta* as not involved in the issue before the court—were uttered. There were in fact no obstacles created by the State of Illinois to performance of the decree to which either court or counsel, in brief or argument or opinion, had called attention. The language can only be regarded as a warning against any technical interpretation of the Constitution of Illinois to be suggested as a bar to carrying out the decree then to be entered.

We are sure this Court will agree that Mr. Justice Holmes would never have attempted to suggest in advance what this Court would decide upon a subsequent issue properly joined and before the Court for decision.

Dealing literally with the last sentence in the above quotation, this sentence merely suggests a choice which might be presented to the State of Illinois, of amending its Constitution or finding itself subject to the exercise of a paramount authority. In view of the nature of the issue presented, the paramount authority referred to was not the judicial power of this Court, but the power of Congress to regulate and control diversion, a power asserted in this very case. We have shown in fact that Congress has now exercised its paramount authority in a way which limits the jurisdiction of this Court in this proceeding.

The real question is whether this court, under the circumstances of this case, can or should exercise authority to set aside and disregard the Constitution of Illinois.

These constitutional provisions were adopted long before any of the circumstances here involved arose. They are not self-created obstacles, selected for the purpose of avoiding performance of this Court's decree. They are essential elements in the structure of government, erected by the people of Illinois in the exercise of a right, which, under our laws and organization, must and always has been held to be free. Exercise of this right is subject only to the requirement that the form of government be republican in its nature and contain no limitations upon the meeting of obligations to be assumed by a state under the federal constitution.

It is the claim of the Special Master that the obligation here involved is an obligation imposed upon the State by that constitution. An analysis of the record completely negatives any such conclusion. The Court is not seeking to compel here the payment of an obligation to sister states, or the performance of a duty to those states. The Court has entered an injunction enjoining wrongful acts performed solely by the defendant Sanitary District. That injunction satisfies the rights of the complaining states. The court has found that immediate compliance with the injunction will endanger the lives and health of many innocent people. Because of this consideration it has postponed and graduated compliance with the injunction in order to give the people to be affected by it an opportunity to protect themselves from these dangers. Circumstances beyond their control have prevented and delayed the progress and completion of this protection. It is now suggested that the Court invade the rights of these people, set aside their constitution, in its essence reconstitute their properly self-originated form of government in order to compel these people to protect themselves.

The duty to protect themselves is, we submit, no duty imposed upon the people of Illinois or upon the people of the Sanitary District by the Constitution of the United States. *But the proposed decree in its essence requires the performance of that duty* and no other. The injunction, we may assume, must be carried out according to its terms unless this Court, recognizing the same impelling humanitarian necessity again postpones performance. The obligation to protect themselves, however, is a domestic obligation solely within the proper scope of the reserved powers of the State of Illinois, and not a matter concerning which this Court or the complaining states have either interest or jurisdiction.

The decree herein was not mandatory in its terms, so far as the program of self-protection was concerned. Such a decree was recommended by the former Special Master on rereference and this recommendation was rejected by the court. We must assume the Court's refusal to adopt this recommendation was due to a recognition by the Court of what, we submit, is the unquestioned fact, that the legal power, as well as the obligation to protect themselves, rested in the people of the Sanitary District. The very existence of this power implies a discretion as to its exercise. That this Court in its decree, and particularly in its opinion in the expressions above noted, indicated a clear and settled determination to protect the rights of the complaining states does not import into the decree any mandatory requirement effective upon the people of the Sanitary District or the State of Illinois. This omission is clearly a recognition of the right of the people of the district to decide for themselves.

Putting the question in its most direct way, we submit this Court now confronts a choice of three alternatives: First, to leave the injunction as it is without modification and leave the people of the Sanitary District to suffer the consequences of their misfortune in not being able to go forward with their program of self-protection; Second, the Court, recognizing the equities which, we submit, should prevail from the fact that this interruption in providing self-protection is due solely to the general economic depression from which the entire country is suffering, should postpone, until recovery can be had, compliance with the decree; Third, the Court, in order to give to the complainants speedily the relief to which they have been held entitled without endangering the safety of the people of the Sanitary District, shall take away from those people their lawful constitutional rights of government and self-determination and itself shall take over and exercise governmental authority for them.

We submit this last alternative is not consistent with judicial procedure and does not involve the proper exercise of judicial power.

The 10th Amendment to the Constitution of the United States specifically declares:

> "The powers not delegated to the United States by the Constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people."

Sanitation is a domestic power, exclusively within the police authority of the states, except only in so far as Congress, in the exercise of control over interstate commerce, may deal with the subject.

This court has decided the rights of the complainants and has awarded them an injunction. It applied principles not only of equity but common humanity to the facts as found by it and adjusted the injunction so as to allow to the district the opportunity the court found they possessed within their own powers and organization of government to so adjust their affairs as to avoid danger otherwise certain to result from the injunction. Even though the court may be impelled by the same appealing consideration for welfare of life and health that originally moved it in this case, the strength of that appeal does not vest in the court any power not originally possessed by it. In its essence the problem is for the people of the Sanitary District, as empowered by the State of Illinois, and for them alone to deal with.

We feel justified, however, in view of the finding of the Special Master that the interruption in the program of self-protection has occurred through no fault of these people, in again pressing upon the consideration of the court the necessity for delay. In view of the principle so often asserted in litigation other than this that the States of the United States stand before this Court, when it exercises its jurisdiction to settle controversies between them, upon a plane of equality and in view of the way in which this court has always heretofore in this as in all other cases balanced the equities and conveniences in the conflict of rights presented in these controversies, we confidently believe the court will recognize the necessity of accommodating its original decree to the changed circumstances set forth in the Special Master's Report. We are equally confident, however, that as a means of accommodating its decree to these requirements, the court will not attempt to assert powers not clearly vested in it by the fundamentals of judicial procedure and the requirements of the Federal Constitution.

CONCLUSION.

We summarize our contentions as follows:

We deal only with the third question submitted to the Special Master by the order of reference, although affirming and joining in the contentions submitted by counsel for the Sanitary District as to the first two questions.

1. We assert, notwithstanding the interruption to the construction program of the Sanitary District, which has occurred without its fault, there exists no such emergency for the giving of relief to the complainants as requires the extraordinary measures recommended. This emergency is lacking. It clearly appears by act of Congress adopted since the decree herein, lake levels are in process of restoration and will be restored at a date sooner than if the original decree were accomplished. This result is also required by the pending Canadian Treaty.

2. We assert for numerous reasons that the recommendations of the Special Master do not meet the requirements of this court that they be "reasonable." They are in fact impractical and would in all probability completely fail to produce any increase in speed of performance of the self-protective program of the Sanitary District. We further show that the State of Illinois in all probability does not possess financial capacity to assume the burdens the Special Master would impose.

3. We point out that this litigation has dealt with the Sanitary District as the active defendant, the State of Illinois being joined in order that the injunction sought to prevent nuisance may be completely effective. We analyze the acts of the State of Illinois in the premises and show that it proceeded originally within its right.

We assert that so far as the State is concerned, if it be regarded as the author of the diversion, its act is wrongful only to the extent the diversion exceeds the share of Illinois in the waters of Lake Michigan to be determined by applying the doctrine of equitable apportionment of those waters as between Illinois and the complaining states. We point out that this doctrine, applied in all other cases, has never been the measure of decision herein. We insist that before the liability of the State of Illinois be determined, the right of this sovereign state to the application of this settled principle is clear, and proper proceedings to determine what is an equitable apportionment of the waters of Lake Michigan should be had.

4. Disregarding all other considerations, we assert that the recommendations of the Special Master ask this Court to exercise powers not judicial in their nature and not within the authority of the Court to settle controversies between states. We contend it does not lie within the essence of judicial power to control and direct an exercise of legislative discretion by the Legislature of the State of Illinois and its government. We point out that the legislative authority, which must be exercised to carry out the Special Master's program under the Constitution of Illinois, is not solely exercised by the Legislature, but is primarily reserved to the people of Illinois, and if the Court is to control and direct this proposed exercise of the legislative authority of the State, it must not only control action by the General Assembly but also by the people of Illinois in a general election required by its Constitution. We insist that this Court possesses no authority to set aside the constitutional requirements of the State of Illinois. We point out that the recommendations merely involve an exercise by the people of the

Sanitary District of the power to protect themselves against sewage evils. This power is in its essence an exercise of the reserved police power of the State. It is not a power which can be exercised, either by the Congress or this Court. Since the State of Illinois exclusively possesses this reserved police power, it follows necessarily that it possesses discretion to decide whether it be exercised or not. Even though a decision not to exercise the power would be unwise and contrary to the interest of the people of Illinois, this Court cannot control that discretion.

Here the decision not to exercise the power in the manner needed to accommodate the decree herein has been forced upon the people of the State of Illinois by circumstances not within their control. The equities of the situation demand a further postponement of the reductions in diversion.

We respectfully urge, therefore, that the recommendations of the Special Master should be rejected. We submit that on principles of comity and equity under the circumstances in this case, the Court now should not enter any additional order whatever. As pointed out by the Sanitary District, in all probability with complete safety the reduction in the diversion to 5000 c. f. s., required at the end of 1935, may be safely made, since, by the uncontroverted testimony in this case, only a relatively small sum need be expended to afford the complete protection adequate to this reduction. This reduction will cut in half the damage produced by the division. Reports will continue to be filed and these will deal in more detail with the financial condition of the Sanitary District. The future will disclose its increase in capacity to go forward with the construction program and, based upon the future, a matter now incapable of determination, an appropriate extension of the reduction in 1938 may, if then needed, be made. In the meanwhile the determination of Congress as to the amount of diversion for navigation will have been reached.

Respectfully submitted,

Otto Kerner,
Attorney General,
Truman A. Snell,
Assistant Attorney General.
Cornelius Lynde,
Special Assistant Attorney General.

We further point out to the Court that the contentions herein advanced, particularly under the third point of this brief, as to the effect of the Rivers and Harbors Act of 1930 and the navigation necessities for diversion on the waterway from Chicago to the Gulf, are the contentions which the original intervening defendant states of Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana have heretofore sought permission to present to the Court. The application of these states was made upon the express approval obtained in reference to this present proceeding from their respective Attorneys General. We, therefore, renew the application on behalf of those states and they join in the contentions in this respect herein submitted.

Respectfully submitted,

J. W. Cammack,
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G. L. Rice,
Attorney General of Mississippi.
James O'Connor,
Attorney General of Louisiana.
Stratton Shartel,
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Cornelius Lynde,
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APPENDIX.

DIRECT TESTIMONY OF GOVERNOR HENRY HORNER GIVEN AT THE EXECUTIVE MANSION, SPRINGFIELD, ILLINOIS, FEBRUARY 28, 1933. (Tr., 1971 to 1987, inclusive):

The Witness: If the Master please, my attention was called last Tuesday for the first time to the very serious and grave nature of the unusual, and I might say, shocking, recommendations which I am advised that the Special Master has under consideration for possible submission in his report to the Supreme Court of the United States in the Sanitary District controversy.

When this was called to my attention by the Attorney General, I had been engaged in studying the financial survey of the state, memoranda upon which had been handed me for the first time a few days previously. I had selected Mr. Rice, a very competent gentleman, and well-known financier, to look into our financial condition, because of my knowledge of his capacity and ability and sound judgment in these matters, to prepare a survey and had assigned to him all of the assistance the executive could command. Before the survey was completed, I had formally appointed him Director of the Department of Finance. Although not an audit, the survey was prepared, I am advised, with as much possible care, considering the requirement of having it rapidly available, as if it were an audit. I am further advised that Mr. Rice testified as to certain facts on yesterday, as the result of his findings.

I have no hesitancy in saying that this audit reveals a grave situation, so far as the state finances are concerned.

Mr. Jackson: If the Master please, may I interpolate: I should feel compelled to move to strike out the characterization of the Master's tentative recommendation and the eulogy of Mr. Rice, whose qualifications have been shown in a prior hearing, and I do not think can be buttressed by any other witness, and the conclusions and characterizations of what is shown by this report. To the extent that that may be material at all, it is a matter for the Special Master to find, and it seems to me manifest, that no witness, however eminent, can in testimony characterize what is in the record before the Master.

The Master: I think nothing has been stated so far that you need feel called upon to meet in any way.

The Witness: I have no hesitancy in saying that this audit reveals a very grave situation, as far as the state finances are concerned. With a deficit in available cash of $8,000,000 at the beginning of the year—and remember, I was inaugurated on January 9th of this year—and even allowing for material economies already adopted, established and in force, an ultimate deficit at the end of the year of $15,000,000, it is quite apparent that the state is approaching the danger point where its credit will be impaired. The only way in which our state can function now at all, and during the year, is of borrowing from special funds and by selling tax anticipation warrants. Even to meet the most drastic emergency, under the constitutional requirements, bonds cannot be sold except upon approval by popular vote at the next general election, which will not be held until November, 1934.

In my contract with bankers, since taking office, with many representatives of business interests throughout the state, members of the legislature, and my own general experience, I am convinced that the possibility of sale of tax anticipation warrants depends very largely upon our success in collecting general revenue taxes.

I am informed that the record in this case contains evidence as to the tax difficulties in Cook County, but I am also informed that this evidence has dealt more particularly with legal difficulties. It has not sufficiently recognized, as a controlling element in the problem, the effect of the business depression upon the capacity of taxpayers in Cook County and elsewhere to pay taxes. It is my belief that this element is a most important one for consideration at the present time. Under the system of taxation in Illinois, required by our Constitution, the bulk of the general revenue comes from the general property tax; more than fifty per cent of the taxable property of the state is found in Cook County, and the business depression has combined with the difficulties of tax collection to affect real estate values there in a most drastic way. As a matter of fact, real estate, whether in the form of business property, the farm or the home, cannot now bear the present excessive tax load.

I view with dispair the likelihood of collecting large amounts of delinquent taxes, and anything like a normal proportion of 1931 and 1932 levies.

The legislature is composed of a majority in both houses of representatives and senators elected from so-called downstate counties. The attitude of our people downstate, who are suffering from the business depression almost as much as those in Cook County, and so far as the farmers are concerned, to a greater extent, must be given consideration when it comes to all practical measures of taxation, and measures tending to solve our tax difficulties. I assume that the Special Master and all those who have studied, or are studying, the Illinois problem, are familiar with this.

The City of Chicago, located in Cook County, is one of the greatest industrial centers of the world. Unhappily, there are many residents and legislators of our downstate population who take the position that there is a difference in point of view between the two sections. Yet, I am hoping the rest of the state eventually may recognize Cook County's difficulties, for it has sympathized with its difficulties in many respects. I feel quite sure, however, that the rest of the state will not be willing to assume any of the local burdens of the Cook County or Sanitary District government.

We have a very disturbed condition in the mining industry of our state, one of the greatest industries in the state. For the past months, one county is being policed by state militia, and within the last few days I have had to order three companies of militia into this very county, where we are now meeting, Sangamon County, where the Capitol of the state is located. To prevent a general conflagration among the miners of the state, this matter must be rapidly and efficiently dealt with.

Bloodshed and destruction of property has already occurred. You can well understand the difficulties of such a situation in the present unhappy state of the people's minds, and its direct relation to the financial problem of our state. The present cost of militia maintenance is $3,000 or $4,000 daily, and no one can say to what extent that may increase.

I am convinced from my contact with people of all kinds and callings throughout the entire state, that one of the most important problems we confront is the essential reduction in governmental expense, with an ultimate reduction in taxation.

This mining controversy, which, by the way, has been punctuated with general riots and like disturbances, is not the only serious problem of its kind. In one county, we have a situation where the farmers have armed themselves and formed large bodies which are preventing the functioning of the courts in foreclosures. Many of these foreclosures have their origin in tax defaults because of the inability of the farmer to pay his taxes. Just to what extent this will spread, I cannot tell, but it is one of the serious problems of the state.

Need I stress here the effect that banking disturbances in the nation, including this state, is having on our state problem?

These are only a few of the considerations which suggest themselves. Any proposal to be submitted to the legislature, involving the assumption by the entire state of the cost of what the entire state has always heretofore regarded as a local problem in Cook County, that is the sewage disposal construction program of the Sanitary District, is one which would be regarded as unthinkable and not to be contemplated seriously under existing conditions by anyone who really knows the facts in this state.

Another great problem which confronts the State of Illinois at the present time is the unemployment relief. We are doing our utmost in this respect, but our financial capacity under existing conditions to meet bare necessities of human needs, seems utterly insufficient. So far, we have been able to do so by the help of the federal government. The nature of this problem, the constant appeal which must be made to the legislature in this connection, makes it one which every person in official responsibility knows. Without regard to any other consideration, in my opinion, it must come first.

Approximately 800,000 persons throughout our state, by reason of widespread unemployment, have become entirely dependent upon private and public relief, and, of course, have enlisted the sympathetic interest and concern of both state and federal governments. At first, our efforts in Illinois were made to give aid through private subscriptions and agencies, and through local public charities. When those resources were exhausted, and they were shortly, every possible method was devised to meet the almost ghastly situation. Through the Illinois Emergency Relief Commission, with the aid of the Reconstruction Finance Corporation, public funds have been used to an almost fabulous extent. More than thirty odd million dollars have been furnished alone by the Reconstruction Finance Corporation.

Our relief representatives are now in Washington, seeking some six and one-half millions, or thereabouts, which, as I understand it, is the last moneys Illinois will be entitled to receive under the provisions of the present Reconstruction Finance Corporation fund. If we get this, and it has not yet been allowed—I just heard from Mr. Ryerson yesterday evening by phone, although I am inclined to think it may be—it will carry us only through the month of March. What is to be done after that, no one can now say.

It is not difficult to imagine the possibility of bread riots, and like difficulties, in the large centers of this state, where relief is not available and unemployment still continues. We are trying to meet the necessity for relief by a sales tax, which has already gone through our State Senate, and is now under consideration by our House of Representatives, and we are not sure of easy sailing by any means in that house.

With these difficulties facing the state entirely on the problem which deals so intensely with human sympathies, you can well imagine the insurmountable difficulties our state would have in carrying an additional burden resulting from asking the entire state to bear the cost of an obligation which the Supreme Court has fixed upon a limited locality in the state, such as the Sanitary District.

Of course, we cannot permit our fellow-citizens to starve, nor to deny them shelter, clothing and the mere sustenance of life. And, mind you, they are not those that are usually dependent upon charity; they represent hundreds of thousands of fine men and women, who are well and anxious to work, but who are so situated because of general unemployment. Notwithstanding what the record in this case may have implied, I cannot believe that the sister states of Illinois are willing to destroy entirely the hope of our state in our effort to extricate ourselves from our present catastrophe. Personally, I know little about the origin of the tremendous amount of litigation of which this present hearing is an outgrowth. My search for information, since the matter has been brought to my attention within the last weeks, has brought to light the fact that there never has been a conference between the respective states regarding any liability or obligation of the State of Illinois in the whole matter. These are times when harmony of action by all the states is necessary to meet the constantly multiplying problems of the nation, and I cannot therefore fail to express wonderment that no conference between the states interested in the controversy has been called. And I say this, for I propose at a reasonably early date to try to bring about such a conference. It seems to me that honest and earnest efforts should be made by the states interested to adjust their controversies before the United States Supreme Court is asked to pass further upon these interstate political, economic and local problems, in ~~so far as~~ they affect the states.

I have suggested very briefly a few of the practical considerations which in my opinion demonstrate the impracticability, yes, the impossibility, of the recommendations under consideration by the Special Master. It may be that the inquiry addressed to the Special Master by the Supreme Court called for a survey of those possibilities. However, whatever the court's view on that subject may be, surely that court will also give consideration always to practical problems, and I cannot conceive that the court will determine upon any action without the essence of its actions being influenced by the possibility of performance. I have no hesitancy in saying that, unless conditions rapidly and marvelously change for the better, the capacity of our state to find a market during each of the next four years for thirty-five millions of bonds, if such an unusual thing were required by the court, is an impossibility. This would be so even without the other present and future financial necessities of the state.

I am not sure what the scope of your inquiry may be, except as I have just heard it from the Master. It is, of course, difficult for me to comprehend how it is possible for any court to impose upon our state responsibility for the obligations of a local tax-spending municipality like the self-controlling Sanitary District.

Any recommendation of the Master of this character calls for action by the Legislature of Illinois. It would be a mandate to direct and control the legislative discretion of the General Assembly of Illinois. Aside from what seems to me the clear illegality of any such proposal under the circumstances of this case, I cannot conceive how such control could be made effective. Notwithstanding the fact that every right-thinking citizen of this country recognizes the importance of the Supreme Court as a paramount factor in our structure of government, and the dignity and weight which must be attached to its conclusions, the practical problems which would confront each member of the General Assembly must inevitably receive consideration by the court in this case. Aside from the necessity of opposing tax increases beyond the ability to pay, a necessity which is not a matter of sentiment at the present moment, but one of compelling force, is the humanitarian problem of unemployment relief, which in my judgment comes first.

May I interpolate here a suggestion that must never be lost sight of in the relation of the federal government and its courts to a sovereign state? At the cost of blood and war, our nation has definitely and forever determined that one state may not destroy the Union. It is equally important to the perpetuity of our constitutional form of government that the United States cannot destroy a state. Any action by the court in this case, to destroy Illinois financially, will have that effect. It should be needless to add in this record that the power to tax may also be the power to destroy.

It always has been the fundamental political philosophy of the State of Illinois to accord to local communities local self government. This is reflected in our Constitution in that provision which gives to local corporate authorities elected by the people control over local taxation. Surely, the recommendation of the Special Master, aside from other considerations, ought not contemplate such a destruction of this fundamental of Illinois government and thus run counter to every trend of political thought and habit in this state. Surely, no incident in the long history of our state has given any justification for the thought by any fair mind that our state, as a sovereign member of the Union, has failed to carry out any valid obligation to any sister state and to the nation. We do not consider the obligation of the Sanitary District of Chicago the obligation of the State of Illinois.

Frankly, I question the power of the Supreme Court to set aside the Constitution of the state; or that it possesses authority to control the legislative discretion of its General Assembly. With this belief, which is shared by our Attorney General and our counsel in this case, I would view with grave apprehension any attempt on the part of the court to exercise such a power. In a period when the entire world is suffering from an economic catastrophe, and when it is frequently said that the very structures of our civilization are being attacked, and in some localities are weakening, I believe it would be a grave misfortune to have the State of Illinois put in a position where its own dignity and its right of self-determination was denied, and it founds itself incapable of complying with and according respect to any mandate or judgment of the Supreme Court of the United States. I cannot believe that the Supreme Court will go as far as the petitioners in this case suggest.

It is apparent that the decree must be modified in order to give more time to the Sanitary District for its accomplishment. When economic conditions improve, tax revenues will undoubtedly increase, and, as shown by the experience of the past, the Sanitary District then ought to be able to finance its own program.

The state is financially unable to assume this burden of the Sanitary District, and even if it were, it ought not, in justice, be asked to do it.

Those are the facts. Whatever theoretical arguments may be possible to support the theory of the petitioners, so far as the State of Illinois is concerned, practical considerations themselves deny the possibility of such theory.

Mr. Lynde: You may cross examine.

Mr. Jackson: If the Master please, I desire, on behalf of the complainants, to make a separate motion to strike out each and every sentence in the statement read by the witness, upon the grounds that the statements are irrelevant; that the testimony offered is wholly incompetent; that it is largely hearsay; that it is wholly argumentative; that it undertakes to make conclusions of fact and law which invade the province of the Special Master, undertakes to state as a matter of evidence conclusions of law and fact which would be found and made by the Special Master, if material; that it undertakes to express opinion evidence without any qualifications shown on the part of the witness to express an opinion, and upon subjects which are not susceptible of opinion evidence.

The Master: As I said earlier in the case, anything which I would strike out on the ground that it was not admissible, I should ignore if it was left in. I see no advantage in dealing in detail with the different statements. It is true that there is a good deal in it that is argument, rather than testimony; it is argument of a character which it would be proper for counsel for the State to address to me, and in its substance, although not in the same phraseology, counsel for the state have already presented such arguments. It seems to me that those arguments are things which, as arguments, I should consider in this case, and give them the weight that in my judgment they prove to be entitled to.

Mr. Jackson: My objection does not go to them as an argument, whether it is irregular or otherwise in that respect, but merely so far as they may purport to state facts which, if evidence, in the regular course, would be something that might be susceptible of rebuttal.

Mr. Lynde: There is a good deal that can be said in reply to Mr. Jackson's objection, but I want to point to one consideration. Your Honor's recommendations, or those at least which are under consideration, or suggested here in the tentative report, impose on Governor Horner, in connection with his constitutional responsibility, action on matters which he must decide which he is called upon to give consideration to, not only officially as executive of the state, but also in connection with the advice which he, as such, is called upon to give to the legislature. Now, I submit that his opinions, or that matter which might be referred to as argument, as illustrative of the official mind, from the viewpoint which he must have in dealing with this matter, is competent evidence for your Honor to consider, because it presents necessarily a picture of the future which must be before him when those things, if they are to be done, are attempted to be carried out. I submit they are the very essence of the matter which the court in its wisdom must give consideration to in deciding on the propriety of the recommendations of this nature. There are other things that can be said, but it is from that standpoint and with the idea of carrying out what I conceive to be our idea to the court, because this testimony is a fair statement of the situation which prevails in this state.

4/17 Jos B. Fleming
Cornelius Lynde
Raymond J. Jackson
By acct for all

Office Supreme Court,
FILED
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IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1932.

Wm Rothmann

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, Complainants, vs. **STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,** Defendants, **STATE OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,** Intervening Defendants.	No. 5, Original.

STATE OF MICHIGAN, Complainant, vs. **STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,** Defendants.	No. 8, Original.

STATE OF NEW YORK, Complainant, vs. **STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,** Defendants.	No. 9, Original.

BRIEF OF THE SANITARY DISTRICT OF CHICAGO ON LEGAL QUESTIONS PRESENTED BY REPORT OF EDWARD F. McCLENNEN, SPECIAL MASTER.

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IN THE

Supreme Court of the United States

October Term, A. D. 1932.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, Defendants, STATE OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, Intervening Defendants.	No. 5, Original.
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BRIEF FOR THE SANITARY DISTRICT OF CHICAGO ON LEGAL QUESTIONS PRESENTED BY REPORT OF EDWARD F. McCLENNEN, SPECIAL MASTER.

I.

The Court is without power to make any further order enlarging, amending or modifying the decree of April 21, 1930.

Under its constitutional power to regulate commerce between the States, Congress possesses complete and paramount power over all navigable interstate waterways and whenever Congress chooses to exercise that power it becomes exclusive.

In and by the Rivers and Harbors Act of July 3, 1930, Congress established a continuous Federal navigation project

from Lake Michigan to the Mississippi River and assumed complete and plenary control over the diversion of water from Lake Michigan through the Chicago sanitary canal.

Notwithstanding the views herein expressed as to the lack of power of the Supreme Court, the Sanitary District, in good faith, fully intends with all possible expedition to complete its program of construction of sewage treatment works and appurtenances which in fact was under way prior to the entry of the decree.

There can be no doubt that under its constitutional power to regulate commerce between the states, the Congress possesses complete power over all navigable interstate waterways, and whenever Congress chooses to exercise that power it becomes exclusive and paramount. It must necessarily follow, therefore, that therefter the Supreme Court is precluded from exercising any power of regulation or control over such waterway. In his report on the original reference, the former Special Master (now Mr. Chief Justice Hughes), among other things said (page 148):

> "My conclusion is that the action of Illinois in diverting water from Lake Michigan through the drainage canal of the Sanitary District was, and is, unlawful *unless validly permitted* by Congress either directly or through the action of the Secretary of War." (Italics ours.)

The complainant states challenged the power of Congress to permit the diversion then in question, either directly or through authority conferred on the Secretary of War, upon the grounds

> "(1) that the diversion constitutes a taking of complainants' property without due process of law and without just compensation in violation of the Fifth Amendment; (2) that Congress could not authorize the diversion from the Great Lakes-St.

Lawrence watershed to the Mississippi watershed; (3) that the authorization of the diversion would constitute a preference of the ports of one State over those of another in violation of Article I, Section 9, Clause 6, of the Constitution; (4) that the power of Congress extends to the protection and improvement of navigation but not to its destruction or to the creation of obstructions to navigable capacity; and (5) that the diversion is for purposes of sanitation and development of power rather than of navigation and hence is outside the authority of Congress under the commerce clause" (Report, page 149).

Each of these contentions was carefully examined by the Special Master, who upon consideration denied their validity (pages 149 to 170 inclusive). In his discussion of number (4) the Special Master said (page 164):

> "I find no basis for a different rule with respect to the abstraction of water from Lake Michigan and the consequent lowering of lake levels. The question whether such an abstraction should be altogether prohibited, or the extent to which it should be permitted with regard to the interests of navigation, when and in what circumstances and in what amount a diversion of water from the lake would constitute an obstruction to navigation, are questions *within the power of Congress to decide* in the exercise of its control over navigable waters for the purposes of navigation. When these questions *have been determined by Congress,* or under its authority validly conferred, they are *not open to reconsideration by the court.*" (Italics ours.)

In discussing the extent of the power of Congress and the supposed power of the court to review the exercise of the same the Special Master said (page 161):

> "But it does not follow that when Congress does act in reasonable relation to the control of navigation, the Court may review the exercise of the dis-

> cretion of Congress and decide for itself whether that which Congress has authorized is a benefit to navigation or the reverse. It is of the essence of the power of Congress that it has the final determination of that question. The improvement of navigation, the protection and promotion of its facilities and the creation or removal of obstructions to it, involve questions of relation and degree. What may appear to be a destruction or obstruction at one point, with respect to the interests of navigation, may be a benefit or improvement to navigation at another point or in the light of a different relation. When it appears that navigation is affected, it also appears that the question is one for Congress to decide in the light of all pertinent facts. * * * It is for Congress, after considering, as it is presumed to consider, the interests of particular localities and of all regions that may be affected by its action, and the consequences to navigation in all its aspects, to determine what is or is not to be deemed an obstruction to navigation, *and its decision in this respect is not subject to judicial review.*" (Italics ours.)

The report of the eminent and learned Special Master spoke as of a date prior to the passage of the "Rivers and Harbors Act" of July 3, 1930. At that time there was no authorized continuous federal navigation project extending from Lake Michigan to the Mississippi. In other words, Congress had not exercised the powers which under the constitution it indisputably possessed over that portion of the "Lakes to Gulf waterway" which had not yet been made a part of the federal project. It was undoubtedly for that reason that in his report on re-reference the Special Master said (page 122):

> "Under the opinion of this Court in the present suits, the question of the allowance of a diversion of water from Lake Michigan in the interest of a

> waterway to the Mississippi is not deemed to be open to consideration. The Court found that *Congress had not acted directly so as to authorize the diversion in question,* and the Court referred to the declaration of Congress in the Rivers and Harbors Act of January 21, 1927, (44 Stat. 1013), providing for the improvement of the channel of the Illinois River, that nothing in the Act should be construed as authorizing any diversion of water from Lake Michigan. Accordingly, in dealing with the claims of the States intervening herein on the side of Illinois, the Court said that 'They really seek affirmatively to preserve the diversion from Lake Michigan in the interest of such navigation' (of the Mississippi) 'and interstate commerce though they have made no express prayer therefor. In our view of the permit of March 3, 1925, and *in the absence of direct authority from Congress for a waterway from Lake Michigan to the Mississippi,* they show no rightful interest in the maintenance of the diversion' (278 U. S. 367, 420)."

It is respectfully submitted that there can be no doubt that throughout both reports of the Special Master and throughout the opinions of the court wherever the subject matter is discussed, it is recognized that whenever it chooses to exercise the same, plenary power is possessed by Congress to the exclusion of all authority over questions relating to and affecting navigation in and upon federal waterways and (in so far as they may affect navigation) questions of diversion of water for purposes of sanitation.

It is respectfully submitted that the passage of the "Rivers and Harbors Act" of July 3, 1930, carried with it as a necessary consequence the assumption by Congress of complete and plenary control over the diversion of water from Lake Michigan through the Chicago sanitary canal for any purpose whatever, either navigation or sanitation, and thereby excluded the further exercise by the Supreme Court of power over the same subject matter. In other words, the question of diversion has been removed from the jurisdiction of the Supreme Court.

In and by said act, the Congress adopted the Illinois River as an authorized federal navigation project, and thereby established a continuous and connected federal project from the mouth of the Chicago river to the Mississippi River. The language of the act in part is as follows:

> "That the following works of improvement are hereby adopted and authorized, to be prosecuted under the direction of the Secretary of War and supervision of the Chief of Engineers, in accordance with the plans recommended in the reports hereinafter designated. * * * *
>
> "Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in the Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway; *Provided,* that there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000: *Provided further,* that the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12, Original—October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway:

> *Provided* further. That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable."

Whether or not the jurisdiction of the Supreme Court over the question of diversion was superseded by Congress in the passage of the "Rivers and Harbors" act of 1930 is to be determined by ascertaining whether or not that act evidences an intention on the part of Congress to assume and exercise control over the waterway. If such intention is evident, then, since the power of Congress is plenary and paramount in respect to diversion for any purpose, it must necessarily follow that in this instance the power of the legislative has displaced that of the judicial department of the federal government.

It is respectfully submitted that the intention of Congress to assume control over the waterway so clearly appears that no room is left for argument.

If the "Rivers and Harbors" act were silent in reference to the question of diversion or the quantity thereof, there might be some possibility of arguing that Congress had not yet chosen to exert the full measure of its power and that the decree of the Supreme Court should be regarded as binding and effective until superseded by specific action on the part of Congress. But the act specifically deals with, among other things, the question of diversion. Thus it provides that the:

> "water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States rendered April 21, 1930, and reported in volume 281, United States Reports, in cases number 7, 11 and 12 Original—October Term, 1929 * * * is hereby authorized to be used for navigation of said waterway."

The act also provided for the making of a study

> "of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway,"

the results of such study to be reported to Congress on or before January 31, 1938.

If Congress in the "Rivers and Harbors" act had specifically authorized a diversion of quantities of water different from those specified in the decree, it is believed that no one would for a moment doubt that the provisions of the decree to that extent were superseded. The mere fact that Congress authorized the same quantity of diversion as that specified in the decree does not alter the fact that Congress has acted,—that it has chosen to exercise the power which it at all times possessed. The act specifies the diversion permitted shall remain in force until January 31, 1938, and that when Congress shall receive the report in the act referred to, Congress will then fix the maximum or minimum quantity of diversion to be permitted.

There consequently is no room for the contention that by adopting the figures specified in the decree Congress intended that the decree should continue in force or that the power of Congress in the premises should be subordinate to that of the court.

The opinion of the court (281 U. S. 179) expressly recognized the paramount power of Congress over the subject matter and in effect implied that if and when Congress should choose to exercise its power, it might do so notwithstanding the decree to be entered. In other words, it fairly may be said that the decree was entered without prejudice to the right of Congress under its plenary and paramount power to assume control over the matter of diversion.

Thus, in the opinion the court, speaking through Mr. Justice Holmes, said (page 197):

> "These requirements as between the parties are the constitutional right of those states, subject to whatever modification they hereafter may be subjected to by Congress acting within its authority. It will be time enough to consider the scope of that authority when it is exercised. In the present condition there is no invasion of it by the former decision of this court as urged by the defendants. The right of the complainants to a decree is not affected by the possibility that Congress may take some action in the matter."

Again the Court said (pp. 198, 199):

> "All action of the parties and the court in this case will be subject, of course, to any order that Congress may make in pursuance of its constitutional powers and any modifications that necessity may show should be made by this court."

As to the general proposition that the federal government possess complete and paramount jurisdiction whenever it chooses to exercise the same over interstate navigable waters and that this power is vested primarily in the legislative department of the federal government and by it from time to time delegated to the executive department, the authorities are numerous and uniform.

Below are cited some of the decisions of this Court which specifically recognize the paramount authority of the Congress over navigable interstate waters:

Pennsylvania v. *Bridge Co.,* 59 U. S. 421.
Wisconsin v. *Duluth,* 96 U. S. 379.
South Carolina v. *Georgia,* 93 U. S. 4
Sanitary District v. *U. S.,* 266 U. S. 405.
Oyster Co. v. *Briggs,* 229 U. S. 82.

A large number of additional cases will be found cited in 8 Ency. U. S. Supreme Ct. Rep. 854, note 27.

It may be contended that the Supreme Court may retain jurisdiction to compel the Sanitary District to carry out the construction program so that it will not be necessary to have the diversion augmented by Congress to obviate pollution in the waterway; that Congress in the Rivers and Harbors Act of July 3, 1930, did not ignore the premises upon which the decree was based, and cannot relieve the Sanitary District of any duty imposed by the decree.

We submit that such contentions would be utterly untenable.

The Supreme Court has no power to act concurrently with Congress in respect of diversion either for sanitation or for navigability. The power of Congress in both respects is plenary, paramount and exclusive; and Congress unquestionably has the power to supersede that part of the decree of the court which deals with diversion.

The Court recognized that its jurisdiction terminates when Congress acts. We previously have quoted from the decision to that effect in the case of *Wisconsin* v. *Illinois, supra.*

We have also previously quoted from the report of the Special Master (Chief Justice Hughes) in which he held that Congress has the power to legislate for the prevention of pollution.

It is respectfully submitted that once Congress has exercised its power over navigable water, the only power that is left the Supreme Court is a reviewing power to determine whether Congress has acted within constitutional limits; and whether the Secretary of War to whom Congress has delegated power has abused his discretion. The established rule is that the courts have no power to control or defeat the will of Congress in respect of navigable waters provided that Congress acts reasonably and does not transcend the limits established by the law of the land.

8 *Ency. of Supreme Ct. Rep.*—p. 855.

Congress is not bound by the executory provisions of the decree.

Those provisions, being executory, are subject to change or modification by Congress. In fact, those provisions may be ignored by Congress and Congress independently may fix the amount of diversion. If Congress did not possess this right, its power could be nullified by the court. Instead of Congress having the plenary, paramount and exclusive power, the court would possess that power.

There are explicit decisions of the Supreme Court which directly or by analogy support our contention that the Rivers and Harbors Act of July 3, 1930, supersedes the executory provisions of the decree.

Perhaps the leading case and one that is squarely in point is that of the *State of Pennsylvania* v. *Wheeling and Belmont Bridge Company,* 18 How. (59 U. S.) 421.

This was an original proceeding in the Supreme Court begun by bill filed by the State of Pennsylvania for the removal of an alleged obstruction to the navigation of the Ohio River caused by the erection and maintenance of certain bridges at Wheeling.

In May, 1852, the Court rendered a decree which declared the bridge in question to be an obstruction of the free navigation of the Ohio River and directed that the obstruction be removed either by elevating the bridge to a height designated or by abatement.

In August, 1852, before the decree had been executed, by an Act of Congress, the bridges were declared to be lawful structures in their then condition.

Subsequently the main bridge was blown down in a storm.

The company was making preparations to rebuild it when the State of Pennsylvania filed a bill praying for injunction.

No opposition was made on the part of the company and the injunction was granted as a matter of course. The company disregarded the injunction. There were motions by the State for attachment and sequestration of the property of the company for contempt and a motion by the company to dissolve the injunction. The Court denied the motion for the attachment and granted the motion to dissolve the injunction. In its opinion the Court, among other things, said (page 431):

> "The defendants rely upon this act of Congress as furnishing authority for the continuance of the bridge as constructed, and as superseding the effect and operation of the decree of the court previously rendered, declaring it an obstruction to the navigation."

In deciding that the act of Congress superseded the the decree, the Court said (pp. 431-432):

> "Now, we agree, if the remedy in this case had been an action at law, and a judgment for damages, the right to these would have passed beyond the reach of the power of Congress. * * * * But that

> part of the decree, directing the abatement of the obstruction, is executory, a continuing decree, which requires not only the removal of the bridge, but enjoins the defendants against any reconstruction or continuance. * * * * If, in the meantime, since the decree, this right has been modified by the competent authority, so that the bridge is no longer an unlawful obstruction, it is quite plain the *decree of the court cannot be enforced.*"

This case has been cited with approval in the following cases:

Hodges v. *Snyder,* 261 U. S. 600, 603, 604.

U. S. v. *Chandler-Dunbar Co.,* 229 U. S. 53, 64, 65.

Luxton v. *Bridge Co.,* 153 U. S. 525, 531.

Miller v. *Mayor of New York,* 109 U. S. 325, 396.

Bridge Co. v. *United States,* 105 U. S. 470, 480, 481, 482, 483.

Stockdale v. *Insurance Companies,* 20 Wall (87 U. S.) 323, 332.

The Clinton Bridge, 10 Wall (77 U. S.) 454, 462.

The case of *Wisconsin* v. *Duluth,* 96 U. S. 379, was an original proceeding in the Supreme Court begun by bill in equity by the State of Wisconsin praying for an injunction to restrain the city of Duluth from maintaining a canal which had been constructed by the city, the effect of which was to lower the level of the water in the St. Louis river and to injure and destroy the navigable waterway adjacent to the State of Wisconsin. A mandatory injunction was also prayed to compel Duluth to fill up the canal and to restore things in that regard to the condition of nature in which they were before the canal was made.

It appeared that theretofore Congress had taken control of all waters involved in the controversy, and approved the construction of the canal and had appropriated money for pier and harbor work in the harbors of Duluth, Superior City, etc.

In denying the relief sought and dismissing the bill, the Court among other things said (page 382):

> "The answer also sets up as an affirmative defense to the relief sought by the bill, that the United States, by the legislative and executive departments of the government, have approved of the construction of the canal; have taken possession and control of the work; have appropriated and spent money on it, and adopted it as the best mode of making a safe and accessible harbor at the western end of the lake navigation."

The Court held that the evidence showed that the Congress had assumed jurisdiction and control of the canal and harbor improvement and that such was within the constitutional power of Congress.

In discussing the exclusive character of the power of Congress the Court said (page 383):

> "It cannot be necessary to say that when a public work of this character has been inaugurated or adopted by Congress and its management placed under the control of its officers, there exists no right in any other branch of the government to forbid the work, or to prescribe the manner in which it shall be conducted."

In discussing the respective powers of Congress and the Supreme Court, the Court said (page 387):

> "If then Congress in the exercise of a lawful authority has adopted and is carrying out a system of harbor improvements at Duluth, this Court can have no lawful authority to forbid the work. * * *"

In the case at bar if Congress did not have the power to supersede the executory provisions of the decree in respect of diversion, there would exist the anomalous situation of the Supreme Court exercising a compulsory power over the Sanitary District to compel the District to comply with the construction program of the decree or be deprived of the right to divert water, although under the Act of Congress the District would have the right, without any conditions imposed, to a diversion of the same amounts of water as prescribed in the decree.

The Rivers and Harbors Act of July 3, 1930, does not provide explicitly that the Supreme Court may retain jurisdiction to compel the Sanitary District to comply with the executory portions of the decree, and reasonably, it cannot be maintained that it so intended by implication. Such an interpretation would be contrary to the maxim *expressio unius est exclusio alterius.* The Act refers to the decree for one purpose only and that is as to the measure of the diversion. The very fact that the Act makes no other provision in respect of the decree would exclude the interpretation that the Act intended that the executory parts of the decree should remain in force. Furthermore, this conclusion is strengthened when we consider the conflict which would result from the concurrent exercise of power by Congress and the Supreme Court.

In the executory parts of the decree in regard to future diversions, the court (by way of injunction, and negatively) exercised the power to grant permission to the Sanitary District to divert certain quantities of water. But this power now belongs exclusively to Congress, and consequently, the court no longer possesses such power, if it ever did.

In view of the authorities and what is hereinbefore said, it is respectfully submitted that since Congress has now chosen to exercise its power and since that power when exercised is plenary and paramount, the jurisdiction of the court has now been superseded or excluded and the court is without power further to deal with the matter, except in so far as it may possess the power of passing upon the legality or otherwise of any order which hereafter may be made or permit issued by the Secretary of War in the exercise of the powers delegated to him by Congress.

Respectfully submitted,

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Office Supreme Court,
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IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1932.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants,
STATE OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,
Intervening Defendants.
No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 8, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 9, Original.

BRIEF OF DEFENDANT, THE SANITARY DISTRICT OF CHICAGO, ON FACTS AS PRESENTED IN THE REPORT OF EDWARD F. McCLENNEN, SPECIAL MASTER.

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IN THE

Supreme Court of the United States

October Term, A. D. 1932.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, Defendants,
STATE OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, Intervening Defendants.
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STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.
No. 9, Original.

BRIEF OF DEFENDANT, THE SANITARY DISTRICT OF CHICAGO, ON FACTS AS PRESENTED IN THE REPORT OF EDWARD F. McCLENNEN, SPECIAL MASTER.

STATEMENT OF OBJECTIONS TO THE SPECIAL MASTER'S REPORT AND SUMMARY OF ARGUMENT.

To the Honorable The Chief Justice and The Associate Justices of the Supreme Court:

The Special Master, Edward F. McClennen, has proceeded upon the premise that the facts found by the former Special Master, now Mr. Chief Justice Hughes, should be taken as unchangeable in this reference. And as facts found in the former references, the Special Master has erroneously assumed as definitely decided (1) that the hydraulics of the Chicago River will not permit a reduction in diversion to 5,000 c.f.s. without controlling works and that controlling works are a necessary condition precedent to a reduction in diversion below 6,500 c.f.s.; and (2) that the Southwest Side Treatment Works cannot be constructed in less than 5½ years, which was the time *allowed* for this work by the former Special Master, and that the time for the preliminary steps allowed by the former Special Master constituted a definite requirement and was inflexible, and that the work can not be completed within a shorter time than that allowed. The Special Master has proceeded upon the further belief that "the facts decided by the two former opinions and by the decree must be taken as unchangeable," and apparently deemed it incumbent upon him to suggest some means of financing the project, so that it can be completed by the end of 1938, irrespective of the financial situation of the Sanitary District, regardless of how drastic the means employed might be, and notwithstanding that the former Special Master and the decree suggest the possibility of unforeseen obstacles which might be so serious as to call for a modification of the decree.

So firmly has the Special Master adhered to this hypothesis and his conception, which we believe to be erroneous, as to what actually was found by the former Special Master and his construction of the requirements of the decree and of the scope of this reference, that he has been unable in our judgment to give due consideration and attach proper significance to much of the testimony presented by the defendants. As the report indicates, the defendants contend that there is error in many of the findings of the Special Master which form the basis of the conclusions reached by him, and because we believe that considerable important testimony has been ignored or misapprehended we are called upon to refer to the record at some length in order to sustain our contention. We believe the circumstances of the case require an analysis of much of the evidence and we assume that inasmuch as the order of the Court does not provide for an abstract of the evidence we may have more than the usual latitude in our references to the testimony.

Before proceeding with our argument we shall, for convenience, summarize our objections to the respective conclusions of the Special Master, which we contend should not be adopted by this Court.

The findings of the Special Master with respect to the causes of the delay in obtaining approval of the construction of controlling works in the Chicago River, insofar as they impute delinquency to the Sanitary District, are erroneous and should not be confirmed by this Court for the following reasons:

(a) Uncontroverted testimony establishing the futility of doing anything more than was done by the Sanitary District, because of the attitude of the War Department, and other reasons, is misapprehended by the Special Master and inaccurately presented in his report.

(b) The Special Master misconceives the duty of the Sanitary District under the decree of April 21, 1930, and fails adequately to state what the Sanitary District regarded its duty to be under the decree.

(c) The Special Master misconstrues entirely the effect of the Rivers and Harbors Act of July 3, 1930; he misinterprets the reports and statements of officials of the War Department with reference to the flow required to maintain a nine-foot depth in the Illinois River from Utica to the Mississippi, (as distinguished from Lockport to Utica) and miscomprehends the present attitude of the War Department on this subject.

(d) The Special Master excluded evidence relating to the flow required to maintain navigation on the now authorized Federal Project between the Port of Chicago and the Mississippi River, but makes an erroneous finding on this point.

(e) The Special Master improperly injects the proposed Canadian Treaty into the case.

(f) The Special Master construes erroneously the former opinions of this Court in these cases.

(g) The Special Master does not state with precision the present attitude of the Sanitary District with respect to the installation of controlling works.

(h) The Special Master errs in proceeding upon the belief that the facts found by the former Special Master must be taken as unchangeable in the present reference; he errs in his conception of what actually was found by the former Special Master and he ignores the express qualification of the former Special Master upon the findings then made.

The recommendations concerning the steps which should now be taken to secure the approval of the War Department of the construction of controlling works, are erroneous and should not be confirmed by this Court because it has been demonstrated that controlling works are not necessary as long as the diversion is 5,000 c.f.s. or more, as it will be at the end of 1935. The Sanitary District Engineers testified in the present reference that the hydraulics of the Chicago River and the Drainage Canal, after the construction of certain large intercepting sewers along the portions of the Chicago River adjacent to Lake Michigan, will permit a reduction in diversion to 5,000 c.f.s. without the installation of controlling works and without danger to the metropolitan water supply. The testimony of these engineers was based upon their experience and knowledge gained since the hearings in 1929. The installation of controlling works will serve no useful purpose until the diversion is reduced to a figure below 5,000 c.f.s., which will not occur, if it occurs at all, before the end of 1938. Controlling works can be built in two seasons.

Aside from the constitutional and legal difficulties presented, the recommendation concerning enforced State financial aid is premature, unreasonable and unnecessary.

In finding as a cause of delay in providing for the construction of the Southwest Side Treatment Works "an inexcusable and planned postponement of the beginning of construction of these Works to January 1, 1935 which left an inadequate time for their completion before December 31, 1938, at the rate of progress expected or to be expected under the methods pursued by the Sanitary District," (Rep. 50) the Special Master errs for the following reasons:

(a) The uncontradicted and unchallenged testimony in this reference is that the Sanitary District adopted a program after the entry of the decree in 1930 (set up in the form of a graph or chart and introduced as Exhibit 22) which contemplated the beginning of the physical construction of these works about January 1, 1935, and allowed sufficient time for completion of the works before the end of 1938, so that a reduction in diversion to 1,500 c.f.s. would be accepted as provided in the decree.

(b) The Special Master errs in assuming the allowance made in the recommendation of the former Special Master for the construction of these works to be the minimum time in which the works might be constructed.

(c) The Special Master errs in ignoring the unchallenged testimony in this reference that the works can be constructed in the time allotted, namely, four years, beginning about January 1, 1935.

The finding as a further alleged cause of delay in providing for the construction of the Southwest Side Treatment Works, that the Sanitary District failed "to proceed to a definite decision as to a site and to the acquisition of the site so chosen," and failed "to proceed with reasonable diligence to prepare designs, plans, and specifications for the Works at this site or on the site of the West Side Works," (Rep. 50) is erroneous, because:

(a) The evidence establishes that the opposition to the proposed Southwest Side site and the difficulties encountered in the digestion of sludge at the West Side Plant by the Imhoff Tanks justified the Sanitary District in experimenting with the dewatering and incineration of sludge, a method of disposal of sludge which eliminates the Imhoff Tanks and open-air drying beds; if practicable and if adopted, the dewatering and incineration method, which requires much less space, would enable the Sanitary District to combine the Southwest Side Treatment Works with the West Side Treatment Works on the West Side site.

(b) No delay in the construction of the Southwest Side Works or its equivalent is attributable to the alleged indecision as to a site and alleged lack of diligence in the preparation of designs, plans and specifications for the Works at this site or on the site of the West Side Works.

The Sanitary District is opposed to the Master's recommendation that the decree of April 21, 1930, be enlarged by the addition of a paragraph enjoining the "State of Illinois to provide forthwith the necessary money for, and * * * forthwith to determine upon and secure the site * * * if the site is not owned already by the Sanitary District and forthwith to design and to construct said Southwest Side Treatment Works * * * at a rate of progress forthwith that except for casualties not now foreseeable will result in the completion of said Works and the beginning of their operation in ordinary course before December 31, 1938" (Rep. 60). The Sanitary District is prepared to construct the Southwest Side Treatment Works as soon as the necessary funds are available. It is not a certainty as yet, and no such contention was made in this reference, that the Sanitary District will not be able to raise the necessary funds in sufficient time to complete the construction before the end of 1938.

We shall discuss separately the reasonableness and wisdom of enlarging the decree of this Court to the end that the financial burden of the entire sewage treatment program be made a State responsibility. This phase of the case overshadows all others. The Special Master's recommendations in this respect should not be adopted, in the opinion of the Sanitary District. For reasons which will appear in our argument, an extension of time beyond 1938 in which to complete the necessary construction work is preferable to a requirement of State financial aid and responsibility, all interests considered, in the event that the Sanitary District cannot finance the entire project before the end of 1938.

Although the financial question has become paramount, we shall, before considering it, refer at some length to the evidence presented to the Special Master upon which we base our contention that his findings imputing delinquency to the Sanitary District in its progress with the construction of controlling works and the Southwest Side Treatment Works are erroneous and should not be confirmed. We maintain that in the circumstances the criticism of the Special Master is unjust and that the Sanitary District should be absolved from the reproach of the Special Master. But our primary purpose in reviewing the evidence in detail on these matters is to remove any erroneous impression that might be conveyed by the Special Master's Report, so that the Court, in its consideration of where responsibility should be placed for the remaining work to be done, will have no misconception of the diligence it may expect from the Sanitary District in the future.

The evidence is undisputed that the officials of the Sanitary District have endeavored conscientiously and with an earnest purpose to comply with the decree of this Court, and that it is the intention of the Sanitary District to effect compliance with the decree, if it is at all possible.

The Special Master has found that the charges of the complainants that there has been an unfaithful effort to delay, avoid and circumvent the performance of the decree of this Court, have not been proved (Rep. 5-6). The Special Master states, however, that the nonaction of the Sanitary District warranted a belief on the part of the complainants in the charge made (Rep. 5). This finding is objected to by the defendants.

After discussing the Special Master's conclusion regarding the charges of bad faith, our argument will follow the outline of the Special Master's Report, and we shall summarize the evidence in support of our objections to the findings and recommendations made in the order that these objections are stated above.

A brief has been prepared on the legal questions presented, and is submitted separately in conjunction with this brief on the facts.

We shall refer to the Report of Special Master McClennen as the "Report of the Special Master," and it will be abbreviated as "Rep." The Report of the former Special Master, now Mr. Chief Justice Hughes, on Re-reference, filed December 17, 1929, will be referred to as the "Report on Re-reference," and will be abbreviated as "Re-ref." The Report of the former Special Master, on the original hearing of the case, filed November 23, 1927, will be referred to as the "First Report" and will be abbreviated as "First Rep." The Record of the hearings before Special Master McClennen will be abbreviated as "Rec."

ARGUMENT.

I.

Charges of Bad Faith.

The application filed by the complaining States contains charges of a very serious character. In addition to the allegations that the alleged failures on the part of the defendants are due to an unfaithful effort to delay, avoid and circumvent the performance of the decree of this Court (Rep. 5) the application contains the following typical charges:

> "The State of Illinois and the Sanitary District of Chicago, through negligence, incompetence or bad faith, have failed, neglected and refused adequately and reasonably to provide for financing the performance of this Court's decree" (Application page 13).
>
> "This wholly inadequate provision for financing in compliance with the decree of this Court is coupled with a failure through neglect, incompetence or bad faith, to levy and collect normal taxes at any time since the decree of this Court became effective" (Application page 14).
>
> "This difficulty [in selling bonds] arose from a self-created obstacle, to-wit, from the fact that, through negligence, incompetence, or bad faith, normal and usual taxes had not been levied and collected" (Application page 15).
>
> "By a course of conduct characterized by neglect, incompetence, defiance, or bad faith, as the case may be, the Sanitary District of Chicago has wholly failed to make any real, substantial and good faith effort to perform the decree of this Court, and has wholly failed to make reasonable, substantial and bona fide progress in carrying out that decree. The State of Illinois has made no effort on her part to comply with the decree; but on the contrary, for

> nearly three years has viewed with complacency, if not approval, the neglect, defiance, and/or bad faith of her political subdivision and agency, the Sanitary District of Chicago" (Application page 16).

The Special Master reports with respect to these charges in general: "I find that the truth of the charge has not been proved and, therefore, that it is not so" (Rep. 6). The Special Master found further that the Sanitary District is not responsible for its financial plight (Rep. 78). And again, that "In the conditions which now exist, there is no reasonable financial measure which The Sanitary District can take, which it is failing to take" (Rep. 82).

With respect to controlling works the Special Master finds that: "Neither Lieutenant Colonel Weeks nor the Sanitary District intended to violate the decree of this Court" (Rep. 18).

With reference to the Southwest Side Project the Special Master states that "* * the Sanitary District was right in giving timely precedence to those other Projects, in case it was impossible to deal concurrently with all the Projects" (Rep. 55).

The Semi-annual Reports that were filed by the Sanitary District state very explicitely that delay in construction has been due to the lack of funds. The opposition encountered to the proposed Southwest Side site is explained in these Reports. Reference is made in the Semi-annual Reports to the experiments in the dewatering and incineration of sludge. The progress of design and construction is summarized in the Reports.

No statements made in the Semi-annual Reports have been disproved and the only ground for the charges made is an unwarranted inference based upon an alleged lack of action. The decree is silent with respect to controlling works and engineering detail. Charges of defiance and bad faith cannot be made upon the mere failure to perform an assumed obligation, and it is manifest that inaction does not warrant a belief of bad faith sufficient to sustain a charge of an intention unfaithfully to delay, avoid and circumvent the performance of a supposed duty. It is obvious that in any case there may be good reasons for the failure to perform a duty, and in the case of public officials who are presumed to do their duty, a charge of bad faith and circumvention should never be held to be justified unless there is sufficient evidence to rebut the presumption to the contrary. A presumption exists in favor of the validity and propriety of official conduct and municipal action.

> *Cincinnati & Texas Pacific Ry.* v. *Rankin,* 241 U. S. 319, 327.
> *Muser* v. *Magone,* 155 U. S. 240, 251.
> *Quinlan* v. *Green County,* 205 U. S. 410, 422.

Under the findings of the Special Master that the charges made have not been proved, and in the light of the evidence hereinafter referred to, we respectfully submit that this Court should find that the complaining States were not justified in making such charges in their application.

II.

Controlling Works.

(a) Formal application to Secretary of War after decree of April 21, 1930, for approval of controlling works would have been futile.

The Special Master has found that "The cause of this delay is a total and inexcusable failure of the defendants to make an application to the Secretary of War for such approval" (Rep. 5). We contend that under the practice which had been followed by the War Department in the District Engineer's office in the Chicago District, the equivalent to an informal application for controlling works was made by the Sanitary District which disclosed that the War Department was opposed to all plans or designs for controlling works which had been brought to its attention, consisting in all of about seventeen schemes, which represented all conceivable ideas on the subject, and that a formal application addressed to the Secretary of War would have been futile. After the entry of the decree Lieutenant-Colonel Weeks, the U. S. District Engineer at the time, told Mr. Ramey, a Sanitary District Engineer, that the War Department was not interested at that time in the installation of controlling works in the Chicago River (Rec. 487). And further, that the subject of control gates could be dropped with propriety for the time being (Rec. 489).

Lieutenant-Colonel Weeks testified that in his conferences with Mr. Wisner, another Sanitary District Engineer who had been placed in charge of this matter, he said to him in effect that, "We should let the matter rest until we had some intimation that the War Department wanted something done" (Weeks, Rec. 493). Weeks testified further that, "After having submitted a number of plans to the Chief of Engineers, to my mind it put the matter of deciding upon which of the numerous plans the Department would be willing to receive an application for * * *. My judgment would be that after having submitted the plans to the Department, I would do nothing to urge action on the part of the Department" (Weeks, Rec. 804-805).

According to his testimony, Weeks was definitely of the opinion that the next move was up to the War Department; he conveyed this opinion to the representatives of the Sanitary District and by tacit agreement they did not press the matter (Weeks, Rec. 492).

Weeks testified further that in his meetings with Mr. Wisner they "invariably mentioned the lack of action on the part of the Department with respect to my [Week's] report on controlling works in the Chicago River, and by tacit agreement we did not press the matter" (Weeks, Rec. 492). On the occasion of every visit, with possibly one or two exceptions, Mr. Wisner inquired of Col. Weeks whether he had heard anything from the War Department with respect to the plans submitted by Col. Weeks in his report (Weeks, Rec. 792).

Seldom as much as two months went by that Wisner did not call on Weeks (Weeks, Rec. 491). The conferences always pertained to the activities of the Sanitary District on matters for which Col. Weeks held himself responsible to the War Department, and the subject of the installation of controlling works in the Chicago River was mentioned in those conferences both before and after the decree (Weeks, Rec. 492). Weeks also testified that Wisner never stated specifically his reason for inquiring whether Weeks had heard anything from the War Department concerning the plans submitted, but his reason was known to both of them (Weeks, Rec. 792), and upon being asked by the Special Master if he stated all of the conversations that he could recall, Weeks testified that Wisner always said in so many words, "When you do hear let us know because we are ready or anxious to go ahead" (Weeks, Rec. 792-793). The Special Master in his report (page 17) states, "It is a matter of conjecture which there is no need to draw, why he said this." Manifestly, what Wisner expressed a willingness to do was to go ahead with controlling works as soon as the War Department indicated a disposition to approve controlling works.

When asked the latest date at which Wisner said "When you do hear, let us know, because we are ready or anxious to go ahead," Weeks testified that he would place the latest date approximately as midsummer 1931 (Rec. 794). With reference to the time that Weeks told Wisner that he should let the matter rest until there was some intimation that the War Department wanted something done, Weeks testified that shortly after he had telephoned Ramey, calling his attention to the fact that controlling works were not mentioned in the decree, Wisner came to see him, and it is quite probable that he said that to him at the time, which would be in April, May or June, 1930 (Rec. 796).

Ramey testified that he personally assumed that the next move was up to the War Department (Rec. 657). In spite of this testimony, the Special Master has found that the cause of the delay in obtaining approval of the construction of controlling works is a total and inexcusable failure of the defendants to make an application to the Secretary of War for such approval. The Special Master concedes the personal objection of General Jadwin, Chief of Engineers, and Lieutenant Colonel Weeks, the Local U. S. Engineer, to controlling works while a diversion of 5,000 c.f.s. or over, plus domestic pumpage, was to continue (Rep. 9, 10, 14; Rec. 498). Reference is made by the Special Master to certain portions of the conferences between Col. Weeks and the representatives of the Sanitary District (Rep. 16-19) "for such extenuation, if any, as they furnish * * and not as furnishing any justification" (Rep. 18).

It is stated by the Special Master that, "at no time in the discussions with the engineers of the Sanitary District did Lieutenant Colonel Weeks attempt to commit the War Department or intimate what might be the attitude of his superiors" (Rep. 18). Col. Weeks testified that he indicated his personal views (Rec. 487, 496). But there is nothing in the record to sustain the Master's conclusion that Col. Weeks did not intimate that his attitude was the attitude of his superiors. Col. Weeks was the local representative of the War Department and he made all these statements that have been referred to in the course of his duties. Unless there was an express qualification, the Sanitary District was justified in believing that Col. Weeks spoke for the Department, and when he said the matter of controlling works could be dropped with propriety for the time being, the Sanitary District had a right to assume that Col. Weeks was speaking in his representative capacity.

The attitude of General Jadwin, Chief of Engineers, was well known. The former Special Master summarized his testimony in part as follows:

> "As to new controlling works to prevent reversals of the river, General Jadwin at first stated that if there was a large diversion it was doubtful whether such works would be needed; that with a very small diversion the necessity becomes more pressing; that he did not know whether they were necessary with a diversion of 7,250 c.f.s. and that of 5,000 later; that the matter was under discussion. Subsequently, after full consideration in the War Department, General Jadwin made a formal statement on the subject of controlling works. He then said that with average annual diversions greater than about 6,000 c.f.s. *controlling works placed near the head of the Drainage Canal,* that is, at or near its northern or eastern terminus, *would add but little to the effectiveness already obtained* by the control at Lockport, the western terminus of the main channel of the Drainage Canal, where the present control is maintained by sluice gates and dams. He said, further, that *controlling*

> *works located at the mouth of the Chicago River would involve a serious interference with navigation;* that a control gate there located would not be necessary until the diversion was 'so low as to require its frequent operation', and, under such conditions, the closure of the river by the gate would be an unwarranted obstruction, and that if an effective control at the mouth of the river consisted of a lock with sluices, it would cause such delay and inconvenience that it would merit approval only as a last resort. General Jadwin's conclusion was that *the question of the control* of both the Chicago River and the Calumet River were *capable of practical solution, probably without any further control works,* with a total annual average diversion of 5,000 c.f.s." (Italics ours.) (Re-ref. 103).

General Jadwin, in a prepared statement submitted to the former Special Master, said:

> "The conclusion as to the general question is that *the need for further control works is not yet established.*
>
> "Control works are not necessary in the interests of navigation. However and wherever constructed they would impose some delay and inconvenience upon navigation."

* * * * *

> "From the standpoint of the protection of the water supply, it may be noted that the complete prevention of any reversal of flow into the lake is not now accomplished and is not essential. As the sewage purification progresses, the temporary amount of outflow which can be tolerated will increase. As the diversion is decreased, the difficulty of preventing considerable outflows will also increase. *It is not now considered possible to fix the exact limit of diversion at which the present control at Lockport will become unsatisfactory.* Recent experience with a reduced diversion to prevent

> flood damage in the Illinois River indicates, however, that after the sewage purification has reached the practicable standard of efficiency, the present Lockport control may be found satisfactory with a total diversion as low at 5,000 c.f.s., annual average, and might possibly be satisfactory with a lower diversion." (Italics ours.) (Re-ref. 108-109).
>
> * * * * *
>
> "CALUMET RIVER.—This discussion has been directed to the specific question of control works for the Chicago River. It does not include the related question of satisfactory control of the Calumet River. Both questions are capable, however, of practical solution, *probably without any further control works,* with a total annual average diversion of 5,000 c.f.s.
>
> "PRACTICAL SOLUTION.—In view of these circumstances, the practical solution, in witness' opinion is to systematically reduce the contaminations and the total diversion, observing the results obtained by the best operation of the present control at Lockport, and accumulating data on the behavior of the flow with this progessively decreasing diversion. *This procedure will demonstrate* in ample time *whether any control works are necessary,* and will furnish a correct basis for their design." (Italics ours.) (Re-ref. 116.)

There is no evidence whatever to the effect that Col. Weeks told the Sanitary District Engineers that he was giving them his personal opinions only. Col. Weeks testified that his mind was pretty well made up and he probably conveyed the impression to Mr. Ramey that the War Department was not interested at the time in the installation of controling works in the Chicago River. In some form of words he said that to Mr. Ramey (Rec. 487).

Notwithstanding the numerous conferences in which the Sanitary District was persuaded, or at least advised by Col. Weeks not to take further action for the time being, the Special Master charges the Sanitary District with a total and inexcusable failure to make an application to the Secretary of War for approval of controlling works. This finding is based upon the premise that the initiative was put upon the Sanitary District because of the attitude of the Chief of Engineers, General Jadwin, as expressed to the Special Master in 1929, and because of the omission of a requirement for controlling works in the permit of December 31, 1929, issued by the Secretary of War for the diversion of water from Lake Michigan (Rep. 14). The Special Master states:

> "Consistently with General Jadwin's position announced on April 19, 1929, to the Special Master, as to the requirements of navigation and as to the requirements of the War Department in consequence, this permit [December 31, 1929] contained no condition that the Sanitary District must provide controlling works" (Rep. 14).
>
> "General Jadwin's statement left the matter on April 19, 1929 so that the Sanitary District did not want to build controlling works, the War Department requirement in the current permit [permit of March 3, 1925, which required submission of plans for controlling works] was gone, in effect, and the Chief of Engineers was of opinion that the protection of the Chicago water supply and beaches did not call for controlling works at least for the time being or until the diversion fell below 5,000 c.f.s.
>
> "The Sanitary District knew all this at the time. Therefore they knew that the War Department intended to do nothing more as to the several methods of control which had been considered, until the Sanitary District made another application" (Rep. 10).

> "The defendants regarded that old application as not officially but practically dead. One of the engineers for the Sanitary District [Ramey] so testified before me. The old application was dead" (Rep. 7).

The effect of the Special Master's finding necessarily renders purposeless the discussions between Col. Weeks and the Sanitary District Engineers. If the "old application" were dead, or if the parties regarded it as finally dead with the War Department, or if it was thought that the filing of an application was a necessary factor, the actions of Mr. Wisner in inquiring of Col. Weeks if he had heard anything from the War Department, and the action of Col. Weeks in advising Mr. Wisner to wait until the War Department had acted, would ~~be without~~ rime or reason and utterly inexplainable. Moreover, if it is proper to speak of the old application as being dead, it is obvious that Col. Weeks was of the opinion that the "old application" was not capable of being resurrected or revived for the time being, and he so advised the representatives of the Sanitary District. Col. Weeks led the Sanitary District to believe that further action would be futile until there was a change of attitude on the part of the War Department, which has not as yet appeared.

An examination of further testimony of Col. Weeks and of the permit of June 26, 1930, establishes conclusively that the War Department was still vitally interested, after the decree of April 21, 1930, in the matter of the entire sewage treatment program including controlling works, and that to secure action there was no greater necessity for the filing of an application than there was before the decree under the permit of March 3, 1925.

Section 6 of the permit of March 3, 1925, provided:

> "That the Sanitary District shall submit for the approval of the Chief of Engineers and the Secretary of War plans for controlling works to prevent the discharge of the Chicago River into Lake Michigan in times of heavy storms. These works shall be constructed in accordance with the approved plans and shall be completed and ready for operation by July 1, 1929" (Rec. 42; Rep. 7).

Plans for a single-pontoon-gate at the mouth of the Chicago River were submitted in 1926 by the Sanitary District, which were revised in 1927 (Rep. 7). The documentary evidence showing in chronological order what was done by the Sanitary District and the War Department toward securing approval of controlling works (Rec. 35-121) shows that no application was ever filed with the Secretary of War or the War Department. The filing of an application was dispensed with obviously because the Sanitary District was ordered to submit plans. Col. Schultz testified in the former hearing (Re-ref. 105-106) that he did not know why these plans for the controlling works had not been approved, but they were for Works at the mouth of the River; that they were "not waiting for any move on the part of the Sanitary District." The Sanitary District complied with the condition of the permit of March 3, 1925, with respect to the filing of plans, and also complied with a later request for more plans in 1929, pursuant to which twelve designs or schemes were submitted by the Sanitary District to the District Engineer of Chicago (Rep. 8). It is manifest that up to this time an application was deemed unnecessary.

The permit of December 26, 1929, provided in part as follows:

> "Whereas, The Supreme Court of the United States delivered an opinion January 14, 1929, rela-

tive to the said diversion, stating among other things that its 'decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby;'

* * * * *

"And Whereas, the Special Master to whom the above mentioned litigation was referred has filed a report recommending a decree providing *inter alia* that the said Sanitary District be enjoined, on and after July 1, 1930 from diverting any waters from the Great Lakes water shed in excess of an annual average of 6500 cubic feet per second in addition to domestic pumpage, but the Supreme Court has not yet rendered its decree.

"Now Therefore, this is to certify that upon the recommendation of the Chief of Engineers, the Secretary of War under the provisions of the aforesaid statute and subject to the following conditions, hereby authorizes the said Sanitary District of Chicago to divert, through its main drainage canal and auxiliary channels, from Lake Michigan, an amount of water not to exceed an annual average of 7,250 cubic feet per second, or such lesser annual average diversion as will restrict the average annual flow measured at Lockport to 8,500 cubic feet per second until July 1, 1930, after which date the amount of diversion will be limited to an annual average of 6,500 cubic feet per second in addition to domestic pumpage."

* * *

"6. That action taken for the reduction of sewage discharge into the said Chicago River and the said diversion of water from Lake Michigan hereby authorized shall be under the supervision of the

United States District Engineer at Chicago, and under his direct control in times of flood on the Illinois and Des Plaines rivers.

* * * * * * *

> "8. That this permit, if not previously revoked or specifically extended, shall cease and be null and void on the effective date of the decree on the Master's report to be entered by the Supreme Court of the United States in the pending litigation referred to above" (Rec. 112-117).

The permit of June 26, 1930, contained the following provisions, among others:

> "Whereas, The Sanitary District of Chicago, Illinois, was granted authority by the Secretary of War by an instrument dated December 31, 1929, to divert water through its main drainage canal and auxiliary channels from Lake Michigan, the said authority if not previously revoked or specifically extended to cease and be null and void on the effective date of the decree to be entered by the Supreme Court of the United States in the case of the *State of Wisconsin, et al., versus the State of Illinois and Sanitary District of Chicago;*
>
> "And Whereas, On April 21, 1930, the Supreme Court of the United States entered a decree enjoining the State of Illinois and the Sanitary District of Chicago from diverting any of the waters of the Great Lakes-St. Lawrence System or Watershed excepting as specified in the said decree, *a copy of which is hereto attached and made a part of this instrument;*
>
> "And Whereas, The said Sanitary District has applied for a continuation of authority to divert water from Lake Michigan;
>
> "Now Therefore, this is to certify that upon the recommendation of the Chief of Engineers, the Secretary of War under the provisions of the afore-

> said statute, and subject to the following conditions, hereby authorizes the said Sanitary District of Chicago to divert through its main drainage canal and auxiliary channels, waters from Lake Michigan, as specified in the said decree.
>
> "The conditions to which the said diversions shall be subject are as follows":
>
> • • •
>
> "4. That action taken by the said Sanitary District for the reduction of sewage discharge into the said Chicago River shall be under the supervision of the United States District Engineer at Chicago, and the said diversion of water from Lake Michigan hereby authorized, shall also be under his supervision, and under his direct control in times of flood on the Illinois and Des Plaines rivers." (Italics ours.) (Rec. 117-120.)

It will be observed that in the permit of December 31, 1929, the War Department took cognizance of the report of the former Special Master and the opinion of this Court, *and that in the permit of June* 26, 1930, *the decree of this Court is expressly made a part of the instrument,* and that under both permits supervision over the action taken by the Sanitary District for the reduction of sewage discharge and the diversion of water is retained by the War Department. Col. Weeks testified that while the permit of March 3, 1925 was in effect, the question of the interest of the War Department and his interest as the official representative of the War Department was to see that the Sanitary District accepted the minimum requirement set out in the permit; that after the permit of December 31, 1929, he continued to check what the Sanitary District did and reported it under official direction (Rec. 707). Col. Weeks did not consider that the permit of June 26, 1930 set up any standard of progress, but he said, "*The decree provides on and after a certain date diversion will be reduced as to dates; the Department wishes to be advised as to whether or not that would be impossible*" (Rec. 708); that what he undertook to do under the permit of June 26, 1930, was to keep the Department advised as to what progress the Sanitary District was making on the sewage disposal program which had been laid down by the Special Master in the Supreme Court (Rec. 708). As a part of his duties he had discussions with officials or engineers of the Sanitary District with respect to the progress of construction and with respect to compliance with the terms of the permit. He was informed at all times of the status of the construction work during the time of his service in Chicago. Up to the time of his leaving Chicago he maintained the same supervision over all the Works of the Sanitary District (Rec. 481).

Representatives of the War Department never at any time after April 21, 1930, called the attention of the Sanitary District to any neglect or omission of duty under the permit of June 26, 1930 in connection with the construction of controlling works (Rec. 438), and the decree of April 21, 1930, was a part of this permit.

At the time that General Jadwin made his statement to the former Special Master on April 19, 1929, and at the time of the entry of the decree, the Chief of Engineers had before him the plans for a pontoon gate, as revised, submitted in 1926 and 1927 by the Sanitary District pursuant to the permit of March 3, 1925, and also had plans for twelve different methods of controlling works, some of them subdivisions of others, prepared by the Sanitary District and submitted to Col. Weeks, the United States District Engineer at Chicago, in connection with the study and report made to the Chief of Engineers by Col. Weeks, and the Chief of Engineers also had five plans prepared in the office of the Local District Engineer and submitted with the same report on March 11, 1929. These plans represented every conceivable thought on the subject (Weeks, Rec. 499; Ramey, Rec. 415).

It was after a study of all possible designs, including Works at the head of the Sanitary Canal, that General Jadwin made his report. The fact that the War Department had passed unfavorably upon every possible scheme was not known to the Sanitary District at the time of the hearings before the former Special Master. The report of Col. Weeks under date of March 11, 1929, was not before the former Special Master (Rec. 649; Rep. 9).

Ramey testified that he knew that Col. Weeks made a report to the Chief of Engineers, but he never saw the report until it was introduced in the record in the hearings conducted by Special Master McClennen (Rec. 398). Col. Weeks testified that Wisner knew he had submitted a report and had incorporated in that report the plans submitted by the Sanitary District, but he did not know the character of the additions that Col. Weeks made because it was an official document, the contents of which Col. Weeks communicated to nobody (Rec. 793).

It was not until after the decree of April 21, 1930, that the futility of submitting further plans appeared. It developed that all possible plans had been considered and none had been approved during the time that the permit of March 3, 1925 was in effect, and which contained a requirement for controlling works.

Col. Weeks testified that in the making of an application for a permit there were two forms of procedure in use in his office, one strictly official, and one informal which was adopted to save time and effort. In the informal method the applicant draws up his application, addressed to the Secretary of War, prepares his plans, and submits them to the Local Engineer. The Local Engineer then looks the plans over and gives them sufficient study; if in his opinion the plans can be bettered, or should be modified, in the interests of navigation, he calls in the applicant and they go over the plans together and finally they effect an agreement so that when the plans go forward to the Chief of Engineers from the Local District Engineer, they go forward with his favorable recommendation. If the plans decided upon by the District Engineer and the applicant are not satisfactory to the Chief of Engineers, they come back to the District Engineer with such instructions as he may see fit to give, looking to a modification of the plan (Rec. 770-771). For reasons which have been stated, the filing of an application addressed to the Secretary of War for the approval of controlling works was dispensed with under the permit of 1925, and was also unnecessary if the construction of controlling works was a requirement under the decree of April 21, 1930, which was incorporated in the permit of June 26, 1930. The former Special Master's recommendation did not call for the filing of an application, but merely for the submission of plans. There is no legislative requirement for the filing of an application. The Sanitary District, in the course of its contacts with the Local District Engineer of the War Department, took up the matter in a way that conditions dictated. The War Department had before it all possible designs; the Sanitary District Engineers discussed the matter with the Local District Engineer of the War Department, and inquired on numerous occasions about what, if anything, should be done. All parties assumed, and rightfully so in the circumstances, that the "next move" was up to the War Department. The informal expressions of Col. Weeks properly were deemed sufficient.

The Special Master makes the suggestion that the Sanitary District could have submitted plans for (1) controlling works near the mouth of the River, consisting of a lock and sluices, or a combination of lock and gate instead of a single gate, or (2) controlling works about seven and one-half miles up the River near the northern or eastern head of the Sanitary Canal, (Re-ref. 112), as Col. Weeks had previously recommended in his report of March 11, 1929. But plans for such works were already before the War Department and had not received favorable consideration by the Chief of Engineers. The first plan mentioned was regarded as an unreasonable obstruction to navigation, and the second plan as not wholly effective (Re-ref. 110, 112, 114). Mr. Ramey testified that the proposition of control works in the upper part of the main channel was suggested by complainants, and that he was "not so sure that from a hydraulic standpoint it was demonstrated that they would be so much better than the present control works at Lockport that they would be selected in preference to control works at the mouth of the River" (Rec. 659-660). It follows, therefore, that the statement made by General Jadwin, and a similar statement by General Brown, "that the Department will consider any application for the approval of plans of controlling works, to be constructed by the Sanitary District or other agency, and may be expected to approve these plans, *if the works are shown to be necessary, to be effective, and to be the minimum detriment to navigation*" (Rep. 10), did not constitute an invitation to the Sanitary District to submit further plans until a scheme was devised to meet with the requirements mentioned which all previous schemes had failed to do. Clearly, there was no greater reason for the Sanitary District to believe that the War Department would act more favorably or with greater leniency upon a re-submission of any of the plans after the decree of the Supreme Court which was incorporated in the permit of June 26, 1930, than it had acted toward the plans submitted when the War Department itself was searching for a design.

In addition to being effective and a minimum detriment to navigation, the War Department also makes the qualification that the Works must be shown to be necessary. The War Department was of the opinion that controlling works were not necessary until the diversion fell below 5,000 c.f.s. Under the decree of the Court a reduction to 5,000 c.f.s. was not to be made until the end of 1935. It is reasonable to suppose that the War Department, notwithstanding the apprehension expressed by the former Special Master, was of the opinion that to pass finally upon the question in 1930 would be unwise, inasmuch as the controlling works could be built in two seasons, and that this factor entered into the discouragement given to the Sanitary District with respect to pressing the matter at the time.

The ultimate necessity for controlling works was rendered more uncertain by the passage of the Rivers and Harbors Act of June 3, 1930, which we shall discuss under a separate heading.

Officials of the War Department have expressed the view that a flow of 5,000 c.f.s. should be held available for the through waterway from Lake Michigan to the Mississippi (Re-ref. 94-95). The Act of July 3, 1930 provides that,

> "as soon as practicable after the Illinois waterway [Utica to Lockport] shall have been completed

> in accordance with this Act, *the Secretary of War shall cause a study of the amount of water that will be required* as an annual average flow *to meet the needs of a commercially useful waterway as defined in said Senate document,* and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes *to the end that Congress may take such action as it may deem advisable.*" (Italics ours.)

An intelligent design and the proper location of controlling works is necessarily dependent upon the flow allowed (Re-ref. 110-116). Ramey testified that they do not know the type of works that should be planned today (Rec. 407).

The ultimate diversion of 1,500 c.f.s. after 1938, specified in the decree of this Court, was allowed upon a consideration of the navigation needs of the Port of Chicago only; the question as to what diversion might be required for a through waterway was expressly excluded. The former Special Master said,

> "Under the opinion of this Court in the present suits, the question of the allowance of a diversion of water from Lake Michigan in the interest of a waterway to the Mississippi, is not deemed to be open to consideration. The Court found that Congress had not acted directly so as to authorize the diversion in question, * *" (Re-ref. 122).

Manifestly, the situation has been changed by the Act of July 3, 1930, and the passage of this Act might well have been one of the causes for the lack of action on the part of the War Department after the decree of April 21, 1930, in encouraging or giving approval to any of the designs that it previously had under consideration. An intelligent opinion as to necessity, design and location cannot be given until the results of the study directed by Congress are known.

The Special Master in his report emphasizes the fact that the Sanitary District in its proposed findings made prior to the filing of the report on re-reference on December 17, 1929, provided that "The Sanitary District shall immediately submit plans to the Chief of Engineers or his representative for such works to be constructed at or near the mouth of the Chicago River, or at or near the northern or eastern terminus of the Main Drainage Canal, and that they shall be completed and in operation within a period of two years subsequent to the date of the Secretary of War's authorization under the statute" (Rep. 11).

The proposal of the Sanitary District was made when the permit of March 3, 1925, requiring controlling works, was still in effect. The former Special Master adopted the proposal. It was not known to him that all conceivable designs for controlling works had already failed to meet the approval of the War Department. He knew that the matter had been studied, but he did not know that the Sanitary District, as well as the War Department, had been unable to design controlling works which met the requirements of effectiveness without unreasonably interfering with navigation.

There is nothing to indicate that subsequently, when the briefs were filed in this Court on behalf of the Sanitary District, in which the submission of plans for controlling works was advocated, the representatives of the Sanitary District knew that all conceivable designs had met with disfavor, and that the filing of further plans would be fruitless. The contents of the report of Col. Weeks had not been disclosed.

The good intentions of the Sanitary District are established by the uncontroverted testimony that with or without controlling works the reduction to 5,000 feet will be accepted without danger if the large intercepting sewers along the main branch of the Chicago River, adjacent to Lake Michigan, are constructed (Rec. 449). Ramey testified, "We are designing the sewers along the main River so that they will take care of all the small rains, all but those ten major storms, so that we will have the main River full of clean water; and in the event that the War Department would never approve controlling works and that they would not be built, there will be clean water in times of reversal" (Rec. 449).

Ramey testified further, "If we could get our work done in accordance with Exhibit 22, so far as it provides for the work being done up to the end of 1935, I see no reason why the diversion should not be shut down to 5,000 c.f.s., even without controlling works, and we have assumed that that might happen. You will notice one thing, we have set up those West Side sewers all to be finished before 1935. [Now this is very important because] they are the sewers that intercept the sewage that flows into the main River and that portion of the Chicago River close to the Lake" (Rec. 450).

Again, "In the Engineering Department we have been working to adapt ourselves to a diversion of 5,000 c.f.s. after December 31, 1935; we have been working to that end, and have had no thought other than that the diversion would be reduced to 5,000 c.f.s. at the end of 1935" (Rec. 447).

Col. Weeks testified:

> "Assuming an average annual diversion of 5,000 c.f.s. it is my opinion that controlling works in the Chicago River would not be necessary. With that large flow in the Sanitary District Canal reversals

> can be controlled by the discharge of canal capacity at the time of heavy precipitation on the Chicago River watershed, and on the average annual basis during periods of settled weather, the diversion can be cut down so as to build up a credit of water in the lake, either to repay a draught that has been made or in anticipation of other draughts that may be made later" (Rec. 500-501).

We submit that the finding of the Special Master, charging the Sanitary District with a total and inexcusable failure to file an application for controlling works, and that the delay in the construction of controlling works is due to such failure to make an application, is contrary to all the evidence presented before the Special Master. The finding is based upon a misapprehension of the testimony and upon the contradicted, or at least unsupported assumption that an application would have resulted in the approval of controlling works by the War Department. To sustain this finding not only must all presumptions be resolved against the defendants, but the veracity of the witnesses must be challenged.

Moreover, the finding requires a conclusion that the War Department was a mere bystander and that the conferences between Col. Weeks and representatives of the Sanitary District were without purpose, a finding which is contrary to the testimony of Col. Weeks and repugnant to the permit of June 26, 1930, which made the decree of April 21, 1930, a part of the permit. As shown by the terms of the permit of December 31, 1929, the War Department was aware of the former Special Master's findings and of the opinion of this Court rendered on April 14, 1930.

Col. Weeks testified that the Sanitary District representatives co-operated with him always, willingly and to his entire satisfaction (Rec. 504-505).

With such a record, a finding that the cause of delay in the construction of controlling works is a total and inexcusable failure to file an application, when the filing of such an application was unnecessary and would have been futile, is clearly erroneous and should not be confirmed.

(b) The Sanitary District is not obliged by the terms of the decree to construct controlling works, and the opinion of this Court does not contemplate the necessity of such works unless the required reductions in diversion can not be made without controlling works; the decree and opinion have been so construed by the Sanitary District.

In order to subject the Sanitary District to a reproach for failing to make application to the Secretary of War for controlling works and proceeding with construction, it must be assumed that there was a duty to perform such acts. It is the contention of the Sanitary District that the decree imposed no such obligation and that if the Sanitary District has established that it has made proper provision for accepting a diversion of 5,000 c.f.s. at the end of 1935 without controlling works and that proper provision will be made, assuming available funds, to accept a diversion to 1,500 c.f.s. at the end of 1938, this Court, under its opinion and decree, is concerned with nothing more, and the Sanitary District should not be held delinquent for failure to carry out a suggested plan if the end sought is attainable otherwise.

The Special Master states the opinion of the Sanitary District engineers to be:

> "If the intercepting sewers parallel to the main Chicago River and to the North Branch of it are completed before December 31, 1935, in accordance with the program submitted to the Special Master in 1929, it will be safe to do without controlling works if the diversion of 5000 c.f.s. continues. * * *" (Rep. 6).

The Special Master then says:

> "I find that the engineers of the Sanitary District hold this opinion that Controlling Works are not necessary under the conditions stated. I make no finding as to the correctness of this opinion as I regard this question as not before me under the terms of the order of December 19, 1932 but as set at rest for the present inquiry by the findings of the Special Master in 1929" (Rep. 6).

The Special Master also makes the following observation:

> "The defendants argue now that the judgment of the Special Master in 1929, as to the need of controlling works was one of precaution and not of a final conviction that the hydraulics of the river absolutely required controlling works, and that in the present reference the Special Master has had the benefit of the opinions above described of the engineers of the Sanitary District. This is important, if it is my duty to reexamine the question, set at rest by the Special Master in 1929. If I ought to reexamine that question, I could not do it without hearing further evidence, as the parties were discouraged by me from going into the question as thoroughly as should be, if so serious a matter is to be reexamined" (Rep. 12).

As observed by the Special Master, the engineers of the Sanitary District testified that it is their present opinion that a diversion of 5,000 c.f.s. can be safely accepted upon a completion of the intercepting sewers along the main branch of the Chicago River adjacent to Lake Michigan without the installation of controlling works. They had not reached this conclusion in 1929. Since the controlling works can be built in two seasons, the War Department was undoubtedly justified in not pressing the matter of the controlling works in 1930, in view of the opinion of the engineers of this department at that time that the controlling works were unnecessary until the diversion fell below 5,000 c.f.s. And, unless the decree required it, the Sanitary District was justified in not pressing the matter with the War Department after its officials, who had the responsibility, came to the same conclusion as that previously reached by the War Department. In these circumstances, it becomes necessary to ascertain the requirements of the decree.

The former Special Master, in his proposed form of decree (Re-ref. 146-149) did not specify any exact dates *for reductions in diversion.* He specified, however, certain dates for the completion of the several projects in the sewage construction program of the Sanitary District. With regard to controlling works, the former Special Master recommended that the decree provide as follows:

> "8. That subject to the approval of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to the applicable statute, controlling works shall be constructed by the Sanitary District of Chicago for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan; that for this purpose the Sanitary District of Chicago shall forthwith submit plans for such works to the Chief of Engineers of the War Department; and that such controlling works shall be completed and placed in full operation by the Sanitary District of Chicago within two years after receiving the authorization of the Secretary of War.
>
> "9. That when such controlling works have been constructed and placed in operation, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage

> Canal and its auxiliary channels or otherwise in excess of an annual average of 5,000 c.f.s. in addition to domestic pumpage.
>
> "10. That after the installation of controlling works as above provided, and on the completion of all the sewage treatment works as outlined in the program proposed by the Sanitary District of Chicago, and *in the absence of competent action by Congress in relation to navigation lawfully imposing a different requirement*, the defendants the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 1,500 c.f.s. in addition to domestic pumpage" (Italics ours) (Re-ref. 147-148).

Under the Master's form of decree, the reductions in diversion would take place upon the fulfillment of certain conditions precedent, for all of which dates were set except for controlling works, but the former Special Master did not recommend that final definite dates for reductions in diversion should be included in the decree. His reasons are stated in part as follows:

> "It is recommended that the Court should retain jurisdiction as there are questions which it is impossible to dispose of at this time in full justice to the parties; as, for example, with respect to the extent to which the diversion of water from Lake Michigan by the Sanitary District may be reduced below 5,000 c.f.s., in addition to pumpage, after the installation of controlling works in the Chicago River and pending the completion of the sewage treatment works, and also with respect to any further or other provisions as to the diversion which may be found to be appropriate after the sewage treatment works

> have been completed and *the results of their operation with respect to the effluent and the condition of the navigable waters have been observed.* As construction work will be conducted on a large scale for several years, and unforeseen contingencies may arise, it would also seem to be important that there should be opportunity for the parties to come before the Court at any time to obtain such further directions as the facts may warrant" (Italics ours) (Reref. 145).

Although the former Special Master suggested certain dates for the completion of each project and suggested that plans be submitted forthwith to the Chief of Engineers of the War Department for controlling works, he was of the belief that certain contingencies might intervene which would affect the reductions to be made in diversion and, therefore, did not specify precise dates for the reductions. He expressly stated "that the Court should retain jurisdiction as there are questions which it is impossible to dispose of at this time in full justice to the parties."

The Court, however, took the plan or proposed decree recommended by the former Special Master and turned it around. The decree entered on April 21, 1930, directed that reductions in diversion be made on certain dates but left the matter of meeting the required reductions to the Sanitary District. The dates specified for the reductions were based upon the former Special Master's findings as to when the sewage treatment works and appurtenances could be completed and the reductions accepted, but the Court did not consider it necessary to adopt these findings except insofar as the Court used them as a measure to determine the time to be allowed before the diversion could be safely reduced. In other words, the Court decided that the time recommended by the former Special Master for the completion of each project constituted a sufficient allowance of time to enable the defendants to accept a reduction in diversion to 5,000 c.f.s. at the end of 1935 and a further reduction to 1,500 c.f.s. at the end of 1938 and entered a decree accordingly. But the Court did not order any particular construction work to be done by the Sanitary District inasmuch as the Court took the view that it was incumbent upon the Sanitary District to take whatever steps might be necessary to effect compliance with the decree. The burden of completing the necessary construction work was placed upon the Sanitary District without reference to detail on the part of the Court.

Mr. Justice Holmes said (281 U. S. 179, 197, 198):

> "The defendants have submitted their plans for the disposal of the sewage of Chicago in such a way as to diminish so far as possible the diversion of water from the Lake. In the main these plans are approved by the complainants. The master has given them a most thorough and conscientious examination. *But they are material only as bearing on the amount of diminution to be required from time to time and the times to be fixed for each step, and therefore we shall not repeat the examination*" (Italics ours).

* * * * *

> "The master finds that, on and after July 1, 1930, the diversion of water from Lake Michigan should not be allowed to exceed an annual average of 6,500 cubic feet per second in addition to what is drawn for domestic uses. He finds that when the contemplated controlling works are constructed that are necessary for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan, works that will require the approval of the Secretary of War and that the master finds should be completed and put in operation within two years after the approval

> is given, and probably by December 31, 1935, the diversion should be limited to an annual average of 5,000 c.f.s. 'in addition to domestic pumpage.' *On this point we deal only with the amount and the time.* When the whole system for sewage treatment is complete and the *controlling works* installed he finds that the diversion should be cut down to an annual average of 1,500 c.f.s. in addition to domestic pumpage. This, he finds, should be accomplished on or before December 31, 1938; and the full operation of one of the contemplated works, the West Side Sewage Treatment Plant, which would permit a partial reduction of the diversion, is to be not later than December 31, 1935. These recommendations are subject to the appointment of a commission to supervise the work, or, better in our opinion, to the filing with the clerk of this Court, at stated periods, by the Sanitary District, of reports as to the progress of the work, at the coming in of which either party may make application to the Court for such action as may seem to be suitable. All action of the parties and the Court in this case will be subject, of course, to any order that Congress may make in pursuance of its constitutional powers and any modification that necessity may show should be made by this Court. *These recommendations we approve within the limits stated above, and they will be embodied in the decree.*" (Italics ours.)

The foregoing language indicates clearly that the Court was of the opinion that the former Special Master gave the Sanitary District sufficient time for the diminutions in diversion and that the diversion should be cut to 5,000 c.f.s. at the end of 1935 and to 1,500 c.f.s. at the end of 1938 *regardless of whether controlling works were constructed or not.* A careful reading of the opinion can lead to no other conclusion. The Court expressly stated that the plans of the Sanitary District were "material only as bearing on the amount of diminution to be required from time to time and the times to be fixed for each step,

* * *" and further, on the point of controlling works, the Court was dealing "only with the amount [of the diversion] and the time" and that the recommendations of the Special Master were approved within these limits.

Any possible uncertainty about this construction of the opinion is removed when we turn to the proposed form of decree appearing at the end of Mr. Justice Holmes' opinion [281 U. S. 179, 201] and also to the decree itself [281 U. S. 696]. The progressive dates for the diminution in diversion are stated definitely and with only one qualification, namely: "Unless good cause be shown to the contrary." No suggestion is made as to an expected rate of progress in the sewage construction program and there is no reference whatsoever to controlling works in the decree. With regard to sewage treatment works, it is provided merely that the Sanitary District file with the Clerk of this Court semi-annually a report adequately setting forth "the progress made in the construction of the *sewage treatment plants and appurtenances* outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report" (281 U. S. 696, 697-698). The Special Master has found that "It did not occur to the compiler of the reports, that he should include a statement of the abandonment of controlling works. Its non-inclusion was not with an intention to deceive" (Rep. 36). Controlling works have not been abandoned as intimated by the Special Master in the sense of a permanent abandonment. We shall establish this fact under a subsequent heading.

Mr. Ramey testified:

"I think we always figured that sometime some-

> thing would be done about controlling works, but we did not know what or when. Now, I think if we had figured that controlling works were not to be built, we would have dropped that out of the program or made some such suggestion * * *. I did not prepare those [reports], to make and include in them every statement of policy on the part of the Sanitary District. I wrote those reports, to conform to a certain provision of the decree, as I understood it" (Rec. 442-443).
>
> "I do know that we always included these controlling works in the program; we did not think that we were not necessarily going to build them; we might build them; we put them in our estimate of cost" (Rec. 444).

It did not occur to Mr. Ramey that he should incorporate any statement in the reports to the effect that a situation had arisen which lead them to believe that they might never have to put in the controlling works but controlling works were carried in every report in the estimate of costs (Rec. 444).

It is almost superfluous to say that the opinion of the Court and the decree entered on April 21, 1930, transcended the report of the former Special Master insofar as the report was modified and that the Sanitary District was justified in looking to the opinion and the decree for the purpose of determining its course of duty.

Colonel Weeks testified that immediately upon the coming of a copy of the decree into his hands, he called Mr. Ramey. He had made a study and had before him a copy of the form of decree suggested by the former Special Master and was familiar with his suggestions. Colonel Weeks noticed when he read the decree that no reference had been made to the construction of the controlling works in the Chicago River and was somewhat surprised that it had not been included. He called Mr.

Ramey on the telephone and asked him if he had noticed the omission in the decree and Mr. Ramey said that he had noticed it (Rec. 482-483). The permit of June 26, 1930, was also discussed by Colonel Weeks and Mr. Ramey and the omission of controlling works was a subject of consideration; as Colonel Weeks recalled Mr. Ramey's remarks, the impression given by Mr. Ramey to Colonel Weeks was one of surprise. The permit of June 26, 1930, followed very closely the form of the decree (Rec. 484).

Mr. Ramey's testimony may be paraphrased as follows:

> "I did not read the Master's findings into the decree" (Rec. 661).
>
> "The fact that the decree did not make a positive statement as to what should be done in this regard lead to a certain amount of uncertainty. It did not create a doubt in my mind as to whether we were to go forward at all with controlling works. I did not know when anything would happen in connection with controlling works" (Rec. 662).
>
> "It is my impression that the decree provides that certain reductions in the diversion are to be made at certain times, and that the Sanitary District is expected to construct certain structures. It has not been my understanding that the exact schedule proposed in the report of the Chief Justice is an inflexible schedule, and subject to no change whatever in any detail, but that the Sanitary District shall carry out the sewage treatment construction schedule submitted by the Sanitary District in a reasonable manner, so far as it can, and I have assumed that irrespective of whether that was carried out or not, the decree would be enforced" Rec. 663-664).
>
> "I read the opinion. I did not understand what the reference to controlling works meant in con-

> nection with the sentence 'we deal only with the amount and the time' and in reading over the opinion of the Court, I read this statement: 'That these provisions would be embodied in the decree.' I read the decree carefully to see if those specific provisions were embodied in the decree, and I thought they were not specifically mentioned in the decree. I do not know whether a recommendation of the Special Master or a finding that is not specifically set up in the decree, would be a part of the decree. I had in mind the finding of the Special Master in the original trial of this case recommending that the bill be dismissed" (Rec. 668).
>
> "I am just telling you some of the things that ran through my mind when I read this decree, but I did take it that the Court meant what it said" (Rec. 669).
>
> "I think it was the view of the Supreme Court that the diversion should be reduced to 5,000 feet on the December 31, 1935, even if no controlling works were put in the river" (Rec. 671).

As shown by testimony referred to elsewhere in our argument, the Sanitary District has made provision for a reduction of 5,000 c.f.s. at the end of 1935 without the installation of controlling works. Mr. Ramey's construction of the decree, in our judgment, is unassailable. The "things that ran through my [his] mind" when he read the decree cannot properly be characterized as a doubt about the meaning of the decree. In addition to his statement that he took it "that the Court meant what it said," Mr. Ramey testified:

> "I thought we were not required to take any furtheir steps and I do not know what further plans we could submit in view of the fact that we had submitted all of the plans and ideas that we could think of for the Chicago River" (Rec. 830).
>
> "There is only one thing that we have been con-

> sidering and that is a reduction in the diversion, and we have been working to the end that we will be prepared for those reductions" (Rec. 832).
>
> "We endeavored at all times to comply with the requirements of the decree. The Sanitary District has at all times attempted in good faith to comply with the requirements of the decree of the Supreme Court" (Rec. 660).

In response to a question from the Special Master, Mr. Ramey testified:

> "As I read it [the decree], I thought it did not require us to take any further steps. That is the reason that I did not go further" (Rec. 683).

Clearly, from the foregoing testimony if there were any doubts in Mr. Ramey's mind about the meaning of the decree, they were resolved positively against the construction that the decree required controlling works regardless of the necessity of such works.

The Master's finding (Rep. 18) that the Sanitary District "was not justified in lying back silently and unadvised, on any such doubt" and that it has not been shown that it resolved the doubt against the construction that the decree required controlling works is erroneous for two reasons: (1) The Sanitary District did not lie back silently and unadvised but immediately discussed the question with the Local District Engineer of the War Department after the decree and after the permit of June 26, 1930, which made the decree a part of the permit; (2) Mr. Ramey's testimony establishes that any doubt which might have existed was nothing more than a passing thought that ran through his mind and he was definitely of the opinion that the decree did not require controlling works unless they should become necessary to effect compliance with its terms.

We urge that the construction placed by the Sanitary

District upon the decree, according to the testimony of Mr. Ramey, was eminently proper and that the decree can be interpreted as requiring the construction of controlling works only if such works are necessary to accept the reductions in diversion which have been ordered.

The Special Master states that:

> "Soon after the decree was entered they [Colonel Weeks, Wisner and Ramey] discussed the significance of the absence from the decree, of reference to controlling works. None of the three wished for controlling works or regarded them as necessary, if a flow of 5000 c.f.s. plus domestic pumpage was to continue. Colonel Weeks desired to avoid any unnecessary impediment to navigation. The Rivers and Harbors Act of July 3, 1930 was imminent. The discussions were continued after it passed. The Sanitary District wished to save the expense of controlling works. In this fertile ground of desire, there sprang up a doubt as to whether the Sanitary District was under obligation to go forward with controlling works" (Rep. 17).

This statement is inaccurate in that it implies that the Sanitary District representatives, Mr. Wisner and Mr. Ramey, were of the opinion soon after the decree was entered that controlling works were not necessary with the flow of 5,000 c.f.s. There is nothing in the record to show when the Sanitary District came to this conclusion, but manifestly it was not until after the last expression of the Sanitary District to Col. Weeks indicating a willingness or readiness to go ahead with the controlling works, which was about midsummer of 1931 (Rec. 793-794). Moreover, it is apparent from the testimony that what has been termed a "doubt" by the Special Master on the part of the Sanitary District as to its duty did not spring up in a "fertile ground of desire" to save expenses. The question came up immediately upon a reading of the decree.

Inasmuch as controlling works were not regarded as an unqualified requirement of the Court and since there was no necessity for immediate action upon the entry of the decree because of the time intervening between 1930 and the end of 1935, the informal inquiries made by the Sanitary District of Colonel Weeks constituted due diligence.

When considered with the conclusion of the Sanitary District that there was no positive duty to construct controlling works unless necessary to effect compliance with the decree respecting reductions in diversion, the following testimony of Mr. Ramey shows the basis for further non-action:

> "Our failure to do more I think was due to the fact that we thought the attitude of the War Department might be that there need be no controlling works. I did not know what the War Department was going to do. I knew that they had issued a permit on December 31, 1929, and omitted any mention of controlling works, and I knew of the permit of June 23, 1930, which specified the diversion, or which authorized the diversion specified in the decree of the Supreme Court, but did not make any mention of controlling works. And shortly thereafter I knew of the Rivers and Harbors Act of July 3, 1930, which calls for a study of the situation in the Illinois Waterway, and I did not know what would happen. I do not know yet. We assumed that the Sanitary District might be called upon to build controlling works, but I think we assumed that the next move was up to the War Department. I personally assumed that" (Rec. 656-657).
>
> "If we could get our work done in accordance with Exhibit 22 so far as it provides for the work being done up to the end of 1935, I see no reason why the diversion should not be shut down to 5,000

c.f.s., even without Controlling Works, and we have assumed that that might happen" (Rec. 450).

In summary, controlling works are not a requirement of the decree unless necessary to insure safety in making the specified reductions. Because the reduction to 5,000 c.f.s. was not to be made until the end of 1935 and since the controlling works could be built in two seasons, there was no necessity for making an immediate application to the Secretary of War (assuming such formal application to be a condition precedent, which we deny) in 1930. Subsequently, it was determined that the reduction to 5,000 c.f.s. could be made without controlling works. Therefore, the defendants are not bound under the decree to construct controlling works in order to facilitate the reductions in diversion to be made at the end of 1935. The question of controlling works is an open one only insofar as the reduction to 1,500 c.f.s. at the end of 1938 is concerned.

(c) The Special Master misconstrues the effect of the Rivers and Harbors Act of July 3, 1930, which provides for a study to be made of the average annual flow that will be required to meet the needs of a commercially useful waterway between Lake Michigan and the Mississippi.

A determination of the amount of flow and consequent diversion required to maintain a commercially useful waterway between Lake Michigan and the Mississippi is not within the scope of the questions submitted in the present reference. The Special Master indicated that he did not consider the question of the flow necessary for navigation in the waterway between Lake Michigan and the Mississippi to be before him. Nevertheless, because the defendants have contended that the Rivers and Harbors Act of July 3, 1930 has made a change that may call for a review of the decree as to the ultimate amount of diversion to be permitted, the Special Master has attempted to show that a diversion greater than 1,500 c.f.s. will not be required to maintain the waterway, and that Congress has in effect so directed. Since the Special Master has taken this view, which we contend is based upon an erroneous interpretation of the Rivers and Harbors Act of July 3, 1930 and certain documents in the record, it is incumbent upon us to explain our conception of the Rivers and Harbors Act and to state the reasons for our contention that the Special Master has misconstrued the Act of July 3, 1930 and evidence relating to the navigation requirements of the waterway. The Mississippi Valley States, as indicated by the former Special Master, have insisted upon the right to be heard on this question (Re-ref. 122).

The Rivers and Harbors Act of July 3, 1930, provides for an appropriation of $7,500,000 to complete the Waterway Project from Utica, on the Illinois River, to Lockport, following in general the line of the Illinois and Des Plaines rivers. This project is the final link in the through Waterway System from Lake Michigan to the Mississippi and is the so-called "Illinois Waterway."

The through Waterway System may be divided into three sections consisting roughly of (1) the Illinois River from Grafton, on the Mississippi, to Utica, on the Illinois River, called the "Lower Illinois River," for which Congress by the Act of January 21, 1927 (44 Stat., Pt. 2, 1013) provided a channel with least dimensions of nine feet in depth and two hundred feet in width; (2) the Illinois River from Utica to its junction with the Kankakee River and the Des Plaines River, the Des Plaines River from this junction to northern Joliet, and the Chicago Sanitary District Canal from northern Joliet to Lockport, called the "Illinois Waterway" (the Illinois River is formed by the confluence of the

Kankakee with the Des Plaines near Dresden Island, sixteen miles below Joliet and forty-four miles above Utica); and (3) the Chicago Sanitary District Canal from Lockport to the Chicago River, and the Chicago River to Lake Michigan, in these hearings referred to as the "Port of Chicago." A branch of this third section follows the Calumet-Sag Canal, the Little Calumet River, and the Calumet River to Lake Michigan.

Confusion has arisen because of the designation that has been given to the link between Utica and Lockport as the "Illinois Waterway." In analyzing or interpreting Congressional Acts and the various statements and reports of officials of the War Department, care must be taken to observe the distinction made between the Lower Illinois River (Grafton to Utica) and the so-called "Illinois Waterway" (Utica to Lockport).

The Special Master has failed to observe this distinction that has been made.

The Special Master states (Rep. 19):

> "The defendants claim in their Return (p. 30) and now persist in the claim that the Act of July 3, 1930 has made a change which may call for a review of the decree as to controlling works. This claim is not borne out by the Act."

We respectfully submit that the Special Master has erred in this conclusion and that the contention of the defendants is sound.

The Act of July 3, 1930 provides that:

> "Illinois River, Illinois, * * * the said project [Utica to Lockport] shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway [i.e., the entire Illinois waterway system consisting of the three links above described]: *Provided,* That there is hereby authorized to be appropriated for this proj-

> ect [Utica to Lockport] a sum not to exceed $7,500,000: *Provided further,* That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12, Original —October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway [the entire system]: *Provided further, That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable"* (Rep. 20). (Italics ours.)

This Act also provides:

> "Great Lakes connecting channels: The existing projects are hereby modified so as to provide a channel suitable for vessels of 24-foot draft when the ruling lake is at its datum plane, and including the construction of *compensation works,* as set forth in paragraphs 30, 31, 48, 67, 69, 70, 71, 76, and 77 of the report of the special board of engineers dated February 14, 1928, and submitted in House Document Numbered 253, Seventieth Congress, first session. The amount hereby authorized to be ex-

pended upon said channels is $29,266,000." (Italics ours.) (This section is not referred to by the Master.)

The Special Master makes the following statement:

> "There is no present Federal project requiring more diversion than the decree allows. There is no indication that Congress will hereafter allow a greater diversion. The provision of the Act for the smallest flow leaves no discretion to the Secretary of War to permit a larger diversion for this project. Congress has exercised its full authority directly, without leaving a part in the hands of the Secretary" (Rep. 27).

This statement is incorrect. The Federal project in the Lower Illinois River between Grafton and Utica, which was made a Federal project in 1927, and which is the longest part of the Waterway, has been dredged and has been provided with a certain number of locks so that a nine-foot channel can be maintained only with a diversion approximating 5,000 c.f.s. General Jadwin testified before the former Special Master as follows:

> "Congress said when they authorized this project, that they did not authorize diversion, but Congress had a scale of prices before it for getting nine feet with various flows, running from one to ten thousand, and it authorized the sum of money, three million and something, the maximum limit we could go to, and that maximum limit would call for a diversion of about 4,500 average c.f.s. Congress did not run the sum up to the larger sum that would have taken care of it with the 1,000, although Congress had that larger sum before them. Congress had the report and adopted it with certain figures. Congress has since called for a revision of that report and we are now working on the revision" (Re-ref. 124).

While it is true that opinions have been expressed to the effect that satisfactory navigation can be secured in the "Illinois Waterway" (Utica to Lockport) with a flow of 1,000 c.f.s., the present situation is that a greater diversion is required for the Lower Illinois River, (as this project is now authorized by Congress) which is a part of the through Waterway, and no appropriation has been made for more dredging and the installation of a greater number of locks that would be required in case the diversion is reduced to 1,500 c.f.s.

This Court, in fixing 1,500 c.f.s. as the diversion to be allowed after 1938, considered only the needs of navigation in the Chicago River, as a part of the Port of Chicago. At that time the project between Utica and Lockport was not a Federal project. The former Special Master said:

> "Under the opinion of this Court in the present suits, the question of the allowance of a diversion of water from Lake Michigan in the interest of a waterway to the Mississippi is not deemed to be open to consideration. The Court found that Congress had not acted directly so as to authorize the diversion in question, and the Court referred to the declaration of Congress in the Rivers and Harbors Act of January 21, 1927 (44 Stat. 1013), providing for the improvement of the channel of the Illinois River, that nothing in the Act should be construed as authorizing any diversion of water from Lake Michigan. Accordingly, in dealing with the claims of the States intervening herein on the side of Illinois, the Court said that 'They really seek affirmatively to preserve the diversion from Lake Michigan in the interest of such navigation' (of the Mississippi) 'and interstate commerce though they have made no express prayer therefor. In our view of the permit of March 3, 1925, and in the absence of direct authority from Congress for a waterway from Lake Michigan to the Mississippi, they

> show no rightful interest in the maintenance of the diversion' (278 U. S. 367, 420)" (Re-ref. 122).
>
> "In considering the needs of navigation, this Court limited its statement to the requirements of navigation in the Chicago River as a part of the Port of Chicago" (Re-ref. 126).

Since the entire Waterway from Lake Michigan to the Mississippi has now become a Federal project, and since Congress has authorized a diversion for the Waterway, and if the War Department recommends a greater diversion than 1,500 c.f.s. for the Waterway, it is manifest that "good cause," as that term is used in the decree, will have intervened so that the decree may be modified to conform with the recommendation which will be made by the War Department.

The War Department, in making its recommendation, must consider the flotation needs or depth requirements of the Illinois River between Grafton and Utica, as well as the flotation and depth requirements between Utica and Lockport. The War Department must also consider the diversion that will be required to keep the water from being unreasonably offensive.

On this point General Jadwin testified on the former reference, as follows:

> "It is therefore seen that it is not practicable to state at this time what the amount of diversion is that may be needed in the Chicago River to meet the requirements of navigation in the broad sense. It may be that the proper proviso would be flexible and enable the United States to secure the fullest benefits of the navigation possibilities of the inland river system of waterways in connection with the Great Lakes water system, when, and if such increases are indicated. Besides providing water necessary for adequate depths and widths of channels another requisite for navigation of the Illi-

nois River is that the water should not be unreasonably offensive. This matter has been studied by sanitary engineers employed by this Department. They made an elaborate study and advised that 4167 c.f.s. total flow measured at Lockport was the minimum total diversion necessary with the activated sludge method of sewage purification and with a 90% metering to prevent the occurrence of a nuisance in the Illinois and Des Plaines rivers and to permit fish life therein. There may be some room for argument as to this standard, but it seems certain that with too little water, the water will be so foul as to be a menace to the health of the workers upon vessels and at terminals. Certainly it is not possible to specify at this time the precise amount of water required to keep the waterway in a reasonably acceptable condition for navigation many years hence, with the growth of the city, changes in the sanitary art, and other developments not yet foreseen. The diversion eventually required can only be stated in round figures. To allow for contingencies, I have placed the eventual amount at 5,000 c.f.s. measured at Lockport.

"It therefore appears that the diversion required for navigation in the Chicago River proper may not be the controlling factor in fixing the ultimate diversion, but that the need of an Inland Waterway System when determined and defined by Congress, or, under its authority, by the Chief of Engineers and the Secretary of War, may prove to be greater than those for navigation in the Chicago River itself.

"In other words, although local navigation on the Chicago River may be safeguarded by a total diversion of about 3200 c.f.s. measured at Lockport, the through navigation between Chicago and the Mississippi system will require about 5000 c.f.s. to keep the water in the channels south of Chicago in acceptable condition with an as yet undetermined but possibly greater flow required for the mainten-

> ance of adequate channel depths and widths" (Re-ref. 94-95).

* * *

> "The discussion does not modify in any respect the statement heretofore made that an average diversion of 5,000 c.f.s. will be necessary to maintain navigation in the Illinois River, as contemplated by existing authority of Congress and under the plan of improvement now under way" (Re-ref. 109).

In support of our contention that the Federal project on the Illinois River below Utica now requires a greater diversion than 1,500 c.f.s., we direct attention to the following:

Statement of General Jadwin:

> "The river and harbor act of 1927 which directed the existing project for the Illinois River specified that it did not authorize a diversion of water. The project directed by Congress provided specifically for a channel with a depth of 9 feet without specifying the manner in which this depth should be obtained. The report before Congress when the project was adopted provided for alternative plans, varying in cost with the amount of diversion, the cost generally increasing as the diversion decreased. The plans were designed to provide a channel of the requisite cross-section with diversions of varying amounts between 1,000 and 10,000 c.f.s. With the lesser flows the depth would be secured by dams and locks, with the greater flows by open channel dredging. A review of the project has since been directed by Congress.
>
> "Questions have arisen as to possible changes that may be necessary in the project to handle navigation in the future.
>
> "There has not been as yet an official determination by the Engineer Department, of its recommendation as to the best type of improvement of the Illinois River" (Re-ref. 93-94).

Statement of Major General Brown, May 16, 1930, paraphrased by Special Master McClennen:

> "It is my present judgment, as to the smallest flow of water that is necessary to develop a commercially useful waterway at this point, the indications are, with everything in view,—is that something like 5000 feet per second should be held available for that purpose" (Rep. 25).
>
> "*The project authorized by Congress about three years ago for the lower Illinois from Utica to Grafton was a 9-foot channel and the flow was 5,000 cubic feet per second and the dredging being done there was done with that end in view.* The development of a 9-foot channel in my judgment at the present time only requires a 1,000-foot diversion, under the conditions stated. A thousand cubic feet per second provides a 9-foot channel in the project that is now being executed on the lower Illinois from Utica to Grafton, with only one provision we would resort to complete channelization [canalization] of the Illinois River. *That would require some more expense, not very much more excavation. It would require locks and dams in large number, lots of things*" (Italics ours) (Rep. 26).

It appears from the statement of Major General Brown which is quoted at greater length in the Report of the Special Master (Rep. 25-27) that although, from the standpoint of water depth or flotation, 1,000 c.f.s. may be a sufficient diversion, this diversion might not be adequate to keep the water sufficiently clear or inoffensive to navigation. Also, that before it is possible to accept a diversion of 1,000 c.f.s., more locks and dams would be required as well as more excavation, for which an appropriation has not as yet been made.

Major General Brown (letter to Master McClennen, dated January 4, 1933):

> "Since the Illinois Waterway is not as yet fully

> completed or in operation, the study directed is yet to be made. I may however advise you that it is the present attitude of the Department that the eventual reduction in the diversion from Lake Michigan provided in the decree of the Supreme Court *will entail the construction of certain locks and dams on the Illinois River* [i.e., Lower Illinois]. The Department is not however now prepared to furnish you with an authoritative report on this subject" (Italics ours) (Rep. 31).

Major General Brown (statement contained in letter dated May 10, 1930, and addressed to Senator Charles S. Deneen, Exhibit 30, page 266; Rec. 856):

> "It is my impression that satisfactory navigation can be secured in the Illinois waterway between Lockport and Utica with a flow of 1,000 cubic feet per second.
>
> "This flow would adequately provide for such lockage as the probable traffic will require. The waterway, however, has been designed as an 8-foot channel with a flow of not less than 4,167 cubic feet per second, and it is probable that additional locks might be required if the diversion from Lake Michigan be materially lessened. With the present diversion (8,500 cubic feet per second), a 9-foot channel is practicable.
>
> "In the lower reach of the Illinois River the character of the improvement differs from that in the waterway section. This section will not be canalized, and the depth of water available in this section is to a great degree dependent upon the amount of diversion from Lake Michigan. Should the entire diversion be reduced to 1,000 cubic feet per second canalization will be necessary and control works with accompanying costs are necessary in inverse ratio to the quantity of diversion. Estimates proposed in 1915 range from about $5,000,000 for complete canalization, based on 1,000 cubic feet

per second diversion, to $1,000,000 if a flow of 10,000 cubic feet per second be allowed.

"I am not at all sure that the decree of the Supreme Court recently handed down in the suit concerning diversion between the Lake States and the Chicago Sanitary District, in which the ultimate diversion was placed at 1,500 cubic feet per second had anything whatever to do with the requirements of navigation. My opinion is that the decree of the Supreme Court was a limitation on the diversion as a means of sewage disposal, and was aimed at the authorities of the Sanitary District of Chicago and not at the interests of navigation or the powers of Congress in relation thereto.

"I am of the opinion that at this time no definite figure on the amount of diversion necessary for navigation should be stated and that future study of the completed waterway should be made to ascertain the quantity of water necessary for navigation. It is, therefore, recommended that any specified diversion be omitted from any authorizing legislation."

The former Special Master, on the original reference of this case, heard testimony regarding the effect of the diversion of water from Lake Michigan upon the Illinois River. His findings on this matter are as follows (First Rep. 119-122):

"Plans for what is called the Illinois waterway, which is under improvement by the State of Illinois, that is, on the upper Illinois River, from Lockport to Utica, about 61 miles, are based on a diversion from Lake Michigan of at least 4,167 c.f.s. The depth designed with such diversion is eight feet, with fourteen feet over the mitre sills of locks, for future improvement. With present diversion, the depth will be about nine feet. If the diversion were reduced materially below 4,167 c.f.s., it would necessitate radical changes in the design and location of the locks, three of which are already either constructed or under construction, and increased outlays. Illinois has authorized the expenditure of $20,000,000 for the completion of the waterway, of which between $5,000,000 and $6,000,000 has been expended, or is payable under contracts. The Illinois waterway as planned will have a capacity of about 60,000,000 tons per annum. There is no adequate water supply for lockage, except by diversion from Lake Michigan. Other plans would involve prohibitive expense.

"The Chief of Engineers and the Secretary of War, in approving the plans for the waterway in 1920, stated that it was not to be understood as authorizing the diversion of water from Lake Michigan, but merely expressed approval so far as concerned the public right of navigation, and that the provision was without prejudice to the use by Illinois of such flow as might be existing in the Illinois and Des Plaines Rivers. The profile map accompanying the plans contains a notation that the water services shown were 'based on an assumed flow of 4,167 c.f.s., already approved, as a diversion from Lake Michigan, plus the normal flow from other sources in various pools'; that is, the assumption was of 6,000 c.f.s. flow, made up of 500 c.f.s. as an actual low water flow, 4,167 c.f.s. from Lake Michigan, and 1,395 c.f.s., as averaging the amount of Chicago's pumpage.

"LOWER ILLINOIS RIVER.—The lower Illinois River, from Utica, to Grafton on the Mississippi (230 miles) is a shallow, sluggish stream, carrying from 500 to 1,000 c.f.s. of natural low water flow. In its natural state, it is inadequate for modern river navigation. The Federal project depth has been seven feet; but this could not have been maintained without at least 8,500 c.f.s. from Lake Michigan, which gives, in the lower Illinois, about four feet of the low water depth of seven feet. The Chicago diversion has increased the navigable capacity of the river. This stretch of the river is adaptable to improvement as an open channel, but if there were no diversion at Chicago, a large amount of improvements and several locks and dams would have to be provided. The question appears to be largely one of cost" (First Rep. 120).

"In the Report of Major Putnam of April, 1924 (*supra*, p. 72), it is said:

> " 'There is no doubt but what navigation conditions have been improved by the diversion of water from Lake Michigan. Originally the low-water discharge at La Salle was in the neighborhood of 500 cubic feet per second, while at Grafton it was near 1,000 second-feet. The addition of over 8,000 cubic feet per second, while increasing the slope and the velocity slightly, produced a discharge of about 8500 cubic feet per second at La Salle and about 9,000 at Grafton. Depths throughout the entire stream were increased substantially as may be seen from the following table and as indicated by comparing the profiles in Plate VII:
>
> | Miles above Grafton | Name of Place | Increased depth with 8,000 cubic feet per second diversion |
> |---|---|---|
> | 223.2 | La Salle | 5.0 |
> | 88.6 | Beardstown | 2.2 |
> | 0.0 | Grafton | 1.2 |
>
> * * * * *
>
> " ' * * * Assuming that the existing 7-foot project based on a flow from Lake Michigan of 4,167 second-feet is completed, it will cost about $2,400,000 to provide a 9-foot channel between La Salle and Grafton with a flow of 5,000 cubic feet per second * * * (First Rep. 121-122).

"By the Act of January 21, 1927, 44 Stat., Pt. 2, 1013, Congress provided for the modification of the existing project for the Illinois River so as to pro-

> vide a channel with least dimensions of nine feet in depth and 200 feet in width from the mouth to Utica.
>
> "The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than 1,000 c.f.s. of water is sufficient to supply all the needs of navigation. *I am unable so to find. The needs of navigation on that waterway will depend upon the carrying out of plans already adopted and upon the ultimate decision of Congress with respect to water communication between Lake Michigan and the Mississippi River, the extent to which locks and dams are to be used or installed, that is, the character of the improvements and the amount which it is determined to expend*" (Italics ours). (First Rep. 122.)

Congress, by adopting the Act of July 3, 1930, which had the effect of extending the Federal project in the Lower Illinois River to connect with the Federal project in the Chicago River, and in providing for a study of the flow needed to make the complete waterway a commercially useful project, made no appropriation other than $7,500,000 to complete the section of waterway between Utica and Lockport. By its action Congress made no change in the project in the Lower Illinois River between Utica and Grafton (adopted in 1927 to be constructed for $3,500,000 to a depth of nine feet and with a diversion of about 5,000 c.f.s.) and this project still remains as originally adopted. The fact that this project in the Lower Illinois could be built to require only 1,000 c.f.s. for flotation, with the complete canalization of the Lower Illinois River, with more expense, more "locks and dams in large number, lots of things," as testified to by General Brown on May 16, 1930, *is no* *indication that Congress intends to change the present project* to the more expensive and less useful project in the Lower Illinois. General Brown did not recommend any change in the Lower Illinois River project in 1930 and has not since.

The finding of the Special Master that upon the completion of the dredging and locks between Utica and Lockport, so as to require a diversion of only 1,500 c.f.s. for floation *in that project*, the War Department is *ipso facto* bound to find that 1,500 c.f.s. will be sufficient for a commercially useful waterway between Lake Michigan and the Mississippi, is clearly erroneous. The fact that a study of the question has been directed by Congress should be sufficient to negative the Master's conclusion, because, if he is right, such a study is not necessary.

Before leaving the subject of the Act of July 3, 1930, it should be noted, as shown by the Special Master's Report (page 21) that the Act provides for a preliminary examination and survey to be made of the Calumet River, Little Calumet River, Lake Calumet, and the Sag Channel, Illinois, with a view to providing a connection with, and terminal transfer harbors for, the waterway from Chicago to the Mississippi River, Chicago Harbor, Illinois, Calumet Harbor and River, Illinois and Indiana. The authorization of this survey contemplates the possibility of the Calumet route becoming the main artery of traffic in the waterway from Lake Michigan to the Mississippi River instead of the Chicago River. The report to be made under this authorization may show conclusively that the Army Engineers contemplate using the Calumet-Sag Channel instead of the Chicago River as the main course of the waterway. This may permit the construction of fixed bridges over the Chicago River, with suitable vertical clearances, in place of bascule bridges. If this course is adopted, and fixed bridges are also constructed over the Calumet-Sag Channel, the water levels in the Chicago River, the Main Sanitary Canal, and the Calumet-Sag Channel necessary to allow sufficient clearances under the bridges, must be controlled so they will not rise above a certain height. The level of water in the Chicago River and the Main Sanitary Canal has a direct bearing on the level of the water in the Calumet-Sag Channel, because the waters join, and approval would not be given for controlling works at the mouth of the Chicago River which were not designed to facilitate prospective navigation through the Calumet-Sag Channel. It would be inadvisable to design controlling works until the ultimate navigation development of those channels has been determined.

The through waterway has been opened very recently, and the study of the amount of water required to meet the needs of a commercially useful waterway, as directed by Congress in the Act of July 3, 1930, may now be begun.

(d) The Special Master excluded evidence relating to the flow required to meet the needs of a commercially useful waterway between Lake Michigan and the Mississippi River; nevertheless, a finding is made on this point, on hearsay evidence, which is misinterpreted.

Objection was made on behalf of the complaining States against the introduction of any testimony relating to the flow or diversion of water required to meet the needs of the waterway between Lake Michigan and the Mississippi River which had become, in its entirety, a Federal Project by the Act of July 3, 1930. The Special Master excluded all evidence offered on this subject (Rec. 939-943). The Special Master's ruling was based upon the assumption that although the ultimate diversion of 1,500 c.f.s. allowed by the decree of this Court was based upon the needs of navigation of the Chicago River as a part of the "Port of Chicago" only, the question of the flow ultimately to be required for the through waterway was not included within the scope of the questions referred to him. Irrespective of the correctness of his understanding of the scope of the last reference and his ruling on this evidence, we believe that, since direct evidence on the question was excluded, the Special Master should not attempt to make a finding as to the minimum flow of water or diversion that will be required annually to meet the needs of the through waterway. As we have shown, the Special Master's finding in this respect is based upon the supposition that the minimum flow required by the Act of July 3, 1930, has already been demonstrated to be 1,500 c.f.s. or less and, therefore, Congress in prescribing a minimum flow circumscribed the study to be made so that the Secretary of War cannot recommend a flow of more than 1,500 c.f.s.; in other words, that Congress by the Act of July 3, 1930, in effect has already provided for a flow of 1,500 c.f.s. or less.

The Master states: "The provision of the Act for the smallest flow leaves no discretion to the Secretary of War to permit a larger diversion for *this Project.* Congress has exercised its full authority directly, without leaving a part in the hands of the Secretary" (Rep. 27) (Italics ours).

Our analysis of the evidence upon which the Master reaches this conclusion establishes (1) that for flotation purposes a flow of 1,000 c.f.s. may be sufficient for the Project between Utica and Lockport; (2) that the amount of flow required for the Project between Utica and Lockport, to keep the water sufficiently free from pollution for navigation, has not been determined; and (3) that the existing Project between Utica on the Illinois River, and Grafton on the Mississippi River, has been developed so that it requires a greater diversion than 1,500 c.f.s. for flotation, and if additional dredging is undertaken and additional locks are constructed so that a flow of 1,500 c.f.s. may be adequate for flotation, no conclusion has been reached as to the amount of flow that will be required to keep this portion of the Illinois River sufficiently free of pollution to render the water suitable for navigation, so that navigation may be free, easy and unobstructed.

Complete treatment of sewage does not amount to 100% purification. With efficient operation the proposed sewage treatment plants should attain not less than an annual average of 85% purification of the sewage treated, and it is probable that the degree of purification will be 90% or more (Re-ref. 35).

Under this view, it is manifest that the Secretary of War has discretion under the Act of July 3, 1930, to determine the minimum amount of flow required for the waterway for navigation purposes and that the recommendation of the Secretary of War has not been predetermined.

(e) The Special Master improperly injects the proposed Canadian Treaty into the case.

The Special Master finds that the Act of July 3, 1930, furnishes no justification for the failure of the defendants to move for authorization of controlling works, and that a new reason to the contrary has now arisen, in the relations with the Dominion of Canada (Rep. 28).

If, as we contend, the defendants properly reached the conclusion that controlling works are not necessary with a diversion that does not fall below 5,000 c.f.s., and the Act of July 3, 1930 warranted a belief that under its provisions the diversion of 5,000 c.f.s., to go into effect at the end of 1935, might continue after 1938, then the Act of July 3, 1930, did furnish a justification for not proceeding with the construction of controlling works. The proposed Canadian Treaty (Exhibit 13) has not, for the present at least, altered the situation. Furthermore, the contemplated provisions of the proposed Treaty were not made public until the Summer of 1932. It is improper, in our judgment, for the Special Master to speculate at this time upon the possibility of the proposed Canadian Treaty being ratified in its present form; and it is improper for him to ascribe any significance to the proposed form of the treaty, to the end that the defendants should proceed on the basis that the treaty will be ratified in its present form. The decree of April 21, 1930, in which the ultimate diversion of 1,500 c.f.s. was fixed, upon a consideration of only the navigation requirements of the Port of Chicago, has been used as the basis for a proposed provision in the treaty "that the diversion of water from the Great Lakes System, through the Chicago Drainage Canal, shall be reduced by December 31st, 1938 to the quantity permitted as of that date by the decree of the Supreme Court of the United States of April 21st, 1930" (Article VIII, Par. A., Rep. 29). If the Secretary of War should recommend, or if it should be otherwise established, that a diversion greater than 1,500 c.f.s. will be required to meet the needs of the commercially useful waterway, as provided in the Act of July 3, 1930, it is not to be assumed that Article VIII of the proposed treaty, as now drawn, will be permitted to stand.

The Special Master states (Rep. 28) that "It should not be anticipated that Congress will lower the level of Lake Michigan by diversion at Chicago, hereafter, in view of the possible unfriendliness of so doing to the Dominion of Canada." We fail to see any "possible unfriendliness" toward Canada in case it should be demonstrated, and Congress should legislate accordingly, that a diversion greater than 1,500 c.f.s. will be required for the waterway from Lake Michigan to the Mississippi. Canada as well as the United States has been diverting water from the Great Lakes and it is to be assumed that there will be mutual deference to the needs of the other, on the part of both governments, as there has been in the past.

The former Special Master in his first report discusses the negotiations with Canada leading up to the existing Treaty of 1909, known as the Canadian Boundary Waters Treaty, which provided (Article V) that the United States might authorize the diversion within the State of New York of waters of the Niagara River above the falls, for *power* purposes, not exceeding in the aggregate, a daily diversion at the rate of 20,000 c.f.s., and that the United Kingdom by the Dominion of Canada or the Province of Ontario might authorize a diversion of said waters for *power* purposes, not exceeding a daily diversion at the rate of 36,000 c.f.s. (First Rep. 55).

In allowing the United States to divert but 20,000 c.f.s. for power while Canada was allowed 36,000 c.f.s. for power, Canada consented to leave out of the Treaty any reference to the Drainage Canal (Statement of Elihu Root, First Rep. 57-58).

Article VIII of the 1909 Boundary Waters Treaty provides that with reference to the use of boundary waters, the following order of precedence should be observed among the various uses enumerated in the Treaty for these waters: (1) uses for domestic and sanitary purposes; (2) uses for navigation, including the service of canals for the purposes of navigation; (3) uses for power and for navigation purposes (First Rep. 55).

On January 4, 1907, the International Waterways Commission (created pursuant to an Act of Congress of June 13, 1902, (32 Stat. 373), consisting of three members from United States and three from Canada), made a special report upon the Chicago Drainage Canal, which contained the following recommendations (First Rep. 48):

> "A careful consideration of all the circumstances leads us to the conclusion that the diversion of 10,000 cubic feet per second through the Chicago River will, with proper treatment of the sewage from areas now sparsely occupied, provide for all the population which will ever be tributary to that river, and that the amount named will therefore suffice for the sanitary purposes of the city for all time. Incidentally, it will provide for the largest navigable waterway from Lake Michigan to the Mississippi River which has been considered by Congress.
>
> "We therefore recommend that the Government of the United States prohibit the diversion of more than 10,000 cubic feet per second for the Chicago Drainage Canal" (First Rep. 48).

The first report of the former Special Master contains the following:

> "In a report to their Government on April 25, 1906, the Canadian members of this Commission recommended that a treaty should be negotiated between the United States and Great Britain, and with respect to the diversions from the Niagara River, the Commission was of opinion that not more than 36,000 c.f.s. should be allowed on the Canadian side and on the American side to the extent of 18,500 c.f.s., exclusive of the amount required for domestic uses; and it was said that, while this would give an apparent advantage to Canadian interests, it was 'more than counterbalanced by the complete diversion of 10,000 cubic feet by way of the Chicago

Drainage Canal to the Mississippi River.' The report stated that the Chicago diversion should be limited to that amount.

"The Joint Commission, by its report of May 3, 1906, made the following recommendations to the two Governments:

> " '3. The Commission, therefore, recommend that such diversions, exclusive of water required for domestic use or the service of locks in navigation canals, be limited on the Canadian side to 36,000 cubic feet per second, and on the United States side to 18,500 cubic feet per second, (and in addition thereto, a diversion for sanitary purposes not to exceed 10,000 cubic feet per second, be authorized for the Chicago drainage canal), and that a treaty or legislation be had limiting these diversions to the quantities mentioned' " (First Rep. 46).

In defining the boundary waters between Canada and the United States, Lake Michigan was excluded (First Rep. 52-53, 57-58), which accounts for the fact that the diversion from Lake Michigan was not mentioned in the 1909 Treaty, although allowance was made for the diversion in the negotiations.

Article V of the Boundary Waters Treaty of 1909, which provides for the respective diversions for power, contains the following clause: "The prohibitions of this article shall not apply to the diversion of water for sanitary or domestic purposes, or for service of canals for the purposes of navigation."

Any objection that Canada might have to a diversion from Lake Michigan would be founded upon the effect of the diversion on the levels of the Great Lakes. The use of water for navigation and sanitation is given preference over the use of water for power in the Boundary Waters Treaty of 1909 (Art. VIII). The diversion of

36,000 c.f.s. allowed Canada under the Treaty of 1909 is for power purposes. This amount is not reduced by the proposed Great Lakes-St. Lawrence Waterway Treaty. Canada should not insist on a reduction of diversion to 1,500 c.f.s. from Lake Michigan for navigation and sanitary purposes, unless the study to be made by the Secretary of War under the Act of July 3, 1930, discloses that a greater diversion is not necessary in the interests of a commercially useful waterway, which is improbable.

Moreover, provision is made by the Act of July 3, 1930 (Rec. 1649) and in the proposed Great Lake-St. Lawrence Waterway Treaty to offset the effect of diversions, including the Chicago diversion, by the installation of compensating works in the Niagara and St. Clair Rivers. With an average annual diversion of 5,000 c.f.s., the levels of Lakes Michigan and Huron would be lowered less than six (about three and one-half) inches, and the levels of Lake Erie and Lake Ontario less than five (about three) inches. (First Rep. 105; Re-ref. 140). The provision in the Act of July 3, 1930, quoted above (page 51) includes the "construction of compensation works, as set forth in paragraphs * * * * 67, 69, 70, 71, 76 and 77 of the Report of the Special Board of Engineers, dated February 14, 1928, and submitted in House Document No. 253, Seventieth Congress, First Session. The amount hereby authorized to be expended upon said channels is $29,266,000." House Document No. 253 was introduced in evidence in the last reference as Exhibit 65.

The former Special Master stated: "From an engineering standpoint, the evidence shows it to be practicable to provide such works" (First Rep. 125).

The appropriation of Congress embraces compensating works in the Niagara and the St. Clair Rivers. The cost of the works proposed in the Niagara River was estimated by the Joint Board of Engineers on St. Lawrence Waterway (United States and Canada), in its report of November 16, 1926, at about $700,000, and in the St. Clair River at $2,700,000 (First Rep. 129-130). General Pillsbury, Assistant Chief of Engineers, United States Army, on November 29, 1932, stated before the Senate Sub-committee of the Committee on Foreign Relations, that it would be practicable to construct compensating structures in the Niagara and St. Clair Rivers to take care of the diversion at Chicago up to 5,000 feet at a comparatively small cost (Page 340, St. Lawrence Waterway Hearings before a Sub-committee of the Committee on Foreign Relations, United States Senate, November 14th to December 3, 1932; introduced in evidence in last reference as Exhibit 29).

Sections 67 and 69 of the Report of the Special Board of Engineers, dated February 14, 1928, referred to in the Rivers and Harbors Act of July 3, 1930 (Rec. 1654; Exhibit 65, pp. 65-66) describe the compensating works for the Niagara River; the cost is estimated to be $700,000. The compensating works for the St. Clair River are described in Section 70 of the same Report (Rec. 1655; Exhibit 29, page 66), the estimated cost of which is there stated to be $2,700,000. An additional allowance of $200,000 is estimated for a 24-foot project in section 76 of this report (Exhibit 29, page 67), making the total estimate of cost of works in the St. Clair River $2,900,000. The total appropriation for compensating works in the Rivers and Harbors Act of July 3, 1930, was $3,600,000.

Article VIII, Section (e) of the proposed Great Lakes-St. Lawrence Deep Waterway Treaty, provides as follows with respect to compensating works:

"that compensation works in the Niagara and St.

> Clair Rivers, designed to restore and maintain the lake levels to their natural range, shall be undertaken at the cost of the United States as regards compensation for the diversion through the Chicago Drainage Canal, and at the cost of Canada as regards the diversion for power purposes, other than power used in the operation of the Welland Canals; the compensation works shall be subject to adjustment and alteration from time to time as may be necessary, and as may be mutually agreed upon by the Governments, to meet any changes effected in accordance with the provisions of this Article in the water supply of the Great Lakes System above the said works, and the cost of such adjustment and alteration shall be borne by the Party effecting such change in water supply."

The Special Master (Rep. 34) refers to a table which contains data on the average low water flow of the Monongahela River, the Ohio River and the Panama Canal, and the amount of tonnage carried by these waterways. This table does not show any allowance for water stored during flood periods and used when needed. It merely shows the possibility of carrying a certain amount of tonnage over these waterways and certain minimum amounts of water available for lockage during average low water periods. It should not be construed as indicating that the tonnages shown were all carried on the low water flows as tabulated. None of these waterways is comparable with either the Illinois Waterway or the Lower Illinois River. The capacity of the locks (volume of water for filling same) is not comparable with locks on the Illinois Waterway, because the lifts are different. There is no pollution factor in the waterways named. There may be no more water available during low water periods in the rivers used as a basis of comparison; in determining the amount of flow required to meet the needs of a commercially useful waterway between Lake Michigan and the Mississippi River, the Secretary of War must consider the pollution factor, and is given a choice of providing water for open river navigation without unnecessary locks and dams and with reasonably pure water, or slack water navigation with possible undue pollution.

(f) The Special Master construes erroneously the former opinions of this Court in these cases.

This Court has not decided that a diversion by the defendants from Lake Michigan in excess of 1,500 c.f.s. would be unlawful under all circumstances, but clearly indicates that this figure is subject to change by any order that Congress may make in pursuance of its constitutional powers, and any modification that necessity may show should be made by this Court (281 U. S. 179, 198-199).

Mr. Chief Justice Taft said (278 U. S. 367, 420): "And insofar as the prior diversion was not for the purpose of maintaining navigation in the Chicago River it was without any legal basis, because made for an inadmissible purpose."

Subsequently to the opinion written by Mr. Chief Justice Taft, the former Special Master, in determining the diversion necessary to maintain navigation in the Chicago River as a part of the Port of Chicago, fixed 1,500 c.f.s. as a proper diversion for this purpose (Re-ref. 126-140).

In his first report on the original reference the former Special Master said (First Rep. 122):

> "The complainants contend that if the water for lockage and navigation purposes of this waterway from Lake Michigan to the mouth of the Illinois River is or should be taken from the Great Lakes-St. Lawrence watershed, a diversion of less than 1,000 c.f.s. of water is sufficient to supply all the

> needs of navigation. I am unable so to find. The *needs of navigation on that waterway will depend upon the carrying out of plans already adopted* and upon the ultimate decision of Congress with respect to water communication between Lake Michigan and the Mississippi River, the extent to which locks and dams are to be used or installed, that is, the character of the improvements and the amount which it is determined to expend" (Italics ours).

By the passage of the Rivers and Harbors Act of July 3, 1930, which had the effect of making the entire waterway a Federal project, Congress acted in pursuance of its constitutional powers, and in so exercising its jurisdiction over navigable waters it has added a new factor, namely, the waterway, which must be considered in determining the amount of diversion to be permitted for navigation. The scope of the inquiry is no longer limited to the navigation requirements of the Chicago River as a part of the Port of Chicago. If the waterway should require a diversion greater than 1,500 c.f.s. plus domestic pumpage, to maintain navigation in the Federal waterway, there is nothing in the opinions that have been rendered by this Court to prevent Congress from allowing a greater diversion, if needed to maintain navigation on the waterway. And if Congress should authorize a larger diversion for such purpose than is now permitted by the decree of this Court for the Chicago River as a part of the Port of Chicago, the decree would be superseded at least to that extent.

It is therefore erroneous for the Special Master to make the following statement:

> "With this definite indication by Congress and with its knowledge that this Court has decided that any greater diversion invades the rights of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan, and New York, and also causes them

> serious damage, it should not be anticipated that Congress, even if it has the power, is going to change its attitude and to continue to inflict that damage in order to save some dredging for which, in the judgment of the Chief of Engineers, the 'cost would be relatively small' " (Rep. 27).

This Court has not decided that a diversion greater than 1,500 c.f.s. invades the rights of the States mentioned. It has decided merely that a diversion of 1,500 c.f.s. is all that is required to maintain navigation in the Chicago River. Under the opinion a greater diversion may be allowed, if required to maintain navigation on the waterway from Lake Michigan to the Mississippi River. The statement of the Master is erroneous in two other respects: (1) there has been no definite indication by Congress as to what flow will be required to meet the needs of a commercially useful waterway, and (2) the quotation "cost would be relatively small" appears at the end of paragraph 12, page 11, of Senate Document 126 (Ex. 11) in the Report of the Board of Engineers for Rivers and Harbors, signed by Herbert Deakyne, Brigadier General. It refers to dredging between Utica and Lockport. To provide a nine-foot channel in the Lower Illinois River with a thousand-foot diversion would require more excavation "locks and dams in large number, lots of things" (Rep. 26-27).

The Special Master states further (Rep. 29): "After such a negotiation [referring to negotiations with Canada], and after this Court has decided that the diversion is damaging to the Great Lakes System, even if the treaty obligation does not ripen, it is not to be anticipated that Congress will authorize the damage."

Congress has full power to authorize any diversion necessary to maintain navigation on the new waterway and its action in this respect is not circumscribed by any pronouncement that has been made relating to the navigation requirements of the Chicago River which has become a part of the waterway.

(g) The Special Master does not state with precision the present attitude of the Sanitary District.

The Master's report contains the following statements:

> "The District did not and does not want controlling works, until it is established that in its opinion they are necessary" (Rep. 8).
>
> "The defendants by their Return filed November 7, 1932, (p. 27) say in substance that nothing should now be done by them about controlling works and they persist in this contention. *They intend and propose to do nothing about controlling works* (Italics ours).
>
> "At the hearings in January and February, 1933, before me, the attitude of the Sanitary District was that they do not propose to do anything about controlling works unless the War Department deems it necessary, unless obliged to, in order to make compliance with the decree of this Court" (Rep. 35).
>
> "The defendants urge that nothing be done. *If no order is entered, nothing will be done and there will be no controlling works for years to come, if ever"* (Italics ours) (Rep. 37).

The finding of the Special Master that "if no order is entered, nothing will be done and there will be no controlling works for years to come, if ever" is true, insofar as it is modified by the previous statements of the Master on the same subject which are quoted above.

Controlling works are not a requirement of the decree unless necessary to render safe the reductions to be made in diversion. The Sanitary District does not contend that anything may be omitted from its program which is "essential to an effective project" (See 278 U. S. 367, 421). But nothing is required by the decree of April 21, 1930 when construed with the opinion in 281 U. S. 179, or otherwise, beyond whatever is essential to an effective project which will enable the reductions in diversion to be made with safety. It is a sanitary and engineering problem for which the defendants have the responsibility and is not primarily a judicial question.

The Sanitary District engineers testified that controlling works are not necessary so long as a diversion of 5,000 c.f.s. continues, assuming the completion of intercepting sewers parallel to the Chicago River adjacent to Lake Michigan (Rep. p. 6, 12).

The War Department and the Sanitary District are now in accord on this question. The complaining States do not challenge this conclusion.

If the diversion is to be reduced below 5,000 c.f.s. after 1938 and if it appears that controlling works are necessary to keep Lake Michigan free from pollution and if the War Department will approve plans for controlling works, such works will be built, without any further order of this Court.

The Special Master also makes the following statements:

> "In the semi-annual reports filed with the Clerk of this Court, by the Sanitary District, nothing is said about the abandonment of the plan for immediate application for authorization of controlling works" (Rep. 35).
>
> "It did not occur to the compiler of the reports, that he should include a statement of the abandonment of controlling works. Its non-inclusion was not with an intention to deceive" (Rep. 36).

According to the testimony of Col. Weeks that has been referred to, Mr. Wisner asked him on several occasions if he had heard anything from the War Department with respect to the plans that had been submitted (Rec. 792). There is nothing to indicate that the Sanitary District ever had in mind the submission of a formal application. Their proposal to the former Special Master merely included the submission of plans, and after the decree it developed that all conceivable plans, including twelve plans prepared by the Sanitary District and five plans prepared in the office of the Local U. S. District Engineer, had been studied and considered as unacceptable by the Chief of Engineers. There was no immediate abandonment of the proposal to submit plans. The defendants sought to show what Mr. Wisner was ready to go ahead with when he told Col. Weeks that the Sanitary District was ready or anxious to go ahead, but the evidence was excluded, apparently on the ground that it called for a conclusion (Rec. 804-809).

Upon receiving some indication from the War Department as to which of the schemes that had been submitted might be acceptable, the Sanitary District could then resubmit a plan for that scheme and file a formal application in case one were deemed necessary. For the time being no immediate action was necessary, because of the time intervening before the reduction to 5,000 c.f.s. was to take place, and the Sanitary District was left without any means of determining what design, if any might meet the approval of the War Department, and was discouraged by Col. Weeks from submitting any design. In addition to the evidence already referred to, Mr. Ramey testified:

> "As to the submission of plans for works at the head of the main drainage canal, it would have been a futile thing to submit plans to the War Department for a structure in that canal, at least prior to the passage of the Act of July 3, 1930, and upon the passage of that Act of course we understood

> that a study was to be made as to the amount of diversion which might ultimately be authorized by Congress for the Waterway. The War Department at that time was not assuming any jurisdiction over the drainage canal" (Rec. 831).
>
> "If we were called upon to submit plans for controlling works at the mouth of the Chicago River I don't know what further plans we would submit other than the plans already submitted. Any additional plan would be a variation of one of those schemes. I think the field has been thoroughly covered" (Rec. 832-833).
>
> "If the decree had incorporated all of the paragraphs that the Special Master recommended we would still have been in the position in which it was necessary to determine upon which plan we would submit in order to get an authorization. We would then have pressed the matter with the War Department and asked them which plan they wished to consider" (Rec. 682).

It is clear from the record, in our judgment, that there was no abandonment of the plan to construct controlling works to meet the reduction to 5,000 c.f.s. until it was decided that controlling works were not necessary with this diversion.

In each of the semi-annual reports controlling works are carried in the estimate of cost for future work.

In the chart completed in September, 1930, controlling works were carried as an item, but no time was appointed for their construction. With respect to the chart Mr. Ramey testified:

> "There was no time set in this diagram [Exhibit 22] for the construction of control works, but in a supporting diagram I find that we had placed controlling works in the year 1935, that is, we had shown $4,000,000 in the year 1935. * * * That was just put down in that year. There was no time

> shown as to when those works were to be built because there was a certain amount of uncertainty as to the controlling works" (Rec. 393).
>
> "We put the controlling works in there but we did not put any time because we did not just know what was to be built and just when. Now that program, of course, was worked out to give the Board of Trustees a picture of the work so that they might arrange financing, and it is my understanding that they did make certain arrangements. * * * We set the time somewhere around, I think, 1935. That was the date of the reduction in the diversion to 5,000 cubic feet per second" (Rec. 406).

The Special Master states:

> "This chart if followed meant that they [controlling works] would not be completed at the earliest before autumn of 1936, nearly a year behind the requirements of the Special Master's conclusions" (Rep. 19).

It is obvious, we believe, from Mr. Ramey's testimony, that it was not the purpose of the Sanitary District in carrying controlling works as of 1935, that the Sanitary District intended construction should be begun in that year. The question was an open one at the time of the preparation of the chart, with a possibility of construction under the chart before the end of 1935.

(h) The Special Master errs in adopting as a premise that the facts found by the former Special Master must be taken as unchangeable in this reference; he errs in ignoring the uncontroverted testimony that controlling works are not necessary with a diversion of 5,000 c.f.s. and he errs in his assumption that the former Special Master made a positive finding that controlling works are essential with such a diversion.

The Special Master makes a finding that the engineers of the Sanitary District hold the opinion that controlling works are not necessary and that it will be safe to do without controlling works if the diversion of 5,000 c.f.s.

continues, assuming that intercepting sewers parallel to the Chicago River adjacent to Lake Michigan are completed before December 31, 1935. Both Mr. Ramey and Mr. Pearse testified to this effect (Rec. 449, 450, 935,-937, 1710).

The former Special Master adopted a statement made by the complainants in their brief as follows:

> " 'It is agreed that the practicability of these further reductions' (after the initial reduction to 6,500 c.f.s., plus pumpage) 'during the construction of the program depends upon whether controlling works are installed to prevent the reversal of the Chicago River in time of storm or whether the hydraulics of the Chicago River and Drainage Canal will permit the prevention of reversal of the River with controlling works at Lockport. The witnesses for both sides agree that subsequent to December 31, 1929, no progressive reductions may be had in the diversion beyond the point where substantial reversals of the Chicago River are prevented' " (Re-ref. 107).

It was the judgment of the former Special Master in 1929 on the question of controlling works,

> "That there is no adequate basis, so far as the testimony on the hydraulics of the river and canal is concerned, for a finding that pending the completion of the sewage treatment program it would be proper *to require* a further reduction of the annual average direct diversion below 6,500 c.f.s. without the installation of new controlling works" (Re-ref. 107). (Italics ours.)

The former Special Master stated that,

> "On all the evidence, it does not seem to me that an *absolute requirement* would be justified *at this time* for a reduction in the diversion below 6,500 c.f.s. pending the completion of the sewage treatment works and without new controlling works" (Re-ref. 117). (Italics ours.)

The former Special Master stated further that,

> "* * * as the sanitary experts, even those of the complainants, have not been ready to testify to the feasibility of further reductions of the diversion without the installation of such works, that is, pending the completion of the sewage treatment program, I am of the opinion that such further reduction should not be required unless permission is given to install controlling works * * *" (Re-ref. 117-118).

We contend that the judgment of the former Special Master was one of precaution based on the fact that under the testimony he did not feel justified *in requiring* a reduction in diversion from 6,500 c.f.s. to 5,000 c.f.s. without controlling works. He did not make a conclusive finding that the hydraulics of the river absolutely required controlling works, but he did not feel justified in requiring a reduction without controlling works on the testimony before him. At that time General Jadwin had expressed his opinion that the diversion could be reduced to 5,000 c.f.s. without controlling works, but there was no other evidence to this effect. In the last hearing the Sanitary District engineers testified that they had reached the same conclusion as that which has been held by the War Department and no contradictory testimony was offered.

The Special Master states:

> "The defendants argue now that the judgment of the Special Master in 1929, as to the need of controlling works was one of precaution and not of a final conviction that the hydraulics of the river absolutely required controlling works, and that in the present reference the Special Master has had the benefit of the opinions above described of the engineers of the Sanitary District. This is important, if it is my duty to reexamine the question, set at

> rest by the Special Master in 1929. If I ought to reexamine that question, I could not do it without hearing further evidence, as the parties were discouraged by me from going into the question as thoroughly as should be, if so serious a matter is to be reexamined. The behavior of the river in times of storm up to 1929, when the average diversion was 8500 c.f.s. or more, was before the Special Master in 1929. Since then there has been an opportunity to observe its behavior with an average diversion of 6500 c.f.s. There has been no opportunity to observe its behavior with an average diversion of 1500 c.f.s or of 5000 c.f.s. The opinions of the engineers of the Sanitary District given me are no more emphatic than that which Major General Jadwin gave to the Special Master in 1929" (Rep. 12.)

The Special Master justifies his action in ignoring the testimony offered and in discouraging further testimony on the ground that:

> "The present inquiry has been made with the belief that both the law and the facts decided by the former two opinions and by the decree must be taken as unchangeable in this reference and that those found by the former Special Master should be so taken in orderly deference and with no responsibility therefor, on the present Special Master. The defendants claim that this is an error" (Rep. 4).

As we have indicated, the apprehension expressed by the former Special Master cannot be deemed a positive finding that controlling works are absolutely essential to permit a reduction to 5,000 c.f.s. At the time his apprehension was expressed, the Sanitary District, which had the responsibility, was not satisfied that a reduction to 5,000 c.f.s. could be made safely without controlling works. But the Special Master in the last hearing was given assurance that the reduction to 5,000 c.f.s. could be safely accepted, and that the Sanitary District assumes that the reduction will be made at the end of 1935 regardless of the construction of controlling works.

Moreover, the hypothesis that the facts found on the former references must be taken as unchangeable in this reference, is one which should not have been adopted by the Special Master. In our judgment such a hypothesis is not required by the order of reference. Both the decree and the report of the former Special Master suggest the possibility and make allowance for change. To us it seems imperative that consideration should be given to all knowledge gained since the hearings in 1929. The facts disclosed in the hearings recently concluded, which were not before the Special Master in the prior hearings, and which have a bearing on the proper solution of the problems of the Sanitary District and the questions to be decided, should not be ignored.

The conclusions reached since 1929 by the Sanitary District Engineers concerning the hydraulics of the Chicago River, based upon the experience of the Sanitary District in preventing pollution of Lake Michigan due to reversals of the River, with an annual average flow of 6,500 c.f.s., are of vital importance in determining the steps that should be taken now with respect to controlling works.

The former Special Master expressly recognized the possibility of unforeseen obstacles arising and changes taking place (Re-ref. 142, 145, 146). From an engineering standpoint it is manifest that no program involving a project of such magnitude could possibly be inflexible. The estimates presented by the Sanitary District in 1929, and the Special Master's conclusion based on all the evidence then available, cannot be taken as an infallible guide as to what actually might develop as the most desirable and feasible means of accomplishing compliance with the decree. The present inquiry as to "the steps which should now be taken to secure such approval and construction" of controlling works, includes an inquiry as to whether any steps should be taken *at all* at the present time, and requires that consideration be given to the defendants' uncontradicted testimony that controlling works are not a condition precedent to the reduction of diversion from 6,500 c.f.s. to 5,000 c.f.s.

(i) The recommendation of the Special Master that an injunctional order be added to the decree providing for an immediate application and submission of plans to the War Department and construction of controlling works under the direction of the State of Illinois should not be confirmed; there is no necessity for such an enlargement of the decree.

The decree provides:

> "That on and after December 31, 1935, unless good cause be shown to the contrary, the defendants, the State of Illinois and the Sanitary District of Chicago, * * * be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence System or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 5,000 cubic feet per second in addition to domestic pumpage."
>
> * * *
>
> "That on and after December 31, 1938, unless good cause be shown to the contrary, the defendants, * * * be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence System * * * in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage" (281 U. S. 696-697).

The decree when read with the opinion of the Court contemplates the construction of all works necessary to render compliance possible with safety. Sewage treatment plants must be constructed so that the Chicago River, Drainage Canal, Des Plaines and Illinois Rivers will be free from undue pollution upon the effective dates for reductions in diversion, and if necessary, controlling works must be constructed under the decree so that Lake Michigan will be free from undue pollution. In the hearings before the present Special Master, witnesses for the Sanitary District evinced an intention on the part of the Sanitary District to comply with the decree in every respect. The conclusion has been reached by the Sanitary District Engineers that controlling works are not necessary so long as the diversion does not fall below 5,000 c.f.s. and that a reduction can be made to 5,000 c.f.s. with safety without controlling works (Rep. 6). The Sanitary District is prepared, upon the completion of the intercepting sewers along the main channel of the Chicago River adjacent to Lake Michigan, to accept the reduction to 5,000 c.f.s. without controlling works. Upon this determination by the Sanitary District involving a conclusion on an engineering and sanitation problem which is not challenged by the complaining States, this Court has been relieved of responsibility and the grounds for the apprehension of the former Special Master have been removed. If the provision of the decree, directing a reduction in diversion to 1,500 c.f.s. at the end of 1938, is not changed as a result of the study to be made by the Chief of Engineers under the Rivers and Harbors Act of July 3, 1930, and if it appears that controlling works are necessary to keep Lake Michigan free of pollution upon the completion of all sewage treatment projects, with a diversion of 1,500 c.f.s., controlling works will be designed and constructed, if the War Department approves, to meet the reduction. Compulsion will be unnecessary. If a diversion of 5,000 c.f.s. should continue upon a direction from Congress based upon the study to be made by the Secretary of War, controlling works will be unnecessary for the purpose of preventing pollution of Lake Michigan.

Mr. Ramey testified:

> "In the Engineering Department we have been working to adapt ourselves to a diversion of 5,000 c.f.s. after December 31, 1935; we have been working to that end, and have had no thought other than that the diversion would be reduced to 5,000 c.f.s. at the end of 1935" (Rec. 447).
>
> "We endeavored at all times to comply with the requirements of the decree. The Sanitary District has at all times attempted in good faith to comply with the requirements of the decree of the Supreme Court" (Rec. 660).
>
> "It is my impression that the decree provides that certain reductions in the diversion are to be made at certain times, and that the Sanitary District is expected to construct certain structures. It has not been my understanding that the exact schedule proposed in the report of the Chief Justice is an inflexible schedule, and subject to no change whatever in any detail, but that the Sanitary District shall carry out the sewage treatment construction schedule submitted by the Sanitary District in a reasonable manner, so far as it can, and I have assumed that irrespective of whether that was carried out or not, the decree would be enforced" (Rec. 663-664).
>
> "It has been our assumption that those reductions would be made on that date, unless something happened to change the situation. In so far as the 1935 reduction is concerned we have assumed that nothing could happen to change it" (Rec. 664).
>
> "It is not my attitude that there will never be any definite action if it is necessary for the Sanitary District to take the initiative" (Rec. 675).

> "There is only one thing that we have been considering and that is a reduction in the diversion, and we have been working to the end that we will be prepared for those reductions" (Rec. 832).

Mr. Pearse testified:

> "In my opinion it is entirely practicable for the District to adapt itself to the cutting of the diversion at the end of 1935 to 5,000 second feet" (Rec. 935-936, 1710).
>
> "My answers with reference to the advisability of the reductions to 5,000 second feet on December 31, 1935, are made on the assumption that there are no controlling works" (Rec. 1719).

Mr. Woodhull, chairman of the Finance Committee, testified:

> "The engineering department had been instructed by the Board to put its program into shape and execute it as rapidly as they could and finish within the prescribed time, and we had confidence in their ability to do so" (Rec. 1137-1138).
>
> "I do not know whether all the Trustees read the findings of the Chief Justice on re-reference. I know I did, and I presume most of them did, because they were all very anxious to perform * * * they knew what was in it. They knew that we had a job to do and wanted to do it" (Rec. 1281).
>
> "I am of the opinion, and as the result of discussion, and if you want to say, some examination, that the program of the engineering department has been at all times consistent with the court order, or program, and that the only thing that has interfered with it has been the sanction, or difficulties, whatever they were, encountered in it, in lack of moneys" (Rec. 1284).
>
> "We have a good engineering department, and we know that there has been no wilful delay, or they would not ignore it, and we have got a board which

is anxious to cooperate with that department, and there is no controversy between the engineering department and us, and there is no reason for delaying this work, except unsurmountable obstacles, and therefore, we are not apprehensive that the engineering department is going to ignore any phase of this program, and they are not apprehensive that we will make the money available as needed" (Rec. 1287).

"I will say that our instruction to the Engineering Department was to comply with the order of the court" (Rec. 1292).

We submit that there is no basis for the following statement made by the Special Master:

> "It has become apparent that the proposed plan of the Sanitary District will not be carried out before 1936 at the earliest as to the controlling works or on time as to the intercepting sewers and treatment works unless there is a decree which makes progress possible" (Rep. 39).

The evidence is clear that there is an avowed purpose on the part of the Sanitary District to perform its obligations under the decree and to do all that is necessary to facilitate safety in making the specified reductions. No enlargement of the decree is necessary to define the duty of the defendants.

The question of enlarging the decree so as to place responsibility upon the State in order to finance the program, which we contend is unreasonable and unnecessary, will be considered in our discussion of the financial measures recommended by the Special Master. The legal aspects of this question are discussed in our brief on the law.

III.

Southwest Side Treatment Works.

(a) The program adopted by the Sanitary District allowed adequate time for the physical construction of the Southwest Side Treatment Works.

The Special Master finds (Rep. 50) as one of the causes of alleged delay in providing for the construction of the Southwest Side Treatment Works,

> "An inexcusable and planned postponement of the beginning of construction of these Works to January 1, 1935 which left an inadequate time for their completion before December 31, 1938, at the rate of progress expected or to be expected under the methods pursued by the Sanitary District * * *."

The evidence introduced in the last reference was all to the effect that the program adopted by the Sanitary District (Exhibit 22) was intended to be a reasonable program from the standpoint of financing and construction, which, if substantially followed, would enable the Sanitary District to accept the reductions in diversion as required by the decree. The work was laid out in an orderly manner to effect compliance with the decree. The dates recommended by the former Special Master for the beginning and completion of each project were not considered to be fixed and inflexible, and subject to no modification whatever.

The chart dated September 10, 1930 and introduced in evidence as Exhibit 22, provides for the physical construction of the Southwest Side Treatment Works to begin on January 1, 1935 which would leave four years for completion. The Special Master's finding that four years is an inadequate time is not based upon any evidence offered by the complaining States in the last reference, but is based upon what he regards to be the finding of the former Special Master and which he assumes to be unchangeable and the only test of the efficacy of the program adopted by the Sanitary District.

In the former reference Mr. Herbert P. Linnell, a witness for the complainants testified that he was of the opinion that it would take four years from the award of the contract to complete the Southwest Side Plant (Re-Ref. 60). The former Special Master refers to Mr. Linnell's testimony in part, as follows:

> "In arriving at his opinion, which he called his 'firm opinion,' that the plant could be built in four years, he stated that he took into consideration availability of material and labor, and the time necessary for procuring plant and equipment. For shutdowns in winter and storm conditions, he provided practically twenty per cent. of twelve months or roughly two and a half months. He believed that the actual time in which the work could be done would be three or three and a quarter years. He stated that the four year limit included layoffs due to seasons, inclement weather; he gave no consideration to the five and a half day week that prevails in Chicago. All contingencies, 'due to inclement weather, winter weather, the five and a half day week and contingencies of a construction job' would be included in the twenty per cent. which he had allowed. He had not heard of a proposed rule providing for a five day week in Chicago, and he would not take that into consideration in arriving at the time of construction; that in his opinion would not make a difference in the computation of time but might affect the cost" (Re-ref. 61).

• • •

> "He believed that if he had absolute specifications the maximum time for completion would be three and a half years. Actual detailed plans and specifications might make a difference of six months in his computation, but he did not think they would require

> a longer time than four years. He assumed that the Southwest Side plant would be substantially the same as the North and West Side plants. His time estimate included the turning of the completed plant over to the owner for acceptance and operation" (Re-Ref. 63).

Another witness for the complaining States, W. J. Hunkin, testified that it was his opinion that the Southwest Side Sewage Treatment plant could be completed within fifteen hundred calendar days which he thought was a liberal estimate. In estimating fifteen hundred calendar days he allowed two hundred fifty days for Sundays and Holidays in the four years, two hundred days for lost time during the winter months and one hundred days for lost time during bad weather. In his fifteen hundred calendar days he had thus included five hundred and fifty days in which no work would be done. "He believed" that all projects, including sewage, could be completed within nine hundred fifty working days (Re-Ref. 64).

John C. Ruettinger, who testified that the defendants testified that if he would receive the contract to build the entire plant on January 1, 1930 it could be completed about October 1, 1937, a period of seven calendar years and nine months. He figured on one hundred seventy-one working days in a year as being available for excavating in open areas and pouring concrete for the tank construction. He said that this computation was arrived at

> "by deducting four winter months" (December to March inclusive), "the Sundays in the remaining months, two days for rain in each working month, the half holidays on Saturdays and the regular holidays, making a total deduction of 194 days, which allows for no unusual conditions such as extraordinary rain, breakdown in transportation, strikes or jurisdictional disputes" (Re-Ref. 66).

In discussing the testimony the former Special Master said:

> "One matter stands out prominently and accounts in considerable measure for the disparity in the estimates of time. That is the calculation of the number of working days in a calendar year. For the complainants, Mr. Linnell, in his estimate of four years for construction, allowed twenty per cent, or roughly two and a half months, for shutdowns in winter and storm conditions. Mr. Hunkin, in his estimate of fifteen hundred calendar days, assumed that there would be nine hundred and fifty working days in that period; that is, that there would be only five hundred and fifty days without work. Mr. Ruettinger, on the other hand, in his period of seven calendar years and nine months, figured on only one hundred and seventy-one working days in a year as permitting the prosecution of a very large part of the work which would consist of excavation and pouring concrete. * * * It seems to me that Mr. Ruettinger is too liberal in his deductions for lost time" (Re-Ref. 68).

* * *

> "The other differences in the estimates of time, on the part of the building experts, relate to many technical details of construction which it would be impracticable to attempt to review in this report. They concern the time required to obtain and erect cableways so as to begin work, the rate of pour of the concrete for the tanks with cableways, and the question of the concurrent construction of different parts of the plant such as tanks and buildings. It is manifest that such matters easily permit of variations in calculations relating to a vast plant, the construction of which from any point of view must extend over several years. * * * *Common experience shows that works of magnitude, especially public works, admit of many delays which are not demonstrably due to neglect and that much depends on the vigor with*

> *which the work is pressed. Much time can be saved or lost in large building operations according to the attitude which is taken as to the importance of early completion.* * * * I think, however, that the period of four years, or four years and thirty-nine days (1,500 calendar days) for such construction is too short to be laid down as a *definite requirement*" (Italics ours). (Re-ref. 69.)

In allowing a period of five and one-half calendar years for physical construction, the former Special Master stated:

> "The requirement to be laid down, while demanding expedition, should be reasonable in all respects. *It should not fix what could be considered to be the shortest conceivable time* under highly favorable conditions of work, but should have regard to what may fairly be expected under average conditions without unjustified delay. * * * * My conclusion on all the evidence is that a reasonable allowance of time for the physical construction of the Southwest Side Treatment Plant, including tuning up, so that it would be ready for complete operation, would be a period of five and one-half calendar years. * * *
>
> "Taking the time required for the preliminary steps that is, acquisition of site and preliminary studies, for preparation of plans and specifications for the securing of and passing upon bids, and for physical construction and tuning up, I conclude that the Southwest Side Sewage Treatment Plant, separately considered and assuming available funds, could be completed within eight calendar years." (Italics ours.) (Re-ref. 70.)

Clearly there is nothing in the findings or recommendations of the former Special Master which precludes the possibility of construction of the Southwest Side Treatment Works in four years, even though the former Special Master did not find that he could recommend a four-year construction period as a "definite requirement."

Upon the presentation of testimony in the last reference by Sanitary District engineers by which it was shown that substantially a four-year construction period for the Southwest Side Treatment Works was adopted by the Sanitary District and which was capable of accomplishment according to the testimony which was unchallenged by the complaining States, it is error, we contend for the Special Master to find the period prescribed to be inadequate.

Disregarding for the moment the presumptions which exist in favor of municipal action, the uncontradicted testimony as to the *necessary* time required for the construction of the Southwest Side Works, under the conditions which we shall mention, is sufficient to overcome any doubt which might arise concerning necessary time *required,* based upon the previous finding as to what time should be set as a *definite requirement* for completion of the Works. There is no inconsistency between the former Special Master's finding, as qualified by him and the testimony offered in the last reference. The complaining States offered no contradictory testimony. Under these circumstances we do not think it was within the province of the Special Master to make a finding contrary to the evidence upon a point not at issue.

Mr. Ramey, under whose direction Exhibit 22 was prepared, testified as follows:

> "Consideration was given as to the amount of time that would be required by the engineering organization to prepare plans and specifications for the various items in the sewage treatment program, for the amount of physical time which would be required by contractors to perform the work, for the amount of time that would be required to advertise for bids and to let the contracts, and consideration was given to the financial angle in that the work should be spread somewhat evenly over the eight

and one-half year construction period which had been allowed, to the end that not only could the work be carried out in the most reasonable and perhaps the most efficient manner, but the financing could be made in a reasonable manner. To this end the works were spread out over the eight year period so that there was a reasonably even distribution of cost for each year. The program called for a lesser expenditure the first five years of the period than in the last three years. That was because of the fact that in the latter part of the program we would be working on the larger plants, particularly at the Southwest Side Plant, and in that we presumed that the work would be let in larger units, the contracts larger and more money would be required (Rec. 377).

"This program was to be an elastic thing (Rec. 406-407). * * * *

"I knew that the decree provided for a reduction in diversion on December 31, 1935. I also knew that the Special Master found that certain sewage disposal works, with reasonable expedition, could be constructed and placed in operation on or before December 31, 1935. And I knew that there was a relation between the dates fixed for the reduction in diversion in 1935 and the extent of the construction of sewage disposal works, which the Master found could reasonably be accomplished on or before that date. The program was laid out with that in mind. And if you will examine that program carefully you will see that all the West Side sewers and all of the preliminary parts of the West Side Treatment Plant were to be finished by the end of 1933, and all that sewage would be taken out of the river, and that the work on the activated sludge portion of the treatment plant would be well on its way to completion. Some of that work, as indicated on the program, would have run over into 1936 (Rec. 543-544). * * *

"Our program for the Southwest Side Plant was not adopted in conscious disregard of the finding of Mr. Chief Justice Hughes that two years and six months would be a reasonable time for preliminary steps. We did not adopt our program without any intention to comply with the findings and conclusions of the Special Master with respect to the time suggested for the acquisition of a site, the preparation of plans, and advertising and passing of bids for the Southwest Side Plant (Rec. 564).

* * *

"We laid out this construction program as best we could to comply with the time set by the decree of the reduction in the diversion, and we laid it out in a way which would give a reasonably even distribution of the construction and of the cost over the eight-year period. Those were the considerations that we had in mind. I personally did not check back the chart to see whether or not it checked with the testimony given by the various experts in this case (Rec. 571).

"The 'additional work,' shown on page 2 of Exhibit 22, consists of needed sanitary improvements, but if any part of the work cannot be financed at the present time, obviously it is that type of work which should be deferred, and that is what we had in mind in showing the construction of these items in the latter part of the construction period (Rec. 576).

"It was not a consciously determined conclusion that we would not provide a program which would satisfy the decree (Rec. 577).

"We assumed that on December 31, 1935, the diversion would be reduced to 5,000 cubic feet per second. And we assumed that on January 1, 1939, the diversion would be reduced to 1500 cubic feet a second, unless good cause be shown to the contrary. We can see definitely ahead to the end of 1935. The thing we have principally in mind in that regard is that we will have by that time all of the sewers which parallel the river adjacent to the lake, constructed. Our program calls for that. And we will take out of the river, except in times of heavy storms, all of the sewage that enters the river east of Halsted Street (Rec. 602-603).

"There is only one thing that we have been considering and that is a reduction in the diversion, and we have been working to the end that we will be prepared for those reductions (Rec. 832).

"The decision in making up the estimate was made by all the engineers who had to do with the construction. We had the total estimate from Exhibit 1387, which had been introduced in the case, so we used the figures in that estimate; then we had all of the heads of the various departments design division, such as mechanical engineer, structural engineer, sewage treatment engineer, architectural engineer, the electrical design engineer and the sewer design engineer, and we called in the field men who had been in charge of construction work; we determined just when we could get these various items designed, the field engineers gave the times as to how long it would take contractors to do the work, and the chart is the result of the study of all the engineers interested in making it out. It was to get a picture of the whole program so that we could readily see what we had to do from time to time, and give our trustees the picture of what they would have to finance (Rec. 391)."

Mr. Pearse testified as follows:

"The matter of beginning construction on the Southwest Side Plant in 1935 was discussed at the time the diagram was prepared, in the light of the variations in the testimony before the Master (Rec. 994).

"* * * as I surveyed the situation, it looked to me as though we could let work earlier than the program showed, but I regarded the time shown as the last minute we could afford to get the work under construction (Rec. 994-995).

"I have explained that we discussed the whole situation with our men who were responsible for construction and design. We had reviewed this testimony and what the Master found, and we drew this conclusion, that as a minimum time that was the shortest we could show (Rec. 995).

"We discussed Mr. Ruettinger's opinion with the men who might have to build the plant, and we said 'What is the shortest time that it will take?' And we set this down as the shortest, bearing in mind that we hoped to get started on it earlier than this program showed (Rec. 996). * * *

"The main reason was to balance up the work there through the office and distribute the expenditures over the period (Rec. 996).

"It is my opinion that the program outlined on Exhibit 22 can be completed according to schedule if adequate financing is provided within the next few months (Rec. 1017). * * *

"I have not changed my views as to the possibility of progress on sewage construction work since I testified before Special Master Hughes. The opinion there given was based on the time that I thought would be reasonably possible to carry out, taking proper precautions in handling the work, and what a municipality would do, and taking into account some of the unknowns that might be forthcoming, and from what I have seen in the last three years, there were a good many unknowns that apparently were forthcoming. So that there may be no misconstruction, I testified to the Master that I had analyzed the situation on the yardstick of dollars, and I took into account the burden that I thought might properly be put on a municipality in estimating the rate of time (Rec. 1022-1023). * * *

"If funds become available within the next three

> months or so, I think possibly all the plants and structures could be completed and placed in operation by December 31, 1938 (Rec. 1025). * * *
>
> "Under pressure I think it can be accomplished if no work is done prior to June 1, 1933 (Rec. 1677-1678).
>
> "Assuming that adequate financing is provided by June 1, 1933, and keeping in mind the present status of design and construction work, it is my belief that with reasonable expedition it would be an up-hill proposition to complete the whole program shown on Exhibit 22 and place it in operation on or before December 31, 1938. The chances would be against the completion of everything on Exhibit 22 by the end of 1938. It would be possible, by some pressure, to go on forced draft and possibly complete the work by the end of 1938 (Rec. 1680).
>
> * * *
>
> "I would say that with those things done there will be no difficulty in the way of dropping to 5,000 c. f. s., with additional pumpage, at the end of 1935. The necessary sewer program to accomplish the reduction can be completed without forced draft if financing is promptly available. The forced draft situation relates to the pushing of the treatment part of the program" (Rec. 1718-1719).

On the question of distribution of costs referred to by the Special Master (Rep. 55) Mr. Ramey testified that the works were spread out over the eight-year period so that there was a reasonably even distribution of cost. The program called for a lesser expenditure per year during the first five years of the period than in the last three years because of the fact that the latter part of the program involved larger plants and the work would be let in larger units. The contracts would be larger and more money would be required (Rec. 377).

In further explanation Mr. Ramey said:

> "With regard to the distribution of expenditures which appears to be heavier in the latter years, we started more slowly because we were working on the Calumet plant first and the items that go to make up that Calumet plant are less expensive than the similar items at the West Side and Southwest Side plants. For instance, at the Calumet plant those aeration tanks cost about $2,400,000. Similar aeration tanks, but larger, are estimated at the West Side plant to cost about $10,000,000 (chart shows over $13,000,000 for aeration and final settling tanks), and at the Southwest Side to cost about $16,000,000 (chart shows a little over $9,000,000). The same thing applied to the other units of the plants and the contracts would be let in larger units, or rather, the work would be let in larger contracts on the Southwest Side project. Of the $31,000,000 that is shown for 1938, there is an item of $14,700,000 which is called "Total Additional Work." That includes the Oak Park Intercepting Sewer, the Howard Street Intercepting Sewer, the California Intercepting Sewer, and Blue Island Intercepting Sewer. Those items were put in the year 1938 because they were not as essential as the sewage treatment project proper. They were sanitary improvements which, if anything had to be omitted from the program or delayed, those items could be postponed with less harm than any others" (Rec. 393).

The former Special Master had contemplated that the West Side Works should be completed by the end of 1935, and that the Southwest Side Works would be started in the latter part of the year 1933, allowing five and one-half years for the construction of the Southwest Side Works. The chart (Exhibit 22) showed the completion of all of the West Side Works by the end of 1936, and the beginning of physical construction on the Southwest Side Works on January 1, 1931. Manifestly, there was some reason why the Sanitary District, in laying out a program in 1930, did not follow precisely the dates recommended by the former Special Master. The purpose in laying out the program was to finish the work in 1938, as suggested by the former Special Master.

The sewage treatment construction program was submitted to the Court in the hearings on re-reference in March, 1929. The program was outlined and estimated in Exhibit 1387. This exhibit summarized the sewage treatment construction program as of December 31, 1928.

Between the time of submission of this program to the former Special Master in March, 1929, and the time of filing of the Report of the former Special Master on December 17, 1929, a period of nine months had elapsed; by the date of the decree of the Supreme Court, April 21, 1930, a period of thirteen months had elapsed; and by the date of the preparation of Exhibit 22, namely, September 10, 1930, a period of eighteen months had elapsed.

In any construction program of this magnitude changes in detail are inevitable as time goes on.

From December 1928 to September 1929 there was an interruption in the financing of the sewage treatment construction program (Woodhull, Rec. 1109-1120), due to the failure to sell $27,000,000 of bonds in December 1928. There was a consequent interruption in construction until September 1929, when $10,650,000 of bonds were sold. (Rec. 1125.)

This interruption naturally has disarranged the construction schedule. In the entire trial of the case on re-reference and in the Report of the Special Master on Re-reference, the program as originally submitted in

March 1929 was followed. No consideration was given to changes which were taking place even during the trial of the case.

When a survey of the whole situation was begun in July 1930, culminating in the design, finance and construction schedule indicated on Exhibit 22 in September 1930, the situation had been changed regarding progress on the construction. The principal construction work during 1929 was taking place at the West Side Plant. (Compare Table 3, page 3, Semi-annual Report of July 1, 1930, and Defendants' Exhibit 1385, page 1 of the same Report), and the interruption of progress affected this plant the most. (See page 6, Semi-annual Report of July 1, 1930.)

So, when Exhibit 22 was prepared, the work on the Calumet project was laid out to conform to the date of completion indicated in the Report of the former Special Master, with smaller proportionate cost because of the smaller units. (Rec. 377, 408-409.)

But the work on the West Side Plant could not be shown for final completion on the date indicated by the former Special Master, namely, December 31, 1935, unless the contracts were grouped in an unreasonable way and perhaps an unworkable fashion. The work on the Southwest Side Plant is similar to that on the West Side Plant. The same engineering organization would have been carrying out the Southwest Side works both as to design and construction.

Hence, the explanation as to why the dates shown on Exhibit 22 for the completion of the West Side Plant and for the beginning of work on the Southwest Side Plant do not conform exactly to the dates indicated for these works in the Report of the former Special Master, is obviously because of the delay at the West Side works during 1929. This necessitated the crowding of the construction on the Southwest Side Plant into a period of four years and the extending of a portion of the work on the West Side Plant into 1936. These were the only two items about which serious complaint had been made. It was the belief of the engineers of the Sanitary District that taking the whole program as it appeared in the summer of 1930, the schedule as laid out in Exhibit 22 was an honest effort to provide for the carrying out of the sewage construction program in the most reasonable and orderly fashion.

As shown by the testimony, it was the belief of the engineers of the Sanitary District that taking the whole program as it appeared in the summer of 1930, the schedule as laid out in Exhibit 22 represented the best effort of the Sanitary District to provide for the carrying out of the sewage construction program in the most reasonable and orderly fashion.

Moreover, as indicated by the return of the defendants filed October 10, 1932 (P. 26), by the testimony of Mr. Pearse and the finding of the Special Master, the sewage treatment projects may yet be completed, assuming available funds, notwithstanding the unanticipated delays, before December 31, 1938.

Mr. Pearse testified:

> "Assuming that the money is forthcoming and that the men are provided, I think we would make a fight to get the balance of the program, shown on Exhibit 22, completed by December 31, 1938, but it all depends on how promptly the money is provided. The best we can do is to try to get it done. I think that if it could be taken up immediately, I think it is very probable that it could be pushed, but it would mean a rate of work which would be higher than we have ever attempted" (Rec. 993).

The Special Master states:

> "It is only by the exercise of unusual diligence

that the time already lost to progress on the Southwest Side Treatment Works can be counteracted and the Works completed before December 31, 1938. *They can be completed by that date if the work of design and construction begins before July* 1, 1933, *and is pressed vigorously.*" (Italics ours.) (Rep. 59.)

(b) The opposition to the proposed Southwest Side site and the difficulties encountered in the digestion of sludge at the West Side plant justified the Sanitary District in conducting a research to discover a less obnoxious method of sludge disposal requiring less space, which has proved successful. No delay in the construction of the Southwest Side works or its equivalent is attributable to the alleged indecision in the selection of a site or an efficient substitute.

The Application filed by the complainant States on October 3, 1932 contains the following charge:

> "* * * The Sanitary District of Chicago had selected the site for this project as early as 1926. Although this project was known to be the controlling factor in the determination of the time within which complete sewage treatment could be provided, no steps were thereafter taken by the Sanitary District throughout this long litigation to acquire the site so selected. The Sanitary District of Chicago on the contrary complacently permitted the site so selected to be sub-divided. It then set forward such subdivision as an additional reason for delay. * * * So far as the reports filed with this Court show, the defendants have made no attempt to perform the decree in this important and controlling particular" (Application, pp. 10-11).

The report of the Special Master does not adequately state the extent of the opposition to the proposed site for the Southwest Side plant, the difficulties in the selection of another site, and the problem presented in the handling of sludge which necessitated a deviation from the program submitted to the former Special Master in 1929.

With respect to the acquisition of the proposed site the former Special Master said:

> "The Sanitary District has had in contemplation for this plant about six hundred acres lying to the south of the West Side plant and south of the main channel of the Drainage Canal. This location has been designated generally by the Sanitary District on its map, but the site has not yet been acquired" (Re-ref. 50).
>
> "* * * On taking up the question of acquiring the contemplated site for the Southwest Side Plant, it was found that the proposed tract had been subdivided for purposes of sale in lots and that there were many separate owners. The Sanitary District has considered another site in the same general location, but from a quarter to half a mile further west, and this project at the last hearing on this re-reference was under consideration by the engineers of the Sanitary District. This question can be determined promptly and there seems to be no reason why proceedings for purchase or condemnation should not go speedily forward." (Re-ref. 51.)

It appeared from the testimony in the last reference that the site referred to by the former Special Master as being in "the same general location, but from a quarter to a half a mile further west" was a site which overlapped the previously mentioned site. The major portion of the sites was identical, the only difference being that in one case the easterly boundary extended to Cicero Avenue and in the other case to LaVergne Avenue which is one quarter of a mile west of Cicero Avenue (Rec. 886).

An ordinance was passed on December 26, 1929 to acquire a site bounded on the east by LaVergne Avenue. The "ordinance map" showing the boundaries of the site was introduced in evidence as Exhibit 24 (Rec.

384), and the ordinance for the acquisition of the site was introduced in evidence as Exhibit 31 (Rec. 891).

The reason for the removal of the eastern boundary of the tract to be acquired, to LaVergne Avenue was that the cost of the frontage on Cicero Avenue was too great; Cicero Avenue was a through street and had business frontage (Rec. 897).

The site included 570 acres consisting of 2,400 separate parcels of subdivided property and 228 acres of unsubdivided property (Rec. 901, 1396).

After the passage of the ordinance the first step taken was by the Engineering Department to supply the Law Department with the necessary maps and plats so that they could proceed to obtain opinions of title. In January, 1930, arrangements were made with the Chicago Title and Trust Company and descriptions and maps were forwarded to them to be used in their work (Rec. 900, 1396). The opinions of title were completed on March 24, 1930 (Rec. 1397). At the time the opinions of title were ordered from the Chicago Title and Trust Company an appraisal of the properties was ordered from the Chicago Real Estate Board (Rec. 906-907, 1398).

It was found that a great many of the subdivided parts had been purchased on contract from the subdividers, while others were held under trust agreements by various banks and other organizations (Rec. 901, 1398). After getting opinions of title two investigators were delegated to go to the office of the subdivider for the purpose of ascertaining the names of the parties who were purchasing the property under contract. It was also necessary to go to the County Treasurer's office and find out the addresses of the people who the opinions indicated were the title holders, so that an offer could be made to them or service obtained on them in a condemnation suit. The Chicago Title and Trust Company report showed only the person who held the title. The investigation in the office of the County Treasurer was also necessary in order to obtain the names of the people who were the beneficiaries under the trust agreements (Rec. 905-906, 1400). The search in the County Treasurer's office took two men several months (Rec. 1425).

In the meantime, conferences were held with the owners of the property; such owners as could be reached were informed of the contemplated purchase of the property and were advised to make no improvements upon it (Rec. 1407). The Board of Local Improvements was advised of the situation and was requested to permit no further improvements to be made on the property by special assessment (Rec. 1404). There were six subdivisions in the property covered by the ordinance, all of which existed prior to January 1, 1926 (Rec. 1408-1410).

Forms of pleadings were prepared for contemplated condemnation suits. Petitions for condemnation were not filed because of the opposition of the Board of Education, property owners, and others who were objecting to the acquisition of the site for the purpose intended (Rec. 1412). After the passage of the ordinance of December 26, 1929, opposition to the acquisition of the site developed from several sources. (Rec. 907).

The Board of Education operated a school near the southern boundary of the proposed site (Rec. 899-900). The Board of Education also owned a section of land approximately one-half a mile distant which was operated and used as a Municipal airport (Rec. 899).

As a result of the character and seriousness of the objections, a Committee, consisting of three public spirited citizens, was selected by the Board of Trustees of the Sanitary District to report on the relative merits of the site covered by the ordinance and an alternate site in Argo, some five and one-half miles away which had been proposed by certain objectors (Rec. 908-909). The committe reported in July, 1930 recommending that the ordinance site be purchased (Rec. 910).

The report of the committee created a storm of protest from citizens, the School Board, and others. Thereafter the Board of Trustees of the Sanitary District held public hearings commencing July 31, 1930 and ending August 22, 1930 in the Board rooms of the District (Rec. 910). Representatives from the School Board, from the Chicago & Alton Railroad, and from the Chicago Real Estate Board (Rec. 1171) attended, and sixteen witnesses were heard on behalf of the objectors, including four sanitary engineers, three of whom had previously testified before the former Special Master (Rec. 911). In addition to the complaint that the location of the sewage treatment works would establish a nuisance and render the property in the vicinity unfit for residential purposes, the objectors contended that the proposed site was unnecessary and that the West Side site was large enough for both works (Rep. 51). Messrs. Gascoigne, Townsend, and Howson testified to this effect (Rec. 911). They had previously appeared as witnesses for the complainant States in these causes.

The Trustees of the Sanitary District then became apprehensive. They did not want to go ahead and buy a piece of ground they did not need and the Sanitary District engineers, in the meantime, decided that they would go into the matter more exhaustively and do some experimental work (Rec. 1172).

The Trustees asked the engineers to recheck and be definite about the absolute necessity of the acquisition of the site (Rec. 1173). In the meantime, they were going ahead with the examination of titles. About $10,000 was spent in the preliminary steps. The Engineering Department was requested to look into the matter further and determine what could be done in the situation, both as to checking up on the availability of the site north of the channel, known as the West Side site, and as to such modifications as could be made in the plant being located south of the channel as proposed, which would remove the source of objections and reduce the area required, and the engineers were also asked to check up on the possibility of splitting the plant or its functions and utilizing perhaps a portion of the Argo site suggested (Rec. 920).

On August 15, 1930 the Sanitary District had prepared a lay-out for a combined plant to be located north of the channel on the present West Side site (Exhibit 34; Rec. 933, 1087). Both the West Side plant and the Southwest Side Plant were included in the lay-out but it necessitated the acquisition of about two hundred (200) acres contiguous to the western boundary of the West Side site (Rec. 1090, 1091). This lay-out contemplated sludge drying beds. In the opinion of the Sanitary District engineers the 501 acres of the West Side site would not furnish enough area for sludge drying beds for both plants and they believed 200 acres more should be acquired (Rec. 59, 1030).

A bond issue of $36,000,000 was under consideration and was to be presented to the electorate in February, 1931. Of this amount $3,100,000 was to be used to acquire a site for the Southwest Side Plant and to commence work on the Southwest Side project (Rec. 922, 1173; Semi-annual Report July 1, 1931, p. 6). There was so much opposition to the proposed site in the town of Stickney, and so many people involved in the controversy, and there being only one site covered by the ordinance a question was raised concerning the advisability of submitting the bond proposition to the voters with the site ordinance of December 26, 1929 of record. On January 22, 1931, the ordinance of December 26, 1929 was repealed. The Trustees were also apprehensive of a question being raised as to whether the bonds would be confined to the purchase of the Southwest Side site described in the ordinance and felt that there was a greater probability of the bond issue being approved if the site ordinance were repealed (Rec. 1174).

One of the clauses in the preamble of the repealing ordinance (Exhibit 32) provides as follows:

> "*Whereas,* the Board of Trustees desires to leave open for further consideration the choice of a definite site for said Southwest Side Sewage Treatment Works and wishes to consider other possible sites therefor and does not wish to be limited to the site specified and described in said ordinance, now therefore,"

The Special Master indicates that the ordinance should not have been repealed until the Sanitary District had decided that the West Side site was adequate for both treatment works or that a better site was obtainable promptly (Rep. 52). The repeal of the ordinance in no way delayed the determination of the site. A new ordinance could be adopted at any time providing for a new site or readopting the old site without causing any delay whatsoever.

During this time the Sanitary District was having difficulty with the digestion of sludge at the West Side Plant. Mr. Pearse testified:

> "We have made a study in the first place of certain plant layouts, to see what could be done in lessening the area required south of the channel; that was from the standpoint, you might say, of plant design, and then, further, we entered into a line of

investigation of the treatment of sludge and its dewatering, which applied to the procedure at both the Southwest and the future procedure at the West Side Works. This came about from the fact that when we had started the original operation of the West Side Works considerable difficulty came about in the digestion of mixed sludge, the mixed activated and fresh sludge and the inability to bring the moisture content down to low enough percentage to meet the original designed requirements.

"In other words, we found that the moisture contained content would remain upwards of 94 per cent instead of dropping down to 87 or lower.

"This indicated that we had to investigate ways and means of digesting sludge to see if we could improve upon it and also to find other ways of handling these solids.

"When the first battery went into service in June of 1930, and the second battery went in, I think, some six months later, and confirmed our opinion that we had to investigate; as result we set up at the West Side first a couple of large steel digestion tanks for the purpose of having separate digestion controlled by heat in an endeavor to see if we could not reduce the moisture content and obtain more work out of a given capacity of digestion space.

"Those experiments were put under way. * * * They went into operation in 1931. We spent $197,000.00 on that work * * *. As we began to find that the moisture content was not appreciably different from that in our Imhoff Tanks, and having had in the meantime some complaint from neighboring property owners adjacent to the West Side Works of odors from the disposal of the sludge in our dump areas west of Harlem Avenue, we decided to look into a different train of investigation and eliminate, if possible, both the sludge drying beds and the digestion of the sludge, thereby if successful, simplify the processes, cutting out the necessary tanks for digestion and cutting down the area required for sludge drying beds by their omission. We started, I think, in the late spring of 1931 on investigations first with vacuum filters, * * *. This work went along and was continued into the late spring of 1932.

"In the meantime, in, I think it was July of 1931, we took up first the question of incinerating the sludge, because we realized that first, solids filtered in the manner we proposed would have to be disposed of promptly in some very definite and final manner, otherwise decomposition might ensue in the cake.

"We first made incineration tests for a few days out at Maywood, in the dryer, we had in there, in our Des Plaines River Works; then we arranged for a cooperative test with the Whiting Company at Harvey and carried on an extended investigation of the burning of different kinds of sludge, with the result that we satisfied ourselves that with the heat units available in them, that the sludge could be burned with a minimum of additional fuel and that there was a possibility of carrying out what we desired, namely, the handling of the sludge directly from the settling tanks, with the addition of excess activated sludge, then dewatering, and incineration, but the results we had on a small scale led us to feel that on the size of the plant we would be called upon to put in service on the West Side and Southwest also, even the Calumet Works, that further investigation on a working basis was desirable.

"That led us to design and build the so-called twenty-four ton test plant * * *.

"We went ahead and that plant went into service early in August, 1932. It cost us approximately $147,000.00. We desired to operate it through four seasons to determine the variation of the sludge in its reactions to the chemicals used and the rates of filtration and also to determine the variations in the heat units in the material and test out the working adequate capacity of the different devices.

"That work is still continuing." (Rec. 923-926.)

Mr. Pearse testified further:

"In my opinion this experimentation in the matter of incineration of sludge does not result in a delay in carrying out the construction program as shown in Exhibit 22. In the meantime, before that final decision is reached, the work is proceeding on the general details required to build up the combined layout for the West Side and Southwest Side plants.

"If the incineration method is adopted there will be an economy to the District in the construction cost, that is, the first cost will be less, and there will be economy in operating cost, and thereby in the total annual cost. There will also be an economy in the amount of space required, because the area required for future sludge beds at that particular location will be eliminated, and if so, its place taken by the relatively small space required for the machinery to carry out the process" (Rec. 935).

"We did not delay the acquiring of the Southwest Side site in order to make plans to put the whole thing north of the channel [location of West Side site]. At the time that we ran foul of the objections, and ran short of money, we were not in that hole in order to deliberately try to put the thing north of the channel, but we have come to the idea of putting it north of the channel through the development we have made in the interim.

"At the start, whatever delay there was in the acquisition of the Southwest Side site was not by reason of any experiments we were carrying on in connection with sewage disposal. Since the process that we worked out became more convincing to us, we have perhaps postponed going ahead with any-

> thing south of the channel, in order to determine whether we cannot put the whole thing north of the channel. But at the start, in 1930, in the summer, we had no thought of postponing the acquiring of the site simply to make experiments." (Rec. 961.)
>
> "As the matter began to develop, in the fall of 1931 and the early part of 1932, we realized that we might have a very good chance of putting the whole plant north of the channel."
>
> * * *
>
> "We have not proceeded upon the assumption that experimentation with a view to developing something new in the way of sewage disposal is an adequate ground for postponing performance under the decree. Under our program the construction of the Southwest Side Plant was to start in 1935, and we had no intent of postponing performance, if the money was forthcoming." (Rec. 962-963.)
>
> "If I were confronted with the problem of beginning in a large way to go forward with these two plants on May 1, 1933, my opinion is that I would simply have to go ahead and take the incineration plan." (Rec. 1033-1034.)

Mr. Ramey testified that in all probability the Southwest Side plant will be constructed on the West Side site (Rec. 598). The question is practically settled (Rec. 597).

Mr. Woodhull testified:

> "It is practically settled that the so-called Southwest Side plant will be built on the West Side area. I think there has been no formal action by the Board, but the sentiment, it is generally conceded. The Trustees have made inquiries to determine whether it is a practical program and they are satisfied that it can be carried out and they expect to

carry it out. The only thing that is worrying us is the money" (Rec. 1298-1299).

The record indicates that no delay has been caused by the investigation conducted by the Sanitary District; it has resulted in a reduction in cost, a reduction in space required and a reduction in time required for construction.

(c) The Sanitary District has proceeded with reasonable diligence in the design of the Southwest Side Treatment Works.

The record clearly shows a diligence in proceeding with the necessary planning, and that studies were made in the summer of 1930 at the time of the hearings before the Board of Trustees as to the location on the West Side site (Rec. 1086). Further studies were continued thereafter on different alternatives and possibilities (Rec. 920, 963, 1086). The West Side site was explored for a determination as to the character of the foundations available (Rec. 985, 986, 988). Other preliminary work included a field investigation of the packing house wastes and a determination now practically completed to show the effect on the design (as shown in the semi-annual reports) covering a full year of examination in the field. An extended survey was made of population figures based on the 1930 Census and the probable future population (Rec. 1582, 1699, 1700, 1714). A search was made into the water pumpage of the city by districts and the changes which may occur, as metering proceeds. The probable flow to the Southwest Side Treatment Works was determined for design purposes (Rec. 1707-1708).

The time that has been spent by the Sanitary District in experimenting with the disposal of sludge by dewatering and incineration has not been assigned by the

Sanitary District as a reason for delay in the ultimate completion of the Southwest Side Treatment Works. These experiments which have proved successful have not operated to cause any delay. Mr. Ramey testified that these experiments did not operate to arrest development on the whole treatment program and that they were not losing time because of the experiment but that they were slowed up by a lack of money (Rec. 600, 601).

Mr. Pearse testified that in his opinion the experimentation in the matter of incineration of sludge has not resulted in delay in carrying out the construction program (Rec. 935).

Mr. Ramey testified further that the present state of progress with respect to the Southwest Side Plant complies, to a reasonable extent, with the general finding of the former Special Master on page 70 of his report on Re-reference. Mr. Ramey stated:

> "We have done a considerable amount of preliminary work. We have made preliminary investigations; we have made studies; we have made preliminary layouts. I know we have enough information now to begin preparation of detailed contract plans" (Rec. 579, 641).
>
> "Some work has been done on plans for all of the sewers" (Rec. 642, 643).
>
> "The profile has been worked out on contracts 1, 2, 3, 4 and 5 (all the Southwest Side sewers), the sewer sizes have been determined but detailed plans have not yet been drawn" (Rec. 642, 643).

As stated by the Special Master, the Sanitary District, in May, 1932, prepared a plan for a layout of a combined West Side Works and Southwest Side Works on the present site of the West Side Works with an incineration plant substituted for sludge drying beds (Rep. 52; Ex. 33).

The Special Master concedes that in spite of the delay that has resulted because of a lack of funds, the construction work can still be completed if pressed vigorously by the end of 1938 (Rep. 59).

The Special Master refers to the investigation of Stockyards and Packingtown wastes as follows:

> "The other delays were so effective, that the halting search for information concerning these wastes has not delayed construction" (Rep. 57).

We submit that diligence has been shown in the search for this information. In the first report filed with the Court on July 1, 1930, this statement is made:

> "Meanwhile the Sanitary District of Chicago is proceeding with certain tests on the flow in the sewers leading from Packingtown and the Stock Yards in order to determine as accurately as possible under the circumstances the character and volume of most of these wastes" (Semi-Annual Report, July 1, 1930, p. 8).

In the Semi-Annual reports filed with the Court on January 1, 1931, and July 1, 1931, respectively, the statement is made that:

> "The Sanitary District is continuing the testing of flow from certain sewers leading from Packingtown and the Stock Yards" (Semi-Annual Report, January 1, 1931, p. 6; Semi-Annual Report, July 1, 1931, p. 6).

In the Semi-Annual report filed with the Court on January 1, 1932, appears the following statement:

> "The testing on certain sewers leading from Packingtown and the Stock Yards *has been completed* and the results are being studied" (Semi-Annual Report, January 1, 1932, p. 6).

The statement in the return of the defendants that good engineering practice required a check upon the information obtained more than fifteen years ago regarding industrial wastes, both as to quantity and as to quality, stands unchallenged (Return 34).

Mr. Ramey testified:

> "We are not in the same situation as we were in 1929 with respect to the Southwest Side Plant. We have considerable more information as to the amount of sewage. We have had a check up on the amount of Stockyards wastes. We had studies made of the Southwest Side sewage, considerable work was done on that. I would say that we are in a much better position now to design that plant than we were four years ago" (Rec. 582).

We find nothing in the record to sustain the Master's finding that the alleged failure to proceed with reasonable diligence to prepare designs, plans and specifications for the Southwest Side Works, has been a contributing cause in the assumed delay in providing for the construction of the Southwest Side Treatment Works.

If money becomes available the works can be constructed and the entire program completed before the end of 1938, and the requirements of the decree will be met.

(d) The Special Master's recommendation concerning the Southwest Side Treatment Works should not be adopted; there is no necessity for a modification of the decree at this time.

The Special Master has recommended that an injunctional order be added to the decree enjoining the State of Illinois to provide the necessary money for, and, through the Sanitary District of Chicago or through some other instrumentality chosen by the State, forthwith to design and construct the Southwest Side Treatment Works as originally proposed, or a sufficient substitute, at a rate of progress that will result in the completion of the works and the beginning of their operation before December 31, 1938, barring unforeseen casualties. (Rep. 60.)

Passing the question of the reasonableness and necessity of entering an injunctional order specifically directing the State to undertake the work for financial reasons, which we shall discuss separately, there is no necessity for the addition of a paragraph to the decree consisting of a command to do certain specific things which the Sanitary District has undertaken to do and will do if funds become available.

The position of the Sanitary District with regard to the proposed recommendations is summarized by the Special Master in his report as follows:

> "The Sanitary District opposes an order to the State of Illinois to provide the necessary money and to construct the Southwest Side Treatment Works, on the alleged grounds that the obligation is not the State's and that the Sanitary District has determined to construct these works on the West Side site which it now owns and is prepared to construct these Works as soon as the necessary funds which the District is endeavoring to get are available, and ample time remains for this construction assuming that funds will be available and that a finding that the District will not obtain the necessary funds or will not construct these Works by December 31, 1938 is premature and unwarranted." (Rep. 61.)

If funds are not immediately forthcoming there is ample time to apply for an extension, either to this Court or to the Department of War, as the case may be, in the event that the study to be made by the War Department does not result in a continuation of the 5,000 c.f.s diversion after 1938. There is a possibility that this diversion may continue and that there will be no compelling necessity to complete the Southwest Side Treatment Works or its equivalent before the end of 1938.

An enlargement of the decree is not required to define the duty of the defendants. No delay has occurred which will affect the ultimate completion of the works before the end of 1938, except the delay caused by a lack of money. The evidence does not disclose that there need be any apprehension on the part of this Court as to the diligence it may expect from the Sanitary District. On the contrary, the testimony to which we have referred indicates that this Court may anticipate that the Sanitary District will act with all possible speed in the performance of work necessary to effect compliance with the decree.

We respectfully submit that upon the showing that has been made of due diligence, under all the circumstances, the decree should not be modified at the present time even though, from the standpoint of future accomplishment with proper diligence, an apprehension might exist that the works will not be completed before the end of 1938. There is due time in which to ask for a modification of the decree if good cause requiring modification should intervene.

IV.

Reasonable and necessary financial measures to be taken to carry out the decree.

The Special Master has found that the Sanitary District is not responsible for its financial plight and that there is no reasonable financial measure that the Sanitary District can take which it is failing to take (Rec. 78, 82).

The latest estimate of the Sanitary District is that all the remaining work in the sewage treatment construction program will cost approximately $139,000,000 (Report 62). Exhibit 51 shows the exact figure to be $138,575.500 which includes the sum of $27,068,000 for the items shown on Exhibit 22 as "Additional Work." This figure for "Additional Work" is made up of the following items:

> Upper DesPlaines Intercepting Sewer, $4,025,000 (Exhibit 22, Sheet 2, Lines 53-56). This item is included in the figure of $19,699,000 for sewers under West Side project on Exhibit 51.
>
> Oak Park Intercepting Sewer, $3,500,000 (Exhibit 22, Sheet 2, Lines 57-60). This item is included in the figure of $19,699,000 for sewers under West Side project on Exhibit 51.
>
> Racine Avenue Pump Station, $4,000,000 (Exhibit 51. This appears as $4,968,000 in Exhibit 22, Sheet 2, lines 34-38).
>
> South Side sewers, $15,543,000 (Exhibit 51. This appears as $19,429,000 on Exhibit 22, Sheet 2, lines 39-52).

Mr. Ramey testified:

> "Now that additional work will not bring in any additional sewage to the treatment plants; it is a needed sanitary improvement, but if any part of the work can not be finished at the present time, obviously it is that type of work which should be deferred and that is what we had in mind in showing the construction of those items in the latter part of the construction period" (Rec. 576).

The significance of this testimony is that the additional work referred to is not a condition precedent to the reductions in diversion in 1935 and in 1938.

If financial considerations make it necessary, this $27,068,000 of "additional work" can be deferred until after 1938 without endangering the local water supply.

The work is essential to a complete sanitary program and must eventually be done. But if this work should be deferred for the present or postponed until after 1938, the total estimate for future work of $136,575,500 would be thereby reduced to $111,507,500; this latter figure may be taken as the maximum estimate of costs of essential sewage treatment works to be considered by this court in determining the financial requirements to effect compliance with the decree. The total amount of $111,507,500 includes an estimate of $3,200,000 for the construction of controlling works which may be found to be unnecessary. Another possible saving may be effected by the consolidation of the construction of the Southwest Side sewage treatment works and the West Side sewage treatment works on structures which are common to both plants. No account has as yet been taken of this possible saving, which may be a considerable amount. All this is in addition to the saving of $9,775,000 referred to by the Special Master (Rep. 62).

The only practical way for the Sanitary District to raise the money required is by the sale of bonds. In order to show the capacity of the Sanitary District to finance the sewage treatment construction program a financial tabulation was introduced in evidence. This tabulation, dated January 24, 1933, is set out in full in the report of the Special Master (p. 75). It was introduced in evidence as Exhibit No. 53 (Rec. 1216). On February 3, 1933, Mr. Ramey testified that he made a closer estimate and re-computed Exhibit No. 53, taking into account the interest on defaulted bonds and putting in the power contract at $18,850,000; he estimated that the liability under that contract would be reduced at an annual rate of $700,000 a year (Rec. 1785). The Special Master then stated: "This is borrowing power computation, now, and it takes the place of 53, so that 53 can be ignored" (Rec. 1785). The latter computation was introduced in evidence as Exhibit 73 (Rec.

1786). Notwithstanding the substitution of Exhibit 73 for Exhibit 53, the Special Master in his report refers only to Exhibit 53 and ignores Exhibit 73. The difference between Exhibit 53 and Exhibit 73 is in three items: (1) Exhibit 73 includes an item of $5,442,900 for interest on defaulted bonds, omitted from Exhibit 53; (2) the liability under the electric power contract is estimated at $18,850,000 instead of the round figure of $19,000,000 appearing in Exhibit 53; (3) the increase in debt incurring capacity accruing from the annual reduction in the liability under the power contract is figured at the rate of $700,000 per year or a total of $4,200,000 in Exhibit 73, as against an old estimate of $500,000 or a total of $3,000,000 as used in Exhibit 53.

In explanation of the adoption of the figure of $700,000 in Exhibit 73 instead of $500,000 as was used in Exhibit 53 for the annual liability under the power contract, Mr. Ramey testified:

> "The reduction each year was estimated then at an arbitrary figure, and about $500,000 has been used in computations by the Sanitary District in * * * reducing that liability to get a figure to use in advertisement for bonds; the amount paid for this figure in 1932 was about $700,000 and this is the amount that is appropriated in 1933" (Rec. 1783).

The Special Master comments with some skepticism upon the reduction of the liability under the electric power contract from $29,108,523, an amount previously used, to $19,000,000 (Rep. 67, 68, 69). Mr. Ramey fully explained the reason for making the reduction and the method of arriving at the figure of $18,850,000. The revised figure was based on actual operating experience of the Sanitary District as distinguished from the arbitrary figure estimated (1929) before any power was used under this contract. Mr. Ramey's testimony on this point is as follows:

> "Now, our experience in operating the North Side Treatment Plant since July, 1930, indicated a much less use of power than was estimated in 1929. The greatest saving has been made in power for compressing air for the aeration tanks. The basis of design for these tanks and blowers was about one cubic foot of air per gallon of sewage. We actually used apparently about one-half a cubic foot. Of course, this has resulted in a much less use of power than we had anticipated. What has happened at the North Side Plant, of course, will happen at the Calumet, West Side and Southwest Side Plants. * * * I requested our electrical engineer to give me an estimate of what the saving would be, assuming that from now on we would use the power as we are now using it, and they gave me a figure of a future liability throughout the balance of the life of that contract at $18,850,000 * * * that is a reduction of about 35 per cent over the original estimate. Now, in preparing Exhibit 53, this figure was rounded out to $19,000,000 to get round numbers" (Rec. 1783-1784).

The total debt incurring capacity of the Sanitary District over the period 1933-1938 as shown by Exhibit 73 is $150,596,600. Both Exhibits 73 and 53 contain a tabulation showing the estimated construction expenditures equal to bond sales by years. The Special Master in his report makes no reference to this tabulation, identical in both exhibits, which is as follows:

Estimated Construction Expenditures equal to Bond Sales by years,

Year	Construction Expenditure
1933	$14,000,000
1934	20,000,000
1935	21,000,000
1936	24,000,000
1937	25,000,000
1938	35,000,000
Total Debt Incurring Capacity Required	$139,000,000

Using the foregoing tabulation as a basis, the excess of the debt incurring capacity over the estimated construction expenditures at the end of 1938 would be $11,596,600, as shown on Exhibit 73. If the figure of $111,507,500, referred to on page 124, *supra,* is used as a basis of calculation, instead of $138,575,500 the excess of the debt incurring capacity over the estimated construction expenditures would be $39,089,100.

These estimates of the Sanitary District assume the collection of taxes and the retirement of bonds as they fall due. The Special Master discounts the possibility that the Sanitary District may be able to finance the construction of the sewage treatment works required before December 31, 1938, on the supposition that there may be no improvement in the collection of taxes and the sale of bonds (Rep. 76).

The Special Master attempts to demonstrate (Rep. 76) that the present unencumbered debt incurring capacity of the Sanitary District, which the Sanitary District estimates at $48,864,600 (Exhibit 73), and which the Special Master estimates at $38,086,950.81 (Rep. 68), may not be substantially increased during the next six years, and that the present amount of the unencumbered debt incurring capacity may be the only amount that will be available for carrying out the sewage treatment construction program up to December 31, 1938. We believe that any adverse forecast at this time with respect to the possible maximum unencumbered debt incurring capacity is premature, and that there is no necessity for indulging in such gloomy speculation until the present available amount is materially diminished. The Sanitary District may acquire more bonding power later by paying off existing debts, from collections of delinquent and future taxes (Rep. 69). The Special Master has found that "it is believed locally that payment of taxes is improving" (Rep. 74). Objectionable features in the assessment of taxes have been removed; other legal obstacles have been obviated, and practically the only remaining feature to consider with respect to the possibility of collecting taxes is the ability of the taxpayers to pay (Return 49-51; Rec. 1600-1618).

The following observation is made by the Special Master concerning the "hope" of the Sanitary District as to its ability to finance the construction of the sewage treatment project:

> "The defendants when requested on February 15, 1933 felt unable to assert and therefore declined to assert and do not assert and cannot assert a confident hope that ever, the Sanitary District will be able financially to resume construction in a large way on this project." (Rep. 108.)

The statement made by the Sanitary District, to which the Special Master has reference, was as follows:

> "* * * we wish to make our statements conservative; in other words, we do not wish to indulge in any extravagant claims or any claims or statements that we do not feel can not be carried out.
>
> "The time within which sufficient funds will become available depends upon the salability of bonds, which in turn is dependent upon the following factors. As shown by the testimony introduced, there is an improvement in the tax situation in Cook County resulting from progressive elimination of sundry difficulties that led up to the so-called tax strike.
>
> "Features of the taxing machinery which were objectionable to the taxpayers have been removed by action of the State legislature. Obstacles to the collection of taxes of 1928, 1929 and 1930, which were kept up by litigation in cases like the Cesar case and the Massachusetts Insurance cases, have been removed by the final disposition of those cases

in the Federal Supreme Court. Legal objections pending in the Cook County court are being disposed of at the rate of hundreds of cases per day; consequently it is reasonable to say that there will be no unnecessary delay from now on in the collection of taxes, which may be attributed to a refusal on the part of the taxpayers to pay because of lack of confidence in the taxing bodies, or because of belief in the illegality or invalidity of the taxes. Their ability to pay is a practical problem upon which we are not able to express a definite opinion. It is impossible to estimate at this time what proportion of the taxes will be slow in coming in due to the inability of the taxpayers to pay their bills. The bills for the 1931 taxes are now being sent out by the county collector. The 1931 taxes have been by legislative action made payable in two installments, in order to make it as easy as possible for the taxpayers to pay." (Transcript of Washington Proceedings, 534-536.)

"It is our hope that the taxes will come in in sufficient volume and in time enough to enable us to cure our defaults on financing the construction program outlined so as to have sufficient work completed in time to accept the next reduction in diversion specified in the decree. However, at this time we can not conscientiously assert that we have a confident hope, as phrased by your Master, but perhaps we could say that we have a confident hope but we can not be sure because of the uncertainty that still exists in the general economic situation with which we are all familiar. We therefore do not feel justified at this time in making positive forecasts, nor do we feel justified in expressing a belief that the work outlined can not be accomplished. It is our position that a forecast at this time would be premature, but the Court may assume * * * that unless it becomes necessary for us to apply to the Court at a later date for an extension of time, the work necessary to take the reduction specified in the decree will be accomplished." (Tr. of Wash. Pro. 537-538.)

If this Court adopts the Special Master's view that "The prospect, highly colored by the best hopes within reason, is that the Sanitary District will be unable financially to construct these Works before December 31, 1938," (Rep. 76) we submit that the exigency of the situation calls for an extension of time in which to complete the works rather than a transfer of the financial responsibility directly upon the State of Illinois.

When asked by the Special Master to submit suggestions respecting financial measures to be taken, which are reasonable and necessary the Sanitary District offered the following, which are here presented as the recommendations of the Sanitary District:

> "There are no financial measures which are reasonable and necessary to be taken by the Sanitary District, other than those which the Sanitary District already has under way. Those shall be diligently pursued.
>
> "These measures include the following:
>
> "(1) The sale of construction bonds, which is the only means which the Sanitary District possesses to obtain money to finance its construction program. More than $43,000,000 par value of such bonds are now available for immediate sale.
>
> "(2) Efforts to remove the existing and imminent defaults in principal of and interest on bonds, which efforts include the following: (a) Cooperation with other governmental authorities in Cook County to speed up the collection of taxes; (b) The effort to obtain passage by the Illinois General Assembly of a bill authorizing the issuance of refunding bonds without referendum restrictions.
>
> "(3) An effort to obtain legislation eliminating the requirement of a referendum on bonds hereafter to be issued and sold, to pay for the work made necessary by the Supreme Court decree.
>
> "(4) Prosecution of the Packingtown litigation to a conclusion prior to the putting in of operation

of the Southwest Side treatment works, so that it will be possible to make a charge for treatment of Packingtown wastes.

"(5) Continued efforts to obtain a loan from the Reconstruction Finance Corporation, or to obtain the necessary amendment of the Emergency Relief and Construction Act, in order that such a loan may be obtained.

"(6) Continued economies in operation and administrative expenses, thus conserving the resources and retaining the confidence of the taxpayers in the administration of the District." (Tr. of Wash. Pro. 545-546.)

"We respectfully suggest to the Master that the financing measures which are hereinafter specifically enumerated and commented upon, are in our opinion both unreasonable and unnecessary and in some cases, in our judgment, would be wholly ineffective. We name first that of requiring the State of Illinois to finance the construction program. Your Honor might say, well, why should you, a citizen of the Sanitary District, be exercised about what, if anything, is done to the State of Illinois? We answer, for the following reasons:

"Assuming without conceding, that the obligation to finance the District's construction program is a primary obligation of the State of Illinois, and assuming without conceding, that the Federal Supreme Court possesses the power to order or direct the State of Illinois to assume or undertake that obligation, it is respectfully submitted that such action would be highly inexpedient at this time or at any time. Manifestly such procedure would be anomalous and most unusual. Unquestionably, in so far as the people of Illinois outside the limits of the Sanitary District have any feeling upon the subject, they feel that the burden belongs to the Sanitary District and should be borne by the Sanitary District which is the territory immediately benefited by the improvement." (Tr. of Wash. Pro. 560-561.)

"Moreover, it is perfectly clear that such procedure not only would result in not saving time but probably would have the opposite effect. The taxpayers residing, let us say, in Danville or in a rural neighborhood would feel that there is not more reason why they should be taxed to pay for sewage treatment works in Chicago than there would be for requiring them to help pay for fire engine houses and police stations in Chicago, and an effort to levy a general tax for the purpose of financing this program would require first of all appropriate action by the General Assembly.

"Assuming such action, the proposed tax levy in our judgment would meet with vigorous resistance in the courts and otherwise. The litigation necessary to establish the validity or otherwise of the tax, therefore, would consume from one to three years. Should the State authorities undertake to sell bonds, they would be confronted by the provisions of the constitution which positively require after appropriate action by the legislature the submission of such a proposition at a general election to the voters. It is inconceivable that any considerable number of the voters of Illinois outside of Cook County would vote to approve such a bond issue, and it is doubtful whether, even in Cook County, a majority of the voters would favor such a procedure." (Tr. of Wash. Pro. 562-563.)

"We must respectfully ask your Honor not to overlook the practical aspect of the situation, however. Suppose such a levy were made by the legislature. It would not get into collection, of course, until about a year from now. As soon as that attempt is made to collect it, we would say that it is as certain as anything human can be that some taxpayer, or, perhaps, a large number of taxpayers would file objections to the validity of the tax." (Tr. of Wash. Pro. 565-566.)

"Assuming that all the obstacles in the way of the State financing the program should be overcome—

> which would, of course, involve a very material period of time—there would still remain a very considerable delay incident to the transfer of the management of a project of this magnitude from one administrative body to another, with the reorganization of forces, etc., that would be necessary." (Tr. of Wash. Pro. 569-570.)

Testimony was introduced on behalf of the State of Illinois which established that there was a deficit of $8,150,000 as of December 31, 1932 in receipts for general operating expenses for the year 1932 (Rec. 1879). The deficit arose out of the fact that the State, in its various funds, was unable to meet its obligations during the year 1932 from general revenue, and it was obliged to borrow $8,150,000. (Rec. 1890.) It is estimated by the State of Illinois that this deficiency will be increased to $15,300,000 on December 31, 1933 (Rec. 1926).

In order to balance expenditures as against receipts, and to keep the deficit at the level existing on December 31, 1932, it will be necessary for the administration of the State of Illinois to reduce expenditures or to provide other revenues to the extent of an additional $7,150,000 (Rec. 1946).

We submit that the Special Master has not given proper consideration to the financial requirements for unemployment relief. The Chairman of the Illinois Emergency Relief Commission has estimated the needs for unemployment relief in Cook County for 1933 at $80,000,000 (Rep. 73; Rec. 1537). It has been estimated that the Sales Tax referred to by the Special Master (Rep. 121), which has been passed, may produce between $30,000,000 and $60,000,000, of which Cook County will receive approximately 50% (Rec. 2019). The Sales Tax is to be distributed to the counties in the ratio that the population of the county bears to the population of the

State. Over half of the population of the State is in Cook County. On the basis of the highest estimate the most that Cook County will receive from the Sales Tax will approximate $30,000,000, leaving a deficit of approximately $50,000,000, which must come from some source.

The Special Master states: "The need of borrowing for other purposes is not to be overlooked. * * No necessity for these borrowings appears to be greater than the one before the Court" (Rep. 120).

We submit that the need of funds for unemployment relief, in the interests of self-preservation and for humanitarian purposes, is paramount. Governor Horner stated:

> "Approximately 800,000 persons throughout our state, by reason of widespread unemployment, have become entirely dependent upon private and public relief, and, of course, have enlisted the sympathetic interest and concern of both state and federal governments. At first, our efforts in Illinois were made to give aid through private subscriptions and agencies, and through local public charities. When those resources were exhausted, and they were shortly, every possible method was devised to meet the almost ghastly situation. Through the Illinois Emergency Relief Commission, with the aid of the Reconstruction Finance Corporation, public funds have been used to an almost fabulous extent. More than thirty odd million dollars have been furnished alone by the Reconstruction Finance Corporation.
>
> * * * * * *
>
> "It is not difficult to imagine the possibility of bread riots, and like difficulties, in the large centers of this state, where relief is not available and unemployment still continues. We are trying to meet the necessity for relief by a sales tax, which has already gone through our State Senate, and is now under consideration by our House of Representatives, and we are not sure of easy sailing by any means in that house.

> "With these difficulties facing the state entirely on the problem which deals so intensely with human sympathies, you can well imagine the insurmountable difficulties our state would have in carrying an additional burden resulting from asking the entire state to bear the cost of an obligation which the Supreme Court has fixed upon a limited locality in the state, such as the Sanitary District" (Rec. 1978-1980).

The Constitution of the United States was ordained, as stated in its preamble, to "insure domestic tranquillity" and "promote the general welfare." In a controversy between states, one of the considerations of this Court in entering a decree should be the effect of the decree upon domestic tranquillity and general welfare. Before entering an injunctional order having as its purpose the enforced construction of the sewage treatment works of the Sanitary District before 1938, at all hazards, regardless of the present expressed inability of the people of the State of Illinois or of the Sanitary District to assume the burden, this Court should consider the attitude of the sovereign state and its people toward the reasonableness of the burden placed upon them. If the State of Illinois is confronted with making a choice between providing for the unemployed and caring for the urgent needs of its people, or providing funds for the immediate construction of sewage treatment works which will have the effect of raising the level of Lake Michigan about three and one-half inches over that which has prevailed for the last twenty-five years, it may be anticipated as a possibility that the State will give prior consideration to the necessities of life for such of its people as are unable to sustain themselves because of economic conditions.

Even though the Court may have the power to enter an order as recommended by the Special Master, nevertheless the State of Illinois, with all due respect and deference, in the exercise of its sovereign power, may be compelled to defer to what it regards as a higher need. And unless this Court gives a like consideration to the human and practical aspects of the question, there may arise a situation which might disturb domestic tranquillity. Mutual deference by component parts of the government, each to the other, should always be the rule, regardless of the power of the Court and regardless of the rights of the States.

The Rivers and Harbors Act of July 3, 1930, contains an appropriation for compensating works which, when constructed, will restore the Lakes to their former level.

The Sanitary District respectfully submits that there is no necessity for an immediate enlargement or modification of the decree. Charges of bad faith on the part of the defendants have not been sustained. Due diligence has been exercised. Controlling works are not necessary to effect the reduction in diversion to 5,000 c.f.s. The diversion may never be reduced below 5,000 c.f.s in view of the Rivers and Harbors Act of July 3, 1930. The Southwest Side Treatment Works will be constructed in conjunction with the West Side Treatment Works on the West Side site. The Sanitary District is prepared to construct these works as soon as the necessary funds, which the Sanitary District is endeavoring to obtain, are available. Ample time remains for the construction of these works by December 31, 1938. There is no emergency which requires financial participation by the State in the sewage treatment program. In the judgment of the Sanitary District the measures suggested by the Special Master will not expedite the completion of the sewage treatment works; the Sanitary

District is opposed to the shifting of the responsibility and financial burden to the State because it is unreasonable and unnecessary.

Respectfully submitted,

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Office Supreme Court,
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CHARLES ELMORE C

In the Supreme Court of the United States

States of Wisconsin, Minnesota, Ohio, and Pennsylvania,
Complainants,
vs.
State of Illinois and the Sanitary District of Chicago,
Defendants.
No. 5, Original.

State of Michigan,
Complainant,
vs.
State of Illinois and the Sanitary District of Chicago,
Defendants.
No. 8, Original.

State of New York,
Complainant,
vs.
State of Illinois and the Sanitary District of Chicago,
Defendants.
No. 9, Original.

REPLY BRIEF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN.

(Names of Solicitors for the Complainants on inside of front cover)

Dated April 17, 1933.

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In the Supreme Court of the United States

STATES OF WISCONSIN, MINNESOTA, OHIO, AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.
No. 5, ORIGINAL.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
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STATE OF NEW YORK,
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REPLY BRIEF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN.

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REPLY BRIEF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN.

The defendants, the State of Illinois and the Sanitary District of Chicago, have filed separate briefs totaling nearly 250 pages. These briefs abound in inaccurate and misleading statements of the record as shown by the transcript on the present Reference and as shown by the Reports of the former Special Master on the two References which preceded the entry of the decree of April 21, 1930. Self-serving statements and conclusions of the defendants' officers and engineers are quoted, when a reading of the entire examination, and particularly the cross examination of such witnesses, establishes that such statements and conclusions are without basis in fact. Manifestly it is impossible to point out and discuss these inaccuracies in detail. The defendants in substance challenge all of the findings of fact made by the Special Master on this Reference. The findings of the Special Master are abundantly supported by the evidence recited in his Report. However, the recitals in the Report of the Special Master by no means exhaust the evidence in the record which sustains his findings. If, therefore, the court should decide to examine the sufficiency of the evidence to support the findings of fact made by the Special Master, we respectfully submit that such an examination will necessarily require the reading of the whole of the record before the Special Master both because the references to the record contained in the defendants' brief are so frequently inaccurate and because a reading of the whole record is necessary to an adequate appreciation of how overwhelmingly the Master's findings are supported. Indeed, such an examination will disclose that no other findings than those attacked by the defendants would be possible on this record.

Our principal brief, in our view, fully answers and refutes the factual contentions and points of law asserted in defendants' briefs. The principles of law in our principal brief are controlling. The defendants have not even attempted to distinguish or refute them. Nevertheless, we will briefly review the factual and legal contentions advanced by the defendants.

I.

THE DEFENDANTS' ATTACK UPON THE FINDINGS OF THE SPECIAL MASTER AS TO THE CAUSES OF THE COMPLETE FAILURE OF THE DEFENDANTS TO DO ANYTHING ABOUT CONTROLLING WORKS AND AS TO THE STEPS NOW TO BE TAKEN TO SECURE THEIR PROMPT CONSTRUCTION IS WITHOUT MERIT.

The defendants first contend that application to the Secretary of War after the decree of April 21, 1930 for approval of controlling works would have been futile. (Sanitary District Brief, pp. 12, *et seq.*) On April 25, 1929, General Jadwin, Chief of Engineers, testified that while the War Department would not require the construction of controlling works, the Department would "consider any *application* for the approval of plans for controlling works to be constructed by the Sanitary District or other agency, and may be expected to approve those plans if the works are shown to be necessary, to be effective and to be the minimum detriment to navigation." (Report of Special Master on 1929 Re-Reference, p. 109.) This position of the War Department was reaffirmed by General Brown, Chief of Engineers, in a statement to Special Master McClennen in January, 1933. (R. 33.)

It is thus manifest that the position of the War Department was, and continued to be that, since controlling works were not required as an aid to navigation and since the interests of navigation were the only ones with which the Department was officially concerned, the Department would impose no mandatory requirement for the construction of controlling works, but that the Department stood ready to consider an application and approve plans for controlling works if properly designed, as a sanitary measure, the responsibility for which rested upon the defendants. This position of the War Department was never changed during the interim. (Weeks, R. 709, 488, 493, 494.)

It is thus clear that the contention that a formal application for approval of controlling works would have been futile is contrary to the facts. The contention is not only unsupported by the record, but it is in direct contradiction of the clear statements of General Jadwin in 1929 and of General Brown in 1933. But in any event, it is unthinkable that this Court or these complainants should be required to speculate whether an application by the defendants, had it been filed, would have been approved. The obligation of the defendants was to file and press their application. If the War Department ever refused their application they could report that fact to this Court. We respectfully submit that the failure to file an application was not because of fear that the War Department would not approve, but because of fear that it would approve.

With the inconsistency which characterizes all of the excuses of the defendants on this subject, the defendants further contend that casual and off-hand conversations had with the District Engineer as an incident to other business, was equivalent to an "informal application" for controlling works. If, in fact, defendants believed that they had made an application and been refused, it was their duty to report that circumstance to this Court. The omission of any such report is eloquent of the consciousness of the defendants that they had taken no such action and obtained no such result. The testimony of Colonel Weeks discloses that there is no such thing as an "unofficial" application. (Weeks, R. 770-1, 773-5.) The so-called "unofficial" or "informal" application relates to preliminary and informal conversations, constituting no part of an application, which it should be beneath the dignity of a great State and a great City to put forward as an honest and *bona fide* attempt to make an application and comply with the decree of this Court. We suppose that every person and every municipality that has had occasion to apply for a permit from the War Department for any purpose, has engaged in preliminary discussions with the District Engineer, not because they supposed that to be an application, but because they desired to shape their application, so far as the exigencies of their requirements would permit, to meet the views of the local representative, with the thought that there would be less likelihood of delay or of ultimate rejection by the Chief of Engineers and the Secretary of War. However, here the casual and off-hand conversations relied upon by the defendants were not even incidental to any application made, or to be made. (Report of Special Master McClennen, p. 17.)

Not only is the attempt to construe these off-hand and casual conversations, incidental to other matters, with a subordinate officer either as an "informal" or "unofficial" application for controlling works or as an excuse for failure to perform on the theory that the filing of the application would be futile so transparently without substance as to require a belief that they cannot be seriously advanced, but the references to the testimony of Colonel Weeks upon which the argument is based are so unfair and inaccurate as to furnish confirmation, were it needed, for that conclusion. It would manifestly be an unwarranted trespass upon the time of this Court to point out those inaccuracies in detail. We merely illustrate them.

The Sanitary District Brief (p. 13) states that Colonel Weeks testified:

> "After having submitted a number of plans to the Chief of Engineers, to my mind it put the matter of deciding upon which of the numerous plans the Department would be willing to receive an application for * * *. My judgment would be that after having submitted the plans to the Department, I would do nothing to urge action on the part of the Department. (Weeks, Rec. 804-805.)"

The incomplete sentence quoted before the asterisks was stricken out and is not part of the evidence. (R. 804.) The last sentence quoted is an answer to a different question. Both sentences had to do with whether Colonel Weeks could fix the date of his so-called tacit agreement with Mr. Wisner, and had nothing to do with what Colonel Weeks told any of the engineers of the defendants. And further, incidentally, Colonel Weeks stated that his tacit agreement with Mr. Wisner may have been reached any time after his report of March 11, 1925. (R. 805.) Were it material, as it is not, it would be reasonable to assume that the so-called tacit agreement was reached during 1929, both before the entry of the decree of March 21, 1930 and before the expiration of the Permit of March 3, 1925, which expired December 31, 1929. That this would naturally follow was evident from the statement of General Jadwin before the former Special Master on April 19, 1929, that the War Department had decided to waive this requirement of the Permit of 1925 as a non-navigational matter, and would not take the initiative in the matter of controlling works.

Defendants claim at various places in their brief that the Sanitary District was justified in believing that Colonel Weeks spoke for the Department, and the Sanitary District states in its brief, (p. 18): "There is no evidence whatever to the effect that Colonel Weeks told the Sanitary District Engineers that he was giving them his personal opinions only." Colonel Weeks testified:

> "The Master: When you made that statement to Mr. Ramey, were you expressing merely your own views, or transmitting something that you had been authorized specifically to say?
>
> A. I was transmitting my own views.

* * * * *

> The Master: When you made your statement to Mr. Ramey, did you put it in the form that you have summarized, that the War Department was no longer interested in that subject, or did you put it as the statement of your own attitude on the subject?
>
> A. I put it as a statement of my own attitude on the subject." (R. 488.)

See also Record, page 496. That Colonel Weeks could not have undertaken to state any changed position on the part of the War Department, unless he were to be unjustifiably charged with usurpation of authority in defiance of his superior officers, is shown by his testimony that he was never advised of any change in the position of the War Department, as stated by General Jadwin, and never received any official communications in regard to that subject for communication to the Sanitary District. (Rec. 709.)

Examples of inaccurate and misleading references to the record could be multiplied indefinitely. If the Court should conclude to reexamine the evidence supporting the finding of fact of the Special Master with reference to the causes of delay as to controlling works, it will be necessary to read the whole of the testimony of Colonel Weeks and Mr. Ramey. If that is done, it will be apparent that no other finding than that made by the Special Master was possible upon this record.

It is contended that the filing of an application is not necessary but only the submission of plans. (Sanitary District Brief, p. 27.) Since the Sanitary District neither filed an application nor submitted plans subsequent to the submission of a plan in 1926-7 for a pontoon gate, in the mouth of the Chicago River (which the District knew had been disapproved by the War Department), the contention, if sound, would be irrelevant for lack of factual basis. However, we know of no way of seeking the approval of the War Department for a permit without making some request, whether it be called an application or something else. Under condition 6 of the Permit of March 3, 1925 the War Department imposed a mandatory requirement upon the Sanitary District to prepare and submit plans for controlling works at the mouth of the Chicago River. It is, of course, manifest that no *application* was necessary to comply with this condition of the Permit of March 3, 1925. It is equally clear that the War Department subsequently waived this mandatory requirement and that thereafter there was substituted an obligation of the defendants to this Court to file an application *forthwith*. The argument that under the circumstances hereinbefore recited it was unnecessary or futile to submit any application is so baseless as to refute itself. The defendants say that the statement of General Jadwin did not constitute an "invitation" to file an application. (Sanitary District Brief, pp. 28-29.) The statement expressed the readiness of the War Department to receive and pass upon an application favorably, if the plans were proper. However, conscientious litigants do not wait for an "invitation" to perform an obligation under a judgment of this Court.

The Sanitary District repeatedly states in its brief that the War Department had passed unfavorably upon every possible scheme for controlling works. That statement is wholly without basis in fact. This statement appears to be based upon the circumstance that in December 1928 the Chief of Engineers directed the District Engineer to make a study and report on the various types of controlling works (other than those forming a complete barrier to navigation like the only plan ever submitted by the Sanitary District) which might be installed to meet Condition 6 of the Permit of March 3, 1925 (Report of Special Master McClennen, p. 8); that in compliance with this direction Colonel Weeks submitted his report of March 11, 1929, and that thereafter the War Department did not enforce Condition 6 of the Permit of March 3, 1925. But thereafter, and on April 19, 1929, General Jadwin, after having the benefit of Colonel Weeks' report, did advise the former Special Master that the Department stood ready to receive and pass upon an application for controlling works favorably, if properly designed. (Report of Special Master on Re-Reference, p. 109.) In that statement General Jadwin made it clear that the War Department had concluded that, since controlling works were not required as an aid to navigation and since the interests of navigation were the only ones with which the Department was officially concerned, the Department would enforce no mandatory requirement for the construction of controlling works, but, controlling works being a sanitary measure, would leave the initiative on that subject upon the defendants. The complete records of the War Department on this subject are in evidence (R. 32-120) and they may be searched in vain for evidence to support this repeated statement of the defendants.

The utter lack of basis for the contention is further shown by the fact that the present Chief of Engineers, General Brown, advised the Special Master that "the Department is prepared to approve plans for any controlling works presented by the Sanitary District, provided these plans do not constitute unreasonable obstruction to navigation." The defendants omit to state that Colonel Weeks' report of March 11, 1929, recommended a type of controlling works for which the defendants have never made application, and further, that Colonel Weeks' report found that the present method of control (continuing large diversions with control only at Lockport) is unsatisfactory; that the chief advantage of the present method is that it involves no expense for new construction; that it has large disadvantages both to the Illinois Valley and the Great Lakes region, and that its disadvantages greatly outweigh its advantages. (R. 108.)

In this connection defendants say that when they filed their brief in this Court (quoted, Report of Special Master McClennen, pp. 15-16) they did not know the contents of the report of Colonel Weeks. (Sanitary District Brief, p. 31.) Since they did not know the contents of that report until January 12, 1933 (Ramey R. 398) it is difficult to understand how the contents of that report controlled their action subsequent to April 21, 1930.

Defendants advance the further contention that controlling works are not necessary until the flow is reduced below 5,000 second feet. (Sanitary District Brief, p. 32.) This question was settled in the Re-Reference of 1929. The then Special Master found that controlling works should be built before the interim reduction to 5,000 second feet. This Court did not refer that question for reexamination. It directed the Special Master to determine (1) the causes of the delay, and (2) steps which should now be taken to secure the prompt construction of controlling works. The defendants throughout this Reference have sought to relitigate the whole case. The defendants in effect assert that the Special Master erred because he did not undertake to overrule this Court. The failure of the complainants to offer evidence on this subject is not because of a concession that the opinion of the Sanitary District Engineers (which throughout this litigation seems to change as the aims and desires of the District change in the varying positions in which it finds itself), is correct, but because the question had already been decided by this Court. However, if there had been any change in circumstances which justified a conclusion by the defendants that controlling works would not be necessary for the reduction of December 31, 1935, they should have reported that supposed fact to this Court and prayed for a modification of the decree. This clearly is an afterthought born of the necessities of the District in this Reference. As stated by the Special Master on the Re-Reference of 1929, it was the universal testimony of the sanitary experts that no reduction beyond the initial one could be had prior to the final completion of the whole sewage treatment program without control of the Chicago River to prevent substantial reversals in time of storm. (Report of Special Master on 1929 Re-Reference, pp. 106-107.) The finding of the former Special Master that controlling works were necessary was based upon the testimony of Mr. Ramey, Horace W. King, Professor of Hydraulic Engineering at the University of Michigan, and Sherman M. Woodward, Professor of Mechanics and Hydraulics at the University of Iowa. (Report of Special Master on 1929 Re-Reference, p. 107.) The former Special Master had also heard the testimony of Major General William Sibert on the subject. (Report of Special Master on 1929 Re-Reference, p. 106.) The present Special Master incorrectly assumes (because the facts were not brought to his attention) that there has been experience with a substantially reduced flow since the decree of April 21, 1930, upon which to base a new hydraulic opinion. The average flow at Lockport since the entry of the decree has been 6500 second feet plus the domestic pumpage, or in excess of 8,000 second feet. (Semi-Annual Report filed Jan. 1, 1931, p. 14; Semi-Annual Report filed Jan. 1, 1932, p. 13; Semi-Annual Report filed Jan. 1, 1933, p. 15.) The average annual flow at Lockport did not exceed 8,000 second feet until 1916; and in many years thereafter, because of low lake levels, was only slightly in excess of 8,000 second feet. (Report of Special Master on 1929 Re-Reference, p. 104.)

It is thus evident that any contention that there has been new experience with a substantially reduced flow at Lockport since the entry of the decree of April 21, 1930, upon which to base a new hydraulic opinion upon this point is without basis in fact. When this is considered, the divergence of Mr. Ramey's testimony with that offered by the defendants in 1929 is difficult to explain.

Defendants criticise the Master's finding that the Sanitary District "was not justified in lying back silently and unadvised on any such doubt" whether the decree required the construction of controlling works. (Sanitary District Brief, p. 45.) The District says that it did not lie back silently because it talked to the local District Engineer. Did these defendants believe that the proper way to resolve any doubt and the proper place to report any doubt as to their duty under the decree was by way of casual conversations with a subordinate Engineer of the War Department rather than by report to this Court? Did these defendants believe, in view of the requirement of the decree that they file semi-annual reports as to their progress, that their reports were to be made to the District Engineer at Chicago? The District's statement in its brief (p. 45) in this Court to the effect that they have not claimed any doubt on the subject but were definitely of the opinion that the decree did not require controlling works, is a new shift in position and contradicted by the record. (Ramey R. 399, 661-674.)

The contention that the Special Master misconstrues the effect of the Rivers & Harbors Act of July 3, 1930 is so fully refuted in the Report of the Special Master, the Complainants' Brief filed on the hearing on Defendants' Return to the Order to Show Cause and in our original brief on this hearing, that further discussion seems unwarranted. A brief statement of a few incontrovertible facts clearly shows the untenable character of the argument advanced. The Federal project for the Illinois River from Utica to its mouth is the identical project which was in effect when the hearings were had on the Re-Reference of 1929, and when the decree was entered on April 21, 1930. The question of whether Congress had undertaken to appropriate any water to that improvement was not and is not affected by whether the water to be used for that improvement first flows through a non-Federal channel or through a Federal channel. That Congress had not undertaken to appropriate water for that purpose, if it had any power, has been adjudicated. That the Rivers and Harbors Act of July 3, 1930, applying only to the Illinois Waterway extending from Utica to the Drainage Canal and taking over supervision of the Drainage Canal to the Chicago River, does not attempt to appropriate any water in excess of this Court's decree is manifest from the analysis of the Special Master. (Report of Special Master McClennen, pp. 19-35.) It was also shown in the Complainants' Brief filed December 5, 1932, pp. 39-47.

On January 12, 1933 the so-called Mississippi Valley States filed an application for a modification of the decree and an enlargement of the present Reference on the ground that the Rivers and Harbors Act of July 3, 1930 had changed the situation by undertaking to appropriate water in excess of this Court's decree. The complainants filed an objection that that Act created no change. On January 16, 1933, this Court denied that application. It is therefore also adjudicated that no such question is in this reference. We agree with Special Master McClennen that the Act does not even indicate a possibility that the Congress may attempt to take such action, but it has already decided that the possibility of congressional action cannot be urged, conceding congressional power which complainants deny, to defeat complainants' rights. (*Wisconsin v. Illinois,* 281 U. S. 179, 197-8.) That attempt has been made throughout this litigation. Many of the statements with reference to the projects on the Illinois River and the Illinois Waterway are incorrect. For the reasons stated, it seems unnecessary to review them in detail.

In criticising the Special Master for referring to the Great Lakes-St. Lawrence Deep Waterway Treaty now pending before the Senate, the Sanitary District attacks the report of General Brown, Chief of Engineers, quoted in Special Master McClennen's Report, pp. 32-35. (Sanitary District Brief, p. 73.) The District's attempt to distinguish conditions on the Monongahela River, the Ohio River, and the Panama Canal set forth in General Brown's report (Report of Special Master McClennen, p. 34) is not only without basis in the record, but without basis in fact. There are no storage reservoirs to impound water for use in low water periods on any of these waterways. The fact is that the commerce is greatest during low water periods. On the other hand the flow at Lockport will always be larger during the summer season, when navigation is most active, for sanitary reasons. The locks on the Ohio are identical in size with those on the Illinois Waterway, and much larger than those on the Illinois River. The locks at Panama are larger than both. There is a vast pollution at the head of the Ohio, both from domestic and industrial wastes, coming from the Pittsburgh district.

Both the Sanitary District and the State of Illinois repeatedly assert (1) that in view of the direction for a survey in the Rivers and Harbors Act of July 3, 1930 the Congress may attempt some time in the future, if it has the power, to authorize a larger diversion than provided by this Court's decree, and (2) that compensating works may be built in the critical channels of the Great Lakes.

The lack of basis for the first assertion is fully established in the Special Master's Report. (Report of Special Master McClennen, pp. 19-35.) Moreover at most it is only the suggestion of a speculative possibility of congressional action, if Congress has any power. That such a possibility does not affect the rights of these complainants has been adjudicated by this Court. (*Wisconsin v. Illinois,* 281 U. S. 179, 197-8.)

In support of their assertion with reference to compensating works the defendants (1) quote that portion of the Rivers and Harbors Act of July 3, 1930 which provides for new project depths in the principal Federal channels of the Great Lakes, the new depths to be in part dependent upon the construction of compensating works (Sanitary District Brief, pp. 51-52) and (2) that the pending Great Lakes-St. Lawrence Deep Waterway Treaty contemplates the construction of compensating works. (Illinois Brief, p. 16; Sanitary District Brief, pp. 72-73.) In urging this matter the defendants in effect ask this Court to modify or set aside its decree of April 21, 1930. There is no such issue on this Reference. Had the defendants applied for a modification and had the Court deemed any basis to be shown for a hearing looking to a modification, the Court would have directed a Reference on that issue and proper evidence would have been taken.

However, there is no basis for the contention of the defendants on this point. *First,* compensating works can not be constructed in the St. Clair, Detroit and Niagara Rivers without the consent of Canada. It is safe to say that that consent will never be given so long as the United States permits the State of Illinois to abstract large quantities of water from the Great Lakes-St. Lawrence watershed for sanitation and power purposes. This conclusion is confirmed, were confirmation necessary, by the terms of the pending Great Lakes-St. Lawrence Deep Waterway Treaty under which Canada has indicated a willingness to give that consent only upon condition that the United States agree to restrict the diversion at Chicago in accordance with the decree of this Court; *Second,* it is certain that conditions on the Great Lakes will be better with compensating works and the diversion at Chicago reduced to the amount fixed by the decree, than with compensating works and a continuance of the present diversion at Chicago. *Third,* compensating works are a matter of national benefit, if they are successful at all, and the complainant States can no more be required to surrender in effect their share of that national benefit for the profit of the State of Illinois, either by way of sewage disposal or water power, than they could be required to pay to the State of Illinois the equivalent of any funds which might be appropriated by the Federal Government to improve the outer harbors at any of the ports of the Great Lakes. The evidence on the original Reference established that there are over 400 ports and landings on the Great Lakes, many of which, though usable, have no Federal improvements, and as to which any increase in depths, either with or without compensating works, determines the feasibility from an economic standpoint of water-borne traffic both interstate and intrastate. The record on original Reference also establishes that Federal improvements on the Great Lakes consist of making a channel from deep water to the entrance of the local harbors, and that all of the local or inner harbors and navigation facilities have been and are provided either at the expense of the local municipality or at the expense of private industries, and usually both. Moreover, compensating works in themselves produce certain harmful effects on the vast navigation of the Great Lakes by creating high velocities in the critical channels, and the greater the amount of compensation required (and the requirement is principally produced by the Chicago diversion) the greater such harmful effects.

The attack made upon the recommendations of the Special Master as to the steps which should now be taken to secure the prompt construction of controlling works is not upon the reasonableness of the recommendation for securing performance, but upon the grounds, (1) that the Master should have overruled this Court and found that controlling works are not necessary, (2) that the defendants hope that Congress, if it has the power, will sometime validate their illegal diversion so that they will never have to comply with the decree of this Court, and (3) an unreported statement that if at some undefined time in the future all hope of the defendants of being able to avoid performance of the decree, through congressional action or otherwise, should vanish, it must be assumed that the Sanitary District would itself take the steps it promised this Court to take at the time of the entry of the decree of April 21, 1930, but has ever since ignored. The only hydraulic testimony on this Reference is that of Mr. Ramey, who also testified on the Re-Reference of 1929. Mr. Ramey is contradicted by all of the testimony before the former Special Master in 1929. The repeated statement that the complainants do not challenge Mr. Ramey's specious conclusion is without foundation in fact. It was already refuted by the record of this case when made. This was not a Reference to determine whether the requirement of controlling works should be eliminated from the decree. No evidence on that subject from the complainants would have been pertinent. The suggestion that the complainants' rights should not be restored because the defendants have not given up hope of getting Congress, if it has any power, to validate their illegal diversion, does not require comment. It is clearly shown, both in the Special Master's Report and in our principal brief that reliance upon the Sanitary District for performance would be wholly unjustified.

II.

THE DEFENDANTS' ATTACK UPON THE FINDINGS OF THE SPECIAL MASTER AS TO THE CAUSES OF DELAY ON THE SOUTHWEST SIDE TREATMENT WORKS AND THE STEPS WHICH SHOULD NOW BE TAKEN TO BRING ABOUT ITS CONSTRUCTION, IS WITHOUT MERIT.

In their attack upon the Special Master's finding that the planned postponement of the beginning of construction of these works left an inadequate time for their completion before December 31, 1938, at the rate of progress expected or to be expected, the defendants assert that the Special Master improperly accepted the findings of the former Special Master that five and one-half years would be a reasonable period of time to allow for the physical construction of this plant. (Sanitary District Brief, pp. 91-101.) The former Special Master heard the most exhaustive testimony upon this subject. The order of Reference in this case neither contemplated nor authorized the present Special Master to reexamine and overrule the finding of the former Special Master. To reexamine this question would have required the most voluminous testimony. The defendants proceed here, as at all points, upon the assumption that the case is to be tried over again. Since the defendants are in substantially the same position as to performance in which they were in 1929, they apparently think that all aspects of this litigation must be in the same situation.

Before the former Special Master, the defendants contended that seven years and nine months would be required for the physical construction of this plant. They adopted their plan a few months after this evidence had been offered and this argument had been made. If the defendants urged a wholly unnecessary time on the former Special Master, that was a fraud on this Court. If the time so sought and allowed was and is wholly unnecessary, the date of the final restoration of complainants' rights should be accelerated.

List of typographical errors in the Reply Brief of the States of Wisconsin, Minnesota, Ohio and Michigan, filed in the case of *Wisconsin et al. v. Illinois et al.*, Nos. 5, 8, and 9 Original.

Page 6, Line 10--Change "March 11, 1925" to "March 11, 1929".

Page 6, line 13--Change "March 21, 1930" to "April 21, 1930".

Page 13, line 9 from the bottom of the page--insert "been" before "decided".

Page 17, line 6--Change "unreported" to "unsupported".

Page 23, line 4 from the bottom of the page--Change "conditioned" to "condition".

Page 26, line 8 from the bottom of the page--Change "and the Congress" to "in Congress".

Page 29, line 18--Change "preferred" to "produced".

Page 31, line 15--Change "Illinois had" to "Illinois has had".

Defendants can not say that they sought an unjustifiable and unnecessary period of time for the construction of the Southwest Side Treatment Works, which was the determining factor in fixing the time for ultimate restoration of complainants' rights, and that therefore they could properly do nothing while they seek to persuade Congress, if it has any power, to take some action through which they hope to avoid the performance of this decree.

The defendants quote excerpts from the testimony of Ramey and Pearce. These are the self-serving assertions and conclusions of the witnesses. A reading of their whole testimony will clearly establish that there could have been no *bona fide* hope or expectation that the Southwest Side Treatment Works could or would be physically constructed within the time allowed therefor in the plan adopted by the Sanitary District after the entry of this decree. Moreover, the testimony of these witnesses is properly subject to the severest scrutiny. A comparison of their testimony on this Reference with their testimony on the same subjects before the former Special Master, as stated in his Report on the 1929 Re-Reference, will disclose, to say the least, the most glaring inconsistencies. These inconsistencies are so grave as to raise serious doubt of the sincerity and credibility of their testimony on the present Reference. Thus, the witness Ramey testified categorically on the 1929 Re-Reference that the assessed valuation of property in the Sanitary District was one hundred per cent of the actual value (Report of Special Master on 1929 Re-Reference, p. 78); but it is established and admitted on the present Reference that the assessed value of property in the Sanitary District is not, and never has approached, one hundred per cent of the actual value. On the contrary it appears to have been thirty-seven per cent or less of the actual value.

The Sanitary District states that financial difficulties in connection with the $29,000,000 bond issue interrupted construction from December 1928 until September 1929, and that this interruption was not considered by the former Special Master. (Sanitary District Brief 103-4.) Of course this had nothing to do with the Southwest Side Treatment Works, which even defendants will scarcely contend was then under construction, but the fact is that all of the evidence about the difficulties with the $29,000,000 bond issue were before the former Special Master, considered by him, and covered in his Report. (Report of Special Master on 1929 Re-Reference, pp. 45-6, 72.) The testimony about these financial difficulties was also before the present Special Master.

The defendants' criticism of the Master's finding that a further cause of delay on the Southwest Side Plant was the failure to proceed to a definite decision as to a site and the acquisition of the site so chosen, justifies little comment. If the defendants can postpone performance on the plea that some property owner, rightly or wrongly, objects to the District's selection of the site, there can be no hope of performance of the decree. The District describes with wearisome minutiae the trifling details of the paper work said to have been performed in contemplation of condemning a site. If the District is incompetent to institute and carry forward a condemnation suit, it is certain that performance of this decree ought not to be left to their halting and feeble efforts. Even the defendants' selected excerpts of testimony establish the stubborn fact that over three and one-half years after the former Special Master found that the selection of a site should be promptly made, the District is today no nearer the definite selection of a site and its acquisition than in 1929. Were it material complainants could refer to testimony in this record which, in their opinion, conclusively establishes that the Southwest Side Treatment Works could at all times have been built on the West

Side area owned by the Sanitary District. While the defendants would not be justified in postponing the restoration of complainants' rights until, if ever, the art of sewage disposal no longer embodies the possibility of future inventions and improvements, the Sanitary District in its brief asserts that its investigations and experiments, whether justified or not, have caused no delay on the Southwest Side Treatment Works. In short they never intended to do anything on the Southwest Side Treatment Works, at least for three and one-half years, whatever may be their future intentions.

In criticising the finding of the Special Master that another cause of delay was the failure to proceed with reasonable diligence to prepare designs, plans and specifications for the West Side Treatment Works, the defendants proceed with a minute statement of irrelevant and insignificant details. This is well illustrated by the reference to tests of the Stockyard wastes. This subject was exhaustively investigated before the former Special Master and he found that a few months at most would be adequate to secure any additional information which might be needed. To refute the defendants' specious contentions on this point it is enough to say that the total expenditures on the Southwest Side project from the entry of the decree to date have been $87,306.65. (Report of Special Master McClennen, p. 56.) These expenditures were in efforts at acquisition of the site, reinvestigation of the Stockyards waste and some studies for the Southwest Side Plant. The preliminary layouts mentioned in the defendants' brief are nothing more than drawings like the ones offered before the former Special Master in 1929. (Exhibit No. 246.) They are mere studies of space requirements and plant arrangements. There is not today a single contract plan prepared or in preparation for the Southwest Side Treatment Works. The Sanitary District budget for 1933 provides $57,580.00

for engineering and designing of the Southwest Side Work. (Report of Special Master McClennen, p. 64.)

The reasons advanced why the Special Master's recommendation for steps which should now be taken to secure construction of the Southwest Side Treatment Works should not be approved are (1) that the Sanitary District will construct the Works in any event if someone gives it the money, and (2) that the defendants again hope that Congress will pass a statute, if it has the power, which will validate a larger diversion, and that in such an event defendants will not have to construct the Southwest Side Treatment Works. (Sanitary District Brief, pp. 120-2.) At every stage the hope, and we think it may fairly be said the purpose, of these defendants to avoid performance of the decree is made manifest by their own words. The illusory character of the first point urged by the District is thoroughly established by the Report of the Special Master. That the second point should be made at all is unexpected frankness. In this connection we invite the Court's attention that one of the arguments advanced by the District why they think that Congress might undertake, if it has the power, to authorize a larger diversion is in order to mitigate a possible nuisance created by these defendants. Apparently the defendants wish to delay installation of sewage disposal works to make sure of the creation of the nuisance in the hope that this may move Congress to take an action which the defendants have so far sought in vain.

III.

THE DEFENDANTS' ATTACK UPON THE SPECIAL MASTER'S FINDING AS TO FINANCIAL MEASURES WHICH ARE REASONABLE AND NECESSARY ON THE PART OF THE STATE OF ILLINOIS IN ORDER TO CARRY OUT THE DECREE OF THIS COURT CAN NOT BE SUSTAINED.

The Sanitary District devotes Section VI of its brief (pp. 122-137) and the State of Illinois devotes the whole of its brief to an attack upon this finding. This finding is fully supported by the Report of the Special Master. It is supported by the considerations set forth in our principal brief. (Complainants' Principal Brief, pp. 54-70.) We shall therefore review only briefly the contentions advanced in the defendants' briefs. We first consider the arguments advanced by the Sanitary District.

The first contention advanced by the Sanitary District is that some of the works involved in the program of the defendants need not be constructed. This contention of the District illustrates the position of both defendants throughout this Reference. They have constantly sought to persuade the Master, and now seek to persuade this Court, to treat this Reference as a trial *de novo* of the original litigation. Thus, on this point and others, as shown in previous sections of this brief, they assert that substantial parts of the program need not be carried out, and that what measures should be carried out is still an open question.

In *Wisconsin v. Illinois,* 278 U. S. 367, this Court adjudicated that the defendants were doing a wrong to the complainants, but in keeping with the principles upon which Courts of equity conditioned their relief, granted the defendants a reasonably practicable time within which to provide some other means of sewage disposal. "To determine the practical issues needed to effect the object just stated" (278 U. S. 367, 421) these causes were again referred to the former Special Master. After an exhaustive hearing the former Special Master determined the practical measures necessary to effect the object of the Court. That question was then settled and adjudicated. The defendants thereafter never applied to this Court for any modification of the decree. No such issue is included in this Reference. It is idle for this Court to adjudicate any issues in these causes if the defendants, whenever cited for failure of performance, may, for purposes of delay, relitigate such issues *de novo*.

This and similar suggestions throughout the defendants' briefs that substantial parts of the sewage disposal program may be omitted or indefinitely postponed is especially significant, since the defendants, throughout their briefs express the hope that, if given enough time, they may be able to obtain congressional action, if Congress has any power, to validate their illegal diversion, and the principal ground assigned for this hope is that they may cause such a nuisance by pollution as to persuade Congress to attempt such action. An omission or postponement in the construction and placing in operation of parts of the sewage disposal program would, of course, tend in the direction of the creation of a nuisance.

The second contention of the District is the assertion of a speculative possibility that Congress may, at some future date, take action, if it has any power, which will relieve the defendants from performance of the decree. The third contention of the District is that the State of Illinois lacks financial capacity to perform the decree. Both of these contentions are also advanced by the State of Illinois, and we will discuss them hereinafter under that portion of this section devoted to the State's brief.

The fourth contention of the District is that the recommendation of the Master should not be approved because the Sanitary District, if all hope of relief from performance fails, may be expected to construct works when and if it provides funds. This contention is contradicted both by the defendants' past failure of performance and by the whole record in this case. That to hazard the restoration of complainants' just rights, adjudged to them by this Court, upon such an illusory expectation would be but a mockery, and a pretense, is overwhelmingly established by the Report of the Special Master. The Sanitary District made no adequate performance even before the financial difficulties arising out of the obstacles created by the State of Illinois and its officers arose. The total funds raised by the Sanitary District since the entry of this decree are approximately $10,000,000. (Complainants' application, p. 8.) The decree required an average annual expenditure of $20,000,000. The record on this Reference discloses, were it material, that the financial policy of the Sanitary District is not only inadequate, but was based upon the principle of placing all hazard of delay from future financial difficulties upon the complainants, who are the injured parties, on the justification of a trifling benefit in interest charges to the defendants, who are the wrongdoers.

The State of Illinois boldly attempts to relitigate every issue of law and many of the issues of fact heretofore determined and settled in this litigation. It seeks to misconstrue and pervert the purposes of this Reference. This Reference is not to adjudicate the rights of the parties. They have heretofore been determined and fixed by this Court. The question now is, what steps should be taken to restore to the complainants their just rights at the times and in the manner fixed by this Court. Were any confirmation necessary, as it is not, of the justness of the complainants' apprehension that these defendants intend to avoid performance of the decree of this Court by every means within their power, the argument of the defendants in their instant briefs in this Court would conclusively establish that fact.

The State of Illinois first asserts that this recommendation of the Special Master should not be approved because, as it contends, under the provisions of the Rivers and Harbors Act of July 3, 1930 and the Great Lakes-St. Lawrence Deep Waterway Treaty, compensating works may, at some future date, be built in the Great Lakes to restore their levels. We have already shown the lack of substance in this contention. (See pp. 14-16, *supra.*) As there stated, the construction of compensating works in the critical channels of the Great Lakes depends upon the consent of Canada. Indeed, the State's brief says (p. 16)

> "Upon the adoption of this treaty (Great Lakes-St. Lawrence Deep Waterway Treaty) the appropriation made for the project authorized in the Rivers and Harbors Bill of 1930, including compensating works, by the War Department Appropriation Bill of 1931, becomes immediately available for carrying out this treaty requirement."

The State thus concedes, as it must, that even the *possibility* of construction of compensating works is dependent upon the ratification of the Great Lakes-St. Lawrence Deep Waterway Treaty. But that treaty embodies the decree of this Court for the termination of the diversion, and this Court has adjudicated that the termination of the defendants' illegal diversion requires the construction of the sewage disposal works which the State seeks to avoid. It will not be denied that since the close of the hearings on this Reference the Governor of Illinois in a public address urged the representatives of Illinois and the Congress to exercise every effort to defeat the ratification of this treaty. Yet the State asks this Court to refuse to enforce complainants' rights upon the basis of this treaty. In any event it is manifest that when, if ever, compensating works will be constructed is unknown. Of course, as hereinbefore pointed out, these complainant States are not required to surrender the general benefits, if any, of compensating works provided for the nation to satisfy either the sewage disposal or water power desires of the State of Illinois. (See p. 16, *supra.*)

The second contention of the State is that, because the Rivers and Harbors Act of July 3, 1930 provides that the Secretary of War shall make a survey and report to Congress, the Congress or the Secretary of War may at some future date attempt to authorize a larger diversion than that provided by this Court's decree, and that therefore the defendants should not be required to perform the decree, because of this speculative possibility. It is difficult to be patient with this sort of argument when this Court has twice adjudicated in this very litigation that the possibility of future congressional action, if Congress has any power in the premises which complainants deny, can not be urged to defeat complainants' rights. (*Wisconsin v. Illinois,* 281 U. S. 179, 197-8.) The suggestion that the Secretary of War might undertake to authorize some diversion in violation of the decree of this Court is amazing. Not only has it been determined that the Secretary of War has no power under Section 10 of the Rivers and Harbors Act of 1899 to authorize a diversion from the Great Lakes-St. Lawrence watershed for the real or fancied improvement of navigation elsewhere, but the Rivers and Harbors Act of July 3, 1930 expressly provides that the Secretary shall submit his recommendations to Congress "to the end that Congress may take such action as it may deem advisable." Of course, the possibility of future action by the Secretary, even if it existed, could no more be urged to defeat complainants' rights than the possibility of future action by Congress.

The third argument of the State is that this Court must not exercise its power to enforce its decree and order the State of Illinois to carry out the decree, because the State of Illinois threatens to defy this Court. Indeed, the State in its brief asks this Court to consider this case upon the assumption that the State of Illinois will defy any order directed to it. While it is a shocking thing that a great State would assume such a position in this Court, these complainants would likewise be lacking in proper respect were they to assume that any discussion on their part is necessary to demonstrate the futility of such an argument in this Court.

The State next contends that the provisions of the Illinois Constitution are such as to render the State of Illinois immune to compulsion to perform a decree of this Court or to right a wrong to its sister States. In our principal brief we have discussed the only provisions of the Illinois Constitution which could have any conceivable relevancy, and have shown them to be inapplicable. However, as there stated, we confidently assert that no State, by its constitutional provisions, can nullify and set at naught the jurisdiction of this Court under the Federal Constitution over controversies between states. If this is not so, the most important jurisdiction of this Court, from the standpoint of the preservation of the nation, will be nullified. The most important provision of the Federal Constitution for preserving peace and amity among States will be rendered a mere scrap of paper.

The next contention of the State is that it lacks financial capacity to perform the decree. In attacking the finding of the Special Master on this point the State relies upon the testimony of Rice, State Director of Finance, and the so-called "testimony" of Governor Horner, and ignores both Mr. Rice's admissions and all the competent evidence in the record on the saleability of Illinois bonds and the State's financial capacity. The Report of the Special Master fully sustains his finding. In our principal brief we have cited the material evidence establishing that the past and present financial resources of Illinois have been and are more than adequate to finance performance of this decree. (Complainants' Principal Brief, pp. 58-59.) Mr. Gordon, who testified that the bonds of Illinois have been at all times since the entry of the decree and are now readily marketable as triple A investments in any amount which can be validly issued, was a witness produced by the defendants. Mr. Gordon is Vice-President of the First National Bank of Chicago and of the First Union Trust and Savings Bank of Chicago. He has been connected with that bank for forty years. He has charge of the Bond Department. He is President of the Investment Bankers Association of America. (R. pp. 715-6.) His qualifications and lack of any bias in favor of the complainants can not be challenged.

On the other hand the testimony of Rice and the so-called "testimony" of Gov. Horner was offered long after the testimony had been closed and the causes submitted to the Master. It was offered after counsel and witnesses for the State of Illinois had seen a tentative draft of the Master's Report and the testimony was preferred for the purpose of attempting to attack the Master's tentative conclusions. (R. pp. 1866-8.)

The State of Illinois contends that this Court should accept the self-serving conclusions of the witnesses so produced, as against the other testimony in the record. Mr. Rice had been appointed Director of Finance on January 26, 1933. (R. pp. 1875, 1923.) He testified on February 27, 1933. Neither his experience as Finance Director nor as an expert in municipal bonds is impressive. However, Rice admitted that if the State of Illinois issued $35,000,000 of bonds and levied a tax to provide for the payment of interest and sinking fund requirements, as they might fall due, such bonds could be marketed in 1933 (R. pp. 1918-9). He admitted that the State of Illinois in January 1933 sold a bond issue of $20,000,000 to a syndicate at a premium, and that the syndicate re-sold the bonds to the public at a larger premium. They were 4½% bonds. (R. pp. 1919-1920.) Mr. Rice admitted that on the day he testified the bonds of the

State of Illinois were selling on the market to yield from 3.8 to 4 per cent. (R. pp. 1920-1921.) He admitted that, as of the day he testified, the bonds of the State of Illinois would command a higher price on the market than the bonds of any other State except those of New York. (R. p. 1921.)

The statement that the State began the year 1933 with a cash deficit of slightly exceeding $8,000,000 and that its cash deficit at the end of 1933 would be $15,000,000 is based upon an exhibit produced by the witness Rice and is entirely misleading.

The statement of Finance Director Rice with reference to the cash on hand on December 31, 1932 can not be reconciled with the report of the State Treasurer of Illinois. (Report of Special Master McClennen, pp. 115-16.) However, the alleged shortage of December 31, 1932 and the predicted shortage at the end of 1933 are bookkeeping shortages. That is, they represent transfers between various accounts of the State. They do not represent any debt of the State. No state tax anticipation warrants have been sold to the public. (R. p. 1937.) The state tax anticipation warrants represent interfund transfers of the State.

All of the present and estimated bookkeeping deficiencies arise from delinquencies and tardiness in tax collections in Cook County. (Rice R. pp. 23-4, Horner R. p. 2014.) The estimated future bookkeeping deficiencies are arrived at in the following way. The expenditures for 1933 are based upon estimates of the department heads, notoriously excessive, and not upon appropriations of the State Legislature. (Rice R. pp. 1944-1946.) Rice's financial statement shows the tax anticipation warrants purchased by the State from itself as a liability, but gives no credit for the taxes against which the warrants are issued. (Rice R. pp. 1942-3.) The estimated receipts of the State for 1933 are based upon an estimate of only 40 per cent collection of the taxes, going into collection in Cook County this year, and with no allowance for any collection of the large delinquent taxes in Cook County for the three preceding years. (Rice R. p. 1934.) In our principal brief we have shown that the tardiness of tax collections in Cook County are due to negligence or mal-administration and not to the depression. There are no unusual delinquent taxes in Illinois outside of Cook County. In our principal brief we cite the evidence which shows that the tax situation in Cook County is not due to the depression. We will not repeat that evidence here.

Reference is made to taxes for poor relief. The estimates of receipts from the sales tax appearing in the record were based upon a two per cent sales tax. The State has adopted a three per cent sales tax. Illinois had a three cent gas tax for many years. One cent of the gas tax goes to counties. They have the option to use it for poor relief, or in the diminution of other taxes. (Horner pp. 2008-9.) Very large sums are available from the two cent gas tax. These are being used to extend the very extensive system of concrete and brick roads in Illinois. The road contracts mentioned in the State's brief were let in December 1932 or early in January 1933, after this Reference had been directed by the Court. (Horner R. p. 2002.) Many other facts could be cited to show that the State's contentions based on the testimony of Mr. Rice are without foundation.

We say only a word about the so-called testimony of Governor Horner, who had been in office less than fifty days. Governor Horner gave no testimony. He read an argument which he had prepared in collaboration with attorneys for the State. (R. p. 1988.) As stated by the Special Master it was in substance the same argument which counsel for the State had already presented to the Special Master. (R. p. 1986; Illinois Brief, Appendix p. IX.) There is not a sentence of the statement that would be competent as evidence. The Governor undertook to express opinions and conclusions of fact and of law. He undertook to give opinion evidence on all kinds of subjects upon which he had no expert qualifications. He undertook to give opinion evidence upon all sorts of subjects which are not susceptible of opinion evidence. The attempts to quote these arguments as *evidence* is a concession of desperation.

The State next contends that Illinois has no responsibility for the wrong inflicted upon the complainant States. The primary liability of Illinois is adequately shown both by the Report of the Special Master and by complainants' original brief. Briefly the primary and direct liability of the State of Illinois is *res judicata.* It is surprising that the State should contend that this Court would direct a reference to determine what financial measures should be required of it for the performance of a decree for which the State has no responsibility. Had not the question been decided the primary liability of the State would be incontestable from the fact that it directed and commanded the wrong to the complainant States. Moreover we submit that a State, even without a command, could not create a subordinate political agency with power to do a thing which would necessarily inflict a tortious wrong upon other States and their citizens and claim immunity from liability upon the ground that it had merely licensed the despoilation. This conclusion applies with peculiar force when the agency so created asserts that the State which gave it power to inflict the wrong has not conferred powers adequate to remedy it.

The next contention of the State is that Illinois acted within its rights in authorizing the commission of the wrong upon the complainant States. It is contended that *United States v. Bellingham Bay Boom Co.,* 176 U. S. 211, establishes that prior to the Rivers and Harbors Act of March 3, 1899 state authority was adequate to authorize an obstruction to navigation. The case is scarcely authority for the proposition that a state could lawfully authorize the commission of a tortious wrong upon other states and their citizens. It is said that the State had a legal right to an equitable apportionment of the waters in question. Of course this question is *res judicata.* The consideration granted the State of Illinois by way of the diversion permitted after December 31, 1938 was based upon the doctrine of equitable apportionment. (Report of Special Master on 1929 Re-Reference, pp. 139-140.) Moreover the mean annual, average contribution of the State of Illinois to the Great Lakes-St. Lawrence watershed is 503 second feet. (Report of Special Master on Original Reference, p. 23.) Under the decree of this Court after December 31, 1938 the State of Illinois is permitted to divert 1500 second feet plus the domestic pumpage of 1700 second feet. It thus will take over six times its *total contribution* to the waterway. If inequity results, it is not to the State of Illinois.

The State further contends that it has done everything to facilitate the performance of the decree which its Constitution permits. This is, of course, manifestly untrue as applied to the State of Illinois, for it has done nothing. It has not even done the things which it could have done to enable the Sanitary District to perform the duty which the State sought to delegate to it, as is shown in our principal brief.

The State finally contends that this Court is without jurisdiction to enforce a judgment against the State of Illinois in the exercise of the original jurisdiction conferred upon this Court over controversies between States. This has been fully covered in our principal brief. Nothing appearing in the State's brief suggests the necessity of further argument.

CONCLUSION.

Both the defendants complain because the complainants' Application filed with this Court, after reciting facts appearing in the records before this Court, largely in the Reports of the Special Master and in the Semi-Annual Reports filed by the defendants, asserted that such facts justified a conclusion that the gross inadequacy and failure of performance thus made evident must be due to negligence, incompetence or bad faith and a lack of a sincere and *bona fide* effort to comply with the decree. This conclusion rested upon the whole record of these defendants throughout this litigation. Considering only the matters referred to the Special Master, he has found that the complainants were justified in charging bad faith. We think he would have been justified in finding bad faith. However, we made no point of that question before the Special Master, and make none here, because the complainants are not interested in condemnation of past delinquencies but in securing the aid of this Court for future action to secure to them their just rights. But, were the question at issue, the nature of the contentions advanced by the defendants on this Reference and in their voluminous briefs before this Court would alone justify the conclusion that it is their purpose to evade performance of the decree of April 21, 1930 by every means within their power. The evidence, the contention of the defendants and the attitude of the defendants on this reference alike establish that the further intervention of this Court is essential to secure to the complainants their just rights as adjudicated by this Court.

In this reply brief the complainants have endeavored merely to point out a few of the many inconsistencies of position and inaccuracies both in statements of fact and in arguments on the law which are found in defendants' briefs. Obviously a detailed analysis of the evidence in these causes would be unwarranted both because it has

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been carefully weighed by the Special Master and because this brief is addressed to a court wholly familiar with what has preceded the present Reference. Nevertheless what we have said, in our brief, fully establishes that the findings made by the present Special Master, which are attacked by the defendants, must be confirmed and, that the legal contentions of the defendants are without merit.

We respectfully submit, therefore, that the Special Master's findings should be confirmed and that his recommendations for enlargement of the decree should be followed, with, however, the inclusion of the suggestions proposed by the complainants in their principal brief.

Respectfully submitted,

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April 17, 1933.

FILE
APR 17 19
CHARLES ELMORE

BEFORE THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1932.

STATE OF WISCONSIN, ET AL,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, ET AL.
No. 5 Original.

STATE OF MICHIGAN, ET AL.,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, ET AL.
No. 8 Original.

STATE OF NEW YORK, ET AL.,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, ET AL.
No. 9 Original.

REPLY BRIEF ON BEHALF OF THE STATE OFF ILLINOIS IN OPPOSITION TO REPORT OF SPECIAL MASTER McCLENNEN.

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BEFORE THE

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State of Illinois and Sanitary District of Chicago, et al.
No. 9 Original.

REPLY BRIEF ON BEHALF OF THE STATE OFF ILLINOIS IN OPPOSITION TO REPORT OF SPECIAL MASTER McCLENNEN.

THE BRIEF OF COMPLAINANT STATES PROCEEDS UPON A MISCONCEPTION OF THE RECORD.

This proceeding is based upon paragraph 6 of the decree herein which reads as follows:

> "That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the program of construction, or the methods of

operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate."

Pursuant to this provision the complainant states made their "application" calling the attention of the Court to the fact as alleged that "the progress of construction" was insufficient. Their application seeks additional relief but incorrectly claims to seek orders enforcing the original decree.

The original decree has been completely performed up to date. Beginning with July 1, 1930, the diversion was reduced as required to 6500 c. f. s. in addition to domestic pumpage. As shown by the record, the defendant Sanitary District will be prepared to accept a reduction on December 31, 1935, to 5000 c.f.s. Since the original damage or lowering of lake levels has always been estimated by the Court as six inches to result from a diversion of 10,000 c.f.s., the reduction already accomplished has reduced the damage one third and the District is prepared to accomplish a reduction of the damage to three inches in 1935. Since there is allowed by the decree 1500 c.f.s. all that remains to be accomplished is the restoration of only two inches. *This entire proceeding therefore only concerns two inches to be added to the surface of the Great Lakes.*

THE DECREE HEREIN DID NOT CONTAIN MANDATORY PROVISIONS REQUIRING THE CARRYING OUT OF THE CONSTRUCTION PROGRAM.

This fact is of the utmost importance. The orders recommended by the Special Master as well as the pleas of the complainants suggest mandatory orders designed to compel the expenditure of money by the defendants for the purpose of carrying out the construction program. Literally, therefore, neither the recommendations of the Special Master nor the prayers of the complainants can be regarded as seeking or recommending any order to enforce the terms of the original decree.

The argument submitted in complainant's brief as to the power of this court presents assertions only as to the extent to which the court may go in enforcing a judgment or decree. Since the orders now in question can not be regarded as orders enforcing the terms of an original decree or judgment, the legal contentions of complainants have little bearing upon the issue before the Court.

The report of the former Special Master on re-reference did recommend a mandatory decree commanding the Sanitary District to go forward with its previously adopted program for the construction of sewage disposal works, with specific detailed commands as to the various operations to be undertaken and the time of completion thereof. *These recommendations were not adopted by the court.*

The sole purpose of these recommendations was to accommodate the proposed reductions in the diversion in such a manner as to safeguard the water supply of the City of Chicago, and thus adequately preserve the essentials of safety for health and life of the inhabitants of the Sanitary District.

We submit this court could and did safely assume that the compelling motive of self-interest and self-protection was sufficient to insure the carrying out of this program. But if this court had held complainants legally entitled to a decree along the lines recommended by the former Special Master, that decree would have been entered. The mere fact that the complainants in their own interest had strong motives to induce the doing of those things, which would insure their own safety, to meet the effects of the injunction decided upon by the court, would of itself be no legal or equitable bar to including in the decree a requirement for the performance of these precautionary measures. The refusal of the court to adopt the recommendations of the former Special Master must have proceeded, we respectfully submit, upon established legal and equitable principles opposed to granting such relief.

Certain facts of record suggest most definitely the principles involved.

In the first place, it is an established principle of equitable procedure that relief shall generally be granted in accordance with the prayers of the bill of complaint. In both of the bills of complaint of the State of Michigan and the joint bill of the states of Wisconsin, Minnesota, Ohio and Pennsylvania, all that is sought is an injunction.

The court found, pursuant to the report of the former Special Master, that the damage to the complainants resulting from the diversion could be stopped and former conditions restored within a definite period after the diversion was cut off. This finding necessarily led to the conclusion that the relief sought by the complainants would be sufficiently and adequately procured if injunctive relief were accorded.

The necessity of adjusting the proposed relief so as to give necessary protection for the lives and health of the citizens of the Sanitary District was merely an incident to the form of relief found to be due the complainants. Whatever steps were to be taken to produce such protection were for the benefit of the defendants, not of the complainants.

We respectfully suggest that the power to carry out these precautions involves exclusively an exercise of the police power of the State of Illinois, or such part of that power as is lawfully and constitutionally delegated to the Sanitary District of Chicago.

The conclusion, therefore, is suggested that the refusal of this court to command by mandatory decree performance of precautionary measures was based first, upon the fact that these measures were not needed to accord complainants relief and, second, upon the fact that if so commanded, the Court would intrude upon the reserved powers of the State of Illinois.

This analysis of the record is, we submit, most pertinent for the primary consideration of the court in view of the nature of the contentions addressed to the court in complainant's brief as well as similar suggestions in the report of Special Master McClennen. Although the latter, at pages 38 and 39, analyses the record very much as we have set it forth above, his recommendations are based on the theory that this court should now enter orders for the purpose of enforcing a previously decreed obligation resting upon the State of Illinois under the constitution of the United States. In discussing his proposal that the General Assembly of Illinois be directed to issue bonds without submitting the bonds to the vote of the people as required by the constitution of Illinois, Special Master McClennen says (Rep. p. 41):

> "* * * Indeed, the decision quoted indicates that because the General Assembly can not delegate its power and duty to have the State perform its obligation under the constitution of the United States, such a vote of the people would be unconstitutional under the Constitution of Illinois."

There is, we submit, no obligation imposed upon the State of Illinois under the constitution of the United States to exercise its reserved police power in any way whatsoever or at all for the procurement of adequate sanitary conditions or a safe water supply for its citizens. That the Special Master is not referring to any such type of federal constitutional obligation upon Illinois in the foregoing statement is shown by his expressions immediately following the above quotation:

> "When the State of Illinois became a part of the United States and a party to its constitution, the people of the State retained no right to vote that the State should not use its necessary means to perform its duties to other states as the Supreme Court of the United States within its jurisdiction has adjudged those duties

> to be and as it has enjoined the state to perform them.
>
> "It has come to pass that the only way in which the State of Illinois can perform those duties is by becoming indebted. Construction contracts and bond issues are the necessary means.
>
> "The State of Illinois is under a liability which it is within the jurisdiction of the Supreme Court of the United States to compel it to satisfy out of the resources of the State. The state has among its resources the inherent power to contract for construction and to borrow money. When the constitution of the United States by the judgment of its Supreme Court obliges the state to use that resource, any self-imposed prohibition to perform that obligation is repugnant to the supreme constitution and falls. A vote of howsoever large a number of people would be unconstitutional."

The foregoing expressions clearly indicate that Special Master McClennen understood this court by the decree herein had imposed an obligation upon the Sanitary District, or the State of Illinois, or both, to go forward with the construction program. We respectfully insist no such requirement is to be found in the decree in this case. As pointed out, the carrying out of this program is in no way whatsoever essential to the relief allowed the complainant states. There exists today, therefore, no federal constitutional obligation upon the State of Illinois or the Sanitary District in these matters. This is, we submit, the inescapable logic of the record.

The opinion of the court indicates beyond question the belief of the court that the construction program is essential. This is a fact with which we entirely and without qualification agree, but recognition of this fact in no sense required nor did it result in the creation by decree of court of any legal obligation resulting from this exercise of the jurisdiction of the court to settle the pending controversy between the complainant states and the State of Illinois.

The only way in which this proceeding can be regarded as one to enforce a decree is for the court to read into the decree, what is not there expressed, a binding command to go forward with the construction program as it was outlined in the not adopted Special Master's recommendations.

THE SOLE QUESTION NOW BEFORE THE COURT IS WHETHER UNDER PARAGRAPH 6 OF ITS DECREE, THE COURT SHALL NOW ENTER ANCILLARY ORDERS FOR THE PURPOSE OF FURTHER ACCORDING TO THE COMPLAINANTS THE RELIEF FOR WHICH THEY BROUGHT THESE SUITS.

Complainants' relief will result, and has already resulted in large part, from the carrying out of the original injunction. The question now before the court is whether additional orders are to be entered. From the practical standpoint, due to the interruption of the construction program, the same compelling necessities for the preservation of life and health must now again receive consideration. The court therefore confronts the question as to whether in order to meet these human needs, the court will for the first time do what it has not yet done in this case, impose a mandatory obligation upon either the Sanitary District of Chicago or the State of Illinois. But it is of the utmost importance to note the fact that in contemplating such a proposal the court is not being called upon to enter an order to enforce a previously issued decree or judgment. We respectfully insist that all of the assertions so fully presented in complainants' brief as to the power of this court to enforce its judgments, have no bearing upon the issue now before the court. The proposal submitted by the Special Master involves the entry of a new decree entirely different in essence and effect from the nature of relief originally allowed by the court to the complainants.

The question merely is the extent to which the discretion of a court of equity shall be exercised under the peculiar and unique circumstances of this case. The power involved is primarily discretionary in its nature. Complainants have no lawful right to assert with mathematical precision based upon controlling legal principles the duty of the court to enter any additional form of order whatever. Assuming complainants have demonstrated, as found by the court, their right to relief, that relief can be accomplished by enforcing the injunction heretofore entered. This states the sole measure of the legal right of the complainants.

It may be suggested there exists a legal qualification upon the foregoing statement in view of the principle so often announced by this court in these controversies between states that plaintiff and defendant states stand upon an equality and the treatment accorded them by the court necessarily should involve the process of weighing the relative benefits sought by the plaintiff as against the detriments incurred by the defendant if those benefits be allowed. We submit the application of this principle can lead to but one conclusion. As pointed out, there is to result from all of the proposals, whether urged by the complainants or recommended by the Special Master, a change in the levels of the Great Lakes of no more than two inches, since the defendants will undoubtedly be prepared under existing circumstances to accept the reduction called for by the original decree to 5000 c.f.s. at the end of 1935. The final reduction of the diversion to 1500 c.f.s. in 1938 would then leave a one inch reduction of levels never to be restored by the court's decree. We believe any fair and impartial consideration of the facts will demonstrate that a two inch change in the levels of the Great Lakes, which are in a constant state of fluctuation, is not appreciable. As we have pointed out in our original brief, the navigation damage to the complainants is already in process of elimination by the

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deepening of the channels to as low a depth as any vessels on the lakes are prepared to utilize, and all damage of every kind is also about to be entirely eliminated by the artificial restoration of levels which will produce more than the entire benefit allowed to the complainants in this case. The complainant states, therefore, stand before the court in the position of having half of the damage they complained of practically now eliminated and of having all of it in process of more speedy elimination than could be achieved by carrying out the original injunction without modification. All that can be accomplished by the proposals now before the court is an additional assurance in the remote event that the program of Congress (specifically required, however, by lawful enactment with proper appropriation for its accomplishment provided) should be delayed or not be carried out. This is the true and accurate measure of complainants needs which they now assert should impel this court to enter the extraordinary, unprecedented and harsh orders sought by the complainants and so surprisingly recommended by Special Master McClennen.

We submit that the Special Master gave no attention to the existence or not of any compelling emergency in fact calling for additional relief to complainants, but through an apparent misconception as to the effect of the order of reference, assumed the existence of such an emergency. He apparently deemed his duty was to advise the court as to *possible* measures to accomplish a result, but not at all to advise the court as to the wisdom, propriety or necessity for the adoption of such measures. If not apparent in other ways, his failure to give any consideration to the facts as to the restoration of lake levels and the deepening of channels demonstrates, we submit, that this must have been his reasoning. From a literal standpoint he has limited his consideration of the problem solely to the giving of answers to the questions submitted by the court, but in doing so he has, as we view it, not sufficiently considered the obligation imposed by the requirement of the last of the three questions, that the measures to be recommended should be "reasonable". As we understand this question, a full consideration of the relative equities is required for an appropriate answer and his report does not present any such comparison.

Contrasted with the unimportant and the inappreciable benefit to result to the complainants from the proposed measures, the court must contemplate the results to the defendants. These may be very briefly summarized as follows:

1. The court must enter an order invading the reserved police power of the State of Illinois, and taking away from the State of Illinois or its agent the exercise of discretion as to the nature and extent to which this power shall be used.

2. The court must, if it comply with the constitution of the State of Illinois, command an exercise of legislative discretion by the general assembly of Illinois, by the governor of Illinois and by the people of Illinois in a vote to be held at the next general election in November, 1934.

3. If the court disregard the constitution of Illinois, it must seek to control, compel and command an exercise of the legislative discretion of the general assembly of Illinois and the governor of Illinois.

4. In decreeing these measures the court must, we submit, immediately decide the legal liability of the State without applying to this case the established rule of equitable apportionment of interstate waters.

5. The court must impose the requirement of an additional tax to be paid by every taxpayer in the State of Illinois, and the record shows inability to collect taxes under existing circumstances to the extent of 60 per cent of taxes now spread in Cook County with increasing difficulties in tax collection in the balance of the state.

6. The court must coerce the use of a portion of the limited financial capacity of the state, infinitely more needed from the standpoint of human requirement for unemployment relief than even for the requirements of sanitation.

Disregarding the many other difficulties, the carrying out of this program is more than likely to ultimately lead to the assumption by this court of the exercise of all of the important functions of government, legislative, executive and judicial, within the State of Illinois. All of these functions will be needed to compel the issuance of bonds and the collection of taxes if the proposed orders should unfortunately not be obeyed.

We respectfully suggest that an exercise of equitable discretion necessarily involved in choosing between the rights of complainants and the effects upon defendants as above briefly outlined, can lead to but one conclusion. The relative benefit to the complainants contrasted with these inevitable effects upon the defendants must, according to the established principles controlling the exercise of discretionary chancery power require the rejection of the Special Master's recommendations.

COMMENTS UPON COMPLAINANTS' DISCUSSION OF THE LAW.

Complainants Point I begins as follows:

> "The admitted judicial power of the Supreme Court to enter the judgment in these causes necessarily embraces full, plenary, adequate and complete power and authority to enforce that judgment and make it effective * * *"

This statement demonstrates complainants misconception of the nature of the pending proceeding. There is no judgment in this case already imposing a legal obligation upon the defendant to be carried out by the proposed recommendation. The argument, therefore, under this point has no bearing upon the issue before the Court. If there were a judgment here imposing a legal duty upon the Sanitary District to go forward with its construction program, this proceeding should properly be a contempt proceeding involving a consideration by this court of the question of fact of whether its decree had been disobeyed and then the question of appropriate further proceedings.

The situation before the court is so unique that analogies are difficult, but we ask the court to contrast its decisions in *United States v. St. Louis Terminal,* 224 U. S. 383, and the subsequent contempt proceeding in *Terminal Railroad Association v. United States,* 266 U. S. 27. In the first case the court found an illegal combination in restraint of trade and entered a decree calling for an adjustment and accommodation of the existing combination, although in many ways permitting its continuance. In condemning the association a consideration of its practices was directly involved. Several of the matters considered and criticized by the court involved the adjustment of rates. The subsequent case presented a charge of contempt, a claim that the decree in the first case had not been complied with, and the principal basis of the charge seems in its essence to involve the assertion that the rate practices criticized in the original decision were being continued. The court held that the question of contempt depended upon the specific provisions of the decree and reservations in the decree, notwithstanding expressions in the opinion, were held to defeat the validity of the charge. We submit a consideration of these two opinions demonstrates that the rights of the defendants are to be determined by the specific requirements of the judgment or decree, rather than by expressions in the opinion, definitely appropriate as they were in the first case as reasons for the judgment entered.

The position of the complainants here is that expressions in the opinion leading to the entry of the decree herein have legal binding force and effect and therefore, because of this claimed binding effect, that this court in entering the proposed orders will be merely exercising the power to enforce a judgment. We rely here, upon the definite and complete distinction between expressions in an opinion and the legal effect of the judgment or decree.

Complainants in sub-point B of Point I (Brief p. 87) state that:

> "The raising of funds by the State of Illinois to discharge its liability and duty under the decree of April 21, 1930, is not the contracting of a debt within the meaning of Sec. 18, Art. 4 of the Illinois constitution, nor is it the assumption of a debt of a municipality within the purview of Sec. 20, Art. 4 of the Illinois constitution."

In the first place this proposition again involves the assumption that the proposed bond issue is to discharge a liability under the decree of April 21, 1930. As we have pointed out, this assumption is incorrect and has no foundation in the record.

Assuming the State of Illinois owed an obligation to the complainants under the decree of April 21, 1930, the proposed order would compel the State of Illinois in order to raise funds with which to meet its obligation to the complainant states to create by a bond issue debts *not to the complainant states but to the purchasers or holders of such bonds.* The purpose of the bond issue we will assume is to raise funds to meet a pre-existing obligation, but that fact does not change the essence of the transaction. The issue of the bonds creates a debt not to the original obligee but to the holder of the bonds. On this ground alone complainants contention is without merit and clearly the Illinois constitutional provisions apply.

The same reasoning distinguishes the Illinois case of *Bloomington v. Purdue,* 99 Ill. 329, cited by complainants (brief p. 88) to the effect that provisions as to debt limits do not apply to involuntary liability arising *ex delicto.* The debt limit provisions may not apply to the creation of such a liability, and we have not contended heretofore that Illinois debt limits would apply to bar the creation of an obligation against the Sanitary District of Chicago. The question before the Court, however, is not as to the creation of the obligation but concerns the creation of a mechanism with which to provide funds with which to meet the claimed obligation.

The cases cited in complainants' brief, *Pear v. East St. Louis,* 273 Ill. 501, *Healey v. Deering,* 231 Ill. 423, do not lay down or support any general proposition that "citizens and tax-payers of Illinois are bound by the judgment rendered against the state as their governmental agency." The first case was a tax payers bill in which the tax payer asserted merely the general rights of all tax payers under statutes. The court held previous decisions construing such rights were binding upon the subsequent suitor. The second case involved the title of a municipality to streets and under the law of Illinois the title to streets is held by a municipality as trustee for the preservation of the right of passage for the benefit of all citizens.

Counsel, we submit, do not properly present the effect of the decision of the Supreme Court of Illinois in *Law v. The People,* 87 Ill. 385. At page 396 the court said:

> "The clear and unmistakable purpose of the framers of the organic law, by inserting this provision (limitations upon the power of the state to contract debts) was to effectually protect persons residing in municipalities from the abuse of their credit and the consequent oppression of burthensome if not ruinous taxation. There could, we think, have been no other purpose, and this is made manifest from the experiences of the past. Under the constitution of 1818, there was no limit on the power of the General Assembly to borrow money on the credit of the state, or to authorize municipal bodies to incur indebtedness. Under that constitution, the General Assembly entered upon a gigantic system of internal improvements, paid for by money borrowed by the state; but it ended in bankrupting the state, and almost in ruin of its citizens. Whilst laboring under the disastrous effects of that policy, the convention convened that framed the constitution of 1848 and they inserted, as a part of that instrument, the 37th section of Art. 4, by which the power of the state to incur indebtedness was limited to $50,000, except to repel invasion, suppress insurrection, or defend the state in war, or when the people should vote to create a debt."

These expressions illustrate the genesis of Sec. 18 of Art. 4 of the constitution of 1870 which is a mere re-enactment of the earlier provision of the constitution of 1848 above referred to.

We respectfully insist that the fundamental question before this court is whether this court shall take away from the people of Illinois the right to decide whether they will run the risk of bankrupting the state, a genuine, existing and not exaggerated risk if these recommendations be adopted, in order to carry out a sanitation program for the inhabitants of Cook County. And this when almost a million of the citizens of the state are dependent upon the state's already strained financial capacity to provide them with the bare necessities of life. No power of this nature has ever heretofore been asserted by this court nor has its exercise ever been heretofore contemplated.

Again counsel for complainant illustrate the fallacy which permeates their entire legal discussion, at page 192 of their brief, where they say:

> "It is manifest therefore that were either Sec. 18 or Sec. 20 of Art. 4 of the Illinois constitution in terms applicable, such state constitutional provisions, when put forward and sought to be applied *to nullify or prevent the enforcement of a judgment of the Supreme Court of the United States,* in its original jurisdiction of controversies between states, would be null and void as though they had never been * * *. When the states became members of the union, they agreed that the Supreme Court of the United States should adjudicate their controversies between themselves and their obligations between each other and that this court should have the power to enforce their just obligations to each other. * * *"

The only obligation of Illinois or the Sanitary District in these proceedings owed to the complainant states is to cease the doing of those acts which wrongfully produce damage to the lake levels. This court has awarded an injunction against the continuance of those acts. The constitutional provisions of the fundamental law of Illinois are not advanced as a bar to this relief. They were not so advanced at the time of its award. They do apply, however, directly to the choice now confronting this court as to the form or nature of further orders which this court in its sole discretion in the exercise of chancery power may or may not now enter. The orders suggested are not required by any legal principle to enforce the injunction heretofore allowed. The fact that consideration of the life and health of the people in Cook County may demand a further postponement of the final step in carrying out the injunction awarded does not of itself as a matter of law compel this court to postpone the decree, unless this be regarded as an equity of controlling weight. Since it was found controlling in the original consideration of this case, we assume it must control now. But arriving at the conclusion that this equity should originally prevail, merely involved an exercise of the discretion vested in a chancellor. The same realm of discretion must now be entered by the court if the recommendations of the Special Master are to be adopted. Even though this Court might assert the power to set aside the constitution of Illinois under the circumstances here presented, this factor alone would also most strongly, we believe, require the gravest possible emergency. Only under circumstances the most moving, on the established principles always heretofore applied, could this court for a moment contemplate such an invasion of the sovereignty of one of the states of the United States. For the reasons set out in our original brief, even in such an emergency, we respectfully urge this court's power does not extend so far. *But, for the reasons we have pointed out no such emergency is here presented.*

We respectfully submit the report of the Special Master should be rejected and the suggestions submitted in our original brief be adopted. Carrying out of the final reduction of the diversion in 1933 should now be regarded as under suspense, a matter only to be ultimately determined when the court, in 1938 or at such appropriate time as it may require, be definitely advised first as to the progress which shall have then been made by the Sanitary District in carrying out its program of self-protection, and second, as to the nature of the final exercise of the paramount power of Congress to determine the amount of diversion needed for navigation.

Respectfully submitted,

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FILE

APR 17 19

CHARLES ELMORE

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1932.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,
Intervening Defendants.

No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9, Original.

REPLY BRIEF OF THE SANITARY DISTRICT OF CHICAGO TO BRIEF FILED BY COMPLAINANTS ON REPORT OF EDWARD F. McCLENNEN, SPECIAL MASTER

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DATED APRIL 17, 1933.

LINCOLN PRINTING COMPANY, CHICAGO—WABASH 4004.
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IN THE

Supreme Court of the United States

October Term, A. D. 1932.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, Defendants, STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, Intervening Defendants.	No. 5, Original.
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REPLY BRIEF OF THE SANITARY DISTRICT OF CHICAGO TO BRIEF FILED BY COMPLAINANTS ON REPORT OF EDWARD F. McCLENNEN, SPECIAL MASTER

STATEMENT OF THE CASE.

The complainants do not contend in their brief that controlling works are necessary in order to effect a reduction in diversion to 5,000 c.f.s. without danger to the local water supply; they do not contend that the Southwest Side Treatment Works, or its equivalent, cannot be constructed before the end of 1938, assuming available funds; nor do they contend that the Sanitary

District cannot finance the construction program assuming the normal collection of taxes. No attempt is made to show a violation of the decree in any respect.

The argument of the complainants on the facts is devoted to a criticism of what has been done by the defendants as measured by what the complainants conceive the duty of the defendants to be as to engineering detail, and not by the actual efficaciousness of the construction program of the Sanitary District. The complainants, in adopting the hypothesis of the Special Master, have taken as an inflexible and unchangeable standard of the engineering and sanitation problems involved, what they regard as final determinations of the former Special Master, which were not intended to be such, and which were not adopted by the Court except insofar as the Court used these findings as a guide in specifying the dates for progressive reductions in diversion.

The Sanitary District, on the other hand, has proceeded upon the belief that any program adopted by it, which was capable of accomplishment and which when accomplished would make the required reductions possible, would constitute a strict compliance with the decree of April 21, 1930, and would constitute a fulfilment of the duties of the Sanitary District as defined in the opinions of the Court in these causes. We submit that this standard is the only proper measure of performance and constitutes the only reasonable test of diligence.

The Sanitary District in the hearings recently concluded showed that a program was adopted which, in the opinion of its engineers, was capable of accomplishment and which would effect compliance with the decree. The complainants introduced no evidence to the contrary, and do not now contend that the program adopted by the Sanitary District was incapable of being completed, and would not, when completed, permit the required reductions.

The evidence introduced by the defendants before the Special Master is discussed at length in our opening brief, and there is no necessity for elaboration except for the purpose of demonstrating that certain statements contained in the brief of the complainants, carrying an implication of bad faith, are untrue. Without making direct charges as they did in their Application, because there is no proof, the complainants in their brief endeavor to create the impression that there was bad faith on the part of the Sanitary District in spite of the lack of evidence and the Special Master's finding to the contrary. Half-truths and distortions are resorted to as a means of accomplishing this purpose.

In complainants' statement of the case, on page 8 of their brief, it is said:

> "With the exception of the subjects of inquiry referred to Special Master McClennen, the complainants take the other matters of failure and inadequacy of performance set forth in their Application as established and therefore will not reargue them in this brief. So far, if at all, as any issue may be raised with respect to them, these complainants will rely upon their brief filed with this Court on December 5, 1932."

Inasmuch as the complainants offered no testimony and introduced no evidence whatever before the Special Master on such matters, it is difficult to perceive upon what theory they consider that any disputed averment in their Application is established.

At the hearings the Special Master stated that he would take the statements in the Application as proved, except:

> "Those things in them which are called to my attention by the defendants as disputed, and with these exceptions, because it is obvious from the return and the briefs, these are disputed and are not to be taken as proved."

Then followed a recital of the things which the Special Master said were disputed and not to be taken as proved, which appears on pages 27, 28, 29, 30 and 31 of the record and is appended hereto (p. 39 *infra.*)

In this reply brief we shall divide our argument in two main divisions, following the order of complainants' brief; we shall refer first to the inaccurate or incomplete statements of fact made on behalf of the complainants, and then discuss certain legal questions which require elaboration in view of complainants' argument.

ARGUMENT.

The Facts.

I.

Alleged Causes of Delay in Obtaining Approval of the Construction of Controlling Works.

(a) Steps taken since the entry of the decree for a permit for the construction of controlling works.

The contention is made under sub-head "A" of complainants' brief (pages 15-17). that it is uncontroverted on the record that the defendants have taken no steps since the entry of the decree to apply to the Secretary of War for a permit for the construction of controlling works. This question is discussed at length in the brief of the Sanitary District, pages 12 to 34 inclusive.

In addition to the testimony referred to in our brief which establishes that the Sanitary District took all reasonable steps after the entry of the decree in the making of an application to the War Department, we direct the attention of the Court to the statement of Mr. Ramey, who testified that when the Sanitary District sought to obtain a permit from the War Department for construction it was the customary practice to talk the matter over with the Local Engineer, or with representatives from his office. There was no regulation requiring a formal application addressed to the Secretary of War. No formal applications addressed to the Secretary of War were made by the Sanitary District when permits were sought for bridges or other structures (Ramey, Rec. 820-830). The recommendation of Col. Weeks would be the guiding factor in a decision by the Secretary of War before a permit for controlling works was issued. Col. Weeks was familiar with all the plans previously submitted and was in a position to act or pass upon the question of controlling works without the resubmission of any of the plans and a formal application. When he told the Sanitary District not to press the matter for the time being the Sanitary District was justified in following his advice as had been the practice.

Counsel also assert (page 16, second paragraph), that the defendants did not make or seek to make any provisions for financing the construction of controlling works when in 1929 the Sanitary District *sought* and obtained from the General Assembly of Illinois authorization for the issuance of $27,000,000 of bonds without a referendum for the prosecution of sewage treatment works at Chicago, and the authorization contained no provision for, and by appropriation to other purposes precluded, the use of any of this money for controlling works. As shown by Exhibit 46, which was a printed appeal to the legislature, the Sanitary District actually sought to obtain authorization for $45,000,000 of bonds for the "Federal program requirements," including "Controlling Works—Chicago River." (See page 30, Exhibit 46.)

Reference is also made, in the same paragraph of complainants' brief, to the resolution passed May 15, 1930, (which resolution the Special Master has included in his report on pages 79 to 82 inclusive) and it is stated by counsel that "this memorial sought no authority to issue bonds for the construction of controlling works."

An examination of this resolution shows that it requested authority to issue bonds without a referendum "for said sewage treatment program to comply with the decision of the Supreme Court above referred to". So that if unlimited authority had been given as requested, the authorization would include not merely the treatment works but all works necessary under the requirements of the decree, including sewers, pumping stations, controlling works, or, in fact, any and all works that were necessary to effect compliance with the decree.

The complainants in their brief, on page 17, make the statement that "the Board of Trustees of the Sanitary District on January 12, 1933 adopted the 1933 budget without making any provision for financing the construction of controlling works."

On cross examination, Mr. Woodhull, Chairman of the Finance Committee, in answer to a question as to whether or not there was any appropriation in Exhibit 50, the budget for 1933, which provides for the construction of controlling works in 1933 or any subsequent year, stated,

> "* * * that appropriation [$5,000] for locks and dams could prove as an initial appropriation for a dam, which would permit of increase in the event that the plans were approved by the government and we were to go ahead." (Woodhull, Rec. 1334.)

(b) Reasons for not submitting plans after the decree of April 21, 1930, with formal application to the Secretary of War for approval of controlling works.

The complainants contend that the defendants have advanced "four excuses" to justify their failure to make application to the Secretary of War for controlling works in the Chicago River, but that "these supposed excuses * * * involve so many changes in position and are so utterly without substance as to challenge their sincerity."

The complainants (pages 17-33) attempt with ingenious distortion to state the position of the defendants with respect to the construction of controlling works in the Chicago River. The characterization of the *reasons* of the Sanitary District for not proceeding with the construction of controlling works as "four excuses" is improper, and counsel's analysis of the situation is misleading and erroneous.

The position of the defendants is clearly stated in the brief filed on behalf of the Sanitary District (pages 12-90) and we respectfully ask the Court to accept the statement of the Sanitary District concerning its position with respect to controlling works, rather than the position attributed to it by the complainants.

The all important consideration is that the decree when considered with the opinion of the Court in these cases does not contemplate the construction of controlling works as an essential requirement unless necessary to effect the reductions in diversion as specified. After the decision was reached by the Sanitary District that controlling works were not necessary to effect a reduction to 5,000 c.f.s., the Sanitary District was justified in taking no further steps to obtain approval of controlling works to meet the 1935 reduction; before such a decision was reached the Sanitary District was justified in following the advice of Colonel Weeks not to press the matter "for the time being" inasmuch as there was no immediate necessity for the approval of plans.

Counsel intimate (page 19) that the "studies" or plans supplied to the District Engineer in December 1928 by the Sanitary District, were plans that had been previously made. The fact is that the plans submitted to Col. Weeks, the District Engineer, were made, after the request for such plans was received. The plans are dated December 27, 1928. (See Exhibit 26.)

Ramey testified that to comply with the request of Col. Weeks the matter was studied in the office of the Sanitary District and plans were submitted to him. (Rec. 397.)

An effort is sought to detract from the importance of the conferences between the Sanitary District engineers and the U. S. District Engineer at Chicago, by referring to the discussions as "casual and off-hand conversations." (Comp. Br. 31.)

Col. Weeks testified that the conferences "pertained always to the activities of the Sanitary District on matters for which he was responsible to the War Department." (Rec. 492.)

II.

Steps Which Should Now Be Taken to Secure Approval and Prompt Construction of Controlling Works.

In our brief (pp. 86 to 90) we demonstrate conclusively, in our judgment, that there is no necessity for an enlargement of the decree so as to include a compulsory requirement for the construction of controlling works. It has been established that controlling works are not necessary to effect the reduction to 5000 c.f.s. on December 31, 1935, and if such works are necessary to effect further reductions they will be constructed without a compulsory order.

As to the contention of the complainants that the decree should be further enlarged to provide for the appointment of a Mandatory of this Court, we submit that the Special Master on page 38 of his report has briefly but accurately presented the practical reasons why a Mandatory should not be appointed. In our discussion of the law (p. 29 *infra*) we present the legal objections to the appointment of such a Mandatory.

On pages 37 and 38 of complainants' brief issue is taken with the Special Master's conclusion that a Mandatory would be received as a "carpet-bagger." The personal belief is expressed by counsel "speaking off the record," that the Mandatory would be welcomed by the thinking citizens of Illinois. It is respectfully suggested that this latter view is at variance with the experience and almost universal knowledge of the reactions of a free people living under free institutions and devotedly attached to democratic institutions and forms of government.

III.

Causes of Delay in Providing for Construction of the Southwest Side Treatment Works.

(a) Adequacy of time allowed for physical construction of Southwest Side Treatment Works.

The brief of the Sanitary District, on pages 91-106, presents the record establishing that adequate time was allowed for the physical construction of the Southwest Side Treatment Works and there is no necessity for further discussion on this point in this reply brief.

On page 41 of complainants' brief, reference is made to the finding of Chief Justice Hughes as Special Master that "five and one-half years would be required for physical construction of the [Southwest Side] plant." Such was not the finding of Chief Justice Hughes. His finding was that five and one-half years would be a reasonable time to allow for such construction. The distinction is substantial and material.

Although the question was not included in this Reference, counsel comment (page 42) on certain portions of the West Side plant and certain West Side sewers which were not to be finished until 1936.

In our opening brief we refer to the undisputed testimony that the reduction to 5,000 c.f.s. could be affected with the program that was adopted.

The completion of the unfinished work referred to by the complainants was unnecessary to effect the reduction to be made on December 31, 1935. (Ramey, Rec. 544, 557-558.)

(b) Acquisition of Site.

The Sanitary District in its brief, on pages 106-117, presents the testimony showing the causes of delay in acquiring a site for the Southwest Side Treatment Works. It is unnecessary to discuss this matter further other than to direct attention to the following incomplete statements contained in complainants' brief.

The statement is made (p. 44) that: "No offers were ever made to property owners and no condemnation suits were ever filed. (McCarthy, R. 1412, 1413)." The reasons why no condemnation suits were filed, although the pleadings for the condemnation suits were prepared, were stated by Mr. McCarthy to be as follows: "Because, as we progressed with the work, the number of objectors from the Board of Education and property owners and others who were petitioning and interviewing the Board of Trustees and objecting to the acquisition of that site for the purpose for which it was to be acquired, and as I understood it advancing for the consideration of the Board an alternative plan or area which they suggested to be acquired by the District." (McCarthy, Rec. 1412).

As to the reasons why offers were not made to any of the owners in answer to a question by the Special Master, Mr. McCarthy stated: "Because of these various objections, the thought was that if we were to—after it had been determined or at least this interference had come along from various objectors, it would not be proper to start a condemnation suit on one little section, and then neglect to take up the entire piece" (McCarthy, Rec. 1413).

In this connection we remind the Court that under the Illinois law before a condemnation suit may be started it is necessary to make an offer to the owner of the property which must be rejected by him if unsatisfactory.

On page 45 of the complainants' brief the following statement is made: "The District stands in exactly the same state of indecision and uncertainty as to where, if at all, the Southwest Side Sewage Treatment Works will be built as it stood on the Re-reference in 1929."

It should be observed as pointed out by the defendants in their brief on page 120 that Mr. Ramey testified: "We are not in the same situation as we were in 1929 with respect to the Southwest Side Plant. We have considerable more information as to the amount of sewage. We have had a check up on the amount of Stockyards wastes. We had studies made of the Southwest Side sewage, considerable work was done on that. I would say that we are in a much better position now to design that plant than we were four years ago." (Ramey, Rec. 582.) And it should also be noted in answer to the following question on cross examination by complainants' counsel: Q. "Mr. Woodhull, did I correctly understand you to testify yesterday that you now regard it as definitely settled that the Southwest Side plant will be constructed on the West Side area?" Mr. Woodhull answered as follows: A. "Correct." (Woodhull, Record 1331).

(c) Preparation of Designs, Plans and Specifications.

Our opening brief, on pages 117-120, shows the progress that has been made in the preparation of designs, plans and specifications for the Southwest Side Project.

On page 46 of the complainants' brief the statement is made that the "1933 budget includes no substantial, if indeed it includes any, appropriation for the preparation of contract plans and the completion of designs for any of the large structures of the Southwest Side Treatment Works."

The Special Master on pages 64 and 65 of his report shows that of the amounts appropriated there is available for the design of the Southwest Side Treatment Works $88,280.

On page 46 of the complainants' brief, the following statement is made: "Even these '*meager*' expenditures were made in efforts at acquisition of the site, in reinvestigation of the Stockyards and Packing Town wastes, and in other purely preliminary and '*unfruitful*' studies." (Italics ours.)

Reference is then made to the report of Special Master McClennen (on page 56) indicating by innuendo that the foregoing was the finding and the expression of the Special Master regarding these expenditures. The Special Master's report on this point is as follows: "These investigations were made in the efforts at acquisition of a site, in reinvestigation of the Stockyards and Packingtown wastes, and *in studies for the Southwest Side plant and in some adaptation of West Side plant designs to Southwest Side uses.*" (Italics ours)

At the close of the last paragraph of complainants' brief on page 46, the statement is made: "As stated by Special Master McClennen, no new reason for extended reinvestigation of the Packing Town wastes has arisen since the Re-Reference in 1929 * * * ." The statement of the Sanitary District in its Return (p. 34) that a check on these wastes was required stands admitted. The Special Master in his report on page 56 states: "The investigation into the Stockyards and Packingtown wastes, the Sanitary District at no time has contended, justified a delay as a single factor until January 1, 1936, in the construction of the Southwest Side Treatment Works."

IV.

Steps Which Should Now Be Taken for Construction of Southwest Side Treatment Works or an Efficient Substitute.

The defendants in their brief on pages 120 to 122, inclusive, discuss the matter of the recommendations of the Special Master. There is no necessity for an enlargement of the decree as proposed by the Special Master to expedite performance. As to the additional enlargement proposed by the complainants, the Special Master in his report on page 38 presents the difficulties and the futility of appointing a Mandatory as suggested by the complainants.

Counsel assert (p. 50):

> "The defendants have neither acquired nor selected a site for the Southwest Side Treatment Plant as originally planned, or an adequate substitute."

Attention has heretofore been directed to the testimony of Mr. Woodhull (Record 1331), who said that the site has been definitely selected.

On the same page of complainants' brief (page 50) the following statement is made:

> "The 1933 budget includes no appropriation for the preparation of contract plans and completion of the plans for any of the structures of the Southwest Side Sewage Treatment Works."

As heretofore pointed out in this brief, the Special Master on pages 64 and 65 of his report states that there has been appropriated and is available for the design and for the construction of the Southwest Side Sewage Treatment Works, $88,280.

At the bottom of page 50 and the top of page 51 the following statement is made in complainants' brief:

> "While the sewers are essential, Chief Justice Hughes as Special Master found that they are not a controlling factor in the time required for the construction of these works. (Report of Special Master on 1929 re-reference 37, 142 (F).")

A careful examination of page 37 of the report of the Special Master on re-reference shows conclusively that there is nothing on this page in any way substantiating the statement made as above by the complainants. The statement referred to on page 142, sub-paragraph (F) which is part of the conclusions of the Special Master, is as follows:

> 4. "That the time that should be allowed for the completion of the sewage treatment works above described, is as follows:
>
> * * * *
>
> (F) "That the necessary intercepting sewers pertaining to the above described sewage treatment works should be completed within the time allowed for the completion of the sewage treatment works respectively."

V.

Reasonable and Financial Measures on the Part of the Sanitary District.

The Special Master properly has found in this connection "the Sanitary District is not failing now to pursue the reasonable financial measures now within its control which are necessary in order to carry out the decree of this Court" (Report page 126).

The complainants on page 54 of their brief state that the finding of the Special Master on this point clearly implies that at and after the date of the entry of the decree and before its present financial difficulties arose, the Sanitary District "did not pursue the reasonable financial measures within its control which were necessary in order to carry out the decree of this Court."

This implication the Sanitary District states is clearly unfounded by the report of the Special Master and is overwhelmingly refuted by the record in this case (Woodhull, 1107-1178). The Special Master in his report on page 78 finds as follows:

> "The complainants contend that the financial plight of the Sanitary District rests squarely upon self-inflicted or self-controlled obstacles on the part of the defendant ** I find that the Sanitary District is not responsible for this."

And the Special Master on page 82 also finds:

> "In the conditions which now exist there is no reasonable financial measures which the Sanitary District can take which it is failing to take."

VI.

Reasonable and Financial Measures on the Part of the State of Illinois.

The Sanitary District submits that there is no immediate emergency which requires financial participation by the State in this sewage treatment program. The Sanitary District is prepared to complete the program as soon as the necessary funds are available and it is endeavoring to obtain these funds. The complainants do not contend that the Sanitary District cannot finance the construction program assuming the normal collection of taxes. In the brief of this defendant, pages 122-137, is contained a complete analysis of the reasonable and necessary financial measures which are proposed to be taken in order to carry out the decree. It is therefore the position of the Sanitary District that at this time an effort to place the financial burden upon the State of Illinois, assuming without admitting that the obligation is properly a State obligation, would be premature, and such action would not expedite the completion of the construction program. The recommendations of the Special Master for a proposed enlargement of the decree compelling the General Assembly of the State of Illinois to appropriate $35,000,000 annually for the construction program without a referendum vote, or the additional enlargement of the decree for the appointment of a Mandatory as suggested by the complainants, should not be adopted by the Court.

Subdivisions A, B, C, D, E, and F of complainants' brief (pages 57-65) deal with State matters and will not be here discussed.

Subdivision G of Complainants' brief (pages 66-67) refers to powers which in the opinion of counsel might properly be conferred upon the Sanitary District and many requirements are suggested for imposition upon the Sanitary District to increase and make available the large financial capacity of the District.

The position of the Sanitary District and the action being taken by it with respect to some of these measures are presented on pages 130 and 131 of its opening brief.

Complainants in their brief have made ten subdivisions of certain measures that should be taken. The Sanitary District submits the following suggestions in the order corresponding to the ten recommendations made by the complainants:

> (1) The Sanitary District is already making an effort to obtain legislation eliminating the referendum provision on bonds for financing the construction program.
>
> (2) As to the matter of assessing real estate at its full value, we submit the Master's Report on

pages 83 and 84, discusses the difficulty of making this change in the statewide policy of the State of Illinois.

(3) At the present time the aggregate of taxes levied in Cook County is greater than the taxpayers are able or willing to pay. Enlightened public authorities and patriotic citizens have been making intelligent efforts to bring about reductions in the cost of government and reductions in the burden of taxation. It is believed that this program meets with the approval of thinking people everywhere.

(4) The same considerations which make (3) above valueless produce the same result when applied to (4).

(5) Should the District be required to collect its own taxes, that would only create confusion and would not result in collecting a single dollar more than would be collected by the county collector.

(6) The Special Master in his Report (pages 86-88) finds that a charge for service would not be of material aid at this time. The sewers of the Sanitary District are not connected to private property in any instance. They are "intercepting" sewers which pick up the sewage brought to them by the primary sewer system built, owned and operated by municipalities other than the Sanitary District.

(7) The Special Master in his Report (pages 85 and 86) concludes that "it is not reasonable to rely in advance on special assessments as a financial resource available in time for the required completion of this program."

(8) Under existing federal legislation, the Reconstruction Finance Corporation has ruled that the Sanitary District's project is not eligible for a loan. The Sanitary District is endeavoring to secure an appropriate amendment to this act.

(9) It may be assumed that if additional laws are necessary to provide for the collection of taxes, the General Assembly will, as in the past, enact such amendments.

(10) The General Assembly, as disclosed by the record, has enacted the necessary laws to aid the collection of taxes in Cook County and throughout the state.

On page 69 of their brief complainants urge the appointment of a Mandatory who shall be vested with power to levy taxes and power to collect the same through United States marshals; with power to issue bonds and power to levy taxes to pay interest and principal and power to collect such taxes through United States marshals, etc. It is respectfully submitted that the Special Master has clearly and concisely shown the futility of such action as expressed in his report at page 37-38:

> "The steps so urged are so inexpedient if not futile that they should not be taken, even if this Court has the power."
>
> * * * *
>
> "A commissioner exercising all the powers of the General Assembly of Illinois and all the powers of the Sanitary District under the existing constitution and legislation cannot raise money this year for this particular purpose, until this Court has by its decree imposed a duty upon the State of Illinois to do this work. If the commissioner is to exercise direct powers of this Court superior to those of the Sanitary District and of the General Assembly to levy and to collect taxes and to issue bonds the necessary machinery cannot be set up in time. The commissioner would be received in Illinois as a carpet-bagger. He would need an army of subordinates to make the valuations, the assessments, and the collection of taxes from a reluctant

> people. His bonds would not find a ready market in Illinois and would be viewed with hesitation as a novelty elsewhere. He should not be vested with Governmental discretion by the Court for such a huge Governmental project. It would be a serious task for the Court to draft a code of laws to govern his operations. He would have to build up an engineering staff and to exercise a judgment as to what particular kinds of structures should be built and what methods should be used for their construction. These and many more considerations of impracticability condemn the method."

A United States marshal under existing conditions would not be able to collect one dollar more of taxes than the county collector of Cook County is able to do. Should the Court appoint a Mandatory and vest him with power to issue bonds and should the Mandatory proceed to execute such power, we are fully persuaded that his attempted exercise of such power would be wholly unavailing.

The appointment of a Mandatory would be fraught with almost untold possibilities of mischief and would serve no useful purpose whatever.

THE LAW

That the Supreme Court possesses jurisdiction of controversies between states and that this necessarily implies power to enter judgments; that the power to enter judgments necessarily embraces power to enforce those judgments and that these powers are conferred by the Federal constitution no one denies.

Counsel for complainants gloss over and ignore the question of what was adjudged by the decree of April 21, 1930. We contend that the essence and substance of that decree consists of an injunction to restrain diversion of water from Lake Michigan beyond certain specified quantities. That the Court possessed this power is not disputed nor is it disputed that the Court possesses power to enforce that judgment, but subject to the qualification that if and when Congress orders or authorizes other and different quantities of diversion the judgment of the Court is superseded and no longer operative.

In enforcing a judgment the Court may employ only such procedure as is in accordance with due process of law or in other words such procedure as is in substantial accord with the law and usage in England before the Declaration of Independence, and in this country since it became a nation.

No Court possesses unlimited, unqualified or arbitrary power nor may it invent new and unheard of methods to enforce judgments.

The waterway from Lake Michigan to the Mississippi River is now open to navigation as a Federal Project. Upon the opening of this waterway the diversion over 1500 c.f.s. permitted by the decree became lawful for maintaining navigation on the waterway by the act of July 3, 1930. The present diversion is no longer a wrong to complainants to be remedied by this Court.

If we read aright, in their headnote and argument on page 71 of their brief, complainants omit to state their view with reference to the scope of the judgment embodied in the decree of April 21, 1930. However, quite adroitly they convey an implication that the judgment is more than an injunction against water diversion. It fairly may be inferred that the implication intended was that the decree embodied an order to construct sewage treatment works and appurtenances, intercepting sewers, controlling works, etc.

Of course the decree contains no such order. It is not believed that the Supreme Court intended to be understood as asserting the power to make such an order. Certainly no requirement based on the supposed existence of such power is found in the decree proper.

At the hearing before the Special Master in answer to a question of the Special Master, the counsel for the complainants himself admitted that he does not know whether at the present moment there is a decree that anybody shall build "these works" (Rec. 484).

It is fundamental that under our system of government there is no place for arbitrary and uncontrolled power in any branch or department of government.

With all respect to the conscientious and capable lawyers who represented The Sanitary District of Chicago, it is believed by those now representing the District, that the concession made by them in March, 1930, which is referred to in the report of the Special Master at page 121, conceding the power of the Court to order the construction of sewage treatment works, etc., was made without full consideration and that it was erroneous.

On principles which, to those now representing the Sanitary District, seem fundamental, this Court was and is wholly without legal power or authority to direct or require the construction of sewage treatment works, etc., or their completion, within a specified time. Nor, as above stated, do we believe that this Court intended to be understood as asserting such power.

If it be assumed, for the purposes of argument, that the Court possessed the power (negatively, by injunction) to permit diversion of water and to require the progressive diminution of such diversion, that would be the utmost extent of its regard. The permission to divert might, it is true, be conditioned upon the construction of sewage treatment works. But if the defendants chose to refuse or omit to perform the condition, it is our view that the only penalty could be that of a withdrawal of the permission to divert. We are wholly unable to perceive any source from which could be derived the power to compel the construction of sewage treatment works. Those who assert the existence of such power should be able to point to the source from which it is derived.

We think no other inference from the argument of complainants (pages 71 to 86 of their brief) is permissible than that they assert (a) that the Supreme Court possessed power to order the defendants to construct sewage treatment works, etc.; (b) that the Court exercised that power and made such order; (c) that the Court lawfully may enforce such order by "any measures it may deem expedient."

We address ourselves to their argument on that assumption.

This Court many times has announced the rule that it will exercise only such jurisdiction as was given it by the Constitution, and will proceed only according to the established usages and modes of procedure.

Thus, in the case of *Luther* v. *Borden,* 7 How. 1, the Court, speaking through Chief Justice Taney, said (page 47):

> "The high power has been conferred on this court of passing judgment upon the acts of the State sovereignties, and of the legislative and executive branches of the federal government, and of determining whether they are beyond the limits of power marked out for them respectively by the Constitution of the United States. This tribunal, therefore, should

> be the last to overstep the boundaries which limit its own jurisdiction. And while it should always be ready to meet any question confided to it by the Constitution, it is equally its duty not to pass beyond its appropriate sphere of action, and to take care not to involve itself in discussions which properly belong to other forums."

The above language was quoted with approval in the case of *Taylor and Marshall* v. *Beckham,* 178 U. S. 548.

And in *Fisher* v. *Cockerell,* 5 Pet. 248, the Court speaking through Chief Justice Marshall said (p. 259):

> "In the argument, we have been admonished of the jealousy with which the states of the Union view the revising power intrusted by the constitution and laws of the United States to this tribunal. To observations of this character, the answer uniformly given has been, that the course of the judicial department is marked out by law. *We must tread the direct and narrow path prescribed for us.* As this court has never grasped at ungranted jurisdiction, so will it never, we trust, shrink from the exercise of that which is conferred upon it." (Italics ours.)

In *Kilbourn* v. *Thompson,* 103 U. S. 168, the Court said (pages 190, 191):

> "It is believed to be one of the chief merits of the American system of written constitutional law, that all the powers intrusted to government, whether State or national, are divided into the three grand departments, the executive, the legislative, and the judicial. That the functions appropriate to each of these branches of government shall be vested in a separate body of public servants, and that the perfection of the system requires that the lines which separate and divide these departments shall be broadly and clearly defined. It is also essential to the successful working of this system that the persons intrusted with power in any one of these branches shall not be permitted to encroach upon the powers con-

> fided the others, but that each shall by the law of its creation be limited to the exercise of the powers appropriate to its own department and no other."

Language peculiarly applicable to the complainants' demand for the appointment of a mandatory with powers unprecedented and unheard of in American jurisprudence, and to suggestions that the Court amend its decree by incorporating orders requiring the financing of construction and the construction of sewage treatment works, etc., is found in the case of *Smith* v. *Turner*, 7 How. 283, at pages 428 and 429:

> "That is a very narrow view of the Constitution which supposes that any political sovereign right given by it can be exercised, or was meant to be used, by the United States in such a way as to dissolve, or even disquiet, the fundamental organization of either of the States. The Constitution is to be interpreted by what was the condition of the parties to it when it was formed, by their object and purpose in forming it, and by the actual recognition in it of the dissimilar institutions of the States. The exercise of constitutional power by the United States, or the consequences of its exercise, are not to be concluded by the summary logic of ifs and syllogisms."

Very much in point also is language used in *United States* v. *County of Macon,* 99 U. S. 582, at page 591:

> "We have no power by mandamus to compel a municipal corporation to levy a tax which the law does not authorize. *We cannot create new rights or confer new powers.* All we can do is to bring existing powers into operation. In this case it appears that the special tax of one-twentieth of one per cent has been regularly levied, collected, and applied, and no complaint is made as to the levy of the one-half of one per cent for general purposes. What is wanted is the levy beyond these amounts, and that, we think, under existing laws, we have no power to order." (Italics ours.)

And in the case of *California* v. *Southern Pacific Co.*, 157 U. S. 229, in speaking of its original jurisdiction, the Court through Chief Justice Fuller said (page 261):

> "The jurisdiction is limited and manifestly intended to be sparingly exercised, and should not be expanded by construction."

In the case of *Ex Porte Bollman and Swartwout* 4 Cranch 75, at page 93, Chief Justice Marshall said:

> "*** courts which are created by written law, and whose jurisdiction is defined by written law, cannot transcend that jurisdiction."

The Supreme Court does not possess (and, of course, has never claimed to possess) arbitrary power to proceed in any manner it may choose. Under our system of government there is no room for arbitrary, unlimited and unqualified power in any branch or department of any government. In all cases not specifically covered by statutory provisions procedure must be in accordance with established and recognized usages and modes of procedure; it must be in accordance with "due process of law"; that is to say, it must be in substantial accord with the law and usage in England before the Declaration of Independence, and in this country since it became a nation.

Lowe v. *Kansas,* 163 U. S. 81, 85.
Murray v. *Hoboken Co.,* 18 How. 272, 277.
Dent v. *West Virginia,* 129 U. S. 114, 124.

In the case of *Dent* v. *West Virginia,* 129 U. S. 114, will be found an exhaustive exposition of the meaning of the term "due process of law." In the opinion by Mr. Justice Field, the Court in considering whether certain legislation was violative of the "due process" requirement, among other things said that the requirement of "due process of law" was designed to secure the subject against the arbitrary action of the crown and place him under the protection of the law. It was deemed to be equivalent to "the law of the land." Further discussing the matter the Court said at page 124:

> "In this country, the requirement is intended * * * to secure the citizen against any arbitrary deprivation of his rights, whether relating to his life, his liberty, or his property. * * * legislation is not open to the charge of depriving one of his rights without due process of law, if it be general in its operation upon the subjects to which it relates, and is enforceable in the usual modes established in the administration of government with respect to kindred matters; that is, by process or proceedings adapted to the nature of the case. The great purpose of the requirement is to exclude everything that is arbitrary and capricious in legislation affecting the rights of the citizen."

And quoting from an earlier case, the Court said (page 124):

> "When we consider the nature and the theory of our institutions of government, the principles upon which they are supposed to rest, and review the history of their development, we are constrained to conclude that they do not mean to leave room for the play and action of purely personal and arbitrary power."

In the case at bar we submit that the proposed procedure is wholly unknown and directly contrary to established law and usage; that it is in violation of the fundamental principles upon which this government is founded in that it ignores the right of a sovereign state to control its internal affairs and usurps the governmental functions of the state.

The general principles announced in adjudicated cases by this Court clearly negative the idea that the Court possesses the implied power attributed to it by the complainants.

In the case of *Osborn* v. *U. S. Bank,* 9 Wheat, 738, Chief Justice Marshall said (p. 866):

> "Judicial power, as contradistinguished from the power of the laws, has no existence. Courts are the mere instruments of the law, and can will nothing. When they are said to exercise a discretion, it is mere legal discretion, a discretion to be exercised in discerning the course prescribed by law; and, when that is discerned, it is the duty of the court to follow it. Judicial power is never exercised for the purpose of giving effect to the will of the judge; always for the purpose of giving effect to the will of the legislature; or, in other words, to the will of the law."

In the case of *In Re Duncan,* 139 U. S. 449, the Court said (p. 461):

> "By the Constitution, a republican form of government is guaranteed to every State in the Union, and the distinguishing feature of that form is the right of the people to choose their own officers for governmental administration, and pass their own laws in virtue of the legislative power reposed in representative bodies, whose legitimate acts may be said to be those of the people themselves; but, while the people are thus the source of political power, their governments, National and State, have been limited by written constitutions, and they have themselves thereby set bounds to their own power, as against the sudden impulses of mere majorities."

In the matter of *Heff,* 197 U. S. 488, 505, the Court held that in the United States there is a dual system of government, National and State, *each of which is supreme within its own domain;* and that it is one of the chief functions of the Supreme Court of the United States to preserve the balance between them.

In answer more specifically to the contention of the complainants that the Court should appoint an officer with power to coerce all the instrumentalities of the State necessary to carry out the construction program prescribed by the Court, we submit that such procedure manifestly would be a usurpation of the sovereign powers of the state; and furthermore, that such a contention is based on the erroneous assumption that the Court has jurisdiction to decree the construction program.

We maintain that in the instant case, the jurisdiction of the Court extended only to the power to determine the validity of certain acts of Congress, and the permit of the Secretary of War.

No order or direction prescribing a program of sewage treatment construction was embodied in the decree nor does it appear that the court undertook in any way to make such an order. Had the Court made such an order, it would undoubtedly have exceeded its jurisdiction, and as a matter of law such action would have been *coram non judice.*

But even assuming for purposes of argument that the Court has such power, its order lawfully could not be enforced in the manner proposed by the complainants.

Such procedure would involve the levy and collection of taxes which elsewhere we have shown is not a judicial function. Such procedure would be an invasion of the internal affairs of a State which affairs we have shown are exclusively within the power of the State. Such procedure would be in violation of section 4 of Article IV of the United States Constitution which guarantees every state a republican form of government; and such procedure would deprive the people of the State of their right to have their affairs administered by officials selected by them, which right is the distinguishing feature of a republican form of government.

In answer to the recommendation of the Special Master that the Court should compel the legislature of Illinois to issue bonds to carry out the construction program, and that the bonds could be issued without a referendum, we submit that even on the assumption that the Court has the power to order the construction program, the Court is without jurisdiction to coerce the legislature to do a thing expressly forbidden by the State constitution which they have sworn to uphold and obey.

The principles announced in the case of the *Commonwealth of Kentucky* v. *Dennison,* Governor 24 How. 66, would preclude the Court from exercising the proposed coercive power.

In that case in discussing the power of a State Governor under the extradition act, Chief Justice Taney said (pp. 107-108):

> "The act does not provide any means to compel the execution of this duty, nor inflict any punishment for neglect or refusal on the part of the Executive of the State; nor is there any clause or provision in the Constitution which arms the Government of the United States with this power. Indeed, such a power would place every State under the control and dominion of the General Government, even in the administration of its internal concerns and reserved rights. And we think it clear, that the Federal Government, under the Constitution, has no power to impose on a State officer, as such, any duty whatever, and compel him to perform it; for if it possessed this power, it might overload the officer with duties which would fill up all his time, and disable him from performing his obligations to the State, and might impose on him duties of a character incompatible with the

rank and dignity to which he was elevated by the State.

> "It is true that Congress may authorize a particular State officer to perform a particular duty; but if he declines to do so, it does not follow that he may be coerced, or punished for his refusal. And we are very far from supposing, that in using this word 'duty', the statesmen who framed and passed the law, or the President who approved and signed it, intended to exercise a coercive power over State officers not warranted by the Constitution. But the General Government having in that law fulfilled the duty devolved upon it, by prescribing the proof and mode of authentication upon which the State authorities were bound to deliver the fugitive, the word 'duty' in the law points to the obligation on the State to carry it into execution."

In the case of *East St. Louis* v. *Zebley,* 110 U. S. 321, the Court said (pp. 324, 325):

> "The further award of the annual sum of ten thousand dollars to the relator, payable out of the remaining seven-tenths of the one per cent. levy cannot be justified. That fund, by the terms of the charter of the city, under which the bonds were issued, is authorized for the purpose of paying the necessary current expenses of administration, not including payments on account of the bonds of the municipal corporation. And admitting that any surplus of such fund, in any year, remaining after payment of such expenses, ought to be applied to the payment of the interest and principal of the bonds, that could only be required when such surplus should have been ascertained to exist. In the present judgment the court has undertaken to foresee it, and by mandamus to compel the city, by limiting its expenditures for its general purposes, to create the surplus which it appropriates. But the question, what expenditures are proper and necessary for the municipal administration, is not judi-

> cial; it is confided by law to the discretion of the municipal authorities. No court has the right to control that discretion, much less to usurp and supersede it. To do so, in a single year, would require a revision of the details of every estimate and expenditure, based upon an inquiry into all branches of the municipal service; to do it for a series of years, and in advance, is to attempt to foresee every exigency and to provide against every contingency that may arise to affect the public necessities."

To the same effect is the case of *Clay County* v. *McAleer,* 115 U. S. 616, 618, 619.

In regard to the question of the power of the legislature to issue bonds without a referendum we submit that if the legislature did so it would violate section 18 of Article IV of the Constitution of Illinois; and that the Court lawfully could not compel the legislature to do an act on contravention of the Constitution.

What was said in *Louisiana* v. *Jumel,* 107 U. S. 711, fully supports our contention.

In that case the Court held among other things that it had no power to compel State officers to do what the State Constitution prohibited. Two suits were consolidated in the case. The action pertinent to our controversy was a mandamus proceeding against State officials. The Court said (721):

> "The relief asked will require the officers against whom the process is issued to act contrary to the positive orders of the supreme political power of the State, whose creatures they are, and to which they are ultimately responsible in law for what they do. They must use the public money in the treasury and under their official control in one way, when the supreme power has directed them to use it in another, and they must raise more money by taxation when the same power has declared that it shall not be done."

The Court further said (727):

> "The remedy sought, in order to be complete, would require the court to assume all the executive authority of the State, so far as it related to the enforcement of this law, and to supervise the conduct of all persons charged with any official duty in respect to the levy, collection, and disbursement of the tax in question until the bonds, principal and interest, were paid in full, and that, too, in a proceeding in which the State, as a State, was not and could not be made a party. *It needs no argument to show that the political power cannot be thus ousted of its jurisdiction and the judiciary set in its place.* When a State submits itself, without reservation, to the jurisdiction of a court in a particular case, that jurisdiction may be used to give full effect to what the State has by its act of submission allowed to be done; and if the law permits coercion of the public officers to enforce any judgment that may be rendered, then such coercion may be employed for that purpose. But this is very far from authorizing the courts, when a State cannot be sued, to set up its jurisdiction over the officers in charge of the public moneys, so as to control them as against the political power in their administration of the finances of the State. In our opinion, to grant the relief asked for in either of these cases would be to exercise such a power." (Italics ours.)

That the case of *Louisiana* v. *Jumel, supra,* is an authority for the proposition that a court will not compel a State official to do what is prohibited by law is shown by the construction of the case in the case of *Rolston* v. *Missouri Fund Com'rs.,* 120 U. S. 390 as follows (411):

> "It is next contended that this suit cannot be maintained because it is in its effect a suit against the state, which is prohibited by the Eleventh Amendment of the Constitution of the United States, and *Louisiana* v. *Jumel,* 107 U. S. 711, is cited in support of this position. But this case is entirely different

> from that. There the effort was to compel a state officer to do what a statute prohibited him from doing. Here the suit is to get a state officer to do what a statute requires of him."

In the case of *United States* v. *County of Clerk,* 95 U. S. 769, the Court also said (p. 773):

> "It need not be said that no court will by mandamus compel county officers of a State to do what they are not authorized to do by the laws of the State. A mandamus does not confer power upon those to whom it is directed. It only enforces the exercise of power already existing, when its exercise is a duty."

The case of *The People* v. *Barnett,* 344 Ill. 62, cited by the Special Master in support of the proposition that the legislature could issue bonds for the construction program without a referendum is not even remotely relevant.

In that case the court said merely in effect that there was no general provision in the constitution requiring all laws to be submitted to referendum; that a referendum was necessary only where the constitution required a referendum; and that the legislative act in that case did not come within the exception.

In concluding this branch of our discussion, we submit that if the Court should establish the extreme and violent doctrine for which the complainants contend, it would transcend the customary and legitimate sphere of judicial power, would prostrate the rights of the people of sovereign states, would produce under the guise of judicial enforcement of a judgment, a centralization of Federal power similar to a judicial dictatorship, and would cause the utter destruction of the autonomy of the sovereign states.

Furthermore, the Court would be pronouncing a rule of decision which would serve as a most dangerous precedent, the momentous consequences of which scarcely can be estimated.

Even if the Court had such power (which we, of course deny) the mischief of its exercise in the case at bar would be wholly disproportionate to the object to be attained. It would be far better that the judgment should remain unexecuted than to be enforced by the method proposed. Judgments of this Court have remained unexecuted. The case of *Worcester* v. *Georgia,* 6 Pet. 515, is a celebrated instance. In that case Chief Justice Marshall ordered the release of Worcester on the ground that the state law under which he was imprisoned was unconstitutional. The governer of Georgia refused to obey the mandate of the court. Andrew Jackson (then President) refused to aid the court and said: "John Marshall has made the decision, now let him execute it." No attempt at enforcement of the mandate was ever made.

Moreover the through waterway is now open for navigation, and upon the opening of the waterway for navigation the flow over 1,500 c.f.s. became lawful for the purpose of maintaining navigation on the waterway. Because of this situation, there now exists no wrong for the court to remedy.

Mr. Justice Taft, in his decision in 278 U. S. 367, 410, says:

> "*And in so far as the prior diversion was not for the purpose of maintaining navigation* in the Chicago River, *it was without any legal basis because made for an inadmissible purpose.* It, therefore, is the duty of this court by an appropriate decree to compel the reduction of the diversion to a point where it *rests on a legal basis* and thus to restore the navigable capacity of *Lake Michigan to its proper level. *** The situation requires the District to devise proper methods* for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the

disposition of the sewage through other means than the lake diversion.

> "Though the restoration of just rights to the complainants will be gradual instead of immediate, it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project. ***
>
> "To determine the practical measures needed *to effect the object just stated* in the period required for their completion there will be need for an examination of experts; and the appropriate provisions of the necessary decree will require careful consideration." (Italics ours)

Observe from this language that navigation is a proper purpose for diversion and when water is diverted for navigation, the diversion rests on a legal basis. The proper level of the lake is not absolutely fixed. The proper level is that level which obtains when no water is drawn off for an inadmissible purpose. The level may be reduced by water diverted for a legitimate purpose under approval of Congress or the Secretary of War but in such an event the reduced level becomes the proper level.

Under the theory of the Court, the diverting of water for an improper purpose created a situation which required "the District to devise proper methods *** and put in operation *** adequate plants for the disposition of the sewage ***."

The Rivers and Harbors Act of July 3, 1930 and the opening of the waterway completely changed the "situation" to the extent that it made the diversion proper and the wrong complained of has been obviated and there are no "just rights" to restore.

Mr. Justice Holmes, in 281 U. S. 179, 197, said:

> "***the defendants are doing a wrong to the complainants and *** they must stop it."

By virtue of the Rivers and Harbors Act of July 3, 1930, and the opening of the waterway the wrong referred to has ceased to exist and, therefore, there is nothing for the court to remedy and there is no reason for retaining jurisdiction.

The Court cannot retain jurisdiction merely because of an apprehension that the Sanitary District may not be able to complete sufficient construction to permit the required reduction in diversion at the end of 1935, as required by the Rivers and Harbors Act. A Court cannot anticipate that such a thing will happen. In any event, it would only be upon a case properly presented in which it is alleged that the reduction required by the Act of July 3, 1930 can not be effected, that the court could assume jurisdiction.

Before the opening of the waterway the present 6,500 c.f.s. diversion has not been permitted as a matter of right but in a sense has merely been allowed under the indulgence of the Court. The Sanitary District need no longer depend on this indulgence, but now asserts a right under the Rivers and Harbors Act of July 3, 1930 which has not as yet been assailed as invalid for any reason.

As the defendant has heretofore submitted additional legal authorities, on the question as to whether or not the Court is without power or jurisdiction to grant the relief sought by the complainants, in the brief filed in opposition to complainants' motion of October 3, 1932, it will be unnecessary at this time to re-state the authorities as presented in defendant's brief or the contentions of the defendant as therein advanced. Such repetition would be needless, and the defendant will rest upon the authorities submitted in its present and previous briefs.

It is earnestly urged that the findings of the Special Master adverse to the Sanitary District, and the recommendations of the Special Master, and the suggestions offered by the complainants, should not be adopted.

The Sanitary District submits that the jurisdiction of the Court has been materially affected by the passage of the Rivers and Harbors Act of July 3, 1930. The Court is without power to grant the relief sought by the complainants or to enlarge the Decree as recommended by the Special Master.

The charges of bad faith, obstructions, avoidance, circumvention, delay, negligence, incompetence, dereliction and defiance, as alleged in the complainants' Application, have not been sustained. The record is undisputed that the Sanitary District has endeavored conscientiously and with an earnest purpose to comply at all times with the decree of this Court. This Reference has not been occasioned by any act of the Sanitary District, and therefore the costs, including the fees of the Special Master, should be taxed against the complainants, who, without just cause, initiated the present proceeding.

Respectfully submitted,

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APPENDIX

Special Master's Recital of Things Contained in the Application of Complainants Which Are Not to Be Taken as Proved Without Substantiating Evidence.

Page 9, second paragraph, second line, the following; the words: "Its performance under the decree has been at all times meager and inadequate, and much of the time negligible."

Two lines lower: "All performance under this decree has substantially ceased."

The next: "The semi-annual reports of The Sanitary District of Chicago are on file with this court further disclose, as hereinafter more particularly set forth, that there has been either no effort or progress in the performance of the work on the controlling factors in the program required, or that such effort and efforts have been wholly inadequate, and that the action of the defendants in those respects has been, whether so intended or not, wholly consistent with an effort to obstruct, avoid and circumvent performance of the decree."

Page 12, prior to Section IX: "This claim of a necessity to study the extent of the stock yards waste as a reason for postponing the commencement of the Southwest side project cannot be made in good faith, and must be advanced solely in an effort to delay, avoid and circumvent the performance of the decree of this court."

Page 13, at the end of Section IX: "The Suit of the Sanitary District in the Federal Court has not been prosecuted diligently or in good faith, and that the Sanitary District of Chicago, aided and abetted by the State of Illinois, is putting forward such suit merely with the purpose and intent of thereby attempting to delay, avoid and circumvent the performance of this court's decree."

Page 13, Section XI: "The State of Illinois and The Sanitary District of Chicago, through negligence, incompetence or bad faith, have failed, neglected and refused adequately and reasonably to provide for financing the performance of this court's decree."

Page 14, a quarter of the way down the page: "A failure due to incompetence, neglect or bad faith, to levy and collect normal taxes at any time since the decree of this court became effective."

Page 15, beginning at the second line: "This difficulty arose from a self-created obstacle to-wit, from the fact that through negligence, incompetence or bad faith, normal and usual taxes, etc."

Page 15, the ninth line, the words: "By reason of the negligence, incompetence or bad faith."

The same page, beginning six lines before Section XII: "This negligence, incompetence or bad faith."

Page 15, Section XII: Beginning with the third line: "Rests upon the neglect, failure and/or refusal of the various authorities of the State of Illinois to levy and collect the proper taxes."

Next: "This ground of alleged inability presently to proceed with the decree."

Next page, 15, beginning with the last line: "The credit of The Sanitary District of Chicago is ample to finance these expenditures and the financial stringency of Chicago, which has existed since prior to 1929, is not due to a general depression, but to the negligence, incompetence or dereliction of duty of the officers and officials of the State of Illinois and her political subdivisions."

Next page, 16, Section XIV: "By a course of conduct characterized by neglect, incompetence, defiance or bad faith, as the case may be, the Sanitary District of Chicago has wholly failed to make any real, substantial and good-faith effort to perform the decree of this court, and has wholly failed to make reasonable, substantial and bona fide progress in carrying out that decree."

Next, on the same page, 16, at the beginning of Section XV: "The Sanitary District of Chicago wilfully disregarded and defied the Federal Government and presumed upon the solicitude of the Government."

Page 17, on the sixth line, the words: "To prevent, hinder or impede a restoration to the petitioners."

Page 18, beginning in the second line: "It is the plan, intention and purpose of the Sanitary District of Chicago and the State of Illinois, by similar means and similar methods, to delay, avoid and circumvent the performance of the decree of this court."

Next page, 18: Section XVI: "It was and is the absolute ministerial duty of the members of the Legislature of the State of Illinois, and every officer of the State of Illinois, and of every officer of The Sanitary District of Chicago, and of every officer of every other political subdivision, agency or instrumentality of the State of Illinois to take the necessary steps."

Next, the second sentence in the same paragraph: "The State of Illinois, its legislature, officers and agents, have failed, neglected and/or refused to carry out the decree of this court."

Three lines lower down: "It is not the intention of the authorities of the State of Illinois or of The Sanitary District of Chicago to carry out and perform this decree as ordered and adjudged by this court."

Next; in the same line: "It is the intention of the authorities of The Sanitary District of Chicago, aided and abetted by the authorities of the State of Illinois, so to obstruct, delay, avoid and circumvent the performance of this decree."

Page 19, the sixth line: "Your petitioners further aver that they are without remedy unless this court, in the exercise of the power conferred upon it under the Constitution in controversies among the states of the Union, etc."

~~Opinion 289 U.S. 395~~

Decree 289 U.S. 710 And see 281/666

Office Supreme Court,
FILED
JUN 14 1933
CHARLES ELMORE CR

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1932.

STATE OF WISCONSIN, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 5** **Original.**
STATE OF MICHIGAN, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 8** **Original.**
STATE OF NEW YORK, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 9** **Original.**

PETITION FOR REHEARING.

OTTO KERNER,
Attorney General.
TRUMAN A. SNELL,
Assistant Attorney General.
CORNELIUS LYNDE,
Special Assistant Attorney General.

OTTO KERNER,
TRUMAN A. SNELL,
CORNELIUS LYNDE,
Of Counsel.

THE GUNTHORP-WARREN PRINTING COMPANY, 210 WEST JACKSON, CHICAGO

IN THE

Supreme Court of the United States

October Term, A. D. 1932.

STATE OF WISCONSIN, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 5 Original.**
STATE OF MICHIGAN, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 8 Original.**
STATE OF NEW YORK, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 9 Original.**

PETITION FOR REHEARING.

To the Supreme Court of the United States:

The State of Illinois respectfully petitions that the Court grant a rehearing in the above entitled causes for the following reasons:

I.

Before the Court impose, by the addition of a paragraph to the decree, a requirement upon the State of Illinois separate and distinct from the provisions of the decree applicable to the Sanitary District of Chicago, the State of Illinois asks the Court to give consideration to rights of the State which have always been asserted throughout this proceeding and defenses based thereon but which because of the course of the litigation, have not, as we understand the record, been given consideration.

The amended bills herein claimed that the diversion of water from Lake Michigan by the Sanitary District lowered the levels of the Great Lakes by not less than 6 inches, to the injury of the complainants; that this diversion had not been authorized by Congress, and was in violation of the Act of Congress of March 3, 1899. The defendants denied the injuries and averred the diversion was authorized by the laws of Illinois, the acts of Congress and permits of the Secretary of War, and pointed to specific benefits to navigation resulting from the diversion on the waterway from Lake Michigan by way of the Mississippi to the Gulf.

On reference to the Special Master the principal defense was reliance upon the validity of the permit of the Secretary of War issued March 3, 1925, with the condition of which, it was established, the Sanitary District had complied. *But the State of Illinois asserted other defenses.* It pointed to what we have termed the rule of equitable apportionment, as established by this Court in *Kansas* v. *Colorado,* 185 U. S. 125, and applied in other controversies between states involving diversions of water from interstate channels. Illinois asserted that standing on a plane of equality with the complainant states, it possessed a right to appropriate a reasonable portion of the waters of Lake Michigan. It was also contended that an equitable appraisement of the relative necessities and benefits to the State on the one side as contrasted with the comparatively slight injury claimed by the complainants, would result in an allowance to Illinois of at least its reasonable requirements. Other defenses of laches, acquiescence, etc. were also pressed.

The Special Master sustained the first ground of defense and held that the permit of March 3, 1925 was valid and consequently that the acts of the defendant Sanitary District, performed in compliance therewith, were legal and hence that no legal damage resulted to the complainants. Having reached this conclusion, he found it unnecessary to consider the other defenses.

On the argument before the Court on the Master's report, the defendants naturally sought to sustain the Master's position, but in their brief, as pointed out in the present brief of the State of Illinois in the pending proceeding (Brief of Illinois on Report of Special Master McClennen, pp. 47-49), the defendants again asserted their right to the rule originally announced in *Kansas* v. *Colorado,* and alleged that a fair appraisal of the contrasted benefits and burdens resulting from the taking of water by the upper riparian defendants would justify the defendants.

We respectfully submit that the Court in its opinion on the merits in this case did not *and on the record before it could not,* deal with this defense. The necessary findings of fact were not made by the Special Master. Because of the way in which the Special Master had dealt with the facts and law, he deemed it unnecessary to attempt any apportionment of the waters of Lake Michigan as between the complainant and defendant states. No finding by him involved the application of the rule of *Kansas* v. *Colorado,* nor was any conclusion of facts on this matter set forth in his report.

The Court, at pages 409-410 of its opinion (278 U. S.

399), summarizes the issues in the case and, we submit, this summary shows that the defenses put forward by the State of Illinois—its rights under the rule of equitable apportionment as established by the previous decisions of this court in *Kansas* v. *Colorado*—were not considered in this case.

As to the conclusion of the Special Master, the Court found the permit of the Secretary of War had been lawfully issued within the authority vested in him by the Act of March 3, 1899, because required by an emergency which was created, as the Court decided, by the wrongful acts of the defendants, and that the complainants were entitled to an injunction to prevent the continuance of these wrongful acts.

We suggest that any application of the doctrine of equitable apportionment of the waters of Lake Michigan as between the complainant and defendant states, would necessarily allow to Illinois some portion of those waters and that as to such amount of diversion, the acts of the defendants were not "wrongful", but clearly within the right of Illinois. The Court's conclusion recognized no right whatever in so far as the acts in question are concerned.

This is further demonstrated, we submit, by the fact that the Court pointed to one of the findings of the Special Master—that diversion to some extent was needed to maintain navigable conditions within the harbor of Chicago—and in resubmitting the cause to the Special Master to recommend an appropriate decree, the Court said:

> "In increasing the diversion from 4167 cubic feet a second to 8500, the drainage district defied the authority of the national government resting in the Secretary of War. And in so far as the prior diversion was not for the purposes of maintaining navi-

> gation in the Chicago River, it was without any legal basis, because made for an inadmissible purpose. It is, therefore, the duty of this Court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis, and thus to restore the navigable capacity of Lake Michigan to its proper level. The *Sanitary District authorities*, relying on the argument with reference to the health of its people, had much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore they cannot now complain if an immediately heavy burden is placed *upon the District* because of their attitude and course. The situation *requires the District* to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition, adequate plants for the disposition of the sewage through other means than the lake diversion." (Italics ours.)

In the Special Master's report on re-reference at page 4, the questions submitted to him by the Court are definitely stated. The only question submitting the amount of diversion was as follows:

> "What diversion, if any, of water from Lake Michigan will be necessary for the purpose of maintaining navigation in the Chicago River as a part of the Port of Chicago, after these sewage disposal works are in full operation?"

The harbor of Chicago as shown by the record and the original Special Master's report was a part of interstate navigable channels then under regulation and control by the federal government. Navigation necessities in this Port are not the necessities and requirements of the State of Illinois, but those of the United States.

We respectfully submit, therefore, the allowance of a diversion of 1500 c. f. s. for the purpose of maintaining navigable conditions in the Port of Chicago cannot be deemed an application of the rule of equitable apportionment, and is in no sense a recognition of either the necessities of the State of Illinois or of its right to appropriate a fair and equitable portion, as between it and sister states, of the waters of Lake Michigan.

The defendants, as this Court can well believe, carefully studied this opinion, and finding in the language last quoted a recognition of the policy adopted by the defendants to have the sewage problem handled by the Sanitary District, as distinguished from the State, and in view of the fact which was proved before the Special Master on re-reference, that the District had already adopted a plan for the construction of plants designed to treat sewage artificially, the defendants felt their only concern as a practical problem under this decision was to obtain in the hearing before the Special Master a reasonable time, properly adjusted to practical necessities and particularly taxable income, in which to carry out the program they had already adopted.

On re-reference the Special Master fully met the suggestion in the above language of the Court and imposed by his recommendations a heavy and immediate burden upon the Sanitary District, but a burden, heavy as it was, which the Sanitary District within its normal capacity could safely assume.

The later phase of the case, occasioned by the unanticipated failure of the District to obtain the funds with which to carry out its program because of the depression, has involved, we respectfully submit, an entirely different procedure. The Court in its recent opinion and order has added a paragraph to the original decree defining a "requirement" that the State of Illinois as distinguished from the Sanitary District undertake financial measures by which the program may be completed.

Since the Court now seeks to impose upon the State of Illinois a specific requirement as distinguished from the obligations heretofore imposed by the Court's decree upon the Sanitary District, the decree having been determined upon a finding that the District possessed capacity to meet these requirements, the State of Illinois respectfully asserts its right now to have consideration given to defenses always urged by it in this proceeding and which are valid, as we understand the decisions of this Court. We rely upon the following cases:

Kansas v. *Colorado,* 185 U. S. 125.
New York v. *New Jersey,* 256 U S. 296.
Wyoming v. *Colorado,* 259 U. S. 419.
Connecticut v. *Massachusetts,* 282 U. S. 660.
New Jersey v. *New York,* 283 U. S. 336.

In *Connecticut* v. *Massachusetts,* 282 U. S. 660, this Court said (p. 670):

> "The determination of the relative rights of contending states in respect to the use of streams flowing through them does not depend upon the same consideration and is not governed by the same rules of law that are applied in such states for the solution of similar questions of private right * * * It seems that the principles of right and equity shall be applied having regard to the 'equal level or plane on which all the states stand, in point of power and right, under our constitutional system,' and that upon consideration of the pertinent laws of the contending states and all other relevant facts, this Court will determine what is an equitable apportionment of the use of such waters."

In *New Jersey* v. *New York,* 283 U. S. 336 (p. 343) the Court said:

> "The removal of water to a different watershed obviously must be allowed at times *unless states are to be deprived of the most beneficial use on formal grounds.* In fact it has been allowed repeatedly and has been practiced by the states concerned." (Italics ours.)

We respectfully urge that up to the present point this Court has determined the validity and effect of the permits of the Secretary of War and contentions based upon interpretation of acts of Congress. But the Court has not applied the rule of the cases referred to. The State of Illinois desires to appropriate the waters of Lake Michigan for the domestic uses of its citizens bordering upon the Great Lakes. In an indirect way this right has been sustained in the pending proceeding. But on the facts in this case the exercise of this particular right has clearly had no bearing upon the determination of any diversion to be made by the Sanitary District. The State of Illinois further desires to appropriate the waters of Lake Michigan for navigation on a waterway largely constructed by its funds and now by appropriate congressional action, a complete federal project regulated and controlled by the federal government and now open to navigation and used therefor. The State of Illinois desires to appropriate the waters of Lake Michigan not only to maintain navigable depths in this waterway but particularly to prevent nuisance from the sewage necessarily, under the conditions of present civilization, required to be emptied into this stream. The State requires the waters to be diverted from the Lake in order to maintain the purity of the waters of Lake Michigan.

The issue here involved is not a re-assertion of the right to divert 10,000 cubic feet per second, to produce a lowering of the lake levels to the extent of 6 inches, but involves a much less amount. There has never been any attempt to appraise the damage to the complainant states to be produced by a change in the levels of the Great Lakes, for instance, of 3 inches. The conditions under which navigation is conducted on the Great Lakes have changed materially since consideration of navigation necessities in the original hearing before the Special

Master occurred. Channels have been materially deepened.

The State of Illinois, therefore, respectfully asks the Court to reconsider its opinion and to take appropriate steps for the application of the rule applied by it in the determination of the relative rights and conflicts of interest between sovereign states who in all cases have been held to stand upon a plane of equality before the Court.

We urge this right because of our belief and confident conviction that a reappraisal of all of the circumstances involved, based upon a recognition of the right of the State of Illinois to appropriate an undetermined portion of the waters of Lake Michigan—a recognition which this Court, because of the peculiar course of the case, has heretofore denied us—will result in a substantial allowance to the State and may largely, if not entirely, eliminate the existence of such an emergency as to require the imposition by this Court of an immediate burden upon the State. This assertion must not be taken to suggest the existence of any intention to depart from the adopted program of the Sanitary District, which is required by the laws of the State of Illinois to be carried out, and which must be fulfilled at the earliest practicable moment for the protection of the citizens of the State.

II.

In concluding that the Court should appropriately add the paragraph to the decree adopted by the opinion and order herein defining the "requirement" of the State of Illinois, the Court says:

> "That responsibility the State should meet. Despite existing economic difficulties the State has adequate resources, and we find it impossible to con-

> clude that the State cannot devise appropriate and adequate financial measures to enable it to afford suitable protection to its people to the end that its obligation to its sister states, as adjudged by this Court, shall be properly discharged."

We respectfully suggest that the evidence in the record will not sustain the foregoing finding of the Court if this finding be deemed to be the Court's conclusion that the "adequate financial measures" referred to may be undertaken by the State of Illinois in sufficient time to meet the Court's requirements as defined in the opinion for speedy and immediate going forward with the construction program of the Sanitary District.

As we understand the Court's opinion, the Court adopts the conclusion of the Master that if expenditures begin at once and the utmost diligence and energy, with no restriction on funds, be employed, it is yet possible to complete the construction program of the Sanitary District so as to permit the reduction in diversion required by the original decree at the end of 1938. This conclusion must be based upon the assumption that funds will be made available at once. We believe, however, the Court's conclusion as to the capacity of the State of Illinois is based upon a misconception by the Court that the credit of the State may now be made presently and immediately available for these purposes.

The responsible officers of the State of Illinois must proceed in accordance with the requirements of the Constitution of the State. Section 18 of Article IV of the Constitution of Illinois, adopted in 1870, forbids the creation of a debt, except upon approval of the vote of the people at a general election. This effectively denies the use of the credit of the State, except in accordance with these provisions. The next general election in Illinois, a matter fixed not only by statute but by Constitution, will occur in November, 1934.

The Court must also bear in mind that under Section 1 of Article XIV of the Constitution of 1870, an amendment to that Constitution must be voted upon at a general election after submission by act of the General Assembly. No amendment to the Constitution of Illinois, therefore, can be adopted prior to November, 1934.

We, therefore, respectfully point out that under these constitutional provisions, in the first place no constitutional change can be made and, in the second place, the State's credit cannot be utilized, before November, 1934. The conclusion of the Court, therefore, in the finding first above quoted from its opinion, if applied to an existing emergency, must be based upon the Court's belief that the State possesses the capacity to raise by additional and extraordinary taxation, $35,000,000.00 in cash in the year 1933 and a like sum in the year 1934. Clearly such tax income must be in addition to existing taxes.

As we understand it the conclusion of the Court and finding as above expressed must be tantamount to a definite expression that the State may be some form of taxation, presently collectible, raise the necessary amounts. We suggest that this view of the requirements of the situation may have escaped the Cour's attention because, we submit, a review of the evidence in the record will not justify the conclusion that the State may, as a practical matter, now raise by taxation, collectible this year and next, the sum of $70,000,000.00 and take care of the other necessities of the State which must be assumed.

The Court will remember the Special Master recommended a mandatory decree requiring the immediate issue of bonds notwithstanding that such requirement would, in the first place, seek to control an exercise of the legislative discretion of the General Assembly of Illinois and, in the second place, would direct a procedure expressly prohibited by the Constitution of the State. His analysis of the financial capacity of the State was clearly the basis for this recommendation. His conclusion of fact, therefore, was merely that the credit of Illinois was good for the required bond issue. To reach this conclusion he was not required to find, and made no finding, that without the use of the State's credit taxes could immediately be collected in the needed amount.

We ask the Court to refer particularly to the report of Special Master McClennen, pages 112-121, inclusive. We suggest there is no conclusion stated in that report to the effect that it is practical for the State by special or general tax levies now to raise the required sum in 1933 and 1934. His final conclusion on the point is in the following language (Report, p. 121):

> "Whether the thirty-five million dollars annually for these Works shall be raised annually by taxation in place of borrowings, is for the General Assembly to determine. It is not to be anticipated that the General Assembly will wish to cover so large an amount in so short a time, when it can be spread over a longer period."

The Master himself sets out the deficiencies in the State tax collection for the years 1929 to 1932, inclusive (Report, p. 116), which shows a total deficiency in collection in the sum of $66,360,000. Whatever may be said as to the natural and acquired advantages of the State of Illinois in the shape of ownership of property, fertile fields, large cities, manufacturing capacity, mines, etc., the ability to pay taxes depends upon income. The value of property owned has no bearing whatever (unless a capital levy be involved) and the record of the past four years showing a failure of tax collection in this vast amount, is the most conclusive evidence this Court could desire.

We respectfully suggest, therefore, that there is no evidence in the record from which can be deduced any accurate estimate or even a guess, as to the capacity of the people of Illinois to pay an increase of taxes in the required amount.

Leaving aside the obligation of the State to take care of its citizens out of employment and deprived of any chance to earn a livelihood because of the depression—a matter we had hoped would receive strong consideration at the hands of this court—we urge that an appraisal of the evidence in the record will entirely fail to justify a conclusion of fact that it is now within the financial capacity of the State of Illinois by additional taxation to raise $35,000,000.00 in 1933 and a like sum in 1934 and subsequent years.

The 3 per cent sales tax, adopted by the General Assembly to meet unemployment relief, has been held unconstitutional since this case was submitted.

In the light of the Court's requirement for immediate raising of funds, a matter clearly indicated by the opinion, and the constitutional incapacity of the State to borrow money before November, 1934, we respectfully submit the sole remedy available to the State is additional taxation. We ask the Court to reconsider the evidence in the record on this point which we believe will not support a definite conclusion that taxes in this amount can be successfully collected within the required time.

We believe Illinois can not from its legally available resources meet the "requirement" now added to the decree. On this view of the facts, clearly supported by the record, we respectfully ask the Court to reconsider its order.

Respectfully submitted,

Otto Kerner,
Attorney General.

Truman W. Snell,
Assistant Attorney General.

Cornelius Lynde,
Special Assistant Attorney General.

Otto Kerner,
Truman W. Snell,
Cornelius Lynde,
Of Counsel.

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1932.

STATE OF WISCONSIN, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 5** **Original.**
STATE OF MICHIGAN, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 8** **Original.**
STATE OF NEW YORK, et al., *vs.* **STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, et al.**	**No. 9** **Original.**

CERTIFICATE OF COUNSEL.

I, Cornelius Lynde, Special Assistant Attorney General of the State of Illinois and of counsel in the above entitled cause, hereby certify that the Petition for Rehearing, to which this Certificate is attached, is presented in good faith and not for delay.

CORNELIUS LYNDE,
Special Assistant Attorney General.

Office Supreme Court, U. S.
FILED
JUL 3 1933
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants*, *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant*, *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 7, Original.
STATE OF NEW YORK, *Complainant*, *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 8, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1933, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO., 24 PRINTERS, CHICAGO.

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IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

October Term, 1932.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 8, Original.
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1933, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1933, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1933, the status of completed work in the sewage treatment construction program involved in this case was stated to be on December 1, 1932, as follows:

TABLE 1.

COMPLETED WORK AS OF DECEMBER 1, 1932.

Calumet Project	$ 20,862,134.96
North Side Project	37,101,223.42
West Side Project	41,653,836.95
Southwest Side Project	277,611.18
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53.415.74
Total	$100,544,411.11

In this same semi-annual report the future work after December 1, 1932 (Table 5, page 11, report January 1, 1933) was estimated to cost $154,350,500.00 without consideration of a possible saving of $9,775,000.00 if dewatering and incineration for the disposal of sludge proved feasible and was adopted. (Page 12, report January 1, 1933). If this saving had been deducted, the estimate of cost of future work after December 1, 1932 would have been $144,575,500.00. It has now been definitely decided, by action of the Board of Trustees of The Sanitary District of Chicago on June 15, 1933, to adopt this process for the disposal of sludge.

In the hearings of this case before Special Master Edward F. McClennen, under the order of reference of the Supreme Court of December 19, 1932, the Sanitary District submitted, as of February 1, 1933, an estimate of future work in the amount of $138,575,500.00. This estimate is just $6,000,000.00 lower than the $144,575,500.00 mentioned in the preceding paragraph and was derived by reducing the figure for "Miscellaneous Plants and Sewers" (a contingent item) from $8,000,000.00 to $2,000,000.00 These matters are discussed on page 62 of the report of Special Master McClennen to the Supreme Court on March 13, 1933.

During the interim of six months between the date of the last report and the present report, very little actual construction work has been accomplished. Work has been prosecuted diligently on the design of the Calumet, the West Side and the Southwest Side Projects. The design force was practically doubled in March and April, 1933, in order that plans and specifications could be ready for a considerable amount of construction work in the event that financing could be arranged for the construction season of 1933.

Calumet Project. Construction work on the Calumet Pumping Station and Blower House and on the Aeration Tanks, Operating Galleries and Final Settling Tanks has been discontinued since December, 1931, because of the inability of the Sanitary District to pay the Contractors, as indicated in the last report to the Court. The manufacturing of pumps, pump motors and large valves has been completed and this machinery is in storage. The fabrication of blowers and blower motors is about 40 per cent completed. None of this machinery work has been paid for. Plans are practically completed for the Harvey sewer, the California Avenue outlet sewer, the Evergreen Park sewer and for the sewer in South Park Avenue. These sewers are estimated to cost about

$3,400,000. Delay by the City of Chicago on certain sewer construction precedent to the construction of the South Park Avenue sewer will postpone the letting of this contract (estimated at $1,380,000) probably until 1935.

Plans are being prepared for preliminary settling tanks, sludge concentration tanks, screens, meter vault, sewage conduits, etc., for the Calumet Treatment Works. This work can be ready for advertising for bids before the end of the summer of 1933. Plans are also in preparation for the sludge dewatering and incinerating plant for the Calumet Works. It is contemplated that this contract will be let in the spring of 1934. Preliminary plans have been made for the conduit connecting the old Calumet Pumping Station with the new. Final plans for this structure will be made by 1934. These three contracts with the work now under contract will complete the Calumet Works, except for roads, grading, lighting, etc.

West Side Project. Construction work on the third battery of Imhoff tanks and on Contract Sections 3 and 4, of the West Side sewer, has also been discontinued since December, 1931, because of lack of funds. Plans have been completed for Contract Sections 5, 6 and 7 of the West Side sewer, and plans are being prepared for Sections 8, 9 and 10 of this sewer, so that contracts for these can be let before the end of 1933. Sections 5, 6 and 7 are estimated to cost about $3,500,000.00 and Sections 8, 9 and 10 about $2,600,000.00. This work will complete the West Side intercepting sewer, except for some minor branches.

The operation of the sludge filtering and drying unit at the West Side Works since August, 1932, has demonstrated the feasibility of dewatering and incineration for the disposal of sludge. Plans are ready and bids will be taken in the near future for an addition to this unit which will be used to further develop the process. This process, by eliminating any further construction of digestion tanks and sludge drying beds saves so much space that it has become possible to build the entire Southwest Side Sewage Treatment Works on a portion of the West Side site already owned by the Sanitary District. This arrangement will also result in considerable saving in construction costs and in time of construction.

Work has been started on the preparation of contract plans for aeration tanks, operating galleries, final settling tanks and the necessary conduits for the activated sludge portion of the West Side Treatment Works. The first contract, or contracts, will be for sufficient plant to handle 600 m.g.d. average flow of sewage. This is a plant about three times the capacity of the North Side Works. Work has also been started on plans for the blower house and sludge return pumping station for the combined West Side and Southwest Side activated sludge plant.

Southwest Side Project. As stated in the last semi-annual report, the studies indicated that the Southwest Side Works might be constructed on a portion of the land acquired for the extension of the West Side Works. This procedure was contingent on the practicability of dewatering and incineration for the disposal of sludge. Further development of this process gave further proof of its feasibility and it has now been definitely decided to place the Southwest Side Plant on a portion of the West Side site and to combine the activated sludge portions of the two plants. The Board of Trustees of the Sanitary District, on June 15, 1933, officially adopted this procedure. The Southwest Side treatment plant thus is reduced to a sewage pumping station, screening plant and preliminary settling tanks, from which the fresh sludge will be taken to the dewatering and incinerating plant and the effluent to the activated sludge plant, both of the combined West-Southwest Side activated sludge plant.

Work has been started on the plans of the new Southwest Side sewage pumping station. This will be constructed of sufficient capacity that, in connection with the West Side pumping station with which it will be connected by a suitable bypass, it can pump at least 150 per cent of the average dry weather flow of sewage.

A definite conclusion as to the quantity of wastes from the Stockyards and Packingtown to be handled at this plant has been made, using the results of the tests made on the Stockyards sewers mentioned in previous semi-annual reports to the Court. The suit entitled "The Sanitary District of Chicago vs. Swift & Company, et al," in the United States District Court, Northern District of Illinois, (No. 3840) is still pending but the trial of this case has no further bearing on the design or construction of the Southwest Side Treatment Works.

ACTIVATED SLUDGE PATENT SUIT:

The Sanitary District of Chicago has been defending a patent suit brought on September 19, 1924, by Edgar C. Guthard and Activated Sludge Limited, in the United States District Court, the Northern District of Illinois, Eastern Division (In Equity No. 4280). In 1928, Activated Sludge, Inc., of Delaware, became an additional plaintiff. The plaintiffs claim infringement of United States patents issue to Walter Jones, Nos. 1,247,540; 1,247,542; Reissue No. 15,140; 1,282,587; 1,286,017; and 1,341,561. The validity of these 6 patents is in question. The plaintiffs assert all the activated sludge plants of the District infringe. The suit came to trial on May 17, 1932, before Judge Walter C. Lindley. Both sides rested on June 8, 1933. Argument is set for October 24, 1933.

Recently a suit brought against Milwaukee under the first four of the patents mentioned was decided for the plaintiffs, Activated Sludge, Inc., by Judge Geiger (Activated Sludge, Inc. vs. The City of Milwaukee, in Equity No. 2323, Eastern District of Wisconsin). Appeal has been taken.

This suit against the Sanitary District is mentioned herein so that the Court may be advised of another element which tends to obstruct progress and may (if the patents are upheld) increase the cost of the works.

Financial. The financial condition of The Sanitary District of Chicago has been thoroughly discussed in the last three semi-annual reports to the Supreme Court and in the report of Special Master McClennen of March 13, 1933. No further comments as to the reasons for this financial crisis are deemed necessary at this time.

The order of the Supreme Court of May 22, 1933, enlarging the decree of April 21, 1933, and requiring the State of Illinois to take the necessary steps to secure the completion of adequate sewage treatment works and sewers has led the Sanitary District officials to believe that adequate finances would become available soon and tentative plans have been made for a resumption of actual construction work, interrupted since December, 1931.

The designing force has been practically doubled since March, 1933. Work on plans and specifications is being vigorously pushed. About $8,600,000 of work is under contract and can be resumed as soon as finances are available. Plans are ready on about $7,000,000 more of work and plans will be ready on about $2,500,000 additional of work before the end of the current year. Plans are under way on approximately $15,000,000 of work on the activated sludge plant for the West-Southwest Side Sewage Treatment Plant, and should be ready for contract work to start there in the spring of 1934.

The local tax situation is improving, due to the passage of certain acts by the Illinois Legislature (now in session) under which payments of taxes on income producing property can be forced. The amounts of taxes levied by the Sanitary District for the years 1928, 1929, 1930 and 1931, and the amounts received by the Sanitary District from the County

Collector up to June 16, 1933, pursuant to these levies, are as follows:

Year	Total Amount of Levy	Amount Collected	Amount Unpaid	Percentage Unpaid
1928	$20,700,455.00	$16,224,573.83	$ 4,475,881.17	21.6%
1929	24,518,343.75	17,780,190.62	6,738,153.13	27.5%
1930	21,725,603.75	13,366,071.38	8,359,532.37	38.5%
1931	18,875,953.75	7,581,446.70	11,294,507.05	60.0%
	$85,820,356.25	$54,952,282.53	$30,868,073.72	36%

The 1931 real estate taxes are payable in two instalments, the second of which will not become delinquent until July 1, 1933. The taxes collected since the time of the last report amount to $9,839,878.05 which is 11% of the taxes levied and due. This money was used to redeem tax anticipation warrants and to pay current expenses.

The non-payment of these taxes has forced the Sanitary District, through lack of revenue, to default in all payments of interest and maturing principal on bonds used for construction work, falling due from January 1, 1932 to June 1, 1933, inclusive. The amounts in default, as of June 19, 1933, are:

Principal	$10,084,500.00
Interest	5,333,328.75
Total	$15,417,828.75

A further default in payment of principal and interest on bonds due July 1, 1933, in the amount of $2,430,802.50 may be expected.

The General Assembly of the State of Illinois, at its 1933 session, passed a bill authorizing The Sanitary District of Chicago to issue bonds without a referendum in sufficient amount (limited to $100,000,000) to do the work made necessary by the decree of the Supreme Court of April 21, 1930. This bill also provides for the issuance of refunding bonds with which (or the proceeds of which) to take up bonds in default. The Sanitary District still has $7,614,000 of bonds unsold from the issue of $27,000,000 of bonds authorized by the Illinois General Assembly in 1929 in addition to the bulk of $36,000,000 of bonds approved by the voters in February, 1931. All these resources, aggregating about $143,000,000, should be sufficient to carry out the sewage treatment construction program when and if arrangements can be made to realize the money on them.

In view of the fact that the local tax situation is not likely to improve sufficiently for some time in the future to enable the payment of bonds in default and thus make the Sanitary District bonds marketable, the Sanitary District is now taking steps to obtain a loan from the Federal Emergency Administration of Public Works recently created by Congress.

The total work accomplished by the Sanitary District of Chicago in the construction of sewage treatment works during the period from December 1, 1932 (the date of the summaries for the last report), and June 1, 1933 (the date of the summaries for this report), as measured by construction expenditures, was as follows:

TABLE 2.

Calumet Project	$168,217.26
North Side Project	1,143,21
West Side Project	57,898.81
Southwest Side Project	14,897.28
Total	$242,156.56

By adding the various items indicated in Table 2 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on June 1, 1933, is as follows:

TABLE 3.

COMPLETED WORK AS OF JUNE 1, 1933.

Calumet Project	$ 21,030,352.22
North Side Project	37,102,366.63
West Side Project	41,711,735.76
Southwest Side Project	292,508.46
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$100,786,567.67

As previously stated (Page 2 of this report) an estimate of the future cost of sewage treatment construction was submitted to Special Master McClennen in February, 1933, in the amount of $138,575,500. In this estimate no account was taken of the savings possible by the combination of the activated sludge portions of the West and Southwest Side Treatment Plants, because at that time this combination had not been definitely determined upon. Within the past three months, a definite conclusion has been reached to combine these plants on the site already owned by the Sanitary District for the West Side Treatment Plant and its future extension. This combination results in the elimination of the purchase of land, of duplicate blower houses, sludge return pumping stations, air mains, dewatering and incinerating plants and a bridge across the Main Channel. The net result will be a saving in construction costs, now estimated at about $17,000,000. The estimates on the other treatment projects have been reviewed and revised slightly. The whole future sewage treatment program, as re-estimated, was submitted to the Board of Trustees of The Sanitary District of Chicago on June 15, 1933, and approved by the Board as the future sewage treatment construction program of the Sanitary District. The estimated cost of future sewage treatment construction, based on these estimates, as of June 1, 1933, is, as follows:

TABLE 4.

FUTURE WORK AFTER JUNE 1, 1933.

Calumet Project	$ 14,140,000.00
North Side Project	5,392,500.00
West Side Project	13,138,000.00
West-Southwest Plant	37,650,000.00
Southwest Side Project	44,847,000.00
Miscellaneous Plants and Sewers	2,000,000.00
Chicago River Controlling Works (if necessary)	3,200,000.00
Total	$120,367,500.00

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of July 1, 1933, is about 4,175,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed as equivalent to 1,717,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 5,892,000. This figure includes the Corn Products wastes, equivalent to the sewage of 378,000 persons, which wastes have been greatly reduced as a result of certain experimental work initiated by the Sanitary District.

The 1933 total population, and industrial waste equivalent, as above indicated, are estimated as 5,892,000. Up to date, the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence, so called complete treatment for the total July 1, 1933, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,008,000, which is 85 per cent of 5,892,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on December 25, 1932 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1932.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	207,000	33⅓	69,000
North Side	1,083,000	85	921,000
West Side (Sedimentation)..	743,000	33⅓	248,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	6,000	85	5,000
Corn Products (Reduction)..	373,000		322,000
Total.............	2,427,000		1,578,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1933.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	210,000	33⅓	70,000
North Side	1,100,000	85	935,000
West Side (Sedimentation)..	750,000	33⅓	250,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	6,000	85	5,000
Corn Products (Reduction)..	378,000		322,000
Total.............	2,459,000		1,595,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,595,000 out of 5,008,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 5,892,000 was being treated. This indicates the treatment of 31.4 per cent of the total sewage within the Sanitary District.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan during the calendar year 1932 averaged 6450 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1650 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8100 cubic feet per second.

The average monthly diversion of water from Lake Michigan from January 1 to June 20, 1933, is indicated in the table following:

Month 1933	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan C.F.S.
January	7120	0	1570	5550
February	6820	0	1610	5210
March	7660	0	1585	6075
April	8200	5	1575	6620
May	7745	530	1595	5620*
June 1 to 20	8350	0	1810	6540
Average	7650	90	1625	5935

*Flow reduced account of high water in Illinois River.

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All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By THOMAS J. BOWLER,
Its President.

PHILIP HARRINGTON,
Its Chief Engineer.

WILLIAM ROTHMANN,
Its Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

Office Supreme Court, U. S.
FILED
JUL 12 1933
CHARLES ELMORE CROPLEY
CLERK

In the Supreme Court of the United States

OCTOBER TERM, A. D. 1932.

STATE OF WISCONSIN, *et al.*, vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, *et al.*	No. 5, ORIGINAL.
STATE OF MICHIGAN, *et al.*, vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, *et al.*	No. 8, ORIGINAL.
STATE OF NEW YORK, *et al.*, vs. STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, *et al.*	No. 9, ORIGINAL.

BRIEF OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN IN OPPOSITION TO PETITION FOR REHEARING FILED BY THE STATE OF ILLINOIS.

(Names of Solicitors for the Complainants
on inside of front cover)

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BRIEF OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN IN OPPOSITION TO PETITION FOR REHEARING FILED BY THE STATE OF ILLINOIS.

The Petition for Rehearing filed by the State of Illinois is divided into two parts. The first and principal part asserts certain supposed grounds for a modification of the decree, for a limitation of the primary liability of the State of Illinois under the decree and for a denial *pro tanto* of the just rights of the Complainant States heretofore found and adjudged to them by this Court, and the second deals with supposed reasons for additional leniency in the performance of the duty of the State of Illinois under the decree of this Court.

I.

THE SUPPOSED GROUNDS ASSERTED BY THE STATE OF ILLINOIS FOR A MODIFICATION OF THE DECREE, FOR A LIMITATION OF THE PRIMARY LIABILITY OF THE STATE OF ILLINOIS UNDER THE DECREE AND FOR A DENIAL PRO TANTO OF THE JUST RIGHTS OF THE COMPLAINANT STATES HERETOFORE FOUND AND ADJUDGED TO THEM BY THIS COURT HAVE BEEN SEVERAL TIMES DECIDED BY THIS COURT ADVERSELY TO THE CONTENTIONS NOW ADVANCED. THEY ARE RES JUDICATA AND STATE NO GROUND FOR A REHEARING; BUT WERE SUCH QUESTIONS STILL OPEN, AS THEY ARE NOT, THEY ARE CLEARLY WITHOUT SUBSTANCE.

Part I of the Petition for Rehearing is a reiteration of the same supposed defenses and the same misconceptions and misapplications of various principles of law and the same misconceptions of fact which the State of Illinois has urged before this Court since 1926 in exoneration or limitation of its obligation to remedy the wrong inflicted upon these Complainant States and their peoples. This is clear from a casual examination of the pleadings, the briefs and the record in this litigation. The Petition for Rehearing not only admits but stresses that the State of Illinois has consistently urged these supposed grounds of exculpation or limitation of its liability throughout this litigation. These supposed grounds of exculpation and limitation have been considered and denied by this Court in four previous decisions. *Wisconsin, et al. v. Illinois, et al.,* 270 U. S. 634; Same 278 U. S. 367, 409, 419; Same 281 U. S. 179, 196, 197, 696; Same (not yet officially reported) decided May 22, 1933, 77 L. Ed. 882. All of the contentions now reasserted by the State of Illinois in its petition for rehearing are *res judicata.* The gratuitous assumption in the Petition for Rehearing that this Court in four careful hearings in this litigation did not give any consideration to these contentions, vigorously pressed in oral argument and voluminous briefs, is wholly unsupported. This Court in fact did carefully consider these bold assumptions of power on the part of the State of Illinois to inflict without restraint injuries upon the Complainant States and their peoples and determined that such supposed rights do not exist. Since the contentions reasserted in the Petition for a Rehearing are *res judicata,* it is manifest that they furnish no grounds for a rehearing; for, if the law were otherwise and a litigant could continually reassert contentions already decided adversely to him, as a proper basis for a rehearing, there could be no end to litigation. Under these circumstances, it is difficult to justify the filing of this Petition for Rehearing.

Moreover were the contentions raised by the State of Illinois in its Petition for Rehearing still open for consideration, as they are not, they are manifestly without substance either in fact or in law. The bills in these suits directly charge the State of Illinois with primary responsibility for the diversion and consequent injury to the Complainant States. In each instance the Sanitary District was charged to be acting as an arm or subordinate agency of the State of Illinois, not only pursuant to its authority but under its compulsion. *Wisconsin et al. v. Illinois et al. Amended Bill,* Paragraphs 11, 12 and 14; *Michigan v. Illinois, et al. Bill,* Paragraphs 12, 13 and 15. The State of Illinois in its Petition for Rehearing not only admits but insists that it urged throughout this long litigation the contentions now reiterated.

The principal contention advanced by the State of Illinois is that the decree of this Court does not give sufficient consideration to the so-called "doctrine of equitable apportionment" or to the supposed right of Illinois "to appropriate a reasonable portion of the waters of Lake Michigan." (Petition for Rehearing, pp. 2-3, 14.) The consideration granted to the State of Illinois by way of diversion after December 31, 1938, was based upon the doctrine of equitable apportionment. (Report of Special Master on Original Reference, p. 23; *Wisconsin et al. v. Illinois, et al.*, 281 U. S. 179, 200.) However, laying aside the circumstance that the question is *res judicata*, the contention of Illinois finds no support in fact or in law.

As defining the so-called "doctrine of equitable apportionment" the State of Illinois relies upon the following cases: *Kansas v. Colorado*, 185 U. S. 125; *New York v. New Jersey*, 256 U. S. 296; *Wyoming v. Colorado*, 259 U. S. 419; *Connecticut v. Massachusetts*, 282 U. S. 660 and *New Jersey v. New York*, 283 U. S. 336. In none of these cases did this Court hold that an upper riparian State may appropriate the whole of its contribution to an interstate waterway in disregard of the rights of lower riparian States. Naturally these decisions fall far short of sustaining a claim of right to appropriate several times the contribution of the upper riparian State to an interstate waterway.

In *Kansas v. Colorado*, 185 U. S. 125, this Court merely overruled a demurrer and did not "pause to consider the scope of the relief which might be granted." When that case came before this Court for final disposition, it was merely held that a limited use of the waters of the interstate stream by the upper riparian State in conformity with the law of waters governing the use of such stream in the lower riparian State could not be considered an unreasonable use by the upper riparian State—at least so long as such use by the upper riparian State did not materially affect the proper uses of the waters of the stream by the lower riparian States. The claim of Colorado, the upper riparian State, that it might appropriate all or as much of the waters of interstate stream as it could use without regard to effect on lower riparian State was specifically denied.

New York v. New Jersey, 256 U. S. 296, did not involve any question of appropriation of interstate waters but merely concerned the creation of a nuisance through pollution and manifestly has no application to the principle urged.

The doctrine of unrestricted appropriation by an upper riparian State, even though the doctrine of prior appropriation under the law of waters of the semi-arid West prevailed in both States was expressly repudiated in *Wyoming v. Colorado,* 259 U. S. 419, and the Court held that the upper riparian State could not justify such an usurpation of power on the ground that it could make a more profitable use of the waters than the lower riparian State.

Connecticut v. Massachusetts, 282 U. S. 660, involved merely the appropriation of a portion of the waters of an insignificant and non-navigable tributary of the Connecticut River. The appropriation by Massachusetts was largely limited to the impounding of flood run-off, and the project of the State of Massachusetts specifically provided for the release during low water periods of more than the average low water flow of the non-navigable tributary. This was the extent of the appropriation by Massachusetts, as an upper riparian State in the exercise of its right as a State standing on a plane of equality with the other States, which was sustained by this Court.

New Jersey v. New York, 283 U. S. 336, involved in substance the appropriation by the State of New York, as an upper riparian State, of only a portion of the impounded flood run-off of some of the head waters of the Delaware River. Like the Massachusetts project in the preceding case, the project of New York provided for a release during low water of an amount equal to or in excess of the low water flow of the head waters from which the appropriation was to be made. In fact the project of the State of New York involved merely the impounding of some of the flood waters which would otherwise run wasting to the sea. This was the extent of the appropriation by New York as an upper riparian State standing on a plane of equality with its sister States, which was sustained by this Court; and the decision was with leave to the State of New Jersey to renew its claim in this Court should such an appropriation prove in practice contrary to the findings made on the available evidence, to be injurious in fact to New Jersey as a lower riparian State.

It will be noted that *Connecticut v. Massachusetts, supra* and *New Jersey v. New York, supra,* concern States in which, as in the instant litigation, the common law of waters prevailed. Similarly *Kansas v. Colorado, supra,* and *Wyoming v. Colorado, supra,* concern States in the semi-arid West where the common law of waters has been replaced by the doctrine of prior appropriation.

The foregoing cases represent the extent to which this Court has sustained appropriations of waters constituting, or tributary to, an interstate waterway by an upper riparian State. They are the cases relied upon by the State of Illinois. When these decisions and their facts are applied to the case at bar, it is manifest not only that they do not sustain, but squarely refute the contention advanced by the State of Illinois.

The mean annual average contribution of the State of Illinois to the Great Lakes-St. Lawrence Waterway is 503 cubic feet per second. (Report of the Special Master on Original Reference, p. 23.) After the decree of this Court becomes fully effective on December 31, 1938, the State of Illinois will be permitted to divert 1500 cubic second feet plus the domestic pumpage. *Wisconsin, et al. v. Illinois,* *et al.,* 281 U. S. 696. The record in this case establishes that the mean average annual domestic pumpage equals or exceeds 1700 cubic feet per second. (Semi-annual Report of the Sanitary District filed January 1, 1931, p. 14.) Under normal conditions it is gradually increasing. The domestic water consumption in the Metropolitan area in Chicago involves a tremendous waste. The City of Chicago has refused and still refuses to meter its domestic water supply, which is largely the supply of the other suburban cities embraced in the Sanitary District of Chicago. While the use of water for domestic and industrial purposes is grossly excessive, it is not limited by the decree of this Court dated April 21, 1930. Although open to future consideration, it is not now or here involved. *Wisconsin, et al. v. Illinois, et al.,* 281 U. S. 179, 200. It thus appears that after the decree of this Court becomes fully effective on December 31, 1938, the State of Illinois will be permitted to take a total of more than 3200 second feet of water or over six times its total contribution to the Great Lakes-St. Lawrence Waterway. It is, therefore, respectfully submitted that the instant decree after it becomes fully effective will permit the State of Illinois to take from the Great Lakes-St. Lawrence Waterway a quantity of water greatly in excess of any appropriation which it could possibly claim in the exercise of any supposed right as a State standing on a plane of equality with the Complainant States. Indeed the decisions of this Court in *Connecticut v. Massachusetts, supra; New Jersey v. New York, supra;* and *Wyoming v. Colorado, supra,* would not sustain a fraction of the appropriation allowed the State of Illinois under the decree of April 21, 1930. And yet the State of Illinois seeks to claim even a more favored position at the expense of its sister States. The facts hereinbefore recited are not only adequate to establish that the diversion allowed to Illinois could not be sustained on the basis of any supposed equitable right of appropriation but that other considerations led the Court to make an allowance far in excess of any rights which Illinois as a State could sustain.

We turn briefly to a consideration of the uses which Illinois, as it asserts in its Petition for Rehearing, desires to make of the waters of the Great Lakes-St. Lawrence Waterway in derogation of the rights and to the great injury of the other States and the Dominion of Canada which contributed those waters. It is said that the State of Illinois desires to appropriate the waters of Lake Michigan for the domestic uses of its citizens bordering upon the Great Lakes. (Petition for Rehearing, p. 8.) The irrelevant and specious character of this suggestion is transparent when it is remembered that, notwithstanding the indefensible waste of such waters for domestic and industrial purposes by the State of Illinois, the decree of April 21, 1930, places no restriction whatsoever upon such use. Indeed one of the objections voiced by the Complainant States on the hearing leading to the decree of April 21, 1930 was that this circumstance placed a premium upon the further wasteful appropriation of waters for domestic and industrial purposes.

It is also stated that the State of Illinois desires to appropriate the waters of Lake Michigan for navigation on a waterway largely constructed by its funds and now taken over by the Federal Government. (Petition for Rehearing, p. 8.) First, it has already been established that the State of Illinois has no right to take any water in addition to that allowed by the decree of April 21, 1930, for the supposed Illinois Waterway or to save a trifling expense in its construction. Second, it has been authoritatively determined by the present Chief of Engineers that the flow provided by this Court's decree is far in excess of any navigation requirements of this waterway. (Report of Special Master

McClennen, pp. 32-35.) Third, since this waterway has been taken over by the Federal Government, any right to maintain a diversion for navigation upon that waterway beyond that provided by the instant decree, if it existed, which Complainants deny, would rest in the Federal Government and not in the State of Illinois. It is further said that the State of Illinois desires to appropriate waters to prevent nuisance from the deposit of sewage in such waters and to maintain purity of the waters of Lake Michigan. One of the purposes of the decree of this Court is to compel the defendants so to purify the sewage of the Sanitary District of Chicago by artificial processes that with the restoration of Complainants' rights it will not cause a nuisance to navigation or otherwise. The State of Illinois thus again advances the bold contention, which was the principal defense originally urged, that it may base a right to inflict a vast and continuing injury upon the Complainant States and their peoples upon a situation created and to be continued by its own wrong. In short, it seeks to support a claim for the continued infringement of Complainants' rights by asserting an intention, unless restrained, to continue the wrong of the State of Illinois. This contention has been expressly repudiated by this Court. *Wisconsin et al. v. Illinois, et al.*, 278 U. S. 367, 418.

It is further asserted that there should be an appraisal to determine the damage to the Complainant States which would be produced by the lowering of the levels in the Great Lakes amounting to three inches instead of six. (Petition for Rehearing, p. 8.) First, it is manifest that the only result would be that the vast, widespread and annually recurring damages to the Complainants, which were described in the report of the Special Master on the Original Reference and in the decision of this Court reported in 278 U. S. 367, would be reduced to something in excess of 50% of the damages so found. The suggestion that the

State of Illinois should be authorized to despoil the Complainant States on condition that it should consent to decreasing its despoliations by something less than 50% is shocking. Even if such a despoliation of the Complainant States and their peoples would save expense for the State of Illinois, it would be unthinkable that it could be sustained upon such a ground; and this Court has decided that the claim of a State that it is profiting or will profit by a wrongful invasion of the rights of sister States constitutes no defense. *Wyoming v. Colorado,* 259 U. S. 419. However, it is manifest that even under such circumstances all of the works for the purification of the sewage of the Metropolitan area of Chicago would have to be constructed and placed in operation.

The gratuitous and untrue suggestion is made that conditions under which navigation is conducted on the Great Lakes have changed materially since the original hearing. (Petition for Rehearing, p. 8.) Presumably reference is made to the circumstance that increased project depths have been adopted for *some* of the navigation channels on the Great Lakes. It is shown by the record on the original reference that project depths are related to a hypothetical datum plane and only by accident coincide with actual water levels and actual depths. For many years the principal navigation channels on the Great Lakes have for a large part of the time had much less than project depths due in a substantial part to the diversion at Chicago. However, the benefit of those depths, whether greater or less than the project depths, belong to the Complainant States and their peoples in common with the other people of United States. They are not created to relieve Illinois from righting a wrong to her sister States. Moreover, the record in the original Reference established that Federal improvements on the Great Lakes consist of making a channel from deep water to the principal inner harbors and that all of the inner harbors and navigation facilities have been and are provided either at the expense of the local municipality or at the expense of private industries and usually both. Their value and usefulness are strictly limited by both the Federal and local imports. It is suggested that at a time when both municipalities and industries are struggling to meet their obligations, there should be imposed upon them the additional cost of reconstructing the inner harbors and navigation facilities so as to offset in some degree the damages caused by the State of Illinois to the end that that State may serve some local selfish purpose of its own, which is apparently not fully disclosed, since it professes that sewage disposal works will be built in any event. It may be significant that the State of Illinois is now pressing before the Federal Power Commission for licenses for water power projects on the so-called Illinois Waterway and that the value of those water power developments, if made, will be in direct proportion to the quantity of water which the State can abstract from the Great Lakes-St. Lawrence Waterway. Of course, even such vast expenditures by the Complainant States and their peoples would not in any degree mitigate the large non-navigational damages found to have been caused by Illinois. Moreover, the evidence on the original Reference established that there are over four hundred ports and landings on the Great Lakes, many of which, though useful and of great value to the Complainant States, have no Federal improvements by way of channels from inner harbors to deep water or otherwise, and as to which the water level determines the feasibility from an economic standpoint of water borne traffic, both interstate and intrastate. In each of these ports any decrease in water level is a serious injury and may readily destroy its utility. It seems unbelievable that the State of Illinois could seriously suggest that all of these ports and landings should either be substantially prejudiced or rendered unusable to serve some undisclosed selfish purpose of the State of Illinois.

II.

THE REASONS URGED BY THE STATE OF ILLINOIS FURNISH NO BASIS FOR A REHEARING ON THE TERMS OF THE PARAGRAPH OF THE DECREE IMPOSING A SPECIFIC RESPONSIBILITY UPON THE STATE OF ILLINOIS TO CARRY OUT THE DECREE OF APRIL 21, 1930.

The State of Illinois in its Petition for Rehearing seeks an opportunity to relitigate the factual issues upon which it relied for additional leniency in the performance of its obligation under the decree. Initially it may be noted that the paragraph added to the decree by the recent decision in this Court merely stated categorically an obligation which always rested upon the State of Illinois under the decree of April 21, 1930.

The State of Illinois was afforded an opportunity to present the fullest evidence upon this subject not only during the protracted regular hearings on the recent Reference but at a special hearing held for its benefit after the State of Illinois had been afforded the privilege of examining a tentative draft of the report of the Special Master on the Reference of December 19, 1932. All of that evidence was carefully reviewed by the Special Master. Undoubtedly it was given careful consideration by this Court. It would be improper for the Complainants to reargue that evidence in detail. Under that evidence there is no question but that the financial resources of the State of Illinois are more than adequate to sustain the burden placed upon the State by the decree of this Court.

The contention that the provisions of the Illinois Constitution are such as to postpone performance of the decree of this Court in the exercise of its original jurisdiction at the pleasure of the State was fully covered in the briefs and arguments before this Court on the recent hearing and was found to be without substance. (See also Complainants' principal Brief on recent hearing, filed with this Court April 10, 1933, pp. 87-93.) It is manifest not only that Section 18 of Article IV of the Illinois Constitution has no application to a provision for satisfaction, through bond issues or otherwise, of a previously existing liability or obligation or a liability or obligation arising involuntarily on account of tortious conduct, but also that were it applicable, it would be clearly void when sought to be applied to defeat the performance of an obligation adjudicated by this Court in the exercise of its original jurisdiction over controversies between States. We respectfully submit that it lies with the State to choose whether it will raise these funds by bond issue or direct taxation. The resources of the State are adequate for either method. It is suggested that funds could not be raised by direct taxation. That is manifestly untrue. The State of Illinois during the current year is appropriating and spending approximately $30,000,000 for extensions of an already magnificent and comprehensive State highway system. (Report of Special Master McClennen, p. 119.) Over $8,000,000 is being distributed to Counties for highway construction. (Report of Special Master McClennen, pp. 119, 121.) It is surprising that the State would suggest that, although it can raise more than the required funds to build unessential new concrete highways, it cannot raise the funds to right a wrong to its sister States.

All the factual questions which the State of Illinois seeks to relitigate by way of petition for rehearing were fully covered in the briefs and arguments before this Court on the hearing had on April 17, 1933. It seems unnecessary and would undoubtedly extend this brief to review them.

We might note in passing that recent advertisements in Chicago newspapers list bonds of the State of Illinois for sale at a price to yield 3.80%. This is scarcely an evidence of impaired credit.

The Petition for Rehearing states:

> "The Master himself sets out the deficiencies in the State tax collection for the years 1929 to 1932, inclusive, (Report, page 116) which shows a total deficiency in collection in the sum of $66,360,000." (Petition for Rehearing, p. 12.)

This is a gross misstatement of the record. The figure quoted is the amount due to the State before or *in 1933* which includes not merely delinquencies but the tax levies which would come into collection *during 1933.* (Report of Special Master McClennen, p. 116.) The total State tax levies, as found by the Special Master, for Counties other than Cook, which had not been collected on December 31, 1932, were $1,999,000 out of the tax levy for 1931 and the tax levy for 1932, amounting to $15,914,000. (Report of Special Master McClennen, p. 116.) Only $1,999,000 out of the State tax levy for 1931 for Counties other than Cook was overdue. (Report of Special Master McClennen, p. 118.) This small sum does not in fact represent delinquencies in the sense in which that term is used in this litigation, for it represents merely the normal loss in tax collections which is expected at all times and allowed for in the tax levies. The State tax levy for 1932 in Counties other than Cook was just going into collection at the close of the recent hearings (R. 1895) and manifestly showed no "deficiency in collection" or delinquencies. Furthermore, the Special Master's statement of the State tax levies for Cook County which had not been collected on December 31, 1932, includes the State tax levy for 1931 in the sum of $15,056,000 and the State tax levy for 1932 in the sum of $19,305,000. Due to the inexcusable maladministration and delay in extending taxes for collection in Cook County, the State tax levy for Cook County for 1931 did not go into collection until 1933, and manifestly was neither overdue nor delinquent on December 31, 1932. (Semi-annual Report of the Sanitary District of Chicago filed January 1, 1933, p. 7; R. 1940.) For similar reasons the 1932 tax levy for Cook County had not been extended for collection at the time of the hearings held by the Special Master and would not go into collection until some time during 1933. (R. 1940.) Manifestly none of the State tax levies for Counties other than Cook for 1932 and in the case of Cook County for 1931 and 1932 had gone into collection and much less become delinquent by December 31, 1932, which is the date of the Table cited as authority for the statement quoted from the Petition for Rehearing.

The record on the recent Reference established that there was no delinquent taxes in the State of Illinois outside of Cook County. (Christy, R. 1768.) That is, there was a normal collection of taxes in the whole of the State of Illinois outside of Cook County. (Christy, R. 233.) In our briefs before this Court on the last hearing, we pointed out that the delinquencies in tax collections in Cook County were conclusively shown by the evidence not to be due to the depression, but to inexcusable maladministration in the extension and collection of tax levies. (See Complainants' Brief, April 10, 1933, pp. 60-61.) This circumstance was adverted to by the Special Master, who found, "The Cook County delinquencies and sluggish extensions," "to be the only thing abnormal in Illinois State finances." (Report of Special Master McClennen, p. 118.) The State in its Petition for Rehearing fails to bring to the attention of the Court the fact that, with more vigorous action by tax collecting officials, tax collections in Cook County have greatly improved since the testimony was taken on the recent hearing, or that such improvement has been great enough to enable the Sanitary District to redeem some of its defaults. The State also neglects to point out that further examination has resulted in a reduction of the estimate of the total cost of completing the whole sewage disposal program of the Sanitary District to $120,000,000. (Engineering News-Record, June 22, 1933, p. 819.)

Reference is again made to poor relief. This matter was carefully examined by the Special Master on the recent Reference. Laying aside the fact that the Federal Government has now largely assumed the obligation for relief, the State neglects to point out that the Counties have extensive resources from one cent of the gas tax and that many of the Counties do not even utilize that money for poor relief but devote it to the diminution of other taxes. Of course, the current improvement in employment is well known. The State does not point out that it is spending large sums for unnecessary improvements which could, were they needed, be devoted to poor relief or other purposes. The State points out that the three cent sales tax adopted by the General Assembly has been held unconstitutional since this case was submitted. That tax was held unconstitutional only because it embodies unconstitutional discriminations under the State and Federal Constitutions by way of exemptions. *Winter v. Barrett, et al.,* decided by the Illinois Supreme Court on May 10, 1933 (Not officially reported—See U. S. Law Weekly Journal, May 23, 1933). The General Assembly of Illinois is in session, and there is nothing to prevent the Assembly from enacting a constitutional sales tax law or any other financial measure it chooses. The State neglected to point out that a new sales tax bill eliminating the unconstitutional features of the old law was then before the Illinois General Assembly. This sales tax bill has now become law. However, it could hardly be suggested seriously that the unwillingness of the General Assembly of Illinois to comply with the restrictions of the State Constitution in enacting fiscal legislation can be made the basis of defeating or postponing the restoration of the Complainants' rights.

It is astounding to find one of the richest States in the Union seeking to be relieved of a just obligation at the expense of its sister States. This shocking position is carried to a point where Illinois with a magnificent highway system interlacing the whole of its territory and vastly superior to the highway systems of the Complainant States seeks to be permitted further to extend and enlarge that system and carry it to every rural hamlet while it fails to meet its obligation to remedy a wrong inflicting a vast and continuing injury upon those States and their peoples. In the last analysis, Illinois in effect asks to have these highways constructed at the expense of the Complainant States for it seeks to appropriate property of those States and their citizens for local sewage disposal while it uses the funds which might otherwise be devoted to that purpose for the construction of internal improvements. An analysis will show that the State tax rate of Illinois is much less than the State tax rate of many of these Complainant States. It will show that the combined bonded indebtedness per capita of the State of Illinois and its municipal subdivisions is much less than the combined bonded indebtedness per capita of the Complainant States and their municipal subdivisions. Yet it is urged that the burden of great and continuing damages should be left upon the Complainant States and their peoples while the State of Illinois devotes its financial resources to local improvements for local benefit. The grounds urged in the Petition for Rehearing are not only without merit in law but they rest upon an unconscionable attempt to perpetuate a great injustice, which has already remained far too long without remedy, upon the Complainant States and their peoples.

We respectfully submit that the Petition for Rehearing should be denied.

Respectfully submitted,

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Patrick H. O'Brien,
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Harry H. Peterson,
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Herbert H. Naujoks,
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Special Assistant to the Attorneys General,
Solicitors for the Complainants.

FILED
SEP 30 1933

BEFORE THE

Supreme Court of the United States

October Term, A. D. 1933.

STATE OF WISCONSIN, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**No. 5 Original**
STATE OF MICHIGAN, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**No.[redacted]ginal 7**
STATE OF NEW YORK, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**[redacted] Original 8**

STATEMENT OF THE STATE OF ILLINOIS.

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Truman A. Snell,
Assistant Attorney General,
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THE GUNTHORP-WARREN PRINTING COMPANY, 210 WEST JACKSON, CHICAGO

BEFORE THE

Supreme Court of the United States

October Term, A. D. 1933.

STATE OF WISCONSIN, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**No. 5 Original**
STATE OF MICHIGAN, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**No. 8 Original**
STATE OF NEW YORK, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**No. 9 Original**

STATEMENT OF THE STATE OF ILLINOIS.

Pursuant to the opinion of this Court herein delivered May 22, 1933, the following provision was added to the decree herein of April 21, 1930:

> "That the State of Illinois is hereby required to take all necessary steps, including whatever authorizations or requirements, or provisions for the raising, appropriation and application of moneys may be needed in order to cause and secure the completion of adequate sewage treatment or sewage disposal plants and sewers, together with controlling works to prevent reversals of the Chicago River if such works are necessary, and all other

> incidental facilities, for the disposition of the sewage of the area embraced within the Sanitary District of Chicago so as to preclude any ground of objection on the part of the State or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence system or watershed to the extent, and at the times and in the manner, provided in this decree. And the State of Illinois is hereby required to file in the office of the Clerk of this Court, on or before October 2, 1933, a report to this Court of its action in compliance with this provision."

The State of Illinois desires to make it clear that in filing this report in compliance with the foregoing provisions added to the decree, the State does not waive any of the contentions heretofore addressed to the Court by its petition for rehearing and set forth more at length in the brief filed herewith in reply to the brief of complainant States opposing this petition for rehearing. For the reasons set forth in the petition and brief, the State of Illinois respectfully submits that this procedure is premature.

The State of Illinois, therefore, respectfully requests that this report be read in conjunction with its petition for rehearing and brief in support thereof.

Upon receipt of a copy of the Court's opinion and order the Attorney General of Illinois, with his assistants, gave most careful consideration to the provisions thereof in the light of the record. The report of Special Master McClennen had recommended to the Court that it direct by mandatory decree the State of Illinois to extend its credit at once by issuance and sale of bonds to raise funds with which to secure the completion of the sewage treatment program of the Sanitary District. The report recommended that the State of Illinois be directed to disregard positive limitations of the Constitution of Illinois which forbade the immediate use of State credit by the issuance of such bonds for this or any purpose, without the necessary approval of the voters at a general election. Consideration of the Court's opinion and order indicate conclusively that the Court did not adopt this recommendation. The proper officers of the State of Illinois, including the Governor, therefore, had been advised by the Attorney General that any procedure to be adopted by the State of Illinois pursuant to the requirements of the above order of the Court must be in accordance with the Constitutional limitations and requirements of the Constitution of the State of Illinois.

Since bonds or other use of the credit of the State of Illinois can only be authorized in accordance with the Constitution of the State by a majority of the voters of the State at a general election, and since, also, under the requirements of the Constitution, the next general election available for a vote on this question occurs in November, 1934, it was immediately apparent that the credit of the State could not be used in any degree whatever as a means of raising funds with which to resume at once the completion of the sewage disposal program.

Under the Constitution of the State, the authority to authorize or require the collection of taxation is vested in the General Assembly, and consistent with what we are advised has been the established conclusion of this Court, the matter of taxation is, under the Constitution of Illinois, solely and exclusively a matter of legislative discretion.

Following several conferences with the Attorney General, on June 13, the Honorable Henry Horner, Governor of the State of Illinois, addressed the following message to the members of the General Assembly:

STATE OF ILLINOIS
EXECUTIVE DEPARTMENT
SPRINGFIELD

June 9, 1933.

To the Honorable the Members of the Fifty-eighth General Assembly:

On May 22, 1933, the Supreme Court of the United States rendered its decision in the case of Wisconsin and other states against The Sanitary District of Chicago and the State of Illinois and entered an order enlarging the decree of April 21, 1930 by adding to it the following:

> "That the State of Illinois is hereby required to take all necessary steps, including whatever authorizations or requirements, or provisions for the raising, appropriation and application of moneys, may be needed in order to cause and secure the completion of adequate sewage treatment or sewage disposal plants and sewers, together with controlling works to prevent reversals of the Chicago River if such works are necessary, and all other incidental facilities, for the disposition of the sewage of the area embraced within the Sanitary District of Chicago so as to preclude any ground of objection on the part of the State or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence system or watershed to the extent, and at the times and in the manner, provided in this decree.
>
> And the State of Illinois is hereby required to file in the office of the Clerk of this Court, on or before October 2, 1933, a report to this Court of its action in compliance with this provision.
>
> AND IT IS FURTHER ORDERED THAT, except as above provided, the application of the complainant States herein be, and the same is hereby, denied. Costs, including the expenses incurred by the Special Master and his compensation, to be fixed by the Court, shall be taxable against the defendants."

While it would unduly extend the length of this message to render here a complete statement of the origin and many phases of this litigation, the following facts at least should be before you:

This litigation, in so far as it affected the State, was first called to my attention shortly after my inauguration, although the litigation has been pending many years—having been commenced in 1922. In 1922 the six states — Wisconsin, Ohio, Michigan, Minnesota, New York and Pennsylvania filed original proceedings before the Supreme Court of the United States to prevent The Sanitary District of Chicago from continuing to divert water from Lake Michigan through its canal into the Illinois River and thence to the Mississippi (the Illinois Waterway Route) on the claim that this diversion lowered the levels of te Great Lakes and thus produced damage to navigation and other rights of those states. The decree, entered in that case in April 1930, required successive reductions in the diversion as follows: from and after July 1, 1930 to 6500 cubic feet per second; by January 1, 1936 to 5,000 cubic feet per second, and by January 1, 1939 reduced to 1500 cubic feet per second. Prior to the time of the decree of 1930, it was found by the District to be necessary to withdraw 8,500 cubic feet per second which has been reduced, as I am informed, to 6500 cubic feet per second, to comply with the requirements of the decree up to July 1, 1930.

The amounts of these reductions and the dates for their going into effect were based by the court on its conclusion that they could be safely imposed if The Sanitary District proceeded vigorously to carry out its previously adopted program for the constructions of plants designed for the artificial treatment of the sewage of Chicago. This artificial treatment is required to comply with the decree as to the diversion and to prevent pollution of the waters of Lake Michigan, the source of supply for the city of Chicago and adjoining communities.

In 1931 the General Assembly authorized the issuance, without referendum, of bonds by The Sanitary District of Chicago to the extent of thirty-six million dollars to enable it to complete its plants for the purpose of decreasing the diversion of water from Lake Michigan, as required by the decree of the Supreme Court of the United States. The economic depression, however, has prevented the sale of those bonds. Due to the delay in the collection of taxes in Cook County, the Sanitary District has not received sufficient taxes to prevent its other bonds from going into default. As a result of its inability to dispose of the bonds authorized by the General Assembly, it has been unable to continue its construction program.

On October 3, 1932 four of the original complaining states called the situation to the attention of the United States Supreme Court in an application which requested, among other things, the appointment of a receiver or other officer of the court to enforce the decree. In effect the complaining states asked the United States Supreme Court to take over the conduct of the affairs of The Sanitary District. On this application, the court appointed one Edward F. McClennen of Boston as Special Master of the court, and directed him to inquire into certain questions, particularly the financial measures needed to permit going forward with the construction program and the hearing on these questions before the Special Master began on January 12, 1933. The present Attorney General of Illinois then appeared and participated vigorously in the proceeding. Up to this date The Sanitary District nad been the active defendant although the state had been made a party to the proceeding.

Although this State had been made a party to the proceedings, I am informed that it was believed by the previous Attorneys General that the state was merely a nominal party and that the real controversy was between the complainant states and The Sanitary District of Chicago.

When the attention of the present Attorney General was called to the matter in January this year, it was made manifest by the complainants that they intended to make this State answerable for any default of The Sanitary District of Chicago. The Attorney General promptly and vigorously and, as I view it, very properly took the position that it was eminently unfair and contrary to law to fasten upon the State responsibility for any liability or default of The Sanitary District of Chicago, one of the municipalities in the state.

It was the position and opinion of the Attorney General, as well as myself as Governor, that the State could not be held liable in law or in fairness, for the default of The Sanitary District of Chicago any more than it would be liable for the default of any other municipality in the state.

The contention of the complainants was to the contrary and they maintained and urged throughout this latter phase of the litigation that not only was the State of Illinois liable but that the Supreme Court should enter an order requiring the issuance, without referendum, of one hundred and thirty-nine million dollars in bonds of the State to pay for the cost of constructing the treatment works and appurtenances insisted upon by the complainants as necessary to comply with the decree of April 1930.

It was contended by the Attorney General and by the Governor that even if the unusual claim of liability of the State of Illinois was sustained, no bonds could be issued by the State without a referendum.

The Attorney General vigorously contended and in my opinion rightly, that it was unfair to impose the financial burdens of The Sanitary District of Chicago, comprising and embracing but one-half of the population of the State upon all of the people of the State.

It was further shown by the Attorney General, through testimony he introduced, I being one of the witnesses, that the financial resources of the State were unable to meet this tremendous expenditure sought to be imposed upon the State and that already the tax-ridden citizens of the State had a taxation load under which they were then staggering.

Notwithstanding the evidence introduced and the strenuous and devoted efforts of the Attorney General, the decision of the Supreme Court of May 22nd and the decree issue in pursuance thereof, as I have quoted it, were rendered and entered.

The court's decision very definitely requires the immediate commencement of work by The Sanitary District of Chicago in order that the full construction may be completed by the end of 1938.

The State of Illinois should do what it can to comply with the court's requirements that it act to assist The Sanitary District to comply with the decree of the United States Supreme Court and the matter, therefore, is submitted to the General Assembly for its consideration and such action as may meet all the necessities of the problem.

It is only proper that this burden should be carried entirely by The Sanitary District of Chicago. The trustees have indicated their willingness to do so if put in a position where they can secure funds for this purpose.

As already stated, The Sanitary District of Chicago has been authorized by previous action of the General Assembly to issue bonds in an amount not heretofore utilized, up to $36,000,000, without the customary requirement that such bonds be approved at an election of the voters of the District. In view of the fact that the Supreme Court of the United States has declared the necessity for this expenditure in an amount exceeding the existing authorization, I recommend that further authorization by appropriate act of the General Assembly be given The Sanitary District of Chicago to issue its bonds without referendum in the amount required to carry out and complete its program for the construction of sewage treatment works and appurtenances thereto. Although these bonds may not be immediately saleable yet if they are not saleable on the open market, it is believed and hoped that they may be available as collateral for loans to The Sanitary District of Chicago from Federal agencies now in existence or expected to be authorized as a result of legislation now adopted and also under consideration in the Congress.

The decree requires a report from this State by October 2, 1933, showing its action in complying with the order of the Supreme Court of May 22, 1933. In view of the nature of the order entered by the court, I earnestly hope this matter will receive the immediate and serious consideration of the members of the General Assembly.

In the meantime, you may rest assured that the rights of the people of the State of Illinois will be vigorously pressed and asserted before the Supreme Court of the United States. I am advised by the Attorney General that a petition will be promptly filed for a rehearing in the Supreme Court of the United States on its decision and decree of May 22, 1933, asking reformation of the said decree. In the meantime, however, it is necessary to take immediate steps to enable The Sanitary District of Chicago to discharge on its own account the obligations placed upon it by the decree of the United States Supreme Court.

HENRY HORNER
Governor of the State of Illinois.

Prior to and at the time of the handing down of the Court's opinion hereinabove referred to the General Assembly of Illinois was in regular session. Shortly prior to the handing down of this opinion, the Supreme Court of Illinois had held unconstitutional an act of the Legislature previously adopted, at a special session for the purpose, designed to impose a sales tax with which to raise revenue to be used for the purpose of unemployment relief. The immediate problem, therefore, before the Legislature at the time of the Court's opinion was the pressing necessity for raising revenue for unemployment relief. These necessities are matters of record in this proceeding. As appeared in the evidence before Special Master McClennen, there were in Illinois, at the time this opinion was rendered and while this problemt was pressing for consideration before the Legislature, 146,000 families dependent entirely upon public funds for subsistence, food, clothing, housing and medical relief. The Governor of Illinois had testified, as the record shows, before the Special Master that approximately 800,000 persons were represented by these figures. It was also a matter of official belief, as evidenced by experience, at the time that notwithstanding a temporary improvement in employment and business conditions which began to appear in the spring of this year, the burden of relief necessities had continued to increase rather than to lessen. The reason for this was understood to be the result of the process of exhaustion of funds and private sources for help, with the effect that there were constant additions to those requiring assistance who had been previously able to postpone seeking public relief.

Consistent with the suggestion contained in the message of the Governor above referred to, the General Assembly duly adopted an act entitled "An Act Amending Section 5 f and 9 of an act entitled 'An Act to Create Sanitary Districts and to Remove Obstructions in the Des Plaines and Illinois Rivers,' approved May 29, 1889, in force July 1, 1889, as amended." As a result of this the Sanitary District was authorized to issue bonds in an amount not to exceed $100,000,000 for the purposes of carrying out the requirements of the decree of the Supreme Court of the United States without submitting the question of such issuance of bonds to the legal voters of the District, and also was given power providing for the refunding of defaulted bonds. This act, as required by the Constitution of the State, vested this additional power in the Sanitary District, subject to the limitation that it should not become indebted in any manner or for any purpose to an amount in the aggregate exceeding 5 per cent of the valuation of the taxable property ascertained by the last assessment for State and county taxes previous to the incurring of such indebtedness. This limitation is required by the State Constitution.

It will be remembered that the District had previous authority to issue bonds without referendum which it had not theretofore been able to sell because of tax collection difficulties, in an amount exceeding $20,000,000, and, in effect, the Legislature removed the last limitation on the power of the District to issue bonds to an amount beyond the estimated cost of $120,000,000, which it lay within the power of te Legislature to remove.

The Legislature adopted, in lieu of the sales tax for unemployment relief purposes previously held unconstitutional, a retailers occupation tax. This went into force July 1st at the conclusion of the legislative session. Machinery for collection had to be set up and funds only began to be made available in August. The estimate of the Director of Finance, based upon collections up to date, is that there will be collected by this tax up until February 1, 1934, a total of $18,000,000 thus to be made available for relief purposes. The Legislature also provided that of the three cent motor fuel tax, after first deducting from the total collection service charges on road bonds, one-third of the net amount remaining should be allocated to the cities of Illinois, one-third to the counties, and only the balance left should be retained by the State for the original purpose of the tax—improvement, maintenance and policing of highways. The allocations to cities and counties were required to be used solely for relief purposes.

It is the fact that the estimated requirements for relief necessities, based upon experience, indicated the requirement for a sum very greatly in excess of the total estimate of receipts from these two sources.

Under date of September 22, 1933, the Director of Finance advises that of the Cook County 1931 levy for State purposes amounting to $14,651,000 there was an unpaid balance on September 1st in the sum of $9,411,000, and of the 1932 tax levy in the balance of the State for State purposes amounting to $15,684,000 there was an unpaid balance of $8,414,000 on September 1st. The Court will remember, as shown by the report of Special Master McClennen, that due to litigation and reassessment, collections in Cook County were one year behind collections in the balance of the State. From these figures, it is apparent that the total tax levy for State purposes collectible in 1933 called for the sum of $30,335,-

000. The 1931 rate for State purposes was 39¢ per $100 of assessed valuation, and the 1932 rate was 50¢ per $100.

The report of the Special Master recommended to the Court that the State should be required to issue bonds in the year 1933 in the sum of $34,000,000. As stated above, no constitutional authority to issue such bonds exists. The only way in which this sum could be made available was by additional taxes. It, therefore, appears that if the recommendation of the Special Master be regarded as defining the requirements of the Court under the order above set forth, the Legislature contemplated the necessity of imposing additional taxes aside from the special additional tax for unemployment relief, calling for total collections of $4,000,000 in excess of the total tax levy for all other State purposes, and this at a time when, as shown by the above figures, due to the effects of the economic depression, more than fifty per cent of the theretofore increased State tax had not been collectible.

Counsel for the State of Illinois are unable to state what was in the minds of the members of the General Assembly in the consideration they gave to the expressions of this Court and the requirements of its order called to their attention, as aforesaid, by the message of the Governor. The fact is that the Legislature, in the exercise of its exclusive legislative discretion, adopted no tax measure applicable throughout the State designed to raise revenue to be made available for the resumption of the Sanitary District construction program. In connection with this decision of the General Assembly of Illinois not to more than double the State tax rate for Sanitary District construction purposes, the Court should remember that the recommendations of the Special Master were that the State issue bonds for this purpose, and not that the State attempt to collect the required sum by taxation. The conclusions of the Special Master, therefore, as to the financial capacity of the State of Illinois dealt only with his conclusion that the State's credit was sufficiently good to make a bond issue of this amount practicable. Such facts as are contained in his report as to tax delinquencies do not justify any conclusion that the required amount could immediately be raised by taxation. The actual increase in tax for a bond issue of $35,000,000 would not exceed $3,500,000 for interest and maturities, and would be less, therefore, than ten per cent of the amount apparently required to be immediately raised by taxation,—$34,000,000.

As indicated by the figures given above, however, tax delinquencies at the present time on the levies now in process of collection exceed fifty per cent of the tax. Since the requirements of the Court, as expressed in its opinion and order, could only be met by taxation, it is at once apparent that the increase in the tax rate demanded to meet these requirements would not be limited to the amount which arithmetically would raise the necessary sum, but would, as a practical proposition, need to be still greater.

It should be remembered that the members of the General Assembly are citizens of the State of Illinois, representative of the people of the State within their respective districts, and it may safely be assumed widely and personally familiar with the economic situation within those districts, and particularly with the capacity of their people to assume a large additional tax burden. We respectfully suggest, therefore, that the action of the General Assembly in failing to adopt any measure to procure by tax increases the sums necessary to meet the Court's requirements should be accepted at the hands of this Court as a fair and unprejudiced conclusion of fact, within the exercise of their legislative discretion, and in no sense whatever as the expression of an unwillingness to meet the obligation decreed by this Court. That decision of fact, we believe, was that the amount involved could not be collected. Whatever the nature of the obligation may be, capacity to perform is an essential which must exist before the obligation can be met. Existing circumstances, of which this Court is fully informed, amply justify, we respectfully suggest, the conclusion of fact which we believe should be accepted by the Court as the basis of the legislative inaction here presented.

It should be remembered in this connection that the State Relief Commission to deal with unemployment relief was formed in February, 1932. Since that date there has been made available the proceeds of a State bond issue in the total sum of $20,000,000 which is a bond issue required to be repaid by taxation; a loan to Cook County in the sum of $12,252,000 secured by a Cook County bond issue in the same amount, also to be repaid by taxation; a diversion of the Motor Fuel Tax funds in the amount of $3,172,278; the proceeds of a county bond issue based upon an allocation of the Motor Fuel tax of $1,790,000; an estimated amount derived from general property tax receipts outside of Cook County in the sum of $5,000,000; and as previously stated actual receipts together with anticipated receipts based on present performance from the Retailers Occupation tax, which will total by the first of next February, $18,000,000. The Legislature directly or indirectly, therefore, had caused to be raised for unemployment relief during this two year period of the worst economic depression this country has ever known, all by extra and extraordinary taxation, a total amount exceeding $60,000,000.

In the light of these circumstances which were before the Legislature at the time of its consideration of the Governor's message above set forth, we submit that a reasonable inference as to the cause of its inaction must have been the conclusion that the addition of further taxation sufficient to raise, within the year, $34,000,000 was impracticable and impossible of execution.

As to the steps that have been taken looking to a resumption of work on the Sanitary District program, the following have occurred:

In September, 1932 the Sanitary District filed an application with the Reconstruction Finance Corporation for a loan of $36,450,000. This included complete engineering data. The Reconstruction Finance Corporation, on examination of the application, held that the loan was not self-liquidating within the requirements of the applicable Statute of the United States, in that it could only be repaid from tax receipts and not from other sources of income.

Upon the adoption of the National Industrial Recovery Act by the last session of Congress, in accordance therewith, in due course, the President of the United States caused to be set up a Public Works Administration under the direct supervision of a board with the Secretary of the Interior as active head. As soon as this organization was announced, counsel for the State of Illinois presented the construction program of the Sanitary District as one which, within the requirements of the Act, would produce a large amount of re-employment and result in socially desirable construction. With all proper diligence and the active cooperation of its trustees and proper officials, the Sanitary District of Chicago in July, 1933 submitted to the individual members of the special board for Public Works at Washington, and, in proper form, to the Illinois State Advisory Board, an application for an allocation of $120,367,500. Under the regulations subsequently announced by the Public Works Administration, because of the prior application to the Reconstruction Finance Corporation, the project was automatically transferred for consideration to the Washington Office, and in full compliance with the requirements of the regulations, the Sanitary District in August, 1933, filed another application, first with the Illinois State Advisory Board for the same amount, and on August 31st, a third application conforming to Circular No. 2 of the Public Works Administration, with the office of the Federal Emergency Administrator of Public Works at Washington. On September 23, 1933 a sub-application for an immediate allocation of $7,874,477 for the purpose of completing work on uncompleted contracts which had been interrupted due to the failure of funds was filed with the Illinois State Advisory Board, pending further consideration of the original application. On these uncompleted contracts engineering and other preliminary details, of course, had been completed and only money was needed to permit an immediate re-employment of some 4,500 men. This proposal has met with the approval and co-operation of the Secretary of the Interior.

As a result of the interposition of the State of Illinois, through its proper officials, the Secretary of the Interior directed the General Solicitor of the Public Works Administration, Lloyd H. Landau, to come to Chicago to determine what steps could be taken, with a view to putting back to work as large a number of men, as soon as possible, in the carrying out and construction of socially desirable projects for which the Federal Government would receive valid and eventually commercially good collateral. These last state the general requirements of the policy of the Public Works Administration within their interpretation of the requirements of the Act.

The Administration had appointed a very able engineer for the projects within Illinois, Joshua D'Esposito, who immediately began examination of the uncompleted contracts of the Sanitary District. It was promptly determined that arbitration of contractors' claims, because of interruptions of work and possible increases of costs due to advances in the cost of materials, would be necessary. The general attorney of the Sanitary District has stated that he will advise the trustees that they are authorized to and should agree to arbitration of these claims. Counsel for the State of Illinois is informed that the Federal Engineer, Mr. D'Esposito, has approved the work under these contracts as socially desirable within the requirements of the Act, and we are further informed that contracts looking to the advancement of Federal funds against Sanitary District bonds on terms yet to be finally determined are in process of preparation by the Public Works Administration in Washington. It may, therefore, be reasonably anticipated that work will be resumed on these uncompleted contracts within a few weeks.

As to the balance of the program, counsel for the State of Illinois is informed that the Federal Engineer has stated an engineer's examination in detail must be made of the entire Sanitary District project, in the first place to determine that it is properly prepared, in view of the most recent developments in the art of artificial treatment of sewage; second, that from the entire program may be selected projects socially desirable which may be in a short period begun; third, that necessary arrangements for adequate and complete Federal supervision not only of construction but of expenditures can be arranged. The General Solicitor of the Administration conferred with counsel for the State of Illinois, the Attorney General and the Governor, and a preliminary outline of requirements was prepared. There are many and complicated details, since the Federal Government probably will require transfer of possession, and possibly title to the land on which construction is to be undertaken, and will also require broad powers of supervision, not only of the construction but as to all the related financial undertakings, which they may decide will have a bearing upon the value as collateral of Sanitary District bonds, either to be sold or held by the Government as security for construction costs. It is agreed that enabling legislation to meet these requirements must be adopted, and the Governor has authorized the Attorney General to state that at a special session very shortly to be called, this subject will be included. Bills will be prepared as soon as the details of the requirements of the Public Works Administration can be learned.

The Sanitary District's unused bonding power within the Constitutional limitation of 5 per cent of the last assessed valuation of property within the District is, at the present time, approximately $42,000,000. It is hoped that by the elimination of certain contract liabilities, which are figured against the borrowing power in arriving at the figure stated, this capacity may be increased to approximately $61,000,000. The Federal Government has adopted the policy within the provisions of the National Industrial Recovery Act of making a grant on municipal projects of the character here involved of 30 per cent of the total cost of labor and materials, which is much the largest item of cost in this program. It is, therefore, expected that there may be available in excess of $75,000,000 for construction, if the engineer's report indicates that this amount may be expended within the emergency requirements of the Act. The general program under discussion and likely to be followed is that the total construction cost will be amortized over a considerable period of years, at least twenty, and the grant will be applied against the cash requirements of the first years. This will not only afford a great immediate tax relief to the over-burdened taxpayers of the Sanitary District, but will greatly advance the improvement in the market value of Sanitary District bonds, since it will help Sanitary District tax collection. If the Recovery Program of the Administration is successful, combined with other helpful economic forces, the present improved trend of tax collections will bring back to par, before the end of the time Federal construction is finished, the bonds of the District and by that time, the District will be amply able to finance whatever remaining portion of the program remains uncompleted.

In view of the fact that Public Works funds are required to be expended at the earliest possible moment in order to accomplish the greatest amount of immediate re-employment, it may confidently be expected that the construction program for the next two years will exceed in volume and amount the program as previously adopted by the Sanitary District and approved by this Court, since that program necessarily had to be limited in annual expenditure by the borrowing power of the Sanitary District; limitations, it will be remembered, which this Court had accepted by its approval of the program. The practical situation is, therefore, that subject to the delay occasioned by the engineering review of the project, the adoption of enabling legislation, which probably can be accomplished before the engineer's report is finished, and the preparation of contracts, rapid progress in accordance with the Court's original requirements may be confidently expected.

Respectfully submitted.

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Office Supreme Court,
FILED
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CHARLES ELMORE C

BEFORE THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1933.

STATE OF WISCONSIN, et al.,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.

No. 5 Original

STATE OF MICHIGAN, et al.,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.

[redacted] Original 7

STATE OF NEW YORK, et al.,
vs.
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.

[redacted] Original 8

BRIEF OF ILLINOIS SUBMITTED IN REPLY TO BRIEF OF WISCONSIN, MINNESOTA, OHIO and MICHIGAN PRESENTED IN OPPOSITION TO PETITION FOR REHEARING FILED BY ILLINOIS.

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BEFORE THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1933.

STATE OF WISCONSIN, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**No. 5 Original**
STATE OF MICHIGAN, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**No. 8 Original**
STATE OF NEW YORK, et al., *vs.* **STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO, et al.**	**No. 9 Original**

BRIEF OF ILLINOIS SUBMITTED IN REPLY TO BRIEF OF WISCONSIN, MINNESOTA, OHIO AND MICHIGAN PRESENTED IN OPPOSITION TO PETITION FOR REHEARING FILED BY ILLINOIS.

The State of Illinois filed a petition for rehearing in this case, now pending before the Court for consideration, in which the purpose and intent of the petition is stated as follows:

> "Before the Court impose, by the addition of a paragraph to the decree, a requirement upon the

> State of Illinois separate and distinct from the provisions of the decree applicable to the Sanitary District of Chicago, the State of Illinois asks the Court to give consideration to rights of the State which have always been asserted throughout this proceeding and defenses based thereon but which because of the course of the litigation, have not, as we understand the record, been given consideration."

Further on in the petition, the rule of law setting forth the defense upon which we relied is summarized in a statement in which the State of Illinois pointed to what we have termed the rule of equitable apportionment, as established by this Court in *Kansas* v. *Colorado,* 206 U. S. 46, and applied in other controversies between States involving diversions of water from interstate channels. Illinois asserted that standing on a plane of equality with the complainant States, it possessed a right to appropriate a reasonable portion of the waters of Lake Michigan.

By the addition of a paragraph to the decree, the Court has now sought to impose upon the State of Illinois a direct financial obligation. Up to that point the Court had determined that the diversion must be entirely eliminated except for 1500 c. f. s. required to maintain navigable conditions in the Harbor of Chicago, and that the Sanitary District must assume the burden of constructing plants for the artificial treatment of sewage, in accordance with the schedule of reductions of diversion set out in the original decree.

It is quite clear, from the facts set out in previous Master's reports and the Court's opinion, that the nature of construction required and the amount of purification of water that must be handled by the plants, as well as the time requirements for the completion of those plants, depend very largely upon the ultimate amount of diversion to be permited. If, as an example, it were determined by the application of the rule of *Kansas* v. *Colorado,* 206 U. S. 46, or as the result of the War Department appraisal of the navigation necessities of the United States, that either the State of Illinois had an equitable right to divert 5000 c. f. s. or that amount were demanded for navigation purposes on the Lakes to the Gulf waterway, the nature of the financial burden to be imposed upon the State of Illinois, if the Court seek to enforce the paragraph added to the decree, becomes entirely different. This is particularly true as to the extent of any present emergency. The burden imposed upon the Sanitary District under the requirements of the original decree required an adjustment of conditions to meet an ultimate diversion of 1500 c. f. s. If this amount be increased, the burden and emergency become less.

It is thus apparent that the contention of the State is a material one. The importance of this contention is also recognized in the unusual procedure adopted by the complainant States of filing a brief in opposition to our petition for rehearing.

Since this brief very definitely misstates the position of the State of Illinois and also completely misconceives the previous course of this litigation, we feel it necessary, on behalf of the State, to reply to this brief, and to present fully and in more detail the serious and important contention, which was, as above set out, the basis of our petition for rehearing.

At pages 4 and 5 of complainants' brief, statements are made suggesting that complainants' counsel understand the State of Illinois presents a claim to "appropriate the whole State's contribution to an interstate waterway in disregard of the rights of lower riparian States." And further that Illinois seeks to apply "the doctrine of unrestricted appropriation by an upper riparian State."

We desire to emphasize the complete difference between these descriptions and the real nature of the right we claim. Our position is that the State of Illinois stands before this Court in this controversy upon a plane of equality with the complainant States, and, therefore, possesses a clear and unchallenged right to a reasonable appropriation of the water of the interstate channel formed by the Great Lakes. We assert that, beginning with *Kansas* v. *Colorado*, 206 U. S. 46, and followed in later cases, particularly the very recent cases of *Connecticut* v. *Massachusetts*, 282 U. S. 660, and *New Jersey* v. *New York*, 283 U. S. 336 and 284 U. S. 585, this court has held that in determining what is reasonable as between the conflicting claims of upper and lower riparian States bordering upon an interstate channel, the question becomes one of fact for the determination of this Court upon a consideration of all of the relative necessities and benefits as well as injuries and damages of the contending parties.

It is important for the Court to note the complete and wide difference between the real position of the State of Illinois as stated above and the statement of that position in complainants' brief. Complainants' arguments in their brief are addressed to their definition of Illinois' assertion of a legal right. Necessarily, these arguments have little, if any, application to the real principle upon which we rely. This principle is too well established in the previous decisions of this Court to which we refer to need argument here, and we assume the Court will not desire us to waste time in replying to complainants' arguments which are in fact addressed to a contention and position we do not assert.

This claim of right and this established doctrine is here presented by a Sovereign State, and we, therefore, ask its appropriate consideration.

Complainants' brief also states that there is a "gratuitous assumption in the petition for rehearing that this Court in four careful hearings in this litigation did not give any consideration to these contentions, vigorously pressed in oral argument and voluminous briefs * * *."

This statement (complainants' brief, pages 2 and 3) is followed by the following assertion:

> "This Court in fact did carefully consider these bold assumptions of power on the part of the State of Illinois to inflict without restraint injuries upon the complainant States, and their peoples, and determined that such supposed rights do not exist."

The position of complainants, therefore, is that this right of the State of Illinois, which we now assert, has been heretofore decided in this litigation, and that the question is *res adjudicata.* We believe a fair consideration of the record, and of the way in which the issues arose and were adjudicated, demonstrates that this claim is not well founded.

We believe it can not be successfully denied that nothing in any opinion in this litigation deals with those contentions. There is no statement in the opinions heretofore filed which discusses the relative equities of the State of Illinois and those of the complaining states concerning the abstraction of water from the Great Lakes. There is ample and complete discussion of the right of the Sanitary District to divert water for sewage purification and of the propriety or impropriety of its action in the premises. We deal here, however, as pointed out above, of necessity with the separate and much broader rights of the State of Illinois.

This is not an attempt to make a technical distinction between the State and the District, nor is it an attempt to reargue the contentions addressed to the Court in brief and argument, as to the distinction between the liability of the State and the liability of the District. We point out that the Court heretofore has imposed a burden only upon the Sanitary District. All of the affirmative requirements of its decree heretofore entered deal with acts to be performed by the District as distinguished from the State.

When the case was referred to the Special Master on the first reference, the State of Illinois and the Sanitary District both asserted that the existing permit of the Secretary of War of March 3, 1925, afforded complete legality for the diversion performed under that permit, which, the Court will remember, *was a permit running to the Sanitary District* and not to the State of Illinois. The State of Illinois asserted, however, that, disregarding the effect of the permit, the doctrine of *Kansas* v. *Colorado,* 206 U. S. 46, would apply and that the State was entitled to a reasonable use of the water of Lake Michigan. The Special Master sustained the first ground of defense. He held the permit was valid and legalized the diversion made by the Sanitary District under the permit which ran only to it, and, based upon this conclusion, he recommended that the complainants' bill be dismissed for want of equity.

When this report came before the Court, the Court differed with the conclusions of the Special Master. It held the permit was valid, as an exercise of properly delegated authority to deal with an emergency. The emergency, however, was held by the Court to be the product of the wrongful acts by the Sanitary District and the Court said:

> "This situation gave rise to an exigency which the Secretary, in the interest of navigation and its protection, met by issuing a temporary permit intended to sanction for the time being, sufficient diversion

> to avoid interference with navigation in the Port of Chicago. See *New York* v. *New Jersey,* 256 U. S. 293, 307, 308. The elimination and prevention of this interference was the sole justification for expanding the prior permit, the limitation of which had been disregarded by the Drainage District. Merely to aid the District in disposing of its sewage was not a justification, considering the limited scope of the Secretary's authority. * * * It may be that some flow from the Lake is necessary to keep up navigation in the Chicago River which really is part of the Port of Chicago, but that amount is negligible as compared with 8500 c. f. s. now being diverted. Hence, and beyond that negligible quantity the validity of the Secretary's permit derived its support entirely from a situation produced by the Sanitary District in violation of the complainants' rights * * *."

In substance, we submit, the Court held the permit valid as to the entire diversion as dealing with a wrongfully created emergency, and permanently valid in so far as the permit allowed an amount needed for navigation in the Port. The Court sustained the power of the Secretary to allow this latter amount and in fixing this amount on the testimony of the Chief of Engineers the Court could not have considered this measure of Federal power to be determined in any degree by the legal rights or equities of the State of Illinois.

The Court thereupon sent the case back to the Special Master for a rereference to determine the nature of decree. The purpose of this rereference is clearly stated in the following language at the conclusion of the Court's opinion:

> "It, therefore, is the duty of this Court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal bases and thus to restore the navigable capacity of Lake Michigan to its proper level. The Sanitary District authorities, relying on the argument with reference

> to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore, they cannot now complain if an immediate heavy burden is placed upon the District because of their attitude and course. The situation requires the District to devise proper methods for providing sufficient money to construct and put in operation with all reasonable expedition adequate plants for the disposal of sewage through other means than the Lake diversion."

The Court thereupon ordered the reference to accomplish these purposes.

We respectfully submit that no consideration of these expressions from the Court's opinion, or of the entire opinion, can justify any claim that the Court, in arriving at this basis of decision, gave any consideration to the equitable and legal right of the State of Illinois to a reasonable diversion from Lake Michigan. The Court in effect condemned the Sanitary District for using the latent oxygen in vast quantities of water to eliminate sewage impurities. The needs and necessities of Illinois under existing circumstances involve consideration of many other equities and purposes.

The record shows that this defense of the State was presented to the Special Master, was not overruled by him, but held, on the contrary, unnecessary to be considered by him because of his conclusion as to the validity of the permit. The defense was presented to the Court upon consideration of the Special Master's report. It appeared in that report and from brief and argument that the Sanitary District had, before the litigation began, adopted a program for the construction of artificial treatment plants which was actually written into the Secretary of War's permit, and furthermore that this program was authorized and in a legal sense directed by Statute of the State of Illinois. The Court's requirement, therefore, in its essence, merely was to call for a speedier accomplishment of what the Sanitary District had previously decided upon and already commenced to bring about. The State of Illinois, notwithstanding the fact that it pressed upon the Court for consideration the propriety of applying the doctrine of *Kansas* v. *Colorado,* 206 U. S. 46, had by Statute adopted and approved this program of the Sanitary District. The remedy proposed by the Court applied, as a practical proposition, solely and exclusively to the Sanitary District. We submit the fair and reasonable interpretation of the Court's opinion and the way in which the case was disposed of leads to only one inference as to this defense of the State of Illinois, and that is that under the then circumstances, the Court did not deem it necessary to give consideration to this defense and probably, in effect, held that on this record the State was in no position to urge it, since by Statute it had authorized the accumplishment of the program of the Sanitary District, which the Court proposed upon the reference to require to be more speedily performed.

The only question refered to the Special Master on rereference involving the amount of diversion was to determine the amount required to maintain navigable conditions in the Harbor of Chicago. This requirement was not in answer to any assertion of any right by the State of Illinois. It was not a recognition of the exercise by the State of Illinois of any right or constitutional power, since the control of interstate navigation in and through the Port of Chicago had long before been exclusively taken over by Congress within its Constitutional authority and was, as the record fully showed, completely regulated by the Secretary of War, as the agent of Congress. We point to this fact simply to demonstrate that on the rereference the Special Master in complying with the Court's direction, gave no consideration whatever to the relative rights as between Illinois and the complaining States and made no attempt to determine what would be a reasonable use of that water by the State of Illinois. The determination of the amount needed to maintain interstate navigation in the Harbor of Chicago was therefore not in recognition of any right sought for or asserted by the State of Illinois.

The question now before the Court is whether at this stage of the litigation, the State can again bring forward and present for consideration its right under the doctrine of *Kansas* v. *Colorado,* 206 U. S. 46.

What we have said above shows not only that the Court did not pass upon this issue in its decision herein, but also shows very clearly, we submit, that the nature of that decision did not involve any right of the State of Illinois, beyond the right of the State, as Constitutional parent, to assert and protect the powers and authority of its municipal corporation, the Sanitary District. Our contention here is that if it be clear that the case now involves what may be termed the personal right of the State of Illinois, as distinguished from the rights of the Sanitary District, on established precedent the rule of *Kansas* v. *Colorado,* 206 U. S. 46, must first be applied before any remedy be allowed by the Court involving those personal or distinctive rights.

That we are justified in the assertions here made that the Court maintained a complete distinction between the Sanitary District and the State of Illinois in the way in which it disposed of this litigation, is most clearly demonstrated by a consideration of the proposed form of decree recommended by the Special Master on rereference. This is set forth in detail at pages 146 to 149 of his report. The Court will find that the first six paragraphs of this proposed mandatory form of decree set forth in detail a program of construction of various works for the artificial treatment of sewage to be constructed by the Sanitary District. Each of these paragraphs of the suggested mandatory decree begins in the following language:

> "That the defendant, Sanitary District of Chicago complete and place in full operation * * *"

The Court will also find that paragraphs 7, 9 and 10 set forth injunctive provisions regulating the diversion, and paragraph 7 reads as follows:

> "That on and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes, St. Lawrence system or watershed through the Chicago drainage canal and its auxiliary channels or otherwise in excess of an annual average of 6500 c.f.s. in addition to domestic pumpage."

Paragraph 9 contains similar language as to the State of Illinois, the Sanitary District, their employees, etc., reducing diversion to 5000 c. f. s. upon certain contingencies, and the ultimate diversion is similarly provided for in the same language in paragraph 10. This form of decree draws, we submit, a clear and definite distinction between the two defendants; one of them, the Sanitary District, is commanded and required to carry out the construction program; both of them, the Sanitary District and the State of Illinois, are enjoined from diverting water in excess of certain stated amounts at stated times on stated contingencies. *This proposed form of decree cannot be construed, therefore, as a suggestion that any financial burden or requirement be imposed upon the State of Illinois.*

This report was considered by the Court in its opinion delivered by Mr. Justice Holmes, 281 U. S. 179. The Court adopted the injunctive provisions of the decree recommended by the Special Master from which we have quoted above, but did not adopt the mandatory requirements running solely against the Sanitary District. The Court adopted the finding of fact by the Master that the District intended to carry out the program involved, and that its accomplishment was within the District's financial capacity and means. The Court required by its injunctive provisions the reduction of diversion at certain times at which the Special Master had found certain steps in the completion of the program of construction would be accomplished, and, at which times as the result of such accomplishment, he found it would be safe, from the standpoint of health, to cut down the diversion. The Court, therefore, instead of using the force of a mandatory decree, merely left it to the self-interest of the Sanitary District, as trustee for its people, to do those things that had to be done in order to protect their lives and health, by accomplishing the completion of the construction program within the time requirements as to these successive reductions in diversion.

This difference in the form of decree, is not, we submit, any change in the attitude of the Court in recognizing in this particular, as it had throughout the course of the litigation up to this point, the practical distinction between the positions of the two defendants, the Sanitary District and the State of Illinois. The injunction, with propriety, ran against the State, as well as the District, in order that there would be no basis for not carrying out its terms through failure to include every person associated in any way with the active defendant, the Sanitary District. Whether the mandatory requirement of the Court be regarded as enforced by the effect of its order, or be enforced by the effect of the controlling self-interest required to be exercised in order to meet the results of the injunction the Court did enter, that effect, so far as it involved the acceptance and performance of the burden of construction, ran solely against the Sanitary District, and not against the State of Illinois.

We, therefore, respectfully submit that by its final decree, this Court made no attempt to impose any burden upon the State of Illinois, but merely enjoined it from acting in concert with the principal defendant, the Sanitary District, in violation of the Court's requirements.

The complainant States must themselves assume the responsibility for any delay that may result from the change in the litigation caused by their application of last December. They asked the Court to change and enlarge the decree. In this application they seek to shift the entire nature of the case—to impose upon the State of Illinois, as distinguished from the Sanitary District the financial burden of complying with the Court's requirements. This distinction is not a technical one. This financial burden must be met by taxation, and even though bonds of the State were to be issued for the purpose of raising necessary funds, State bonds are merely twenty-year extensions of taxation under our system of government. An entirely different and much broader group of taxpayers is, therefore, directly to be affected by the remedy the complainants themselves sought at the hands of this Court than were affected by the relief the Court allowed the complainants in the original proceeding.

We respectfully insist, therefore, that the distinction we point out is not only not technical, but involves matters of fundamental right, which the people of the State of Illinois can and must assert in their own defense as distinguished, and completely distinguished, from any position taken by the Trustees of the Sanitary District on behalf of the taxpayers of the District.

We insist, and we believe the Court has failed to note the distinction here involved, that by reason of this change of approach, this entirely different remedy, new rights are necessarily presented for consideration, since new defendants, when the real parties in interest are considered, are brought before the Court.

We submit that without regard to the right of the State of Illinois as a Sovereign to expect to receive at the hands of this Court consideration of any assertion carefully and earnestly presented, when the State presents, as it now does, contentions involving *the rights of individuals who were in no way affected by the prior proceeding, or the relief allowed,* as a matter of fundamental equity, the necessity for a consideration, without regard to what has heretofore occurred, of these present contentions, should be admitted.

The position of the State of Illinois on behalf of some three millions of its population—the half of its people outside the Sanitary District—not heretofore directly affected by the decree of this Court, is that the State stands upon a plane of equality before this Court as to its right to a reasonable and equitable share of the water of the interstate channel of which Lake Michigan forms a part; that without regard to any determination which has been made in a controversy which has only heretofore involved the people of the Sanitary District, the State asserts that the exact nature of judicial process always heretofore applied by this Court in controversies of this nature, must, as a matter of justice and Constitutional right, be applied now, to the controversy between the people of the State of Illinois and the complaining States. The application of this principle, established for the first time in *Kansas* v. *Colorado*, 206 U. S. 46, and followed in subsequent cases, requires a careful examination before a Master of all of the relevant facts; the benefit to the State of Illinois under existing abnormal conditions to result from a reasonable diversion; the damage to the complainant States to result from such diversion.

The Court will find on such a reference that the question of damage is entirely different. The original case proceeded on the theory that the Sanitary District was diverting approximately 10,000 c. f. s. Due to the progress of the sewage disposal program and other factors which would appear on such a reference, even under present conditions the necessities of Illinois would be met by the allowance of a diversion of 5,000 c. f. s.—one-half of the amount upon which the Court heretofore has estimated damages. On such a reference the Special Master would be informed that the limiting depths of the navigation channels of the Great Lakes have been materially deepened since the original hearing. The navigation necessities are, therefore, fundamentally different than they were at the time the Court considered the damage resulting from a diversion of 10,000 c. f. s. As has been heretofore pointed out in this proceeding, the navigation interests of the United States in this diversion are greater now and entirely different from what they were at the time of the original decision. The United States has taken over and is now operating a completed waterway connecting the Sanitary District canal with the Illinois and Mississippi Rivers. Commerce is proceeding on this channel. Its necessities are rapidly becoming apparent, so that they may be much more definitely appraised than at any time heretofore. The Court's limitation in the prior proceeding in its consideration of National requirements to a determination of the navigation needs of the Harbor of Chicago is now clearly too narrow.

What we have said above is not for the purpose of rearguing questions previously considered but only to show that a re-examination of the basic question in the light of changed circumstances might and, we believe, inevitably would result in an allowance to the State of Illinois as a matter of its legal right and equity of an amount of diversion different and greater than the 1500 c. f. s. heretofore fixed as the ultimate maximum diversion. It also follows necessarily that a different allowance might and, we believe, certainly would entirely alter, in the first place, the necessity for an immediate resumption of construction work, and, in the second place, might well involve changes in the entire construction program.

We believe there is one fact in this record whose effect on the contention now addressed to the Court is inescapable. The allowance of 1500 c. f. s. for the sole and only purpose of maintaining navigable conditions in the Harbor of Chicago was not arrived at by applying the nature of judicial reasoning and procedure which, under the established precedents referred to above, have always heretofore been applied. In each of these cases the Court will note that the defendant State which has permanently abstracted water has been allowed a diversion. This has not been allowed as a matter of grace or as the result of an equitable settlement of a controversy. The fact of diversion has been held to be within the State's right. Only the amount of the diversion has been required to be adjusted by equitable consideration not only of the State's necessities but also of the effect upon neighboring States. In the instant case, the reason for the allowance of 1500 c. f. s. cannot be construed to be a recognition of any right of the State of Illinois, but solely to meet a requirement of the National Government in the exercise by it of the power of Congress to regulate interstate navigation. Examination of the record will demonstrate that the process by which this allowance was reached did not involve any attempt to balance the conflicting necessities and rights of the complainant and defendant States. We respectfully submit that under these circumstances, it is clear the rule applied to other States has not been applied to the State of Illinois. Although the State could, with propriety, as we have pointed out above, acquiesce in the way this case was handled as long as the burden of the remedy allowed rested where the State desired it to rest, upon the Sanitary District, now that burden by direct financial effect upon millions of individuals not heretofore involved, is sought to be spread in a manner in no wise contemplated by the original decree. We respectfully submit the State of Illinois has a right to present its original contention for reconsideration and to urge that the judicial process applied to all other States be now applied to it, in order that the extent of the burden to be imposed upon the State of Illinois shall be determined in this established manner rather than as a result of giving consideration solely to Federal necessities.

The State of Illinois, therefore, respectfully submits this brief in support of its petition for rehearing heretofore filed.

Respectfully submitted,

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Cornelius Lynde,
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Otto Kerner,
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Office Supreme Court, U. S
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CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8,
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9,
Original.

[illegible]I-ANNUAL REPORT OF THE SANITARY DIS[illegible]CT OF CHICAGO OF JANUARY 1, 1934, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO., [illegible]24 PRINTERS, CHICAGO.

IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

October Term, 1933.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 8, Original.
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1934, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of January 1, 1934, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of July 1, 1933, the status of completed work in the sewage treatment construction program involved in this case was stated to be on June 1, 1933, as follows:

TABLE 1.

COMPLETED WORK AS OF JUNE 1, 1933.

Calumet Project	$ 21,030,352.22
North Side Project	37,102,366.63
West Side Project	41,711,735.76
Southwest Side Project	292,508.46
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$100,786,567.67

TABLE 2.

FUTURE WORK AFTER JUNE 1, 1933.

Calumet Project	$ 14,140,000.00
North Side Project	5,392,500.00
West Side Project	13,138,000.00
West-Southwest Plant	37,650,000.00
Southwest Side Project	44,847,000.00
Miscellaneous Plants and Sewers	2,000,000.00
Chicago River Controlling Works (if necessary)	3,200,000.00
Total	$120,367,500.00

During the interim of six months between the date of the last report and the present report, very little actual construction work has been accomplished. Work has been prosecuted diligently on the design of the Calumet, the West Side and the Southwest Side Projects and on the West-Southwest Sewage Treatment Plant.

Calumet Project. Construction work on the Calumet Pumping Station and Blower House and on the Aeration Tanks, Operating Galleries and Final Settling Tanks has been discontinued since December, 1931, because of the inability of the Sanitary District to pay the Contractors, as indicated in previous reports to the Court. The manufacturing of pumps, pump motors and large valves has been completed and this machinery is in storage. The fabrication of blowers and blower motors is about 40 per cent completed. None of this machinery work has been paid for. Plans are practically completed for the Harvey sewer, the California Avenue outlet sewer, the Evergreen Park sewer and for the sewer in South Park Avenue and plans are being prepared for the Blue Island Sewer Extension. These sewers are estimated to cost about $3,850,000.

Plans have been completed for preliminary settling tanks, sludge concentration tanks, screens, meter vault, sewage conduits, etc., for the Calumet Treatment Works. This work is ready for advertising for bids. Plans are also in preparation for the sludge dewatering and incinerating plant for the Calumet Works. It is contemplated that this contract will be let in the late summer of 1934. Preliminary plans have been made for the conduit connecting the old Calumet Pumping Station with the new. Final plans for this structure will be made by 1934. These three contracts with the work now under contract will complete the Calumet Works, except for roads, grading, lighting, etc.

Agreements were made on December 16, 1933 for the purchase of bonds of the Sanitary District of Chicago by the Federal Emergency Administration of Public Works to finance the completion of the contracts for the Pumping Station and Blower House, the Aeration and Final Settling Tanks, etc., and to finance the completion of the Calumet Sewage Treatment Works, the construction of the Harvey Sewer, South Park Avenue Sewer, Blue Island Sewer Extension and California Avenue Outlet Sewer. It is expected that construction work can be resumed immediately and all of these items completed before the end of 1935. This work will complete the Calumet Project, except for five sewers, namely, California Avenue Extension, Evergreen Park, Calumet City, Colfax Avenue and Blue Island Intercepting Sewer, estimated to cost $4,590,000.

West Side Project. Construction work on the third battery of Imhoff tanks and on Contract Sections 3 and 4, of the West Side Sewer, has also been discontinued since December, 1931, because of lack of funds. Plans have been completed for Contract Sections 5, 6, 7, 8 and 10 of the West Side Sewer, and plans are being prepared for Sections 9 and 1A of this Sewer, so that contracts for these can be let early in 1934. Sections 5, 6, 7, 8 and 10 are estimated to cost about $5,240,000 and Sections 9 and 1A about $1,270,000.

Agreements were made on December 16, 1933 for the purchase of bonds of the Sanitary District of Chicago by the Federal Emergency Administration of Public Works to finance the completion of the third battery of Imhoff Tanks and Sections 3 and 4 of the West Side Sewer and the construction of Contract Sections 5, 6, 7, 8, 9, 10 and 1A of the West Side Sewer. It is expected that construction work can be resumed immediately and all of these items completed before the end of 1935. This work will complete the West Side Project except for the Cicero Avenue Outfall Sewer, Section 4A of the West Side Sewer and additional sewers for 100 per cent collection, estimated to cost $1,870,000.

The operation of the sludge filtering and drying unit at the West Side Works since August, 1932, has demonstrated the feasibility of dewatering and incineration for the disposal of sludge. A contract was let on September 14, 1933, in the amount of approximately $150,000, for an addition to this unit, which will be used to further develop the process. This contract is being financed through the sale of tax anticipation warrants. The construction of this additional unit is about 80 per cent completed. It should be in operation by February 1, 1934.

The activated sludge portion of the West Side Works for the complete treatment of sewage has been combined with the Southwest Side Sewage Treatment Plant, as stated in the last report to the Court. This will be discussed under the heading of "West-Southwest Treatment Plant".

Southwest Side Project. Work has been continued on the plans for the new Southwest Side sewage pumping station. Specifications are practically completed for the sewage pumping units. Bids can be taken for these units as soon as finances are provided. Since the Southwest Side sewage treatment works are to be built in combination with the works for the final treatment of the West Side sewage it would be extremely difficult from an accounting standpoint to segregate the costs applicable to the preliminary treatment of the Southwest Side sewage. The Southwest Side treatment works therefore will hereafter be considered as a part of the West-Southwest Sewage Treatment Plant. The Southwest Side project will cover the intercepting sewers, etc., for the collection of sewage which will flow to the new Southwest Side sewage pumping station of this new plant. This will include the Southwest Side Intercepting Sewers, the South Side Sewers and Racine Avenue Pumping Station, the Upper Des Plaines Sewer and the West Towns Sewer. Later the Salt Creek Sewer, now draining into the West Side Treatment Works will be diverted to the Southwest Side pumping station and then be transferred to the Southwest Side Project.

The study of the Southwest Side intercepting sewer has been considered at length, particularly with reference to the crossing of this sewer under the Main Drainage Canal at the site of the treatment plant, and the possible use of the lower end of this sewer as the by-pass connection between the present West Side and the new Southwest Side sewage pumping stations.

West-Southwest Treatment Plant. Plans are being prepared for the blower house, the aeration tanks, operating galleries, final settling tanks, conduits, etc., for the new West-Southwest activated sludge plant. Specifications are practically ready for the blower units. Plans for the sewage pumping station and equipment have been discussed under the Southwest Side Project. Plans for the first two batteries of aeration and final settling tanks, etc., with sufficient capacity to handle 500 million gallons per day average flow of sewage are being prepared so that bids could be taken in the early spring of 1934 if it were not for the Engineering Survey required by the agreement with the Federal Emergency Administration of Public Works hereinafter described. Plans and specifications for the substructure of the blower house are being prepared so that bids could also be taken in the early summer of 1934.

An agreement was made on December 16, 1933 for the purchase of bonds of the Sanitary District of Chicago by the Federal Emergency Administration of Public Works, in the amount of $21,646,000, sufficient to construct about half of the West-Southwest Sewage Treatment Plant. One condition of the Agreement with the Federal Emergency Administration of Public Works is that the Sanitary District shall

> PART TWO, 5 (h). "Provide for and undertake an engineering survey at the expense of the Borrower by a Commission to be appointed by the Government to review the plans and specifications for the construction of Items 4 (A) to 4 (K), both inclusive, (these items all being on the West-Southwest Treatment Plant and estimated to cost $21,646,000) of Sub-Application, Docket No. 3622, as to the general method and details of sewage treatment. Such Commission is to make such survey as may be necessary to permit the District to take advantage of any change in the development of the art of sewage disposal;"

Another provision of this agreement is

> PART THREE, 4. "*Engineering Survey.* Before any contracts are let for work, labor and materials in connection with the construction of Item 4 (A) to Item 4 (K), both inclusive of Sub-Application, Docket No. 3622, or any proceeds of the sale of the Bonds are disbursed in connection therewith, the Borrower shall provide for the engineering survey provided in subparagraph 5 (h) PART TWO, hereof. Unless such survey be not completed within five months from the date hereof, all contracts and disbursements of funds in connection with the construction of such Items shall be made in accordance with the conclusions and recommendations of the Commission undertaking such survey, if approved by the Government or such Items shall be modified

or changed as recommended by the Commission, if approved by the Government, and in such event all contracts and disbursements shall be made in accordance with such modifications or changes. The salaries, fees and expenses of the Commission shall be charged against the Borrower as a part of the cost of constructing the works of the Projects of which such Items are a part, and paid from the Construction Fund of such Projects, or shall be paid from such other fund or funds as the Borrower may designate; provided, however, that such salaries, fees and expenses shall not be deemed to be labor and materials within the meaning of any Grant hereunder."

This is an "occurrence beyond the control of the Sanitary District" and will occasion some delay in commencing of actual construction work on the West-Southwest Sewage Treatment Plant.

Activated Sludge Patent Suit. The suit of Edgar C. Guthard, Activated Sludge, Ltd. and Activated Sludge, Inc., versus The Sanitary District of Chicago, in the United States District Court, for the Northern District of Illinois Eastern Division (In Equity No. 4280) mentioned in the last report to the Court is set for argument on January 30, 1934 before Judge Walter C. Lindley.

The suit brought against Milwaukee, which was decided for the plaintiffs, Activated Sludge, Inc., by Judge Geiger (Activated Sludge, Inc. versus the City of Milwaukee, In Equity No. 2323, Eastern District of Wisconsin) was appealed. The case was argued in the U. S. Circuit Court of Appeals for the 7th Circuit (The City of Milwaukee, Defendant Appellant, versus Activated Sludge, Inc., Plaintiff Appellee, U. S.

Circuit Court of Appeals, 7th Circuit, No. 5001) on December 5, 1933.

While the suit against the Sanitary District has no direct bearing at present on the progress of the sewage treatment construction program, it is mentioned herein so that the court may be advised of another element which tends to obstruct progress and may (if the patents are upheld) increase the cost of the works.

Financial. The financial condition of The Sanitary District of Chicago has been thoroughly discussed in previous semi-annual reports to the Supreme Court and in the report of Special Master McClennen of March 13, 1933. No further comments as to the reason for this financial crisis are deemed necessary at this time.

The local tax situation is practically the same as at the time of the last report to the Court. The amounts of taxes levied by the Sanitary District for the years 1928, 1929, 1930 and 1931, and the amounts received by the Sanitary District from the County Collector up to December 18, 1933, pursuant to these levies, are as follows:

Year	Total Amount of Levy	Amount Collected	Amount Unpaid	Percentage Unpaid
1928	$20,700,455.00	$16,939,549.43	$ 3,760,905.57	18.2%
1929	24,518,343.75	19,052,451.34	5,465,892.41	22.3%
1930	21,725,603.75	15,147,265.35	6,578,338.40	30.4%
1931	18,875,953.75	12,336,611.14	6,539,342.61	34.7%
	$85,820,356.25	$63,475,877.26	$22,344,478.99	26.0%

The 1931 real estate taxes are payable in two installments, the second of which did not become delinquent until the property was up for sale. The sales started December 4, 1933. The taxes collected since the time of the last report to the Court amount to $8,523,594.73, which is 10 per cent of the taxes levied and due. This money was used to redeem tax anticipation warrants, to pay current expenses and to pay defaulted interest on bonds.

The non-payment of these taxes has forced the Sanitary District, through lack of revenue, to default on all payments of maturing principal on bonds used for construction work due from January 1, 1932 to December 1, 1933, inclusive, and any payments of interest on these bonds from June 1, 1933 to December 1, 1933, inclusive. The amounts in default, as of December 20, 1933, are:

Principal	$14,853,000.00
Interest	2,381,716.25
Total	$17,234,716.25

The interest in default amounted to a maximum of $6,370,268.75 on May 1, 1933 but this has been reduced to $2,381,716.25 since that time. The first payment of interest coupons since default occurred was made May 22, 1933. Since that time $6,368,268.75 has been paid, up to December 11, 1933. A further default in payment of principal and interest on bonds due January 1, 1934, in the amount of $982,475.00 may be expected.

The General Assembly of the State of Illinois, at its 1933 session, passed a bill authorizing The Sanitary District of Chicago to issue bonds without a referendum in sufficient amount (limited to $100,000,000, and, of course, to the limitation of 5 per cent of the assessed valuation) to do the work made necessary by the decree of the Supreme Court of April 21,

1930. The Sanitary District still had $7,614,000 of bonds unsold from the issue of $27,000,000 of bonds authorized by the Illinois General Assembly in 1929 in addition to the bulk of $36,000,000 of bonds approved by the voters in February, 1931.

In view of the fact that the local tax situation is not likely to improve sufficiently in the near future to enable the payment of bonds in default from the receipt of taxes and thus make the Sanitary District bonds marketable, the Sanitary District has been using every effort possible to obtain a loan from the Federal Emergency Administration of Public Works (created by an Act of the Congress, in June, 1933), in order that the sewage treatment construction program might be completed. After extended negotiations the Federal Emergency Administration of Public Works has agreed to purchase bonds of the Sanitary District in an amount sufficient to carry on the construction work for approximately the next two years. The steps taken by the Sanitary District to obtain money from the United States in order to complete the works made necessary by the decree of this Court were as follows:

The Board of Trustees of The Sanitary District of Chicago, on June 15, 1933, approved the future sewage treatment construction program, estimated to cost $120,367,500. An application (hereinafter designated "Preliminary Application") for a loan from the Federal Emergency Administration of Public Works, in the amount of $120,367,500, was then prepared, using the same general form that had been used in the application to the Reconstruction Finance Corporation, in 1932, referred to in the report of January 1, 1933. Copies of this "Preliminary Application" were mailed on June 29, 1933 to the Secretary of the Interior Harold L. Ickes; General Hugh S. Johnson; Colonel Donald H. Sawyer, Temporary Public Works Administrator; Colonel Waite, Assistant Public Works Administrator, and John F. Coleman, of the Reconstruction Finance Corporation.

On July 5, 1933, the Sanitary District received a formal application blank, Form No. 1, from the Federal Emergency Administration of Public Works. The "Preliminary Application" was then revised to comply with Form No. 1 and the "Formal Application" was ready for filing by July 20, 1933. One copy of the "Preliminary Application" was returned by Colonel Sawyer on July 8, 1933, with instructions to make formal application on Form No. 1 furnished by the Public Works Administration and file the same with the Illinois State Advisory Board of the Federal Emergency Administration of Public Works, and on July 15, 1933, another copy of the "Preliminary Application" was returned by Colonel Waite with the same instructions as given by Colonel Sawyer. The Illinois State Advisory Board was appointed on July 26, 1933, and the "Formal Application" was filed with this Board on August 5, 1933. At a public hearing held on August 11, 1933, the Illinois State Advisory Board and the Regional Director requested that supplemental information be prepared and filed in accordance with Circular No. 2 (dated and issued August 1, 1933) of the Federal Emergency Administration of Public Works, which became available to the Sanitary District on the date of the hearing.

The Illinois State Engineer of the Public Works Administration was appointed on August 18, 1933. On August 19, 1933, the supplemental information contained in Circular No. 2 was furnished to the Illinois State Advisory Board, together with additional information requested at the public hearing on August 11, 1933.

Then the "Formal Application" was changed to comply with the requirements of Circular No. 2 and was filed with the Federal Emergency Administration of Public Works at Washington on August 31, 1933. At that time, conferences were held with Secretary Ickes, Federal Emergency Administrator of Public Works, Mr. Landau of the legal staff, Colonel Clark and Mr. McDonough of the engineering staff, and Mr. Mansfield of the financial staff.

About a week later, the Sanitary District learned that the matter had been referred back to the Illinois State Advisory Board. On September 8, 11 and 19, conferences were held with the Illinois State Engineer of the Public Works Administration, relative to the purchase of bonds. On September 19, 1933, the Sanitary District was informed that favorable consideration would be given to an application for a purchase of bonds to complete the five principal contracts on the work already under contract by the Sanitary District, namely the Pumping Station and Blower House and the Aeration and Final Settling Tanks at the Calumet Works, Battery "C" of the Imhoff Tanks at the West Side Works and Sections 3 and 4 of the West Side Sewer, all of which work had been discontinued because of lack of funds. Meanwhile, from September 12 to September 14, one of the financial experts from the Washington office of the Federal Emergency Administration of Public Works had been in Chicago investigating the financial condition of the Sanitary District. On September 20, 1933, a conference was held with the Illinois State Engineer of the Public Works Administration concerning the details for the sub-application for the purchase of bonds to complete the five existing contracts and on September 22, 1933 a sub-application (No. 1) for the purchase of bonds, in the sum of $7,874,477, was filed.

On October 11, approval of the purchase of bonds requested in Sub-Application No. 1 was announced in Washington by Secretary Ickes. At a conference held on October 16, 1933, the Illinois State Engineer of the Public Works Administration informed the Sanitary District representatives that an agreement covering the subject matter would be prepared in Washington and submitted to the Sanitary District. Copies of the agreement for the purchase of bonds, in the amount of $8,000,000, were furnished to the Sanitary District on November 3, 1933. Conferences were held in Chicago on November 6 and 7, 1933 between representatives of the Public Works Administration and the Sanitary District, regarding the details of this agreement and it was accepted by the Board of Trustees of the Sanitary District on November 13, 1933, and finally approved by the Federal Emergency Administrator of Public Works on November 15, 1933.

In the Sub-Application No. 1, the Sanitary District stated that it proposed to press the "Formal Application" (filed August 31, 1933) for the purchase of bonds, in the amount of $120,367,500, sufficient to complete the entire sewage treatment construction program. At a conference held on November 7, 1933, the Sanitary District representatives were informed that no purchase of bonds would be considered for work which could not be completed within the next two years and that no serious consideration had been given or would be given for the purchase of bonds to complete the entire project. Further, the Sanitary District was informed that favorable consideration would be given to an application for the purchase of bonds in the amount of $4,690,000, sufficient to construct four additional sections of the West Side Intercepting Sewer, for which plans had already been completed.

Another Sub-Application (No. 2) for the purchase of bonds in the amount of $4,690,000 for the construction of West Side Sewer, Sections 5, 6, 7 and 8, was then prepared and filed with the Illinois State Engineer of the Public Works Administration on November 14, 1933. The Chairman of the Finance Committee of The Sanitary District of Chicago conferred with Secretary Ickes, Federal Emergency Administrator of Public Works, in Washington, on November 15 and 16, 1933, relative to this Application (No. 2) and relative to the purchase of bonds for such additional work as could be completed within the next two years. Then, on November 21, 1933, the Sanitary District was instructed by the Illinois State Engineer of the Public Works Administration to file an application for this additional work.

Another Sub-Application (No. 3) for the purchase of bonds in the amount of $29,257,770 was prepared and filed with the Illinois State Engineer of the Public Works Administration on November 25, 1933. A public hearing on this application (while in preparation) was held on November 23, 1933 by the Illinois State Advisory Board.

On December 6, 1933, Secretary Ickes, Federal Emergency Administrator of Public Works, announced, in Washington, that the purchase of bonds from the Sanitary District, in the amount of $33,948,000, had been approved. This purchase covers the amounts requested in Sub-Applications Nos. 2 and 3. The Sanitary District, on December 8, 1933, received the form of agreement for the purchase of $33,948,000 of bonds. Conferences were held in Chicago on December 11 and 12, 1933, between representatives of the Federal Emergency Administration of Public Works and the Sanitary District, regarding the details of this agreement. On December 13, 1933, the Board of Trustees of The Sanitary District of Chicago passed an ordinance authorizing the execution of the agreement for the purchase of bonds in the amount of $33,948,000 by the Public Works Administration, as well as an ordinance providing for the rescinding and cancelling of the agreement of November 15, 1933 and the execution of a substitute agreement for the purchase of $8,000,000 of bonds in lieu thereof. Both agreements were formally executed and in force on December 16, 1933.

The bonds were delivered by the Sanitary District and the cash was deposited by the Federal Emergency Administration of Public Works to the credit of the Sanitary District on December 20, 1933 in the amount of $42,169,315.76. Of this amount $41,938,000.00 was for the purchase of bonds, and $231,315.76 for accrued interest on these bonds from the date of their issue to the date of their delivery to the Federal Emergency Administration of Public Works.

Construction work will be resumed immediately and prosecuted diligently, subject to the supervision of the Federal Emergency Administration of Public Works, on approximately half of the items for which finances are provided in the agreements of December 16, 1933. On the balance of these items, namely, those items of the West-Southwest Sewage Treatment Plant for which finances are provided, design work will be continued and construction will be started as soon as the Engineering Survey provided in the agreement of December 16, 1933, is completed. This should not be later than May 16, 1934. These items are those which can be completed within a period of two to two and one-half years.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from June 1, 1933 (the date of the summaries for the last report) to December 1, 1933 (the date of the summaries for this report), as measured by construction expenditures, was as follows:

TABLE 3.

Calumet Project	$ 89,797.16
North Side Project	2,624.30
West Side Project	59,479.27
Southwest Side Project	30,74[illegible]2
Total	$182,644.65

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed por-

tion of the sewage treatment construction program on December 1, 1933, is as follows:

TABLE 4.

COMPLETED WORK AS OF DECEMBER 1, 1933.

Calumet Project	$ 21,120,149.38
North Side Project	37,104,990.93
West Side Project	41,771,215.03
Southwest Side Project	323,252.38
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$100,969,212.32

By subtracting, in round figures, the various items indicated in Table 3 from corresponding items in Table 2 and transferring certain items from the Southwest Side Project to the West-Southwest Plant, the estimated cost of future sewage treatment construction, as of December 1, 1933, is as follows:

TABLE 5.

FUTURE WORK AFTER DECEMBER 1, 1933.

Calumet Project	$ 14,050,000.00
North Side Project	5,390,000.00
West Side Project	13,078,000.00
West-Southwest Plant	42,697,000.00
Southwest Side Project	39,770,000.00
Miscellaneous Plants and Sewers	2,000,000.00
Chicago River Controlling Works (if necessary)	3,200,000.00
Total	$120,185,000.00

Arrangements have been concluded with the Federal Emergency Administration of Public Works for financing construction work on these projects as follows:

Calumet Project	$ 9,408,000.00
West Side Project	10,884,000.00
West-Southwest Plant	21,646,000.00
Total	$41,938,000.00

The remainder of the work in the sewage treatment construction program (for which no finances are at present available) is as follows:

Calumet Project	$ 4,642,000.00
North Side Project	5,390,000.00
West Side Project	2,194,000.00
Southwest Side Project	39,770,000.00
West-Southwest Plant	21,051,000.00
Miscellaneous Plants and Sewers	2,000,000.00
Chicago River Controlling Works (if necessary)	3,200,000.00
Total	$78,247,000.00

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of December 1, 1933, is about 4,221,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,745,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 5,966,000. This figure includes the Corn Products wastes, equivalent to the sewage of 393,000 persons, which wastes have been greatly reduced as a result of certain experimental work initiated by the Sanitary District.

The 1933 total population, and industrial waste equivalent, as above indicated, are estimated as 5,966,000. Up to date, the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence, so called complete treatment for the total December 1, 1933, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,071,000, which is 85 per cent of 5,966,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on June 25, 1933 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1933.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	210,000	33⅓	70,000
North Side	1,100,000	85	935,000
West Side (Sedimentation)..	750,000	33⅓	250,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	6,000	85	5,000
Corn Products (Reduction)..	378,000		322,000
Total...............	2,459,000		1,595,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1933.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	215,000	33⅓	72,000
North Side	1,117,000	85	949,000
West Side (Sedimentation)..	757,000	33⅓	252,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	6,000	85	5,000
Corn Products (Reduction)..	393,000		331,000
Total..............	2,503,000		1,622,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,622,000 out of 5,071,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 5,966,000 was being treated. This indicates the treatment of 32.0 per cent of the total sewage within the Sanitary District.

DIVERSION OF WATER.

As was stated in the last report to the Supreme Court the net diversion of water from Lake Michigan during the calendar year 1932, averaged 6450 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1650 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8100 cubic feet per second.

Diversion of water from Lake Michigan by the Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limits the net diversion to an annual average of not more than 6500 cubic feet per second up to December 31, 1935. The average monthly diversion as made under this Permit from January 1 to December 20, 1933, is indicated in the table following:

Month 1933	Total Flow From Main Channel At Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	7120	0	1570	5550
February	6820	0	1610	5210
March	7760	0	1585	6075
April	8200	5	1575	6620
May	7650	525	1600	5625*
June	8545	0	1865	6680
July	8925	0	1875	7050
August	8750	0	1835	6915
September	8525	0	1800	6725
October	7690	0	1695	5995
November	8095	0	1645	6450
December 1 to 20.	8090	0	1600	6490
Average	8015	45	1690	6280

*Flow reduced account of high water in Illinois River.

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By THOMAS J. BOWLER,
Its President.

PHILIP HARRINGTON,
Its Chief Engineer.

WILLIAM ROTHMANN,
Its Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, *Complainants,* *vs.* **STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,** *Defendants,* **STATE OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,** *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant,* *vs.* **STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al,** *Defendants.*	No. 8, Original.
STATE OF NEW YORK, *Complainants,* *vs.* **STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al,** *Defendants.*	No. 9, Original.

5

SUPPLEMENTAL REPORT OF DEFENDANTS RELATIVE TO MODIFICATION IN SEQUENCE OF CONSTRUCTION PROGRAM PROCEDURE.

May 23, 1934

FRED KLEIN CO., [illegible]24 PRINTERS, CHICAGO.

IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

STATE OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants,
STATE OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al,
Defendants.

No. 8, Original.

STATE OF NEW YORK,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al,
Defendants.

No. 9, Original.

SUPPLEMENTAL REPORT OF DEFENDANTS RELATIVE TO MODIFICATION IN SEQUENCE OF CONSTRUCTION PROGRAM PROCEDURE.

To the Honorable, the Chief Justice and Associate Justices of the Supreme Court of the United States:

Now come the STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, a public municipal corporation, by Otto Kerner, Attorney General of Illinois, Cornelius Lynde, Special Assistant Attorney General, William Rothman, Joseph B. Fleming, James Hamilton Lewis and Lawrence J. Fenlon, their solicitors, and submit this supplemental report, relative to a modification in sequence of procedure on the construction program heretofore presented to this court, which program was designed to enable defendants to accept the reduction in diversion of water from Lake Michigan through the Drainage Canal as heretofore decreed by the court on April 21, 1930, (281 U. S. 696, 74 L. ed. 1123, 50 S. Ct. 331) said amount of diversion, in addition to domestic pumpage, to be as follows:

6500 cu. ft. per sec. on and after July 1, 1930
5000 cu. ft. per sec. on and after Dec. 31, 1935
1500 cu. ft. per sec. on and after Dec. 31, 1938

The program presented to the Court in 1929 by the Special Master on Re-Reference contemplated, among other things, (1) completion of the West Side Sewage Treatment Works on or before December 31, 1935, to provide for complete treatment of the area served by said West Side Sewage Treatment Works and (2) completion of the Southwest Side Sewage Treatment Works on or before December 31, 1938. The aforesaid plants when completed were to attain not less than an average of 85% purification of the sewage treated.

On July 1, 1933, the Sanitary District reported to the Court that improvements in the method of sewage sludge disposal had made possible the combining of the proposed West Side and Southwest Side Sewage Treatment Plants on the original site for the west side plant. These two combined plants have since been referred to as the West-Southwest Sewage Treatment Plant.

As heretofore reported to the Court, in the Semi-Annual Report of January 1, 1934, the Sanitary District of

Chicago, in June, 1933, under the provisions of the National Industrial Recovery Act, made application to the Federal Emergency Administration of Public Works, for allocation of a Loan and Grant amounting to $120,000,000 to finance the uncompleted work remaining to be performed under the construction program as recommended by the Special Master on Re-Reference. After extended negotiations with the Public Works Administration over a period of several months, the Sanitary District was advised in November, 1933, that the policy of the Public Works Administration limited allocations of the available funds to work which could reasonably be completed in approximately two years, and that an application would be considered for only such works as could be completed within that time. In pursuance of this policy The Sanitary District of Chicago filed sub-applications for an allocation of the necessary funds to finance that part of the construction program, heretofore presented to the Court, which could be completed within the calendar period of two and one-half years. These sub-applications, as the Court has previously been advised in the semi-annual report of the defendants, resulted in the purchase by the Government of bonds of the Sanitary District in the principal amount of $41,938,000 to be used to complete certain contracts already in existence, plus certain additional work necessary to complete the West Side Intercepting Sewer, the Calumet Treatment Works Extension and certain collateral sewers, and also to build that portion of the West-Southwest Sewage Treatment Plant required to provide complete treatment for the sewage from the West Side area. The amount allocated for this portion of the West-Southwest Sewage Treatment Plant was $21,646,000.

As heretofore reported to the Court in the Semi-annual report filed January 1, 1934, the contract with the Government for the purchase and sale of the bonds to finance the work above described provided, that before the Sanitary District would let contracts for any part of the West-Southwest Sewage Treatment Plant embraced in its application, a survey was to be made by an Engineering Board to be appointed by the Government to make a study of the West-Southwest Sewage Treatment Project and report its recommendations in the premises.

In accordance with the foregoing provision an Engineering Board of Review was appointed by the Federal Emergency Administrator of Public Works. This Board after a careful and detailed review extending over a period of three months completed its survey, rendered its report to the Federal Emergency Administrator of Public Works and said report was approved by the Administrator on May 10th, 1934. This report recommends a change in the order of procedure on the construction program heretofore presented to the Supreme Court. A copy entitled "Report of The Board of Engineers appointed by the Hon. Harold L. Ickes, Administrator Federal Emergency Administration of Public Works, To Review The Plans and Specifications Prepared By The Sanitary District of Chicago For Certain Sewage Treatment Work at the West-Southwest Site," is attached to the original petition hereto, marked Exhibit "A." The Engineering Board recommends that the finances obtained from the Government be used to build at once the Southwest Side Intercepting Sewer and a complete treatment works for the Southwest Side area, and that the final step in the program be to supplement the existing partial treatment at the West Side Works with complete treatment.

This construction program as recommended by the Board of Review when completed will provide treatment at least to a partial degree of sewage from all the important areas which affect the question of diversion embraced within The Sanitary District of Chicago.

Attached hereto is a map entitled "The Sanitary District of Chicago Map Indicating Proposed Modification of Order of Construction Procedure May, 1934," marked Exhibit "B," showing the locations of the proposed West-Southwest Treatment Works with the additional intercepting sewers that are to be built indicated in red. This map shows that these additional Southwest Side sewers will complete the interception of all sewers discharging into the Chicago River throughout its entire length extending from its mouth to the site of the treatment works, a distance of approximately eleven miles, thus removing practically all sewage pollution from the Chicago River, except that produced by storm overflows. The Sanitary District will therefore be placed in a safer position in accepting the reduction in diversion on December 31, 1935, than it would be if the original construction program were followed.

The modification in the program recommended by the Engineering Board of Review, appointed by the Federal Emergency Administrator of Public Works in accordance with the Agreement between the Government and the Sanitary District, in which the defendants concur, provides that a main interceptor, a pumping station and a treatment plant be constructed immediately for the collection and treatment of the sewage from the Southwest Side area instead of now building a plant to supplement the existing West Side Sewage Treatment Works, for the reason that such procedure will provide, (a) the immediate purification of the Southwest Side Sewage and, (b) permit time for further investigation as to the best method of supplementing the West Side Imhoff tank plant, and (c) provide added protection against pollution of the lake water supply in the event of reversal of the Chicago River.

The defendants approve the recommendations of the Engineering Board of Review that the present available funds provided by the Government be used to finance the immediate construction of the intercepting sewers, pumping station, treatment plant and other necessary appurtenances for the Southwest Side area, and respectfully report that the sequence of procedure in the construction program heretofore presented to the Court, will be modified to the extent that the defendants will proceed immediately with the construction of the complete treatment plant, with the Intercepting Sewer System, pumping station and the other necessary appurtenances for the complete treatment of sewage from the Southwest Side area to be followed by supplementing, as a final step, the existing partial treatment of the sewage now provided for the West Side area.

The defendants further respectfully represent that this change in the sequence of procedure recommended by the Engineering Board of Review and by the defendants will not retard, but in the opinion of the defendants and in that of the Engineering Board of Review, will improve conditions and expedite the performance of the decree.

Respectfully submitted,

State of Illinois,

By Otto Kerner,
Attorney General of Illinois.

Cornelius Lynde,
Special Assistant Attorney General.

The Sanitary District of Chicago.

By Thomas J. Bowler,
Its President.

Philip Harrington,
Its Chief Engineer.

William Rothmann,

Joseph B. Fleming,

James Hamilton Lewis,

Lawrence J. Fenlon,
Solicitors for the Sanitary District of Chicago.

Attest:
James J. Sullivan,
Clerk

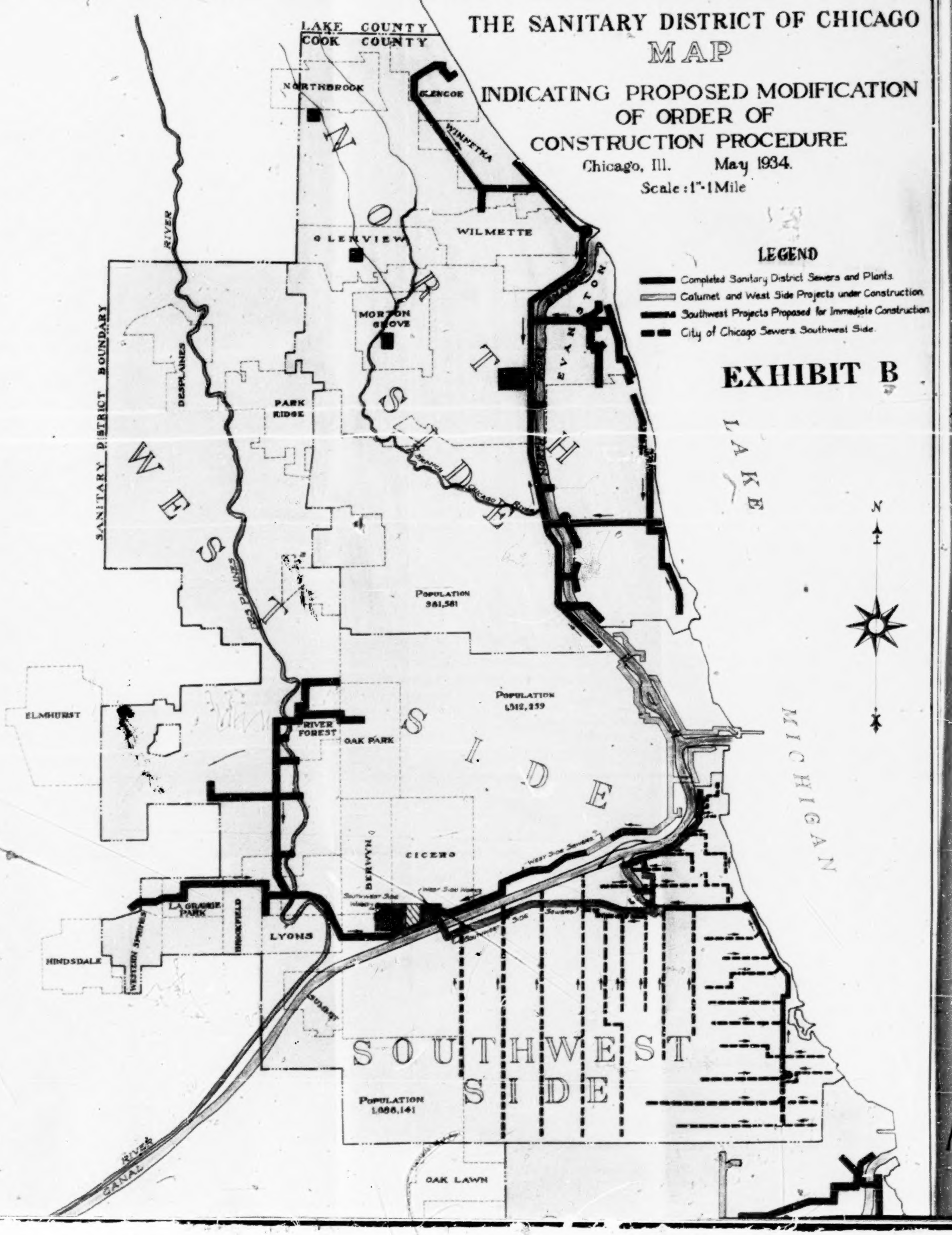
THE SANITARY DISTRICT OF CHICAGO

MAP

INDICATING PROPOSED MODIFICATION OF ORDER OF CONSTRUCTION PROCEDURE

Chicago, Ill. May 1934.

Scale: 1"-1 Mile


LEGEND
Completed Sanitary District Sewers and Plants
Calumet and West Side Projects under Construction
Southwest Projects Proposed for Immediate Construction
City of Chicago Sewers Southwest Side.
EXHIBIT B
LAKE COUNTY
COOK COUNTY
NORTHBROOK
GLENCOE
WINNETKA
WILMETTE
GLENVIEW
EVANSTON
MORTON GROVE
NORTH SIDE
DESPLAINES
PARK RIDGE
SANITARY DISTRICT BOUNDARY
DES PLAINES RIVER
WEST SIDE
POPULATION 981,581
POPULATION 1,312,239
ELMHURST
RIVER FOREST
OAK PARK
BERWYN
CICERO
West Side Sewers
West Side Works
Southwest Side Works
Southwest Side Sewers
LA GRANGE PARK
BROOKFIELD
WESTERN SPRINGS
HINSDALE
LYONS
SUMMIT
SOUTHWEST SIDE
POPULATION 1,088,141
OAK LAWN
RIVER
CANAL
LAKE MICHIGAN
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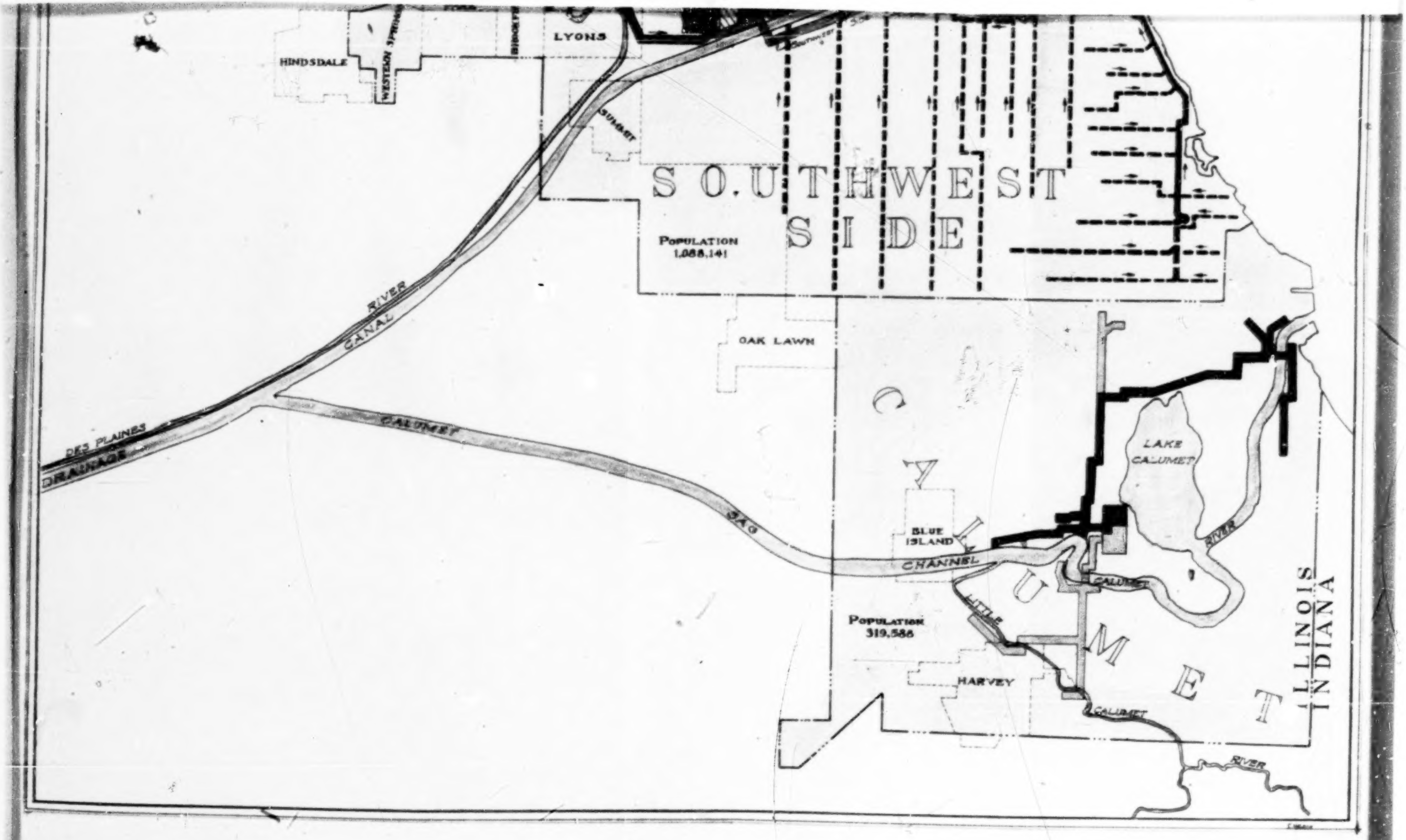
HINDSDALE
WESTERN SPRINGS
BROOKFIELD
LYONS
SUMMIT
SOUTHWEST SIDE
POPULATION 1,088,141
OAK LAWN
DES PLAINES
RIVER
DRAINAGE
CANAL
CALUMET
SAG
CHANNEL
BLUE ISLAND
CALUMET
LAKE CALUMET
RIVER
CALUMET
LITTLE
POPULATION 319,588
HARVEY
CALUMET
RIVER
ILLINOIS
INDIANA

Office Supreme Court, U. S.
FILED
JUL 2 1934
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~5,~~ 4
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 5
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 6
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1934. MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO., 24 PRINTERS, CHICAGO.

IN THE

Supreme Court of the United States

NOS. 5, 8 AND 9, ORIGINAL.

OCTOBER TERM, 1933.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1934. MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1934, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1934, the status of completed work in the sewage treatment construction program involved in this case was stated to be on December 1, 1933, as follows:

TABLE 1.

COMPLETED WORK AS OF DECEMBER 1, 1933.

Calumet Project	$ 21,120,149.38
North Side Project	37,104,990.93
West Side Project	41,771,215.03
Southwest Side Project	323,252.38
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$100,969,212.32

TABLE 2.

FUTURE WORK AFTER DECEMBER 1, 1933.

Calumet Project	$ 14,050,000.00
North Side Project	5,390,000.00
West Side Project	13,078,000.00
West-Southwest Plant	42,697,000.00
Southwest Side Project	39,770,000.00
Miscellaneous Plants and Sewers	2,000,000.00
Chicago River Controlling Works (If necessary)	3,200,000.00
Total	$120,185,000.00

During the interim of six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet and West Side Projects. Reasonable progress has been made on the development of plans for the Southwest Side Project.

Calumet Project. As stated in the last Semi-annual Report to the Court, agreements were made December 16, 1933, for the purchase of bonds of The Sanitary District of Chicago by the Federal Emergency Administration of Public Works to finance the completion of the Calumet Sewage Treatment Works and the construction of certain Calumet Sewers. Construction work on the Aeration Tanks, Operating Galleries and Final Settling Tanks, which had been discontinued since December 1931, because of lack of funds, was resumed on January 2, 1934. Construction of the Pumping Station and Blower House, likewise discontinued since December 1931, was resumed on January 8, 1934. A contract for Preliminary Settling Tanks, Sludge Concentration Tanks, Screen House, Meter Vault and Miscellaneous Conduits was awarded on March 29, 1934 and construction was started on April 12, 1934. A contract for the extension of the discharge tubes of the sewage pumps past the proposed building to house the incinerating plant was awarded on April 12, 1934. An agreement for the resumption of work on the Blowers and Blower Motors was made April 19, 1934. Similar agreements for the Sewage Pumps, and their motors, and for Large Valves are being negotiated.

Plans are being prepared for the Sludge Dewatering and Incinerating Plant and for Conduits between the old and new Sewage Pumping Stations. This will complete the Calumet Sewage Treatment Works except for a minor contract for roads, grading, drainage, lighting, etc. All this work will be completed before the end of 1935. A contract for the construction of the Harvey Sewer was let May 3, 1934, the bond approved May 17, 1934, and actual work was started June 4, 1934. Plans have been completed for the South Park Avenue and the California Avenue Outlet Sewers and considerable progress has been made on plans for the Blue Island Extension Sewer.

Construction of these sewers may be deferred and the funds used for the more urgent work in the South west Side Intercepting Sewer.

West Side Project. As stated in the last Semi-Annual Report to the Court, agreements were made December 16, 1933 for the purchase of bonds of The Sanitary District of Chicago by the Federal Emergency Administration of Public Works to finance the completion of the third battery of Imhoff Tanks at the West Side Sewage Treatment Works and two Sections of the West Side Sewer and for the construction of seven additional Sections of the West Side Sewer.

Construction work on the third battery of Imhoff Tanks at the West Side Treatment Works, which had been discontinued since December 1931, because of lack of funds, was resumed February 5, 1934. Construction of Section 3 of the West Side Sewer, likewise discontinued since December 1931, was resumed March 26, 1934. An agreement for the resumption of work on Section 4 of the West Side Sewer, likewise discontinued since December 1931, is being made and work should be resumed within a month.

Contracts have been let for four additional Sections of the West Side Sewer and bids have been taken for two other Sections. The contract for Section 5 was let February 1, 1934 and construction work was started February 26, 1934. The contract for Section 6 was let April 26, 1934, the bond was approved May 17, 1934, and actual work was started June 18, 1934. The contract for Section 7 was let March 15, 1934 and construction was started April 2, 1934. The contract for Section 8 was let March 8, 1934 and work was started April 4, 1934. Bids were taken for Section 9 on June 21, 1934. Bids were taken for Section 10 on March 29, 1934 and rejected April 26, 1934. This work will be re-advertised for bids in the near future. All this sewer construction is planned for completion before the end of 1935.

Operation of the additional sludge filtering and drying unit at the West Side Sewage Treatment Works was started February 9, 1934. This operation is for the further development of the proposed method of disposing of sludge by mechanical dewatering and incineration. Results to date are fully as satisfactory as had been anticipated.

As stated in the last two Semi-annual Reports to the Court, the activated sludge portion of the West Side Works, for the complete treatment of the sewage, has been combined with the Southwest Side Sewage Treatment Plant, to be built as one plant, and will be discussed under the heading of "West-Southwest Treatment Plant."

West-Southwest Treatment Plant. The agreement of December 16, 1933 between the Sanitary District and the Federal Emergency Administration of Public Works provided $21,646,000 to construct approximately half of this ultimate plant and it had been planned to use this portion of the plant to give final treatment to the West Side sewage to conform to the order of construction procedure set forth in the Report of the Special Master. Certain features of the plant, such as Blower House, Pumping Station, Electric Sub-station, Outfall Conduit, etc., were to be built to sizes for the ultimate plant. However, the agreement with the Public Works Administration provided that none of this money should be expended until an "Engineering Survey" had been made by a Board appointed by the Government.

Such an "Engineering Survey" was made and the Engineering Board reported to Harold L. Ickes, Administrator of Public Works, on April 30, 1934. The change in order of construction procedure recommended in the report was approved by said Administrator May 10, 1934, and by the Board of Trustees of the Sanitary District May 17, 1934. This change in sequence of procedure was made the subject of a special supplementary Report to the Supreme Court, dated May 23, 1934, which after due notice to all the parties to this cause was, on May 28, 1934, received and ordered filed. These recommendations were that provision for the final treatment of the West Side sewage be deferred for the present and the available funds be used toward the construction of the South-Side portion of the West-Southwest Sewage Treatment Works. The Sanitary District of Chicago is now proceeding according to such recommendations and as reported to the Court in its supplementary report. Specifications are practically completed for the sewage pumping units and for the blower units. Preliminary plans have been drawn for the Sewage Pumping Station, Outdoor Electrical Sub-station, Aeration and Final Settling Tanks, Conduits, etc. Contracts for a considerable portion of this work can be let before the end of the current year.

Southwest Side Project. Since the receipt of the report of the special Engineering Board, appointed by the Public Works Administration, when it appeared probable that the Southwest Side Intercepting Sewers could be financed from funds presently on hand, active design work has been started on these sewers. A survey party is engaged in completing field work necessary for the design and the hydraulics studies are being reviewed. A contract for digging test pits will be let in the near future.

It is expected that one or more contracts on the Southwest Side Intercepting Sewer can be let before the end of the current calendar year and that all of this sewer can be under contract within a year from date.

Activated Sludge Patent Suit. The suit of Edgar C. Guthard, Activated Sludge, Ltd. and Activated Sludge, Inc., versus The Sanitary District of Chicago, in the United States District Court for the Northern District of Illinois, Eastern Division (In Equity No. 4280), mentioned in the last report to the Court, was argued before Judge Walter C. Lindley on March 27 and 28, 1934. No decision has been rendered.

The suit brought against Milwaukee, which was decided for the plaintiff, Activated Sludge, Inc., by Judge Geiger (Activated Sludge, Inc. versus the City of Milwaukee, in Equity No. 2323, Eastern District of Wisconsin) was decided by the U. S. Circuit Court of Appeals for the 7th Circuit (The City of Milwaukee, Defendant Appellant, versus Activated Sludge, Inc., Plaintiff Appellee, U. S. Circuit Court of Appeals, 7th Circuit, No. 5001) in favor of the Plaintiff Appellee, Activated Sludge, Inc., on March 2, 1934. A rehearing was denied on April 13, 1934. Notice was then given to the Court of Appeals that an appeal would be taken to the U. S. Supreme Court.

While the suit against the Sanitary District has no direct bearing at present on the progress of the sewage treatment program, it is mentioned herein so that the Court may be advised of another element which tends to obstruct progress and may (if the patents are upheld) increase the cost of the works.

Financial. The financial condition of The Sanitary District of Chicago has been thoroughly discussed in previous semi-annual reports to the Supreme Court and in the report of Special Master McClennen of March 13, 1933.

The local tax situation has not improved much since the time of the last report to the Court. The amounts of taxes extended for the Sanitary District for the years 1928, 1929, 1930, 1931, and 1932, and the amounts collected up to June 7, 1934, pursuant to these extensions, are as follows:

Year	Total Taxes Extended	Amount Collected	Amount Unpaid	Percentage Unpaid
1928.......	$ 19,448,392.46	$17,100,971.53	$ 2,347,420.93	12.1%
1929.......	24,466,998.58	19,465,944.01	5,001,054.57	20.4%
1930.......	22,453,699.40	15,749,024.76	6,704,674.64	29.8%
1931.......	20,517,561.90	13,463,624.12	7,053,937.78	34.4%
1932.......	19,281,643.24	7,922,827.19	11,358,816.05	59.2%
	$106,168,295.58	$73,702,391.61	$32,465,903.97	30.6%

The 1932 real estate taxes are payable in two installments, the second of which does not become delinquent until July 1, 1934. The taxes collected since the time of the last report to the Court amount to $10,226,514.35, which is about 10 per cent of the taxes levied and due. This money was used to redeem tax anticipation warrants, to pay current expenses and to pay defaulted interest on bonds.

The non-payment of these taxes has forced the Sanitary District, through lack of revenue, to default on practically all payments of maturing principal on bonds used for construction work due from January 1, 1932 to June 1, 1934, inclusive, and a relatively small amount of interest on these bonds. The amounts in default, as of June 13, 1934, are:

Principal	$16,233,125.00
Interest	126,382.50
Total	$16,359,507.50

The interest in default amounted to a maximum of $6,370,268.75 on May 1, 1933 but this has been reduced to $126,382.50 since that time.

As stated in the last report to the Court, in view of the fact that the local tax situation was not likely to improve sufficiently in the near future to enable the payment of bonds in default from the receipt of taxes and thus make the Sanitary District bonds marketable, the Sanitary District conducted extended negotiations with the Federal Emergency Administration of Public Works. These negotiations resulted in agreements, dated December 16, 1933, under which the Public Works Administration purchased bonds of the Sanitary District in the principal amount of $41,938,000, at par plus accrued interest.

Construction work has been resumed or started on twelve contracts, for which $12,765,000 was allocated in the P. W. A. Agreements. Five other contracts, for which $3,412,000 was allocated, are in process of being let. Plans are well under way for four other contracts, for which $1,985,000 was allocated. These works, with the total allocation of

$18,162,000, will complete the Calumet Treatment Works, the Harvey Sewer, the West Side Treatment Works (for sedimentation and digestion) and the essential West Side Sewers.

As hereinbefore stated, one of the agreements with the Public Works Administration of December 16, 1933, provided that before any commitments were made in connection with the construction of the West-Southwest Treatment Works an "Engineering Survey" should be made by an Engineering Board appointed by the Government. The recommendations of this Engineering Board were reported to the Court on May 23, 1934. Negotiations are now under way with the Public Works Administration on an amended agreement which will set forth the changes in the program as recommended by this special Engineering Board and the necessary re-allocation of funds for this work. Conferences are being held between the Sanitary District and this Government Engineering Board relative to certain details of the changed program.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December, 1933 (the date of the summaries for the last report) to June 1, 1934, (the date of the summaries for this report), as measured by construction expenditures, was as follows:

TABLE 3.

Calumet Project	$ 438,259.74
North Side Project	17,390.59
West Side Project	617,772.50
Southwest Side Project	2,953.33
West-Southwest Treatment Plant	159,000.17
Total	$1,235,376.33

It is apparent from the prices bid on the contracts let within the past five months that there will be a saving of probably $2,000,000 in the costs estimated for the construction of the Calumet Sewage Treatment Works and the West Side Sewers. The exact amount of this saving will appear in future reports as the work nears completion. Some proportional saving might at this time be reasonably expected on other future work but this is impossible to estimate so far in advance. Approximately $600,000 was expended in the early part of June for construction work performed in the month of May 1934. This additional amount of work was actually performed during this report period but it will appear in the record of completed work in the next report to the Court. The monthly expenditures for construction will materially increase during the next six months.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on June 1, 1934, is as follows:

TABLE 4.

COMPLETED WORK AS OF JUNE 1, 1934.

Calumet Project	$ 21,558,409.12
North Side Project	37,122,381.52
West Side Project	42,388,987.53
Southwest Side Project	326,205.71
West-Southwest Treatment Plant	159,000.17
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$102,204,588.65

By subtracting, in round figures, the various items indicated in Table 3 from corresponding items in Table 2, the estimated cost of future sewage treatment construction, as of June 1, 1934, is as follows:

TABLE 5.

FUTURE WORK AFTER JUNE 1, 1934.

Calumet Project	$ 13,612,000
North Side Project	5,375,000
West Side Project	12,460,000
West-Southwest Plant	42,538,000
Southwest Side Project	39,765,000
Miscellaneous Plants and Sewers	2,000,000
Chicago River Controlling Works (if necessary)	3,200,000
Total	$118,950.000

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of July 1, 1934, is about 4,267,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,758,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,025,000. This figure includes the Corn Products wastes, equivalent to the sewage of 398,000 persons, which wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The 1934 total population, and industrial waste equivalent, as above indicated, are estimated as 6,025,000. Up to date, the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total June 1, 1934, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,121,000, which is 85 per cent of 6,025,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on December 24, 1933 (as of the time of the last report to the Supreme

Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1933.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	215,000	33⅓	72,000
North Side	1,117,000	85	949,000
West Side (Sedimentation)..	757,000	33⅓	252,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	6,000	85	5,000
Corn Products (Reduction)..	393,000		331,000
Total............	2,503,000		1,622,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1934.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	219,000	33⅓	73,000
North Side	1,133,000	85	963,000
West Side (Sedimentation)..	763,000	33⅓	254,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	7,000	85	6,000
Corn Products (Reduction)..	398,000		303,000
Total............	2,535,000		1,612,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,612,000 out of 5,121,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,025,000 was being treated. This indicates the treatment of approximately 32.0 per cent of the total sewage within the Sanitary District, although considerable additional construction work has been performed during this period, for which no credit will appear in this percentage until the works are completed and put in operation.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan during the calendar year 1933, averaged 6,270 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,690 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8,005 cubic feet per second.

Diversion of water from Lake Michigan by the Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limits the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935. The average monthly diversion as made under this Permit from January 1 to June 20, 1934, is indicated in the table following:

Month 1934	Total Flow From Main Channel At Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	7281	0	1598	5683
February	7144	0	1617	5527
March	7004	0	1599	5405
April	7955	0	1588	6367
May	8413	0	1738	6675
June 1 to 20..	8700	0	1800	6900
Average	7750	0	1657	6093

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By THOMAS J. BOWLER,
Its President.

PHILIP HARRINGTON,
Its Chief Engineer.

WILLIAM ROTHMANN,
Its Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

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Office Supreme Court, U.
FILED
DEC 31 1934
CHARLES ELMORE CROP
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8,
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9,
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1935. MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO., 24 PRINTERS, CHICAGO.

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IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

October Term, 1933.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1935. MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of January 1, 1935, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of July 1, 1934, the status of completed work in the sewage treatment construction program involved in this case was stated to be on June 1, 1934, as follows:

TABLE 1.

COMPLETED WORK AS OF JUNE 1, 1934.

Calumet Project	$ 21,558,409.12
North Side Project	37,122,381.52
West Side Project	42,388,987.53
Southwest Side Project	326,205.71
West-Southwest Treatment Plant	159,000.17
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$102,204,588.65

TABLE 2.

FUTURE WORK AFTER JUNE 1, 1934.

Calumet Project	$ 13,612,000.00
North Side Project	5,375,000.00
West Side Project	12,460,000.00
West-Southwest Plant	42,538,000.00
Southwest Side Project	39,765,000.00
Miscellaneous Plants and Sewers	2,000,000.00
Chicago River Controlling Works (if necessary)	3,200,000.00
Total	$118,950,000.00

During the interim of six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet and West Side Projects. Reasonable progress has been made on the design and preparation of plans for the Southwest Side Project.

Calumet Project. Construction was continued on the following contracts mentioned in the last semi-annual report: the Calumet Pumping Station and Blower House, now 76 per cent completed; the Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 77 per cent completed; the Preliminary Settling Tanks, Sludge Concentration Tanks, Screen House, Meter Vault, etc., now 75 per cent completed; the Extension of the Pump Discharges, now 100 per cent completed; the Blower Units, now 70 per cent completed; and on the Harvey Sewer, now 54 per cent completed. Agreements for the resumption of work on the Sewage Pumping Units and on the Large Valves were made July 12, 1934. The Pumping Units were delivered in November and are being installed, the contract being 89 per cent completed. The Valves have been delivered and installed and this contract is 100 per cent completed. A contract for the Connecting Conduits between the old Calumet Pumping Station and the new Sewage Treatment Plant was awarded October 11, 1934 and actual work was started October 29, 1934. Contracts for the manufacture and delivery of the Diffuser Plates to be installed in the aeration tanks were awarded October 18, 1934 and this work is under way.

Preparation of plans for the Sludge Dewatering and Incinerating Plant mentioned in the last semiannual report has been somewhat delayed. In August 1934 the Resident Projects Engineer (PWA) requested a report, reviewing studies previously made as to the relative merits and costs of (1) digestion of sludge and disposal on sand drying beds, (2) pumping sludge to the Southwest Side Plant and disposal there by dewatering and incineration, and (3) dewatering and incineration of sludge at the Calumet site, this latter proposition involving three alternate methods. Such a report was prepared and was studied by the Engineering Board for the Public Works Administration on November 9, 1934, and on November 21, 1934, authority was granted to proceed with the preparation of plans and specifications. This work is being rushed to receive bids early in 1935 for the construction so that the plant may be ready to operate during the late summer of 1935. Plans for duct lines (power supply), water mains, roadways, grading, drainage, lighting, etc., are being prepared. Barring unforeseen difficulties, the entire project as presently planned, should be ready for operation by the fall of 1935. Certain sewers necessary to increase the delivery of sewage in the system will remain to be constructed whenever finances become available.

West Side Project. Construction was continued on the following contracts mentioned in the last semi-annual report: Battery C, etc., of the Imhoff Tanks, now 78 per cent completed; West Side Sewer, Contract 3, now 55 per cent completed; West Side Sewer, Contract 5, now 87 per cent completed; West Side Sewer, Contract 6, now 37 per cent completed; West Side Sewer Contract 7, now 34 per cent completed; West Side Sewer, Contract 8, now 80 per cent completed. An agreement for resumption of work on West Side Sewer, Contract 4, was made July 12, 1934 and actual work was started July 13, 1934. A contract for the construction of Section 9 of the West Side Sewer was awarded June 28, 1934 and actual work was started September 18, 1934. A contract for the construction of Section 10 of the West Side Sewer was awarded August 7, 1934 and actual work was started September 17, 1934. All of this work mentioned will easily be completed before the end of 1935 with the possible exception of Contract 4 of the West Side Sewer, on which the construction difficulties encountered have been considerable.

Operation of the experimental Sludge Filtering and Drying Unit at the West Side Sewage Treatment Works has been continued and considerable more progress made in the development of the process of disposal of sludge by mechanical dewatering and incineration.

West-Southwest Treatment Plant. Progress on the plans for the West-Southwest Sewage Treatment Plant has not been as rapid as was anticipated at the time of the last semi-annual report. The recommendations of the Engineering Board of the Public Works Administration, approved by the Administrator on May 10, 1934, were approved by the Board of Trustees of the Sanitary District May 17, 1934, as stated in the Special Supplementary Report to the Supreme Court, dated May 23, 1934, received and ordered filed May 28, 1934, and as stated in the last semi-annual report. There were, however, certain details of design upon which the Engineering Department of the Sanitary District and the Engineering Board of the Public Works Administration were not in complete accord. These items were set forth in a communication of the Chief Engineer of the Sanitary District to the Resident Projects Engineer (PWA) on June 16, 1934 and were reviewed by the Engineering Board (PWA) June 21 and 22, 1934. Further conferences resulted in agreement by August 17, 1934 on the capacities for which certain parts of the plant should be designed, after which date, definite layouts could be made.

The development of the process of dewatering and incineration of sludge at the experimental plant at the West Side Treatment Works progressed to a point where it has been found to be feasible to combine steam generation with sludge incineration and thereby produce the power necessary to operate the entire plant more economically than by purchasing electrical energy. The proposed use of steam turbine driven units in place of electric driven units, previously proposed, was submitted to the Resident Projects Engineer (PWA) on July 17, 1934. A review of all the supporting data was requested by him on September 13, 1934 with comparative studies of the merits and costs of (1) dewatering and incineration of sludge with electric driven pumps and blowers, (2) dewatering and incineration of sludge with steam turbine driven pumps and blowers, (3) disposal of sludge by best method of digestion, and (4) digestion of sludge in heated tanks and subsequent dewatering and disposal of filter cake. The reports submitted by the District on this matter were considered by the Engineering Board (PWA) on November 10, 1934, at which time approval was given for the design of steam turbine driven pumps and blowers, though not as yet for the incineration process for the disposal of sludge. Definite approval awaits further development of the process in actual operation at the new Calumet plant. Specifications were prepared for Steam Turbine Driven Pumping and Blowing Units and advertisements and bids for the same were received December 27, 1934. The general plan of the Pumping Station and Blower House was approved by Engineers of the Public Works Administration November 23, 1934. The plans are now being rushed.

Preparation of plans for the Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., has progressed slowly. Final approval of the proposed general layout and location was obtained from engineers of the Public Works Administration on November 30, 1934. It is now anticipated that plans and specifications will be finished within the next two months.

Southwest Side Project. Satisfactory progress has been made on plans for the Southwest Side Intercepting Sewer. Field surveys have been completed, test pits have been dug along the route of the first four sections of the sewer from the Southwest Side Pumping Station to Racine Avenue. Right-of-way ordinances have been prepared for the City of Chicago and passed by the Sanitary District. Negotiations have been started toward the acquisition of certain necessary easements. A check has been made on the population and water use of the area served. The hydraulics of the entire intercepting sewer have been reviewed and a profile adopted. Plans and specifications have been prepared for one contract, namely, Section 2, for 8,100 feet of 18-foot sewer, upon which bids were received December 27, 1934. It is planned to have the first four Sections of this Sewer (75 per cent of the total work) under contract by June, 1935, and the remainder by the end of the year 1935. Progress on this sewer has been such that it can be completed before the earliest date on which the new Southwest treatment works will be ready to receive sewage.

Activated Sludge Patent Suit. The suit of Edgar C. Guthard, Activated Sludge, Ltd. and Activated Sludge, Inc., versus The Sanitary District of Chicago, in the United States District Court for the Northern District of Illinois, Eastern Division (In Equity No. 4280), mentioned in the last report to the Court, was argued before Judge Lindley on March 27 and 28, 1934.

On October 18, 1934, Judge Lindley presented his opinion and findings in the Chicago case. He held that the four patents in the Milwaukee case were valid and infringed; that because of their resemblance, the U. S. patent No. 1,286,017 was also valid and infringed. He denied an injunction because of the health hazard. He further found the sixth patent, No. 1,341,561 invalid for want of invention.

A petition for a rehearing is now pending before Judge Lindley. No decree has been entered as yet.

The suit brought against Milwaukee, which was decided for the plaintiff, Activated Sludge, Inc., by Judge Geiger (Activated Sludge, Inc., versus the City of Milwaukee, in Equity No. 2323, Eastern District of Wisconsin) was decided by the U. S. Circuit Court of Appeals for the 7th Circuit (The City of Milwaukee, Defendant Appellant, versus Activated Sludge, Inc., Plaintiff Appellee, U. S. Circuit Court of Appeals, 7th Circuit, No. 5001) in favor of the Plaintiff Appellee, Activated Sludge, Inc., on March 2, 1934, except that it was reversed as to the injunction. A rehearing was denied on April 13, 1934.

The City of Milwaukee filed a petition with the U. S. Supreme Court for a writ of certiorari. This was denied on October 8, 1934.

Another suit has been brought by Activated Sludge, Inc. against the Milwaukee Sewerage Commission. An injunction was granted by the trial court. On appeal, the decree was reversed as to injunction by the United States Circuit Court of Appeals (69 F. (2) 594). Judge Geiger has entered a decree in favor of the Plaintiff, from which an appeal is now being taken.

A further suit has been brought by Activated Sludge, Inc. against the Metropolitan Sewerage Commission in the Eastern District of Wisconsin, and also a suit has been brought by the same plaintiff against contractors and others furnishing supplies and parts for the Milwaukee plant.

While the suit against the Sanitary District has no direct bearing at present on the progress of the sewage treatment program, it is mentioned herein so that the Court may be advised of another element which tends to obstruct progress and may (if the patents are upheld) increase the cost of the works.

Packingtown Situation. A new suit was brought by the District against various firms in the Stockyards and Packingtown in the Circuit Court of Cook County by a bill filed on October 5, 1934, praying that pending the final hearing and disposition of this case, the various firms be enjoined from preventing the Sanitary District from inspecting the various plants in question and measuring and sampling the flow therefrom. As a result by agreement the right of inspection, sampling and gaging has been obtained. The field work will start early in 1935. Details of this survey are now being worked out with representatives of the Packing interests.

Financial. The financial condition of The Sanitary District of Chicago has changed but little since the time of the last report to the Court. The local tax situation has improved slightly. The amounts of taxes extended for the Sanitary District for the years 1928, 1929, 1930, 1931, 1932 and 1933 and the amounts collected up to December 14, 1934, pursuant to these extensions, are as follows:

Year	Total Taxes Extended	Amount Collected	Amount Unpaid	Percentage Unpaid
1928	$ 19,448,392.46	$17,229,330.92	$ 2,219,061.54	11.41
1929	24,466,998.58	19,854,969.36	4,612,029.22	18.85
1930	22,453,699.40	16,386,709.82	6,066,989.58	27.02
1931	20,517,561.90	14,319,206.45	6,198,355.45	30.21
1932	19,281,643.24	11,580,554.91	7,701,088.33	39.94
1933	18,037,092.11	0.00	18,037,092.11	100.00
	$124,205,387.69	$79,370,771.46	$44,834,616.23	36.18

The 1933 real estate taxes were placed in collection just prior to the writing of this report. No figures are as yet available as to the amount of collections. These taxes are payable in two installments, the second of which does not become delinquent until May 1, 1935. The delinquent date for the second installment of the 1932 taxes was July 1, 1934, ten months earlier than the corresponding date for the 1933 taxes, so it can be seen that the collection dates are gradually being brought back to normal.

The amount, $79,370,771.46, shown in the foregoing table, is the amount of Sanitary District taxes collected by the County Collector. Of this amount, $75,316,656.30 has been turned over to the Sanitary District.

The taxes collected since the time of the last report to the Court amount to $5,668,379.85, which is about 4.5 per cent of the taxes levied and due. This money was used to redeem tax anticipation warrants, to pay current expenses and to pay defaulted interest on bonds. The non payment of these taxes has forced the Sanitary District, through lack of revenue, to default on practically all payments of maturing principal on bonds used for construction work due from January 1, 1932 to December 17, 1934, inclusive, and a certain amount of interest on these bonds. The amounts in default, as of December 17, 1934, are:

Principal	$16,512,555.00
Interest	2,956,180.00
Total	$19,468,735.00

The interest in default amounted to a maximum of $6,370,268.75 on May 1, 1933, but this has been reduced to $2,956,180.00 since that time.

As stated in the last two reports to the Court, because the local tax situation was not likely to improve sufficiently in the near future to enable the payment of bonds in default, from the receipt of taxes, and thus make the Sanitary District bonds marketable, the Sanitary District negotiated with the Federal Emergency Administration of Public Works two agreements, dated December 16, 1933, under which the Public Works Administration purchased bonds of the Sanitary District in the principal amount of $41,938,000, at par plus accrued interest.

Because of certain changes in sequence in the construction program recommended by both the Sanitary District and the Engineering Board (PWA), negotiations have been undertaken with the Public Works Administration on an amended agreement, which would set forth the changes in procedure and the necessary re-allocation of funds for this work. Conferences were held with representatives of the Public Works Administration in the latter part of June, 1934 and again in October, 1934, and the provisions of the amended agreement have been determined. This agreement has not yet been officially executed but work is now proceeding according to the new allocations provided in it.

Since the time of the agreement of December 16, 1933, construction work has been resumed or started on 19 contracts, which apparently will cost $15,500,000. Bids have been received for three other contracts, which are estimated to cost $2,800,000. Plans will be completed within the next two months for two additional contracts, estimated to cost $6,100,000. All of these contracts will amount to $24,400,000 out of the total of $41,938,000 obtained from the Federal Emergency Administration of Public Works.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from June 1, 1934 (the date of the summaries for the last report) to December 1, 1934 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$2,526,935.78
West Side Project	2,890,932.30
Southwest Side Project	32,408.97
West-Southwest Treatment Plant	69,940.04
Total	$5,520,217.09

In addition to the amounts shown in Table 3, approximately $787,000 had been earned by contractors up to December 1, 1934, on the various items of work but is retained by the Sanitary District as reserved percentage until the final completion of the contracts. During the month of December, payments aggregating approximately $1,320,000 were paid for contract work. This will appear in the cost summaries of the next report to the Court.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed por-

tion of the sewage treatment construction program on December 1, 1934, is as follows:

TABLE 4.

COMPLETED WORK AS OF DECEMBER 1, 1934.

Calumet Project	$ 24,085,344.90
North Side Project	37,122,381.52
West Side Project	45,279,919.83
Southwest Side Project	358,614.68
West-Southwest Treatment Plant	228,940.21
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$107,724,805.74

Because of the extremely low construction prices prevailing during the past year, there has been a considerable saving on the work placed under contract in 1934, particularly on the Calumet Sewage Treatment Works and the West Side Intercepting Sewers. The Engineering Board (PWA) recommended that the Southwest Side sewers and certain units of the Southwest Sewage Treatment works be constructed to less ultimate capacity than originally planned. This fact and late developments in the sludge dewatering and incinerating process necessitated a new, up to date estimate of the entire Southwest Side Project. The net result of the contract letting and the re-estimates are an indicated saving of $7,525,000.00 on the entire construction program.

The estimated cost of future sewage treatment construction, as of December 1, 1934, is, as follows:

TABLE 5.

FUTURE WORK AFTER DECEMBER 1, 1934.

Calumet Project	$ 11,544,000.00
North Side Project	5,375,000.00
West Side Project	8,947,000.00
Southwest Side Project	39,561,000.00
West-Southwest Treatment Plant	35,278,000.00
Miscellaneous Plants and Sewers	2,000,000.00
Chicago River Controlling Works	3,200,000.00
Total	$105,905,000.00

The balance remaining of the funds obtained from the Public Works Administration amounts to $35,837,000, leaving $70,068,000 of the future work to be financed from other sources. The Sanitary District of Chicago, at the present time, has no resources for this work.

In December, 1933, when the agreements with the Public Works Administration were being negotiated, the debt incurring capacity of the Sanitary District of Chicago was $183,183,629, being 5 per cent of the assessed valuation $3,663,672,580 for the year 1931 of all the property within the District. The bonds then sold to the Public Works Administration, coupled with the already outstanding bonds and other contractual obligations of the Sanitary District, utilized practically all its debt incurring capacity. If this transaction had not been completed promptly, before the assessed valuations for the year 1932 were in effect, the deal could not have been consummated, because the Sanitary District would not have had sufficient debt incurring capacity. The assessed valuation for the year 1932 (on which taxes were collected in the spring and summer of 1934), was $2,877,336,389 and the debt incurring capacity of the Sanitary District was $143,866,819. The assessed valuation of all the property within the Sanitary District for the year 1933 (on which taxes have been extended within the past month) amounts to $2,774,937,248, reducing the debt incurring capacity of the Sanitary District to $138,746,862 as of the present time. The presently outstanding bonds of the Sanitary District amount to $143,420,055. Construction contractual obligations, not payable from funds derived from the PWA, amount to $438,000 and judgments amount to $153,000. In addition to obligations under the contract for purchase of power, obligations for rent, etc., the Sanitary District has today outstanding obligations of upwards of $144,000,000, with a debt incurring capacity of $138,746,862. Aside from the funds obtained by sale of bonds to the Public Works Administration, which are strictly allocated to certain projects in the sewage treatment construction program, estimated to cost $35,837,000, there is now a deficit of more than $5,000,000 in the debt incurring capacity of the Sanitary District. This situation can not be corrected until collection of taxes improves sufficiently to permit the redemption of outstanding bonds ($16,512,555 of which are in default) or until an increase in the assessed valuation of property brings about a resultant increase in the debt incurring capacity of the Sanitary District. It is practically certain that neither of these expedients will make available any important amount of revenue in time to enable the financing of the estimated $70,068,000 balance of the sewage treatment construction program by the end of 1938.

In order to obtain funds, sufficient to finance the remainder of this construction the Sanitary District of Chicago has been endeavoring to bring about the purchase by the Federal Government of the waterway improvements applicable to navigation made by the Sanitary District in the South Branch of the Chicago River, the Little Calumet River, the Main Channel and the Calumet-Sag Channel. A resolution initiating steps toward this purchase, introduced in the House of Representatives March 27, 1934 (H. J. Res. No. 308, Seventy-third Congress, 2nd Session) was referred to the Committee on Rivers and Harbors. This Committee, by resolution, after a hearing on June 15, 1934, referred the matter to the War Department for report.

At a public hearing in the office of the United States District Engineer in Chicago, December 19, 1934, the Sanitary District presented a formal written statement supported by oral testimony of its officers setting forth the facts that it had improved these natural streams and constructed these artificial channels in a manner to provide equal facility for navigation and for the disposal of sewage by dilution; that this system of channels was constructed with a nominal capacity of 10,000 cubic feet per second of water for the dilution of sewage; that after December 31, 1938, the diversion of water from Lake Michigan through these channels was to be reduced, under the Supreme Court decree, to an annual average of 1,500 cubic feet per second and their value to the Sanitary District for the dilution of sewage thereby greatly diminished; that their value for navigation, connecting the waterways of the Mississippi River System with the Great Lakes System was not thereby impaired; that under the Rivers and Harbors Act of July 3, 1930 these channels had been taken over by the War Department, without compensation; that the 1934 reproduction cost of the navigation improvements in said channels was estimated at $90,607,173; that since the national purpose of these channels (navigation) was to be unimpaired and their local purpose (disposal of sewage) greatly diminished, the local taxpayers were entitled to reimbursement for the investment they had made, to the end that the taxpayers' funds so reimbursed by reason of this sale might be applied to the purpose for which it was originally intended, namely, disposal of sewage. The Sanitary District pledged itself to use whatever money might be obtained, from the sale of its rights in these channels, for the construction of sewage disposal facilities. At this Public Hearing the representatives of the Attorneys General of the States of Ohio, Minnesota, Michigan and Wisconsin appeared in opposition to the purchase of these channels by the Government. A continuance of this Public Hearing was obtained by the representatives of the Lake States until January 15, 1935, at which time a formal statement of their position is to be presented. This action will delay the early consideration of the matter by the War Department and possibly by Congress.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of January 1, 1935, is about 4,312,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,738,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,050,000. This figure includes the Corn Products wastes, equivalent to the sewage of 371,000 persons, which wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The 1935 total population, and industrial waste equivalent, as above indicated, are estimated as 6,050,000. Up to date, the Sanitary District has assumed that sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total January 1, 1935, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,142,000, which is 85 per cent of 6,050,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on June 25, 1934 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1934.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	219,000	33⅓	73,000
North Side	1,133,000	85	963,000
West Side (Sedimentation)..	763,000	33⅓	254,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	7,000	85	6,000
Corn Products (Reduction)..	398,000		303,000
Total............	2,535,000		1,612,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1934.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	224,000	33⅓	74,000
North Side	1,150,000	85	977,000
West Side (Sedimentation)..	770,000	33⅓	257,000
Miscellaneous (Morton Grove, Glenview, Northbrook) ...	7,000	85	6,000
Corn Products (Reduction)..	371,000		284,000
Total............	2,537,000		1,611,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,611,000 out of 5,142,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,050,000 were being treated. This indicates the actual treatment of approximately 31.4 per cent of the total sewage within the Sanitary District, although considerable additional construction work has been performed during this period, for which no credit will be taken in this percentage until the works are completed and put in operation.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan, during the calendar year 1933, averaged 6,270 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,690 cubic feet per second; the inflow from the Des Plaines River at Willow Springs averaged 45 cubic feet per second and the total flow from the Main Channel at Lockport averaged 8,005 cubic feet per second.

Diversion of water from Lake Michigan by the Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limits the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935. The average monthly diversion as made under this Permit from January 1 to December 20, 1934, is indicated in the table following:

Month 1934	Total Flow From Main Channel At Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	7281	0	1598	5683
February	7144	0	1617	5527
March	7004	0	1599	5405
April	7955	0	1588	6367
May	8413	0	1738	6675
June	8762	0	1792	6970
July	8710	0	1886	6824
August	8700	0	1839	6861
September ..	8657	0	1726	6931
October	8239	0	1699	6540
November ...	8266	0	1616	6650
Dec. 1 to 20..	8325	0	1600	6725
Average	8121	0	1691	6430

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By ROSS A. WOODHULL,
President.

PHILIP HARRINGTON,
Chief Engineer.

WILLIAM ROTHMANN,
Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

Office Supreme Court, U. S.
FILED
JUL 2 1935
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~5,~~ 4
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~8,~~ 5
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~9,~~ 6
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1935. MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO., 24 PRINTERS, CHICAGO.

IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

October Term, 1934.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 8, Original.
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1935. MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1935, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1935, the status of completed work in the sewage treatment construction program involved in this case was stated to be on December 1, 1934, as follows:

TABLE 1.

COMPLETED WORK AS OF DECEMBER 1, 1934.

Calumet Project	$ 24,085,344.90
North Side Project	37,122,381.52
West Side Project	45,279,919.83
Southwest Side Project	358,614.68
West-Southwest Treatment Plant	228,940.21
Miscellaneous Plants and Sewers	596,188.86
Chicago River Controlling Works	53,415.74
Total	$107,724,805.74

TABLE 2.

FUTURE WORK AFTER DECEMBER 1, 1934.

Calumet Project	$ 11,544,000.00
North Side Project	5,375,000.00
West Side Project	8,947,000.00
Southwest Side Project	39,561,000.00
West-Southwest Treatment Plant	35,278,000.00
Miscellaneous Plants and Sewers	2,000,000.00
Chicago River Controlling Works	3,200,000.00
Total	$105,905,000.00

During the interim of six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet and West Side Projects and a reasonable start has been made on the Southwest Side Project.

Calumet Project. Construction was continued on the following contracts mentioned in the last semi-annual report: the Calumet Pumping Station and Blower House, now 95 per cent completed; the Aeration Tanks, Operating Galleries, Final Settling

Tanks, etc., now 98 per cent completed; the Preliminary Settling Tanks, Sludge Concentration Tanks, Screen House, Meter Vault, etc., now 98 per cent completed; the Blower Units, now 91 per cent completed; the Connecting Conduits between the old and new Calumet pumping station and the new sewage treatment plant, now 85 per cent completed; the Sewage Pumping Units, now 100 per cent completed; the manufacture and delivery of the Diffuser Plates to be installed in the aeration tanks, now 100 per cent completed; and on the Harvey Sewer, now 98 per cent completed.

Bids for the construction of the Sludge Dewatering and Incinerating Plant and for Underground Duct Lines to supply power to the plant were taken May 16, 1935 and four contracts were awarded June 6, 1935 for this work. These contracts are: Division J, Building and Miscellaneous Work; Division K, Sludge Disposal Equipment and Piping; Division L, Electrical Equipment; and Division M, Underground Duct Lines. Construction work has already started and will be completed before the end of 1935. Plans are being prepared for roadways, grading, drainage, lighting, etc., the final clean-up contract for the Calumet Treatment Works. It is expected that the Calumet Treatment Works will be placed in operation in the fall of 1935. Certain sewers in the Calumet Region are yet to be constructed whenever finances become available.

West Side Project. Construction was continued on the following sewer contracts mentioned in the last Semi-annual Report to the Court: West Side Sewer, Contract 3, now 100 per cent completed; West

Side Sewer, Contract 4, now 64 per cent completed; West Side Sewer, Contract 5, now 100 per cent completed; West Side Sewer, Contract 6, now 88 per cent completed; West Side Sewer, Contract 7, now 88 per cent completed; West Side Sewer, Contract 8, now 100 per cent completed; West Side Sewer, Contract 9, now 45 per cent completed; and West Side Sewer, Contract 10, now 66 per cent completed. All of this work mentioned will easily be completed before the end of 1935 with the possible exception of West Side Sewer, Contract 4.

Battery C of the Imhoff Tanks was completed and placed in operation April 29, 1935. Contract Section 3 of the West Side Sewer was placed in service June 14, 1935.

Operation of the experimental Sludge Filtering and Drying Unit at the West Side Sewage Treatment Works has been continued and considerable more progress made in the development of the process of disposal of sludge by mechanical dewatering and incineration.

West-Southwest Treatment Plant. As stated in the last semi-annual report to the Court, bids for furnishing Steam Turbine driven Pumping and Blower Units for the West-Southwest Treatment Works were received December 27, 1934. Two contracts for these units were awarded February 14, 1935. Bids for the construction of Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., were received March 28, 1935 and the contract for the same was awarded April 11, 1935. Bids for furnishing Sludge Removal Mechanisms were received March 28, 1935 and the contract awarded April 11, 1935. Bids for furnishing Venturi Meters were received March 28, 1935 and the contract awarded April 4, 1935. Bids for furnishing Large Valves were received March 28, 1935 and the contract awarded April 11, 1935. Bids for Electrical Work in connection with the Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., were received June 6, 1935 and the contract awarded June 14, 1935. Bids for the construction of the Substructure of the Pumping Station and Blower House were received April 4, 1935 and the contract for the same was awarded April 18, 1935. Plans are being prepared for the Superstructure of the Pumping Station and Blower House, for Conduits and Preliminary Settling Tanks, etc. Studies are being made for the Sludge Dewatering and Incinerating Plant. Actual construction work was started on the Aeration Tanks April 29, 1935 and on the Pumping Station Substructure May 20, 1935.

Southwest Side Project. As stated in the last semi-annual report to the Court, bids for the construction of Section 2 of the Southwest Side Intercepting Sewer were received December 27, 1934. The contract for this work was awarded February 14, 1935 and actual construction work was started March 11, 1935. Bids for the construction of Section 3 of the Southwest Side Intercepting Sewer (from Crawford Avenue to Western Avenue) were received March 14, 1935, the contract was awarded March 21, 1935 and actual construction work was started May 13, 1935. Bids for the construction of Section 1 of the Southwest Side Intercepting Sewer were received June 27, 1935. This section extends from the West-Southwest Treatment Works to a connection with the West Side

Sewer near Laramie Avenue, then under the Main Drainage Canal to connect with Section 2 of the Southwest Side Sewer. The contract also involves the construction of the Screen Chamber for the West-Southwest Pumping Station. Plans are practically completed for Section 4 of the Southwest Side Intercepting Sewer (from Western Avenue to Racine Avenue) and it is expected that bids will be taken early in August, 1935. Considerable preliminary work has been done on Sections 5 and 6 of the Southwest Side Sewer.

Activated Sludge Patent Suit. In the suit of Edgar C. Guthard, Activated Sludge, Ltd., and Activated Sludge, Inc., versus The Sanitary District of Chicago, in the United States District Court for the Northern District of Illinois, Eastern Division (In Equity No. 4280), mentioned in the last report to the Court, Judge Lindley denied a petition for a rehearing on February 8, 1935. On February 8, 1935, an interlocutory decree was rendered against the Sanitary District in favor of the Activated Sludge, Inc. An appeal to the United States Circuit Court of Appeals for the 7th Circuit was prayed by the Sanitary District on March 9, 1935.

While the suit against the Sanitary District has no direct bearing at present on the progress of the sewage treatment program, it is mentioned herein so that the Court may be advised of another element which tends to obstruct progress and may (if the patents are upheld) increase the cost of the works.

Packingtown Situation. The field work on the survey of the Stockyards and Packingtown mentioned in the last report to the Court started with active sampling and gaging on February 18, 1935. The representatives of the Packing interests are cooperating in this survey. To date, the sewer outlets of 10 firms have been tested. The survey will probably require at least three months longer.

On May 1, 1935, a bill was introduced in the General Assembly of the State of Illinois (known as House Bill No. 938, of the 59th General Assembly), amending the Sanitary District Act to grant police power to control the discharge of industrial wastes and to permit a charge being made for the conveying, pumping, treatment and disposal of industrial waste. All establishments discharging over 3,650,000 gallons of industrial waste per year are affected. The bill has been approved by the House of Representatives and is now pending before the Senate.

Financial. The financial condition of The Sanitary District of Chicago has changed but little since the time of the last report to the Court. The local tax situation has improved slightly. The amounts of taxes extended for the Sanitary District for the years 1928, 1929, 1930, 1931, 1932 and 1933 and the amounts collected up to May 31, 1935, pursuant to these extensions, are as follows:

Year	Total Taxes Extended	Amount Collected	Amount Unpaid	Percentage Unpaid
1928	$ 19,448,392.46	$17,307,124.49	$ 2,141,267.97	11.01%
1929	24,466,998.58	20,111,872.85	4,355,125.73	17.80%
1930	22,453,699.40	16,840,274.55	5,613,424.85	25.00%
1931	20,517,561.90	14,860,870.08	5,656,691.82	27.57%
1932	19,281,643.24	12,498,361.12	6,783,282.12	35.18%
1933	18,037,167.48	10,346,119.28	7,691,048.20	42.64%
	$124,205,463.06	$91,964,622.37	$32,240,840.69	25.96%

The amount, $91,964,622.37, shown in the foregoing table, is the amount of Sanitary District taxes collected by the County Collector. Of this amount, $88,253,531.40 has been turned over to the Sanitary District.

The taxes collected since the time of the last report to the Court amount to $12,593,850.91, which is about 10.1 per cent of the taxes levied and due. This money was used to redeem tax anticipation warrants, to pay current expenses and to pay defaulted interest and principal of bonds. The non-payment of these taxes to the extents indicated above has forced the Sanitary District, through lack of revenue, to default on a considerable amount of maturing principal on bonds used for construction work due from January 1, 1932 to June 1, 1935, inclusive, and a certain amount of interest on these bonds. The amounts in default, as of June 1, 1935, are:

Principal	$15,738,390.00
Interest	1,110,460.00
Total	$16,848,850.00

The amount in default has been reduced by $2,619,885.00 since the time of the last report.

Reference was made in last report to the Court to negotiations between the Sanitary District of Chicago and the Federal Emergency Administration of Public Works leading up to a Supplementary Agreement providing for the re-allocation of certain funds of the $41,938,000 obtained by the Sanitary District from the Public Works Administration. This Supplementary Agreement was approved by the Board of Trustees of the Sanitary District March 7, 1935 and by the Administrator of the Federal Emergency

Administration of Public Works April 4, 1935. Work is now proceeding in accordance with the terms of this Supplementary Agreement.

Under the provisions of the Agreements between the Sanitary District of Chicago and the Public Works Administration the Sanitary District is to receive a Grant, limited to $12,000,000, when the total of $41,938,000 shall have been expended on construction work. As the amounts making up this Grant are earned, at six months intervals, bonds of the Sanitary District, now owned by the Government, in amounts equal to the amounts earned under the Grant provisions are to be set aside and held by the Government until the end of the periods covered by the Agreements and the bonds so held then delivered to the Sanitary District. The net result of these operations will be a net expenditure of $29,938,000 by the Sanitary District, which when added to the amount of the Grant, $12,000,000, will make up the total of $41,938,000. On June 12, 1935 the Sanitary District filed with the Federal Emergency Administration of Public Works an Application to increase the allocation of funds to the Sanitary District to $58,630,000, under which the Government would retain all of the $41,938,000 of bonds of the Sanitary District and advance the Grant, in cash, to be applied to sewage treatment construction work. If this Application is approved and the net expenditure of the Sanitary District thus becomes $41,938,000, then the possible Grant to be earned according to the ratios in the present Agreements will be $16,692,000. A list of additional sewage treatment construction projects, estimated to cost $16,692,000, has been submitted in the aforesaid Application. All of these projects submitted are parts of the program proposed by the Sanitary District during the trial of the case.

As stated in the last report to the Court the Sanitary District of Chicago initiated steps to bring about the purchase by the Federal Government of the waterway improvements applicable to navigation in the South Branch of the Chicago River, the Little Calumet River, the Main Channel and the Calumet-Sag Channel. A public hearing on this matter before the United States District Engineer in Chicago December 19, 1934 was continued until January 15, 1935. At this continued public hearing, representatives of the Attorneys General of the States of Ohio, Michigan, Minnesota and Wisconsin appeared and presented formal opposition to the purchase of these channels by the Government. The Sanitary District Act was amended by the Illinois Legislature at the 1935 session, giving the necessary legal authority to make the sale. No recommendation to Congress has yet been made by Engineers of the War Department.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December 1, 1934 (the date of the summaries for the last report) to June 1, 1935 (the date of the summaries for this report) as measured by construction expenditures was as follows:

TABLE 3.

Calumet Project	$1,742,323.40
North Side Project	4,526.08
West Side Project	4,044,968.49
Southwest Side Project	99,411.59
West-Southwest Treatment Plant	133,996.61
Miscellaneous Plants and Sewers	7,591.07
Total	$6,032,817.24

In addition to the amounts shown in Table 3, approximately $944,000 had been earned by contractors up to June 1, 1935, on the various items of work but is retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on June 1, 1935, is, as follows:

TABLE 4.

COMPLETED WORK AS OF JUNE 1, 1935.

Calumet Project	$ 25,827,668.30
North Side Project	37,126,907.60
West Side Project	49,324,888.32
Southwest Side Project	458,026.27
West-Southwest Treatment Plant	362,936.82
Miscellaneous Plants and Sewers	603,779.93
Chicago River Controlling Works	53,415.74
Total	$113,757,622.98

Because of the low construction prices prevailing during the past year, there has been a considerable saving on the work placed under contract during the past six months. Such savings amounted to $2,463,000 on the West-Southwest Sewage Treatment Plant and on the Southwest Side Sewers. A re-estimate of the plans of the future construction program resulted in a reduction of $1,073,000 more. The estimated cost of future sewage treatment construction, as of June 1, 1935, is as follows:

TABLE 5.

FUTURE WORK AFTER JUNE 1, 1935.

Calumet Project	$ 8,734,000
North Side Project	5,000,000
West Side Project	4,117,000
Southwest Side Project	39,672,000
West-Southwest Treatment Plant	33,621,000
Miscellaneous Plants and Sewers	1,992,000
Chicago River Controlling Works	3,200,000
Total	$96,336,000

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of July 1, 1935, is about 4,358,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,757,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,115,000. This figure includes the Corn Products wastes, equivalent to the sewage of 382,000 persons, which wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The 1935 total population, and industrial waste equivalent, as above indicated, are estimated as 6,115,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total January 1, 1935, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,198,000, which is 85 per cent of 6,115,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on December 24, 1934 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1934.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	224,000	33⅓	74,000
North Side	1,150,000	85	977,000
West Side (Sedimentation)...	770,000	33⅓	257,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	7,000	85	6,000
Corn Products (Reduction)...	371,000		284,000
Total.............	2,537,000		1,611,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1935.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	228,000	33⅓	76,000
North Side	1,167,000	85	992,000
West Side (Sedimentation)...	883,000	33⅓	294,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	7,000	85	6,000
Corn Products (Reduction)...	382,000		316,000
Total.............	2,682,000		1,697,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,697,000 out of 5,198,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,115,000 were being treated. This indicates the actual treatment of approximately 32.6 per cent of the total sewage within the Sanitary District, although considerable additional construction work has been performed during this period, for which no credit will be taken in this percentage until the works are completed and put in operation.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan during the calendar year 1934, averaged 6,433 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,692 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8,125 cubic feet per second.

Diversion of water from Lake Michigan by the Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limits the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935. The average monthly diversion as made under this Permit from January 1 to June 20, 1935, is indicated in the table following:

Month 1935	Total Flow From Main Channel At Lockport C.F.S.	Inflow From Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	8312	0	1631	6681
February	8325	0	1614	6711
March	8247	12	1567	6668
April	8376	1	1579	6796
May	8360	69	1561	6730
June 1 to 20..	8340	0	1600	6740
Average	8327	14	1542	6721

While the average diversion for the first half of the year 1935 is greater than 6,500 C. F. S., the annual average will be maintained below the allowable maximum by reducing the diversion during the remainder of the year.

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,
By ROSS A. WOODHULL,
President.

PHILIP HARRINGTON,
Chief Engineer.

ELMER J. WHITTY,
Acting Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

Office Supreme Court, U.
FILED
DEC 30 1935
[illegible]
CLERK

13

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1936, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO., 24 PRINTERS, CHICAGO.

100

IN THE

Supreme Court of the United States

NOS. 5, 8 AND 9, ORIGINAL.

OCTOBER TERM, 1935.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 8, Original.
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1936, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of January 1, 1936, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of July 1, 1935, the status of completed work in the sewage treatment construction program involved in this case was stated to be on June 1, 1935, as follows:

TABLE 1.

COMPLETED WORK AS OF JUNE 1, 1935.

Calumet Project	$ 25,827,668.30
North Side Project	37,126,907.60
West Side Project	49,324,888.32
Southwest Side Project	458,026.27
West-Southwest Treatment Plant	362,936.82
Miscellaneous Plants and Sewers	603,779.93
Chicago River Controlling Works	53,415.74
Total	$113,757,622.98

TABLE 2.

FUTURE WORK AFTER JUNE 1, 1935.

Calumet Project	$ 8,734,000.00
North Side Project	5,000,000.00
West Side Project	4,117,000.00
Southwest Side Project	39,672,000.00
West-Southwest Treatment Plant	33,621,000.00
Miscellaneous Plants and Sewers	1,992,000.00
Chicago River Controlling Works	3,200,000.00
Total	$96,336,000.00

During the interim of six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet, the West Side and the Southwest Side Sewage Treatment Projects and a reasonable start has been made on plans for the extension of the North Side Treatment Works. Studies, estimates and preliminary plans have been made for the Chicago River Control Works, an application for a permit to construct the same has been filed with the United States District Engineer in Chicago and a public hearing has been held on this matter.

Calumet Project. The following contracts, mentioned in the last semi-annual report, have been completed: Calumet Pumping Station and Blower House; Aeration Tanks, Operating Galleries, Final Settling Tanks, etc.; Preliminary Settling Tanks, Sludge Concentration Tanks, Screen House, Meter Vault, etc.; Blower Units; Connecting Conduits between old Calumet pumping station and new treatment plant; and the Harvey Sewer.

Construction was continued on contracts for: Sludge Disposal Building and Miscellaneous Work, now 75 per cent completed; Sludge Disposal Equipment and piping, now 48 per cent completed; Electrical Equipment, now 10 per cent completed; and Underground Duct Lines, now 81 per cent completed. A contract for roadways, grading, drainage, lighting, etc., was awarded September 5, 1935 and this work is now 50 per cent completed.

The Calumet Sewage Treatment Works Extension was placed in operation December 3, 1935, treating the sewage of approximately 250,000 people by the Activated Sludge process. The contracts yet to be completed are all in connection with the sludge disposal plant (by dewatering and incineration) and roads and grading. It is expected that all these contracts will be completed before March 1, 1936. Meanwhile the excess sludge will be stored in the tanks of the old Calumet treatment plant or lagooned in the ash disposal area.

Arrangements were made, in an agreement with the Federal Emergency Administration of Public Works, dated September 21, 1935, for financing the construction of four additional sewers in the Calumet region, namely: South Park Avenue, Colfax Avenue, Stony Island Avenue and Calumet City. Plans and specifications have been prepared for the South Park Avenue sewer and bids for the construction of the same were received November 7, 1935, but were returned unopened because of a dispute over labor rates on sewer work. This work was re-advertised and bids for the construction were received December 26, 1935. Plans for the Colfax Avenue Sewer are practically completed. Surveys have been completed for the Stony Island Avenue and Calumet City sewers and work started on the plans.

Three other sewers in the Calumet area will still remain to be constructed whenever finances become available. These are the Blue Island Intercepting, the Evergreen Park and the California Avenue-Oak Forest Sewers.

North Side Project. In an agreement with the Federal Emergency Administration of Public Works, dated September 21, 1935, arrangements were made for financing the construction of a portion of the North Shore Intercepting Sewer, known as the Cherry Street Sewer, of certain sewer siphons under the North Shore Channel and of an extension of the North Side Treatment Works. Bids were received for the construction of the Cherry Street Sewer, December 26, 1935. Plans and specifications for additional final settling tanks and sludge removal mechanisms for the North Side Treatment Works will be completed within the next month.

West Side Project. The following sewer contracts, mentioned in the last semi-annual report to the Court, have been completed: West Side Sewer Contract 6, Contract 7, Contract 10. West Side Sewer Contract 4 is now 98 per cent completed and Contract 9 is now 92 per cent completed. It is expected that these contracts will be completed within the next two months, thereby completing the main West Side Intercepting Sewer. Through West Side Sewer Contracts 1, 2 and 3 and from Laramie Avenue Sewer, the sewage of approximately 695,000 persons is taken to the West Side Treatment Works. With the completion of Contract 4, the remaining sewage from the areas served by West Side Sewer, Contracts 4 to 10, inclusive, involving approximately 600,000 people, can be taken to the plant for treatment.

Certain collateral intercepting sewers remain to be constructed to make the West Side system complete. Arrangements were made, in an agreement with the Federal Emergency Administration of Public Works, dated September 21, 1935, for financing the construction of three of these sewers, namely: Goose Island, Halsted Street and Harrison Street to Fourteenth Street Sewers. Surveys have been completed for all these sewers; plans have been started for the Goose Island and Halsted Street Sewers and plans and specifications have been completed for the Harrison Street to Fourteenth Street Sewer. The taking of bids for this latter sewer is being delayed by difficulty in acquiring right-of-way.

The remaining work in the West Side Project, dependent upon future financing, consists of certain collateral sewers and sewer connections in the area adjacent to the Main Drainage Channel west of Western Avenue and of facilities for the secondary (or complete) treatment of sewage at the West Side works.

West-Southwest Treatment Plant. Construction was continued on the following contracts, mentioned in the last semi-annual report to the Court: Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 39 per cent completed; Electrical work in connection with Aeration Tanks, etc., now 8 per cent completed; Substructure of Pumping Station and Blower House, now 99 per cent completed. The fabrication of the following equipment was continued: Steam Turbine driven Pumping Units, now 40 per cent completed; Steam Turbine driven Blower Units, now 43 per cent completed; Sludge Removal Mechanisms, now 25 per cent completed; Venturi Meters, now 86 per cent completed; Large Valves, now 50 per cent completed.

A contract for the structural steel work of the Pumping Station and Blower House was awarded November 21, 1935. Bids were received for furnishing Steam Turbine driven Electric Generators, for furnishing Condensers, for furnishing Electric Transformers, for furnishing Feed Water Heaters December 5, 1935. Plans are practically completed for the Superstructure (Architectural Work) of the Pumping Station and Blower House and for the Influent and Effluent Conduits, etc. Plans are well under way for the Piping and Auxiliary Equipment in the Pumping Station and Blower House.

Progress on the Sludge Disposal Plant (Sludge Dewatering and Incinerating Plant) has been unavoidably slow. Two distinct processes and types of equipment for dewatering and incinerating sludge had been the subject of consideration by the Sanitary District engineers and the Engineering Board (PWA) at the time of the last semi-annual report to the Court. Both methods contemplated the combining of sludge incineration with steam power generation for all plant power requirements. This Engineering Board (PWA) met September 11-13, 1935 to review this and other matters and requested a comprehensive report on construction and operating cost of both types. Such report was prepared and submitted to the Engineering Board (PWA) on October 3, 1935. The type of dewatering and incinerating equipment developed and recommended by engineers of the Sanitary District at the West Side Experimental Plant was then approved (October 5, 1935) and the Sanitary District was directed to proceed with the design of a sludge disposal plant (dewatering and incineration process) utilizing this type and process, of sufficient capacity to handle the sludge from the North Side Plant and from the Southwest Plant with an average sewage flow of 400 M. G. D. Plans and specifications for boilers and for air preheaters have been practically completed and advertisements for bids for furnishing this equipment will be published as soon as approval of the details can be obtained from representatives of the Public Works Administration. It is planned to contract for the purchase of all the major equipment for the sludge disposal plant by April, 1936 in order that the building may be placed under contract in the early summer of 1936.

Southwest Side Project. The contract for the construction of Section 1 of the Southwest Side Intercepting Sewer including the Screen Chamber for the Southwest Pumping Station was awarded July 11, 1935 and actual construction was started July 23, 1935, this contract now being 9 per cent completed. Work was continued on the construction of contract Section 2, now 68 per cent completed and on contract Section 3, now 34 per cent completed. The contract for the construction of Section 4 (from Western Avenue to Racine Avenue) was awarded August 15, 1935 and actual work started September 16, 1935, the contract now being 3 per cent completed. Bids for the construction of Section 5 of the Southwest Side Intercepting Sewer were received October 31, 1935, but were returned unopened because of the pending dispute relative to an increase in labor rates on sewer work. This work was re-advertised and bids were received December 19, 1935. Plans for contract Section 6 are about 50 per cent completed. Considerable progress has been made on the plans for connections and collateral work of the Southwest Side Intercepting Sewer.

In an agreement with the Federal Emergency Administration of Public Works, dated September 21, 1935, arrangements were made for financing the construction of the Upper Des Plaines Sewer, the West Towns Sewer and a portion of the Argo Sewer from the Southwest Treatment Plant to Narragansett Avenue. Bids were taken October 17, 1935 for the construction of ten miles of the Upper Des Plaines Sewer from Dempster Street to North Avenue. These bids were rejected November 6, 1935, as being too high, the work was re-advertised November 20, 1935 and bids considerably lower were received December 5, 1935. Three contracts, for Sections 3, 4 and 6 of this sewer, were awarded December 12, 1935. Plans for Sections 1 and 2 of the Upper Des Plaines Sewer, about five miles from North Avenue to Roosevelt Road are about 50 per cent completed. Plans for Sections 2 and 3 of the West Towns Sewer, from Roosevelt Road to the Main Drainage Channel are approximately 85 per cent completed.

Control Works, Chicago River. In an agreement with the Federal Emergency Administration of Public Works, dated September 21, 1935, arrangements were made for financing the construction of Control Works for the Chicago River, the sum of $3,000,000 being allocated for this purpose. The Engineering Board (PWA) on September 13, 1935, requested that estimates be furnished for four different types of flood gates which could be placed in the Chicago River east of Michigan Avenue, or east of the most easterly sewer outlet. These estimates were furnished on October 3, 1935 and on October 5, 1935 the Engineering Board recommended that an application be filed with the United States District Engineer, in Chicago, for a permit for the construction of two sets of flood gates in the Chicago River, spaced about 800 feet apart. Each set of gates, similar to standard lock gates, was to be placed in an opening 110 feet wide in a wall, or dam, across the river. The gates would be closed only in times of flood, or threatened river reversal, and even when closed, boats could pass, since the section of the river between the gates could be used as a lock.

An application was filed with the War Department, October 10, 1935, for a permit for the construction of flood gates, or control works, in the Chicago River. At a public hearing before the United States District Engineer in Chicago, November 15, 1935, considerable opposition was expressed to the construction of such gates, particularly as to the location first designated. Suggestion was made that a comprehensive harbor plan, including control works, which had been worked out by the Chicago Plan Commission be substituted for the proposed control works. All the construction in the comprehensive harbor plan, estimated to cost $4,800,000, would be in the lake east of the Outer Drive Bridge. The flood gates in the Chicago River were estimated to cost not more than $1,000,000, including some allowance for land and dock damages. The control works portion of the comprehensive harbor plan were estimated to cost about $1,000,000 but no method of financing the cost of the remaining construction was suggested. This matter received further consideration from the Engineering Board (PWA) December 13-14, 1935 and December 19-20, 1935 and a modified plan is being prepared to be submitted to the War Department.

Activated Sludge Patent Suit. In the suit of Edgar C. Guthard, Activated Sludge, Ltd., and Activated Sludge, Inc. versus The Sanitary District of Chicago, in the United States District Court for the Northern District of Illinois, Eastern Division (In Equity No.

4280), mentioned in the last report to the Court, the record is being prepared for the appeal to the United States Circuit Court of Appeals for the 7th Circuit.

On November 26, 1935, all the patents held valid by Judge Lindley in the above-mentioned suit expired.

In the litigation at Milwaukee, the United States Circuit Court of Appeals heard arguments on November 8, 1935 in the suit brought by Activated Sludge, Inc. against the Milwaukee Sewerage Commission.

While the suit against the Sanitary District has no direct bearing at present on the progress of the sewage treatment program, it is mentioned herein so that the Court may be advised of another element which tends to obstruct progress and may (if the patents are upheld) increase the cost of the works.

Packingtown Situation. Considerable progress has been made on the survey of the Stockyards and Packingtown mentioned in the last report to the Court. The sewer outlets of 28 packing companies have been tested, as well as all of the outlets of the Stockyards. It is hoped that this survey may be continued during the year 1936 to the extent necessary, so that a report can be made over a sufficient period of time to reflect normal conditions.

At the 1935 session of the General Assembly of the State of Illinois the Sanitary District Act was amended to grant police power to control the discharge of industrial wastes and to permit a charge being made for the handling of the same. This law went into effect July 1, 1935. It is anticipated that steps will be taken to make necessary surveys so that

The Sanitary District of Chicago may exercise the power granted under that statute.

Financial. The financial condition of The Sanitary District of Chicago has improved somewhat since the time of the last semi-annual report to the Court. The local tax situation has improved slightly. The amounts of taxes extended for the Sanitary District for the years 1928 to 1934, inclusive, and the amounts collected up to November 29, 1935, pursuant to these extensions, are as follows:

Year	Total Taxes Extended	Amount Collected	Amount Unpaid	Percentage Unpaid
1928......	$ 19,448,392.46	$ 17,350,771.08	$ 2,097,621.38	10.79
1929......	24,466,998.58	20,255,293.84	4,211,704.74	17.21
1930......	22,453,699.40	17,091,947.72	5,361,751.68	23.88
1931......	20,517,561.90	15,137,586.82	5,379,975.08	26.22
1932......	19,281,643.24	12,877,152.60	6,404,490.64	33.22
1933......	18,037,167.48	11,634,595.56	6,402,571.92	35.50
1934......	21,163,009.22	8,322,487.85	12,840,521.37	60.67
	$145,368,472.28	$102,669,835.47	$42,698,636.81	29.37

The amount, $102,669,835.47, shown in the foregoing table, is the amount of Sanitary District taxes collected by the County Collector. Of this amount, $99,114,019.21 has been turned over to the Sanitary District.

The taxes collected since the time of the last report to the Court amount to $10,705,213.10, which is about 7.4 per cent of the taxes levied and due. This money was used to redeem tax-anticipation warrants, to pay current expenses and to pay defaulted interest and principal of bonds. The non-payment of these taxes to the extents indicated above has forced the Sanitary District, through lack of revenue, to default on a considerable amount of maturing principal on bonds used for construction work due from January 1, 1932 to December 1, 1935, inclusive, and a certain amount of interest on these bonds. The amounts in default, as of December 2, 1935, were:

Principal	$20,718,890.00
Interest	2,412,311.25
Total	$23,131,201.25

Refunding of Bonds. Because of the delayed tax collection schedule and the slow payments on tax bills rendered, payments of maturing interest and principal have not been made for the past few years by the Sanitary District, as heretofore stated. This fact and the circumstance that its bonds mature in the next few years in very large amounts made it advisable and, in fact, necessary to re-arrange the District's funded debt. Accordingly, the outstanding bonds are now being refunded through the cooperation of the bond holders, approximately 97 per cent of whom have indicated their acceptance of the plan.

This plan provides for the issuance of new bonds to the holders of bonds maturing January 1, 1936, and thereafter, amounting to $119,227,000. These new bonds are due January 1, 1955, bear the same rate of interest as the old bonds but are subject to redemption on January 1st of the year after the year in which the old bonds for which they were exchanged were due to mature, or on any interest date thereafter. Bonds which were in default or will mature prior to January 1, 1936, amounting to $20,718,890, will be paid in cash. This cash payment of principal is made possible through the recent sale above par of bonds in that amount. The payment of the defaulted interest has also been arranged.

PWA Agreement. Reference was made in the last semi-annual report to the Court to an Application filed by The Sanitary District of Chicago, June 12, 1935 with the Federal Emergency Administration of Public Works to increase the allocation of funds to the Sanitary District from $41,938,000 to $58,630,000. This Application was approved and the allocation of funds was thereby increased $16,692,000. A Supplementary Agreement, dated September 21, 1935, was executed between The Sanitary District of Chicago and the Federal Emergency Administration of Public Works. Construction to be financed by the additional funds include additional sewers in the Calumet, North Side, West Side and Southwest Side Projects, Control Works for the Chicago River and an extension of the North Side Sewage Treatment Works. All these projects are included in the construction program submitted to the Court by the Sanitary District in 1929 during the trial of the case.

Sale of Canals. As stated in the last report to the Court The Sanitary District of Chicago initiated steps to bring about the purchase by the Federal Government of the waterway improvements applicable to navigation in the South Branch of the Chicago River, the Little Calumet River, the Main Channel and the Calumet-Sag Channel. A public hearing on this matter was held before the United States District Engineer in Chicago December 19, 1934 and January 15, 1935. On August 15, 1935 the United States Division Engineer, Upper Mississippi Valley Division, issued a notice of unfavorable report with respect to this matter. The Sanitary District thereupon appealed to the Board of Engineers for Rivers and Harbors and at a hearing before this Board, December 17, 1935, filed additional information and made additional arguments in favor of the proposed sale.

The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from June 1, 1935 (the date of the summaries for the last report) to December 1, 1935 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$ 651,740.29
North Side Project	13,960.58
West Side Project	1,833,522.30
Southwest Side Project	1,351,268.30
West-Southwest Treatment Plant	1,301,557.84
Miscellaneous Plants and Sewers	28,995.08
Chicago River Controlling Works	492.04
Total	$5,181,536.43

In addition to the amounts shown in Table 3, approximately $1,820,000 had been earned by contractors up to December 1, 1935, on the various items of construction work, but had not been paid. Of this total amount, approximately $930,000 was for unpaid vouchers on current work and $890,000 was retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on December 1, 1935, was as follows:

TABLE 4.

COMPLETED WORK AS OF DECEMBER 1, 1935.

Calumet Project	$ 26,479,408.59
North Side Project	37,140,868.18
West Side Project	51,158,410.62
Southwest Side Project	1,809,294.57
West-Southwest Treatment Plant	1,664,494.66
Miscellaneous Plants and Sewers	632,775.01
Chicago River Controlling Works	53,907.78
Total	$118,939,159.41

After the execution of the latest agreement with the Public Works Administration, dated September 21, 1935, estimates on the entire future construction program were revised and reduced by $7,736,000. The principal items entering into this reduction were $1,500,000 of contingency items eliminated from estimates on Calumet and West-Southwest treatment plants; $4,636,000 taken from the West-Southwest treatment plant estimate figuring ultimate capacity at 1,000 M. G. D. instead of 1,200 M. G. D. as previously done, also for omission of power recovery plant; $701,000 saved on letting of Contracts 1 and 4 of the Southwest Side intercepting sewer; and $499,000 cut from the estimate of cost of the proposed South Side Sewers. The estimated cost of future sewage treatment construction, as of December 1, 1935, is as follows:

TABLE 5.

FUTURE WORK AFTER DECEMBER 1, 1935.

Calumet Project	$ 7,591,000
North Side Project	4,998,000
West Side Project	2,308,000
Southwest Side Project	36,957,000
West-Southwest Treatment Plant	26,614,000
Miscellaneous Plants and Sewers	1,950,000
Chicago River Controlling Works	3,000,000
Total	$83,418,000

Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935 with the Federal Emergency Administration of Public Works are definitely allocated to projects in this future work, estimated to cost $39,044,000. This leaves work estimated at $44,374,000 to be financed from other sources.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of January 1, 1936, is about 4,404,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,767,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,171,000. This figure includes the Corn Products wastes, equivalent to the sewage of 385,000 persons, which wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The 1936 total population, and industrial waste equivalent, as above indicated, are estimated as 6,171,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total January 1, 1936, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,245,000, which is 85 per cent of 6,171,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3 and 4. The amounts of actual sewage treatment in operation on June 25, 1935 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.
ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1935.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet:			
(Complete treatment)	15,000	85	13,000
(Sedimentation)	228,000	33⅓	76,000
North Side	1,167,000	85	992,000
West Side (Sedimentation)	883,000	33⅓	294,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	7,000	85	6,000
Corn Products (Reduction)	382,000		316,000
Total	2,682,000		1,697,000

TABLE 7.
ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1935.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	279,000	85	237,000
North Side	1,184,000	85	1,006,000
West Side (Sedimentation)	890,000	33⅓	297,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	7,000	85	6,000
Corn Products (Reduction)	385,000		331,000
Total	2,745,000		1,877,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 1,877,000 out of 5,245,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,171,000 were being treated. This indicates the actual treatment of approximately 35.8 per cent of the total sewage within the Sanitary District, although considerable additional construction work has been performed during this period, for which no credit will be taken in this percentage until the works are completed and put in operation.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan during the calendar year 1934, averaged 6,433 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,692 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8,125 cubic feet per second.

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limits the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935. The average monthly diversion as made under this Permit from January 1 to December 20, 1935, is indicated in the table following:

Month 1935	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Willow Springs Spillway C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan C.F.S.
January	8312	0	1631	6681
February	8325	0	1614	6711
March	8247	12	1567	6668
April	8376	1	1579	6796
May	8360	69	1561	6730
June	8214	0	1597	6617
July	8024	0	1743	6281
August	7732	0	1715	6017
September ..	7217	0	1621	5596
October	7824	0	1566	6258
November ...	8752	0	1505	7247
Dec. 1 to 20..	7737	0	1515	6222
Average	8093	7	1601	6485

The diversion of water from Lake Michigan will be reduced to an annual average of not more than 5,000 cubic feet per second on and after December 31, 1935.

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By ROSS A. WOODHULL,
President.

WILLIAM H. TRINKAUS,
Acting Chief Engineer.

ERNST BUEHLER,
Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

Office - Supreme Court, U. S.
FILED
JUL 2 1936
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

[redacted] Original. 4

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

[redacted] Original. 5

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

[redacted] Original. 6

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1936, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED KLEIN CO., 24 PRINTERS, CHICAGO.

IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

October Term, 1935.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8,
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9,
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1936, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1936, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1936, the status of completed work in the sewage treatment construction program involved in this case was stated to be on December 1, 1935, as follows:

TABLE 1.

COMPLETED WORK AS OF DECEMBER 1, 1935.

Calumet Project	$ 26,479,408.59
North Side Project	37,140,868.18
West Side Project	51,158,410.62
Southwest Side Project	1,809,294.57
West-Southwest Treatment Plant	1,664,494.66
Miscellaneous Plants and Sewers	632,775.01
Chicago River Controlling Works	53,907.78
Total	$118,939,159.41

TABLE 2.

FUTURE WORK AFTER DECEMBER 1, 1935.

Calumet Project	$ 7,591,000.00
North Side Project	4,998,000.00
West Side Project	2,308,000.00
Southwest Side Project	36,957,000.00
West-Southwest Treatment Plant	26,614,000.00
Miscellaneous Plants and Sewers	1,950,000.00
Chicago River Controlling Works	3,000,000.00
Total	$83,418,000.00

During the six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet, the North Side, the West Side and the Southwest Side Sewage Treatment Projects and plans and specifications have been prepared for the major portion of the Chicago River Control Works.

Calumet Project. The following contracts, mentioned in the last semi-annual report, have been completed: Sludge Disposal Building and Miscellaneous Work; Sludge Disposal Equipment and

Piping; Electrical Equipment; and Underground Duct Lines. The Sludge Disposal Plant is therefore completed and was placed in service April 27, 1936. The Treatment Works Extension had been placed in operation December 3, 1935. The contract for roadways, grading, drainage, lighting, etc., is now approximately 80 per cent completed.

Contracts were awarded for the construction of the South Park Avenue Sewer January 3, 1936 and the Colfax Avenue Sewer March 23, 1936. The construction of the South Park Avenue Sewer is now 40 per cent completed and the Colfax Avenue Sewer about 10 per cent completed. Plans and specifications for the Calumet City Sewer are approximately 40 per cent completed.

Three other sewers in the Calumet area will still remain to be constructed whenever finances become available. These are the Blue Island Intercepting, the Evergreen Park and the California Avenue-Oak Forest Sewers.

North Side Project. Contracts were awarded for the construction of the Cherry Street, Winnetka, Sewer January 3, 1936 and for Additional Final Settling Tanks, etc., at the North Side Treatment Works May 7, 1936. The construction of the Cherry Street Sewer is now about 30 per cent completed.

West Side Project. All the contracts on the main West Side Intercepting Sewer, namely, Contracts 1 to 10, have been completed and this sewer has all been placed in service. On the collateral intercepting sewers, plans are 50 per cent completed for the Goose Island Sewer and 30 per cent completed for the Halsted Street Sewer. Plans and specifications have been completed for the Harrison to Taylor Street Sewer, but difficulty in acquiring right-of-way is still delaying the taking of bids for this work.

The remaining work in the West Side Project, dependent upon future financing, consists of certain collateral sewers and sewer connections in the area adjacent to the Main Drainage Channel west of Western Avenue and of facilities for the secondary (or complete) treatment of sewage at the West Side Works.

Southwest Side Project. Construction was continued on the following contracts for the Southwest Side Intercepting Sewer, mentioned in the last semi-annual report to the Court: Contract Section 1, now 60 per cent completed; Contract Section 2, now 100 per cent completed; Contract Section 3, now 95 per cent completed; and Contract Section 4, now 65 per cent completed. The contract for the construction of Section 5 was awarded January 30, 1936 and the work is now about 3 per cent completed. Plans have been completed for Contract 6, but difficulty in securing right-of-way is delaying the taking of bids for this work. Considerable progress has been made on plans for connections and for collateral work for the Southwest Side Intercepting Sewer.

Construction was started December 30, 1935 on Contract Sections 3, 5, and 6 of the Upper Des Plaines Intercepting Sewer. Work on Contract Section 3 is now 25 per cent completed; Contract Section 5 is now 30 per cent completed and Contract Section 6 is 75 per cent completed. A contract for Section 1 of this sewer was awarded March 12, 1936 and for Section 2

April 16, 1936. Plans are being prepared for the small pumping station and for the connections to the Upper Des Plaines Intercepting Sewer.

Contracts were awarded for the construction of Section 2 of the West Towns Outlet Sewer February 20, 1936 and for Section 1 May 21, 1936. Plans are being prepared for the connections to this sewer and for the Outfall into the Main Drainage Channel. Plans for the Argo Sewer are approximately 60 per cent completed.

West-Southwest Treatment Plant. Construction was continued on the following contracts mentioned in the last semi-annual report to the Court: Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 55 per cent completed; Electrical Work in connection with Aeration Tanks, etc., now 12 per cent completed; Substructure of Pump and Blower House, now 100 per cent completed; and Structural Steel Work of Pump and Blower House, now 100 per cent completed. The fabrication of the following equipment was continued: Steam Turbine driven Pumping Units, now 86 per cent completed; Steam Turbine driven Blower Units, now 91 per cent completed; Sludge Removal Mechanisms, now 53 per cent completed; Venturi Meters, now 90 per cent completed; and Large Valves, now 93 per cent completed.

A contract for the Architectural Work of the Pumping Station and Blower House was awarded February 27, 1936 and for the Electrical Work in this structure March 12, 1936. Contracts were let for Main Influent and Effluent Conduits, etc., for Meters and for Valves and Sluice Gates in connection with said conduits March 5, 1936. Bids were received June 25, 1936 for the construction of the Pump Discharge Chamber and Plant Outfall.

Contracts were awarded for furnishing Steam Turbine driven Generator Units, for Condensers and for Transformers March 5, 1936; for furnishing Boiler Feed Water Heaters March 26, 1936; for furnishing Boilers and Settings and for Heat Exchangers April 2, 1936; and for furnishing Diffuser Plates May 21, 1936.

At the present time 55 per cent of the 400 MGD West-Southwest Sewage Treatment Plant has been placed under contract and 21 per cent of the total plant completed.

Control Works, Chicago River. As stated in the last semi-annual report to the Court, an application for the construction of Control Works for the Chicago River was filed with the War Department October 10, 1935 and a public hearing thereon held November 15, 1935. After extended negotiations with all parties interested and the submission of a modified plan February 8, 1936, a permit was granted by the War Department March 12, 1936 for the construction in Chicago Harbor of a navigation lock, connected to the shore by certain walls in which control gates are located.

Detail plans of the Lock and Guide Walls, comprising approximately 75 per cent of the entire Control Works project, were submitted to the War Department May 7, 1936 and approved June 2, 1936. Under a contract, awarded May 21, 1936, Test Piles were driven on the site of the Lock and Guide Walls, this work being completed May 29, 1936. Bids for the construction of this lock, guide walls, etc., were received June 30, 1936.

Financial. The financial condition of The Sanitary District of Chicago has improved somewhat since the time of the last semi-annual report to the Court. The local tax situation has improved slightly. The amounts of taxes extended for the Sanitary District for the years 1928 to 1934, inclusive, and the amounts collected up to May 14, 1936, pursuant to these extensions, are as follows:

	Total Taxes Extended	Amount Collected	Amount Unpaid	Percentage Unpaid
1928......	$ 19,448,392.46	$ 17,417,527.84	$ 2,030,864.62	10.44
1929......	24,466,998.58	20,466,248.03	4,000,750.55	16.35
1930......	22,453,699.40	17,439,364.32	5,014,335.08	22.33
1931......	20,517,561.90	15,525,014.78	4,992,547.12	24.33
1932......	19,281,643.24	13,314,063.42	5,967,579.82	30.95
1933......	18,037,167.48	12,412,680.85	5,624,486.63	31.18
1934......	21,163,009.22	13,354,237.36	7,808,771.86	36.90
	$145,368,472.28	$109,929,136.60	$35,439,335.68	24.38

The amount, $109,929,136.60, shown in the foregoing table, is the amount of Sanitary District taxes collected by the County Collector. Of this amount, $106,216,433.45 has been turned over to the Sanitary District.

The taxes collected since the time of the last report to the Court amount to $7,259,301.13, which is about 5.0 per cent of the taxes levied and due. This money was used to redeem tax anticipation warrants, to pay current expenses and to pay defaulted interest and principal of bonds. The non-payment of these taxes to the extents indicated above forced the Sanitary District, through lack of revenue, to default on more than $20,000,000 of maturing principal on bonds used for construction work due from January 1, 1932 to December 31, 1935. This condition has been corrected by the refunding of the bonds of the Sanitary District.

Refunding of Bonds. The refunding of bonds, mentioned in the last semi-annual report to the Court, has been successfully accomplished and as a result the Sanitary District is no longer in default for payment of principal or interest on bonds, except a comparatively small amount of bonds not yet exchanged. Through the cooperation of the bond holders, the outstanding bonds in the amount of $139,259,890 were refunded up to June 1, 1936, leaving only $686,000 of the old bonds outstanding. The bonds refunded amount to 99.5 per cent of all the bonds of the Sanitary District outstanding.

The refunding plan provided for the issuance of new bonds to the holders of bonds maturing January 1, 1936, and thereafter, amounting to $119,227,000. These new bonds are due January 1, 1955, bear the same rate of interest as the old bonds but are subject to redemption on January 1st of the year after the year in which the old bonds for which they were exchanged were due to mature, or on any interest date thereafter. Bonds which were in default or matured prior to January 1, 1936, amounting to $20,718,890, were paid in cash. This cash payment of principal was made possible through the sale above par of new bonds in that amount. The payment of all defaulted interest was also arranged. The two amounts of $119,227,000 and $20,718,890 make up the total of $139,945,890 of Sanitary District bonds outstanding.

Sale of Canals. As stated in the last report to the Court, The Sanitary District of Chicago initiated steps to bring about the purchase by the Federal Government of the waterway improvements applicable to navigation in the South Branch of the Chicago River, the Little Calumet River, the Main Channel and the Calumet-Sag Channel. A public hearing on this matter was held before the United States District Engineer in Chicago December 19, 1934 and January 15, 1935. On August 15, 1935 the United States Division Engineer, Upper Mississippi Valley Division, issued a notice of unfavorable report with respect to this matter. The Sanitary District thereupon appealed to the Board of Engineers for Rivers and Harbors and at a hearing before this Board, December 17, 1935, filed additional information and made additional arguments in favor of the proposed sale. The Board of Engineers for Rivers and Harbors reported December 19, 1935 that the purchase of these canals by the government was not advisable and the Chief of Engineers, on January 13, 1936, concurred in the views and recommendations of the Board.

Progress of Work. The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December 1, 1935 (the date of the summaries for the last report) to June 1, 1936 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$1,064,034.60
North Side Project	63,426.20
West Side Project	713,832.06
Southwest Side Project	3,739,399.42
West-Southwest Treatment Project	1,157,770.25
Miscellaneous Plants and Sewers	186.19
Chicago River Controlling Works	30,508.59
Total	$6,769,157.31

In addition to the amounts shown in Table 3, approximately $1,320,000 had been earned by contractors up to June 1, 1936, on the various items of construction work, but had not been paid, being retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on June 1, 1936, was as follows:

TABLE 4.
COMPLETED WORK AS OF JUNE 1, 1936.

Calumet Project	$ 27,543,443.19
North Side Project	37,204,294.38
West Side Project	51,372,242.68
Southwest Side Project	5,548,693.99
West-Southwest Treatment Plant	2,822,264.91
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	84,416.37
Total	$125,708,316.72

The estimated cost of future sewage treatment construction, as of June 1, 1936, is as follows:

TABLE 5.
FUTURE WORK AFTER JUNE 1, 1936.

Calumet Project	$ 7,561,000.00
North Side Project	5,027,000.00
West Side Project	1,742,000.00
Southwest Side Project	33,074,000.00
West-Southwest Treatment Plant	23,964,000.00
Miscellaneous Plants and Sewers	1,950,000.00
Chicago River Controlling Works	2,830,000.00
Total	$76,148,000.00

Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935 with the Federal Emergency Administration of Public Works are definitely allocated to projects in this future work, estimated to cost $31,708,000. Approximately $3,500,000 of funds obtained from the PWA are not now definitely allocated, but may be used for some of this future work. This leaves work estimated at $40,940,000 to be financed from other sources.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of July 1, 1936, is about 4,449,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,791,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,240,000. This figure includes the Corn Products wastes, which would have been equivalent to the sewage of 401,000 persons if no recovery had been accomplished. These wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The 1936 total population, and industrial waste equivalent, as above indicated are estimated as 6,240,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total July 1, 1936, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,304,000, which is 85 per cent of 6,240,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3, and 4. The amounts of actual sewage treatment in operation on December 24, 1935 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1935.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	279,000	85	237,000
North Side	1,184,000	85	1,006,000
West Side (Sedimentation)	890,000	33⅓	297,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	7,000	85	6,000
Corn Products (Reduction)	385,000		331,000
Total	2,745,000		1,877,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1936.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	284,000	85	241,000
North Side	1,211,000	85	1,029,000
West Side (Sedimentation)	1,602,000	33⅓	534,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	401,000		364,000
Total	3,506,000		2,175,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 2,175,000 out of

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5,304,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,240,000 were being treated. This indicates the actual treatment of approximately 41.0 per cent of the total sewage within the Sanitary District. although considerable additional construction work has been performed during this period, for which no credit will be taken in this percentage until the works are completed and put in operation.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan, during the calendar year 1935, averaged 6,484 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,602 cubic feet per second; the inflow from the DesPlaines River averaged 7 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8,093 cubic feet per second.

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limited the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935, and thereafter limits the net diversion to an annual average of not more than 5,000 cubic feet per second up to December 31, 1938. The average monthly diversion, as made under this Permit from January 1 to June 20, 1936, is indicated in the table following:

Month 1936	Total Flow From Main Channel At Lockport C.F.S.	Inflow From DesPlaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	6256	0	1593	4663
February ...	6670	73	1798	4799
March	6654	28	1704	4922
April	6826	0	1624	5202
May	7593	0	1661	5932
June 1 to 20..	6753	0	1700	5053
Average ...	6792	17	1680	5095

The diversion of water from Lake Michigan has been reduced to an annual average of not more than 5,000 cubic feet per second on and after December 31, 1935.

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By ROSS A. WOODHULL,
President.

WILLIAM H. TRINKAUS,
Acting Chief Engineer.

ERNST BUEHLER,
Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
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Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~7~~, 3
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~8~~, 4
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~9~~, 5
Original.

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FRED. KLEIN CO. [illegible]24 PRINTERS CHICAGO

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IN THE

Supreme Court of the United States

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October Term, 1936.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 8, Original.
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1937, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1937, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1937, the status of completed work in the sewage treatment construction program involved in this case was stated to be on December 1, 1936, as follows:

TABLE 1.
COMPLETED WORK AS OF DECEMBER 1, 1936.

Calumet Project	$ 29,113,277.54
North Side Project	37,625,183.73
West Side Project	52,076,355.45
Southwest Side Project	10,446,684.05
West-Southwest Treatment Plant	5,043,939.78
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	345,678.37
Total	$135,284,080.12

TABLE 2.
FUTURE WORK AFTER DECEMBER 1, 1936.

Calumet Project	$ 5,929,000.00
North Side Project	4,593,000.00
West Side Project	1,603,000.00
Southwest Side Project	26,588,000.00
West-Southwest Treatment Plant	21,899,000.00
Miscellaneous Plants and Sewers	1,000,000.00
Chicago River Controlling Works	2,546,000.00
Total	$64,158,000.00

During the six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet, the North Side, the West Side and the Southwest Side Sewage Treatment Projects and on the Chicago River Control Works.

Calumet Project. The sewage treatment works and the sludge disposal plant have been completed and have been in service for more than a year. Minor changes and adjustments are being made, to increase the operating efficiency.

Construction of sewers in the Calumet region has been continued. The South Park Avenue and the Colfax Avenue sewers have been completed and are now in service. Construction of the Calumet City sewer is now 60 per cent completed. A contract for the construction of a small pumping station to pump the Calumet City sewage was awarded January 28, 1937 and this work is now 27 per cent completed. The studies made on the Stony Island Avenue sewer project have resulted in a decision to abandon this project and substitute therefor additional pumps in the Ninety-fifth Street pumping station, which will develop sufficient added flow capacity in certain existing sewers equal to that expected from the proposed Stony Island Avenue sewer.

On April 16, 1937 a change was made in the agreement of September 21, 1935 between the Sanitary District and the Federal Emergency Administration of Public Works, by which funds were made available for the construction of the Blue Island intercepting sewer. It is expected that a contract will be let for this work within the next three months. Certain WPA projects are under way in the areas to be served by the Evergreen Park and California Avenue-Oak Forest sewers, which will eliminate the necessity of constructing these sewers within the next few years. The Sanitary District is assisting in these WPA projects. The Evergreen Park and California Avenue-Oak Forest sewers are therefore eliminated from the future construction to be completed by the end of 1938.

North Side Project. The construction of additional Final Settling Tanks, etc., for the North Side Treatment Works is now 95 per cent completed and some of the additional tanks have been placed in service.

Plans are being prepared for certain miscellaneous improvements at the sewage treatment plant, for certain siphons under the North Shore Channel and for a sewer in Niles.

The extension of the North Side Treatment Works and the construction of the Howard Street and the North Shore Intercepting sewers are at this time eliminated from the construction program to be completed before the end of 1938. Experience in operating the treatment plant and a reduction in the detention period of the sewage for aeration indicate that this portion of the plant has far greater capacity than was considered possible in 1928. The additional final settling tanks, now being placed in service, and the other miscellaneous improvements, soon to be made, should give this treatment plant ample capacity for the next few years. The construction of the Howard Street and North Shore Intercepting sewers can be deferred, for the reason that the territory which they were expected to serve has not yet developed to an extent which would justify the expense of their construction.

West Side Project. Construction was continued on three collateral intercepting sewers. The construction of the sewer from Harrison to Taylor Street and of the Goose Island sewer has been entirely completed. The construction of the Halsted Street sewer is now 97 per cent completed.

The remaining work in the West Side Project, dependent upon future financing, consists of certain collateral sewers and sewer connections in the area adjacent to the Main Drainage Channel west of Western Avenue and of facilities for the secondary (or complete) treatment of sewage at the West Side Works. A contract for an Experimental Plant, to determine the advantages of certain chemical processes on the effluent from the West Side Imhoff Tanks, was awarded March 25, 1937.

Southwest Side Project. Construction was continued on the following contracts for the Southwest Side Intercepting Sewer, mentioned in the last semiannual report to the Court: Contract Section 1, now 100 per cent completed; Contract Section 4, now 100 per cent completed; Contract Section 5, now 74 per cent completed; Contract Section 6, now 13 per cent completed; and Contract Section 7, now 66 per cent completed:

The contract for the construction of Section 9, Miscellaneous Sewer Connections, was awarded May 6, 1937.

On April 16, 1937 a change was made in the agreement of September 21, 1935 between the Sanitary District and the Federal Emergency Administration of Public Works, by which funds were made available for the construction of that portion of the Racine Avenue pumping station which is essential for the proper operation of the Southwest Side Intercepting sewer. It is expected that a considerable amount of this work can be placed under contract before the end of 1937.

Construction was continued on the following contracts of the Upper Des Plaines Intercepting Sewer: Contract Section 1, now 100 per cent completed; Contract Section 2, now 89 per cent completed; Contract Section 3, now 100 per cent completed and Contract Section 5, now 100 per cent completed. Plans and specifications for the small pumping station for the Upper Des Plaines Sewer are now approximately 75 per cent completed. A contract for the connections to the Upper Des Plaines Sewer was awarded April 29, 1937 and this contract is now 4 per cent completed. The change in the PWA agreement, made April 16, 1937, provided for the construction of a short extension of the Upper Des Plaines sewer to the north. This work will be designated as Contract Section 8.

Construction was continued on the West Towns Outlet Sewer and Contract Section 1 is now 99 per cent completed and Contract Section 2 is now 100 per cent completed. A contract for the construction of the Outfall Structure for the West Towns Outlet Sewer was awarded January 14, 1937 and this work is now 77 per cent completed. The contract for the construction of the Argo Sewer, from the Southwest Sewage Treatment Works to Natchez Avenue is now 42 per cent completed. The change in the PWA agreement, made April 16, 1937, provided for the construction of the extension of the Argo sewer to Argo.

West-Southwest Treatment Plant. Construction was continued on the following contracts mentioned in the last semi-annual report to the Court: Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 95 per cent completed; Electrical Work in connection with Aeration Tanks, etc., now 88 per cent completed; Architectural Work of the Pumping Station and Blower House, now 100 per cent completed; Erection of Machinery and Auxiliary Equipment now 51 per cent completed; Electrical Work in the Pumping Station, now 8 per cent completed; Main Influent and Effluent Conduits, now 91 per cent completed; and Pump Discharge Chamber and Plant Outfall now 97 per cent completed.

The fabrication of the following equipment was continued: Steam Turbine driven Pumping Units, now 98 per cent completed; Steam Turbine driven Blower Units, now 96 per cent completed; Sludge Removal Mechanisms, now 97 per cent completed; Venturi Meters, now 99 per cent completed; Diffuser Plates, now 100 per cent completed; Meters, Valves and Sluice Gates in connection with Effluent Conduits, now 72 per cent completed; Steam Turbine driven Generator Units, now 99 per cent completed; Transformers, now 93 per cent completed; Condensers, now 54 per cent completed; Boiler Feed Water Heaters, now 91 per cent completed; Boilers and Settings; Heat Exchangers; Ash handling Equipment; Preliminary Tank Mechanisms; and Vacuum Filters, now 22 per cent completed.

A contract for the construction of the Preliminary Settling Tanks was awarded January 14, 1937 and the work is now 21 per cent completed. A contract for Electrical Work in connection with the Preliminary Tanks was awarded March 18, 1937. A contract for Structural Steel of the Incineration Plant was awarded April 1, 1937. A contract for the construction of the Substructure of the Sludge Dewatering and Incinerating Building was awarded June 17,

1937. Contracts for Coal and Sludge Conveying Equipment and for Sludge Drying Equipment were awarded June 17, 1937.

At the present time, 76 per cent of the 400 MGD West-Southwest Sewage Treatment Plant has been placed under contract and 47 per cent of the total plant has been completed.

Control Works Chicago River. The contract for construction of the Lock, Guide Walls, etc., comprising about 75 per cent of the entire Control Works project, is now approximately 33 per cent completed. The contract for Electrical Work in connection with the Lock is now 2 per cent completed. Plans are being prepared for the Cross Walls connecting the lock with the shore and for the Control Gates.

Financial. The financial condition of The Sanitary District of Chicago has changed little since the time of the last semi-annual report to the Court. The local tax situation has not improved. The amounts of taxes extended for the Sanitary District for the years 1928 to 1935, inclusive, and the amounts collected up to May 14, 1937, pursuant to these extensions, are as follows:

Year	Total Taxes Extended	Amount Collected	Amount Unpaid	Percentage Unpaid
1928.......	$ 19,448,392.46	$ 17,493,851.75	$ 1,954,540.71	10.05
1929.......	24,466,998.58	20,757,364.80	3,709,633.78	15.16
1930.......	22,453,699.40	17,893,799.05	4,559,900.35	20.31
1931.......	20,517,561.90	15,991,271.24	4,526,290.66	22.06
1932.......	19,281,643.24	13,914,904.09	5,366,739.15	27.83
1933.......	18,037,167.48	13,071,910.76	4,965,256.72	27.53
1934.......	21,163,009.22	15,123,519.86	6,039,489.36	28.54
1935.......	16,068,908.60	11,111,690.10	4,957,213.50	30.85
	$161,437,380.88	$125,358,311.65	$36,079,069.23	22.35

The amount, $125,358,311.65, shown in the foregoing table, is the amount of Sanitary District taxes collected by the County Collector. Of this amount $121,381,977.00 has been turned over to the Sanitary District. The taxes turned over to the Sanitary District since the time of the last report to the Court amount to $5,676,233.01, which is about 3.5 per cent of the taxes levied and due. The bonds of the Sanitary District now outstanding amount to $133,322,390. It is expected that $2,018,000 of bonds will be redeemed July 1, 1937, leaving $131,304,390 outstanding. This is still considerably in excess of the bonding capacity of the Sanitary District, which at present amounts to $119,915,555.

Progress of Work. The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December 1, 1936 (the date of the summaries for the last report) to June 1, 1937 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$ 579,180.36
North Side Project	193,765.64
West Side Project	486,072.91
Southwest Side Project	3,915,588.38
West-Southwest Treatment Plant	1,407,673.75
Chicago River Controlling Works	334,448.67
Total	$6,916,729.71

In addition to the amounts shown in Table 3, approximately $1,493,000 had been earned by contractors up to June 1, 1937, on the various items of construction work, but had not been paid, being retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on June 1, 1937, was as follows:

TABLE 4.

COMPLETED WORK AS OF JUNE 1, 1937.

Calumet Project	$ 29,692,457.90
North Side Project	37,818,949.37
West Side Project	52,562,428.36
Southwest Side Project	14,362,272.43
West-Southwest Treatment Plant	6,451,613.53
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	680,127.04
Total	$142,200,809.83

At this time, eighteen months in advance of the date of the ultimate reduction in the diversion of water from Lake Michigan under the decree of the Court of April 21, 1930, it is proper to submit a revised estimate of the cost of the essential construction work remaining to be performed. The original program, outlined in 1928, contained many items which have been materially altered during the course of the past nine years. It also contained some items which, in the light of present day knowledge of the art of sewage treatment and of the growth of the community, could have been omitted.

In 1928, near the close of an era of prosperity and a period of rapid growth of the community, certain items were included as essential items, which now are known to be not essential. This change in conditions has been brought about partly by natural causes and partly because of the recent prolonged depression. Items were included for a number of sewers in outlying sections suburban to Chicago, which are not yet necessary and probably will not be needed till after

1940 because there has been little building in these communities for the past six years and there is no prospect for a revival of building in the near future. For this reason the following sewers can now be eliminated from the program:

Calumet:	
Westerly section of Blue Island Intercepting Sewer	$ 510,000
California Ave.-Oak Forest Sewer	1,000,000
Evergreen Park Sewer	580,000
North Side:	
Howard Street Sewer	2,000,000
North Shore Intercepting Sewer	550,000
	$4,640,000

The extension of the North Side Sewage Treatment Plant, estimated to cost $1,200,000, probably will not be required until 1945 or later. The lessening of the period of detention of the sewage in the tanks for aeration has greatly increased the capacity of this portion of the plant. Thus with the addition of more final settling tanks now under construction this plant will have sufficient capacity for the next few years.

The contingent item for Miscellaneous Plants and Sewers, reduced to $1,000,000 at the time of the last semi-annual report to the Court, can now be eliminated.

The item of $15,000,000 for South Side Sewers and an item of $1,100,000 for that portion of the Racine Avenue Pumping Station required to handle the discharge of these sewers, must be deferred until some future time because of financial necessity. The postponement of this work will not affect the reduction in diversion of water from Lake Michigan. The proposed new South Side Sewers comprise a very important sanitary improvement, but their construction would not bring any additional sewage under treatment.

The items eliminated from the program of essential construction work at this time and postponed until some future date have been estimated to cost $22,940,000.

The estimated cost of future essential sewage treatment construction, as of June 1, 1937, is as follows:

TABLE 5.

FUTURE WORK AFTER JUNE 1, 1937.

Calumet Project	$ 2,927,000.00
North Side Project	481,000.00
West Side Project	265,000.00
Southwest Side Project	6,577,000.00
West-Southwest Treatment Plant	20,821,000.00
Chicago River Controlling Works	2,217,000.00
Total	$33,288,000.00

Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935 with the Federal Emergency Administration of Public Works to the extent of $18,979,000 are available for this future work. This leaves essential work to the extent of $14,309,000 to be financed from other sources. The Sanitary District will apparently be able to finance work to the extent of $1,359,000 now, leaving work estimated at $12,950,000 for which no resources are presently available. The specific items estimated at $12,950,000 are secondary treatment of West Side sewage $12,650,000 and additional sewers for 100 per cent collection of sewage on the North and West Side areas $300,000.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of July 1, 1937, is about 4,541,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,820,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,361,000. This figure includes the Corn Products wastes, which would have been equivalent to the sewage of 415,000 persons if no recovery had been accomplished. These wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The 1936 total population, and industrial waste equivalent, as above indicated, are estimated as 6,361,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total July 1, 1937, population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,406,000, which is 85 per cent of 6,361,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3, and 4. The amounts of actual sewage treatment in operation on December 24, 1936 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1936.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	304,000	85	258,000
North Side	1,218,000	85	1,035,000
West Side (Sedimentation)	1,612,000	33⅓	537,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	372,000		350,000
Total	3,514,000		2,187,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1937.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	326,000	85	277,000
North Side	1,235,000	85	1,049,000
West Side (Sedimentation)	1,622,000	33⅓	541,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	415,000		370,000
Total	3,606,000		2,244,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 2,244,000 out of 5,406,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,361,000 were being treated. This indicates the actual treatment of approximately 41.5 per cent of the total sewage within the Sanitary District, although considerable additional construction work has been performed during this period, for which no credit will be taken in this percentage until the works are completed and put in operation.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan, during the calendar year 1936 averaged 4,862 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1712 cubic feet per second; the inflow from the Des Plaines River averaged 33 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 6607 cubic feet per second.

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limited the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935; and thereafter limits the net diversion to an annual average of not more than 5,000 cubic feet per second up to December 31, 1938. The average monthly diversion, as made under this Permit from January 1 to June 20, 1937, is indicated in the table following:

Month 1937	Total Flow From Main Channel At Lockport C.F.S.	Inflow From Des Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion From Lake Michigan C.F.S.
January	6348	88	1602	4658
February	5629	32	1635	3962
March	5462	30	1613	3819
April	6350	41	1587	4722
May	5850	31	1590	4229
June 1 to 20..	6700	25	1510	5165
Average	6056	41	1589	4426

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By ROSS A. WOODHULL,
President.

WILLIAM H. TRINKAUS,
Acting Chief Engineer.

ERNST BUEHLER,
Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants,
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. ~~7~~, 4 Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~8~~, 5 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. ~~9~~, 6 Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1937, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

F. J. Riley Printing Co. 179 Chicago

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IN THE

Supreme Court of the United States

NOS. 5, 8 AND 9, ORIGINAL.

OCTOBER TERM, 1936.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants,
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8,
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9,
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1937, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of January 1, 1937, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of July 1, 1936, the status of completed work in the sewage treatment construction program involved in this case was stated to be on June 1, 1936, as follows:

TABLE 1.

COMPLETED WORK AS OF JUNE 1, 1936.

Calumet Project	$27,543,443.19
North Side Project	37,204,294.38
West Side Project	51,872,242.68
Southwest Side Project	5,548,693.99
West-Southwest Treatment Plant	2,822,264.91
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	84,416.37
Total	$125,708,316.72

TABLE 2.

FUTURE WORK AFTER JUNE 1, 1936.

Calumet Project	$ 7,561,000.00
North Side Project	5,027,000.00
West Side Project	1,742,000.00
Southwest Side Project	33,074,000.00
West-Southwest Treatment Plant	23,964,000.00
Miscellaneous Plants and Sewers	1,950,000.00
Chicago River Controlling Works	2,830,000.00
Total	$76,148,000.00

During the six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet, the North Side, the West Side and the Southwest Side Sewage Treatment Projects and on the Chicago River Control Works.

Calumet Project. As stated in the last semi-annual report to the Court, the Calumet Sewage Treatment Works, as extended, were placed in operation December 3, 1935 and the Sludge Disposal Plant was placed in service April 27, 1936. The final contract, for roadways, grading, drainage, lighting, etc., has been 100 per cent completed. The sewage treatment works are therefore complete. Some addition to the capacity of the sludge disposal plant will probably be required within the next three or four years as the sewage load increases, due to the normal population increase.

Construction of sewers in the Calumet region was continued. The South Park Avenue Sewer is now 99 per cent completed; the Colfax Avenue Sewer is now 99 per cent completed; a contract for the construction of the Calumet City Sewer was awarded November 24, 1936 and bids for the comparatively small pumping station to pump this sewage will be received December 30, 1936. Studies are being made for another sewer in this area, designated as the Stony Island Avenue Sewer.

Three other sewers in the Calumet area will still remain to be constructed whenever finances become available. These are the Blue Island Intercepting, the Evergreen Park and the California Avenue-Oak Forest Sewers.

North Side Project. The construction of the Cherry Street, Winnetka, Sewer is now 100 per cent completed. The construction of Additional Final Settling Tanks, etc., for the North Side Treatment Works is now 71 per cent completed. Work yet to be done, for which finances are available consists of certain miscellaneous improvements at the sewage treatment plant, of siphons under the North Shore Channel and of a sewer in Niles. This work is scheduled for 1937. The extension of the North Side Treatment Works and the construction of certain additional sewers in the North Side area may reasonably be deferred for four or five years, though included in the program submitted to the Court. Experience in operating the treatment plant and a reduction in the detention period of the sewage for aeration indicates that the plant has far greater capacity than was considered possible in 1928.

West Side Project. The main West Side Intercepting Sewer has been completed and placed in service, as was stated in the last semi-annual report to the Court. The sewage treatment plant had previously been in service giving partial treatment to the West Side sewage, by sedimentation and digestion in Imhoff tanks. Construction of three collateral intercepting sewers was started within the past six months. A contract for the construction of the sewer from Harrison to Taylor Street was awarded October 1, 1936 and this construction is now 70 per cent completed. A contract for the construction of the Halsted Street Sewer was awarded October 15, 1936 and construction was started November 28, 1936. A contract for the construction of the Goose Island Sewer was awarded October 22, 1936 and this construction is now 45 per cent completed.

The remaining work in the West Side Project, dependent upon future financing, consists of certain collateral sewers and sewer connections in the area adjacent to the Main Drainage Channel west of Western Avenue and of facilities for the secondary (or complete) treatment of sewage at the West Side Works.

Southwest Side Project. Construction was continued on the following contracts for the Southwest Side Intercepting Sewer, mentioned in the last semi-annual report to the Court: Contract Section 1, now 98 per cent completed; Contract Section 3, now 100 per cent completed; Contract Section 4, now 99 per cent completed; and Contract Section 5, now 30 per cent completed.

The contract for the construction of Section 6 was awarded December 8, 1936 and for Section 7 October 29, 1936. Three other contracts remain on the Southwest Side Intercepting Sewer, all of which are expected to be under construction within the next six months.

Construction was continued on the following contracts of the Upper Des Plaines Intercepting Sewer: Contract Section 1, now 80 per cent completed; Contract Section 2, now 38 per cent completed; Contract Section 3, now 87 per cent completed; Contract Section 5, now 76 per cent completed and Contract Section 6, now 100 per cent completed. Plans and specifications for the small pumping station and for the connection to the Upper Des Plaines Sewer are now approximately 75 per cent completed.

Construction was continued on the West Towns Outlet Sewer and Contract Section 1 is now 45 per cent completed and Contract Section 2 is now 65 per cent completed. Bids will be taken for the construction of the Outfall Structure for the West Towns Outlet Sewer January 7, 1937. A contract for the construction of the Argo Sewer, from the Southwest Sewage Treatment Works to Natchez Avenue, was awarded September 24, 1936. The construction of the future extension of this sewer to Argo depends upon future financing, yet to be arranged.

West-Southwest Treatment Plant. Construction was continued on the following contracts mentioned in the last semi-annual report to the Court: Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 92 per cent completed; Electrical Work in connection with Aeration Tanks, etc., now 30 per cent completed; Architectural Work of the Pumping Station and Blower House, now 96 per cent completed; Electrical Work in the Pumping Station, now 5 per cent completed; and Main Influent and Effluent Conduits, now 78 per cent completed.

The fabrication of the following equipment was continued: Steam Turbine driven Pumping Units, now 96 per cent completed; Steam Turbine driven Blower Units, now 94 per cent completed; Sludge Removal Mechanisms, now 97 per cent completed; Venturi Meters, now 90 per cent completed; Large Valves, now 100 per cent completed; Diffuser Plates, now 49 per cent completed; Meters, Valves and Sluice Gates in connection with Effluent Conduits, now 45 per cent completed; Steam Turbine driven Generator Units, now 68 per cent completed; Transformers, now 93 per cent completed; Condensers; Boiler Feed Water Heaters; Boilers and Settings; and Heat Exchangers.

A contract for the construction of the Pump Discharge Chamber and Plant Outfall was awarded July 9, 1936 and this contract is now 19 per cent completed. Bids will be received for the construction of the Preliminary Settling Tanks December 30, 1936.

At the present time 64 per cent of the 400 MGD West-Southwest Sewage Treatment Plant has been placed under contract and 40 per cent of the total plant completed.

Control Works Chicago River. The contract for construction of the Lock, Guide Walls, etc., comprising about 75 per cent of the entire Control Works project, was awarded July 9, 1936. This contract is now approximately 19 per cent completed. A contract for Electrical Work in connection with the Lock was awarded November 16, 1936.

Financial. The financial condition of The Sanitary District of Chicago has changed little since the time of the last semi-annual report to the Court. The local tax situation has not improved. The amounts of taxes extended for the Sanitary District for the years 1928 to 1935, inclusive, and the amounts collected up to December 4, 1936, pursuant to these extensions, are as follows:

Year	Total Taxes Extended	Amount Collected	Amount Unpaid	Percentage Unpaid
1928......	$ 19,448,392.46	$ 17,470,012.66	$ 1,978,379.80	10.17
1929......	24,466.998.58	20,629,210.95	3,837,787.63	15.69
1930......	22,453,699.40	17,700,544.45	4,753,154.95	21.17
1931......	20,517,561.90	15,797,753.06	4,719,808.84	20.00
1932......	19,281,643.24	13,674,879.88	5,606,763.36	29.08
1933......	18,037,167.48	12,886,8[illegible]4.51	5,150,302.97	28.55
1934......	21,163,009.22	14,485,058.32	6,677,950.90	31.56
1935......	16,068,908.60	7,076,653.97	8,992,254.63	55.96
	$161,437.380.88	$119,720,977.80	$ 41 [illegible]6,403.08	25.84

The amount, $119,720,977.80, shown in the foregoing table, is the amount of Sanitary District taxes collected by the County Collector. Of this amount $115,705,743.99 has been turned over to the Sanitary District.

The taxes collected since the time of the last report to the Court amount to $9,791,841.20, which is about 6.0 per cent of the taxes levied and due. The bonds of the Sanitary District now outstanding amount to $139,945,890. It is expected that $6,623,500 of bonds will be redeemed January 1, 1937, leaving $133,322,390 outstanding. This is still considerably in excess of the bonding capacity of the Sanitary District, which at present amounts to $119,915,555.

Progress of Work. The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from June 1, 1936 (the date of the summaries for the last report) to December 1, 1936 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$1,569,834.35
North Side Project	420,889.35
West Side Project	204,112.77
Southwest Side Project	4,897,990.06
West-Southwest Treatment Plant	2,221,674.87
Chicago River Controlling Works	261,262.00
Total	$9,575,763.40

In addition to the amounts shown in Table 3, approximately $1,529,000 had been earned by contractors up to December 1, 1936, on the various items of construction work, but had not been paid, being retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed por-

tion of the sewage treatment construction program on December 1, 1936, was as follows:

TABLE 4.

COMPLETED WORK AS OF DECEMBER 1, 1936.

Calumet Project	$ 29,113,277.54
North Side Project	37,625,183.73
West Side Project	52,076,355.45
Southwest Side Project	10,446,684.05
West-Southwest Treatment Plant	5,043,939.78
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	345,678.37
Total	$135,284,080.12

The estimated cost of future sewage treatment construction, as of December 1, 1936, is as follows:

TABLE 5.

FUTURE WORK AFTER DECEMBER 1, 1936.

Calumet Project	$ 5,929,000
North Side Project	4,593,000
West Side Project	1,603,000
Southwest Side Project	26,588,000
West-Southwest Treatment Plant	21,899,000
Miscellaneous Plants and Sewers	1,000,000
Chicago River Controlling Works	2,546,000
Total	$64,158,000

Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935 with the Federal Emergency Administration of Public Works are definitely allocated to projects in this future work, estimated to cost $23,445,000. Approximately $2,500,000 of funds obtained from the PWA are not now definitely allocated, but may be used for some of this future work. This leaves work estimated at $38,213,000 to be financed from other sources.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of January 1, 1937, is about 4,495,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,770,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,265,000. This figure includes the Corn Products wastes, which would have been equivalent to the sewage of 372,000 persons if no recovery had been accomplished. These wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The 1937 total population, and industrial waste equivalent, as above indicated, are estimated as 6,265,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total January 1, 1937 population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,325,000, which is 85 per cent of 6,265,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3, and 4. The amounts of actual sewage treatment in operation on June 25, 1935 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1936.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	284,000	85	241,000
North Side	1,211,000	85	1,029,000
West Side (Sedimentation)	1,602,000	33⅓	534,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	401,000		364,000
Total	3,506,000		2,175,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1936.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	304,000	85	258,000
North Side	1,218,000	85	1,035,000
West Side (Sedimentation)	1,612,000	33⅓	537,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	372,000		350,000
Total	3,514,000		2,187,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 2,187,000 out of 5,325,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,265,000 were being treated. This indicates the actual treatment of approximately 41.1 per cent of the total sewage within the Sanitary District, although considerable additional construction work has been performed during this period, for which no credit will be taken in this percentage until the works are completed and put in operation.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan, during the calendar year 1935, averaged 6,484 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,602 cubic feet per second; the inflow from the Des Plaines River averaged 7 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 8,093 cubic feet per second.

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limited the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935, and thereafter limits the net diversion to an annual average of not more than 5,000 cubic feet per second up to December 31, 1938. The average monthly diversion, as made under this Permit from January 1 to December 20, 1936, is indicated in the table following:

	Total Flow from Main Channel at Lockport	Inflow from Des Plaines River	Domestic Pumpage Chicago Metropolitan Area	Net Diversion From Lake Michigan
Month 1936	C.F.S.	C.F.S.	C.F.S.	C.F.S.
January	6256	0	1593	4663
February ...	6670	73	1798	4799
March	6654	28	1704	4922
April	6826	0	1624	5202
May	7593	0	1661	5932
June	6425	0	1707	4718
July	7002	0	1950	5052
August	7086	0	1860	5226
September ..	7475	282	1753	5440
October	5887	0	1677	4210
November ..	6495	0	1614	4881
Dec. 1 to 20.	4900	0	1620	3280
Average..	6606	32	1713	4861

At the request of the United States District Engineer in Chicago an increase was made in the diversion of water from July 8, 1936 to August 7, 1936 in order to increase navigation depths in the Illinois River. This increase, maintained for thirty days, made the gross flow for this period 5,414 c.f.s. average. It increased navigation depths to some extent, though not to the full extent desired; nor could this limited increase be continued as long as desired, because of the necessity of keeping the annual average diversion within the prescribed limits.

An exceptionally heavy rainfall, amounting to 6.3 inches in one week, occurred in the Chicago area between September 11, 1936 and September 17, 1936. This necessitated an increase in the diversion of water to an average for this one week of 6,983 c.f.s., practically all of which was composed of storm run-off. The Board of Review of the Public Works Administration, in October, 1936, having reviewed a report covering the details of this flood and its effect on the annual average flow in the canal made the following comment: "While it does not seem to the Board to be appropriate to ask for a modification at this time of the decree of the Supreme Court in the Great Lakes diversion case, this experience may well be one of a number of reasons to be advanced at some future time for an increase in the permissible diversion of Lake Michigan water at Chicago. In view of the conditions created by this storm the Board fears that when the flow is limited to an average of 1,500 s. f., the necessary irregularities, in diversion as shown by the records in [this] report will be of such magnitude as to create serious conditions in Chicago harbor during periods of low flow resulting from these irregularities."

The request from the War Department for an increased flow in July and the exceptionally heavy flood in September made it necessary, in order to bring the annual average diversion for 1936 within the 5,000 c. f. s. limit, to materially reduce the flow in the Main Drainage Canal during the month of December, 1936. The rate of diversion, 3,281 c. f. s., estimated as necessary and maintained during the first part of December was still further curtailed December 18, 1936 and after to 2,680 c. f. s., in compliance with instructions from the United States District Engineer at Chicago, as given in a letter dated December 17, 1936. A formal request has been made for a review of the data on which these instructions were based, but the time is too limited to make the results of such review available for 1936.

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By ROSS A. WOODHULL,
President.

WILLIAM H. TRINKAUS,
Acting Chief Engineer.

ERNST BUEHLER,
Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

Office - Supreme Court, U. S.
FILED
JAN 10 1938
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 3,
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4,
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 5,
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1938, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED. KLEIN CO. 24 PRINTERS CHICAGO

IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

October Term, 1937.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 8, Original.
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JANUARY 1, 1938, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of January 1, 1938, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of July 1, 1937, the status of completed work in the sewage treatment construction program involved in this case was stated to be on June 1, 1937, as follows:

TABLE 1.

COMPLETED WORK AS OF JUNE 1, 1937.

Calumet Project	$ 29,692,457.90
North Side Project	37,818,949.37
West Side Project	52,562,428.36
Southwest Side Project	14,362,272.43
West-Southwest Treatment Plant	6,451,613.53
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	680,127.04
Total	$142,200,809.83

TABLE 2.

FUTURE WORK AFTER JUNE 1, 1937.

Calumet Project	$ 2,927,000.00
North Side Project	481,000.00
West Side Project	265,000.00
Southwest Side Project	6,577,000.00
West-Southwest Treatment Plant	20,821,000.00
Chicago River Controlling Works	2,217,000.00
Total	$33,288,000.00

During the six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet, the North Side, the West Side and the Southwest Side Sewage Treatment Projects and on the Chicago River Control Works.

Calumet Project. The sewage treatment works and the sludge disposal plant have been completed and have been in service for more than a year. Minor changes and adjustments are being made, to increase the operating efficiency.

Construction of sewers in the Calumet region has been continued. Construction of the Calumet City sewer is now 99 per cent completed. Construction of the small pumping station to pump the Calumet City sewage is now 75 per cent completed. A contract for the construction of the Blue Island intercepting sewer was awarded November 4, 1937 and work was started November 19, 1937.

North Side Project. The construction of additional Final Settling Tanks, etc., for the North Side Treatment Works has been completed and the tanks have been placed in service. Plans are being prepared for certain miscellaneous improvements at the sewage treatment plant. Bids for the construction of a sewer in Niles will be received December 23, 1937, and for the construction of certain siphons under the North Shore Channel will be received December 30, 1937.

West Side Project. Construction was continued on one collateral intercepting sewer, the Halsted Street sewer which is now entirely completed and in service.

The remaining work in the West Side Project, dependent upon future financing, consists of certain collateral sewers and sewer connections in the area adjacent to the Main Drainage Channel west of Western Avenue and of facilities for the secondary (or complete) treatment of sewage at the West Side Works. Some experimental work, to determine the advantages of certain chemical processes on the effluent from the West Side Imhoff Tanks, is now being carried on. Other experiments involving short periods of aeration for this effluent are also being made.

Southwest Side Project. Construction was continued on the following contracts for the Southwest Side Intercepting Sewer, mentioned in the last semi-annual report to the Court: Contract Section 5, now 100 per cent completed; Contract Section 6, now 97 per cent completed; Contract Section 7, now 100 per cent completed; and Contract Section 9, now 80 per cent completed.

Construction was continued on the following contracts of the Upper Des Plaines Intercepting Sewer; Contract Section 2, now 100 per cent completed; and the contract for the connections to the Upper Des Plaines Sewer, now 100 per cent completed. A contract for the construction of the small pumping station for the Upper Des Plaines Sewer was awarded September 30, 1937 and the work is now 15 per cent completed. A contract for the construction of a short extension of the Upper Des Plaines sewer to the north, designated as Contract Section 8, was awarded October 21, 1937 and the work is now 12 per cent completed.

Construction was continued on the West Towns Outlet Sewer, and Contract Section 1 is now 100 per cent completed and the construction of the Outfall Structure for this sewer is now entirely completed. The construction of the Argo Sewer, from the Southwest Sewage Treatment Works to Natchez Avenue is now entirely completed.

West-Southwest Treatment Plant. Construction was continued on the following contracts mentioned in the last semi-annual report to the Court: Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 98 per cent completed; Electrical Work in connection with Aeration Tanks, etc., now 92 per cent completed; Erection of Machinery and Auxiliary Equipment, now 94 per cent completed; Electrical Work in the Pumping Station, now 24 per cent completed; Main Influent and Effluent Conduits, now 97 per cent completed; Pump Discharge Chamber and Plant Outfall, now 100 per cent completed; Preliminary Settling Tanks, now 92 per cent completed; Structural steel of the Incineration plant, now 90 per cent completed; Substructure of the Incineration plant, now 62 per cent completed.

The fabrication of the following equipment was continued: Steam Turbine driven Pumping Units, now 99 per cent completed; Steam Turbine driven Blower Units, now 98 per cent completed; Sludge Removal Mechanisms, now 99 per cent completed; Venturi Meters, now 99 per cent completed; Meters, Valves and Sluice Gates in connection with Effluent Conduits, now 95 per cent completed; Steam Turbine driven Generator Units, now 99 per cent completed; Transformers, now 93 per cent completed; Condensers, now 100 per cent completed; Boiler Feed Water Heaters, now 99 per cent completed; Boilers and Settings, now 28 per cent completed; Heat Exchangers, now 78 per cent completed; Preliminary Tank Mechanisms, now 59 per cent completed; Vacuum Filters, now 64 per cent completed; Sludge and coal conveying equipment; Sludge drying equipment, now 7 per cent completed; Precipitators; and Ash Handling Equipment.

A contract for the construction of the Superstructure of the Incineration Plant was awarded September 16, 1937. A contract for Electrical Work in connection with the Incineration Plant was awarded November 4, 1937. Bids were received for Piping and Miscellaneous Equipment in the Pump and Blower House December 16, 1937.

At the present time, 78 per cent of the 400 MGD West-Southwest Sewage Treatment Plant has been placed under contract and 53 per cent of the total plant completed.

Control Works Chicago River. The contract for construction of the Lock, Guide Walls, etc., comprising about 75 per cent of the entire Control Works project, is now approximately 85 per cent completed. The contract for Electrical Work in connection with the Lock is now 30 per cent completed. It is expected that bids will be taken for the construction of the Cross Walls connecting the lock with the shore and for the Control Gates in January, 1938.

Activated Sludge Patent Suit. The last reference to the Activated Sludge patent suit was made in the Semi-Annual Report dated January 1, 1936. Since that report the case of Edgar C. Guthard, Activated Sludge, Ltd. and Activated Sludge, Inc. vs. The Sanitary District of Chicago was argued before the United States Circuit Court of Appeals for the 7th Circuit on May 10, 1937, and on June 16, 1937, the Court upheld Judge Lindley in his interlocutory decree against the Sanitary District. Thereafter, The Sanitary District of Chicago filed a petition with the United States Supreme Court for a writ of certiorari, which was denied October 25, 1937.

Financial. The financial condition of The Sanitary District of Chicago has changed little since the time of the last semi-annual report to the Court. The local tax situation has not improved. The taxes collected and turned over to the Sanitary District since the time of the last report to the Court amount to $10,498,080.87. The bonds of the Sanitary District now outstanding amount to $131,302,390. It is expected that $6,309,500 of bonds will be redeemed January 1, 1938, leaving $124,992,890 outstanding. This is still considerably in excess of the bonding capacity of the Sanitary District, which at present amounts to $115,732,909.

Progress of Work. The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from June 1, 1937 (the date of the summaries for the last report) to December 1, 1937 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$ 934,737.16
North Side Project	84,131.24
West Side Project	107,694.84
Southwest Side Project	3,288,079.54
West-Southwest Treatment Plant	2,777,908.08
Chicago River Controlling Works	830,985.19
Total	$8,023,536.05

In addition to the amounts shown in Table 3, approximately $1,195,000 had been earned by contractors up to December 1, 1937, on the various items of construction work, but had not been paid, being retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on December 1, 1937, was as follows:

TABLE 4.

COMPLETED WORK AS OF DECEMBER 1, 1937.

Calumet Project	$ 30,627,195.06
North Side Project	37,903,080.61
West Side Project	52,670,123.20
Southwest Side Project	17,650,351.97
West-Southwest Treatment Plant	9,229,521.61
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	1,511,112.23
Total	$150,224,345.88

The estimated cost of future essential sewage treatment construction, as of December 1, 1937, is as follows:

TABLE 5.

FUTURE WORK AFTER DECEMBER 1, 1937.

Calumet Project	$ 1,889,000
North Side Project	685,000
West Side Project	205,000
Southwest Side Project	3,484,000
West-Southwest Treatment Plant	19,265,000
Chicago River Controlling Works	1,380,000
Total	$26,908,000

Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935 with the Federal Emergency Administration of Public Works to the extent of $11,158,000 are available for this future work. This leaves essential work to the extent of $15,750,000 to be financed from other sources. The Sanitary District will apparently be able to finance work to the extent of $1,275,000 now, leaving work estimated at $14,475,000 for which no resources are presently available. The specific items estimated at $14,475,000 are secondary treatment of

West Side sewage $12,650,000, additional sewers for 100 per cent collection of sewage on the North and West Side areas $300,000, improvements in Calumet Project $130,000, additions to North Side plant $175,000, Argo sewer $870,000, connections to 39th Street conduit and changes at 39th Street pumping station $220,000 and a contingent expenditure of $130,000 in connection with Chicago River control works.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of January 1, 1938, is about 4,587,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,805,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,392,000. This figure includes the Corn Products wastes, which would have been equivalent to the sewage of 393,000 persons if no recovery had been accomplished. These wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The January 1, 1938 total population, and industrial waste equivalent, as above indicated, are estimated as 6,392,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total January 1, 1938 population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,433,000, which is 85 per cent of 6,392,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3, and 4. The amounts of actual sewage treatment in operation on June 25, 1937 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1937.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	326,000	85	277,000
North Side	1,235,000	85	1,049,000
West Side (Sedimentation)	1,622,000	33⅓	541,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	415,000		370,000
Total	3,606,000		2,244,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1937.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	335,000	85	285,000
North Side	1,251,000	85	1,063,000
West Side (Sedimentation)	1,633,000	33⅓	544,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	393,000		359,000
Total	3,620,000		2,258,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 2,258,000 out of 5,433,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,392,000 were being treated. This indicates the actual treatment of approximately 41.6 per cent of the total sewage within the Sanitary District, although considerable additional construction work has been performed during this period, for which no credit will be taken in this percentage until the works are completed and put in operation.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan, during the calendar year 1936 averaged 4,862 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,712 cubic feet per second; the inflow from the Des Plaines River averaged 33 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 6,607 cubic feet per second.

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limited the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935, and thereafter limits the net diversion to an annual average of not more than 5,000 cubic feet per second up to December 31, 1938. The average monthly diversion, as made under this Permit from January 1 to December 20, 1937, is indicated in the table following:

Month 1937	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Des Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan C.F.S.
January	6348	88	1602	4658
February	5629	32	1635	3962
March	5462	30	1613	3819
April	6350	41	1587	4722
May	5843	31	1586	4226
June	6746	25	1629	5092
July	7313	0	1835	5478
August	7681	0	1895	5786
September ...	6925	0	1772	5153
October	7175	0	1673	5502
November ...	7392	0	1571	5821
Dec. 1 to 20..	7300	0	1550	5750
Average	6680	21	1662	4997

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By ROSS A. WOODHULL,
President.

WILLIAM H. TRINKAUS,
Chief Engineer.

ERNST BUEHLER,
Attorney.

Attest:
JAMES J. SULLIVAN,
Clerk.

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OCT. 10 1938

CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. [redacted] 2
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. [redacted] 3
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. [redacted] 4
Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1938, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED. KLEIN CO. 24 PRINTERS CHICAGO

IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

October Term, 1937.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.* STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS, *Intervening Defendants.*	No. 5, Original.
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 8, Original.
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1938, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1938, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1938, the status of completed work in the sewage treatment construction program involved in this case was stated to be on December 1, 1937, as follows:

TABLE 1.

COMPLETED WORK AS OF DECEMBER 1, 1937.

Calumet Project	$ 30,627,195.06
North Side Project	37,903,080.61
West Side Project	52,670,123.20
Southwest Side Project	17,650,351.97
West-Southwest Treatment Plant	9,229,521.61
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	1,511,112.23
Total	$150,224,345.88

The estimated cost of future essential sewage treatment construction, as of December 1, 1937, is as follows:

TABLE 2.

FUTURE WORK AFTER DECEMBER 1, 1937.

Calumet Project	$ 1,889,000.00
North Side Project	685,000.00
West Side Project	205,000.00
Southwest Side Project	3,484,000.00
West-Southwest Treatment Plant	19,265,000.00
Chicago River Controlling Works	1,380,000.00
Total	$26,908,000.00

During the six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet, the North Side, and the Southwest Side Sewage Treatment Projects and on the Chicago River Control Works.

Calumet Project. A contract for new sludge conveying equipment at the Calumet sludge disposal plant was awarded February 10, 1938 and the installation of this new equipment is 70 per cent completed.

Construction of the Calumet City sewer and of the small pumping station to pump the Calumet City sewage is now 100 per cent completed. Construction of the Blue Island Intercepting sewer is now 54 per cent completed. A contract for the construction of the connections to the Blue Island intercepting sewer was awarded June 16, 1938.

North Side Project. A contract for the construction of a sewer and pumping station in Niles was awarded December 30, 1937 and this work is now 81 per cent completed. A contract for the construction of siphons under the North Shore Channel was awarded January 6, 1938 and this work is now 39 per cent completed.

Southwest Side Project. Construction of contracts Section 6 and Section 9 of the Southwest Side intercepting sewer has been entirely completed.

The contract for the fabrication of pumps for the Racine Avenue Pumping Station was awarded January 27, 1938. The contract for the construction of the substructure of the Racine Avenue Pumping Station was awarded May 12, 1938.

The construction of contract Section 8 of the Upper Des Plaines sewer has been entirely completed. The construction of the small pumping station for the Upper Des Plaines sewer is now 74 per cent completed.

The only work remaining to be placed under contract in the Southwest Side project is the superstructure, mechanical equipment and electrical equipment of the Racine Avenue Pumping Station. It is expected that this work will be let by August, 1938.

West-Southwest Treatment Plant. Construction was continued on the following contracts mentioned in the last semi-annual report to the Court: Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 98 per cent completed; Electrical Work in connection with Aeration Tanks, etc., now 95 per cent completed; Erection of Machinery and Auxiliary Equipment, now 95 per cent completed; Electrical Work in the Pumping Station, now 47 per cent completed; Main Influent and Effluent Conduits, now 97 per cent completed; Electrical Work in connection with conduits, now 83 per cent completed; Preliminary Settling Tanks, now 96 per cent completed; Structural Steel of the Incineration plant, now 100 per cent completed; Substructure of the Incineration plant, now 100 per cent completed; Superstructure of the Incineration plant, now 87 per cent completed; and Electrical Work in connection with the Incineration plant, now 8 per cent completed.

A contract for Piping and Miscellaneous Equipment in the Pump and Blower House was awarded December 23, 1937 and this work is now 37 per cent completed. The contract for Piping and Miscellaneous Equipment in the Incineration plant was awarded May 17, 1938. A contract for the construction of Sludge Concentration Tanks and Miscellaneous Work was awarded June 16, 1938.

The fabrication of the following equipment was continued: Steam Turbine driven Pumping Units, now 99 per cent completed; Steam Turbine driven Blower Units, now 98 per cent completed; Sludge Removal Mechanisms, now 99 per cent completed; Venturi Meters, now 99 per cent completed; Meters, Valves and Sluice Gates in connection with Effluent Conduits, now 96 per cent completed; Steam Turbine driven Generator Units, now 99 per cent completed; Transformers, now 93 per cent completed; Boiler Feed Water Heaters, now 99 per cent completed; Boilers and Settings, now 95 per cent completed; Heat Exchangers, now 99 per cent completed; Preliminary Tank Mechanism, now 94 per cent completed; Vacuum Filters, now 91 per cent completed; Sludge and coal conveying equipment, now 76 per cent completed; Sludge drying equipment, now 91 per cent completed; Precipitators, now 90 per cent completed; and Ash Handling Equipment, now 2 per cent completed.

At the present time, 95 per cent of the 400 MGD West-Southwest Sewage Treatment Plant has been placed under contract and 76 per cent of the total plant completed.

Control Works Chicago River. The contractor for construction of the Lock, Guide Walls, etc., comprising about 75 per cent of the entire Control Works project, is now approximately 92 per cent completed. The contract for Electrical Work in connection with the Lock is now 68 per cent completed. A contract for the construction of the Cross Walls connecting the Lock with the shore and for the Control Gates was awarded March 16, 1938 and the work is now 40 per cent completed. It is expected that these three contracts will be completed before December, 1938.

Financial. The financial condition of The Sanitary District of Chicago has changed little since the time of the last semi-annual report to the Court. The local tax situation has not improved. The taxes collected and turned over to the Sanitary District for corporate purposes and bond service since the time of the last report to the Court amounted to $7,848,620.87. The bonds of the Sanitary District now outstanding amount to $124,992,890. On July 1, 1938 some $4,128,000 of these bonds will be redeemed, leaving $120,864,890 then outstanding. The constitutional debt limit of The Sanitary District of Chicago, which includes bonds and other obligations, based on the 1937 assessed valuation of property, is $122,861,672.

Progress of Work. The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December 1, 1937 (the date of the summaries for the last report) to June 1, 1938 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$ 615,623.12
North Side Project	210,666.29
West Side Project	53,863.31
Southwest Side Project	527,973.96
West-Southwest Treatment Plant	2,322,095.63
Chicago River Controlling Works	453,787.50
Total	$4,184,009.81

In addition to the amounts shown in Table 3, approximately $700,000 had been earned by contractors up to June 1, 1938, on the various items of construction work, but had not been paid, being retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on June 1, 1938, was as follows:

TABLE 4.

COMPLETED WORK AS OF JUNE 1, 1938

Calumet Project	$ 31,242,818.18
North Side Project	38,113,746.90
West Side Project	52,723,986.51
Southwest Side Project	18,178,325.93
West-Southwest Treatment Plant	11,551,617.24
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	1,964,899.73
Total	$154,408,355.69

The estimated cost of future essential sewage treatment construction, as of June 1, 1938, is as follows:

TABLE 5.

FUTURE WORK AFTER JUNE 1, 1938.

Calumet Project	$ 1,281,000.00
North Side Project	480,000.00
West Side Project	200,000.00
Southwest Side Project	2,760,000.00
West-Southwest Treatment Plant	16,696,000.00
Chicago River Controlling Works	926,000.00
Total	$22,343,000.00

Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935 with the Federal Emergency Administration of Public Works to the extent of $8,683,000 are available and will be used for this future work.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of June 1, 1938, is about 4,632,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,843,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,475,000. This figure includes the Corn Products wastes, which would have been equivalent to the sewage of 423,000 persons if no recovery had been accomplished. These wastes have been greatly reduced, as a result of certain rearrangements in the factory processes resulting from research initiated by the Sanitary District.

The June 1, 1938 total population, and industrial waste equivalent, as above indicated, are estimated as 6,475,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total June 1, 1938 population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,504,000, which is 85 per cent of 6,475,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3, and 4. The amounts of actual sewage treatment in operation on December 24, 1937 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1937.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	335,000	85	285,000
North Side	1,251,000	85	1,063,000
West Side (Sedimentation)	1,633,000	33⅓	544,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	393,000		359,000
Total	3,620,000		2,258,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1938.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	362,000	85	308,000
North Side	1,268,000	85	1,078,000
West Side (Sedimentation)	1,644,000	33⅓	548,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	423,000		387,000
Total	3,705,000		2,328,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 2,328,000 out of 5,504,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,475,000 were being treated. This indicates the actual treatment of approximately 42.2 per cent of the total sewage within the Sanitary District.

When the West-Southwest Sewage Treatment Plant is placed in service (probably in the early spring of 1939) the sewage of 1,266,000 additional people and trade wastes equivalent to the sewage of 1,210,000 people, will be treated. The treatment of the sewage of this additional 2,476,000 population and equivalent to the extent of 85 per cent will have the effect of increasing the over-all treatment percentage from the present 42.2 per cent to 80 per cent of ~~and~~ the total sewage within the Sanitary District. The addition of complete treatment facilities to the West Side Sewage Treatment Works will have the effect of increasing this percentage to 96 per cent.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan, during the calendar year 1937 averaged 4,989 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,665 cubic feet per second the inflow from the Des Plaines River averaged 23 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 6,677 cubic feet per second.

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limited the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935, and thereafter limits the net diversion to an annual average of not more than 5,000 cubic feet per second up to December 31, 1938. The average monthly diversion, as made under this Permit from January 1 to June 20, 1938, is indicated in the table following:

Month 1938	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Des Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan Watershed C.F.S.
January	6408	20	1589	4799
February ...	7422	63	1554	5805
March	7607	25	1534	6048
April	7686	22	1529	6135
May	6311	13	1563	4735
June 1 to 20.	6645	10	1600	5035
Average	7013	26	1561	5426

The net diversion will be reduced to 1500 cubic feet per second, annual average, after December 31, 1938.

All of which is respectfully submitted,

The Sanitary District of Chicago,

By Ross A. Woodhull,
President.

William H. Trinkaus,
Chief Engineer.

Ernst Buehler,
Attorney.

Attest:

James J. Sullivan,
Clerk.

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CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. [redacted] Original. 2

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. [redacted] Original. 3

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. [redacted] Original. 4

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1938, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED. KLEIN CO. 24 PRINTERS CHICAGO

IN THE

Supreme Court of the United States

Nos. 5, 8 and 9, Original.

October Term, 1937.

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 8, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9, Original.

SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO OF JULY 1, 1938, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its semi-annual report of July 1, 1938, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of January 1, 1938, the status of completed work in the sewage treatment construction program involved in this case was stated to be on December 1, 1937, as follows:

TABLE 1.

COMPLETED WORK AS OF DECEMBER 1, 1937.

Calumet Project	$ 30,627,195.06
North Side Project	37,903,080.61
West Side Project	52,670,123.20
Southwest Side Project	17,650,351.97
West-Southwest Treatment Plant	9,229,521.61
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	1,511,112.23
Total	$150,224,345.88

The estimated cost of future essential sewage treatment construction, as of December 1, 1937, is as follows:

TABLE 2.

FUTURE WORK AFTER DECEMBER 1, 1937.

Calumet Project	$ 1,889,000.00
North Side Project	685,000.00
West Side Project	205,000.00
Southwest Side Project	3,484,000.00
West-Southwest Treatment Plant	19,265,000.00
Chicago River Controlling Works	1,380,000.00
Total	$26,908,000.00

During the six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet, the North Side, and the Southwest Side Sewage Treatment Projects and on the Chicago River Control Works.

Calumet Project. A contract for new sludge conveying equipment at the Calumet sludge disposal plant was awarded February 10, 1938 and the installation of this new equipment is 70 per cent completed.

Construction of the Calumet City sewer and of the small pumping station to pump the Calumet City sewage is now 100 per cent completed. Construction of the Blue Island Intercepting sewer is now 54 per cent completed. A contract for the construction of the connections to the Blue Island intercepting sewer was awarded June 16, 1938.

North Side Project. A contract for the construction of a sewer and pumping station in Niles was awarded December 30, 1937 and this work is now 81 per cent completed. A contract for the construction of siphons under the North Shore Channel was awarded January 6, 1938 and this work is now 39 per cent completed.

Southwest Side Project. Construction of contracts Section 6 and Section 9 of the Southwest Side intercepting sewer has been entirely completed.

The contract for the fabrication of pumps for the Racine Avenue Pumping Station was awarded January 27, 1938. The contract for the construction of the substructure of the Racine Avenue Pumping Station was awarded May 12, 1938.

The construction of contract Section 8 of the Upper Des Plaines sewer has been entirely completed. The construction of the small pumping station for the Upper Des Plaines sewer is now 74 per cent completed.

The only work remaining to be placed under contract in the Southwest Side project is the superstructure, mechanical equipment and electrical equipment of the Racine Avenue Pumping Station. It is expected that this work will be let by August, 1938.

West-Southwest Treatment Plant. Construction was continued on the following contracts mentioned in the last semi-annual report to the Court: Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 98 per cent completed; Electrical Work in connection with Aeration Tanks, etc., now 95 per cent completed; Erection of Machinery and Auxiliary Equipment, now 95 per cent completed; Electrical Work in the Pumping Station, now 47 per cent completed; Main Influent and Effluent Conduits, now 97 per cent completed; Electrical Work in connection with conduits, now 83 per cent completed; Preliminary Settling Tanks, now 96 per cent completed; Structural Steel of the Incineration plant, now 100 per cent completed; Substructure of the Incineration plant, now 100 per cent completed; Superstructure of the Incineration plant, now 87 per cent completed; and Electrical Work in connection with the Incineration plant, now 8 per cent completed.

A contract for Piping and Miscellaneous Equipment in the Pump and Blower House was awarded December 23, 1937 and this work is now 37 per cent completed. The contract for Piping and Miscellaneous Equipment in the Incineration plant was awarded May 17, 1938. A contract for the construction of Sludge Concentration Tanks and Miscellaneous Work was awarded June 16, 1938.

The fabrication of the following equipment was continued: Steam Turbine driven Pumping Units, now 99 per cent completed; Steam Turbine driven Blower Units, now 98 per cent completed; Sludge Removal Mechanisms, now 99 per cent completed; Venturi Meters, now 99 per cent completed; Meters, Valves and Sluice Gates in connection with Effluent Conduits, now 96 per cent completed; Steam Turbine driven Generator Units, now 99 per cent completed; Transformers, now 93 per cent completed; Boiler Feed Water Heaters, now 99 per cent completed; Boilers and Settings, now 95 per cent completed; Heat Exchangers, now 99 per cent completed; Preliminary Tank Mechanism, now 94 per cent completed; Vacuum Filters, now 91 per cent completed; Sludge and coal conveying equipment, now 76 per cent completed; Sludge drying equipment, now 91 per cent completed; Precipitators, now 90 per cent completed; and Ash Handling Equipment, now 2 per cent completed.

At the present time, 95 per cent of the 400 MGD West-Southwest Sewage Treatment Plant has been placed under contract and 76 per cent of the total plant completed.

Control Works Chicago River. The contractor for construction of the Lock, Guide Walls, etc., comprising about 75 per cent of the entire Control Works project, is now approximately 92 per cent completed. The contract for Electrical Work in connection with the Lock is now 68 per cent completed. A contract for the construction of the Cross Walls connecting the Lock with the shore and for the Control Gates was awarded March 16, 1938 and the work is now 40 per cent completed. It is expected that these three contracts will be completed before December, 1938.

Financial. The financial condition of The Sanitary District of Chicago has changed little since the time of the last semi-annual report to the Court. The local tax situation has not improved. The taxes collected and turned over to the Sanitary District for corporate purposes and bond service since the time of the last report to the Court amounted to $7,848,620.87. The bonds of the Sanitary District now outstanding amount to $124,992,890. On July 1, 1938 some $4,128,000 of these bonds will be redeemed, leaving $120,864,890 then outstanding. The constitutional debt limit of The Sanitary District of Chicago, which includes bonds and other obligations, based on the 1937 assessed valuation of property, is $122,861,672.

Progress of Work. The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from December 1, 1937 (the date of the summaries for the last report) to June 1, 1938 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$ 615,623.12
North Side Project	210,666.29
West Side Project	53,863.31
Southwest Side Project	527,973.96
West-Southwest Treatment Plant	2,322,095.63
Chicago River Controlling Works	453,787.50
Total	$4,184,009.81

In addition to the amounts shown in Table 3, approximately $700,000 had been earned by contractors up to June 1, 1938, on the various items of construction work, but had not been paid, being retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on June 1, 1938, was as follows:

TABLE 4.

COMPLETED WORK AS OF JUNE 1, 1938

Calumet Project	$ 31,242,818.18
North Side Project	38,113,746.90
West Side Project	52,723,986.51
Southwest Side Project	18,178,325.93
West-Southwest Treatment Plant	11,551,617.24
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	1,964,899.73
Total	$154,408,355.69

The estimated cost of future essential sewage treatment construction, as of June 1, 1938, is as follows:

TABLE 5.

FUTURE WORK AFTER JUNE 1, 1938.

Calumet Project	$ 1,281,000.00
North Side Project	480,000.00
West Side Project	200,000.00
Southwest Side Project	2,760,000.00
West-Southwest Treatment Plant	16,696,000.00
Chicago River Controlling Works	926,000.00
Total	$22,343,000.00

Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935 with the Federal Emergency Administration of Public Works to the extent of $8,683,000 are available and will be used for this future work.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of June 1, 1938, is about 4,632,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to the sewage of 1,843,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,475,000. This figure includes the Corn Products wastes, which would have been equivalent to the sewage of 423,000 persons if no recovery had been accomplished. These wastes have been greatly reduced, as a result of certain rearrangements in the factory processes resulting from research initiated by the Sanitary District.

The June 1, 1938 total population, and industrial waste equivalent, as above indicated, are estimated as 6,475,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment for the total June 1, 1938 population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,504,000, which is 85 per cent of 6,475,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3, and 4. The amounts of actual sewage treatment in operation on December 24, 1937 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 24, 1937.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	335,000	85	285,000
North Side	1,251,000	85	1,063,000
West Side (Sedimentation)	1,633,000	33⅓	544,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	393,000		359,000
Total	3,620,000		2,258,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1938.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	362,000	85	308,000
North Side	1,268,000	85	1,078,000
West Side (Sedimentation)	1,644,000	33⅓	548,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	423,000		387,000
Total	3,705,000		2,328,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 2,328,000 out of 5,504,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,475,000 were being treated. This indicates the actual treatment of approximately 42.2 per cent of the total sewage within the Sanitary District.

When the West-Southwest Sewage Treatment Plant is placed in service (probably in the early spring of 1939) the sewage of 1,266,000 additional people and trade wastes equivalent to the sewage of 1,210,000 people, will be treated. The treatment of the sewage of this additional 2,476,000 population and equivalent to the extent of 85 per cent will have the effect of increasing the over-all treatment percentage from the present 42.2 per cent to 80 per cent of ~~and~~ the total sewage within the Sanitary District. The addition of complete treatment facilities to the West Side Sewage Treatment Works will have the effect of increasing this percentage to 96 per cent.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan, during the calendar year 1937 averaged 4,989 cubic feet per second. The domestic pumpage of the Chicago metropolitan area during this period averaged 1,665 cubic feet per second the inflow from the Des Plaines River averaged 23 cubic feet per second; and the total flow from the Main Channel at Lockport averaged 6,677 cubic feet per second.

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limited the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935, and thereafter limits the net diversion to an annual average of not more than 5,000 cubic feet per second up to December 31, 1938. The average monthly diversion, as made under this Permit from January 1 to June 20, 1938, is indicated in the table following:

Month 1938	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Des Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan Watershed C.F.S.
January	6408	20	1589	4799
February ...	7422	63	1554	5805
March	7607	25	1534	6048
April	7686	22	1629	6135
May	6311	13	1563	4735
June 1 to 20.	6645	10	1600	5035
Average	7013	26	1561	5426

The net diversion will be reduced to 1500 cubic feet per second, annual average, after December 31, 1938.

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By ROSS A. WOODHULL,
President.

WILLIAM H. TRINKAUS,
Chief Engineer.

ERNST BUEHLER,
Attorney.

Attest:
JAMES J. SULLIVAN,
Clerk.

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JAN 9 1939
CHARLES ELMORE CROPL
CLERK

IN THE

Supreme Court of the United States

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. [redacted] 2
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. [redacted] 3
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. [redacted] 4
Original.

FINAL SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO, JANUARY 1, 1939, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

FRED. KLEIN CO. 24 PRINTERS CHICAGO

IN THE

Supreme Court of the United States

NOS. 5, 8 AND 9, ORIGINAL.

OCTOBER TERM, 1[redacted] 1938

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
STATE OF MISSOURI, STATE OF KENTUCKY, STATE OF TENNESSEE, STATE OF LOUISIANA, STATE OF MISSISSIPPI, and STATE OF ARKANSAS,
Intervening Defendants.

No. 5, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al,
Defendants.

No. 8, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 9, Original.

FINAL SEMI-ANNUAL REPORT OF THE SANITARY DISTRICT OF CHICAGO, JANUARY 1, 1939, MADE PURSUANT TO DECREE OF APRIL 21, 1930.

Pursuant to provisions of paragraph numbered 5 of the Decree in the above entitled causes, entered on April 21, 1930, the Defendant, The Sanitary District of Chicago, hereby makes its final semi-annual report, January 1, 1939, as follows:

CONSTRUCTION PROGRAM.

In the semi-annual report of July 1, 1938, the status of completed work in the sewage treatment construction program involved in this case was stated to be on June 1, 1938, as follows:

TABLE 1.

COMPLETED WORK AS OF JUNE 1, 1938.

Calumet Project	$ 31,242,818.18
North Side Project	38,113,746.90
West Side Project	52,723,986.51
Southwest Side Project	18,178,325.93
West-Southwest Treatment Plant	11,551,617.24
Miscellaneous Plants and Sewers	632,961.20
Chicago River Controlling Works	1,964,899.73
Total	$154,408,255.69

The estimated cost of future essential sewage treatment construction, as of June 1, 1938, was as follows:

TABLE 2.

FUTURE WORK AFTER JUNE 1, 1938.

Calumet Project	$ 1,281,000.00
North Side Project	480,000.00
West Side Project	200,000.00
Southwest Side Project	2,760,000.00
West-Southwest Treatment Plant	16,696,000.00
Chicago River Controlling Works	926,000.00
Total	$22,343,000.00

During the six months between the date of the last report and the present report a considerable amount of construction work has been accomplished on the Calumet, the North Side and the Southwest Side Sewage Treatment Projects and on the Chicago River Control Works.

The Calumet and North Side Projects and the Chicago River Control Works are physically completed to the point where they have been placed in full service. The Southwest Side sewer system is completed except for the Racine Avenue Pumping Station and can function for the interception of sewage under all ordinary conditions without the Racine Avenue Station which is designed for control under storm flow conditions. The Southwest Side intercepting sewer however cannot be placed in service until the West-Southwest Treatment Plant is in operation. Under the construction program the West-Southwest Treatment Plant was planned to be ready for service before December 1, 1938. The agreement with the Federal Emergency Administration of Public Works, through which funds were obtained for this construction, provided for completion by December 1, 1938. It became impossible to complete certain portions of the work on the West-Southwest Treatment Plant before December 1, 1938, through circumstances beyond the control of the Sanitary District, involving rejection of bids and re-advertisement for new bids on certain important contracts, also construction delays caused by strikes, etc. Thus the sequence of the work was so interrupted that it was physically impossible to meet the completion date in the agreement.

The Sanitary District of Chicago has requested the Public Works Administration to extend the date of the completion of the P.W.A. agreement from December 1, 1938 to September 1, 1939. To this the Public Works Administration will undoubtedly consent. It is expected that all the physical work covered by this agreement will be completed before July 1, 1939. Since it was impossible to put the West-Southwest

Sewage Treatment Plant in service by December 1, 1938, the operation of this plant was postponed to avoid starting during winter weather. The plant should be started in March 1939, and be in complete operation by June 1939. Certain contracts in the Project, involving the testing of equipment after actual service, cannot be completed until after the plant is in operation.

Calumet Project. Construction was continued on the new sludge conveying equipment at the Calumet sludge disposal plant and this work is now 100 per cent completed.

Construction was continued on the Blue Island Intercepting sewer, now 100 per cent completed, and on the connections to the Blue Island Intercepting sewer, which work was 98 per cent completed on December 1, 1938.

North Side Project. Construction was continued on the construction of a sewer and pumping station in Niles and on the construction of siphons under the North Shore Channel. Both projects are now 100 per cent completed.

Southwest Side Project. Work was continued on the fabrication of pumps for the Racine Avenue Pumping Station, this contract now being 91 per cent completed. Construction was continued on the substructure of the Racine Avenue Pumping Station, the work now being 42 per cent completed. Contracts were awarded for the erection of the superstructure of the Racine Avenue Pumping Station on September 1, 1938, and for the electrical work on this Station on September 22, 1938, this work now being 6 per cent completed. In connection with the Racine Avenue Pumping Station, only one contract remains to be let, namely, that for mechanical work and erection of machinery, which will probably be awarded in January 1939.

The construction of the small pumping station for the Upper Des Plaines sewer is now 100 per cent completed and the entire Upper Des Plaines sewer has been placed in service.

West-Southwest Treatment Plant. Construction was continued on the following contracts mentioned in the last semi-annual report to the Court: Aeration Tanks, Operating Galleries, Final Settling Tanks, etc., now 98 per cent completed; Electrical Work in connection with Aeration Tanks, etc., now 100 per cent completed; Erection of Machinery and Auxiliary Equipment, now 97 per cent completed; Electrical Work in the Pumping Station, now 77 per cent completed; Main Influent and Effluent Conduits, now 97 per cent completed; Electrical Work in connection with Conduits, now 95 per cent completed; Preliminary Settling Tanks, now 97 per cent completed; Superstructure of the Incineration Plant, now 99 per cent completed; Electrical Work in connection with the Incineration Plant, now 91 per cent completed; Piping and Miscellaneous Equipment in the Pump and Blower House, now 98 per cent completed; Piping and Miscellaneous Equipment in the Incineration Plant, now 81 per cent completed; Sludge Concentration Tanks and Miscellaneous Work, now 69 per cent completed.

A contract for Insulation in the Incineration Plant was awarded July 28, 1938, and this work is now 38 per cent completed. A contract for Electrical Duct Lines was awarded September 1, 1938, and this work is now 59 per cent completed. A contract for Trash Racks was awarded September 22, 1938, and this work is now 35 per cent completed.

The fabrication of the following equipment which was referred to in the last report to the Court was continued and is now all practically completed: Steam Turbine driven Pumping Units, now 100 per cent completed; Steam Turbine driven Blower Units now 100 per cent completed; Sludge Removal Mechanisms, now 100 per cent completed; Venturi Meters, now 100 per cent completed; Meters in connection with the Effluent Conduits, now 100 per cent completed; Valves and Sluice Gates in connection with the Effluent Conduits, now 93 per cent completed; Steam Turbine driven Generator Units, now 99 per cent completed; Transformers, now 100 per cent completed; Boiler Feed Water Heaters, now 100 per cent completed; Boilers and Settings, now 99 per cent completed; Heat Exchangers, now 99 per cent completed; Preliminary Tank Mechanisms, now 94 per cent completed; Vacuum Filters, now 97 per cent completed; Sludge and Coal Conveying Equipment, now 98 per cent completed; Sludge Drying Equipment, now 99 per cent completed; Precipitators, now 99 per cent completed; and Ash Handling Equipment, now 77 per cent completed.

Two minor contracts remain to be awarded in connection with the West-Southwest Treatment Plant, namely, a contract for Miscellaneous Work, which is really a clean-up contract, now advertised, probably to be awarded in January 1939, and a contract for Painting Machinery and Equipment in the Pumping Station and Incineration Plant to be let not later than February 1939.

At the present time 98 per cent of the 400 M.G.D. West-Southwest Sewage Treatment Plant has been placed under contract and 90 per cent of the total plant completed. It is expected that the plant will be entirely completed and placed in full service by June 1939.

Control Works, Chicago River. The contract for the construction of the Lock, Guide Walls, etc., comprising about 75 per cent of the entire Control Works has been entirely completed and the Lock was officially dedicated on September 7, 1938. The contract for Electrical Work in connection with the Lock has also been completed. Work has been continued on the construction of the Cross Walls connecting the Lock with the shore and on the Control Gates and this work is now 93 per cent completed. The last section of Wall was placed December 15, 1938, and there is now a tight barrier between the Chicago River and Lake Michigan. The work not yet completed consists of a concrete slab along the top of the North Cross Wall, well above the water line. For all effective purposes the Control Works may be considered complete and operable.

Financial. The financial condition of The Sanitary District of Chicago has changed little since the time of last semi-annual report to the Court. The local tax situation has not improved. The taxes collected and turned over to the Sanitary District for corporate purposes and bond service since the time of the last report to the Court amounted to $9,057,903.74. The bonds of the Sanitary District now outstanding amount to $120,864,890. On January 1, 1939, some $3,380,500 of these bonds will be redeemed, leaving $117,484,390 then outstanding. The constitutional debt limit of The Sanitary District of Chicago, which includes bonds and other obligations, based on the 1937 assessed valuation of property, is $122,861,672.

Progress of Work. The total work accomplished by The Sanitary District of Chicago in the construction of sewage treatment works during the period from June 1, 1938 (the date of the summaries for the last report) to December 1, 1938 (the date of the summaries for this report) as measured by construction expenditures was, as follows:

TABLE 3.

Calumet Project	$1,237,415.55
North Side Project	229,422.29
West Side Project	368,562.66
Southwest Side Project	587,026.84
West-Southwest Treatment Plant	2,334,446.55
Miscellaneous Plants and Sewers	1,601.78
Chicago River Controlling Works	628,500.34
Total	$5,386,976.01

In addition to the amounts shown in Table 3, approximately $758,700 had been earned by contractors up to December 1, 1938, on the various items of construction work, but had not been paid, being retained by the Sanitary District as reserved percentage until the final completion of the contracts.

By adding the various items indicated in Table 3 to corresponding items in Table 1, the completed portion of the sewage treatment construction program on December 1, 1938, was as follows:

TABLE 4.

COMPLETED WORK AS OF DECEMBER 1, 1938.

Calumet Project	$ 32,480,233.73
North Side Project	38,343,169.19
West Side Project	53,092,549.17
Southwest Side Project	18,765,352.77
West-Southwest Treatment Plant	13,886,063.79
Miscellaneous Plants and Sewers	634,562.98
Chicago River Controlling Works	2,593,400.07
Total	$159,795,331.70

The estimated cost of future essential sewage treatment construction, as of December 1, 1938, is as follows:

TABLE 5.

FUTURE WORK AFTER DECEMBER 1, 1938.

Calumet Project	$ 302,000
North Side Project	290,000
West Side Project	200,000
Southwest Side Project	2,443,000
West-Southwest Treatment Plant	10,895,000
Chicago River Controlling Works	330,000
Total	$14,460,000

Funds remaining unexpended from the amounts obtained under the agreement of September 21, 1935, with the Federal Emergency Administration of Public Works to the extent of $3,730,000 are available and will be used for this future work. This leaves essential work to the extent of $10,730,000 to be financed from other sources. The Sanitary District hopes to be able to finance this work over the next two years assuming tax collections and assessed valuations to remain the same as at present and assuming the possibility of Federal aid in this construction.

SEWAGE TREATMENT.

The population of The Sanitary District of Chicago, as of January 1, 1939, is about 4,684,000, according to estimates made from the figures of the 1930 census. The industrial wastes in the Sanitary District are assumed to be equivalent to sewage of 1,810,000 additional persons. Hence, the total population and industrial wastes equivalent amount to 6,494,000. This figure includes the Corn Products wastes, which would have been equivalent to the sewage of 425,000 persons if no recovery had been accomplished. These wastes have been greatly reduced, as a result of certain experimental work initiated by the Sanitary District.

The January 1, 1939, total population and industrial waste equivalent, as above indicated, are estimated as 6,494,000. Up to date, the Sanitary District has assumed that so-called complete sewage treatment could produce an annual average of 85 per cent purification. Hence, so-called complete treatment as of January 1, 1939, for the total population and industrial wastes equivalent would equal the 100 per cent treatment of the sewage of 5,520,000, which is 85 per cent of 6,494,000.

The expenditures for sewage treatment have been indicated in Tables 1, 3, and 4. The amounts of actual sewage treatment in operation on June 25, 1938 (as of the time of the last report to the Supreme Court) and at the present time are shown in Tables 6 and 7, following:

TABLE 6.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF JUNE 25, 1938.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	362,000	85	308,000
North Side	1,268,000	85	1,078,000
West Side (Sedimentation)	1,644,000	33⅓	548,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	8,000	85	7,000
Corn Products (Reduction)	423,000	91.5	387,000
Total Treated	3,705,000	62.8	2,328,000
Not Treated	2,770,000	0	0
Total Population	6,475,000	35.9	2,328,000

TABLE 7.

ACTUAL SEWAGE TREATMENT IN OPERATION AS OF DECEMBER 31, 1938.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	444,000	85	377,000
North Side	1,291,000	85	1,097,000
West Side (Sedimentation)	1,722,000	33⅓	574,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	6,000	85	5,000
Corn Products (Reduction)	425,000	91.5	389,000
Total Treated	3,888,000	62.8	2,442,000
Not Treated	2.606,000	0	0
Total Population	6,494,000	37.7	2,442,000

The extent of the operation of sewage treatment plants at the present time is equal to the 100 per cent treatment of the sewage of 2,442,000 out of 5,520,000 persons, which would be the present possible 100 per cent treatment if the sewage of the total population and industrial wastes equivalent of 6,494,000 were being treated. This indicates the actual treatment of approximately 44.2 per cent of the total sewage within the Sanitary District. The 37.7 per cent treatment of 6,494,000 shown in Table 7 is 85 per cent of the above 44.2 per cent.

In the spring of 1939 the completion of a sewer now under construction by the City of Chicago will bring the sewage of 89,000 additional people to the West Side works for treatment, to the extent of 33⅓ per cent. The West-Southwest sewage treatment plant will also be placed in service in the spring of 1939 but in the usual procedure of tuning up will probably not function to best advantage before June 1939. This plant will treat to the extent of 85 per cent, the sewage of 1,277,000 additional persons as well as indusrial wastes (principally from the Stock Yards) equivalent to the sewage of about 1,185,000 people, or a total equivalent population of 2,462,000. The population figures cited are as of January 1, 1939, and of course will change by July 1, 1939, but using these figures for comparative purposes, the actual sewage treatment in operation after the completion of all the work now in progress will be as shown in Table 8, following:

TABLE 8.

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
Calumet	444,000	85	377,000
North Side	1,291,000	85	1,097,000
West Side (Sedimentation)	1,811,000	33⅓	604,000
Southwest Side	2,462,000	85	2,093,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	6,000	85	5,000
Corn Products (Reduction)	425,000	91.5	389,000
Total Treated	6,439,000	71.5	4,565,000
Not Intercepted	55,000	0	0
Total Population	6,494,000	70.4	4,565,000

The addition of complete treatment facilities to the West Side sewage treatment works, the final step in the sewage treatment program, will increase the treatment of the sewage of 1,811,000 population from 33⅓ per cent to 85 per cent, increasing this treatment on a 100 per cent basis from 604,000 to 1,539,000. This addition to the West Side Works will be undertaken as soon as possible after the starting of operation at the West-Southwest works. It will increase the extent of treatment of sewage of the total population from the present 37.7 per cent and the July 1, 1939, figure of 70.4 per cent to an ultimate of 84.7 per cent. When and if the sewage of the remaining 55,000 people is intercepted and treated the percentage of treatment will be increased to 85.

The statements in the preceding paragraphs may be more clearly visualized in the following tabular form:

TABLE 9.

	Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis
As of June 25, 1938			
Treated	3,705,000	62.8	2,328,000
Not Treated	2,770,000	0	0
Total	6,475,000	35.9	2,328,000
As of December 31, 1938			
Treated	3,888,000	62.8	2,442,000
Not Treated	2,606,000	0	0
Total	6,494,000	37.7	2,442,000
As of July 1, 1939			
Treated	6,439,000	71.5	4,565,000
Not Treated	55,000	0	0
Total	6,494,000	70.4	4,565,000
After Complete Treatment at West Side Works			
Treated	6,439,000	85.4	5,500,000
Not Treated	55,000	0	0
Total	6,494,000	84.7	5,500,000
Ultimate Treatment			
Total	6,494,000	85	5,520,000

The effect of this sewage treatment in its various stages on the water in the Illinois Waterway and the Illinois River is well illustrated by certain comparisons. The figures of treatment on the 100 per cent basis in Table 9 may be taken as a measure of the wastes removed from the sewage and the difference between such figures and the total population equivalent may be taken as a measure of the wastes remaining. It may be assumed that the sewage and wastes remaining are equivalent to the raw sewage from a population equal to the figure thus derived as the measure of the sewage and wastes remaining. The results will be as in Table 10, following:

TABLE 10.

Date	Total Population Equivalent	Treatment 100 Per Cent Basis	Sewage and Wastes Remaining Equivalent to Sewage from Population of
June 25, 1938............	6,475,000	2,328,000	4,147,000
Dec. 31, 1938............	6,494,000	2,442,000	4,052,000
July 1, 1939.............	6,494,000	4,565,000	1,929,000
After Complete Treatment			
West Side	6,494,000	5,500,000	994,000
Ultimate	6,494,000	5,520,000	974,000

The sewage and wastes remaining equivalent to the sewage from the various populations and the fresh water available for the dilution and the ultimate natural purification of such remaining wastes has been and will be as follows, with the present diversion of water from the Lake Michigan watershed of 5,000 cubic feet per second annual average and the reduction of this diversion to 1,500 c.f.s. after December 31, 1938:

TABLE 11.

	Diluting Water C.F.S.	Sewage and Wastes Remaining Equivalent to Sewage of Population of	Diluting Water Per 1000 Persons C.F.S.
June to December 1938	5,000	4,147,000	1.21
January to June 1939	1,500	4,052,000	0.37
July 1939 to Complete Treatment West Side	1,500	1,929,000	0.78
After Complete Treatment West Side	1,500	994,000	1.51
Ultimate	1,500	974,000	1.54

The dilution ratio in effect over the past six months has been 1.21 c.f.s. of fresh water per 1000 persons and during the next six months will be 0.37 c.f.s. after which it will be 0.78 c.f.s. until complete treatment facilities have been provided at the West Side works; when it will become 1.51 c.f.s. for the time being. These figures are all slightly higher than the actual ratios because the increase in population has been ignored. In general, a ratio of a minimum of approximately 5 c.f.s. to 6 c.f.s. of water per 1,000 persons is required if sewage is to be adequately disposed of by dilution.

It is reasonably certain that the conditions which will prevail during the early part of 1939 would, if continued, produce nuisance in the Illinois Waterway, particularly in the pools back of the dams at the northern end. It is also extremely probable that the conditions which will prevail after July 1, 1939, will cause nuisance on this waterway, especially during the summer or navigation season. This waterway, though under construction at the time of the trial of the case of Wisconsin, et al vs. the State of Illinois and The Sanitary District of Chicago, et al, was not then an authorized Federal project and was eliminated from the case. Conditions have now changed. The Chicago Sanitary and Ship Canal, the Calumet Sag Channel and the Illinois Waterway were made Federal navigation projects, by the Rivers and Harbors Act of July 3, 1930. The unsanitary conditions which will be produced in this Federal waterway when and if the diversion of the waters of the Great Lakes-St. Lawrence system or watershed are reduced below an annual average of 1,500 cubic feet per second are of interest to the Court and may reasonably be considered good cause for not making this reduction now; or if presently made, provide good cause for not making the reduction irrevocable.

DIVERSION OF WATER.

The net diversion of water from Lake Michigan, the domestic pumpage of the Chicago metropolitan area, the inflow from the Des Plaines River and the total flow from the Main Channel at Lockport, for the years 1930 to 1938, have been as indicated in the table following:

Year	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Des Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan C.F.S.
1930 6 mo. (Jan. to June)	8500	0	1680	6820
1930 6 mo. (July to Dec.)	8216	0	1719	6497
1931	8180	0	1680	6500
1932	8100	2	1650	6450
1933	8005	45	1690	6270
1934	8125	0	1692	6433
1935	8093	7	1602	6484
1936	6607	33	1712	4862
1937	6677	23	1665	4989
1938 to Dec. 20	6630	45	1605	4480

Diversion of water from Lake Michigan by The Sanitary District of Chicago since July 1, 1930, has been made in accordance with a Permit from the Secretary of War, dated June 26, 1930, which authorized the diversion of water as specified in the Decree of the Supreme Court, handed down April 21, 1930. This limited the net diversion to an annual average of not more than 6,500 cubic feet per second up to December 31, 1935, and thereafter limits the net diversion to an annual average of not more than 5,000 cubic feet per second up to December 31, 1938. The average monthly diversion, as made under this Permit from January 1 to December 20, 1938, is indicated in the table following:

Month 1938	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Des Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan C.F.S.
January	6408	20	1589	4799
February	7422	63	1554	5805
March	7607	25	1534	6048
April	7686	22	1529	6135
May	6311	13	1563	4735
June	6701	28	1649	5024
July	6814	305	1761	4748
August	6740	11	1808	4921
September ...	7247	25	1683	5539
October	5512	11	1577	3924
November ...	5861	9	1514	4338
Dec. 1 to 20..	5246	5	1496	5745
Average	6630	45	1605	4480

By the time of the filing of this report the Sanitary District of Chicago will have accepted the reduction in the diversion of water from the Great Lakes-St. Lawrence watershed to 1500 cubic feet per second, annual average, as prescribed in the decree of this Court of April 21, 1930. Therefore, this will be the final semi-annual report unless this Court shall otherwise direct.

All of which is respectfully submitted,

THE SANITARY DISTRICT OF CHICAGO,

By ROSS A. WOODHULL,
President.

WILLIAM H. TRINKAUS,
Chief Engineer.

ERNST BUEHLER,
Attorney.

Attest:

JAMES J. SULLIVAN,
Clerk.

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CHARLES ELMORE CROPLEY
CLERK

In the Supreme Court of the United States

OCTOBER TERM, 1939

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS, and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

RETURN OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK AS RESPONDENTS, TO RULE TO SHOW CAUSE ISSUED ON APPLICATION OF THE STATE OF ILLINOIS, AS PETITIONER, FOR A TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930.

JOHN E. MARTIN, Attorney General of Wisconsin,
J. A. A. BURNQUIST, Attorney General of Minnesota,
THOMAS J. HERBERT, Attorney General of Ohio,
CLAUDE T. RENO, Attorney General of Pennsylvania,
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Filed: February 26, 1940.

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To the Honorable, the Chief Justice and Associate Justices of the Supreme Court of the United States:

Now come the respondents, State of Wisconsin by John E. Martin, Attorney General, the State of Minnesota, by J. A. A. Burnquist, Attorney General, the State of Ohio by Thomas J. Herbert, Attorney General, the State of

Pennsylvania by Claude T. Reno, Attorney General, and William S. Rial, Deputy Attorney General, the State of Michigan by Thomas Read, Attorney General, and James W. Williams, Assistant Attorney General, the State of New York by John J. Bennett, Attorney General, and Timothy F. Cohan, Assistant Attorney General, and Herbert H. Naujoks, Special Assistant to Attorneys General, their solicitors, and for their return to the rule to show cause issued on application of State of Illinois, as petitioner, for a temporary modification of paragraph 3 of the decree of April 21, 1930, respectfully say:

I.

Respondents admit due notice of the filing of the petition.

II.

The petition of the State of Illinois, filed herein on January 15, 1940, for a modification of paragraph 3 of the decree of April 21, 1930, was not filed within the time allowed to the parties in the above-entitled causes to apply to this Court under paragraphs 6 and 7 of said decree (281 U. S. 696, 698) for modification of said decree with reference to the times fixed for the progressive reduction and ultimate cessation of the diversion adjudged to be illegal. At the date of filing said petition, said decree had become final and *res judicata* as between the parties in this as well as in all other respects.

III.

The State of Wisconsin filed the first of these bills on July 14, 1922. The Wisconsin bill was amended on October 5, 1925, and the States of Minnesota, Ohio and Pennsylvania became co-plaintiffs. The amended bill sought an injunction restraining the State of Illinois and The Sanitary District of Chicago from causing any water to be taken from the Great Lakes-St. Lawrence watershed in such manner as permanently to divert the same from that watershed. On April 8, 1926, the State of Michigan filed a separate bill for the same relief. On October 18, 1926, the State of New York filed a separate bill for the same relief. Subsequently the three suits were consolidated for the purpose of hearing. *Wisconsin v. Illinois,* 278 U. S. 367, 369-70.

After three hearings before this Court and two references to a Special Master, this Court on April 21, 1930 entered its decree and judgment in said suits for the purpose of carrying out the conclusions set forth in the opinions of this Court announced on January 14, 1929, (278 U. S. 367) and April 14, 1930 (281 U. S. 179). While this decree does not set out the specific measures to be taken by the Sanitary District of Chicago and the State of Illinois to effect compliance with its provisions with reference to the sewage treatment works' construction program, the decree does require that the diversion of water from the Great Lakes-St. Lawrence watershed through the Chicago Drainage Canal be limited as follows:

(a) On and after July 1, 1930, to an annual average diversion not to exceed 6500 cubic feet per second, in addition to domestic pumpage;

(b) On and after December 31, 1935, to an annual average diversion not to exceed 5000 cubic feet per second, in addition to domestic pumpage;

(c) On and after December 31, 1938, to an annual average diversion not to exceed 1500 cubic feet per second, in addition to domestic pumpage.

The Court in its opinion of April 14, 1930, approved the recommendation of the Master that the entire system of sewage treatment works of the Sanitary District of Chicago be completed by December 31, 1938, and that the West Side Treatment Works be completed and in operation not later than December 31, 1935. (281 U. S. 179, 199; Report of the Special Master on Re-reference, filed December 17, 1929, pages 81, 142.)

IV.

Thereafter the decree of April 21, 1930 was enlarged by the Court in 1933, after extended hearings before Honorable Edward F. McClennen, Special Master.

On May 22, 1933 the Court entered a decree enlarging the original decree of April 21, 1930, by the addition of the following provision:

> "That the State of Illinois is hereby required to take all necessary steps, including whatever authorizations or requirements, or provisions for the raising, appropriation and application of moneys, may be needed in order to cause and secure the completion of adequate sewage treatment or sewage disposal plants and sewers, together with controlling works to prevent reversals of the Chicago River if such works are necessary, and all other incidental facilities for the disposition of the sewage of the area embraced within the Sanitary District of Chicago so as to preclude any ground of objection on the part of the State or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence system or watershed to the extent, and at the times and in the manner, provided in this decree." (289 U. S. 395).

V.

The decree of April 21, 1930 as enlarged, as respondents are severally informed and believe, provided for a gradual reduction in the unlawful diversion of water and a gradual, rather than immediate, restoration of complainants' rights in order to permit the defendants to construct works claimed to be necessary to safeguard the health of the residents of the Sanitary District of Chicago; and the dates and amounts of the progressive reductions in the unlawful diversion provided by the decree of this Court were fixed and determined by the findings of fact as to the time within which the various works, claimed by the defendants to be essential to purify the sewage of Chicago and protect the health of its people, could be constructed and placed in operation. (*Wisconsin v. Illinois,* 281 U. S. 179.) The basis and reasons for the progressive rather than instantaneous termination of the unlawful diversion were set forth in the opinion of this Court, rendered by Mr. Chief Justice Taft, in *Wisconsin v. Illinois,* 278 U. S. 367, where the Court said:

> "* * * If the view urged by the complainants is right, the necessity for the use of the 8,500 cubic feet a second to save the health of the inhabitants of the Sanitary District will then present the problem of the power and discretion of a court of equity to moderate the strict and immediate rights of the parties complainant to a gradual one which will effect justice as rapidly as the situation permits. The framing of the decree will then require the careful consideration of the Court" (pp. 410-411)

and further:

> "* * * In these circumstances we think they are entitled to a decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end. But in keeping with the principles

> on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction." (pp. 418-19)
>
> "* * * The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion.
>
> "Though the restoration of just rights to the complainants will be gradual instead of immediate, it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project." (pp. 420-421)

VI.

The decree of April 21, 1930, as modified on May 22, 1933, finally adjudged and determined the rights of the respondents and the duty and obligation of the petitioner. The rights of the respondents so adjudged and determined, were to have the diversion over and above 1500 second feet plus domestic pumpage terminated immediately to the end that the great continuing damage to the respondents and their peoples caused by said illegal diversion should be brought to an end as speedily as possible. The restoration of the adjudged rights of respondents and their peoples was postponed and made gradual, as a matter of favor to petitioner and its agency, The Sanitary

District of Chicago, upon the representation of petitioner and its said agency that, notwithstanding their adjudged wrong, they should be given an opportunity and a reasonable time within which to construct sewage disposal works and all ancillary facilities necessary for the complete treatment of all of the sewage of The Sanitary District of Chicago. The decree specifically imposed upon the petitioner the duties—(1) to reduce the diversion at the time and in the amounts specified in the decree, and (2) to complete said sewage treatment works and ancillary facilities "so as to preclude any ground of objection on the part of the State or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence System or watershed to the extent, and at the times and in the manner, provided in this decree."

VII.

This Court found that the times fixed by the Master for the completion of the various sewage disposal works proposed by petitioner and its said agency were as liberal as the evidence permitted (281 U. S. 179, 199). With any reasonable diligence, all of said sewage disposal works and ancillary facilities could easily have been fully completed and placed in operation before the time fixed for the ultimate termination of the illegal diversion on December 31, 1938. After inexcusable delays during 1930-1932 in the construction program proposed by petitioner and its agency, petitioner and its agency in November 1932, filed a response to a rule to show cause issued by this Court on October 10, 1932, in which petitioner and its agency advised this Court that, notwithstanding previous delays, adequate time remained for the completion of the sewage disposal works and ancillary facilities within the time fixed by the decree for the ultimate termination of the illegal diversion. Although petitioner and its agency were never reasonably diligent in prosecuting the construction program involved in providing complete treatment for all of the sewage of The Sanitary District of Chicago, the progress of construction, as measured by the construction expenditures reported from year to year to this Court by The Sanitary District of Chicago, plainly show that all of these works could have been completed and placed in operation well before the time fixed for termination of the illegal diversion, if the construction program were prosecuted with any reasonable diligence and funds were provided for that purpose.

Petitioner does not allege that the time granted by this Court was inadequate for the construction of such works, but merely alleges that its agency, The Sanitary District of Chicago, failed to provide sufficient funds for the performance of this duty of petitioner and its agency under the decree. The deficiency in funds so provided is alleged to have been approximately $9,000,000. The resources and credit of the petitioner were sufficient to have provided many times this sum. It conclusively appears from the Semi-annual Reports filed by The Sanitary District in this Court and from the petition filed by the State of Illinois in response to which the instant rule to show cause was issued, that the State of Illinois has not at any time made available State funds or State credit for the purpose of performing the duty of the State under the decree. This default of the State in the performance of its duty under the decree stands wholly unexplained and unexcused in the petition.

VIII.

To the extent, if at all, that unsatisfactory sanitary conditions obtained in the Chicago Drainage Canal, Illinois Waterway or upper Illinois River after the termination of the illegal diversion in 1939, those conditions arose, and were created, solely by the neglect or wilful default of petitioner in the performance of its duty under the decree. By the terms of the decree, it was the duty of the petitioner to provide by December 31, 1938 complete treatment of all of the sewage of The Sanitary District of Chicago through suitable and adequate works which would provide 85 per cent to 90 per cent or more purification of all of the raw sewage of said District. The works necessary, suitable and adequate to accomplish this purpose were proposed and selected by petitioner or its agent; and the postponement of the termination of petitioner's wrong was granted by this Court upon the representation that such works would be completed within the times found reasonable by this Court. In fact, on December 31, 1938, petitioner and its said agency had only provided treatment of *varying degrees* for *part* of the sewage of The Sanitary District; and such partial and incomplete treatment provided only 37.7 per cent purification of the sewage of said District. Consequently any unsatisfactory sanitary conditions which existed during 1939 upon the waters described in the petition, were the result of the neglect and default of petitioner in the performance of its duty under the decree.

IX.

The plan proposed and adopted by petitioner and its agency for the complete treatment of all of the sewage of The Sanitary District of Chicago consisted of four major sewage disposal plants with necessary intercepting sewers and ancillary facilities, to-wit: the Calumet Plant, the North Side Plant, the Southwest Side Plant and the West Side Plant. The Master found that with reasonable diligence the North Side Plant with appurtenances should be completed on or before July 1, 1930; that the Calumet Plant should be completed and in operation by December 31, 1933; that the West Side Plant with appurtenances should be completed on or before December 31, 1935 and the Southwest Side Plant with appurtenances should be completed on or before December 31, 1938.

The *West Side Plant* is designed to serve a population equivalent of 1,800,000. Although the Master found that this plant should have been completed with reasonable diligence on or before December 31, 1935, it has not yet been completed. At the present time this plant is providing only preliminary treatment in Imhoff tanks, which is only 33⅓ per cent treatment. Not only has this partially treated sewage been discharged into the waters described in the petition ever since December 31, 1935, but during a large part of that time no provision whatever was made for taking care of the sludge from the Imhoff tanks and such sludge was discharged into the waters described in the petition. The default of the petitioner and its agent with reference to the completion of the West Side Plant and ancillary facilities has, therefore, contributed very greatly to such pollution, if any, as has existed in the waters described in the petition since December 31, 1935, and continues to contribute to such pollution, if any, as exists in those waters.

The *Southwest Side Plant,* designed to treat the sewage of a population equivalent of 2,462,000, was not completed nor in operation on January 1, 1939. This plant was placed in partial operation in June 1939, but was not completed and placed in full operation until October 1939 after the critical period had ended for the 1939 season. The result was that such pollution, if any, as appeared in the waters described in the petition during 1939, was in no small degree due to the default of the petitioner in the performance of its duty with respect to this plant. At the present time the Racine Avenue Pumping Station, which is necessary to deliver 25,000,000 gallons of raw sewage daily to this plant for treatment, is not yet completed; and consequently this raw sewage is still being discharged by petitioner, or its agent, to the waters described in the petition.

The *North Side Plant* is designed to treat the sewage of a population equivalent of 1,291,000. While this plant was completed and placed in operation during 1930, for many years the petitioner or its agent, The Sanitary District of Chicago, made no arrangements to take care of the sludge produced by this plant but simply discharged the sewage into the Drainage Canal with the result of nullifying in a large degree the benefit which should have been obtained from the completion and operation of this plant. Whether this condition was remedied during 1939 and if so, at what time during 1939, respondents are not advised and put the petitioner to its proof. Respondents further allege that throughout 1939, and now, petitioner's agency, The Sanitary District, failed to provide a proper supply of air for the operation of the aeration tanks at the North Side Plant and thereby to a substantial extent nullified, and are still nullifying, the benefits which should be obtained from a reasonable and competent operation of that plant. The result was that such pollution, if any, as appeared in the waters described in the petition during 1939, was in part due to the failure and neglect of the petitioner and its agent to operate this plant in a normal and reasonable manner.

As of January 1, 1939, the *Calumet Plant*, with a designed capacity for the treatment of the sewage of a population equivalent of 440,000, was completed and in operation. However, the connections with the Blue Island intercepting sewer, built to convey the raw sewage to this plant for treatment, were only 98 per cent completed on December 31, 1938. (Final Semi-Annual Report, p. 4.) A completed sewage disposal plant is not fully effective for the reduction of pollution unless and until all the ancilliary facilities for conveying the raw sewage to the plant for treatment are completed and placed in operation. In the case of the Calumet Plant, this had not been done, as respondents are advised and believe, and therefore allege, as of January 1, 1939.

The *Southwest Side Plant* will be in full operation during 1940. According to the allegations of the petition certain additional defaults of petitioner will have been cured before the Summer season of 1940. Consequently the conditions obtaining in the waters described in the petition, whatever they may have been during 1939, will be no measure of conditions to be anticipated during 1940. Of course, the default of petitioner, resulting in the discharge of large quantities of untreated or partially treated sewage into the waters described in the petition has undoubtedly resulted in deposits of sludge which will to some extent affect conditions in 1940, although the effects of such past defaults will not extend beyond that season.

X.

Respondents are informed and believe, and therefore allege, that whether or not the Great Lakes are averaging a foot higher than they have averaged over the past eight years is irrelevant and immaterial. Respondents further deny this allegation and show that, as disclosed by the latest chart of the United States Lake Survey, the levels of Lakes Michigan and Huron at the end of January, 1940, were only 46/100ths of a foot higher than the annual mean average for the preceding eight years; but the level of Lake Erie was 24/100ths of a foot *below* the annual mean average for the preceding eight years and that the level of Lake Ontario was 45/100ths of a foot *below* the annual mean average for the preceding eight years and that the trend of lake levels is downward at the present time. Respondents further show that petitioner bases its comparison upon an eight year period, during which the normal levels of the Great Lakes were substantially lower than they otherwise would have been, by reason of the illegal diversion of petitioner, and that petitioner takes nothing by comparison with conditions produced by its own wrong.

XI.

That the illegal diversion of water from Lake Michigan by petitioner has substantially lowered the natural levels of the Great Lakes, that such lowering of the natural levels of the Great Lakes has caused great continuing damage to respondents and their citizens and that the restoration of normal lake levels and the termination of such continuing damages to respondents and their citizens will require a period of five years after the termination of the illegal diversion of petitioner from Lake Michigan, are severally *res judicata* under the decree of this court. The modification of the decree requested by the petitioner would, if granted, postpone the restoration of normal lake levels and the termination of these continuing damages to respondents and their citizens for a period of four years. During most of the navigation season of 1939, the draft of vessels carrying the great ore, coal and grain traffic between the head of the Lakes and lower lake ports was restricted to 19 feet, greatly reducing the loads which could be carried by vessels carrying 90 per cent of this traffic in comparison with the loads which could have been carried but for the lower lake levels caused by the petitioner's diversion.

XII.

The Respondents deny that any unhealthful conditions obtained in the Chicago Sanitary Canal, the Des Plaines or Illinois Rivers or areas adjacent thereto during the year 1939 and further deny that any unhealthful conditions will obtain during the summer of 1940.

The reports submitted to the U. S. Public Health Service by the State Health officer for the State of Illinois disclose no unusual incidence of waterborne or other diseases on or along any of the waters described in the petition.

Typhoid fever cases in communities along the Illinois Waterway in 1939 were far fewer than in the balance of the state of Illinois. There were 140 typhoid fever cases in Illinois in a 4,670,660 population, or slightly more than 3 cases of typhoid per 100,000 population from the territory tributary to the Illinois Waterway during 1939; while the remaining counties of the state (excepting Kankee County) with a population of 2,909,899, produced a total of 328 typhoid fever cases, or an average of 11.4 cases per 100,000 population during 1939.

No one of the cities mentioned in the petition, namely, Argo, Lemont, Lockport, Joliet, Morris, Marseilles, Ottawa, and La Salle, Illinois, takes its drinking or domestic water from the Illinois Waterway. All such cities or towns, except Argo, obtain their drinking supply from wells located in the vicinity thereof.

Whether, and if so to what extent, petitioner has received the complaints from certain municipalities set forth in the petition, respondents are not advised and therefore neither admit nor deny the same; but in that connection respondents allege that complaints about the nuisance conditions created in these waters by The Sanitary District of Chicago were continually and repeatedly made by municipalities along such waters for twenty years prior to the entry of the instant decree and that petitioner was never moved to take any action by reason of said complaints. Petitioner is without equity now to urge such complaints as the basis for continuing its adjudged wrong and for postponing the restoration of the adjudged rights of respondents. Respondents further allege that the principal alleged complaining municipalities cited in the petition, to wit, Lemont, Lockport and Joliet dump their raw sewage into said water courses and contribute to the alleged conditions of which they are alleged to complain.

XIII.

Petitioner's request for a temporary increase in diversion to December 31, 1942, is premised on the alleged need for additional time to complete the West Side Sewage Treatment Plant in order to provide ultimate treatment of 100% of all the sewage of the District on an 85 to 90% or more treatment basis. This treatment can be attained at once with existing installations by the efficient operation and maintenance of such facilities and by any one of the following methods, or combinations thereof:

(a) By increasing the amount of sewage from the West Side area which is treated in the Southwest Side Treatment Works, so as to provide complete treatment of a larger amount at the Southwest Side Sewage Treatment Plant.

(b) By increasing the efficiency of all of the plants now operated by the Sanitary District of Chicago, namely, the North Side Plant, the Calumet Plant, the West-Southwest Side Plants, to approximately 93-95% instead of 85% efficiency now provided for. The efficiency of these plants has been reduced by reason of the failure of the Sanitary District to operate already installed equipment so as to provide sufficient air for the aeration tanks.

(c) By the addition of supplementary chemical treatment to all or part of the West Side sewage flow, which would substantially double the efficiency of the Imhoff tanks in the removal of biochemical oxygen demand in the sewage at the West Side Treatment Works.

(d) In addition to the above changes, there is another step which should be adopted so as to further increase the efficiency of the existing sewage disposal plants and augment their capacity, and that is the adoption of a complete metering program for the entire domestic consumption of the City of Chicago. Such a metering program would reduce the per-capita consumption of water from about 300 to 160 gallons per day and the capacity of the sewage treatment work of the Sanitary District would be increased so much that no addition to the present facilities would be required for a great many years.

XIV.

The primary obligation and duty to perform the decree herein rests upon the State of Illinois, of which the Sanitary District of Chicago is a mere political agency. (289 U. S. 395, 289 U. S. 710) The credit and financial resources of the State of Illinois are more than ample to finance the performance of the decree. In the petition filed with this Court on January 15, 1940, the State of Illinois confesses her default and failure to provide the monies needed to finance a prompt and full compliance with this Court's decrees. The representations made to this Court in the petition disclose that the State of Illinois has made no real effort to place the financial resources of the State at the disposal of the Sanitary District of Chicago or to provide the needed monies for the construction and completion of adequate sewage treatment plants, sewers, and facilities for the disposition of all the sewage of the Sanitary District of Chicago. If the credit and resources of the Sanitary District were inadequate for that purpose, as they are not, that would not excuse the failure of petitioner to perform the decree. The default of the State of Illinois in this regard affords no reason for further delay in the performance of the decree.

XV.

Petitioner alleges that the object of its request is to obtain a temporary increase in the diversion to aid in the disposal of the sewage of the Chicago metropolitan area pending the completion of the sewage disposal works which, with reasonable diligence, on the part of petitioners, should have been completed long since. Respondents are severally informed and believe, and therefore allege, that one of the objects of this Application by petitioner is to obtain additional water from Lake Michigan for the generation of hydroelectric power at the site owned by the Sanitary District of Chicago at Lockport, Illinois, and at other sites owned by the State of Illinois and situated on the so-called Illinois Waterway between Lockport and Starved Rock, Illinois. The additional diversion sought by the Application would increase the value of the electrical energy generated at the Lockport plant of the Sanitary District of Chicago by approximately $100,000 per annum, as respondents are informed and believe, and therefore allege.

The State of Illinois now has pending before the Federal Power Commission an Application for licenses under the Federal Power Act to develop water power at all of the power sites between Lockport and Starved Rock, Illinois, which include all of the commercial power sites between Lake Michigan and the Mississippi River. The amount of water available for power development along this reach is dependent upon the amount of diversion from Lake Michigan and by means of said diversion is made substantially uniform throughout the year. The hydraulic capacity of the hydroelectric generating machinery which, as disclosed by its Application for license before the Federal Power Commission, the State of Illinois proposes to install greatly exceeds the present direct diversion from Lake Michigan, plus domestic pumpage, plus natural flow, and would be practically useless without a large increase in the present diversion. These declared intentions of the State of Illinois establish a purpose to circumvent the performance of the decree of this Court and the restoration of the just rights of the respondents and their peoples as declared by this Court and an intention also evidenced by the past conduct of the petitioner, to secure in some way a large permanent diversion for water power at the expense of the rights of the respondents and their peoples.

XVI.

For many years the Sanitary District of Chicago, as agency of State of Illinois, wilfully disregarded and defied the Federal Government and presumed upon the solicitude of the Federal Government for the health and welfare of the people of Chicago to prevent the Federal Government from enforcing its order and terminating the wrongful action of the District.

Thereafter, the Sanitary District of Chicago as agency of the State of Illinois for many years interposed the claim of necessity of protecting the health of the people of the District to prevent, hinder or impede a restoration to the respondents and their peoples of their just rights. In *Wisconsin v. Illinois,* 287 U. S. 367, at 419-20, Mr. Chief Justice Taft, rendering the unanimous opinion of this Court, said:

> "* * * The Secretary of War and the Chief of Engineers in 1907 refused a permit by which there would be more than 4,167 feet a second diverted. Advised that the District authorities proposed to ignore that limitation, the United States brought suit against the authorities of the District to enjoin any diversion in excess of that quantity, as fixed in an earlier permit. Another application for enlargement was made to Secretary of War Stimson in 1913 and was rejected. For several years, including the inexcusable delays made possible by the failure of the Federal Court in Chicago to render a decision in the suit brought by the United States, the District authorities have been maintaining the diversion of 8,500 cubic feet per second or more on the plea of preserving the health of the District. Putting this plea forward has tended materially to hamper and obstruct the remedy to which the complainants are entitled in vindication of their rights, riparian and other."

And further:

> "* * * The Sanitary District authorities, relying on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore they can not now complain if an immediately heavy burden is placed upon the District because of their attitude and course."

This petition represents another in the long chain of attempts to avoid the termination of petitioner's adjudged wrong and restoration of respondents' adjudged rights by reliance upon exaggerated and simulated dangers to public health which, if they existed, would be the result of inexcusable negligence or wilful default of petitioner over a period of nearly forty years.

XVII.

Respondents allege that a modification of the decree and temporary increase in the diversion from Lake Michigan is sought for the purposes of local sanitation and the development of water power by the State of Illinois. Respondents deny that the Secretary of War has any jurisdiction or any statutory or constitutional authority to modify the decree or, quite independently of the decree, to authorize the increased diversion requested by petitioner. Respondents further allege that the lack of any jurisdiction or authority in the Secretary of War to authorize any diversion for sanitation or water power, the purposes for which the temporary increase are sought, has heretofore been adjudicated in this suit and is *res judicata* of this issue which is now sought to be again raised by petitioner.

XVIII.

Except as otherwise herein expressly admitted or qualified, respondents deny each and every material allegation of the petition of the State of Illinois, filed with this Court on January 15, 1940.

WHEREFORE, respondents pray that the Application of the State of Illinois, petitioner, for a modification of paragraph 3 of the decree made and entered in these causes on April 21, 1930 (281 U. S. 696) be dismissed.

Respectfully submitted,

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Special Assistant to the Attorneys General.

Filed: February 26, 1940

STATE OF WISCONSIN)
)SS.
DANE COUNTY)

JOHN E. MARTIN, being first duly sworn, on oath deposes and says: That he is the duly elected, qualified and acting Attorney General of the State of Wisconsin; that he has read the foregoing return and the matters and things therein set forth are true in substance and in fact.

....

Subscribed and sworn to before
me this .... day of February,
A. D. 1940.

....
Notary Public.

FILE COPY

Office - Supreme Court, U. S.
FILED
MAR 4 1940
CHARLES ELMORE CROPLEY
CLERK

In the
Supreme Court of the United States

OCTOBER TERM, 1939

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS, and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

BRIEF IN SUPPORT OF RETURN OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK AS RESPONDENTS, TO RULE TO SHOW CAUSE ISSUED ON APPLICATION OF THE STATE OF ILLINOIS, AS PETITIONER, FOR A TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930.

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Filed February 26, 1940

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In the
Supreme Court of the United States
OCTOBER TERM, 1939

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and STATE OF PENNSYLVANIA, *Complainants,* *v.* STATE OF ILLINOIS, and THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	**No. 2 Original**
STATE OF MICHIGAN, *Complainant,* *v.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	**No. 3 Original**
STATE OF NEW YORK, *Complainant,* *v.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	**No. 4 Original**

BRIEF IN SUPPORT OF RETURN OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK AS RESPONDENTS, TO RULE TO SHOW CAUSE ISSUED ON APPLICATION OF THE STATE OF ILLINOIS, AS PETITIONER, FOR A TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930.

I.

HISTORY OF THE LITIGATION

The State of Wisconsin filed the first of these bills on July 14, 1922. The Wisconsin bill was amended on October 5, 1925, and the States of Minnesota, Ohio and

Pennsylvania became co-plaintiffs. The amended bill sought an injunction restraining the State of Illinois and the Sanitary District of Chicago from causing any water to be taken from the Great Lakes-St. Lawrence watershed in such manner as permanently to divert the same from that watershed. On April 8, 1926, the State of Michigan filed a separate bill for the same relief. On October 18, 1926, the State of New York filed a separate bill for the same relief. Subsequently the three suits were consolidated for the purpose of hearing. *Wisconsin v. Illinois,* 278 U. S. 367, 369-70.

Pursuant to a hearing upon the First Report of the Special Master, to whom the causes had been referred, this Court in a decision rendered on January 14, 1929, established the facts and declared the law governing the rights of the parties. *Wisconsin v. Illinois,* 278 U. S. 367. This Court held that the diversion of water beyond any negligible amount which might be necessary to maintain navigation in the Port of Chicago was illegal, but the restoration of the just rights of the complainants was made gradual rather than immediate "in order to avoid so far as might be possible pestilence and ruin with which the defendants have done much to confront themselves." *Wisconsin v. Illinois,* 281 U. S. 179, 196. Thereafter these causes were again referred to the Special Master to determine (1) the practical measures for the disposition of the sewage of the Sanitary District of Chicago through other means than Lake diversion; (2) the time required to complete such practical measures and place them in operation; (3) the reductions in diversion immediately practicable, and from time to time, pending the completion and placing in operation of such practical measures; and (4) the amount of the negligible diversions, if any, which might be eventually required to maintain navigation in the Port of Chicago. After the filing of the report of the Special Master on re-reference and on March 14, 1930, this Court rendered its decision. *Wisconsin v. Illinois,* 281 U. S. 179.

On April 21, 1930, the decree of the Court was entered (281 U. S. 696). This decree provided, in part, that, (1) on and after July 1, 1930, the diversion of the waters of the Great Lakes-St. Lawrence system through the Chicago Drainage Canal should be reduced to an annual average of 6,500 cubic feet per second, in addition to domestic pumpage, (2) on and after December 31, 1935, this diversion should be reduced to 5,000 cubic feet per second, in addition to domestic pumpage, and (3) on and after December 31, 1938, this diversion should be reduced to 1,500 cubic feet per second, in addition to domestic pumpage.

In October 1932, the states of Wisconsin, Minnesota, Ohio and Michigan applied for the appointment of a Commissioner or other special officer to execute the decree of April 21, 1930 (281 U. S. 696) on behalf of and at the expense of the defendants. The respondents complained of the delay in the construction of the works and facilities embraced in the program of the Sanitary District of Chicago for the disposition of sewage so as to obviate danger to the health of the inhabitants of the District on the reductions in diversion on December 31, 1935 and December 31, 1938, in accordance with the decree, in the diversion of water from Lake Michigan through the Drainage Canal.

The court appointed Edward F. McClennen as Special Master to make summary inquiry and to report thereon to the court (287 U. S. 578). The Special Master proceeded accordingly and after full hearing submitted his report and recommendations. Upon that report the Supreme Court on May 22, 1933, rendered its opinion (See 289 U. S. 395). On the same day, the court enlarged the decree to provide in part that the State of Illinois is required to take all necessary steps to cause and secure the completion of adequate sewage disposal plants and sewers, to the end that the reductions in diversion may be made at the times fixed in the decree.

II.

THE PETITION OF THE STATE OF ILLINOIS FILED JANUARY 15, 1940 FOR A MODIFICATION OF THE DECREE OF APRIL 21, 1930 WAS NOT FILED WITHIN THE TIME ALLOWED UNDER THE DECREE FOR MODIFICATION OF SAID DECREE WITH REFERENCE TO REDUCTION OF THE DIVERSION ADJUDGED TO BE ILLEGAL; AT DATE OF FILING SAID PETITION, SAID DECREE HAD BECOME FINAL AND *RES ADJUDICATA* AS BETWEEN THE PARTIES.

The petition of the State of Illinois was filed on January 15, 1940, under the provisions of paragraphs 6 and 7 of the decree entered in these causes on April 21, 1930 (281 U. S. 696) which paragraphs read as follows:

> "6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, or any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.
>
> "7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above entitled

suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject-matter in controversy."

It seems clear from the record in these causes and the language of the decree that this Court intended to retain jurisdiction of these causes only until the final permanent reduction in diversion was made. It is manifest that the Court did not intend to retain jurisdiction of these causes indefinitely for all future time. The relief sought by respondents was and is a mandatory permanent injunction to enjoin petitioner and its agent, the Sanitary District of Chicago, from unlawfully diverting the waters of the Great Lakes-St. Lawrence Watershed through the Chicago Drainage Canal. This Court ruled that respondents were entitled to a decree "which will be effective in bringing that violation and the unwarranted part of the diversion to an end. But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section" the decree was so framed as to accord to petitioner and its agent a reasonably practicable time within which to provide some other means of disposing of this sewage, the diversion to be reduced as the artificial disposition of the sewage increased, until it is entirely disposed of, when a final permanent operative and effective injunction should issue (278 U. S. 367). After a re-reference to the Special Master the Court on April 21, 1930 entered its decree fixing December 31, 1938 as the date when the final cessation of the illegal diversion was to be made (281 U. S. 696). Jurisdiction was of these causes retained by the Court only to see that the reductions in diversion were made by petitioner and its agent in the amounts and at the times fixed in the decree. These causes were then closed finally when on January 1, 1939 the ultimate cessation of the diversion adjudged to be illegal became effective and was accepted by the Sanitary District of Chicago (See Final Semi-annual Report, Sanitary District, filed January 1, 1939, pp. 17-18).

Thus, at the date of filing of said petition, the decree of April 21, 1930 had become final and *res adjudicata* as between the parties in this as well as in all other respects and hence, the petition must be dismissed.

III.

THE DECREE OF APRIL 21, 1930, AS ENLARGED BY THE COURT ON MAY 22, 1933, IMPOSED A DUTY UPON PETITIONER AND ITS AGENT, THE SANITARY DISTRICT OF CHICAGO, TO REDUCE PROGRESSIVELY, AT STATED TIMES, THE DIVERSION OF WATER FROM LAKE MICHIGAN, AND CONCURRENTLY TO CONSTRUCT AND COMPLETE ADEQUATE SEWAGE TREATMENT FACILITIES FOR THE DISPOSITION OF THE SEWAGE OF THE AREA EMBRACED WITHIN THE SANITARY DISTRICT OF CHICAGO, SO AS TO PRECLUDE ANY GROUND OF OBJECTION ON THE PART OF THE STATE OR OF ANY OF ITS MUNICIPALITIES TO THE REDUCTION OF THE DIVERSION OF THE WATERS OF THE GREAT LAKES-ST. LAWRENCE SYSTEM OR WATERSHED TO THE EXTENT, AND AT THE TIMES AND IN THE MANNER PROVIDED IN THE DECREE.

(a) *The Decisions of the Court Herein Clearly Define the Rights of Respondents and the Duty of Petitioner with Respect to Reductions in Diversion and the Construction, Completion and Operation of Sewage Treatment Works.*

The Court in holding that the respondent Great Lakes states were entitled to an injunction against the State of Illinois and the Sanitary District of Chicago to restrain the abstraction of the waters of the Great Lakes-St. Lawrence watershed through the Chicago Drainage Canal beyond what is necessary to keep up the normal navigation in the Chicago river said: (*Wisconsin et al., v. Illinois, et al.* 278 U. S. 367, 420-421)

> "In increasing the diversion from 4,167 cubic feet a second to 8,500, the drainage district defied the authority of the national government resting in the Secretary of War. And in so far as the prior diversion was not for the purpose of maintaining navigation in the Chicago river, it was without any legal basis, because made for an inadmissable purpose. It, therefore, is the duty of this court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis, and thus to restore the navigable capacity of Lake Michigan to its proper level. The sanitary district authorities, relying on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore, they can not now complain if an immediately heavy burden is placed upon the district because of their attitude and course. The situation requires the district to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the lake diversion.
>
> "Though the restoration of just rights to the complainants will be gradual instead of immediate, it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project."

When the litigation again came before this Court after re-reference to Honorable (now Mr. Chief Justice) Charles Evans Hughes for the formulation of a decree, the Court, speaking through Mr. Justice Holmes, after referring to the previous decision by Mr. Chief Justice Taft said: (*Wisconsin v. Illinois*, 281 U. S. 179, 196)

> "'It was decided that the defendant State and its creature the Sanitary District were reducing the level of the Great Lakes, were inflicting great losses upon the complainants and were violating their rights, by diverting from Lake Michigan 8,500 or more cubic feet per second into the Chicago Drainage Canal for the purpose of diluting and carrying away the sewage of Chicago. The diversion of the water for that purpose was held illegal, but the restoration of the just rights of the complainants was made gradual rather than immediate in order to avoid so far as might be the possible pestilence and ruin with which the defendants have done much to confront themselves.'"

And again, the Court in holding the State of Illinois primarily responsible for the carrying out of the Court's decree pointed out: (*Wisconsin v. Illinois*, 281 U. S. 179, 197)

> "* * * It already has been decided that the defendants are doing a wrong to the complainants and that they must stop it. They must find out a way at their peril. We have only to consider what is possible if the State of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awaked. It can base no defenses upon difficulties that it has itself created. If its constitution stands in the way of prompt action it must amend it or yield to an authority that is paramount to the State.'"

When this matter again came before the Court on October 3, 1932, after the states of Wisconsin, Minnesota, Ohio and Michigan had invited the attention of this Court to the circumstance that the facts then before the Court through the report of the Special Master on the 1929 Rereference and the Semi-annual reports filed by the Sanitary District of Chicago disclosed that the general over-all or ratable performance by the petitioner and its agent, the Sanitary District, under the decree had been and was grossly inadequate; that without the further intervention and aid of this Court to secure to respondents the rights heretofore adjudged to them, the arrival of the dates fixed by the decree for the intermediate and ultimate restoration of respondents' rights would inevitably be coincident with a default by the petitioner and the Sanitary District of Chicago.

The respondents in their application of October 3, 1932, and supporting brief urged that the facts therein recited from the records of this Court established that unless the respondents were able to secure the Court's aid in removing the obstacles which had already modified as to time the relief to which they are entitled, these respondents will be in exactly the same situation in 1935 and in 1938 that they were when the decree was entered on April 21, 1930. The Court then appointed a Special Master, Honorable Edward F. McClennen, to make inquiry and to submit a report thereon to the Court.

This Court in considering the Report of the Special Master, Honorable Edward F. McClennen, on the 1933 Rereference said: (289 U. S. 395, 410-411)

> "The question, then, comes down to the procuring of the money necessary to effect the prompt completion of the sewage treatment works and the complementary facilities. To provide the needed money is the special responsibility of the State of Illinois. For the present halting of its work the Sanitary District is not responsible. It appears to be virtually at the end of its resources. The Master states that, due to its financial condition, the Sanitary District cannot go forward in any adequate manner with either contracts or construction. We find that the Master's conclusion that there is no way by which the *decree can be per-

formed under tolerable conditions 'unless the State of Illinois meets its responsibility and provides the money', is abundantly supported by the record.

"That responsibility the State should meet. Despite existing economic difficulties, the State has adequate resources, and we find it impossible to conclude that the State cannot devise appropriate and adequate financial measures to enable it to afford suitable protection to its people to the end that its obligation to its sister States, as adjudged by this Court, shall be properly discharged.

"We do not undertake to prescribe the particular measures to be taken or to specify the works and facilities to be provided. But in view of the delay that has occurred and the importance of prompt action, and in order that there may be no ground for misapprehension as to the import of the decree or the duty of the defendant State, we think that complainant States are entitled to have the decree enlarged by the addition of the following provision:

"That the State of Illinois is hereby required to take all necessary steps, including whatever authorizations or requirements, or provisions for the raising, appropriation and application of moneys, may be needed in order to cause and secure the completion of adequate sewage treatment or sewage disposal plants and sewers, together with controlling works to prevent reversals of the Chicago River if such works are necessary, and all other incidental facilities, for the disposition of the sewage of the area embraced within the Sanitary District of Chicago so as to preclude any ground of objection on the part of the State or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence system or watershed to the extent, and at the times and in the manner, provided in this decree.

"And the State of Illinois is hereby required to file in the office of the Clerk of this Court, on or before October *2, 1933, a report to this Court of its action in compliance with this provision." (289 U. S. 395, 410-411)

This decision again defined the duty of petitioner and the rights of respondents and recommended an enlargement of the decree of April 21, 1930, as above stated.

(b) *The Requirements of the Decree of April* 21, 1930, *as Modified by the Decree of May* 22, 1933 *were*: (1) *to Reduce, Progressively, the Diversion of Water from Lake Michigan to* 1500 *Cubic Feet Per Second, Plus Domestic Pumpage, and* (2) *to Construct Concurrently Adequate Sewage Treatment Facilities for All of the Sewage of the Sanitary District of Chicago.*

The decree of this Court dated April 21, 1930 (281 U. S. 696) was entered for the purpose of carrying out the conclusions set forth in the opinions of this Court announced on January 14, 1929 (278 U. S. 367) and April 14, 1930 (281 U. S. 179), portions of which have been referred to above. While this decree does not set out the specific measures to be taken by the Sanitary District of Chicago and the State of Illinois to the effect compliance with its provisions with reference to the sewage treatment works construction program, the decree does require that the diversion of water from the Great Lakes-St. Lawrence watershed through the Chicago Drainage Canal be limited as follows:

(1) On and after July 1, 1930, to an annual average diversion not to exceed 6500 cubic feet per second, in addition to domestic pumpage;

(2) On and after December 31, 1935, to an annual average not to exceed 5000 cubic feet per second in addition to domestic pumpage;

(3) On and after December 31, 1938, to an average annual diversion not to exceed 1500 cubic feet per second, in addition to domestic pumpage.

The Court in its opinion of April 14, 1930, approved the recommendation of the Master that the entire system of sewage treatment works of the Sanitary District of Chicago be completed by December 31, 1938, and that the West Side Treatment Works be completed and in operation not later than December 31, 1935. (281 U. S. 179, 199; Report of the Special Master on Re-reference, filed December 17, 1929, pages 81, 142).

Thereafter the decree of April 21, 1930 was enlarged by the Court in 1933 upon the completion of extended hearings before Honorable Edward F. McClennen, Special Master.

On May 22, 1933, the Court entered a decree enlarging the original decree of April 21, 1930, by the addition of the following provision:

> "That the State of Illinois is hereby required to take all necessary steps, including whatever authorizations or requirements, or provisions for the raising, appropriation and application of moneys, may be needed in order to cause and secure the completion of adequate sewage treatment or sewage disposal plants and sewers, together with controlling works to prevent reversals of the Chicago River if such works are necessary, and all other incidental facilities, for the disposition of the sewage of the area embraced within the Sanitary District of Chicago so as to preclude any ground of objection on the part of the State or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence system or watershed to the extent, and at the

times and in the manner, provided in this decree." (289 U. S. 395)

The decree of April 21, 1930, as modified above in 1933, determines the rights of respondents and the duty of petitioner herein.

(c) *The Recommendations of the Special Master with Reference to the Program of Construction of Sewage Treatment Works Required Petitioner in Addition to other Measures to Take Necessary Steps to Secure Completion by December 31, 1938, of Adequate Sewage Treatment Works and Facilities for the Disposition of the Sewage of the Sanitary District.*

Honorable (now Mr. Chief Justice) Charles Evans Hughes, in his report on the 1929 Re-reference made the following recommendations with reference to the practical measures to be adopted by Illinois and the Sanitary District with respect to sewage treatment works with their appurtenances (including the allowance of time for the construction of same) as follows: (Report of the Special Master on Re-reference, filed December 17, 1929, pages 141-142)

> "(1) That the completion of the North Side, West Side, Calumet, and Southwest Side Sewage Treatment Works, above described, with their appurtenances and the necessary intercepting sewers, and the efficient operation of these plants, will afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes of all the area comprised within the Sanitary District of Chicago, and also, in times of storm, of approximately 150% of the ordinary dry weather flow of sewage and wastes; that in the actual operation of these plants it

may appear that a greater amount of the storm flow can be treated at least in part.

"(2) That what is described as 'complete treatment' of the sewage taken to the sewage treatment works (that is, apart from the excess storm flow which remains untreated) does not amount to 100% purification; that with efficient operation the proposed sewage treatment plants should attain not less than an annual average of 85% purification of the sewage treated, and that it is probable that the degree of purification will be 90% or more.

"(3) That the remainder of the storm flow, in excess of the volume treated in the sewage treatment plants will pass into the Chicago River and its branches, and into the canals of the Sanitary District, and any storm flow so passed into the river, its branches and the canals, at storm times will contain sewage and wastes which have not been treated by the sewage treatment works.

"(4) That the time that should be allowed for the completion of the sewage treatment works above described is as follows:

"(a) That the North Side Sewage Treatment Works, with appurtenances, should be completed on or before July 1, 1930;

"(b) That the Calumet Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1933;

"(c) That Batteries A and B of the Imhoff tanks of the West Side Sewage Treatment Works should be completed on or before July 1, 1930;

"(d) That the West Side Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1935;

"(e) That the Southwest Side Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1938;

> "(f) That the necessary intercepting sewers pertaining to the above described sewage treatment works should be completed within the time allowed for the completion of the sewage treatment works, respectively;
>
> "(g) That in the foregoing estimate allowance is made for ordinary contingencies, but not for strikes or other occurrences beyond the control of the Sanitary District or its contractors."

Honorable Edward F. McClennen, Special Master, to whom this matter was again referred by order of this Court entered December 19, 1932, had before him certain subjects for summary inquiry and report, (Report of the Special Master, Edward F. McClennen, March 13, 1933, pages 4-5). Thereafter, hearings were held and a report filed with the Court by the Special Master on March 13, 1933.

The Special Master on the 1933 Re-reference made, among others, the following findings and recommendations: (Report of the Special Master, Edward F. McClennen, March 13, 1933, pages 125-128)

> "3B: The financial measures on the part of the State of Illinois which are reasonable and necessary in order to carry out the decree of this Court are in the enlargement of the decree by adding to it a paragraph providing that the State of Illinois be enjoined to appropriate through its General Assembly, before July 1, 1933, the sum of thirty-five million dollars to be expended before the end of the first fiscal quarter after the adjournment of the next regular session or in any event before October 1, 1934, and the same amount per year for each year ending on September thirtieth thereafter for the designing and the securing the authorization from the War Department and for construction of Controlling Works for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake

Michigan and for sites for, and for the engineering expenses of designing, and for the construction, enlargement, alteration and completion of the intercepting sewer tunnels, conduits, sewage treatment plants and pumping stations commonly known as the Calumet Treatment Works, North Side Treatment Works, West Side Treatment Works and Southwest Side Treatment Works and all things appertaining thereto within the Sanitary District of Chicago, until all the same shall have been fully completed; and to incur indebtedness therefor and for the purposes aforesaid and no other to issue and to sell bonds of the State of Illinois for the amounts so appropriated and on such terms of payment and maturity and at such rates of interest as the General Assembly shall determine and without the laws authorizing the same being submitted to the people of Illinois and the said laws shall be valid and the bonds so issued if in other respects conforming to the Constitution and laws of the State of Illinois notwithstanding the fact that said laws have not been submitted to the people of Illinois either theretofore or thereafter and any sums expended for said Works by the Sanitary District of Chicago, hereafter, from its own funds in any year ending September thirtieth shall reduce by so much the State of Illinois is hereby required to expend."

It is clear under the recommendations of the Masters in these causes that it was the duty of petitioner and the Sanitary District of Chicago to reduce on December 31, 1938, the annual average diversion to 1500 cubic feet per second, plus domestic pumpage, and to complete on or before December 31, 1938, adequate sewage treatment works for the disposition of the sewage of the Sanitary District.

IV.

EXTENT OF COMPLIANCE WITH THE REQUIREMENTS OF THE DECREE OF APRIL 21, 1930 AND THE DECREE OF MAY 22, 1933.

(a) *The State of Illinois and its agent the Sanitary District of Chicago have complied with the decree with respect to reductions in diversion of the waters of the Great Lakes-St. Lawrence Watershed through the Chicago Drainage Canal.*

The Sanitary District of Chicago has complied with the terms and requirements of the decrees of this Court with respect to the reduction in diversion of water from Lake Michigan.

The semi-annual reports of the Sanitary District of Chicago filed with the clerk of this Court beginning on July 1, 1930, and ending with the final semi-annual report dated January 1, 1939, coupled with the records in the office of the United States District Engineer at Chicago, indicate that the reductions in diversions of water from Lake Michigan since the entry of the decree of April 21, 1930, have been made, both as to amount and as to time, in accordance with the requirements of the decree of this Court.

The reduction in diversion of water from Lake Michigan to an annual average of 6500 cubic feet per second, plus domestic pumpage, was made on July 1, 1930; the reduction in diversion to 5000 cubic second feet, plus domestic pumpage was made on December 31, 1935, and the final reduction in diversion of water from Lake Michigan to 1500 cubic feet per second, plus domestic pumpage, was made on December 31, 1938.

The net diversion by the Sanitary District of Chicago, and the domestic pumpage of the Chicago metropolitan area for the year 1939 and for January 1940 are shown in the following table:

Month of 1939	Net Diversion by Sanitary District of Chicago from Lake Michigan c.f.s.	Domestic Pumpage, Chicago Metropolitan area c.f.s.
January	1413	1488
February	2445	1504
March	1654	1515
April	1006	1689
May	1073	1532
June	2542	1669
July	995	1878
August	1089	1801
September	1093	1733
October	1399	1619
November	1298	1518
December	1978	1487
Average, 1939	1499	1620
Maximum, 1939	6748	2119
Minimum, 1939	412	1351
January, 1940	1364	1581

(b) *The State of Illinois and the Sanitary District of Chicago are in default in failing to comply with the decree with respect to the program of construction, completion and operation of adequate sewage treatment plants, sewers and other facilities for the disposition of all of the sewage of the Sanitary District of Chicago.*

The petition of the State of Illinois, filed with this court on January 15, 1940, and the semi-annual reports of the Sanitary District of Chicago filed with the court pursuant to decree of April 21, 1930, disclose that the State of Illinois and its agency, the Sanitary District of Chicago, have failed, neglected or refused to comply fully and promptly with the decree of this court by failing, neglecting or refusing to complete on or before December 31, 1938 (the date of the final reduction in the diversion of the waters of Lake Michigan to 1500 cubic feet per second plus domestic pumpage), adequate sewage treatment plants, sewers and other facilities for the disposition of all of the sewage of the Sanitary District of Chicago.

The original decree of April 21, 1930 (281 U. S. 696) required the diversion from the Great Lakes-St. Lawrence watershed through the Chicago Sanitary Canal be reduced by specified amounts at definitely fixed dates. This decree was thereafter enlarged so as to require the State of Illinois to take all necessary steps, including the raising of monies that might be needed, in order to secure the completion of adequate sewage treatment plants, sewers, and other facilities for the disposition of all of the sewage of the area embraced in the territory of the Sanitary District of Chicago "so as to preclude any objection on the part of the State or any of its municipalities to a reduction of the diversion of the waters of the Great Lakes-St. Lawrence System or watershed to the extent, at the times, and in the manner provided in this decree.". (289 U. S. 395-396).

This Court found that the times fixed by the Master for the completion of the various sewage disposal works proposed by petitioner and its said agency were as liberal as the evidence permitted (281 U. S. 179, 199). With any reasonable diligence, all of said sewage disposal works and ancillary facilities could easily have been fully completed and placed in operation before the time fixed for the ultimate termination of the illegal diversion on December 31, 1938. After inexcusable delays during 1930-1932 in the construction program proposed by petitioner and its agency, petitioner and its agency in November 1932, filed a response to a rule to show cause issued by this Court on October 10, 1932, in which petitioner and its agency advised this Court that, notwithstanding previous delays, adequate time remained for the completion of the sewage disposal works and ancillary facilities within the time fixed by the decree for the ultimate termination of the illegal diversion. Although petitioner and its agency were never reasonably diligent in prosecuting the construction program involved in providing complete treatment for all of the sewage of The Sanitary District of Chicago, the progress of construction, as measured by the construction expenditures reported from year to year to this Court by The Sanitary District of Chicago, plainly show that all of these works could have been completed and placed in operation well before the time fixed for termination of the illegal diversion, if the construction program were prosecuted with any reasonable diligence and funds were provided for that purpose.

Petitioner does not allege that the time granted by this Court was inadequate for the construction of such works, but merely alleges that its agency, The Sanitary District of Chicago, failed to provide sufficient funds for the performance of this duty of petitioner and its agency under the decree. The deficiency in funds so provided is alleged to have been approximately $9,000,000. The resources and credit of the petitioner were sufficient to have provided many times this sum. It conclusively appears from the Semi-annual Reports filed by The Sanitary District in this Court and from the petition filed by the State of Illinois in response to which the instant rule to show cause was issued, that the State of Illinois has not at any time made available State funds or State credit for the purpose of performing the duty of the State under the decree. This default of the State in the performance of its duty under the decree stands wholly unexplained and unexcused in the petition.

The plan proposed and adopted by petitioner and its agency for the complete treatment of all of the sewage of The Sanitary District of Chicago consisted of four major sewage disposal plants with necessary intercepting sewers and ancillary facilities, to-wit: the Calumet Plant, the North Side Plant, the Southwest Side Plant and the West Side Plant. The Master found that with reasonable diligence the North Side Plant with appurtenances should be completed on or before July 1, 1930; that the Calumet Plant should be completed and in operation by December 31, 1933; that the West Side Plant with appurtenances should be completed on or before December 31, 1935 and the Southwest Side Plant with appurtenances should be completed on or before December 31, 1938.

The Final Semi-Annual Report of the Sanitary District of Chicago filed January 1, 1939, and the petition of the State of Illinois, filed January 15, 1940, show that as of January 1, 1939, the status of the construction work on the four major sewage treatment plants of the Sanitary District of Chicago was as follows:

1. *Calumet Sewage Treatment Works*

The Calumet sewage treatment plant is designed to treat by the activated sludge process the sewage of a population equivalent to 444,000. This plant provides for complete treatment of all sewage from the Calumet District which embraces an area bordering on the Indiana state line on the east, 87th street on the north, to Harvey and Calumet City on the south, and west to Blue Island an area comprising approximately 53 square miles. (The Technical Bases for the Recommendations of the Engineering Board of Review of the Sanitary District, Part II (1925), map page 10; Engineering works, Sanitary District of Chicago, August 1928, pages 67-71).

This plant is designed for an average of 130 million gallons daily, with an excess of 50% over the average.

As of January 1, 1939, this plant was 100% completed and in operation except for the connections with the Blue Island intercepting sewer which were only 98% completed on December 1, 1938 (Final Semi-Annual Report, Sanitary District, page 4).

2. *North Side Sewage Treatment Works*

These works are located in the Village of Niles Center, covering an area of 97 acres, and are of the activated sludge type with preliminary settling tanks, digestion of the excess sludge taking place at the West Side Treatment Works. The works consist of a main sewage pumping station and blower house, outdoor electrical substation, grid chambers and coarse screens, preliminary settling tanks, aeration tanks, final settling tanks, operating galleries, main building, service building, miscellaneous conduits and 17 miles of force main for the conveying of the excess sludge to the West Side Treatment Works. This plant is designed for an average flow of 175 million gallons daily and a maximum flow of 50% in excess of the average. (From, Engineering Works, Sanitary District of Chicago, August 1928, pages 71-79).

While the North Side project was completed long before January 1, 1939, (Final Semi-Annual Report, Sanitary District of Chicago, page 4), nevertheless for many years the petitioner or its agent, The Sanitary District of Chicago, made no arrangements to take care of the sludge produced by this plant but simply discharged the sewage into the Drainage Canal with the result of nullifying in a large degree the benefit which should have been obtained from the completion and operation of this plant. Whether this condition was remedied during 1939 and if so, at what time during 1939, respondents are not advised. Furthermore, throughout 1939, and now, petitioner's agency, The Sanitary District, failed to provide a proper supply of air for the operation of the aeration tanks at the North Side Plant and thereby to a substantial extent nullified, and are still nullifying, the benefits which should be obtained from a reasonable and competent operation of that plant. The result was and is that due to the failure and neglect of the petitioner and its agent to operate this plant in a normal and reasonable manner an additional heavy pollution load is placed on the Canal, Illinois Waterway and upper Illinois River.

3. *Southwest Side Project*

(a) *In General*

Work on the sub-structure of the Racine Avenue Pumping Station was 42% completed on January 1, 1939 and work on the fabrication of pumps for the Racine Avenue Pumping Station was 91% completed as of that date. Contracts were awarded for the super-structure of the Racine Avenue Pumping Station on September 1, 1938, and for the electrical work on this station on September 22, 1938, this work being 6% completed as of January 1, 1939. The contract for mechanical work and erection of machinery at the Racine Avenue Pumping Station was not yet awarded on January 1, 1939. (Final Semi-Annual Report, Chicago Sanitary District, pages

4 and 5.) With the exception of the Racine Avenue Pumping Station which is designed to deliver 25 million gallons daily and which is not yet completed, the above work is now completed.

(b) *Southwest Side Treatment Works*

Construction on the Southwest Side Sewage Treatment Works was begun early in 1935. This plant is designed to treat the sewage of 1,277,000 human population, together with industrial waste equivalent to a human population of 1,185,000, originating largely in the stock yards and packing houses, or a total equivalent population of 2,462,000.

The Southwest Side Treatment Works consist of a combined sewage pumping station and blower house, preliminary settling tanks, two batteries of aeration and final settling tanks, sludge concentration tanks and a sludge disposal building adjacent to the pumping station and blower house. It was placed into partial operation in June 1939 and was completed and placed into full operation about October 1, 1939, except for the Racine Avenue pumping station which is expected to be completed soon. The designed capacity of this plant is an average sewage flow of 400 million gallons daily, with a maximum 50% in excess of this. (Final Semi-Annual Report, Sanitary District of Chicago, pages 12 et seq; Petition of State of Illinois, pages 4 et seq; Civil Engineering, May 1939, article entitled "Southwest Sewage Treatment Works" by William H. Trinkaus, Chief Engineer, Sanitary District of Chicago, pages 285-288).

4. *West Side Treatment Works*

The entire West Side treatment plant consists of three batteries of Imhoff tanks for the preliminary settling and digestion of the sewage of the west side area, and for digesting the waste sludge from the North Side Treatment Works. Although the Master found that this plant should have been completed with reasonable diligence on or before December 31, 1935, it has not yet been completed. At the present time this plant is providing only preliminary treatment in Imhoff tanks, which is only 33⅓ per cent treatment. Not only has this partially treated sewage been discharged into the waters described in the petition ever since December 31, 1935, but during a large part of that time no provision whatever was made for taking care of the sludge from the Imhoff tanks and such sludge was discharged into the waters described in the petition. The default of the petitioner and its agent with reference to the completion of the West Side Plant and ancillary facilities has, therefore, contributed very greatly to such pollution, if any, as has existed in the waters described in the petition since December 31, 1935, and continues to contribute to such pollution, if any, as exists in those waters.

The petition of the State of Illinois, filed January 15, 1940, alleges that the present facilities at the West Side Treatment Works, as outlined hereinbefore, should be supplemented by the addition of complete treatment facilities so as to raise the degree of treatment of the sewage of the said west side area from 33⅓% to 85%. (See Petition of the State of Illinois, pages 5 et seq; see also Final Semi-Annual Report, Sanitary District of Chicago, filed January 1, 1939, page 13).

5. *Miscellaneous* (Morton Grove, Glenview and Northbrook)

These treatment plants consist of Imhoff tank (trickling filter works) and treat the sewage of a population equivalent of 6,000 people. The percentage of treatment obtained as reported is 85%. These plants were all in operation on January 1, 1939.

6. *Summary*

The actual sewage treatment of the Sanitary District of Chicago as of December 31, 1938, as shown by the Final Semi-Annual Report of the Sanitary District to this court (page 11) is as follows:

Treatment Works	Population Equivalent	Percentage Treatment	Treatment 100 per cent basis
Calumet	444,000	85	377,000
North Side	1,291,000	85	1,097,000
West Side (Sedimentation)	1,722,000	33⅓	574,000
Miscellaneous (Morton Grove, Glenview, Northbrook)	6,000	85	5,000
Corn Products (Reduction)	425,000	91.5	389,000
Total treated	3,888,000	62.8	2,442,000
Not treated	2,606,000	0	0
Total population	6,494,000	37.7	2,442,000

The following table shows the amount of money expended by the defendants for construction work on sewage treatment plants and facilities for the period from 1930-1939 inclusive:

1930	$5,339,377	1935	$11,214,353
1931	4,686,717	1936	16,344,921
1932	705,469	1937	14,940,266
1933	424,801	1938	9,570,986
1934	6,755,594	1939	4,177,748

(Semi-annual reports of Sanitary District of Chicago, filed with the U. S. Supreme Court pursuant to decree of April 21, 1930; Petition of State of Illinois, filed January 15, 1940)

The Sanitary District of Chicago during the period 1930-1939 inclusive demonstrated its ability to construct sewage treatment facilities costing more than 16 million dollars in one year. The three years asked in which to finance and construct 9 million dollars worth of additions to the West Side Plant is manifestly much too long a time for such work when the entire construction program, as recommended by the Master and as approved by the Court, was eight years. This eight year period so fixed was extremely liberal, as the Court pointed out (281 U. S. 179, 197).

It should also be noted that the frequent use of the term "population equivalent" by petitioner is something adopted by the petitioner or its agent, the Sanitary District of Chicago, in view of the exigencies of the suit. All other municipalities in this country have industrial wastes which they include and treat in their sewage disposal works as a matter of course. Such other municipalities have never felt it necessary to build up and magnify their problem or to exaggerate their accomplishments by the adoption and use of new phrases such as "population equivalent."

C. *The Default of the Petitioner in the Construction and Completion of Adequate Sewage Treatment Facilities Remains Wholly Unexplained and Unexcused and Has Resulted in the Discharge of Large Quantities of Untreated or Partially Treated Sewage into the Waters Described in the Petition, Causing such Pollution, if any, as Appeared Therein During* 1939.

It is manifest from the foregoing that the petitioner and its agent, the Sanitary District of Chicago, were and are in default in the performance of the decree of April

21, 1930. This default of petitioner has resulted in the discharge of large quantities of untreated or partially treated sewage during the year 1939 into the waters mentioned in the petition and this has resulted in such pollution, if any, as appeared in those waters during 1939. The placing of enormous quantities of raw sewage equivalent into those waters has undoubtedly resulted in deposits of sludge which will to some extent effect conditions therein in 1940 although the effects of such past defaults will not extend beyond that season.

V.

THE EFFECT OF THE CHICAGO DIVERSION ON THE LEVELS OF THE GREAT LAKES IS TO LOWER SUBSTANTIALLY THE NATURAL LEVELS OF SUCH LAKES, CAUSING GREAT LOSS TO RESPONDENTS AND THEIR PEOPLES.

(a) *The Lowering of the Natural Levels of the Great Lakes Due to the Illegal Diversion of the Waters Thereof by Petitioner has Caused Great Continuing Damages to Respondents and Their Citizens.*

Under the decree in these causes it is now *res adjudicata* that the illegal diversion of water from Lake Michigan by petitioner has substantially lowered the natural levels of the Great Lakes and that such lowering of the natural levels of the Great Lakes has caused great continuing damage to respondents and their citizens and that the restoration of normal lake levels and the termination of such continuing damages to respondents and their citizens will require a period of five years after the termination of the illegal diversion of petitioner from Lake Michigan. (Report of Special Master, filed Nov. 23, 1927, pp. 114-115;

Wisconsin et al. v. Illinois et al., 278 U. S. 367, 409) The modification of the decree requested by the petitioner would, if granted, postpone the restoration of normal lake levels and the termination of these continuing damages to respondents and their citizens for a period of four years. During most of the navigation season of 1939, the draft of vessels carrying the great ore, coal and grain traffic between the head of the Lakes and lower lake reports was restricted to 19 feet, greatly reducing the loads which could be carried by vessels carrying 90 per cent of this traffic in comparison with the loads which could have been carried but for the lower lake levels caused by the petitioner's diversion.

(b) *The Trend of Lake Levels is Downward at the Present Time; On January* 31, 1940 *the Levels of Lakes Michigan and Huron were only Slightly Higher than the Annual Mean Average for the Preceding Eight Years while the Levels of Lakes Erie and Ontario were Below the Annual Mean Average for the Preceding Eight Years.*

Whether or not the Great Lakes are averaging a foot higher than they have averaged over the past eight years is irrelevant and immaterial. However, the latest chart of the United States Lake Survey shows that the levels of Lakes Michigan and Huron at the end of January, 1940, were only 46/100ths of a foot higher than the annual mean average for the preceding eight years; but the level of Lake Erie was 24/100ths of a foot *below* the annual mean average for the preceding eight years and that the level of Lake Ontario was 45/100ths of a foot *below* the annual mean average for the preceding eight years and that the trend of lake levels is downward at the present time. Moreover petitioner bases its comparison upon an eight year period, during which the normal levels of the Great Lakes were substantially lower than they otherwise would have been, by reason of the illegal diversion of petitioner.

The levels of the Great Lakes for the period 1930 to 1939 are shown by the following table:

	Lake Michigan		Lake Huron		Lake Erie		Lake Ontario	
Year	High	Low	High	Low	High	Low	High	Low
1930	581.15	579.15	581.20	579.20	573.95	571.65	248.10	245.10
1931	579.15	578.20	579.15	578.20	571.70	570.70	245.45	243.95
1932	578.60	577.55	578.60	577.55	571.85	570.40	246.15	243.95
1933	578.65	577.45	578.65	577.45	572.10	570.00	245.45	243.35
1934	578.05	577.40	577.95	577.40	570.40	569.45	244.50	242.70
1935	578.55	577.55	578.60	577.60	570.90	569.50	244.30	242.80
1936	578.70	577.75	578.70	577.80	571.20	569.43	245.25	242.80
1937	578.65	577.70	578.65	577.70	572.60	570.20	246.05	242.50
1938	579.65	577.65	579.65	577.60	572.30	570.55	245.95	244.40
1939	580.00	578.80	580.00	578.80	572.40	570.95	246.15	244.15

Average	High	Low	Mean
1860-1899 for Lake Michigan	582.06	580.74	581.40
1900-1939	580.32	579.06	579.70

The Lakes Survey chart shows that the levels of the Great Lakes have been dropping rapidly since August 1939 when the stage of Lakes Michigan and Huron was almost 580 feet above mean tidewater at New York, while on January 31, 1940 such lake stage was only 578.75 feet above mean tidewater at New York, a drop of more than 15 inches in six months, and that during January, 1940, the total drop in levels of such lakes was 3 inches. The mean level of Lake Erie began to drop in June 1939 from 572.40 to 570.65 feet on January 31, 1940, a drop of 21 inches. Lake Ontario reached a high of 246.15 feet in May, 1939 when the level began to drop until the mean lake stage of record on January 31, 1940 was 243.95, a drop of 26 inches in 8 months.

On the basis of the recent drop in the water levels of the Great Lakes and considering the drought conditions which obtained in this region during a great part of ~~1930~~ 1939, it would seem that the water levels will continue to drop rather than rise during the next three years and if so the complainant states would again be faced with some of the lowest Lake levels in history with the resultant additional damage and loss to the navigational and riparian interests of the respondent states and their peoples.

The Special Master has pointed out that the damages and losses to respondents and their peoples are greatest when the mean water levels on the Great Lakes are lowest. (Report of Special Master, Nov. 23, 1927, p. 116).

VI.

THE PRIMARY CAUSE OF THE ALLEGED UNSATISFACTORY CONDITIONS WHICH PETITIONER CLAIMS OBTAINED IN THE SANITARY CANAL, THE DES PLAINES AND ILLINOIS RIVERS IN THE SPRING AND SUMMER OF 1939 WAS AND IS THE FAILURE AND NEGLECT OF THE SANITARY DISTRICT OF CHICAGO AND THE STATE OF ILLINOIS TO COMPLY FULLY AND PROMPTLY WITH THE DECREES OF THIS COURT DATED APRIL 21, 1930 and MAY 22, 1933, WITH RESPECT TO THE CONSTRUCTION, COMPLETION AND OPERATION OF ADEQUATE SEWAGE TREATMENT PLANTS, SEWERS AND OTHER FACILITIES FOR THE DISPOSITION OF THE SEWAGE OF THE SANITARY DISTRICT OF CHICAGO.

(a) *The alleged unsatisfactory conditions which obtained in the Sanitary District Canal, the Des Plaines and Illinois Rivers in* 1939 *were caused solely by the failure of the State of Illinois and the Sanitary District* of *Chicago to comply fully and promptly with the decree of this court.*

Petitioner complains that conditions in the Sanitary District Canal, the Illinois Waterway and Upper Illinois River were not satisfactory during the spring, summer and fall of 1939. We have heretofore demonstrated that the default of petitioner and its agent, the Sanitary District of Chicago, in complying with the decree of this court, resulted in the placing of enormous quantities of raw sewage equivalent into the waters described in the petition during 1939. The effect of discharging such raw sewage equivalent into those waters was to create conditions which petitioner describes as unsatisfactory during 1939.

Under the decisions of this court and under the decree of April 21, 1930, the restoration of the adjudged rights of respondents and their peoples was postponed and made gradual solely as a matter of favor to petitioner and its agent, the Sanitary District of Chicago, upon the representation of said petitioner and its agent that notwithstanding their adjudged wrong they should be given an opportunity and a reasonable time within which to construct sewage treatment facilities for the complete treatment of all of the sewage of the district. The court granted such additional time solely in the interests of the health of the people for the Chicago metropolitan area. In its return to the Supreme Court filed in November, 1932, petitioner and its agent reported that they would be able, with due diligence, to construct and complete within the time specified by the court, all of the necessary sewage disposal works and ancillary facilities.

As of January 1, 1939, petitioner and its agent provided for complete treatment of only 37.7 per cent of all of the sewage of the Sanitary District of Chicago. The result was that 62.3 per cent of all of the sewage of the District, amounting to a total "population equivalent" of 4,462,000 was dumped without treatment into the waters described in the petition. Thus, such pollution, if any, as appeared in those waters was caused solely by reason of the default of petitioner and its agent and their failure and neglect to operate the existing plants in a normal and efficient manner.

(b) *The conditions which obtained in the Sanitary District Canal, the Des Plaines and Illinois Rivers in 1939 were not as bad as pictured in the Illinois Petition; in fact the conditions in those water-courses in 1939 when the direct diversion from Lake Michigan was 1500 c. s. f. were no worse than the conditions which existed in previous years when the direct diversion from Lake Michigan was nearly five times as great.*

In the petition of the State of Illinois, much attention is devoted to showing the dissolved oxygen content in these water-courses in the summer of 1939 when the direct annual average diversion was 1500 cubic feet per second. The figures reported by the State of Illinois show that the dissolved oxygen content was at times zero per million, and at other times not much higher. These figures do not disclose a condition any worse than when the direct diversion of water from the Great Lakes-St. Lawrence watershed was nearly five times as great as it was in 1939.

In a survey made by the U. S. Public Health Service from July 1921 to August 1922, it was discovered that during the month of July 1922 the dissolved oxygen at Lockport was zero for thirty days and that for one day in July 1922 the dissolved oxygen content of the Des Plaines and Illinois Rivers was 0.3. At Morris, Illinois, during July 1922 the dissolved oxygen content at Station E was zero for 24 days, while during seven days of that month the dissolved oxygen content at Station E was 0.4, 0.3, 0.3, 0.5, 0.4, 0.3, and 0.2. (Report of the Engineering Board of Review of the Sanitary District, 1925, part III Appendix I, page 50.)

This would indicate that the dissolved oxygen content in the Des Plaines and Illinois Rivers at Lockport, and below that at Morris, during the 1939 season was no worse than it was in those watercourses during 1922 when the direct diversion at Lockport and Summit was about 7,000 c. s. f. (Report of Engineering Board of Review, Sanitary District of Chicago, 1925, Part III, Appendix I, page 48).

(c) *The State of Illinois, in addition to neglecting to construct and complete by December 31, 1938, adequate sewage treatment facilities for treatment and disposition of all the sewage of the Sanitary District of Chicago, has added to the* alleged *seriousness of the situation complained of by the construction after the decree of April 21, 1930 of the dam at Brandon's Bridge, near Joliet, thereby replacing the former turbulent flow of the river and its great purifying capacity with a slack water, stagnant pool.*

The State of Illinois has not only created the situation complained of by failing and neglecting to provide adequate sewage treatment facilities by December 31, 1938 so as to provide complete treatment of all the sewage of the Sanitary District of Chicago but it has added to the alleged seriousness of the situation complained of, particularly by the citizens of Joliet, Illinois, by the construction of the dam at Brandon's Bridge near Joliet, thereby replacing the former turbulent flow of the river and its great purifying capacity, with a slack water, stagnant pool. Prior to the construction and completion of the dam at Brandon's Bridge, near Joliet, the oxygen demand due to the Chicago sewage load was satisfied to some extent by re-aeration in the Sanitary Drainage Canal and the Des Plaines and Illinois Rivers. At Lockport, during July and August, 1922, tests showed a 28% reduction in the oxygen demand caused by the Chicago load, and that in the turbulent section through Joliet this reduction in oxygen demand was increased to over 50% of the total. This was the equivalent of 100% treatment for 22% of the total population equivalent of 6,494,000; that is, the equivalent of 100% treatment of the sewage of about 1,400,000 people. The dam at Brandon's Bridge together with the locks and dams at Marseilles, Dresden Island and Starved Rock were part of the $20,000,000.00 program of the State of Illinois for the improvement of this section chiefly for the development of hydro-electric power. With the construction of the dam at Brandon's Bridge and the creation of the so-called Brandon Road pool extending back toward Lockport more than 5½ miles, this section with a drop of about 30 feet was changed from a turbulent, fast flowing stream with a great purifying capacity, to a slack water, stagnant pool which has become, in fact, a settling tank for the large volume of untreated sewage of the Chicago area. The sewage from the Lemont and Lockport areas is also dumped into this waterway untreated.

(d) *The Conditions which will obtain in the Sanitary Canal, the Illinois Waterway and the Upper Illinois River During* 1940 *Will Result in No Nuisance or Unhealthy Environment.*

Petitioner alleges that it will be necessary during 1940 in order to avoid unsatisfactory conditions in the Sanitary Canal, the Illinois Waterway and Upper Illinois River to obtain an increase in the annual average diversion to 5,000 cubic second feet plus domestic pumpage.

In the petition filed with this court on January 15, 1940, petitioner reports that as of January, 1940 the treatment of the sewage of the Sanitary District will be increased to 70.4 per cent and that as of May, 1940 the total percentage of sewage treatment will be raised to 75.1 per cent.

It is manifest that in view of the increased treatment of sewage, the conditions which will obtain during 1940 in the Sanitary Canal, the Illinois Waterway and Upper Illinois River will be immeasurably improved over the conditions which obtained therein in 1939. While the conditions during 1939 may not have been ideal in the waters described in the petition, petitioner has no equity to insist that such conditions be improved at the expense of respondents and their peoples, when the very condition of which petitioner complains has been caused by failure, neglect or refusal of petitioner and its agent to comply with the decree of this court.

It should also be pointed out that in 1940 the amount of raw sewage equivalent that will be placed in the waters mentioned in the petition will be materially reduced. The effluent from the treatment plants will be rich in oxygen, thus reducing the bio-chemical oxygen demand which is present in the raw sewage.

Comparing the residual organic matter in the effluent of an activated sludge sewage treatment plant with an equal percentage of the raw sewage as a potential source of nuisance is grossly misleading. From the standpoint of bulk, the organic load would be the same. However, from the standpoint of environment of the organic load in the two cases, there is a radical difference. In the case of the organic matter in the effluent, the effluent is rich in oxygen both in the form of dissolved oxygen and nitrates, this oxygen supply being more than adequate to meet the oxygen demand, resulting in stability. In the case of the raw sewage, the contained oxygen supply is usually decidedly deficient, the net result being that the oxygen demand in the raw sewage will not be supplied by its own oxygen and putrefaction would result.

We submit that with the efficient operation of existing sewage treatment plants of the Sanitary District of Chicago, the 1500 cubic feet per second diversion, plus domestic pumpage of approximately 1700 cubic feet per second, will provide enough oxygen to balance the remaining biochemical oxygen demands of the effluents from said sewage treatment works.

VII.

NO UNHEALTHFUL CONDITIONS OBTAINED IN THE SPRING, SUMMER OR FALL OF 1939 IN THE SANITARY DRAINAGE CANAL, DES PLAINES OR ILLINOIS RIVERS OR THE AREAS ADJACENT THERETO, NOR WILL ANY UNHEALTHFUL CONDITIONS OBTAIN DURING THE SUMMER OF 1940 IN SUCH WATERWAYS OR IN AREAS ADJACENT THERETO.

(a) *No unhealthful conditions obtained during the spring, summer or fall of* 1939 *in the area adjacent to the Sanitary District Drainage Canal, the Des Plaines or Illinois Rivers.*

Petitioner alleges that unhealthful conditions obtained in such waterways or in areas adjacent thereto. (Petition, pp. 8-9)

Plaintiff's Petition is manifestly in error in this assertion because:

(1) The unsatisfactory conditions, if any, which obtained for a portion of the year 1939 in the Sanitary District Canal, the Des Plaines and Illinois Rivers were not caused by the "effluent" of sewage from the Sanitary District, but was caused, if at all, by the dumping of millions of gallons of raw sewage equivalent of the Sanitary District into the aforesaid waterways. The effluent from the sewage treatment plants efficiently operated is a stable, clear, sparkling liquid which will not cause any unsatisfactory conditions in any of the waterways in which it is placed.

(2) The reports submitted to the U. S. Public Health Service by the State Health Officer for the State of Illinois disclose that no unusual incidence of waterborne or other diseases occurred along the Illinois Waterway or in areas adjacent thereto.

(3) The cities mentioned in the petition from which complaints are alleged to have come, namely Lemont, Lockport, Joliet, Morris, Marseilles, Ottawa, and LaSalle, Illinois, do not take their drinking or domestic water from the Illinois Waterway. All of such cities or towns, except Argo which obtains its drinking water from Chicago, obtain their drinking supply from wells located in the vicinity thereof.

(4) Whether, and if so to what extent, petitioner has received the complaints from certain municipalities set forth in the petition, respondents are not advised. In that connection respondents suggest that complaints about the nuisance conditions created in these waters by The Sanitary District of Chicago were continually and repeatedly made by municipalities

along such waters for twenty years prior to the entry of the instant decree and that petitioner was never moved to take any action by reason of said complaints. It is manifest that petitioner is without equity now to urge such complaints as the basis for continuing its adjudged wrong and for postponing the restoration of the adjudged rights of respondents.

(5) No claim is made that any epidemics of typhoid, cholera or other waterborne diseases were caused by the alleged unsatisfactory conditions during 1939 in the Sanitary District Canal and Illinois Waterway. No such claim could be made. Cholera in human beings has practically been stamped out in this country. Typhoid fever cases in communities along the Illinois Waterway in 1939 were far fewer than in the balance of the state of Illinois.

There were 140 typhoid fever cases in Illinois in a 4,670,660 population, or slightly more than 3 cases of typhoid per 100,000 population from the territory tributary to the Illinois Waterway during 1939.

There were a total of 928 cases of typhoid reported to the U. S. Public Health Service by all counties in Illinois in 1939, of which 460 came from Kankakee County. This large number was due to a contaminated well water supply at the State Hospital at Manteno, and since this was an unusual case and one which has been traced to its source, we will eliminate Kankakee County entirely from further consideration.

The 1930 population for the state of Illinois was 7,630,654. Deducting the population of the twenty counties adjoining the Illinois Waterway and the population of Kankakee County which together totalled 4,720,755, the remaining counties of the state have a population of

2,909,899, and they produced a total of 328 typhoid fever cases, or an average of 11.4 cases per 100,000 population during 1939.

(b) *No unhealthful conditions will obtain, during the year* 1940, *in the area adjacent to the Sanitary Drainage Canal, the Des Plaines and Illinois Rivers.*

We have demonstrated that no unhealthful conditions obtained during the spring, summer and fall of 1939 in the Sanitary Drainage Canal, the Des Plaines and Illinois Rivers, or the area adjacent thereto. It is manifest that during the year 1940 conditions in these waterways will be materially improved from a pollution standpoint, with the result that the sewage effluent in these streams will represent no menace or hazard to the health of persons living along or adjacent thereto.

As a matter of sanitation, every city in the country is faced with the problem of disposing of its sewage, so as to safeguard the health of its citizens. The situation in Chicago, in this respect is no different than it is elsewhere, yet other cities have been able to solve such problem without asking or expecting neighboring communities to forego or relinquish any of their rights. The State of Illinois and the Sanitary District of Chicago can solve their problem by the construction of adequate facilities and the proper and efficient operation of the same, making it unnecessary to ask the respondent states to surrender their property rights in the levels of the Great Lakes, on the plea that the health of the inhabitants along the Chicago Sanitary Canal, the Des Plaines and Illinois Rivers is imperiled.

VIII.

PETITIONER'S REQUEST FOR A TEMPORARY INCREASED DIVERSION TO DECEMBER 31, 1942 IS BASED ON THE ALLEGED NEED FOR ADDITIONAL TIME TO COMPLETE THE WEST SIDE SEWAGE TREATMENT PLANT IN ORDER TO PROVIDE ULTIMATE TREATMENT OF ALL OF THE SEWAGE OF THE SANITARY DISTRICT OF CHICAGO ON AN 85 PER CENT TREATMENT BASIS. THIS ULTIMATE TREATMENT CAN BE ATTAINED AT ONCE WITH EXISTING INSTALLATIONS.

Petitioner's tables at pages 10 and 11 of the petition showing conditions and treatment of sewage from June 1938 and the ultimate treatment expected by various dates by the Sanitary District of Chicago disclose that the additional time sought by the petitioner is deemed necessary in order to provide an ultimate treatment of a total population equivalent of 6,494,000 on an 85 percentage treatment basis.

The plea of the petitioner for additional time so as to secure ultimate treatment of all the sewage of the District on an 85 per cent treatment basis is without merit, inasmuch as the Sanitary District of Chicago, as agent of the State of Illinois, is now able to obtain such ultimate treatment immediately with the efficient operation of existing installations and by any one of the following methods or combinations thereof;

(a) By increasing the amount of sewage from the West Side area which is treated in the Southwest Side Treatment Works so as to provide complete treatment of a larger amount at the Southwest Side sewage treatment plant. This is an entirely practicable procedure and has been recognized as such by officials of the Sanitary District of Chicago. William H. Trinkhaus, Chief Engineer of the Sanitary District of Chicago, in an article appearing in "Civil Engineering" for May, 1939, said:

> "The estimated tributory human population to be handled at the Southwest Works as of 1940 is 1,277,000, together with industrial wastes equivalent to a human population of approximately 1,185,000, largely originating in the stockyards and packing-house district. The initial installation is designed for an average sewage flow of 400 M.G.D. with a maximum 50 per cent in excess of this. Long-time experiments at the North Side Works indicate, however, that the new plant will probably run satisfactorily at a continuous rate considerably in excess of the design average rate. A cross connection between the West Side and Southwest intercepting sewer systems at the plant side makes possible the diversion of West Side sewage in any desired amount to the Southwest Works. Thus the Southwest Works can operate continuously at its maximum load and give complete treatment to the largest possible volume of sewage, and the remaining West Side flow can be handled at the existing West Side Works, where at present only partial treatment is provided."

(b) By increasing the efficiency of all of the plants now operated by the Chicago Sanitary District, namely, the North Side Plant, the Calumet Plant, the West-Southwest Side Plants, to approximately 93 to 95% instead of 85% efficiency now provided for. The efficiency of these plants has been reduced by reason of the failure of the Sanitary District to operate already installed equipment so as to provide sufficient air for the aeration tanks. At the present time in the aeration of the sewage at least at the North Side Plant air is used on the basis of less than .4 cubic feet per gallon. Equipment is installed and available to provide about 1 cubic foot per gallon. If the aeration of the sewage were increased the efficiency of the operations would be increased considerably and could thus provide for an efficiency from 93% to 95%.

(c) By the addition of supplementary chemical treatment to all or part of the West Side Sewage flow, which would substantially double the efficiency of the Imhoff tanks in the removal of the oxygen demand in the sewage at the West Side Treatment Works.

The above suggested changes in the present program of sewage disposal would increase the efficiency of the sewage treatment of the entire Sanitary District so as to immediately provide for the degree of treatment of the sewage which petitioner states could only be obtained at the earliest by December 31, 1942.

However, in addition to the above changes there is another step which could be and should be adopted so as to further increase the efficiency of the sewage disposal plants and augment their capacity and that is to adopt a complete metering program for the entire domestic consumption of the City of Chicago. Such a metering program for this area would reduce the per capita consumption of water from about 300 to 160 gallons and the capacity of the Chicago Sanitary District treatment works would be increased to such an extent that no addition to the present treatment works would be required for a great many years.

The vital need for complete metering of the entire Chicago area is shown by the following:

(a) The temporary permit of March 3, 1925 which was granted by Secretary of War, John W. Weeks, to the

Sanitary District of Chicago, authorizing an annual average diversion of 8500 cubic feet per second, contained the following condition:

> "8. That if, within six months after the issuance of this permit, the city of Chicago does not adopt a program for metering at least ninety per cent of its water service and provide for the execution of said program at the average of ten per cent per annum, thereafter this permit may be revoked without notice." (Report of Special Master, November 23, 1927, p. 79)

This permit expired by its terms on December 31, 1929, "if not previously revoked or specifically extended."

(b) The enormous water waste in Chicago is again confirmed in the "Report of the Board of Engineers, Appointed by The Hon. Harold L. Ickes, Administrator, Federal Emergency Administration of Public Works, to Review the Plans and Specifications Prepared by the Sanitary District of Chicago for certain Sewage Treatment Work at the West-Southwest Site, dated April 30, 1934" where at page 41, it is said:

> "*Water Waste in Chicago.*
>
> "While the Sanitary District of Chicago has no control over the water supply of the communities within its borders, the amount of water pumped and either used or wasted has a controlling influence on the size of sewers required and the hydraulic capacity of the sewage disposal plants and their appurtenances because the equivalent of this amount reaches the sewers and the disposal plants. The population of the Sanitary District at this time (1934) is estimated at over 4,000,000. Of this population about 3,900,000 are furnished with water by the Chicago Water Works.

> "The extravagant waste of water from the Chicago water system, which has long been known to exist, and which seems to be constantly increasing, has added and will continue to add millions of dollars to the cost of the sewers and of the sewage disposal plants of the Sanitary District of Chicago unless such waste is materially reduced. The water annually pumped at the present time exceeds 1,000 M.G.D. and is almost double the amount which is reasonably necessary for domestic and commercial use, as is demonstrated by the results of the use in other cities where continuous inspection, supervision and metering have curtailed waste with relative great economies in construction cost and operative expenditures."

(c) The Public Works Administration contract with the City of Chicago for the construction of the 79th Street Filteration Plant contained a clause requiring the immediate metering of all of the area which would receive filtered water. This area covered approximately the entire south side of Chicago and included most of the area serviced by the Southwest Side Treatment Plant. The original contract between the City of Chicago and the Public Works Administration provided that the metering was to start immediately. Later this provision was waived with the understanding that complete metering of the area referred to would be completed simultaneously with the completion and placing into operation of the 79th Street Water Filteration Plant.

(d) The metering of the West Side and Southwest Side area so as to provide for metered water within the entire area serviced by the West Side and Southwest Side Sewage Treatment Plants would make the present construction program of the Sanitary District of Chicago adequate for complete treatment for both of such areas.

IX.

THE COMMUNITIES FROM WHICH THE CHIEF COMPLAINTS HAVE BEEN RECEIVED BY THE STATE OF ILLINOIS AS TO ALLEGED UNSATISFACTORY CONDITIONS IN THE ILLINOIS WATERWAY AND UPPER ILLINOS RIVER AND ON WHICH COMPLAINTS THE PETITION OF ILLINOIS, FILED JANUARY 15, 1940, IS BASED, DO NOT PROVIDE TREATMENT FOR THE SEWAGE OF THEIR POPULATIONS; LEMONT, LOCKPORT AND JOLIET DUMP THE RAW SEWAGE EQUIVALENT INTO SUCH WATERCOURSES.

In considering the petition of the State of Illinois, and the alleged unsatisfactory conditions in certain waterways caused by the failure of the Sanitary District of Chicago and the State of Illinois to complete the sewage treatment program at the times and in conformity with the requirements and recommendations of the Special Master and of the Court, it should be noted that the cities bordering on the Sanitary Drainage Canal, the Des Plaines and Illinois Rivers, from which the main complaints have been received and on which the Illinois petition is based, are not providing treatment for the disposal of the sewage and wastes of their populations. The raw sewage equivalent from Lemont, Lockport and Joliet is placed in these waterways to contaminate further the said waters and to contribute to the very conditions of which complaint is made.

It should also be noted that the city of Kankakee, bordering on the Kankakee River, which river together with the Des Plaines River forms the Illinois River, as respondents are advised, provides only partial treatment for the sewage and wastes of that area. These wastes partially treated are placed in the Kankakee River and find their way to the Illinois River. This places an additional substantial burden in the form of unstable putrescent material and wastes on the Illinois Waterway and upper Illinois River. It would seem that the protests and complaints forming the main basis of the petition herein come with poor grace from those localities heretofore mentioned which have to date not provided for the proper sanitary disposal of the sewage of their population and industrial wastes.

X.

WITH THE PRESENT INSTALLATIONS AND THEIR EFFICIENT OPERATION AND PROPER MAINTENANCE, THE SANITARY DISTRICT OF CHICAGO SHOULD BE ABLE TO OBTAIN AN ANNUAL AVERAGE EFFICIENCY OF 95% ON A 100% BASIS INSTEAD OF THE 85% EFFICIENCY NOW ATTAINED.

It should be noted that in the semi-annual reports filed with this Court the Sanitary District has consistently reported that it was able to obtain at the best an average efficiency of only 85% on a 100% treatment basis in its existing sewage treatment plants. However, there have been many times when the District attained consistently an efficiency of more than 90% at some of its plants. In a publication entitled "Modern Sewage Disposal" (1938) at page 80, of which Langdon Pearse, Chief Engineer of the Sanitary District of Chicago, is editor, it was reported in an article written by J. F. Mohlman, Chief Chemist of the Sanitary District of Chicago, that the North Side Plant of the Sanitary District obtained an average efficiency of 91.5% during the year 1937.

See also, Article entitled "Problems and Trends in the Activated Sludge Practice," November 1939, appearing in the American Society of Civil Engineers, by Richard G. Regester, at page 1516, wherein the efficiency of the North Side Plant was also reported at 91.5%.

It should also be noted that the city of Milwaukee was able to obtain a five-year average in its Milwaukee Plant as follows:

Removals	Five-Year Average (1928 - 1932)
Suspended Solids	93.5
20 deg. Bacteria	97.5
B. O. D.	95.4

Many other activated sludge sewage disposal plants throughout the country are able to operate with an efficiency of more than 90 per cent and there appears to be no reason why the Sanitary District of Chicago with proper operation, cannot obtain an efficiency at its present Calumet, North Side and Southwest Side Sewage Treatment Plants of from 90 to 95 per cent.

XI.

THE ALLEGED UNSATISFACTORY FINANCIAL CONDITION OF THE SANITARY DISTRICT OF CHICAGO DOES NOT EXCUSE THE FAILURE OF THE STATE OF ILLINOIS TO MAKE ADEQUATE PROVISION FOR FINANCING COMPLIANCE WITH THIS COURT'S DECREES.

The primary obligation and duty to perform the decree herein rests upon the State of Illinois, of which the Sanitary District of Chicago is a mere political agency.

(289 U. S. 395, 289 U. S. 710). The credit and financial resources of the State of Illinois are more than ample to finance the performance of the decree. In the petition filed with this Court on January 15, 1940, the State of Illinois confesses her default with respect to providing the monies needed to finance a prompt and full compliance with this Court's decrees. The representations made to this Court in the petition disclose that the State of Illinois has made no real effort to place the financial resources of the state at the disposal of the Sanitary District of Chicago for the construction and completion of adequate sewage treatment plants, sewers and facilities for the disposition of all the sewage of the Sanitary District of Chicago. The default of the State of Illinois in this regard affords no reason for further delay in the performance of the decree.

While we believe the present financial condition of the Sanitary District of Chicago would warrant a finding that it could and should have obtained sufficient money to complete their construction program promptly, this is really immaterial. This Court held that it was the special responsibility of the State of Illinois to provide the money needed to effect the prompt completion of the sewage treatment works and complementary facilities. The Court said:

> "The question, then, comes down to the procuring of the money necessary to effect the prompt completion of the sewage treatment works and the complementary facilities. To provide the needed money is the special responsibility of the State of Illinois. For the present halting of its work the Sanitary District is not responsible. It appears to be virtually at the end of its resources. The Master states that, due to its financial situation, the Sanitary District cannot go

forward in any adequate manner with either contracts or construction. We find that the Master's conclusion, that there is no way by which the decree can be performed under tolerable conditions 'unless the State of Illinois meets its responsibility and provides the money,' is abundantly supported by the record.

"That responsibility the State should meet. Despite existing economic difficulties, the State has adequate resources, and we find it impossible to conclude that the State cannot devise appropriate and adequate financial measures to enable it to afford suitable protection to its people to the end that its obligation to its sister States, as adjudged by this Court, shall be properly discharged."

Wisconsin et al v. Illinois et al. 289 U. S. 395, 410-411.

The State of Illinois has utterly failed to carry out the Court's order to make adequate provision for obtaining the money needed to effect the prompt completion of the sewage disposal works and complementary facilities. The unexplained and inexcusable default of the State of Illinois in this regard affords no reason or just cause for further delay in the performance of the decree at the expense of the rights of the complainant states and their peoples.

XII.

ONE OF THE OBJECTS OF THIS PETITION IS TO OBTAIN AT THE EXPENSE OF RESPONDENTS, ADDITIONAL WATER FROM LAKE MICHIGAN FOR THE GENERATION OF HYDROELECTRIC POWER AT THE SITE OWNED BY THE SANITARY DISTRICT AT LOCKPORT, ILLINOIS, AND AT OTHER SITES OWNED BY THE STATE OF ILLINOIS AND SITUATED BETWEEN LOCKPORT AND STARVED ROCK, ILLINOIS

The purposes of the Sanitary District Canal were and are the disposal of sewage of the Chicago Metropolitan area and the development of profitable water power. This court found that sanitation and power were the purposes for the diversion. *Wisconsin, et al. v. Illinois, et al.*, 278 U. S. 367, 415. Both purposes required as large a diversion as possible.

Petitioner alleges that the object of its request is to obtain a temporary increase in the diversion to aid in the disposal of the sewage of the Chicago metropolitan area pending the completion of sewage disposal works which, with reasonable diligence on the part of petitioners, should have been completed long since. It seems clear that one of the objects of this Application is to obtain additional water from Lake Michigan for the generation of hydroelectric power at the site owned by the Sanitary District of Chicago at Lockport, Illinois, and at other sites owned by the State of Illinois and situated on the so-called Illinois Waterway between Lockport and Starved Rock, Illinois. The additional diversion sought by the Application would increase the value of the electrical energy generated at the

Lockport plant of the Sanitary District of Chicago by approximately $100,000 per annum.

The State of Illinois now has pending before the Federal Power Commission an Application for licenses under the Federal Power Act to develop water power at all of the power sites between Lockport and Starved Rock, Illinois, which include all of the commercial power sites between Lake Michigan and the Mississippi River. The amount of water available for power development along this reach is dependent upon the amount of diversion from Lake Michigan and by means of said diversion is made substantially uniform throughout the year. The hydraulic capacity of the hydroelectric generating machinery which, as disclosed by its Application for license before the Federal Power Commission, the State of Illinois proposes to install greatly exceeds the present direct diversion from Lake Michigan, plus domestic pumpage, plus natural flow, and would be practically useless without a large increase in the present diversion. These declared intentions of the State of Illinois establish a purpose to circumvent the performance of the decree of this Court and the restoration of the just rights of the respondents and their peoples as declared by this Court and an intention also evidenced by the past conduct of the petitioner, and its agent, the Sanitary District, to secure in some way a large permanent diversion for water power at the expense of the rights of the respondents and their peoples.

The generation of hydro-electric power at Lockport and other sites has always been and continues one of the motives for the diversion. *Wisconsin v. Illinois*, 278 U. S. 367, 415.

XIII

THE SECRETARY OF WAR HAS NO AUTHORITY TO AUTHORIZE AN INCREASE IN THE ANNUAL AVERAGE DIVERSION ABOVE 1500 CUBIC FEET PER SECOND, IN ADDITION TO DOMESTIC PUMPAGE, TO AID IN DISPOSING OF THE SEWAGE OF THE SANITARY DISTRICT OF CHICAGO OR FOR THE DEVELOPMENT OF WATER POWER.

The petition of the State of Illinois asks the Court whether "the Secretary of War, under existing law, has authority to grant a temporary increase in this diversion if conditions so warrant."

It is clear that a modification of the decree and temporary increase in the diversion from Lake Michigan is sought for the purposes of local sanitation and the development of water power by the State of Illinois. The Secretary of War has no jurisdiction or any statutory or constitutional authority to modify the decree or, quite independently of the decree, to authorize the increased diversion requested by petitioner. This lack of any jurisdiction or authority in the Secretary of War to authorize any diversion for sanitation or water power, the purposes for which the temporary increase are sought, has heretofore been adjudicated in this suit and is *res judicata* of this issue which is now sought to be again raised by petitioner. In *Wisconsin et al. v. Illinois, et al.*, 278 U. S. 367, 418, the Court, in holding that the Secretary of War had no authority to authorize any diversion whatsoever in the interests of sanitation, said, in part:

> "Merely to aid the District in disposing of its sewage was not a justification, considering the limited scope of the Secretary's authority. He could not make mere local sanitation a basis for a continuing diversion. Accordingly he made the permit of March 3, 1925, both temporary and conditional — temporary in that it was limited in duration and revocable at will, and conditional in that it was made to depend on the adoption and carrying out by the District of other plans for disposing of the sewage."

And again:

> "So, complainants urge that the diversion here is for purposes of sanitation and development of power only, and therefore that it lies outside the power confided by Congress to the Secretary of War. The master says:
>
> "* * * The purpose of utilizing the flow through the drainage canal to develop power is also undoubtedly present, although subordinated to the exigency of sanitation. So far as the diverted water is used for the development of power, the use is merely incidental. * * *'"
>
> *Wisconsin et al. v. Illinois et al.*, 278 U. S. 367, 415.

This Court then held the Secretary of War had no power to authorize any diversion for power or sanitation purposes. This holding of the Court on this issue is not now open to argument.

CONCLUSION

Respondents respectfully submit that in view of the foregoing, this court dismiss the petition of the State of Illinois for a modification of paragraph 3 of the decree made and entered in these causes on April 21, 1930 (281 U. S. 696).

Respectfully submitted,

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Filed February 26, 1940.

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IN THE

Supreme Court of the United States

October Term, A. D. 1939.

STATE OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original.

STATE OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants,
STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3
Original.

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original.

REPLY BRIEF AND ARGUMENT OF THE STATE OF ILLINOIS TO THE BRIEF OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK IN SUPPORT OF THEIR RETURN TO RULE TO SHOW CAUSE ISSUED ON APPLICATION OF THE STATE OF ILLINOIS AS PETITIONER, FOR A TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930.

JOHN E. CASSIDY,
Attorney General of Illinois.

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  (b) This modification of the order of construction procedure adopted pursuant to the recommendation submitted by the Board of Engineers of the Public Works Administration was reported to this Honorable Court on May 23, 1934, due notice having been served on respondents. No objections were filed at that time or since by the respondents to the revised order of construction procedure, and construction has proceeded in accordance with the said modification...... 5-6

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IN THE

Supreme Court of the United States

October Term, A. D. 1939.

STATE OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, Complainants, v. **STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,** Defendants.	**No. 2 Original.**
STATE OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS, Intervening Defendants, **STATE OF MICHIGAN,** Complainant, v. **STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,** Defendants.	**No. 3 Original.**
STATE OF NEW YORK, Complainant, v. **STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,** Defendants.	**No. 4 Original.**

REPLY BRIEF AND ARGUMENT OF THE STATE OF ILLINOIS TO THE BRIEF OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK IN SUPPORT OF THEIR RETURN TO RULE TO SHOW CAUSE ISSUED ON APPLICATION OF THE STATE OF ILLINOIS AS PETITIONER, FOR A TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930.

I.

THIS COURT HAS JURISDICTION TO ALLOW THE PETITION OF THE STATE OF ILLINOIS FOR MODIFICATION OF THE DECREE OF APRIL 21, 1930.

Contrary to the position assumed by the respondent lake states, it is obvious from a review of the Special Master's report and the decree entered by the court with the subsequent amendment, that this court did not intend to relinquish jurisdiction over the matter of diversion on December 31, 1938, the date when the annual average diversion of 1500 c.f.s. was to become effective. Respondents recognize of course that the Sanitary District has complied with the provision of the decree as to the restricted annual diversion.

In the Report of the Special Master on re-reference, Honorable (now Chief Justice) Charles Evans Hughes, on pages 138 and 139, stated:

> "* * * Provision should be made for further examination, after the sewage treatment plants have been completed, and the effect of the effluent therefrom with the storm water flow on the navigable channels has been observed, to the end that the question of any further or other relief may have appropriate consideration *in the light of actual conditions.*"

In this connection, we call the Court's attention to the fact that the decree contemplated that the last work was to be completed on or before December 31, 1938, and on page 145 of said Master's Report appears the following recommendation:

> "It is recommended that the Court should retain jurisdiction as there are questions which it is impossible to dispose of at this time in full justice to the

> parties; as, for example, with respect to the extent to which the diversion of water from Lake Michigan by the Sanitary District may be reduced below 5,000 c.f.s., in addition to pumpage, after the installation of controlling works in the Chicago River and pending the completion of the sewage treatment works, and also with respect to any further or other provisions as to the diversion which may be found to be appropriate *after the sewage treatment works have been completed and the results of their operation with respect to the effluent and the condition of the navigable waters have been observed.* As construction work will be conducted on a large scale for several years, *and unforeseen contingencies may arise,* it would also seem to be important that there should be opportunity for the parties to come before the Court at any time to obtain such further directions as the facts may warrant.''

In the proposed form of the decree submitted by Special Master Hughes, in Item 13, he recommends that either party, complainants or defendants, may apply for relief with respect to the time allowed for construction or the progress of construction or the method of operation or in respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

Paragraph 14 of the proposed decree provides that any of the parties, complainants or defendants, may irrespective of the filing of the reports, apply at any time for an order or direction or modification of the decree.

The decree entered April 21, 1930, followed the recommendations of the Master in retaining jurisdiction to entertain at any time petitions in relation to the subject matter by either the complainants or the defendants as stated in Paragraphs 6 and 7 thereof.

Furthermore, when the Court entered its amended decree of May 22, 1933, it used the language ''that the decree of April 21, 1930 be and the same is hereby enlarged by the addition of * * *, etc. It in no way indicated any intention to relinquish jurisdiction to entertain petitions from either the complainants or the defendants for any other or further action or relief.

We respectfully submit that the Court did retain jurisdiction of the subject matter and now may enter such modification of said decree as it in equity may deem fit and proper, and therefore, the Petition of the State of Illinois was filed in apt time.

II.

THE SANITARY DISTRICT OF CHICAGO HAS BEEN DILIGENT IN CARRYING ON THE CONSTRUCTION PROGRAM CONTEMPLATED BY THE DECREE ENTERED IN THIS CASE AND NEITHER THE STATE OF ILLINOIS NOR THE SANITARY DISTRICT HAS BEEN NEGLIGENT IN FULFILLING ITS OBLIGATIONS WITH RESPECT THERETO.

There has been no comparable sewage treatment construction program carried on either in the United States or in the entire world that in any way equals the huge scale sewage construction work carried on by the Sanitary District since the amended decree of May 22, 1933.

The respondents, in their return to the rule to show cause entered in this case, charge, generally, that the petitioner and the Sanitary District of Chicago "were never reasonably diligent in prosecuting the construction program involved in providing complete treatment for all the sewage of The Sanitary District." It is set forth in the petition, however, and not denied in the return filed by respondents, that the construction program contemplated by the decree is practically completed and in operation, except for the secondary or complete treatment of the West Side sewage; that the West Side Treatment Works is now giving only partial treatment and that the failure to complete said works is primarily responsible for the obnoxious, noisome and unhealthy conditions now existing in the Sanitary District channel and the Illinois Waterway; that the failure to complete said West Side Treatment Works is not due to negligence on the part of the petitioner or the Sanitary District of Chicago; that the Sanitary District did not proceed with the construction for the complete treatment of the West Side sewage because of a recommendation submitted by a commission appointed by the Federal Emergency Administration of Public Works that it proceed with the construction of works to provide complete treatment for the South-West Side area instead of the original plan to supplement the existing West Side Treatment Works for complete treatment, in order to permit time for further investigation and large scale tests as to the best methods of supplementing the existing West Side Imhoff Tank Plant (Report of the Board of Engineers appointed by the Honorable Harold L. Ickes, Administrator, Federal Administration of Public Works, to review the plans and specifications prepared by The Sanitary District of Chicago for certain sewage treatment work at the West South-West site April 30, 1934, pages 15, 27, 34, 44-45); and that said modification of the order of construction procedure adopted pursuant to the recommendation submitted by said P.W.A. Commission was reported to this Honorable Court by the Sanitary District on May 23, 1934, due notice thereof having been given to the respondents. No objections were filed at that time or since by the respondents to the revised order of construction procedure.

Following this modification of construction procedure, The Sanitary District proceeded with the construction of the sewers and treatment plants as suggested and recommended by the Public Works Administration. While delay in the prosecution of this construction program was caused from time to time by strikes, by the necessity of re-advertising certain contracts, by bad weather and other conditions, it must be remembered that the construction work performed pursuant to these plans involved, since 1934, an expenditure of over *sixty million dollars* and was carried on under *more than one hundred separate contracts.* We respectfully submit that the resulting delay was not excessive in view of the large amount of work involved in this program.

With respect to the investigation and large scale tests which the Public Works Administration recommended should be made before the plans for the West Side Treatment Works were adopted, we respectfully submit that the Sanitary District was conducting and continued to conduct certain experiments at the West Side Works and that experimental work continued there and also at the North Side Works. A contract for the testing plant was advertised in March, 1937, and this plant was put in operation in September, 1937. Experiments were conducted at this plant until April, 1939. Reports were made monthly to the Review Board of Public Works Administration regarding this experimental work. The final formal report on this work is now being prepared and should be ready within the next two or three weeks. When this report is submitted and approved by the Public Works Administration, The Sanitary District of Chicago will proceed with the preparation of detailed plans and specifications for the complete supplementary sewage treatment plant at the West Side Treatment Works.

It is contemplated that funds will be available for construction work as such construction work progresses when these plans and specifications are completed and approved and it is estimated that the time required for the physical construction of said works for complete treatment at the West Side Sewage Treatment Works will be two working seasons, which will require the diversion of the additional water from Lake Michigan requested in the petition until December 31, 1942, to relieve the obnoxious, noisome and unhealthy conditions now existing in the Sanitary District channel and the Illinois waterway, pending the completion of the West Side Treatment Works.

III.

THE SEWAGE TREATMENT WORKS OF THE SANITARY DISTRICT OF CHICAGO NOW IN OPERATION ARE BEING OPERATED IN A HIGHLY EFFICIENT MANNER.

The respondents in their brief criticize without justification, the operation by The Sanitary District of Chicago, of its present facilities for the treatment of sewage. In answer to their criticism we respectfully submit the following:

North Side Sewage Treatment Works.

Contrary to the statement made in respondents' brief on page 24, sludge from the North Side Sewage Treatment Works in the past has been digested in the Imhoff Tanks of the West Side Treatment Works and is now being dried in the incinerating plant at the South-west Side Treatment Works as previously reported to this Honorable Court. The operating results show that the sewage treated in the North Side Treatment Works during the past three years was purified to the extent of 91.5% in 1937, 92¼% in 1938, and approximately 93% in 1939, although credit in the reports to this court has only been assumed by The Sanitary District of Chicago for 85% purification. We also call attention to the fact that air was used at the North Side Treatment Works to the extent needed to produce a suitable effluent. This is evidenced by the fact that in 1937 the 5-day B.O.D. reduction was 91.5% and suspended solids reduction 91.5%; in 1938 the B.O.D. reduction was 92.2% and the suspended solids reduction was 93%; in 1939 the B.O.D. reduction was 93.5% and the suspended solids reduction was 92.4%. In parts per million the effluents contained:

Year	*5-day B.O.D.*	*Suspended Solids*
1937	9.2	12
1938	8.6	10
1939	7.7	11

All of these results demonstrate efficient and well controlled operations.

For the purpose of supporting the purported inefficiency in operation of the North Side plant the respondents compare the operation with a similar plant at Milwaukee, Wisconsin. The following table shows the sewage treatment in 1939 at the North Side Sewage Treatment Works compared with treatment at the Milwaukee plant:

SEWAGE TREATMENT, 1939.

	North Side	*Milwaukee*
Average Flow (mil. gal. per 24 hrs.)	202.5	121.2
5-Day B.O.D.		
Raw Sewage (p.p.m.)	117.0	179.7
Effluent (p.p.m.)	7.7	8.5
Reduction (per cent)	93.5	95.0
Suspended Solids		
Raw Sewage (p.p.m.)	114	268
Effluent (p.p.m.)	11	16.5
Reduction (per cent)	92.4	93.8

The effluent from the North Side Treatment Works of The Sanitary District of Chicago as shown on the basis of the average analyses for 1939 is commonly recognized as better than that from the Milwaukee plant. The Milwaukee effluent (discharged into Lake Michigan) contained 50% more suspended solids and had a higher B.O.D. than the effluent from the North Side Sewage Treatment Works of The Sanitary District of Chicago.

The table, page 50 of respondents' Brief, showing 97.5 per cent removal of 20 degree Bacteria at Milwaukee, is of no particular significance for Chicago conditions. This is a test made where treatment plant effluent is discharged into drinking water sources. It means the removal of Bacteria as shown by tests media incubated at a temperature of 20 degrees Centigrade or 68 degrees Fahrenheit, and of course includes intestinal organisms. Tests may also be made with media incubated at body temperature, or 98.4 degrees Fahrenheit. Such tests are interesting and have been made occasionally by The Sanitary District, but since none of the sewage, either raw or treated, is discharged into a drinking water supply in the Sanitary District, or in the Illinois River Valley, such determinations are not made by the Sanitary District as a routine matter. The universal measure of the efficiency of sewage treatment is the percentage of removal of suspended solids and the percentage of the reduction of the biochemical oxygen demand, usually based on the 5-day period of incubation and designated 5-day B.O.D.

The West Side Treatment Works.

Contrary to the statement made in respondents' brief on page 26, no sludge from the Imhoff Tanks of the West Side Treatment Works has ever been discharged into the Main Channel. As a matter of fact, there is no way in which such sludge could be discharged into the channel. The sludge has been placed on sand drying beds and after drying has been removed for deposit west of Harlem Avenue and north of the main channel on the property of the Sanitary District. A portion of the sewage from the West Side project is now being treated at the South-west Side Treatment Works, but the extent to which the South-west Side Treatment Works can be used for West Side sewage can be determined only by actual trial. Information on the exact amount of sewage which can be so treated should be available within the next two or three months. However it is expected that this amount will be about 100,000,000 gallons daily.

With respect to respondents' suggestion, on pages 43 and 44 of their brief, that the amount of sewage from the West Side area, which is treated in the South-west Side Treatment Works, should be increased so as to provide complete treatment of a larger amount at the South-west Side Treatment Works, the Sanitary District has not been ignorant of such a possibility and in addition to so treating that portion of the sewage of the West Side area now handled at the South-west Sewage Treatment Works it contemplates an increase within the limits of the capacity of such works and in that connection the petitioner submits the following:

The South-west Side Treatment Works has an average designed capacity of 400,000,000 gallons daily and can be operated to treat 600,000,000 gallons daily (which is 150% of dry flow) during the relatively brief periods of storm flow. It could not, without certain major additions in tanks and equipment, be operated continuously at 600,000,000 gallons daily rate.

The West Side Treatment Works (Imhoff Tanks) has a flow capacity per day of 467,000,000 gallons as an average and 700,000,000 gallons for a storm maximum.

If operated as designed, the combined South-west and West Side Treatment Works would give complete treatment to the 400,000,000 gallons daily average with overload to 600,000,000 gallons daily storm maximum South-west Side sewage, but only partial treatment to the 467,000,000 gallons daily average with overload to 700,000,000 gallons daily storm maximum West Side sewage.

It is expected that 500,000,000 gallons daily average may be completely treated continuously at the South-west plant, leaving only 367,000,000 gallons daily average for partial treatment at the West Side plant. The treatment of the storm maximum of sewage however would be the same in either case.

This procedure will not attain the ultimate treatment expected of 90% or better on dry flow and 85% annual average. It will be nearer to 77% treatment of dry flow and 71% annual average. It is not expected that the aforesaid ultimate treatment can be attained until complete treatment facilities have been provided for the West Side sewage.

Operating Efficiency of the Several Sewage Treatment Plants.

The North Side Plant, the Calumet Plant and the South-west Side Plant as now operated produce a purification of 90% or more. The actual purification during 1939 was in per cent removal:

Plant	*5-day B.O.D.*	*Suspended Solids*
North Side	93.5	92.4
Calumet	87.0	90.6
West Side	53.7	63.0
Southwest (6 mos., July-Dec.)	85.8	88.5

During the period of "tuning up" at the South-west Sewage Treatment Works the efficiencies have not been as high as at the North Side works, but when the South-west plant operates on a permanent schedule, the percentage purification should be as high as at the North Side Works.

Respondents' criticism of the use of the term "population equivalent" (p. 29 of their brief) is not justified. The use of this term is made necessary in the case of the City of Chicago because of the large amount of packing house and stockyards waste. This waste is equivalent to the waste of approximately 1,200,000 people.

No other municipality in the world has so large a total of packing house and stockyards or any other trade waste. All such wastes in Chicago must be treated at the South-west Plant, and not distributed to all of the treatment works of the Sanitary District.

The suggestion regarding the metering of water in Chicago is not new. The Sanitary District has advocated water-metering for many years past and this matter is being handled by the City of Chicago and reasonable progress has been made and is being made. The average daily pumpage for the Chicago waterworks was reported in gallons per capita as 255 in 1937 and 241 in 1938.

Respondents' contention that the Sanitary District of Chicago is now able to obtain the ultimate treatment necessary by the addition of supplementary chemical treatment to all or part of the West Side flow which respondents contend would substantially double the efficiency of the Imhoff Tanks in the removal of the oxygen demand in the sewage at the West Side Treatment Works, is not supported by actual large scale tests or accepted by recognized sanitary engineers. Actually for the nine year period, from 1931 to 1939, the West Side Works averaged

48.2 per cent removal of 5-day B.O.D. with a maximum year of 36 per cent. Obviously this efficiency cannot be doubled. On this subject we call the Court's attention to the report of the Board of Review made April 30, 1934, to the Honorable Harold L. Ickes, Administrator, Federal Emergency Administration of Public Works, wherein on page 45 said board states that although it has given considerable time and attention to the various chemical processes of sewage disposal, the high cost of chemicals in some cases and the relative inferior quality of the resulting effluent, precludes this process from consideration as a primary method of disposal under conditions in Chicago, although its consideration as a supplementary method, either for the treatment of the Imhoff Tank effluent or for final treatment of the effluent of other processes, merits further consideration. On page 47 the Board suggested that large scale tests be made to determine whether any combination of Imhoff Tank treatment and chemical treatment, with or without filtration, will so improve the quality of effluent as to make further treatment unnecessary. These tests have been made and the results show that the efficiency of the Imhoff Tanks is not doubled, as claimed by respondents, but only increased about one-third or at most one-half.

In passing, it may be said that one of the consultants of the Board of Review, John H. Gregory, Consulting Engineer of Baltimore, Maryland, and Professor of Sanitary Engineering at Johns Hopkins University, reported to the Board that chemical precipitation, either as a primary means of treatment or as a means of supplementing the existing Imhoff Tank installation at the West Side, did not merit serious consideration.

From the various large scale tests that have been made by The Sanitary District, it appears that the activated sludge process is probably the proper method of supplementing the existing Imhoff Tanks in the treatment of West Side sewage, and the determination as to whether or not the activated sludge process or a combination of tank treatment and chemical treatment should be adopted is dependent upon the approval by the Board of Review of the Public Works Administration.

The efficiency attained by the Sanitary District in the operation of its sewage treatment works compares favorably with that of the treatment works of any other municipality. The criticism of respondents is unjustified and is not supported by facts.

IV.

THE TREND OF THE WATER LEVELS IN THE GREAT LAKES WILL BE UPWARD FOR THE YEARS 1940, 1941 AND 1942.

The water levels in the Great Lakes are now in the rising period of one of the fluctuating cycles. From a study of the lake level chart compiled by the U. S. Lake Survey it can be expected that the levels of the Great Lakes during the years 1940 to 1942, inclusive, will average a foot or more higher than they have averaged over the past eight years. This chart indicates that the average level of Lakes Michigan and Huron for the years from 1932 to 1939 was 578.33 feet above mean sea level; that this average for the year 1938 was 578.94, and for the year 1939 was 579.35. The history of the rise and fall of the lake levels, as shown by the U. S. Lake Survey, indicates that this rising trend will probably continue over the next three years, based on past experiences and that these lake levels will not return to their 1932-

1939 average of 578.33 during that period of time. Furthermore it can be expected that the level of these lakes will rise to elevation 580 annual average before they again begin to recede.

The statement by respondents in their brief that the levels of the Great Lakes have been dropping rapidly since August, 1939, is misleading, when considering the trend of lake levels for the next three years. The fact that these levels have dropped between the summer of 1939 and January 31, 1940, cannot be taken as an indication that they will continue to drop. Despite the severe drought in the latter part of 1939, the drop in lake levels has not greatly exceeded the normal drop between summer and winter levels. The drop in levels, as stated by respondents in their brief, and the normal drop, is as follows:

	Fluctuation in Water Levels	
Lake	*Respondents*	*Normal*
Michigan-Huron	15 inches	13.5 inches
Erie	21 inches	18 inches
Ontario	26 inches	21 inches

The high level on all the lakes in the summer of 1940 will be about 1 foot or more higher than the January level, referred to by respondents in their brief. This has been the case for the past eight years, and there will probably be no change in 1940, regardless of local drought.

The granting of a temporary increase in the diversion of water from Lake Michigan to 5000 cubic feet per second for the three year period from 1940 to 1942, inclusive, will work no hardship on riparian owners around the Great Lakes nor upon persons using the lakes for navigation. The temporary increase of 3500 c.f.s. (from 1500 c.f.s. to 5000 c.f.s.) will only lessen navigation depths (lower lake levels) two inches at the most. This amount is no more than the change in levels which is likely to occur in any of the lakes in any month, due to natural causes.

V.

THE SECRETARY OF WAR HAS CERTAIN POWERS REGARDING THE AMOUNT OF THE DIVERSION OF WATER.

It has not been contended by the State of Illinois that the Secretary of War has power to authorize any diversions for the purpose of local sanitation. No diversion is being made for the purpose of sanitation, but for navigation in the Chicago river, as a part of the port of Chicago. The Secretary of War has certain authority under Section 10 of the Rivers and Harbors Act of 1899. The diversion now being made by the Sanitary District of Chicago is under the permit of June 26, 1930, from the Secretary of War acting in accordance with Section 10 of the Rivers and Harbors Act of 1899 and in conformity to the decree of this Court.

As stated in our petition, the Mayor of Joliet appealed to the Secretary of War for relief and the Secretary of War replied that he was of the opinion that he was without legal authority, in view of the decree of this Court to grant a temporary increase in diversion, and suggested that application be made to this Court. Acting under this suggestion, the State of Illinois has applied to this Court for a temporary increase, or for a pronouncement defining the authority of the Secretary of War. In so far as the power of the Secretary of War is concerned, it is not a matter of local sanitation; it is a question of proper conditions in a Federal waterway, over which the petitioner respectfully submits the Secretary of War has jurisdiction.

VI.

IT WAS NOT ONE OF THE OBJECTS OF THE STATE OF ILLINOIS IN FILING THE PETITION IN THIS CASE TO OBTAIN ADDITIONAL WATER FROM LAKE MICHIGAN FOR THE GENERATION OF HYDROELECTRIC POWER.

While the State of Illinois has filed an application with the Federal Power Commission for permits to construct power plants at the Brandon Pool Dam, at Marseilles and at Starved Rock, the plans for said power plants contemplate the diversion of water from Lake Michigan of only 1500 cubic feet per second in addition to domestic pumpage. Furthermore, the State of Illinois could not avail itself of any additional temporary diversion permitted by this Court in the operation of power plants, because (1) power plants cannot be constructed by the State of Illinois until further legislation is passed by the General Assembly of said State, and (2) the period required for constructing such power plants would extend beyond the period for which additional diversion is requested.

With respect to the power plant operated by the Sanitary District of Chicago, at Lockport, Illinois, said power plant was constructed and in operation before the reduction in water diversion to 1500 cubic feet per second under the decree of this Court, and while the Sanitary District could avail itself of the additional diversion requested in this petition, it has now adjusted its operation to the present limitations upon diversion imposed by the decree of this Court.

VII.

THE OBNOXIOUS, NOISOME AND UNHEALTHY CONDITIONS NOW EXISTING IN THE SANITARY DISTRICT CHANNEL AND THE ILLINOIS WATERWAY WERE MATERIALLY INCREASED UPON THE REDUCTION IN DIVERSION OF WATER FROM LAKE MICHIGAN FROM 5000 C.F.S. TO 1500 C.F.S. AND WILL CONTINUE UNTIL COMPLETE SEWAGE TREATMENT IS PROVIDED FOR THE WEST SIDE AREA UNLESS A TEMPORARY INCREASE IN DIVERSION IS PERMITTED.

In their brief respondents have sought to negative the present need for diversion of additional water by making a comparison of the dissolved oxygen in the DesPlaines and Illinois Rivers between the years 1921, 1922 and the year 1939. The conditions of 1921 and 1939 were in no way comparable. The total flow in the canal in 1921 was about 8500 c.f.s., made up of about 1200 c.f.s. domestic pumpage and 7300 c.f.s. of water diverted from Lake Michigan. No sewage treatment plants were in service prior to August 1, 1922, except in the small village of Morton Grove. The DesPlaines plant (Maywood) was started in operation August 2, 1922. The Calumet Sewage Treatment Plant was started in September, 1922. The Calumet Sag Channel was opened August 26, 1922.

Sanitary conditions in the Sanitary District Channels after the treatment plants were in operation and before the diversion was reduced to 1500 c.f.s. on January 1, 1939, were far better than they have been in 1939. In our petition, pages 8 to 15, inclusive, appear the various tests that have been made showing the extent of the pollution of the Sanitary District Channel and the Illinois Waterway, both prior to the reduction to 1500 c.f.s. and subsequent thereto, and the detrimental and dangerous condition to the health of the citizens along said channel and waterway and also to those in service of navigation.

On page 16 of our petition we set forth that the Secretary of War, recognized that conditions were unsightly, filthy and noisome and much worse than they were in 1938, and that unquestionably the waterways were contaminated by sewage from the Chicago area to a greater extent than contemplated, that remedial action was necessary, and furthermore that a temporary increase in diversion to 5000 cubic feet is necessary in the interest of public health and to remedy the unsightly and odorous conditions existing in Joliet.

With respect to respondents' criticism of the construction of the dam at Brandon Bridge, the petitioner states that the construction of this dam was necessary in the development of the Illinois Waterway and that although the Illinois Waterway project was begun by the State of Illinois, it was later turned over to and completed by the Federal Government and is now subject to the jurisdiction and control of the United States Government; that said dam was not constructed chiefly for the development of hydroelectric power but was necessary for the development of a nine foot channel for use as a waterway.

The cities of Lemont, Lockport and Joliet are not responsible for the condition complained of, as the pollution tests set forth in the petition show that at Summit, which is many miles above Lemont, there was no dissolved oxygen from April to September, 1939, except for 0.2 parts per million in June.

The United States census for 1930 shows the population of Lemont to be 2582, Lockport 3383, and Joliet 43000 making a total of 48,965. The total average of polluted and untreated sewage waters coming from The Sanitary

District of Chicago is of the equivalent of a population close to 2,000,000 persons, so that the pollution that could be charged to Lemont, Lockport and Joliet is negligible in its effect on river conditions.

The statement on page 30 of respondents' brief, that 1500 c.f.s. of diversion, plus domestic pumpage of 1700 c.f.s., would provide enough oxygen to balance the remaining biochemical oxygen demand of the effluents from the treatment plants is in error. The 1500 c.f.s. diversion is an annual average of which 500 c.f.s. will be storm run-off, leaving only 1000 c.f.s. diversion in times of dry weather. The 1700 c.f.s. is sewage or sewage treatment plant effluent. With all the oxygen that is present in the fresh water diverted, and in the sewage treatment plant effluent there will not be sufficient oxygen to supply the 5-day biochemical oxygen demand of the sewage treatment plant effluent. The 5-day B.O.D. is much less than the total B.O.D. In addition to the oxygen needed to balance the biochemical oxygen demands, an additional amount of about three parts per million is needed to guarantee against nuisance.

CONCLUSION.

In conclusion it is respectfully submitted that:

(1) The Court has jurisdiction to grant a temporary modification of the decree of April 1, 1930, as prayed in the petition.

(2) The Sanitary District has been diligent in carrying on the vast construction program contemplated by the decree and neither the State of Illinois nor the Sanitary District has been negligent in fulfilling its obligations with respect thereto.

(3) The sewage treatment works of the Sanitary District now in operation are being operated in a highly efficient manner and the sewage treated therein, except that treated in the West Side plant, is being purified to a point in excess of the purification of 85% considered as sufficient by this Court.

(4) The inability of the Sanitary District to complete the West Side Treatment Works within the time contemplated by the decree for the reasons set forth in the petition and this brief and the diminution of the diversion of water from Lake Michigan to 1500 c.f.s. under the terms of the decree has caused noisome and unhealthy conditions along the Sanitary District channel and the Illinois waterway to the injury of the people residing adjacent thereto of such a serious nature as to warrant relief and such conditions will continue until complete sewage treatment is provided for the West Side area unless a temporary increase in diversion is permitted as prayed in the petition.

(5) The time reasonably required for the construction of the complete West Side Treatment Works will be two working seasons after the plans and specifications are

approved and the contracts let with the result that this construction program cannot be completed until the fall of 1942; and

(6) The trend of water levels in the Great Lakes will be upward for the years 1940, 1941 and 1942 and the increased diversion will not injure the respondent states.

Wherefore the State of Illinois respectfully suggests that the decree in this case be modified temporarily to permit an annual average diversion of 5000 c.f.s. per second of water from Lake Michigan in addition to domestic pumpage until December 31, 1942, in order to alleviate said obnoxious, noisome and unhealthy conditions during the time required by the Sanitary District of Chicago for the completion of the West Side Treatment Works. (*Wisconsin* v. *Illinois,* 278 U. S. 367 pp. 418-9, 281 U. S. 179, p. 200, 289 U. S. 395, pp. 401-2; *Washington* v. *Oregon,* 297 U. S. 517 pp. 522-3.)

Respectfully submitted,

John E. Cassidy,
Attorney General of the
State of Illinois,
Attorney for Petitioner.

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SUPREME COURT OF THE UNITED STATES.

Nos. 2, 3 and 4, Original.—October Term, 1939.

State of Wisconsin, Minnesota, Ohio and Pennsylvania, Complainants, *vs.* State of Illinois and the Sanitary District of Chicago, Defendants.	No. 2, Original.
State of Michigan, Complainant, *vs.* State of Illinois and the Sanitary District of Chicago, et al., Defendants.	No. 3, Original.
State of New York, Complainant, *vs.* State of Illinois and the Sanitary District of Chicago, et al., Defendants.	No. 4, Original.

[April 3, 1940.]

ORDER.

Upon consideration of the return of the States who are complainants in the above entitled causes to the rule issued January 29, 1940, requiring them to show cause why the petition of the State of Illinois for temporary modification of the decree of this Court entered April 21, 1930, and enlarged May 22, 1933, should not be granted, and of the argument had thereon,

It is ordered that the petition of the State of Illinois and the return of the complainant States to the order to show cause be referred to Monte M. Lemann, Esquire, as a Special Master, with directions and authority to make summary inquiry and to report to this Court with all convenient speed with respect to the actual condition of the Illinois Waterway by reason of the introduction of untreated sewage, and whether, and to what extent, if any, that condition constitutes an actual menace to the health of the inhabitants of the complaining communities, and also with respect to the feasibility of remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan.

The Special Master is authorized to employ stenographic and clerical help, to fix times and places for taking evidence, to issue subpoenas to witnesses, including those of his own selection, and to administer oaths. When the report of the Special Master is filed the clerk of the Court shall cause the same to be printed. The Special Master shall be allowed his actual expenses and a reasonable compensation for his services to be fixed hereafter by the Court. The allowances to him, the compensation paid to his stenographic and clerical assistants and the cost of printing his report shall be charged against and be borne by the parties in such proportions as the Court hereafter may direct.

If the appointment herein made of a Special Master is not accepted, or if the place becomes vacant during the recess of the Court, the Chief Justice shall have authority to make a new designation which shall have the same effect as if originally made by the Court herein.

A true copy.

Test:

Clerk, Supreme Court, U. S.

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SUPREME COURT OF THE UNITED STATES.

Nos. 2, 3 and 4, Original.—October Term, 1939.

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State of New York, Complainant, *vs.* State of Illinois and the Sanitary District of Chicago, et al., Defendants.	No. 4, Original.

[April 3, 1940.]

Per Curiam.

By the decree of April 21, 1930 (281 U. S. 179, 696), the State of Illinois and the Sanitary District of Chicago were enjoined from diverting on and after December 31, 1938, any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal or otherwise in excess of the annual average of 1500 cubic feet per second in addition to domestic pumpage. That date was fixed as affording adequate time, upon a liberal estimate, for the completion of the entire system designed for sewage treatment, together with controlling works to prevent reversals of the Chicago River in times of storm.

The State of Illinois now seeks a temporary modification of the decree so as to permit an increase of the diversion to not more than 5000 cubic feet per second, in addition to domestic pumpage, until December 31, 1942. The State submits its petition, not on behalf of the City of Chicago or the Sanitary District, but at the instance of certain communities bordering on the Illinois Waterway, including Lockport and Joliet. The grounds for the application are that the system for sewage treatment has not yet been completed and will not be completed until the end of the year 1942, and that, in consequence, through the introduction of untreated sewage into the stream, an "obnoxious, noisome, filthy, unsanitary and dangerous condition to public health" exists along the Sanitary District Canal and the Illinois Waterway.

The State of Illinois has failed to show that it has provided all possible means at its command for the completion of the sewage treatment system as required by the decree as specifically enlarged in 1933 (289 U. S. 395, 710). No adequate excuse has been presented for the delay. Nor has the State submitted appropriate proof that the conditions complained of constitute a menace to the health of the inhabitants of the complaining communities or that the State is not able to provide suitable measures to remedy or ameliorate the alleged conditions without an increase in the diversion of water from Lake Michigan in violation of the rights of the complainant States as adjudged by this Court.

In order, however, that the Court may be satisfied as to the actual condition of the Illinois Waterway by reason of the introduction of untreated sewage, and as to the actual effect, if any, of that condition upon the health of the inhabitants of the complaining communities, and also with respect to the feasibility of remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan, the Court appoints a Special Master to make a summary inquiry as to such condition, effect and measures, and to report to this Court with all convenient speed.

A true copy.

Test:

Clerk, Supreme Court, U. S.

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SUPREME COURT OF THE UNITED STATES.

Nos. 2, 3 and 4, Original.—October Term, 1940.

States of Wisconsin, Minnesota, Ohio and Pennsylvania, Complainants,
vs.
State of Illinois and the Sanitary District of Chicago, et al., Defendants. — No. 2, Original.

State of Michigan, Complainant,
vs.
State of Illinois and the Sanitary District of Chicago, et al., Defendants. — No. 3, Original.

State of New York, Complainant,
vs.
State of Illinois and the Sanitary District of Chicago, et al., Defendants. — No. 4, Original.

[November 25, 1940.]

ORDER.

Upon consideration of the motion of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan, New York, and Illinois, and in accordance with the following stipulation:

> "Whereas, the State of Illinois contends that also during the period intervening between the effective date of the decree and since then substantial amounts of flocculent active sludge and sewage sludge have accumulated in the Brandon Road Pool and that the existence of such accumulation also adds to the menace of the health of the persons living adjacent thereto (which contention is denied by the resopndent Great Lakes States) and,
>
> Whereas, The Special Master in the above captioned causes, the Honorable Monte M. Lemann, before the close of the hearings, suggested that the Attorney General of the State of Illinois and the Attorneys General of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York (hereinafter referred to as the opposing Great Lakes States) consider the making of an agreement to permit a temporary increase in diversion from 1500 cubic second feet plus domestic pumpage now authorized by the decree of the United States Supreme Court of April 21, 1930, to 10,000 cubic second feet plus domestic pumpage of water from Lake Michigan through the Chicago

Sanitary Canal for one continuous period of ten days so as to scour out the Brandon Road Pool at Joliet, Illinois, and attempt to remove whatever flocculent active sludge and sewage sludge may have accumulated in said pool, and

Whereas, the Special Master suggested that any such agreement between the State of Illinois and the opposing Great Lakes States would be without prejudice to any of the parties to the above captioned causes, and would be solely for the purpose of trying by this means to remove whatever flocculent active sludge deposits and sewage sludge may have accumulated in the Brandon Road Pool by reason of the introduction of untreated sewage and sludge from treated sewage. Nothing in this stipulation shall be construed as an admission by the opposing Great Lakes States as in any manner or form whatsoever waiving, abandoning or prejudicing any of the positions of the opposing Great Lakes States hereinbefore stated or at any time taken in these causes or in the course of the present hearings; and said opposing Great Lakes States hereby affirm and again advance each and every contention and allegation set forth in the return of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York as respondents to rule to show cause issued on application of the State of Illinois, as Petitioner, for a temporary modification of Paragraph 3 of the Decree of April 21, 1930, filed in this court on February 26, 1940; and said opposing Great Lakes States again deny each and every allegation contained in the Petition of the State of Illinois herein, filed in this court on January 15, 1940, and deny the positions taken during the course of the present hearings by Illinois, and,

Whereas, it is further understood that the State of Illinois does not by reason of this stipulation or motion or test in any manner or form waive, abandon or prejudice any of its positions at any time stated or taken in this proceeding, and the State of Illinois hereby affirms and again advances each and every contention and allegation set forth in its petition, and it is not to be construed as an admission by the State of Illinois that such temporary increase in diversion of water for a period of ten days will either remedy or ameliorate effectively the conditions in Brandon Pool which Illinois contends have constituted the alleged menace to health complained of, and,

Whereas, it is the position of the opposing Great Lakes States that any accumulation of sewage wastes and sludge in the Brandon Road Pool since the decree of the United States Supreme Court went into full operation on December 31, 1938, has not created any nuisance condition either from the stand point of public health, navigation or in any other way, and that such temporary increase in diversion is in no wise necessary to protect the interests of public health or navigation, and,

Whereas, the opposing Great Lakes States are nevertheless, in a spirit of conciliation and accommodation, willing to enter into the agreement suggested by the Special Master upon the express condition—(a) that such agreement shall not be construed as in any way waiving, abandoning or prejudicing any of the positions of the opposing Great Lakes States hereinbefore stated or at any time taken in these causes or in the course of the present hearing; (b) that nothing in this stipulation nor the fact of the consent of the opposing Great Lakes States to such temporary expedient shall be construed as an admission or evidence of any claim of the State of Illinois or the Sanitary District of Chicago in the premises and shall not be used as a precedent for any future request for any additional temporary diversion over and above the amounts fixed by the decree of April 21, 1930.

Now, Therefore, it is Stipulated and Agreed by and between the parties to the above captioned causes, by their respective counsel, that a temporary increase in diversion from 1500 cubic second feet plus domestic pumpage now authorized by the United States Supreme Court decree of April 21, 1930, to 10,000 cubic second feet plus domestic pumpage of water from Lake Michigan through the Chicago Sanitary Canal may be authorized for one continuous period of ten days for the purpose of trying to remove whatever flocculent active sludge deposits and sewage sludge may have accumulated in the said Brandon Road Pool. It is understood that a record of said operation will be made and the results thereof incorporated in the record of the hearing.

It is Further Stipulated and Agreed that any such agreement will be without prejudice to any party to the above captioned causes and that such agreement is not to be used as a precedent for any future request for additional temporary diversion in excess of the amounts fixed by the United States Supreme Court Decree of April 21, 1930.

It is Further Stipulated and Agreed that a motion in accordance with this stipulation may be filed with the United States Supreme Court and that an order in accordance with the terms of this stipulation may thereupon be entered by said Court without notice to any of said parties.

STATE OF ILLINOIS,

By John E. Cassidy,
Attorney General of the State of Illinois.

STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN and NEW YORK,

By Herbert H. Naujoks,
Special Assistant to Attorneys General.

Dated this 31st day of October, 1940."

It is ordered that the Sanitary District of Chicago be and it hereby is authorized to increase its diversion of water from the Great Lakes-St. Lawrence System or watershed through the Chicago Drainage Canal from 1,500 cubic feet per second in addition to domestic pumpage to 10,000 cubic feet per second in addition to domestic pumpage for one continuous period of ten days from an appropriate hour on December 2, 1940, to the same hour on December 12, 1940, after which period all the provisions of the decree entered April 21, 1930, shall be and remain in full force and effect until further order of this Court.

A true copy.

Test:

Clerk, Supreme Court, U. S.

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CHARLES ELMORE CROPL
CLERK

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4 Original

October Term, A. D. 1940.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
No. 2 Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 3 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 4 Original.

EXCEPTIONS OF THE STATE OF ILLINOIS TO THE REPORT OF THE SPECIAL MASTER, MONTE M. LEMANN.

◆

GEORGE F. BARRETT,
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IN THE

Supreme Court of the United States

Nos. 2, 3 and 4 Original

October Term, A. D. 1940.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
No. 2 Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 3 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 4 Original.

EXCEPTIONS OF THE STATE OF ILLINOIS TO THE REPORT OF THE SPECIAL MASTER, MONTE M. LEMANN.

The State of Illinois excepts to certain of the conclusions made by the Special Master; to certain of the finding of facts made and filed by the Special Master; to the failure or refusal of the Special Master to make and file certain findings of facts requested by the State of Illinois; to the recommendations for a decree made and filed by the Special Master; and to failure of the Special Master to make and file recommendations for a decree requested by the State of Illinois in the following particulars:

Exceptions to the Special Master's conclusions as to health conditions and to his recommendations as a result of such erroneous conclusions.

I.

(a) Illinois excepts to the conclusion, appearing on page 50 of the Special Master's Report, which reads as follows, to-wit:

> "The complaints as to the condition of the Waterway are based entirely upon the very offensive odors given off by it in the summer time and the effect of such odors upon persons living close to the Canal, in causing loss of appetite, nausea (in a few cases vomiting) and inability to sleep or difficulty in sleeping."

because insofar as said conclusion sets forth that the complaints are based entirely upon offensive odors, said conclusion is erroneous, inasmuch as the evidence indicates that certain persons also suffered from infections resulting from contact with the water from the Waterway; that said conclusion is also erroneous in that it omits many of the ailments resulting from the offensive odors and condition of the Waterway, such as sinus infection, skin infections, impetigo, headaches, sore throat, diarrhoea, dysentery, asthma, and secondary anemia.

(b) Illinois excepts to the conclusion, appearing on pages 51, 52 and 53 of the Special Master's Report, which reads as follows, to-wit:

> The foregoing statement sufficiently discloses the facts as found by me. Whether these facts constitute a "menace to the health" of the inhabitants of the complaining communities within the meaning which the Court intended that phrase to have, requires a decision as to which I have no certain guide. Counsel have gone to the dictionaries for definitions of menace, but it seems to me beside the point to cite such definitions to the Court, which itself used the phrase and will itself determine what it meant. In this report I can only give the phrase the meaning and scope which it seems to me that it was intended to have in this case. I do not believe that the Court intended to use the expression "menace to health" in the sense in which it was employed by Professor Carlson and Professor Ivy. On such a view it would not have been necessary to refer the case to me because it was apparent on the face of the papers that the sewage treatment program of the Sanitary District had not been completed and that untreated and incompletely treated sewage continued to be discharged into the Waterway. Under this condition, if the test is to be that which was urged by Professors Carlson and Ivy, it is clear that a menace would necessarily be found to exist.

because the said conclusion has failed to define "menace to health"; the Special Master failed to accept the proper definition as presented by the testimony of competent authorities; and the evidence as detailed sufficiently sets forth facts which unquestionably indicate a "menace to health", and the record is full of specific instances of conditions other than those cited by the Master showing such an actual menace.

(c) Illinois excepts to the conclusion, appearing on pages 53 and 54 of the Special Master's Report, which reads as follows, to-wit:

> Nor can the effect of odors upon invalids and persons of less than average health be accepted as any test of health menace; even in cases of private nuisances the test is the effect of the acts complained of upon persons of ordinary sensibilities and in normal health.

because insofar as said conclusion limits the effect of the odor upon persons of average health; the order of reference to the said Special Master did not limit the scope of "menace to health" solely to persons of average health, or above average, and if the majority of said persons in the vicinity of the Waterway were below average in health, the Master should have found the effect of the Waterway upon their health. The Special Master recited in part the testimony of some of the attendants at St. Joseph's Hospital, which is near the Waterway, and the effect on their health and obviously their health was affected.

(d) Illinois excepts to the conclusion, appearing on page 54 of the Special Master's Report, which reads as follows, to-wit:

> My conclusion is that the facts proven do not establish any menace to the health of the inhabitants of Joliet and Lockport or elsewhere along the Waterway requiring an increase in diversion in water from Lake

> Michigan. However, as the issue is one which only the Court itself can determine, I necessarily proceed to discuss the other points covered by the order of reference.

because said conclusion is inconsistent in that it concludes, in the judgment of the Special Master based upon his understanding of his definition of "menace to health", that there is no "menace to health" and leaves the question of determination of this concept to the court itself.

(e) Illinois excepts to the conclusion, appearing on page 110 of the Special Master's Report, which reads as follows, to-wit:

> "The actual condition of the Illinois Waterway by reason of the introduction of untreated sewage creates in the summer months a nuisance through offensive odors at Joliet and Lockport, but does not present a menace to health. * * *"

Because although the Special Master found that the conditions of the Waterway caused witnesses or members of their family to complain of nausea, lack of appetite and inability to sleep, sore throats and nose or sinus trouble, asthma, diarrhoea, summer complaint and that children at school were made restless and hard to keep at work, that they had to shut the windows in the school because the odors were offensive; that school children became sick with nausea and had to be taken out of their classes and sent home for a day or so; that the paint on the homes in the neighborhood was ruined by the gas from the canal, that people kept their windows closed to keep out the odors, drove out at night to avoid the odors; that at the hospital sisters and lay nurses and many of the patients of the hospital suffered nervousness, nausea, vomiting, inability to sleep and headaches and some of the patients were anxious to go home because of the odors, and some were so anxious to leave the hospital that they left before their sutures had been removed; that some of the sisters' and nurses' throats became sore or dry and had sinus trouble; that windows in the operating room had to be kept shut to keep odors out; that windows in the maternity ward of the hospital had to be kept shut at times, on account of the odors; that patients had asked to be transferred to the side away from the canal on account of the odors; nevertheless the Special Master failed to find that such conditions causing the complaints aforesaid were a menace to health.

Exceptions to failure or refusal of Special Master to grant findings of fact as to the following health conditions as submitted by Illinois to the Special Master in its requested findings of fact.

II.

Illinois excepts to the failure or refusal of the Special Master to find or grant the following requested findings of fact in Illinois' Requested Findings of Fact, which read as follows, to-wit:

(a) Finding of Fact 22, page 17:

> The reduction of diversion to 1,500 c.f.s. on January 1, 1939, resulted in the deposition of putrefying sludge in the Main Channel and Brandon Pool, and the discharge of foul, nauseous and sickening gases and odors to the atmosphere (Rec. 317, 321, 405, 472, 497, 623, 669, 681, 689, 771, 776, 827, 835, 1175).

(b) Finding of Fact 23, page 17:

Hydrogen sulfide, a nauseous, irritating and toxic gas, is generated in the water and sludge of Brandon Pool when the temperature rises to 62 deg. Fahr. (Rec. 1992). Other obnoxious fecal odors known as mercaptan, indol, skatol and cadaverin are produced (Muehlberger, Rec. 3004; Carlson Rec. 2888). Both hydrogen sulfide and the fecal odors are a menace to the health of the people who live or work along the Waterway (Rec. 2802, 2904, 3036, 3083).

(c) Finding of Fact 24, page 18:

The putrescent, obnoxious, noisome and unhealthful odor which emanates from the Main Channel and the Brandon Pool causes nausea, insomnia, loss of appetite, irritation of the mucous membranes of the sinuses, nose and throat, nervousness, disturbance and difficulty in sleeping, vomiting, headaches, increase in sinus trouble, and in general, undermines the health of persons living or working along the Illinois Waterway (Rec. 447, 529, 555, 600, 608, 611, 614, 635, 650, 657, 694, 703, 748, 757, 831, 846, 850, 853, 906, 935, 988, 996, 1007, 1027, 1170 1215, 1220, 1225, 1240, 1246, 1274, 1284, 1300).

(d) Finding of Fact 25, page 18:

The odors which emanate from the Main Channel and Brandon Pool, are injurious and harmful to school children in schools in the vicinity thereof (Rec. 357, 382, 383, 394, 403). The odors are responsible for absences from school and cause the children to become nervous and inattentive in the classrooms, and make it impossible for them to go out and play in the playgrounds (Rec. 342, 343, 380, 1035).

(e) Finding of Fact 26, page 18:

The condition of the Main Channel and Brandon Pool aggravates illness and retards the recovery of patients ill in hospitals located along the Main Channel and Brandon Pool. Patients at the hospitals, because of the offensive odors from the Pool, had to leave the hospitals before stitches were removed after an operation; nurses had to put cotton in the noses of the patients because of the offensive odors; mothers who were about to give birth to children were unable to keep food on their stomachs because of the odors (Rec. 555, 880, 1019, 1111, 1112, 1129, 1141, 1181, 1189, 1195, 1203, 1204, 1205, 1290, 1292, 1304, 1305, 1307, 1309, 1313, 1317, 1320, 1328, 1330, 1342, 1345).

(f) Finding of Fact 27, page 19:

The odors which make up the fecal stench which emanates from the Main Channel and Brandon Pool set up a series of chemical processes known as nervous impulses which affect the heart and circulation and produce salivation, headache, nausea and loss of appetite (Rec. 2888).

(g) Finding of Fact 28, page 19:

The ordors caused nausea and vomiting (Rec. 311, 393, 600, 689, 694, 742, 748, 774, 846, 906, 988, 990, 996, 1026, 1050, 1071, 1106, 1135, 1157, 1164, 1186, 1191, 1195, 1204, 1209, 1240, 1302, 1323, 1332).

(h) Finding of Fact 29, page 19:

The odors caused loss of sleep (Rec. 313, 386, 392, 424, 601, 609, 611, 614, 635, 641, 651, 667, 679, 685, 704, 708, 748, 805, 816, 819, 826, 832, 845, 850, 853, 997, 1025, 1030, 1035, 1059, 1063, 1066, 1080, 1102, 1116, 1130, 1143, 1164, 1172, 1183, 1185, 1199, 1216, 1221, 1236, 1240, 1246, 1264, 1267, 1273, 1286, 1299, 1305, 1310, 1313, 1316, 1322, 1336, 1343). **Insomnia** or sleeplessness is not a trifling thing, in the matter of health. It is one of the serious questions in connection with disturbances of the nervous system (Carlson, Rec. 2986).

(i) Finding of Fact 30, page 19:

The odors or gases caused irritation of mucous membranes, sore throat, sinus trouble (Rec. 598, 651, 803, 826, 837, 906, 1000, 1045, 1110, 1128, 1134, 1160, 1164, 1185, 1219).

(j) Finding of Fact 31, page 20:

In addition to the actual injury to health by the odors and gases emanating from Brandon Pool, there is a serious menace to health in the exposure of the surface of millions of square feet of polluted and infected water, on which dried and drying sludge and scum floats in summer, and from said sludge or scum insects carry bacteria of putrefaction and disease to the homes of residents along the Waterway (Rec. 2889, 3036, 3083).

(k) Finding of Fact 32, page 20:

Health may be insidiously undermined by the odors, gases and infections emanating from Brandon Pool, although the damage may not be demonstrable by vital statistics. The human system can be tremendously injured before a person is cognizant of the fact, or before the keenest of pathologists can actually prove that injury has been done (Carlson, Rec. 2883-2884).

Illinois excepts to the Special Master's conclusions of present and past conditions at Lockport and Joliet.

III.

(a) Because said Special Master based his conclusions on the memory of certain few witnesses and not on the actual analyses of the water;

(b) Because the Special Master failed to find that the analytical data on the analysis of water at Lockport as shown in Illinois Exh. 37-A, from 1925 through December, 1940, showed that conditions were worse in 1940 than in 1930 or any year from 1925 to 1939;

(c) Because the Special Master failed to find that the testimony of Callahan and Andrew were inconsistent as to conditions in 1930 and that Andrews stated it was difficult to compare conditions in 1925 with 1939;

(d) Because the Special Master considered the evidence of certain objectors purporting to represent certain communities below Joliet, whereas their testimony was not proper testimony and should have been excluded for the reason that the State of Illinois was representing all of its people in this cause, and the objectors did not represent any community. Furthermore he failed to state that some of these objectors have consistently and militantly for over twenty years opposed any diversion of water whatsoever. The Special Master also failed to find that the objectors' reasons for opposing the increase was because they thought that more flow of water would carry more sewage downstream and that with less flow they would have as they had, had, better conditions downstream, and he also failed to find that such objections were without merit by reason of the fact that the evidence conclusively shows that conditions were better downstream due solely to the increased treatment of sewage by the Sanitary District of Chicago and not due to the reduction in diversion of water;

(e) Because said reports ignores the record of analyses which shows:

1. Conditions in 1939 were far worse than in any prior year back to 1925;
2. Conditions in 1940 were better than in 1939, but worse than in 1938 or any prior year back to 1925;
3. Analyses through January, 1941, continue to be worse than in any previous January, except 1939, back to 1925;

(f) Because the Special Master's interpretation of the record of analyses at Lockport as shown in Exh. 37-A, (Master's Report, note 2, bottom of p. 70) refers only to the dissolved oxygen, whereas the B.O.D. was much less in every summer prior to 1939, thus indicating better conditions in every summer prior to 1939 even though the D.O. approached zero;

(g) Because at the bottom of page 66 of the Special Master's Report the Master states that The Sanitary District concedes that the B.O.D. at Lockport will be far less in the summers of 1941 and 1942 than in the summer of 1940, whereas, Illinois' exhibits indicate just the opposite;

(h) Because the Special Master in finding that conditions in 1941 and 1942 will be better than in 1939, (bottom of p. 71), did not follow this finding with the conclusion that 1941 and 1942 will be worse than 1938 or any prior year back as far as 1925;

(i) Because the Special Master made comparison of 1940 conditions, and those expected in 1941 and 1942, with those of 1939 (p. 71), whereas, the comparison should be with 1938, before the diversion was cut. If this comparison had been used, the Special Master should have concluded that:

(1) 1940 was worse than 1938 (bottom of p. 71);

(2) January, 1941, was worse than January, 1938, (Table middle of p. 70);

(3) The summer of 1941 will be much worse than 1938 (Table p. 67);

(4) Additional diversion will be necessary to maintain conditions in the summer of 1941 the same as in the summer of 1938;

(j) Illinois excepts to the findings of fact of the Special Master appearing in the last three lines of page 56 of his Report, which reads as follows:

> "The weight of opinion, however, seems to be that the presence of *any* dissolved oxygen is sufficient; compare *New York* v. *New Jersey,* 256 U. S. 296, 311, decided in 1921."

Because the weight of the testimony is to the contrary. *New York* v. *New Jersey,* 256 U. S. 296, holds that 25 to 50 per cent saturation of oxygen is necessary to avoid a nuisance. The record shows the dissolved oxygen in the water of Lake Michigan during the summer months is 8 parts per million, so that, on the basis of the aforesaid decision, 2 to 4 parts per million of dissolved oxygen is necessary to avoid a nuisance, and not merely *any* dissolved oxygen;

(k) Illinois excepts to the statements of the Special Master (page 82) relative to the results of the flushing experiment, because he failed to find that said experiment did not improve conditions, and he failed to find that as a result of the flushing conditions of Brandon Pool will be much worse in the summer of 1941, and probably 1942, than they otherwise would have been.

Exceptions to failure or refusal of Special Master to grant findings of fact relative to actual condition of the Waterway submitted by Illinois to the Special Master in its requested findings of fact.

IV.

Illinois excepts to the failure or refusal of the Special Master to find or grant the following requested findings of fact in Illinois' Requested Findings of Fact, which read as follows, to-wit:

(a) Finding of Fact 13, page 13:

> Analyses have been made continuously since March, 1925, of the water from the Main Channel at Lockport. Samples are collected each hour and analyzed for dissolved oxygen. At the present time, approximately 9,000 determinations of dissolved oxygen are made per month at some twelve stations on the Illinois River and in the Sanitary District (Rec. 237). Samples are collected daily, at intervals of four hours for determinations of B.O.D. The dissolved oxygen may be considered as an asset, the B.O.D. as a liability (Rec. 239). The changes in condition of the Illinois Waterway are shown by such chemical data (Illinois Exh. 37, 37A).

(b) Finding of Fact 14, page 13:

> The analyses at Lockport (Illinois Exh. 37 and 37A) show that the condition of the water remained practically unchanged from 1925 through 1938 (Rec. 271). In 1939, however, marked deterioration occurred, with a great increase of B.O.D. (Rec. 272). The degree of pollution was much worse in 1939 than in any previous year. Conditions in 1940 were better.

The actual condition in January, 1941, however (Mohlman Exh. 18, a, b, c, d, e) was worse than in January of 1940 or 1938 and almost as bad as in January, 1939.

(c) Finding of Fact 16, page 15:

At the time of the decree of April 21, 1930, and of the enlargement of the decree in May 22, 1933, the Supreme Court did not have before it any matter relating to Brandon Pool, the creating of which through the construction of a Federal waterway has brought about a condition which was not in existence at the time of the original decree or the enlargement thereof.

(d) Finding of Fact 18, page 15:

The foul and nauseous conditions present since January, 1939, in the Main Channel and Brandon Pool are due primarily to deposits of putrefying sewage sludge containing large amounts of organic matter which lie on the bottom of the Main Channel and the Brandon Pool (Rec. 210, 278, 281, 1426, 1875, 1940, 1942, 1985, 2071, 2089, 2108, 2622). This sludge decomposes most actively and erupts violently in the early summer (Mohlman Exh. 8) and continues to putrefy throughout the summer. Hydrogen sulphide and other sickening gases are discharged to the atmosphere.

(e) Finding of Fact 19, page 16:

Sludge deposits of sewage origin, which are undergoing putrefaction in the Main Channel and Brandon Pool, become less potent in time as the organic matter contained therein is decomposed. The loss of putrescibility is approximately 50 per cent the first summer, 25 per cent the second summer, and less thereafter (Mohlman Cross-Exam. Exh. 8, 9).

(f) Finding of Fact 20, page 16:

Although all discharge of sludge to the Main Channel was discontinued at the end of September, 1940, the previously deposited sludge will not lose its potency until late in 1943 (Mohlman Cross-Exam. Exh. 8, 9; Pearse Rec. 216, 1675-1676). The flushing test (made between December 2 and 12, 1940) resulted in the deposition of 62,887 tons of sludge in Brandon Pool, and the discharge of 21,123 tons from the Pool. Since the test the sludge deposits in Brandon Pool are more putrescible than before the test was made (Mohlman Exh. 17, p. 22 of report).

(g) Finding of Fact 21, page 16:

The conditions in Brandon Pool will be worse in 1941 than in 1940 or 1938 (Illinois Exh. 60A, 61A; Mohlman Exhs. 18a, b, c, d, e). Conditions prior to 1938 were never wholly satisfactory. The modified Petition of Illinois does not contemplate making conditions in the Illinois Waterway better than they were in 1938 (Cheadle Rec. 424, 434-435; Mohlman Rec. 272, 281; Pearse Rec. 211-212; Jones Rec. 298; Andrew Rec. 3798-3801; Sontag Rec 397-398; Callahan Rec. 861-862; Carlson Rec. 2980; Muehlberger Rec. 3010-3011; Hollis Rec. 1329). Conditions in the summer of 1942 should be better than in the summer of 1941, but there will still be an absence of dissolved oxygen at Lockport and in Brandon Pool.

Exceptions to failure or refusal of the Special Master to recommend an increase in diversion, despite his finding that all remedial or ameliorating measures proposed by the lake states are not feasible and practicable, whereas increased diversion is the only feasible, practicable remedial measure available for relief at Brandon Pool in the summers of 1941 and 1942.

V.

(a) Illinois excepts to the Special Master's failure or refusal to recommend an increase of diversion, because he found that all other remedial measures were not feasible or practicable, thus leaving increased diversion as the only feasible ameliorating and remedial measure available. His failure to recommend an increase in diversion was not because increased diversion would be ineffective as a remedial measure.

(b) Illinois excepts to the Special Master's failure or refusal to find that the results of the flushing test will increase the need at Brandon Pool for diversion of additional water in the summer of 1941 and probably for 1942.

Exceptions to failure or refusal of Special Master to grant findings of fact relative to the need for increase of diversion in the summer months of 1941 and 1942 as requested by the State of Illinois in its modified petition, submitted to the Special Master.

VI.

Illinois excepts to the failure or refusal of the Special Master to find or grant the following requested findings of fact in Illinois' Requested Findings of Fact, which read as follows, to-wit:

(a) Finding of Fact 39, page 26:

A controlled increase diversion offers the only practical remedial measure.

(a) An increase of diversion during the summer is the only practical remedial measure available for preventing recurrence of the foul and nauseous condition of Brandon Pool (Calvert 3202; Mohlman 278; Pearse 218; Andrew 1509; Carlson 2990).

(b) Additional diversion will reduce the B.O.D. by dilution and introduce an additional supply of dissolved oxygen (Buswell 2269; Warrick 2167; Howson 2825).

(c) Regulated diversion provides more dilution and dissolved oxygen in the summer, when needed (Howson Exh. 10, Item 5, Rec. 2828). With an annual average diversion of 1,500 c.f.s., as at present, budgeting will not provide sufficient water in summer, but is a step in the right direction (Mohlman Exh. 11, Item 5, Rec. 3288).

(b) Finding of Fact 40, page 26:

The maintenance of satisfactory conditions demands the presence of dissolved oxygen in the water (Calvert 3202; Howson 3239; Warrick 2240, 2244; Petitioners' Exh. 37; Mohlman Exh. 19; Pearse 194).

(a) The amount of dissolved oxygen necessary must be greater than zero (Howson 3255; Pearse 194; Mohlman Exh. 14e), because there can be no sub-zero.

(b) The amount of dissolved oxygen necessary should be a minimum of 3 parts per million (Pearse 195).

(c) In *New York v. New Jersey*, 256 U. S. 296, 311, the Court considered that 25 to 50 per cent of the saturation value of dissolved oxygen is necessary to prevent the appearance of offensive odors. The evidence in the present hearing shows that Lake Michigan contains about 8 p.p.m. dissolved oxygen in the summer (Rec. 198, 239), so that applying the yardstick of the Court to the instant situation, from two to four parts per million would be required in summer.

(d) A minimum of one part per million should be maintained in Brandon Pool (Mohlman Exh. 14e). This is lower than indicated by the evidence, but is accepted by Illinois as a minimum standard for the purpose of temporarily improving the condition of Brandon Pool.

(c) Finding of Fact 41, page 27:

The minimum of one part per million of dissolved oxygen in the water of Brandon Pool above the Dam is the lower limit to establish the amount of increased diversion suggested for the warmer months by Illinois in its modified request.

(d) Finding of Fact 42, page 28:

The maximum increased diversion requested for 1941 is actually slightly less than the total increase, over 1,500 c.f.s., for the same seven months in 1938.

(e) Finding of Fact 44, page 29:

The modified request of Illinois "prays that the Decree be modified so that the actual amount of diversion of water and the periods of time of such diversion be based on the results of a continuation of the actual analyses made by The Sanitary District of Chicago and verified by whomsoever this Court may designate, with a provision that the daily reports of the results, together with the record of the increased diversion of flow, be transmitted to the United States Engineer in Chicago and monthly reports filed with the Clerk of this Court and copies thereof transmitted to the respective Attorney General of the opposing Lake States".

(f) Finding of Fact 45, page 29:

The proposal of Illinois can be accomplished by a modification of the Decree of April 21, 1930, to provide for maximum limitations as specified in the modified request of Illinois, and minimum diversions to be determined by scientific analyses to be made on samples of water collected hourly above Brandon Dam, the collection and analyses to be made by the present personnel of the Illinois River Investigations of The Sanitary District of Chicago, which have acted continuously since 1925. The results of analyses and diversions of water from Lake Michigan can be reported for each 24-hour period to a competent expert, either an engineer or a chemist, appointed by the Supreme Court for the purpose of checking and verifying the accuracy of such reports. Copies thereof can be transmitted by such Court appointee to the Attorneys General of the Great Lakes States and to the U. S. District Engineer at Chicago, cooperation between The Sanitary District of Chicago and the U. S. District Engineer to be continued as heretofore, with reference to daily or hourly rates of diversion.

(g) Finding of Fact 46, page 30:

> No measurable harm will be done to the Great Lakes States by the increased diversion from Lake Michigan, suggested by the modified request of Illinois, which will result in a trifling temporary lowering of the lake levels of Lakes Michigan, Huron and Erie during the years 1941 and 1942. From the findings of the Special Master, Charles Evans Hughes, in 1927, the conclusion is reached that if the aforesaid temporary diversions are allowed, then the temporary lowering effect will be not more than one-half inch in 1941 and not more than one-third inch in 1942 on Lakes Michigan, Huron and Erie (Hughes Original Report 95-96, 104-105; Hughes Re-reference Report 139-140).

Illinois excepts to the following miscellaneous statements and finding of facts as reported by the Special Master:

VII.

(a) Illinois excepts to findings of fact appearing on page 4 of the Special Master's Report, which reads as follows:

> "After the hearings before me had been completed, Illinois in the brief which it submitted to me and the findings which it requested me to enter, modified its petition * * *."

Because the record shows that the modified request was made prior to the hearing held January 13, 1941, and became part of the record during the hearing of January 13, 1941.

(b) Illinois excepts to the statement appearing in lines 2 and 7 on page 11 of said Special Master's Report, which reads as follows:

> "Excluding this 10-day experimental period, the 1940 total flow at Lockport averaged 3,138 c.f.s., and the domestic pumpage 1,592 c.f.s, leaving a net amount diverted from the Lake, in addition to pumpage and excluding the 10-day experimental flow period, of 1,546 c.f.s."

Because the record shows the inflow from the Des Plaines River averaged 49 c.f.s. for 1940, which should have been excluded. By adding such inflow of 49 c.f.s. to the domestic pumpage of 1,592 c.f.s., makes a total of 1,641, which sum when subtracted from 3,138 leaves 1,497 c.f.s., being the correct net amount diverted from the Lake.

A note appearing at the bottom of Table 11, page 124, of the reports of the Special Master, should likewise be corrected so as to similarly show that the correct net amount diverted from the Lake, in addition to pumpage and excluding the 10-day experimental flow for 1940, was 1,497 c.f.s.

(c) Illinois excepts to the statement appearing in lines 1 to 16 on page 32 of said Special Master's Report because said statement fails to state that the evidence shows that the villages and towns mentioned are all taking active steps to install treatment plants for the treatment of their sewage.

(d) Illinois excepts to the statement of facts appearing on pages 72 to 75 and also paragraph "a" appearing on page 110 of said Special Master's Report, because the Master failed to find that the time required for the dredging of Brandon Road Pool would require from six to nine months.

(e) Illinois excepts to the statement of facts appearing on pages 82 to 91, inclusive, and paragraph "c" of pages 110 and 111 of said Special Master's Report relating to chlorination of the Waterway because said Master failed to find that the time required from 6 to 9 months.

(f) Illinois excepts to the statements of facts made by the Special Master appearing on pages 94 and 95 and on page 111 of said Special Master's Report relating to cascading, because said Special Master failed to find that the time required to commence cascading would require from 3 to 6 months.

(g) Illinois excepts to the statements of facts appearing on page 101 of said Special Master's Report, relating to the planned flow of diverted water permitted under the decree of 1930, to the effect that a different budgeting of the available water would have ameliorated conditions in 1939 and 1940 and that this amelioration will be available in 1941 and 1942. The record shows that the diversion was carefully budgeted in 1939 and 1940, but that the planned flow was not obtained at all times because of the variations in storm run-off which could not be predicted. The conclusion that better results can be assured in 1941 and 1942 is necessarily based on the assumption that storm flow can be accurately predicted; and this is problematic.

(h) Illinois excepts to the statement of facts appearing on page 109 of said Special Master's Report, appearing in line 7 of page 109, because the Sanitary District did not file any petition in this court and is not a party to this instant proceeding. The petition was filed by the State of Illinois.

(i) Illinois also excepts to the statement of the Master appearing on page 113, last paragraph, which reads as follows:

> "It is true that the District is not entitled to any grace for delays which have transpired during the hearings or since it filed its petition in January, 1940, for additional water from Lake Michigan. But it is one thing to say that Illinois must suffer the penalty for failure of the District to act with more speed, and another thing to make a finding that in the time now remaining the work can be done. The *per curiam* opinion of April 3, 1940, seems to indicate that the Court might yet permit additional diversion, if paramount considerations of health demanded it and no other adequate ameliorating measures were in fact available, notwithstanding that Illinois was in unexcused default. It would seem that the more time that elapses, the greater will be the difficulty in the position of Illinois. Every increased diversion from the Lakes removes a stimulus to Illinois to speed the work. More than two years have already elapsed since December 31, 1938. That date itself represented an allowance of 9 years from January 1, 1930, for carrying out the entire sewage treatment program, and more than 11 years have now elapsed."

Because, the record and evidence shows that the people in Joliet and Lockport did suffer serious consequences to their health in 1939 and 1940, and will continue to so suffer if relief is denied for the years 1941 and 1942. The Sanitary District cannot possibly finish its treatment program until the end of 1942, and the evidence and record shows that a contract for certain of the required equipment was let to the Allis Chalmers Company, who since the conclusion of this hearing has been on a strike for nearly three months and delivery of such equipment will be accordingly delayed. A delay in delivery of much of the additional equipment necessary, because of the

National Defense Program, may further interfere with the procuring of the necessary equipment for the future construction program.

VIII.

Illinois excepts to the Conclusion, appearing on page 114 of the Special Master's Report, which reads as follows, to-wit:

> "I recommend that a decree be entered dismissing the petition and the modified petition of the State of Illinois for a modification of the decree of April 21, 1930, and taxing costs against the State of Illinois."

Because said recommendation is inequitable contrary to the evidence in this case and erroneous as a matter of law.

IX.

Illinois excepts to the refusal or failure of the Special Master to grant or make recommendations for a decree as requested by the petitioner appearing on pages 31 and 32 of Illinois Requested Findings of Fact and recommendations for a decree, which reads as follows, to-wit:

> "On application of the State of Illinois for a temporary modification of Paragraph Three of the Decree of this Court entered April 21, 1930, these causes came on to be heard on the report of the Special Master, Monte M. Lemann, and were argued by counsel.
>
> In consideration whereof, it is ordered by this Court that Paragraph Three of the Decree of April 21, 1930 (281 U. S. 696), be and the same is hereby modified and changed as follows:
>
> On and after April 1, 1941, The Sanitary District of Chicago is hereby authorized and permitted to

divert such amount of water from Lake Michigan through the Chicago Drainage Canal and its auxiliary channels during the respective months of April, May, June, July, August, September and October for the years 1941 and 1942, to provide a minimum of one part per million of dissolved oxygen in the water above the dam at Brandon Pool at Joliet, Illinois.

Samples of the water above the dam at Brandon Pool shall be collected hourly and analyzed for their dissolved oxygen content. Such sampling and analyses shall be carried on by the personnel of the Illinois River Investigations of The Sanitary District of Chicago. The results of such analyses and the discharges at Lockport shall be reported for each 24-hour period to an Appointee of this Court. The diversions of water in accordance with the Decree as amended, shall be determined by The Sanitary District of Chicago in conjunction with the U. S. District Engineer at Chicago. Daily reports of such analyses and diversions shall be made by the Appointee of the Court to the U. S. District Engineer at Chicago, and monthly reports thereof shall be submitted to the Attorneys General of the Great Lakes States and to the Clerk of this Court.

The maximum additional amount of water diverted from Lake Michigan over and above the 1,500 c.f.s. now permitted by the Decree of April 21, 1930, shall be monthly averages in 1941, not exceeding a maximum increase of 1,000 c.f.s. in April, 3,000 c.f.s. in May, 5,000 c.f.s. in June, 6,000 c.f.s. in July, 5,000 c.f.s. in August, 3,000 c.f.s. in September, and 1,000 c.f.s. in October; and in 1942, not exceeding a maximum increase of 2,000 c.f.s. in May, 4,000 c.f.s. in June, 5,000 c.f.s. in July, 3,000 in August, and 1,000 c.f.s. in September.

It is further ordered that except as herein provided the Decree of April 21, 1930, in all other respects shall remain in full force and effect; and

It is ordered that the costs in these cases shall be taxable against the States of Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin."

All of which exceptions are herewith duly filed pursuant to the order of the Court.

Respectfully submitted,

George F. Barrett,
Attorney General of the State of Illinois,
Attorney for the Petitioner.

William C. Clausen,
Albert J. Meserow,
Assistant Attorneys General,
Of Counsel.

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IN THE

Supreme Court of the United States

October Term, 1940

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

EXCEPTIONS BY THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN and NEW YORK TO THE REPORT OF THE SPECIAL MASTER

JOHN E. MARTIN, Attorney General of Wisconsin,
J. A. A. BURNQUIST, Attorney General of Minnesota,
THOMAS J. HERBERT, Attorney General of Ohio,
CLAUDE T. RENO, Attorney General of Pennsylvania,
HARRINGTON ADAMS, Deputy Atty. General of Pennsylvania,
HERBERT J. RUSHTON, Attorney General of Michigan,
JAMES W. WILLIAMS, Assistant Attorney General of Michigan,
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TIMOTHY F. COHAN, Asst. Attorney General of New York,
HERBERT J. NAUJOKS, Special Assistant to the Attorneys General.

Filed: April 15, 1941

The Gilman Press—Madison, Wis.

IN THE

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October Term, 1940

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA,
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No. 4 Original

EXCEPTIONS BY THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN and NEW YORK TO THE REPORT OF THE SPECIAL MASTER

FOREWORD

While we realize that the recommendation of the Special Master for a decree herein disposes of the issues involved on the petition of the State of Illinois and the return of the opposing Great Lakes States, we cannot overlook the fact that past experience has shown that both the State of Illinois and the Sanitary District of

Chicago have made repeated efforts to nullify the effect of the decree of this Court dated April 21, 1930.

In order that our position may be understood on the record, we are filing the exceptions herewith because we believe that had the Special Master not concluded that the petition of the State of Illinois should be dismissed on the basis on which he has made his recommendations, he would have made findings as requested in the exceptions herein on most, if not all, of these exceptions and the purpose hereof is to preserve the right to such findings if at any time an issue is presented in which those matters become important.

EXCEPTIONS

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York in the above entitled Original Causes, Nos. 2, 3 and 4, October Term, 1940, jointly and severally except to the findings of fact made and filed by the Special Master in these causes and to the failure or refusal of the Special Master to make and file findings of fact requested by said States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York in the following particulars, to-wit:

A.

EXCEPTIONS TO FAILURE OR REFUSAL OF THE SPECIAL MASTER TO MAKE OR GRANT FINDINGS OF FACT REQUESTED BY OR ON BEHALF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK.

I.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to the failure or refusal of the Special Master to find or grant Complainants' Requested Finding of Fact No. 30, appearing on page 24 of the Requested Findings of Fact, which reads as follows, to-wit:

> "The actual condition of the Illinois Waterway at Joliet and Lockport during 1941 is much improved over conditions which existed in previous years and will result in no nuisance with respect to odors during the summer months of the year 1941 (Opponent's Exhibit 14, R. 3030; Mohlman Cross-examination Exhibit 13A, R. 3304; Illinois Exhibit 61, R. 3529; Illinois Exhibits 24A, 25A, 26A, 27A, 28A, 29A, 47A, 50A, 51A, 52A, 54A, 60A, R. 3636, 3638, 3640, 3642, 3644, 3646, 3654, 3658, 3660, 3662, 3664, 3529; Opponent's Exhibits 8 and 16, R. 2762-3387)."

II.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to the failure or refusal of the Special Master to find or grant Complainants' Requested Finding of Fact No. 31, appearing on page 25 of the Requested Findings of Fact, which reads as follows, to-wit:

> "The Illinois Waterway as the result of receiving untreated sewage has not and does not give off any measurable amounts of hydrogen sulphide (Dr. Krumbiegel, R. 2185, 2198-2199; Dr. Enzer, R. 2173; Dr. McNally, R. 2669-2700; Howson, R. 1948; Ellms, R. 2326; Dr. Perkins, R. 2469-2474; Dr. Nichols, R. 3131, 3132)."

III.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to the failure or refusal of the Special Master to find or grant Complainants' Requested Finding of Fact. No. 32, appearing on page 25 of the Requested Findings of Fact, which reads as follows, to-wit:

> "Hydrogen sulphide is a very soluble gas and a great deal of such gas will remain dissolved in water and come up in minute bubbles over a large surface of water and within a few feet of water, and the dispersion of any such gas from the Illinois Waterway would be so great it could never reach a sufficient concentration to be detected by persons residing near or working or traveling along or on the Illinois Waterway (Enzer, R. 2168-2174; Nichols, R. 3131-3135)."

IV.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to the failure or refusal of the Special Master to find or grant Complainants' Requested Finding of Fact No. 46, appearing on pages 29 and 30 of the Requested Findings of Fact, which reads as follows, to-wit:

> "There is no measurable difference in the menace to health due to water taken from a well into which water from the Illinois Waterway has access regardless of whether the direct diversion from Lake Michigan is 1500 c.f.s. or 5000 c.f.s. (Howson, R. 1946-1948; Warrick, R. 2109)."

V.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to the failure or refusal of the Special Master to find or grant Complainants' Requested Finding of Fact No. 51, appearing on pages 32, 33 and 34 of the Requested Findings of Fact, which reads as follows, to-wit:

> "Feasible remedial or ameliorating measures available to the State of Illinois to remedy or ameliorate the conditions complained of along the Illinois Waterway at Lockport and Joliet, Illinois, without any additional diversion of water from Lake Michigan, are:
>
> "(1) * * * * *
>
> "(2) Budgeting the flow of the water from Lake Michigan within the terms of the decree of April 21,

1930, so as to provide regulated flow of approximately 4200 c.f.s. including domestic pumpage to be used during each of the four summer months of each year. This would add 22,000 pounds of dissolved oxygen per day to the waters of the Chicago Drainage Canal during the summer months. (Howson, R. 2820).

"(3) Construction of temporary cascades at the old controlling works near Lockport, Illinois, which would add approximately 6-3/4 p.p.m. of dissolved oxygen to the waters of the Chicago Drainage Canal (Howson, R. 2825; Warrick, R. 2107-2233-2236; Enslow, R. 2009; Pearse, R. 195; Mohlman, R. 239; Illinois Exhibit 47A, R. 3654; Illinois Exhibit 20, R. 142-147; Opponents' Exhibit 10, R. 2828; Illinois Exhibit 20, R. 142-147).

"(4) A greater use of air in the present activated sludge plants of the Sanitary District of Chicago which would add about 40,500 pounds of dissolved oxygen in the form of nitrate and nitrite oxygen (Howson, R. 2825, 3217, 1939, 1943; Warrick, R. 2105; Ellms, R. 2090; Buswell, R. 1892-1895; Opponents' Exhibit 10 item 2, R. 2828; Opponents' Exhibit 12, item 1, R. 2847).

"(5) Dredging the Brandon Road Pool below the McDonough Street bridge at Joliet, Illinois, to remove the sludge deposits accumulated there. (Andrew, R. 1503; Howson, R. 1939; Andrew's Exhibits 4 and 5, R. 212-213; Opponents Exhibit 12, item 6, R. 2847).

"(6) The use of chlorine applied to the waters of the Illinois Waterway at the Brandon Road Pool below the McDonough Street bridge at Joliet, Illinois (Howson, R. 1943-44; Opponents' Exhibits 11 and 12, R. 2832, 2847; Ellms, R. 2089, 2093, 2303-2304, 2314-2315; Buswell, R. 1896, 1900, 2255, 2262; Warrick, R. 2105, 2111-2112, 2248; Enslow, R. 1987-1994, 2070-2072).

"(7) The use of chemicals applied to the effluent of the West Side Imhoff tanks which would reduce the B.O.D. in the effluent from 57 p.p.m. to 36 p.p.m. or a total of 76,000 pounds of B.O.D. per day (Howson, R. 1941; Buswell, R. 1890-1892, 2287; Opponents' Exhibit 12, R. 2847; Opponents Exhibit 11, R. 2832).

"(8) Additional treatment of all or a part of the West Side Imhoff tank effluent by putting such effluent through the West Side plant for aeration which would remove 200,000 pounds of B.O.D. per day from such effluent (Howson, R. 2838-2839; Opponents' Exhibit 11, item 2, R. 2832).

"(9) Prohibit the discharge of any sludge into the main channel of the Chicago Drainage Canal which would keep out 105,000 pounds of B.O.D. per day. (Opponents' Exhibit 11, item 4, R. 2832; Howson, R. 1940-1942; Warrick, R. 2107-2108, 2231; Ellms, R. 2089-2090; Enslow, R. 1985; Pearse, R. 210; Mohlman, R. 278, 281, 1426, 1875; Calvert, R. 2622-2623).

"(10) The use of chlorine applied to the effluent of the West Side Imhoff tanks (Howson, R. 2840-2842; Ellms, R. 2089-2093; Enslow, R. 2024; Opponents' Exhibit 12, R. 2847).

"(1) Universal metering of the water supply of the City of Chicago and particularly the South and South West area (Howson, R. 2820-2821; Opponents' Exhibit 9, R. 2823-2824).

"(12) Treatment of the sewage from Argo, Lemont, Lockport, and Joliet and from the State Prisons at and near Joliet; and also treatment of the industrial wastes that are discharged into the Illinois Waterway. (Jones, R. 294-296; Pearse, R. 1656-1657, 1781, 2555-2558; Cheadle, R. 435-436; Testim, R. 1391)."

VI.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to the failure or refusal of the Special Master to find or grant Complainants' Requested Finding of Fast No. 52, appearing on page 34 of the Requested Findings of Fact, which reads as follows, to-wit:

> "The waters from Lake Michigan abstracted by the Sanitary District of Chicago through the Chicago Drainage Canal has been and is being manipulated for power purposes to provide greater flows during the nighttime when the power load goes on (Christman, R. 630, 632-633; Cheadle, R. 426-427; Ramey, R. 1586; Illinois Exhibit 43, R. 1431-1432; Deneau, R. 799)."

VII.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to the failure or refusal of the Special Master to find or grant Complainants' Requested Finding of Fact No. 55, appearing on page 35 of the Requested Findings of Fact, which reads as follows, to-wit:

> "Universal metering of the City of Chicago water supply would reduce the per capita daily consumption by about one-half and would result in a similar reduction in the sewage flow which would extend the usefulness and available capacity of the parts of the sewage treatment plants of the Sanitary District of Chicago and would enable better results to be attained

at sewage disposal plants primarily designed on a liquid volume basis (Howson, R. 1942, 1965-1966, 2820-2821; Pearse, R. 179[illegible])."

VIII.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to the failure or refusal of the Special Master to find or grant Complainants' Requested Finding of Fact No. 56, appearing on pages 35 and 36 of the Requested Findings of Fact, which reads as follows, to-wit:

> "In the event that the State of Illinois wishes to furnish any additional assurance to the inhabitants of the complaining communities the State of Illinois should first proceed with each and every remedial or ameliorating measure suggested in requested Findings of Fact No. 51, either singly or in combinations before any additional diversion of water from Lake Michigan is recommended as an ameliorating measure."

B.

EXCEPTIONS TO FINDINGS OF FACT MADE AND FILED BY THE SPECIAL MASTER

IX.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to that portion of the Finding of Fact appearing in the Report of the Special Master at page 50, which reads as follows, to-wit:

> " * * * These odors are due in part to hydrogen sulphide and in part to other unidentifiable gases. * * *"

because insofar as said finding of fact finds or implies that measurable quantities of hydrogen sulphide are given off by the Illinois Waterway, such finding of fact is not supported by any competent evidence and is contrary to all the competent evidence in these causes.

X.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to that portion of the Finding of Fact appearing in the Report of the Special Master at page 71, which reads as follows, to-wit:

> "* * * it is also most probable that there will be no dissolved oxygen at the Pool in the summer of 1941 and that there are likely again to be offensive odors at Joliet and Lockport. * * *"

because insofar as said finding of fact finds or implies any concession by the opposing Great Lakes States that conditions in and along the Illinois Waterway at Joliet and Lockport will not be satisfactory during the summer months of 1941 said finding of fact is not supported by any competent evidence and is contrary to all the competent evidence in these causes.

XI.

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and each of them except to that portion of the Findings of Fact appearing in the Report of the Special Master at pages 110 to 113, inclusive, which read as follows, to-wit:

> "(2) With respect to remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan, my findings are as follows:
>
> "(a) The dredging of the Brandon Road Pool would remove chiefly old accumulations of sludge which have completely or largely lost their potency as causes of nuisance and would therefore be of extremely doubtful efficacy. It would cost between $400,000 and $750,000, plus the cost of providing spoil banks and lagoons. It would present problems as to possible nuisance from such spoil banks and lagoons and require further expense for chlorination. I do not think this is a feasible ameliorating measure.
>
> "(b) The draining of Brandon Road Pool cannot be accomplished without some interference with navigation, to which the War Department, which has sole jurisdiction over navigation problems, will not con-

sent. For this reason I do not think this suggestion feasible. There would also be presented problems with respect to the water intake pipes of several industries which take water for industrial purposes from the Pool.

"(c) Chlorine is an effective measure to reduce and eliminate odors, but owing to the size of the Brandon Road Pool and the large sludge deposits therein and the continuing discharge into the Waterway of incompletely treated sewage, it is impossible to make a reasonably certain estimate of the amount of chlorine which would have to be applied to produce a substantial result.

"In order to have a reasonable prospect of substantially controlling offensive odors, it would be necessary to spend $3,000 to $4,000 a day for chlorine, plus several hundred thousand dollars for chlorinating equipment.

"(d) Cascading the water at Lockport or sending it over the dam there would be remedial to the extent of producing some oxygen at Lockport. How much oxygen would be produced and how much it would reach Joliet and the Brandon Road Pool is uncertain and could only be determined by actual trial. The use of the water in this way would cost the Sanitary District $1,500 a day in the loss of power and it would be necessary to use an undetermined amount of chlorine to prevent an odor at the point of cascading.

"(e) The supply of additional oxygen through production of nitrates by increase of air on the North Side and Calumet plants is not a feasible ameliorating suggestion for the summer of 1941. The evidence before me is not sufficient to prove that it is feasible for 1942, in view of the testimony of the Sanitary District experts that it would require an increase in aeration tank capacity. The proof before me is insufficient to support a conclusion that this suggestion, if it could be put into effect for the summer of 1942, would be substantially ameliorating.

"(f) Chemical treatment at the West Side plant would involve a very large permanent expenditure, which could not be made effective in 1941 and if it could be installed by 1942 would be almost immediately superseded by the activated sludge treatment which is provided for by the District's permanent program. This does not seem to me a feasible ameliorating measure.

"(g) The estimates as to cost of chlorinating West Side Imhoff tank effluents are too uncertain and the opinions of the experts too conflicting as to the extent of amelioration which it would afford, to enable me to make any finding that such chlorination is a feasible ameliorating measure.

"(h) It is feasible for the Sanitary District to budget the 1,500 c.f.s. of water now permitted to be diverted in addition to domestic pumpage so as to divert only 1,150 c.f.s. in the months of January, February, March, November and December, and to allocate the aggregate saving in diversion in those months to the summer months. This ameliorating measure will not, however, materially reduce the B.O.D. at Lockport, and will not, therefore, substantially relieve the odor nuisance.

"(i) The adoption of compulsory water metering by Chicago is an ameliorating measure, but the evidence before me is not sufficient to enable me to make any finding as to the extent of amelioration which it would afford or the time within which it could be made available.

"(j) The provision of activated sludge treatment at the Southwest plant for the West Side Imhoff tank effluent is a very important and feasible ameliorating measure to which the Sanitary District is committed, and toward which it has made some progress. The extent of the progress will depend upon the industry and enterprise of the Sanitary District. There is no prospect that this ameliorating measure will be operative in the summer of 1941. It is possible, but doubtful, that by special diligence it might be made operative in the summer of 1942, instead of only by the end of 1942, as claimed by the District.

"(k) As additional equipment is installed, it will become possible to give complete treatment during the course of 1941 and 1942 to increased quantities of sewage at the Southwest plant. * * * The extent of relief from offensive odors which will be afforded at Lockport and Joliet in the summer months of 1941 is very doubtful, but there is a better outlook for the summer months of 1942. Weather conditions will have an important influence,"

because, insofar as said findings of fact find or imply that the ameliorating measures suggested by the opposing Great Lake States would not remedy or afford substantial amelioration of the condition complained of, such findings of fact are not supported by any competent evidence and are contrary to all the competent evidence in these causes.

Respectfully submitted,

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Special Assistant to the Attorneys General.

Filed: April 15, 1941

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Complainants,
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No. 2 Original

State of Michigan,
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Defendants.

No. 3 Original

State of New York,
Complainant,
vs.
State of Illinois and The Sanitary District of Chicago,
Defendants.

No. 4 Original

BRIEF OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK IN OPPOSITION TO ILLINOIS' EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER DATED MARCH 31, 1941.

John E. Martin, *Attorney General of Wisconsin,*
J. A. A. Burnquist, *Attorney General of Minnesota,*
Thomas J. Herbert, *Attorney General of Ohio,*
Claude T. Reno, *Attorney General of Pennsylvania,*
Harrinton Adams, *Deputy Attorney General of Pennsylvania,*
Herbert J. Rushton, *Attorney General of Michigan,*
James W. Williams, *Assistant Attorney General of Michigan,*
John J. Bennett, Jr., *Attorney General of New York,*
Timothy F. Cohan, *Assistant Attorney General of New York,*
Herbert H. Naujoks, *Special Assistant to the Attorneys General.*

Filed: April 30, 1941.

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IN THE

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BRIEF OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK IN OPPOSITION TO ILLINOIS' EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER DATED MARCH 31, 1941.

PART ONE

A. NATURE OF THE ACTION AND ISSUES INVOLVED.

I. A HISTORY AND STATEMENT OF THE CASE.

The State of Wisconsin filed the first of these bills on July 14, 1922. The Wisconsin bill was amended on October 5, 1925, and the State of Minnesota, Ohio and Pennsylvania became co-plaintiffs. The amended bill sought an injunction restraining the State of Illinois and the Sanitary District of Chicago from causing any water to be taken from the Great Lakes-St. Lawrence watershed in such manner as permanently to divert the same from that watershed. On April 8, 1926, the State of Michigan filed a separate bill for the same relief. On October 18, 1926 the State of New York filed a separate bill for the same relief. Subsequently the three suits were consolidated for the purpose of hearing (*Wisconsin* v. *Illinois,* 278 U. S. 367, 369-70) and heard by Hon. (now Chief Justice) Charles Evans Hughes as Special Master.

Thereafter the Special Master duly filed his Report in which he found that the diversion of water from the Great Lakes-St. Lawrence watershed by said defendants had lowered the level of Lakes Michigan and Huron approximately six inches, the levels of Lake Erie and Ontario approximately five inches and the levels of connecting Rivers, Bays and Harbors to the same extent. (Report of Special Master Hughes, filed November 23, 1927, pp. 104-5). The Master further found that the extent of the lowering of said waters was in direct proportion to the extent of the diversion and that an increase of 1500 c.f.s. in the diversion would produce an additional lowering in said waters of approximately one inch. (Report of Special Master Hughes, filed November 23, 1927, p. 105). As a result of this diversion, the Master found that the complainant States and their people had suffered substantial damage to their navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other interests and to riparian property generally. (Report of Special Master Hughes, filed November 23, 1927, pp. 105-118). The Master's finding in this respect was confirmed by this Court (*Wisconsin et al.* v. *Illinois et al.*, 278 U. S. 367 at 407-9).

Upon the consideration of the Master's Original Report and the exceptions filed thereto, this Court held in *Wisconsin, et al.* v. *Illinois et al.*, 278 U. S. 367, that the diversion of water from the Great Lakes then maintained by the State of Illinois and the Sanitary District of Chicago was unlawful and in violation of the rights of the complainant Lake States, that the Sanitary District was under a legal duty to provide some other means of disposing of the sewage to the end that the unlawful diversion might be terminated, that in keeping with the principles of a Court of Equity, the defendants (Illinois and the Sanitary District of Chicago) would be afforded a reasonable time within which to provide other means of disposing of the sewage and that thereafter there would be a final, permanent, operative and effective injunction.

Thereupon this Court again referred these causes to the Special Master for a determination of certain questions deemed to be essential to the formulation of an appropriate decree which, while avoiding unnecessary hazard to the health of the people of the Sanitary District, should nevertheless terminate the unlawful diversion and restore the rights of the complainants as speedily as possible. The Report of the Special Master on rereference was filed December 17, 1929, and on March 14, 1930 this court rendered its decision (*Wisconsin, et al.* v. *Illinois, et al.*, 281 U. S. 179).

On April 21, 1930, the decree of the Court was entered (281 U. S. 696). This decree provided, in part, that, (1) on and after July 1, 1930, the diversion of the waters of the Great Lakes-St. Lawrence system through the Chicago Drainage Canal should be reduced to an annual average of 6500 cubic feet per second, in addition to domestic pumpage, (2) on and after December 31, 1935, this diversion should be reduced to 5000 cubic feet per second, in addition to domestic pumpage, and (3) on and after December 31, 1938, this diversion should be reduced to 1500 cubic feet per second, in addition to domestic pumpage.

In October 1932, the states of Wisconsin, Minnesota, Ohio and Michigan applied for the appointment of a Commissioner or other special officer to execute the decree of April 21, 1930 (281 U. S. 696) on behalf of and at the expense of the defendants. The above named Lake States complained of the delay in the construction of the works and facilities embraced in the program of the Sanitary District of Chicago for the disposition of sewage so as to obviate danger to the health of the inhabitants of the District on the reduction in diversion on December 31, 1935 and December 31, 1938, in accordance with the decree, in the diversion of water from Lake Michigan through the Drainage Canal.

The court appointed Edward F. McClennen as Special Master to make summary inquiry and to report thereon to the court (278 U. S. 578). The Special Master proceeded accordingly and after full hearing submitted his report and recommendations. Upon that report the Court on May 22, 1933, rendered its opinion (See 289 U. S. 395). On the same day, the court enlarged the decree to provide in part that the State of Illinois is required to take all necessary steps to cause and secure the completion of adequate sewage disposal plants and sewers, to the end that the reductions in diversion may be made at the times fixed in the decree.

On January 11, 1940, the State of Illinois filed a petition with this Court for a temporary modification of Paragraph 3 of the Court's Decree of April 21, 1930, in the above causes wherein the diversion of water from the Great Lakes-St. Lawrence System or Watershed after December 31, 1938, was restricted to 1500 cubic second feet, in addition to domestic pumpage. The petition prayed that the diversion of water through the Sanitary District Canal as limited above be temporarily increased to 5000 cubic second feet in addition to domestic pumpage, until December 31, 1942, so as to avert the alleged obnoxious, noisome, unhealthy and dangerous condition claimed to exist in the Illinois Waterway.

On January 29, 1940, the Court issued a Rule to Show Cause requiring the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York to show cause why the petition of the State of Illinois for temporary modification of the Decree of the Court entered April 21, 1930, and enlarged May 22, 1933, should not be granted.

On February 26, 1940, the Return of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York as Respondents, to Rule to Show Cause issued on application of the State of Illinois, as petitioner, for a temporary modification of Paragraph 3 of the Decree of April 21, 1930, was filed with the Court.

On February 26, 1940, the respondent Great Lakes States also filed their Brief in support of said Return. The State of Illinois filed its Reply Brief and Argument to the Brief of Respondent Great Lakes States on March 25, 1940. Oral arguments were heard upon the Return to the Rule to Show Cause on March 25 and 26, 1940. Thereafter, upon consideration of the return of the Lake States who are complainants in the above entitled causes to the Rule issued January 29, 1940, and of the argument had thereon, the Court under date of April 3, 1940, rendered a per curiam opinion (309 U. S. 569, 60 S. Ct. 789, 84 L. Ed. 953) and entered an order referring these causes to the Honorable Monte M. Lemann as Special Master with directions and authority to make summary inquiry on three particular subjects therein described and to report to the Court thereon with all convenient speed (309 U. S. 636, 60 S. Ct. 791, 84 L. Ed. 992). Pursuant to this Order, the Special Master held hearings at Chicago and Joliet, Illinois, beginning on July 11, 1940. Other hearings were held in September and October 1940, and in January 1941. Oral arguments were heard in New Orleans, Louisiana, in February 1941 (Report of Special Master Lemann, p. 5).

II. THE ORDER OF THIS COURT, DATED APRIL 3, 1940, REFERRED THE CAUSES HEREIN TO A SPECIAL MASTER FOR SUMMARY INQUIRY AS TO CERTAIN ISSUES OF FACT.

The order of the Court dated April 3, 1940 (309 U. S. 636, 60 S. Ct. 791, 84 L. Ed. 992), provides in part that:

> "the petition of the State of Illinois and the return of the complainant States to the order to show cause be referred to Monte M. Lemann, Esquire, as a Special Master, with directions and authority to make summary inquiry and to report to this Court with all convenient speed with respect to the actual condition of the Illinois Waterway by reason of the introduction of the untreated sewage, and whether, and to what extent, if any, that condition constitutes an actual menace to the health of the inhabitants of the complaining communities, and also with respect to the feasibility of remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan." (84 L. Ed. 993.)

III. NO ISSUES OF LAW ARE INVOLVED AND THE ISSUES OF FACT ARE MEASURED PRECISELY AND SOLELY BY THE ORDER OF REFERENCE DATED APRIL 3, 1940.

The scope of the instant reference and the issues of fact to be determined herein are measured precisely and solely by the terms of the Order of Reference made by the United States Supreme Court on April 3, 1940. The nature and extent of the inquiry is defined by the Order of the court.

The ultimate questions of fact therefore to be determined on this reference are:

(1) What is the actual condition of the Illinois Waterway as the result of receiving untreated sewage?

(2) What is the effect of such actual condition of the Illinois Waterway on the health of the inhabitants of the complaining communties?

(3) What remedial or ameliorating measures are available to the State of Illinois without an increase in the diversion of water from Lake Michigan?

PART TWO

A. THE FINDINGS AND RECOMMENDATIONS OF THE SPECIAL MASTER AND THE ISSUES RAISED ON THE EXCEPTIONS TO THE MASTER'S REPORT.

I. THE SPECIAL MASTER DULY ENTERED HIS FINDINGS AND CONCLUSIONS AND HIS RECOMMENDATIONS ON THE THREE ISSUES OF FACT.

After extended hearings the Special Master made and filed his report dated March 31, 1941 with this Court.

In answer to the first issue of fact the Special Master found:

> "(1) The actual condition of the Illinois Waterway, by reason of the introduction of untreated sewage, creates in the summer months a nuisance through offense odors at Joliet and Lockport, but does not present a menace to health. No nuisance conditions were proven to exist along the Waterway at any other points." (Report of Special Master Lemann, p. 110.)

After due consideration the Special Master made the following finding on the second issue of fact:

> "My conclusion is that the facts proven do not establish any menace to the health of the inhabitants of Joliet and Lockport or elsewhere along the Waterway requiring an increase in diversion in water from Lake Michigan." (Report of Special Master Lemann, pp. 54, 110.)

In answering third issue raised herein, the Special Master found as follows:

> "(2) With respect to remedial or ameliorating measures available to the State of Illinois without an

increase in the diversion of water from Lake Michigan, my findings are as follows:

"(a) The dredging of Brandon Road Pool would remove chiefly old accumulations of sludge which have completely or largely lost their potency as causes of nuisance and would therefore be of extremely doubtful efficacy. It would cost between $400,000 and $750,000, plus the cost of providing spoil banks and lagoons. It would present problems as to possible nuisance from such spoil banks and lagoons and require further expense for chlorination. I do not think this is a feasible ameliorating measure.

"(b) The draining of Brandon Road Pool cannot be accomplished without some interference with navigation, to which the War Department, which has sole jurisdiction over navigation problems, will not consent. For this reason I do not think this suggestion feasible. There would also be presented problems with respect to the water intake pipes of several industies which take water for industrial purposes from the Pool.

"(c) Chlorine is an effective measure to reduce and eleminate odors, but owing to the size of the Brandon Road Pool and the large sludge deposits therein and the continuing discharge into the Water way of incompletely treated sewage, it is impossible to make a reasonably certain estimate of the amount of chlorine which would have to be applied to produce a substantial result.

"In order to have a reasonable prospect of substantially controlling offensive odors, it would be necessary to spend from $3,000 to $4,000 a day for chlorine, plus several hundred thousand dollars for chlorinating equipment.

"(d) Cascading the water at Lockport or sending it over the dam there would be remedial to the extent of producing some oxygen at Lockport. How much oxygen would be produced and how much of it would reach Joliet and the Brandon Road Pool is uncertain and could only be determined by actual trial. The use of the water in this way would cost the Sanitary District $1500 a day in the loss of power and it would be necessary to use an undetermined amount of chlorine to prevent an odor at the point of cascading.

"(e) The supply of additional oxygen through production of nitrates by increase of air on the North Side and Calumet plants is not a feasible ameliorating suggestion for the summer of 1941. The evidence before me is not sufficient to prove that it is feasible for 1942, in view of the testimony of the Sanitary District experts that it would require an increase in aeration tank capacity. The proof before me is insufficient to support a conclusion that this suggestion, if it could be put into effect for the summer of 1942, would be substantially ameliorating.

"(f) Chemical treatment at the West Side plant would involve a very large permanent expenditure, which could not be made effective in 1941 and if it could be installed by 1942 would be almost immediately superseded by the activated sludge treatment which is provided for by the District's permanent program. This does not seem to me a feasible ameliorating measure.

"(g) The estimates as to cost of chlorinating West Side Imhoff tank effluents are too uncertain and the opinions of the experts too conflicting as to the extent of amelioration which it would afford, to enable me to make any finding that such chlorination is a feasible ameliorating measure.

"(h) It is feasible for the Sanitary District to budget the 1500 c. f. s. of water now permitted to be diverted in addition to domestic pumpage so as to divert only 1150 c. f. s. in the months of January, February, March, November and December, and to allocate the aggregate saving in diversion in those months to the summer months. This ameliorating measure will not, however, materially reduce the B.O.D. at Lockport, and will not, therefore, substantially relieve the odor nuisance.

"(i) The adoption of compulsory water metering by Chicago is an ameliorating measure, but the evidence before me is not sufficient to enable me to make any finding as to the extent of amelioration which it would afford or the time within which it could be made available.

"(j) The provision of activated sludge treatment at the Southwest plant for the West Side Imhoff tank effluent is a very important and feasible ameliorating measure to which the Sanitary District, is committed, and toward which it has made some progress. The extent of the progress will depend upon the industry and enterprise of the Sanitary District. There is no prospect that this ameliorating measure will be operative in the summer of 1941. It is possible, but doubtful, that by special diligence it might be made operative in the summer of 1942 instead of only by the end of 1942, as claimed by the District.

"(k) As additional equipment is installed, it will become possible to give complete treatment during the course of 1941 and 1942 to increase quantities of sewage at the Southwest plant. The progress which will be made during these years and the gradually declining influence of sludge deposits from past years will be operative in the summer of 1941 to improve conditions at Lockport and Joliet as compared with 1939 and 1940, and will be operative to a further extent in 1942. The extent of relief from offensive odors which will be afforded at Lockport and Joliet in the summer months of 1941 is very doubtful, but there is a better outlook for the summer months of 1942. Weather conditions will have an important influence." (Report of Special Master Lemann, pp. 110-113.)

II. EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

The exceptions filed by the State of Illinois to the Report of the Special Master are very voluminous and many of such exceptions are duplications, some of said exceptions relating to findings of the Special Master on a particular point or to the failure of the Special Master to make the requested finding of Illinois on that point. Other exceptions are not material or relevant to the issues involved on this reference and were apparently taken to clarify the record on particular points. Moreover it is apparent that many of the exceptions by Illinois will not be argued or discussed in its brief. An examination of all the exceptions taken and filed with this Court discloses that the proper treatment of these exceptions is to group them under the three issues of fact referred to the Special Master for summary inquiry.

(a) Exceptions to the Report of the Special Master filed by the State of Illinois.

The exceptions of the State of Illinois to the report of the Special Master, Hon. Monte M. Lemann, may be summarized and divided into the following classifications:

(1) The first group of exceptions by Illinois relate to the Special Master's conclusion as to the health conditions and to his recommendations thereon, or to the failure or refusal of the Special Master to grant certain findings of fact submitted by Illinois relating to health conditions. (See Illinois Exceptions I and II.)

(2) The second class of exceptions by Illinois relate to the Special Master's conclusions concerning present and past conditions at Lockport and Joliet, Illinois, or to the failure or refusal of the Special Master to grant certain findings submitted by Illinois relative to the actual condition of the Illinois Waterway. (See Illinois Exceptions III and IV inclusive.)

(3) The third type of exceptions relate to miscellaneous matters, including alleged mistakes in the record, failure to make requested findings relative to remedial measures, and the like. (See Illinois Exceptions VII.)

(4) The fourth class of exceptions by Illinois relate to the failure or refusal of the Special Master to recom-

mend an increase in diversion. (See Illinois Exceptions V and VI.)

(5) The fifth type of exceptions by Illinois relate to the failure of the Special Master to make or grant the recommendations for decree requested by Illinois and to the conclusion of the Special Master recommending that the petition and modified petition of Illinois be dismissed with costs against the State of Illinois. (See Illinois Exceptions VIII and IX.)

(b) Exceptions of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York to the Report of the Special Master.

The exceptions as filed by the opposing Great Lakes States to the report of the Special Master relate principally to his failure to find that each and every remedial or ameliorating measure suggested by the said opposing Great Lakes States would be feasible. It should be pointed out, however, that the questions raised in connection with the opposing Great Lakes States' exceptions arise only in the event that it should be held by this Court that an actual menace to the health of the inhabitants of the complaining communities exists. We feel confident that this Court will sustain the finding of the Special Master that no menace to health exists and that the recommendation of the Special Master that the petition and modified petition of Illinois be dismissed will be sustained. Therefore, it will be unnecessary for the Court to consider the arguments on the remedial or ameliorating measures.

As we pointed out in the foreword to the exceptions of the opposing Great Lakes States, said exceptions were taken solely for the purpose of placing on the record the position of the opposing Great Lakes States with respect to the feasibility of ameliorating measures in order to preserve their right to such finding if, at any time, an issue is presented in the future in which those matters become important.

The exceptions filed by the opposing Great Lakes States to the report of the Special Master relate (1) to his failure to make findings that each and every one of the suggested ameliorating or remedial measures would be feasible and available to the State of Illinois without increase in diversion from Lake Michigan, and (2) to the failure of the Special Master to make a finding that the actual condition of the Illinois Waterway at Joliet and Lockport will result in no nuisance conditions with respect to odors during the summer months of 1941, and (3) to the failure of the Special Master to find that the flow through the Chicago Drainage Canal is manipulated for power purposes.

The argument of the opposing Great Lakes States in support of their exceptions to the Report of the Special Master appears in the appendix to this brief.

PART THREE

A. DATA CONCERNING THE COMPLAINING COMMUNITIES.

I. JOLIET AND LOCKPORT, ILLINOIS, THEIR LOCATION, SOURCE OF WATER SUPPLY, SEWAGE DISPOSAL, SIZE, POPULATION, INDUSTRIES, AND LIKE DATA.

(a) Joliet, Illinois.*

Joliet, Illinois, a city covering approximately five square miles of land (Illinois Exhibits 2, 38 R. 6, 289), is located about 40 miles, by railroad, southwest of Chicago, Illinois, on the Illinois Waterway (Illinois Exhibits 1, 2, 3, 4, R. 6-7). The population of Joliet in 1930 was 42,993, while the 1940 census showed a slight decrease in population, with a total of 41,936 people in Joliet (Pearse, Cross-Examination, Exhibit 5B). The health commissioner of the City of Joliet, Dr. Louis J. Frederick, estimated the total number of people living in Joliet and the surrounding territory who were likely to be affected by health conditions in and near Joliet, at 50,000 (Frederick, R. 459).

Joliet has within its borders many diversified industries, including seven big wallpaper mills, three plants of the American Steel and Wire Company, the Ruberoid Company, General Refractories and chemical plants (Jones, R. 229).

Joliet is a busy railroad center and many leading railroads pass through Joliet, including the Chicago, Milwaukee, St. Paul and Pacific, the Atchison, Topeka and Santa Fe, the Michigan Central, the Elgin, Joliet and Eastern, the Chicago and Alton, and the Chicago, Rock Island and Pacific Railroad (Illinois Exhibit 38, R. 289).

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*The Joint Abstract of record herein consists of two parts; the first volume the Joint Abstract of record contains the testimony of the witnesses and will be hereinafter referred to as follows: JA-I, while the second volume of the Joint Abstract of record consists of the exhibits and will be hereinafter referred to as JA-II.

The domestic water supply of Joliet is not obtained from the Illinois Waterway but such water is taken from deep wells located in various parts of the city, one on Jasper Street, East Washington Street, Ruby Street, Williamson Street and Ottawa Street (Testim., R. 1368-1369; Jones, R. 295, JA-I, 570). Joliet has no sewage treatment plant and the raw sewage of Joliet is dumped into the Illinois Waterway below the city of Joliet (Testim., R. 1369, JA-I, 695; Jones, 294-295, JA-I, 570). The raw, untreated sewage of the Chicago area, since the reversal of the Chicago River in 1900, has always flowed through the city of Joliet (Jones, R. 296, JA-I, 570).

Two state prisons are located near the Illinois Waterway at Joliet, Illinois. The population of such prisons is as follows: The total population at the old Penitentiary is 2,029, while the total population at Stateville is 4,396, which includes, in both institutions, both inmates and employees. The total population at both the old prison and Stateville is 6,425. (Pearse, Cross-Examination, Exhibit 6; R. 3318). The raw, untreated sewage of these state prisons is dumped into the Illinois Waterway at the Brandon Road Pool (Pearse, R. 2555-2558, JA-I, 162-163).

(b) Lockport, Illinois.

Lockport, Illinois, is a small community covering about 1 square mile of territory, located about 3 miles northeast of Joliet, Illinois, and 37 miles southwest of Chicago on the Chicago Drainage Canal section of the Illinois Waterway (Illinois Exhibits 1, 2, 3 and 4, R. 6-7). The population of Lockport, Illinois, in 1930 was 3,383, while in 1940, the population was 3,433. (Pearse, Cross-Examination, Exhibit 5-B, R. 3315). Lockport and other nearby communities, namely, Justice, Lemong, Romeo, Argo-Summit, Sag and Willow Springs, have no sewage treatment plants (Cheadle, R. 435-6; JA-I, 586; Pearse, R. 1656, JA-I, 124-5, 2556, JA-I, 162-163). The raw untreated sewage of these communities finds its way into the canal section of the Illinois Waterway (Pearse, R. 1656, 2556, JA-I, 162-3; Cheadle, R. 435-437, JA-I, 586). Lockport, and other nearby communities, namely, Justice, Lemong, Romeo, Sag and Willow Springs and Argo-Summit do not obtain their domestic water supply from the Illinois Waterway and all of such communities take their domestic water from deep wells, except Argo which obtains its water supply from the City of Chicago. (Cheadle, R. 437, JA-I, 586).

PART FOUR.

A. THE FACTS.

I. WITH RESPECT TO THE ACTUAL CONDITIONS OF THE ILLINOIS WATERWAY BY REASON OF THE INTRODUCTION OF UNTREATED SEWAGE.

(a) The record conclusively establishes that "the actual condition of the Illinois Waterway as the result of receiving untreated sewage" while never wholly satisfactory, has not in the past resulted in or caused any nuisance condition affecting public health and that the actual condition today is not such as to cause or result in any nuisance condition affecting health, and no increase in diversion of water from Lake Michigan, though temporary in nature, is necessary to protect the interests of public health.

1. *The conditions which have obtained in the Illinois Waterway since the opening of the Chicago Drainage Canal on January 17, 1900, have never been wholly satisfactory by reason of the fact that the Illinois Waterway has been the main receptacle of the sewage of the Chicago Metropolitan area and since an early date has received huge quantities of raw untreated or partially treated domestic sewage and industrial wastes, resulting in the pollution of said Waterway; nevertheless, although the actual condition of the Illinois Waterway has never been ideal it has not, at any time, caused or resulted in any nuisance condition affecting health.*

As the Special Master rightly says:

> "In considering the weight to be given to the claims of Illinois that the situation in Joliet and Lockport presents a menace to health which makes imperative an increase in the diversion, it seems pertinent to consider the situation which has prevailed in past years" (Report of Special Master Lemann, pp. 47-48).

It is agreed by almost everyone that even before 1939, conditions in the Illinois Waterway were never wholly satisfactory due to the discharge therein of the untreated sewage of Chicago (Report of Special Master Lemann, pp. 48-49). In the earlier years the Chicago River and the old Illinois and Michigan Canal and, since the opening of the Chicago Drainage Canal on January 17, 1900, the Main Channel and the DesPlaines and Illinois Rivers have been the main receptacles of the sewage of the entire Chicago Metropolitan area (Report of Special Master Hughes (1927), pp. 6-7; Report of Special Master Lemann, pp. 48-49).

Witnesses who were familiar with the Illinois Waterway in the past testified that the condition of said Waterway for a great many years was never wholly satisfactory because of the large quantities of raw, untreated or partially treated, sewage which were deposited therein to be carried away downstream (Cheadle, R. 424, 434-435, JA-I, 585-586; Mohlman, R. 281, JA-I, 204; Pearse, R. 211-212, JA-I, 104; Andrew, R. 3798-3801, JA-I, 261-262; Sontag, R. 397-398, JA-I, 581; Callahan, R. 861-862, JA-I, 633; Kerr, R. 2351-2383, JA-I, 711-717; Moore, R. 2332-2342, JA-I, 707-709; Detweiller, R. 2344-2348, JA-I, 709-711; Goodell, R. 2385-2410, JA-I, 718-724).

Dr. Mohlman, a witness called by the State of Illinois, who is in charge of all of the laboratories for the Sanitary District of Chicago, testified that conditions even before January, 1939, were never wholly satisfactory if one measured the condition of the Waterway by the amount of dissolved oxygen available and the biochemical oxygen demand of the water (R. 281, JA-I, 204).

Mr. Pearse, Chief Sanitary Engineer for the Sanitary District of Chicago, testified that there has always been a heavy deposit of sludge above the old power house at Lockport and that up to the year 1929 they measured 6 to 8 feet of sludge deposits above the power house racks (R. 211, JA-I, 104). He testified further that they have always had some sludge deposits in the Brandon Road Pool and that such deposits started to form as soon as the gates were closed in the Brandon Road Dam when the Waterway was opened in the year 1933, and that sludge deposits were noticed during the first year when the dam was closed (R. 211-212, JA-I, 104).

The Special Master in his report refers to testimony by Pearse in previous hearings (1926-1927) in which Pearse affirmed that the Canal and River constituted a nuisance for a number of years and that odors from the Waterway could be smelled for a distance of half a mile. (Report of Special Master Lemann, p. 49.)

Bruce Cheadle, a witness for the State of Illinois, who is Secretary of the Chamber of Commerce in Lockport and also Secretary of the DesPlaines Valley Improvement Association and who has observed the deep Waterway for a great many years testified that the Chicago Drainage Canal has been a source of complaint in the DesPlaines Valley prior to the year 1939 and that they have always objected to its being a cess pool for the City of Chicago or any other territory (R. 424, JA-I, 585-586). Mr. Cheadle further testified that there has always been some odor emanating from the Canal and that there have been complaints for a great many years back about the condition of the Canal (R. 434-435, JA-I, 586).

The State of Illinois, Exhibit 37A (R. 4480, JA-II, p. 35) shows that since the year 1925, through the year 1938, during every summer, the dissolved oxygen has gone down to zero for a few months. Dr. Mohlman confirmed this fact in his direct testimony (R. 272, JA-I, 200).

Other witnesses familiar with the condition of the Illinois Waterway over a period of years, likewise testified that prior to the year 1939 the sanitary conditions of such Waterway have not been wholly satisfactory (Sontag, R. 397-398, JA-I, 581; Andrew, R. 3798, JA-I, 261; Hollis, R. 1329, JA-I, 689).

Edward P. Callahan, United States Lock Master at Lockport (R. 859-860, JA-I, 633) testified that he had been lock master there since the 1st of May, 1932, and that he came to Lockport to paint the towers in the year 1930 for the United States Government. He said:

> "At that time the water out there was thick, you could almost paint with it. * * * You could almost paint with that water then. It was thick. And it was filthy, plenty. Then there was an awful stench. We almost had to get clothes pins and put on our nose. * * * That is when we first came here. * * * They (conditions) are nowhere near as bad today as they were then. They have been clearing that water up, cleared up at least, I would guess, 60 per cent. * * *" (R. 861-862, JA-I, 633).

Mr. Callahan testified further that conditions today (1940) were better than conditions a year ago and that smelling the water had not affected his health (R. 862, JA-I, 633).

Mr. Andrew of the United States District Engineer's Office in testifying with respect to conditions along the Illinois Waterway during the years 1924 and 1925 stated that in 1924 and 1925 "the odors in the City of Joliet at that time were very offensive." Andrew further stated that conditions in Joliet in 1925 were as bad as in 1939 (R. 3799-3800, JA-I, 261).

Even with the large quantities of water which have been abstracted from the Great Lakes-St. Lawrence Watershed during the period prior to the year 1939, due to the huge quantities of raw sewage or partially treated sewage which were deposited in such Waterway, conditions along the

Illinois Waterway were never satisfactory, especially during the years from 1925 to about 1930 when the water was very unsightly and thick and the odors extremely offensive and conditions were very bad (Andrew, R. 3798-3801, JA-I, 261; Callahan, R. 861-2, JA-I, 633).

2. *The conditions which obtained in the Illinois Waterway during the year 1939 were not satisfactory by reason of the default of the Sanitary District of Chicago in failing to provide the necessary facilities for complete treatment of all of the sewage of the District by December 31, 1938, the date of the final reduction in illegal diversion to 1500 c.f.s. became effective.*

The conditions which obtained in the Illinois Waterway at Lockport and Joliet during the year 1939 were worse than they had been during the year 1938. Those conditions, however, arose and were created solely by the default of the State of Illinois and the Sanitary District of Chicago in the performance of their duty under the Decree of April 21, 1930 (281 U. S. 696) as enlarged by the Decree of May 22, 1933 (289 U. S. 710). By the terms of the Decree of April 21, 1930, as enlarged, it was the duty of the State of Illinois and the Sanitary District of Chicago to provide by December 31, 1938, complete treatment of all of the sewage of the Sanitary District of Chicago through suitable and adequate works which would provide 85% or 90%, or more, purification of all the raw sewage of said District.

In fact on December 31, 1938, the Sanitary District of Chicago had only provided treatment of varying degrees for part of the sewage of the Sanitary District and such partial and incomplete treatment provided only 37.7% purification of the sewage of the said District (Final Report of Sanitary District, filed Jan. 1, 1939, pp. 11, 13).

The testimony of the 127 witnesses at the Joliet hearings the week of July 22, 1940, was mainly to the effect that during the warm months of 1939 conditions along the Illinois Waterway were unsatisfactory due to offensive odors which from time to time annoyed the residents and inhabitants of Joliet and Lockport. Many witnesses testified that conditions on the Illinois Waterway in 1939 were worse than they had been prior to that time. (Sampson, R. 308, JA-I, 571; Jones, R. 291, JA-I, 569; Sontag, R. 395, JA-I, 581; Castello, R. 678, JA-I, 614; Britz, R. 689, JA-I, 616; Kerwin, R. 694, JA-I, 616).

There were many complaints about the odors which emanated from the Canal and Waterway during the warm months of 1939. Several witnesses stated that the physical appearance of the Waterway in 1939 was much worse than it was in previous years or in 1940. (Cheadle, R. 425, 433-539, JA-I, 585-586; Jones, 291-292, JA-I, 569; Sampson, R. 308-309, JA-I, 578).

On the other hand, one witness was of the opinion that the Illinois Waterway was better in 1939 than in 1938 (Santini, R. 685, JA-I, 615); and another witness, the U.S. Lock Master at Lockport was positive the condition of the Waterway in 1939 was much better than in the years 1930 or 1932 (Callahan, R. 681-682, JA-I, 633).

Mr. Callahan, United States Lock Master at Lockport, testified that in 1930 and 1932 the water was so thick you could almost paint with it and it was filthy with an awful stench so that they almost had to get clothes pins to put on their noses (R. 681-682, JA-I, 633). Callahan estimated that the river had cleared up at least 60 per cent since 1930 or 1932 (R. 862, JA-I, 633).

It will be seen from an examination of the record that there is no agreement among the witnesses as to the actual condition of the Waterway in the year 1939, except the general agreement that conditions were not ideal and annoying to some persons who resided near the Waterway.

Turning now to an examination of the exhibits prepared by witnesses Howson, Pearse and Mohlman to show the comparative pollution loads in the Chicago Drainage Canal during the years 1938 to 1942, we find that while the pollution load was less in 1939 than in 1938, owing to the failure of the Sanitary District to provide complete treatment for all the sewage of the District, coupled with the reduction in diversion on December 31, 1938, from 5000 c.f.s. to 1500 c.f.s. resulted in unsatisfactory sanitary condition in the Illinois Waterway (Opponents' Exhibit 14, R. 3030, JA-II, 107, Illinois Exhibit 61, R. 3529, Mohlman Exhibit 13-a, R. 3304). Other exhibits recording the degree and amount of treatment of the sewage of the Sanitary District of Chicago, the amount of sludge removed from the sewage, the huge amount of sludge removed from sewage deposited in the Main Channel of the Canal, the B.O.D. in the Canal, the D. O. in the Canal water, likewise show that during the summer of 1939, conditions in the Illinois Waterway at Lockport and Joliet were less satisfactory than in the year 1938 (Report of Special Master Lemann, tables 2, 3, 4, 5, 6, 7, 8, 9, pp. 117-122; see also: Illinois' Exhibits: No. 24A, R. 3636; 25A, R. 3638; 26A, R. 3640; 27A, R. 3642, JA-II, 28; 28A, R. 3644, JA-II, 29; 29A, R. 3646, JA-II, 30; 47A, R. 3654, JA-II, 47; 50A, R. 3658; 51A, R. 3660; 52A, R. 3662; 54A, R. 3664; 60, R. 3528; 37, R. 271). The B.O.D. in the Canal water at Lockport during the summer months of 1939 was 30.2 p.p.m. as compared to 17.3 p.p.m. of B.O.D. during the summer months of 1938 (Illinois' Exhibit 61, R. 3529). The D. O. in the Canal at Lockport was zero for many months in 1939 as compared to zero dissolved oxygen in the Main Channel at Lockport for several summer months in 1938 (Illinois' Exhibit 37, JA-II, 35). Thus, conditions in the Illinois Waterway at Lockport and Joliet were worse in the summer of 1939 than in 1938 as measured by the B.O.D., the D. O. in the canal water, the amount and degree of sewage treatment and the water available from Lake Michigan. However, though such condition of the Waterway in 1939 may have been annoying to some persons, yet no menace to health ever existed on or along the Illinois Waterway.

3. *The condition of the Illinois Waterway in 1940 was considerably improved over the condition which existed in 1939.*

By the spring of 1940 the Sanitary District of Chicago had in full operation the Southwest Treatment Plant and thereby kept out of the Drainage Canal a large pollution load which formerly went into the Canal. The increase in the degree of treatment of all of the sewage of the Sanitary District is graphically shown in table 2 of Special Master Lemann's report at page 117. (See also: Illinois' Exhibits 24A, R. 3636; 25A, R. 3638; 26A, R. 3640; 27A, R. 3642, JA-II, 28, 28A, R. 3644, JA-II, 29; 29A, R. 3646, JA-II, 30; 47A, R. 3654, JA-II, 47; 51A, R. 3660; 52A, R. 3662). It is clear from an examination of the reports of operations of the several treatment plants of the Sanitary District that by the summer of 1940 a very decided improvement in the Waterway was made as compared to the sanitary condition of the Illinois Waterway at Lockport and Joliet during the summer of 1939.

Thus, in 1939, the dry solids removed from the sewage by the Sanitary District of Chicago averaged 305.6 tons per day while in 1940 this was increased to 422.7 tons per day (Table 3, Report of Special Master Lemann, p. 117). The amount of sludge returned to the channels of the Sanitary District in 1939 was 53,970 tons, dry weight, while in 1940 the sludge returned to the Canal was reduced to 20,224 tons, dry weight (Table 5, Report of Special Master Lemann, p. 119, see also Illinois' Exhibits 50A, 51A, 52A, R. 3658, 3660, 3662). During the year 1939, a grand total of

670 m.g.d., yearly average, of sewage was treated in all of the treatment works of the Chicago Sanitary District, while in 1940 the amount of sewage treated was increased to 930 m.g.d. yearly average (Table 2, Report of Special Master Lemann, p. 117, Illinois' Exhibit 25A, R. 3638).

The improvement in conditions along the Illinois Waterway in the year 1940 at or near Lockport and Joliet was apparent to all who visited the Illinois Waterway at those points.

On July 8, 1940, the Master, counsel and others took a trip to Joliet by auto and examined the Brandon Road Pool from the Brandon Road Lock and Dam to the Lockport Lock and Dam by boat. Conditions along the pool and on the Waterway on that day while not ideal were not bad. There were few odors apparent and not a great deal of scum or debris apparent on the surface of the water. Certainly the Waterway on July 8, 1940, was vastly improved over the condition testified to by witnesses as having existed in the summer of 1939. This improvement was quite marked and conditions were satisfactory despite the fact that one employee, a lock man, who locks boats at the Brandon Road Lock, testified that on July 8, 1940, the odors "were extra strong because the weather warmed up." (Christman, R. 629). Despite the high temperatures (Opponents' Exhibit 18A, R. 3978), the Master and counsel had no cause for complaints concerning odors from the Waterway.

The witnesses who were called to testify at Joliet were for the most part of the opinion that conditions on the Illinois Waterway had improved considerably during the year 1940 as compared to conditions on such Waterway in the year 1939. (Jones, R. 289-306, JA-I, 569-570; Sampson, R. 307-314, JA-I, 571; Ray Powers, R. 314-318, JA-I, 572; Mrs. Marie Bush, R. 331-360, JA-I, 575, 576; Mary S. Wurtz, R. 377-389, JA-I, 578-579; Sontag, R. 389-400, JA-I, 580-581; Cheadle, R. 420, JA-I, 585; Dr. Lennon, R. 526-543, JA-I, 598-599; Dr. Curtiss, R. 547-595, JA-I, 601-604; Thos. Calamaras, R. 609, JA-I, 606; Mrs. Vina Poole, R. 633-639, JA-I, 610; Velt, R. 1311, JA-I, 686; Himes, R. 1312, JA-I, 686).

On the other hand, there were some witnesses who were of the opinion that conditions were about the same in 1940 as in the year 1939 (Sister Ursuline, R. 1107, JA-I, 657; Sister Hilda, R. 1117, JA-I, 658; Chrzanowski, R. 1254, JA-I, 679; Pellino, R. 733-735, JA-I, 621), while several witnesses were of the opinion that conditions were somewhat worse at Joliet in 1940 than during the summer of 1939 (Boles, R. 1321, JA-I, 688; Faulkner, R. 935, JA-I, 640).

However, with but few exceptions the consensus of opinion among the Joliet witnesses was that the Illinois Waterway had improved materially during the year 1940. (Report of Special Master Lemann, p. 20.) This can be attributed, directly, of course, to the fact that the Southwest Side Treatment Plant was placed in partial operation in May, 1939, and in almost complete operation in the Fall of 1939 (Pearse, R. 169, 176-177, JA-I, 90-92). Since the completion of the Racine Avenue pumping station on March 20, 1940 (Ramey, R. 20, JA-I, 6), additional sewage is brought to the Southwest Plant for treatment. In the fall of 1940 the Kostner Avenue sewer was placed into operation (Pearse, R. 2739, JA-I, 177), and more sewage of the southwest area now receives treatment. The additional sewage from the Southwest Area which in 1940 received complete or partial treatment took a tremendous pollution load off of the Canal and assisted in creating improved conditions. The sanitary experts on both sides are in general agreed that there was a gradual and progressive improvement in the Waterway in 1940 over conditions in 1939 due to the operations of the Chicago Sanitary District Sewage Disposal Plants in treating more sewage of the

District from time to time and in keeping sludge from the Canal (Opponents' Exhibit 14, R. 3030, JA-II, 107; Illinois' Exhibit 61, R. 3529; Mohlman, R. 267; Mohlman Exhibit 13A, R. 3304; Illinois' Exhibit 24A, 25A, 26A, 27A, 28A, 29A, 37, 47A, 50A, 51A, 52A, 54A, 60A, R. 3636, 3638, 3640, 3642, JA-II, 28, 3644, JA-II, 29, 3646, JA-II, 30, 271, 3654, 3656, 3658, 3660, 3662, 3664, 3528).

On Wednesday, July 24, 1940, the Master accompanied by counsel at 7:30 P. M. embarked at Jackson Street bridge, Joliet, for an inspection trip of the Brandon Road Pool (R. 1088-1098, JA-I, 699-706). During the trip the Master made the following observations:

The Special Master's notes show that in this inspection trip he could detect an odor from time to time but only intermittently; it would last for a few seconds or a minute and then he would lose it for several minutes and then catch it again. While an odor was perceptible at times, it did not seem to the Master terrible or particularly bad at any time. He noted that it would not bother him very much, although it might bother others. Although he would not call it pleasant, it was not strong. It did not seem to be any worse at the wider section of the Pool than at other points. He did not observe any flies and had only one mosquito bite, although it was dusk. At times there was a good breeze which, at other times, died out. He saw a number of bubbles on the water, which he was told represented the operation of gas from sludge underneath the surface. At first he saw little scum. Then as the party proceeded on its way the Master saw along the walls a rather thick surface layer, which appeared to be scum and which contained pieces of wood, paper, miscellaneous debris and a good many grease spots, which might have been due to oil. This scum varied in extent. At one point the scum was 2 or 3 feet in width; at others perhaps 10 to 20 feet; it was usually on the side along the walls, but he observed it also at points in the middle of the Waterway. Bubbles were apparent for the whole width of the Waterway. At one point he detected an oily odor.

The Master slept four nights at Joliet and was not troubled by odors. The only trouble he had in sleeping was due to the heat, which was so great that he kept an electric fan constantly going all night. The City Hall, in which the hearings were held, was on the east side of the Canal about three blocks away. He detected an odor on only one day and then only for a few minutes. The four days he spent in Joliet were the hottest of the summer, the temperature reaching 103 degrees on July 25th.

Illinois' Exhibit 61 (R. 3529) prepared by Pearse shows that the B.O.D. at Lockport in 1940 was 20.6 p.p.m. compared to 17.3 p.p.m. of B.O.D. at the same place in 1938 and 302 p.p.m. of B.O.D. in 1939. The pollution load of the Canal in 1940 was much less than in the year 1939 (Illinois' Exhibit 61, R. 3529; Mohlman Exhibit 13A, R. 3304; Opponents' Exhibit 14, R. 3030).

We submit that the testimony of the witnesses who observed the condition of the Illinois Waterway in 1940 and in other years, together with the record of improvement in treatment of the sewage of the Sanitary District of Chicago, the observations of the condition of the waterway made by the Master during the summer of 1940, the photographs of the Canal taken from the bridge on Highway 45 in 1940 (Opponents' Exhibits 8 and 16, R. 2762 and 3387) conclusively establish that the condition of the Illinois Waterway in 1940, while open to improvement, clearly was not such as to create any nuisance affecting public health, nor such as to constitute a menace to the health of the inhabitants of Lockport or Joliet. Howson, R. 1948, JA-I, 340; Ellms, 2326, JA-I, 472; Dr. Enzer, 2148-51, 2161-2165, JA-I, 538-547; Dr. Perkins, R. 2460, 2474, JA-I, 521, 526; Dr. Krumbiegel, R. 2180, 2190, JA-I, 554, 558; Observations of the Master, 855-857, 1088-1098, JA-I, 699-706; Dr. McNally, R. 2669, 2700, JA-I, 491, 501; Dr. Gute, R. 2209-2211, JA-I, 565; Dr. Nichols, R. 3132, JA-I, 510-511; Opponents' Exhibits 1, 4, 5, R. 1919A, 1931, 2123; Dr. Frederick, R. 464-465, JA-I, 589-590; Opponents' Exhibits No. 6, JA-II, 96; No. 7, JA-II, 98, No. 15, JA-II, 108-116; No. 23, JA-II, 117-121; No. 24, JA-II, 121).

4. *The actual condition of the Illinois Waterway today by reason of the introduction of untreated sewage is such as to result in no nuisance condition affecting health nor to constitute any menace to the health of the inhabitants of communities along the Illinois Waterway.*

(a) The condition of the Illinois Waterway has improved progressively since 1939 and today is better than in 1940 or in previous years.

The Sanitary experts of the opposing Great Lakes States and of the State of Illinois, are, in general, agreed that condition of the Illinois Waterway has improved progressively since the latter part of the year 1939 when the Southwest Side sewage treatment plant was substantially fully completed and began to operate substantially all of its units (Mohlman R. 267; Mohlman Exhibit 13A, R. 3304; Illinois' Exhibit 61, R. 3529; Opponents' Exhibit 14, R. 3030, JA-II, 107).

Mohlmann Exhibit 13A (R. 3304) shows that the pollution load of the Sanitary District Canal in 1941 will be only 33% of the pollution load in 1938. The pollution load of the Canal will be only 30% in 1941 of the pollution load in 1938 as shown by Exhibit 61 prepared by Pearse (R. 3529). The pollution load of the Sanitary Drainage Canal in 1941 will be only 26% of the pollution load of the Canal in 1938 according to Howson, as shown by Opponents' Exhibit 14 (R. 3030, JA-II, 107). The direct diversion of water from Lake Michigan was reduced on December 31, 1938, from 5000 c.f.s plus domestic pumpage to 1500 cubic second feet plus domestic pumpage. However, the comparative improvement in the pollution load as testified to by Mohlman, Pearse and Howson indicate how much improved the Illinois Waterway is today even with the reduced diversion of 1500 c.f.s. over the condition of the Waterway in 1939 when the reduction in diversion first became effective or in 1938 when 5000 c.f.s. was abstracted from Lake Michigan.

The Comparative Improvement in Pollution Load of the Chicago Drainage Canal May Be Noted in the Following Table Based on the Testimony of Mohlman, Pearse and Howson

	1938	1939	1940	1941	Ultimate After West Side Activated Sludge Plant is Completed
Dr. Mohlman: Based on Exhibit No. 13-A (R. 3304) tons of volatile solids to canal....................	(123,100) 100%	(115,658) 94%	(76,472) 62%	(40,910) 33%	(18,720) 15%
Mr. Pearse: Based on Illinois Exhibit No. 61, R. 3529, 5-Day B. O.D. lbs. per day, including B. O.D. from old sludge, but no credit for improvement due to reaeration of canal surface......	(630,800) 100%	(562,300) 89%	(386,000) 61%	(194,000) 30%	(33,000) 5%
5-day B.O.D. P.P.M. (Illinois' Exhibit 61, R. 3529).................	17.3	30.2	20.6	10.3	
Mr. Howson: Based on Opponents' Exhibit 14, R. 3030, tons of B.O.D. to Canal.................. B.O.D. of sludge and canal reaeration assumed as offsetting each other and left out of figures.	(645,000) 100%	(539,400) 84%	(421,050) 65%	(169,000) 26%	(100,000) 15%*

*Computed in ratio of 100,000 lbs. to 169,000 lbs. to 26% in 1941.

With respect to all figures of Dr. Mohlman, Mr. Pearse and Mr. Howson the pollution load for the year 1938 is taken as 100%, and the percentages in subsequent years reflect the pollution load in per cent of that present in 1938.

Illinois Exhibit 61 (R. 3529) shows that the B.O.D. in the Canal in 1941 will be only 10.3 p.p.m. as compared to 20.6 p.p.m. in 1940, or 30.2 p.p.m. in 1939, and 17.3 p.p.m. in 1938.

(b) In the year 1941, conditions in the Illinois Waterway with 1500 c.f.s. are and will be improved over conditions which obtained in the Illinois Waterway in 1938 with 5000 c.f.s.

After the foregoing exhibits had been introduced and after the Brief of the Respondent Great Lakes States was filed with the Special Master and served upon Illinois, the State of Illinois, at the New Orleans hearings, introduced what it called a corrected exhibit of former Illinois' Exhibit 61 which was marked and received as Illinois' Exhibit 61-A (R. 4033).

The revised figures submitted by witness Pearse indicate that according to their latest estimates the 5-day B.O.D. at Lockport during 1941 would be 361,500 pounds per day instead of 194,000 pounds per day as originally computed on Illinois' Exhibit 61 (Report of Special Master Lemann, p. 67). According to the revised figures appearing on Illinois Exhibit 61-A, the 5-day B.O.D. at Lockport in p.p.m. would be 21 instead of 10.3 as originally computed.

After Mr. Pearse had submitted his revised figures he testified,

> "that he would be disposed to again revise them so as to reduce to 346,000 the figure of 406,000 appearing in the 1941 and 1942 columns (as B.O.D. demands from current deposits of sludge and/or effluents) in order to give proper weight to probable decreases in B.O.D. from West Side and Southwest effluents." (Report of Special Master Lemann, p. 67).

Mr. Howson, Chief Sanitary witness for the Respondent Great Lakes States, challenged the accuracy of the revised figures introduced by the State of Illinois and asserted that conditions at Lockport in the summers of 1941 and 1942 will be materially better than claimed by Illinois. Mr. Howson contended that even upon the revised figures appearing in the Illinois Exhibit 61-A, the B.O.D. at Lockport in the summer months of 1941 and 1942 should properly be determined by taking that proportion of the estimated sources of B.O.D. in those years which (1) the actual B.O.D. at Lockport in the earlier years was to (2) the total sources of B.O.D. in the earlier years. On this basis, even upon the revised figures, Mr. Howson asserts that the B.O.D. at Lockport in the summer months of 1941 will be 13.5 p.p.m. and 11.5 p.p.m. in 1942 instead of the revised estimates of 21 for 1941 and 17.6 for 1942, as estimated by Illinois (Report of Special Master Lemann, p. 68).

Mr. Howson originally computed that during the three summer months of 1941 and 1942, the B.O.D. at Lockport would be 7.3 p.p.m. and 4.8 p.p.m. (Report of Special Master Lemann, p. 68).

It is manifest from the foregoing that even on the basis of the revised figures introduced by the State of Illinois that in the year 1941 conditions in the Illinois Waterway at Lockport with 1500 c.f.s. will be materially improved during the summer months over conditions which obtained in the Illinois Waterway at Lockport in 1938 with 5,000 c.f.s., and that no nuisance conditions from odors will result anywhere along the Illinois Waterway during 1941 or 1942 or thereafter.

Illinois complains that the Special Master based his conclusion of present and past conditions at Lockport and Joliet on the memory of a certain few witnesses and not on an actual analysis of the water. This exception appears to the respondent Great Lakes States as frivolous and specious inasmuch as the water from the Canal and the Des Plaines and Illinois Rivers is not used for drinking, bathing or other domestic purposes and because analysis of the water will show neither the existence of nor the intensity of odors, if any. It is clear that the only way one could determine the present and past conditions at Lockport and Joliet along the Waterway would be by the testimony of persons familiar with conditions as they now exist as compared to conditions as they have existed at those points in the past.

The witnesses upon whose testimony the Special Master relied in part, and whose testimony is attacked by Illinois as being inconsistent were both United States Government employees—one the U. S. Lockmaster at Lockport and the other the Principal Assistant Engineer of the War Department at Chicago, who had been familiar with the Illinois Waterway for a great many years. An examination of the record discloses that the testimony of Andrew (JA-I, 261) and Callahan (JA-I, 633) as to conditions in 1930 is not inconsistent in any particular, but on the other hand is thoroughly consistent. Andrew testified that conditions at Lockport in 1925 and in 1939 were the same and that conditions during the period from 1926 on up to the completion of the Brandon Road dam in 1933 were very bad because of the turbulent stretch of shallow river running through Joliet which caused the spray to be diffused into the air carrying with it the offensive odors of which complaint was made. It should also be noted, according to the testimony of both Callahan and Andrew that conditions began to clear up in the thirties, despite the fact that the progressive reduction in diversion of water from Lake Michigan under the decree became effective whereby on July 1, 1930 the direct diversion was reduced to 6500 c.s.f. and to 5000 c.s.f. on December 31, 1935. Of course, the reason for the improvement in conditions was due to the increased treatment of the sewage of Chicago by the Sanitary District.

At this point we might also comment briefly on the objection raised by Illinois to the evidence of certain witnesses from communities below Joliet along the Illinois Waterway.

The witnesses were Dr. Kerr and Messrs. Moore, Detweiller and Goodell, who testified concerning conditions today along the Illinois Waterway from Joliet to down below Peoria as compared with conditions in the past. These witnesses objected to any increased diversion by Illinois on the ground that it might bring more sewage down to Peoria and the communities below. Certainly these objectors have as much interest in and right to give their testimony on the question of increased diversion as the residents of Joliet and Lockport because of the effect which might be produced downstream if more water from Lake Michigan were authorized.

The fact that these objectors have complained about nuisance conditions created in the waters of the Illinois Waterway by the Sanitary District of Chicago for more than twenty years discloses the complete lack of equity of Illinois to now urge such complaints from Joliet and Lockport as a basis for obtaining more diversion at the expense of the respondent Great Lakes states and their citizens as well as to the detriment of the citizens of the State of Illinois residing in the lower Illinois River communites.

We submit that the record conclusively establishes that the inhabitants of Joliet and Lockport, Illinois, will not suffer any annoyance or inconvenience from odors from the Illinois Waterway during the summer months of 1941 or 1942 or thereafter.

5. *The request of Illinois for a controlled increased diversion of water from Lake Michigan during 1941 and 1942 in an amount sufficient to insure one part per million of dissolved oxygen in Brandon Road Pool is wholly without merit.*

In its so-called modified petition, referred to in its brief submitted to the Special Master, the State of Illinois suggests that Illinois should be granted a temporary controlled increase in diversion of water from Lake Michigan for the years 1941 and 1942 to be measured by the amount of water necessary to produce one part per million of dissolved oxygen content in the water above the dam of Brandon Pool. Here Illinois again is setting up a high standard, one which it never has had in the past, to be obtained at the expense of the Great Lakes States and their peoples. An examination of exhibit 37-a, JA-II p. 35, indicates that during the period from the year 1925 to 1940 the dissolved oxygen in the water at Lockport during the summer months of each of such years has gone down to zero (Report of Special Master Lemann, p. 70). See also the testimony of Dr. Mohlman (R. 281, JA-I, 204). An examination of the table prepared by the Board of twenty-eight experts employed by the Sanitary District of Chicago and published by the Sanitary District in its document, entitled Vol. III Sewage Disposal, at page 45, discloses that from 1911 through 1924 for an average of 157 days of each of said years the dissolved oxygen content in the water at Lockport was below one part per million. The presence of any dissolved oxygen is sufficient to prevent nuisance and a minimum of 1 p.p.m. of dissolved oxygen is not necessary (Report of Special Master Lemann, p. 56).

Thus it will be seen that Illinois is asking for a standard it has never had in the past, one that is not necessary to prevent nuisance conditions in the Waterway. The suggestion that Illinois be granted a controlled increased diversion would be placing a premium or bonus on inefficiency. Under the suggested plan, the more inefficiently the sewage disposal plants of the Sanitary District of Chicago are operated, the greater the amount of diversion of water from Lake Michigan that could be obtained. Inasmuch as no menace to health exists along the Illinois Waterway at any point, no increase in the diversion of water from Lake Michigan is necessary. However, if the court should hold that some increase in diversion is necessary, the suggested controlled temporary increase in diversion would be clearly objectionable from every standpoint. The past record of Illinois and the Sanitary District of Chicago certainly arouses no confidence in either their willingness or their ability to function and perform efficiently and speedily so as to restore to the respondent Great Lakes States and their peoples the rights, which have heretofore been adjudicated by this court, and of which Illinois and the Sanitary District have for so many years deprived them. As the Special Master points out, the record shows that the Sanitary District of Chicago has been influenced not by any desire to make speed but rather by the purpose to complete ultimately its sewage disposal program at as little expense as possible to its taxpayers (Report of Special Master Lemann, p. 107), and that every increased diversion from the Great Lakes removes a stimulus to Illinois to speed the work necessary to carry out the decree of the court of April 21, 1930 as amended (Report of Special Master Lemann, p. 109).

6. *The Ten-Day Flushing Test Resulted in a Very Decided Improvement of the Illinois Waterway from Chicago Through the Brandon Road Pool.*

Illinois complains that the ten-day experimental flushing test during the period December 2d to December 12, 1940 will increase the need at Brandon Pool for increased diversion of water in the summers of 1941 and 1942. The fact of the matter is the result of the experimental ten-day flushing test was that of the offensive material carried into the Pool by flushing, a larger percentage was carried out of the Pool than the total material taken into the Pool. In other words 52.8% of the tons of B.O.D. carried into the Pool were carried out of it. The flushing scoured out the Illinois Waterway through the Canal and above the Brandon Road Pool. This means that the Sanitary Drainage Canal above Lockport having been well scoured out will permit the lake water to reach the Brandon Pool in much better condition so far as dissolved oxygen is concerned, than during previous years. Thus, despite the fact that much of the material swept down the Canal by the increased flow did not carry through the Pool, but was deposited therein, the entire Canal from Chicago to below the Brandon Road dam was improved by at least fifty per cent. Therefore, the water from Lake Michigan will have much more dissolved oxygen than in the past to neutralize the odors which might arise from the putrefactive material deposited in the Pool. The cleansing of the upper reaches of the Waterway will more than offset the disadvantage of the deposit in the Brandon Pool of the material which was brought down from the upper reaches by the increased flow during the ten days. (Report of Special Master Lemann, pages 78-82.)

7. *The Brandon Road dam creating the Pool was initiated and begun by the State of Illinois prior to 1930 and was completed by the Federal Government in 1933.*

Illinois complains that at the time of the decree of April 21, 1930 and of its enlargement May 22, 1933, the Court did not have before it any matter relating to Brandon Pool at the lower end of the City of Joliet. The fact is that the situation at Joliet through the construction of Brandon Pool was brought about by the State of Illinois itself through the planning and beginning of the construction of the dam near Brandon Bridge at Joliet, which replaced the former turbulent flow of the DesPlaines River and its great purifying capacity with a slack-water, stagnant pool. After the passage of the Act of Congress of July 3, 1930, which federalized the Illinois Waterway, the Federal Government took over and completed construction of the Brandon Road dam in 1933. The Federal Government merely carried out and completed the plans and ideas of the State of Illinois on this subject.

II. "WHETHER, AND TO WHAT EXTENT, IF ANY, THAT CONDITION (OF THE ILLINOIS WATERWAY) CONSTITUTES AN ACTUAL MENACE TO THE HEALTH OF THE INHABITANTS OF THE COMPLAINING COMMUNITIES."

(a) The record conclusively establishes that the actual condition of the Illinois Waterway by reason of the introduction of untreated sewage therein has not constituted and does not now constitute a menace to the health of the inhabitants of the complaining communities and no increase in the diversion of water from Lake Michigan, though temporary in nature, is necessary to protect the interests of public health.

1. *The Scope of the issues on the present reference.*

(a) Material allegations in the petition of the State of Illinois with respect to the alleged health problem.

The petition of the State of Illinois for temporary modification of the decree of April 21, 1930, which petition was filed with this Court on January 15, 1940, contains the following allegations with reference to the alleged effect of the condition of the Illinois Waterway on the health of persons living or working along said waterway. At pages 8 and 9 of the Illinois petition is the following pertinent paragraph, to-wit:

> "Subsequent to December 31, 1938, when the diversion of lake water was reduced to 1500 cubic feet per second there has been stagnation in the Sanitary District Canal and the Illinois Waterway. This stagnation has resulted in the formation of thick, black, bubbling scum for long distances along the Sanitary District Canal and the Illinois Waterway. Because of the effluent of sewage from the Sanitary District of Chicago into said Sanitary District Canal and the Illinois Waterway a putrescent, obnoxious, noisome and unhealthful odor exists, causing nausea, insomnia, loss of appetite, irritation of the mucous membrane of

> the nose and throat and in general the undermining of the health of those persons living or working along the Sanitary District Canal and the Illinois Waterway. This condition aggravates illness and retards the recovery of patients ill in hospitals located along said Sanitary District Canal and the Illinois Waterway."

(b) The order of reference, dated April 3, 1940.

The order of this Court of April 3, 1940 referred the causes herein to Special Master Lemann for summary inquiry with reference to three issues of fact, among them the question whether and to what extent, if any, the *actual* condition of the Illinois Waterway constitutes an *actual* menace to the health of the inhabitants of the complaining communities (309 U. S. 636).

"Actual" is defined in Webster's New International Dictionary (second edition) as follows:

> "Exist in act or reality; really acted or acting; in fact; real *opposed* to potential, possible, ostensible, virtual, speculative, conceivable, ideal, theoretical, hypothetical or nominal."

"Menace" is defined as follows:

> "Projecting, threatening. The show of an intention to inflict evil; a threat; indication of probable evil or catastrophe to come."

Dr. Norbert Enzer, a witness for the opposing Lake States, defined "Menace to health" as follows: (R. 2156-7, JA-I, 542)

> "I would use the word 'menace' with respect to health as applied to something which was actively a menace. In other words, it would produce deleterious effects to health to a sufficiently large number of people who came in contact with it so that one could say that it eliminated the accidental factor of some particular or peculiar individual's susceptibility."

Professor Andrew C. Ivy, a witness for the State of Illinois, in stating why he thought the Waterway constitutes an actual menace to health said:

> "We abate smoke, we abate noise, we abate dust, we try to abate pollen distribution because of hay fever sufferers; we abate stray dogs because of threat of rabies and the spread of disease by stray dogs, and when a water supply is threatened with pollution, there is any question that the water supply might be polluted, we immediately take steps to take care of the situation, and it is on the basis of generalizations and principles of that sort that I believe there is an actual menace to health existing there now." (R. 3037, JA-I, 307.)

In the above quoted definitions may be found the conflicting theories of the State of Illinois and the opposing Great Lakes States with reference to the issue concerning the health of the inhabitants of the complaining communities.

It is the contention of the opposing Great Lakes States that the phrase "actual menace to health" as used in the order of this Court means that the effects on the health of the people residing near the Waterway must be real and exist in fact, as opposed to any potential, speculative, hypothetical views on what might happen, unsupported by any real cases or actual happenings. On the other hand, it is the theory of the medical experts called by the State of Illinois that an actual menace to health may be shown by mere speculative and theoretical guesses as to what might possibly happen in the future, unsupported by any actual happenings in the past, and based upon generalizations that smoke, dust, odors, noises, carbon monoxide gases from automobiles on the streets, and the like, are all harmful to the human system and should be abated. In addition, Illinois contends that the test is the effect of the Waterway upon invalids and persons of less than average health rather than the effect upon persons of normal health. With this view, the opposing Lake States earnestly disagree.

2. *The record conclusively establishes that the evidence introduced by Illinois concerning the alleged effect of the Illinois Waterway on the health of the residents of Joliet and Lockport falls far short of establishing a menace to the health of the people of those communities and at the most shows only annoyance, discomfort and inconvenience suffered by some people, chiefly during the summer of 1939.*

During the hearings held at Joliet, Illinois, the week of July 22, 1940, a total of 127 witnesses testified before the Special Master (Report of Special Master Lemann, 12). The general trend of the testimony by the lay witnesses and doctors related to the personal experiences of the witnesses during the summers of 1939 and 1940, although some of the witnesses also testified as to the experiences of members of their family, while several school teachers testified with respect to the health of the children under their care.

A summary of the testimony discloses that during the year 1939 odors from the Illinois Waterway at most annoyed certain witnesses, or annoyed members of their families or children under their care, and that such odors were worse in 1939 than in previous years. Most of the witnesses are agreed that the odors in 1940 were not nearly as bad as the odors in 1939.

Many of the witnesses complained of having suffered nausea or insomnia, or loss of appetite in 1939 or 1940 and some witnesses also testified concerning impetigo and sinus trouble. There was also some testimony of the effect of the proximity of the Illinois Waterway on the health of patients in St. Joseph's Hospital at Joliet, Illinois.

We submit that a reading of the record discloses that all of the symptoms and complaints alleged to have been suffered by residents of Joliet and Lockport during 1939 and 1940 are trivial in character, transient and inconsequential, and could have been due to numerous other causes rather than to the Waterway.

3. *The evidence with respect to complaints concerning neusea establishes that since nausea may result from numerous causes it is speculative that the Illinois Waterway is responsible for any of the cases of nausea herein complained of.*

Dr. Thomas H. Wagner defined nausea as a "sick stomach" (R. 887, JA-I, 636). He stated that was as near as he could get to it. When Dr. Wagner was asked to name the common causes of nausea, he answered: "Oh, my gosh, that would take me an hour" (R. 887, JA-I, 636). He was then questioned as follows:

> Q. "There are so many causes, then, it would take you an hour to name them?"

and he answered:

> A. "Certainly, many causes of it."

It seems elementary that since there are many common causes for nausea it is often impossible to determine just which cause is responsible for the symptoms complained of. One witness, J. G. Nichols, in testifying that his wife became nauseated and suffered from loss of sleep and loss of appetite in 1939, frankly stated that those things hadn't happened this year (1940) and that his wife had been nauseated but he thought it was on account of the heat (R. 1302, JA-I, 684).

Of the 127 witnesses who testified at the Joliet hearings, about 34 per cent testified that they personally had been nauseated either in 1939 or 1940, while about 22 per cent of such witnesses testified that members of their families, patients, or school children in their care suffered from nausea, either in 1939 or 1940.

Many of the witnesses who testified that they personally suffered from nausea or that members of their family suffered from nausea during 1939 or 1940 were of the opinion that the odors from the Illinois Waterway were responsible for this condition. Dr. Wagner, a physician practicing in Joliet, testified for Illinois that all individuals would not be susceptible to odors from the Illinois Waterway, it would depend entirely upon the individual. In the words of Dr. Wagner a normal individual in the presence of this odor would not necessarily become nauseated.

> "It depends whether he is susceptible to that odor. As I said before some people are susceptible to the odor of a rose, which is supposed to be a perfume. They become nauseated and sick, the same way people become nauseated from the odor from the canal or from gas or anything" (R. 896, JA-I, 637-638).

In other words, the average individual would not be susceptible to odors from the Canal, but only the sensitive, susceptible person might be annoyed by certain odors whether they came from a polluted Waterway or from a rose.

Dr. Wagner testified further that an individual could become accustomed to odors emanating from the Canal, that is, "you can become accustomed to almost anything if you live with it long enough" (R. 894). Surely, the Illinois Waterway with its 40 year record of sewage pollution should have allowed residents of Joliet ample time to become accustomed to odors from the Waterway. Dr. Norbert Enzer, a witness called by the opposing Great Lakes States, testified on this point as follows:

> "I might say with respect to odors that they can be annoying; they can be a source of discomfort;

> they can produce even symptoms on occasion, but they are transient, they are effunescent, they don't cause a disease, they don't undermine health, and, as a general rule, people who are constantly exposed to the same odors rapidly became adjusted to them so they very soon become less conscious of it and finally do not notice it at all'' (R. 2151, JA-I, 540).

It should be noted that the number of people who actually testified to having suffered from nausea in 1939 or 1940 were and are but a very small percentage of the total number of witnesses at Joliet and a very small percentage of the total population of the communities of Joliet and Lockport combined (total population of about 50,000) and a still smaller percentage of the 150,000 people within the trading area of Joliet. Nausea is a common symptom in our modern life and one not associated solely with sewage pollution or waterways. It would be highly speculative to say that every case of nausea testified to at the Joliet hearings was directly caused by odors from the Waterway Even the witnesses don't all go that far in their claims. With numerous causes of nausea, it is probable that most of the complaints were due in part or wholly to causes not connected with the Waterway. Finally, nausea does not undermine the health and is in general inconsequential and transient, and certainly not a menace to health as the physician understands it (Dr. Enzer, R. 2168, JA-I, 548; Dr. Perkins, R. 2483, JA-I, 528).

4. *The inability to find sleep easily during the summers of 1939 and 1940 could have been due to the heat or other causes not connected with the Illinois Waterway.*

Some witnesses at the Joliet hearings testified concerning loss of sleep or the difficulty of going to sleep. About 46 per cent of the witnesses who testified at Joliet stated that during the summer months of 1939 or 1940 they had some complaint to offer with respect to their ability to go to sleep or to loss of sleep suffered by them. About 22 per cent of the witnesses at Joliet described the difficulty that members of their family had in going to sleep or concerning the loss of sleep suffered by members of their family. Other witnesses testified they were not affected in this way at all. One witness was frank to admit that last night "the heat was keeping me awake more than anything" (Sherman, R. 823, JA-I, 628).

The Special Master was not troubled at night at Joliet by odors and the only trouble he had in sleeping was due to the heat, which was so great that he kept an electric fan constantly going all night (Report of Special Master Lemann, p. 29). The four days the Master spent in Joliet were the hottest of the summer of 1940, the temperature reaching 103 degrees on July 25th.

Sherman testified on Tuesday, July 23, 1940. The maximum temperature on that date was 97 degrees, while the maximum temperature on July 22, 1940 was 94 degrees (Opponents' Exhibit 18, R. 3391).

Concerning the effect of loss of sleep upon the health of a person, Dr. Norbert Enzer, on cross examination, testified as follows:

> "I can conceive, for example, that the loss of sleep that is going on in London now might affect some of the people there in an unfavorable manner, but loss of sleep as an incident, I don't think, contributes to ill health, and if the thing that produces the loss of sleep at the time we sleep is normally expected is continued over a long period of time, the normal individual will readjust himself and find his sleep at other times" (R. 2172, JA-I, 550).

The Court will take judicial notice of the fact that even the normal, healthy individual suffers from inability to sleep due to heat, worry, fatigue, overwork, concentration on work, indigestion, and the like, and that it would be very difficult to say with reasonable assurance just what caused a particular individual to lose sleep or to have difficulty in going to sleep. Moreover it is common knowledge that almost everyone has at times suffered from inability to find sleep easily. Lack of sleep or inability to find sleep easily constitutes no menace to health. Every person has at one time or another had difficulty in finding sleep due to worry, illness, upset stomach, the heat, or the like. In fact, it is common knowledge that one of the principal causes of inability to find sleep during the summer months is the heat. It is clear that every case of inability to sleep at Joliet and Lockport in 1939 and 1940 was not due solely to the Waterway. It would be speculative to say that it was. The Court will take judicial notice that the drug stores throughout this country today sell large quantities of sleeping drugs and potions to induce sleep for those persons who are unable to find sleep easily. Insomnia or sleeplessness was known to the people of Joliet and Lockport long before the final cut in diversion was made on December 31, 1938.

We submit that insomnia or inability to find sleep easily does not undermine health, is a complaint universally noted everywhere, and is not a menace to health, at least not as testified to in these causes.

5. *Loss of appetite may result from so many causes that it is speculative and conjectural to say that the proximity of the Illinois Waterway is in any way responsible for such complaints at Joliet.*

About 22 per cent of the witnesses who testified at the Joliet hearings stated they suffered from loss of appetite during the summer months of 1939 or 1940. About 22 per cent of the witnesses at Joliet testified that members of their family suffered from loss of appetite. Loss of appetite is not rare and may be due to numerous causes (Ivy, R. 3072-3073, JA-I, 324).

At the outset, the attention of the Court is invited to the fact that, with one or two exceptions, all the people who testified at the Joliet hearings appeared to be very healthy and many of such witnesses seemed to tend to overweight. With but one or two exceptions there was no testimony that any one of the witnesses were compelled to give up even a day's work due to loss of appetite, nausea or loss of sleep.

Approximately 78 per cent of the witnesses testified that they did not suffer from any loss of appetite or didn't mention anything about loss of appetite. In fact, the witnesses who were asked directly concerning their health either testified it was fine (Koehl, R. 1308, JA-I, 685) or that their health was all right (Marietta, R. 755, JA-I, 623) or that they were immune to those things (Nichols, R. 1302, JA-I, 684) or that they couldn't blame their health on the river (Swanco, R. 751, JA-I, 623).

Dr. Wagner when he was asked whether Joliet is generally a pretty healthy community, replied: "Well, I believe so, yes; as good as the average" (R. 893, JA-I, 637). Dr. Wagner was then asked the following question by the Special Master:

> Q. "One of the questions that the Supreme Court will have to decide is where does something become a menace to health as distinguished from annoyance, unpleasantness, disagreeableness or lack of enjoyment. Would you say that this condition here is a menace to health?"

Dr. Wagner replied:

> A. "Well, to the average healthy individual I must honestly state that I don't believe it is a menace to the health of the average healthy individual * * * (R. 892, JA-I, 637).

It should also be noted that the witnesses who testified at the Joliet hearings were all average normal, healthy individuals, as could be noted by their appearance and as was disclosed by their testimony. Most of such witnesses resided in Joliet which was described by Dr. Frederick, City Health Commissioner, as a healthy community (R. 464, JA-I, 589). From the physical appearance of these witnesses any temporary and slight loss of appetite certainly had no effect on their weight or appearance, even if we assume for purposes of argument that the Waterway caused the loss of appetite. In any event occasional loss of appetite is not a serious matter. In fact a little loss of appetite would be beneficial rather than detrimental for most people. It is highly speculative to say that the cases of loss of appetite testified to at Joliet were caused by odors from the Canal rather than from indigestion, worry, the heat or some other cause.

6. *There is no direct proof that the condition of the Illinois Waterway is responsible for any actual case of retarding the recovery of patients at St. Joseph's Hospital or elsewhere.*

Some of the doctors called by the petitioner, State of Illinois, testified that the odors from the Illinois Waterway might have the effect of prolonging the time of the recovery of patients in hospitals adjacent to the Illinois Waterway. Dr. Wagner testified that while he thought the conditions along the Illinois Waterway did not constitute a menace to the health of the average healthy individual, it would be a menace to the health of the individual ill from other causes or who is not strong (R. 892, JA-I, 637).

Dr. Lannon testified he thought that the odors from the Waterway "would postpone recovery of chronically ill patients, probably heart patients" (R. 525, JA-I, 598). Sister Evangelisten stated that the odor retards recovery and prolongs illness (R. 1188-1191, JA-I, 670).

The record, however, does not show one single instance of an actual case where recovery of a patient has been retarded due to the proximity of the Illinois Waterway. The Special Master finds that "the average period of stay in St. Joseph's Hospital during 1939 was about one day less than the average for general hospitals in the country as shown by the records of the American Hospital Association." (Report of Special Master Lemann, p. 19.)

This finding is supported by Opponents' Exhibits 30 and 31 (R. 3985, 3988, JA-II, 122) which show that the average hospital stay of patients at St. Joseph's Hospital for the year 1939 was 11.48 days while the average stay of patients in general hospitals of the United States was 12.46 days. These records demonstrate that the theory that odors from Illinois Waterway have or might result in retarding the recovery of patients in hospitals is pure speculation and not based upon actual facts. While some patients, because of their illnesses, might find disagreeable odors annoying or uncomfortable, yet other patients might find the same condition true from inhalation of the odor of a rose (Dr. Wagner, R. 896, JA-I, 637-638).

The observations of the Special Master during the course of the hearings at Joliet that the testimony was not based upon anything that happened but on suggestive fears of what might happen (R. 482-483) is particularly applicable to the claim that odors from the Waterway retard recovery of patients in hospitals ~~located~~ near the Waterway.

There was some testimony to the effect that certain patients were so anxious to escape the odors from the Illinois Waterway that they left the hospital before they were ready for discharge. It is manifest that an early return from a hospital is not an unusual experience. Every hospital is faced with the situation where patients are anxious to return home before they are ready to be discharged and such patients often leave before they really should. Nevertheless no patient is ever permitted to leave the hospital before the doctor on the case approves the discharge of such a patient. It is clear, therefore, that there is no foundation in the record for the contention that odors from the Illinois Waterway have retarded the recovery of patients in hospitals near such Waterway.

7. *The proximity of the Illinois Waterway has not caused any general undermining of health of persons working or living along such waterway.*

(a) The witnesses who testified at Joliet, with but one or two exceptions, were average, normal, healthy individuals of normal or above-normal weight who lost no time from work as a result of any illness.

It was manifest from the physical appearance of the witnesses who testified at the Joliet hearings that they were average, normal, healthy individuals, most of whom tended to overweight and who, with but one or two exceptions, had lost no time from work due to any illness These individuals all came from a community which the Health Commissioner described as a good, healthy community (Dr. Frederick, R. 464, JA-I, 589) and other doctors echoed this opinion, (Dr. Wagner, R. 893, JA-I, 637).

The only exceptions to the rule that the witnesses testifying at the Joliet hearings were average, normal healthy individuals, were the cases of the lady who testified that she became ill due to odors from the Illinois Waterway and her husband made her quit working (Mrs. Mitchell, R. 660, JA-I, 613) and the case of the doctor who testified that a patient of his, a river pilot, suffered an infection due to water sprayed from the Illinois Waterway during one of his trips. The doctor stated that he ordered this pilot to quit his work for a time and take a vacation in order to recover from the effect of the infection and from nervousness (Dr. Curtis, R. 569, JA-I, 603).

The Master noted, during the course of the hearings, that the people who testified at Joliet as to inability to eat and sleep all looked healthy and appeared to be tending to overweight and this fact was borne out by the testimony of the witnesses who were asked concerning their health (Callahan, R. 859-867, JA-I, 633; Mohr, R. 868-871, JA-I, 634; Koehl, R. 1308, JA-I, 685; Nichols, R. 1302, JA-I, 684; Imfeld, R. 1280, JA-I, 681; Argoudalis, R. 1277, JA-I, 681).

As the Master observed during the course of the hearings, "It seems pretty clear that the testimony so far is not supported by anything that has happened so far; that is, based upon anything but suggestive fears of what might happen. That, I think, is a bald summary of what they have said" (R. 482-483).

Nothing that transpired at the Joliet hearings after the above statement was made, nor any of the evidence given thereafter has changed the situation. The remaining testimony taken during the course of the week was mainly cumulative.

The statistical records of communicable diseases and the testimony of the doctors plainly establishes that as far as actual happenings go the condition of the Illinois Waterway has not been proven to be a menace to the health of the individuals residing along or working upon the Illinois Waterway at Joliet and Lockport, the two complaining communities.

(b) The condition of the Illinois Waterway has not affected the health of children in Lockport or Joliet.

Illinois contends that children in the Joliet-Lockport area have been particularly susceptible to odors from the Illinois Waterway resulting from the reduction in diversion in 1939. There was some testimony to the effect that children during the warm weather in April and May of 1939 and 1940 suffered nausea and restlessness (Bush, R. 337-338, JA-I, 575; Wurtz, R. 379-381, JA-I, 578-579; Blatchley, R. 405, JA-I, 582).

It is common knowledge that school children are quite susceptible to illnesses and to symptoms such as nausea, but that they recover very promptly from the same. Nausea, whether suffered by children or adults, might be induced by any one of a great many causes (Dr. Wagner, R. 887, JA-I, 636). There was also testimony that the children at one of the schools who were most frequently ill were girls between the ages of 10 and 12 (Wurtz, R. 388-389, JA-I, 580). Temporary illness is to be expected in girls of that age and is a normal rather than unusual incident of a girl's childhood days.

The restlessness of children during the spring of the year can easily be explained by reason of the fact that with the coming of the vacation season children become restless and are affected, just as are adults, with what is commonly known as "spring fever" and a desire to escape from schoolroom confinement. Mary S. Wurtz, Principal of the McKinley Public School in Joliet who testified that during the years 1939 and 1940 some of the children became ill, also stated that she was not attempting to state the reason or causes for any of the illnesses mentioned; that she didn't know the causes (R. 389). Miss Wurtz further admitted that "children get sick any time of the year" (R. 384, JA-I, 579).

The evidence in these causes falls far short of establishing that the Illinois Waterway affects in any way the health of school children in Joliet or Lockport. On the contrary the testimony shows, at the most, that the school children residing adjacent to the Waterway are average, normal youngsters who become ill occasionally, stay home from school once in a while, become restless in the springtime when the weather begins to get warm, and, on occasion, have to be sent home from school when they suffer a stomach ache brought on by too much candy, too strenuous play, the heat, or any one of a number of common causes not connected with the Illinois Waterway.

8. *The mortality and communicable disease rate statistics indicate that Joliet, Illinois, is a very healthy community.*

The mortality and communicable disease rate statistics as furnished by the Department of Health, State of Illinois, disclose that Joliet, Illinois, and other cities and villages located along or adjacent to the Illinois Waterway are very healthy communities insofar as communicable diseases are concerned (Opponents' Exhibits 1, 4, 5; R. 1919a, 1931, 2123; Opponents' Exhibits 6, 23, 24; R. 2126, 3454, 3460; JA-I, 96, 117, 121). Some of the doctors who testified at Joliet expressed the fear that a typhoid epidemic may result from the presence of the Illinois Waterway at Joliet (Dr. Faulkner, R. 935, JA-I, 640; Dr. Frederick, R. 455, JA-I, 588). However, the statistics show that not only are the typhoid cases and deaths very favorable in Joliet and other communities adjacent to the Illinois Waterway but that the death rates and case rates are much lower than they are in many other communities located away from the Waterway (Opponents' Exhibits 1, 4, 5, 6, R. 1919a, 1931, 2123, 2126, J.A.-I, 96).

In the original decision in these causes in the merits, the Court pointed out that it was postponing the restoration of the just rights of the complainant Great Lakes states for a number of years in order to eliminate any danger of an epidemic or pestilence due to water-borne diseases (278 U. S. 396). What the Court had in mind, of course, was the fear of contamination of the water supply of the City of Chicago if polluted sewage should reach the water intakes. It should be noted that no one of the cities along the Illinois Waterway takes its water supply from such stream but all the water is obtained from deep wells, excepting Argo which purchases its water from the City of Chicago (Pearse, R. 1692, JA-I, 132; Cheadle, R. 437, JA-I, 586; Testim, R. 1368-1369, JA-I, 695).

The past health record of Joliet and other communities along the Illinois Waterway discloses that insofar as reportable diseases are concerned, such communities are very healthy places in which to live and the Health Commissioner of the City of Joliet, Dr. Frederick, admitted the health of the people of Joliet was very good (R. 464, JA-I, 589), and he further admitted that health conditions in 1939 were no worse in Joliet than health conditions in 1938 (R. 464, JA-I, 589).

9. *The air in the vicinity of the Illinois Waterway contains no more harmful substance or ingredients than does the air in localities away from such Waterway.*

(a) There are no more bacteria, toxins, bacilli or other harmful substances in the air at Joliet or Lockport than would be ordinarily found in localities away from the Illinois Waterway.

The examination of the contents of the air made at locations along the Illinois Waterway at Joliet and Lockport and at locations away from such Waterway proves conclusively that the inhabitants of Joliet and Lockport have no more to fear from the air over or adjacent to the Waterway than people residing or working in cities located away from such Waterway.

Opponents' Exhibit No. 7 (JA-I, 503, JA-II, 99) contains the results of an analysis of the air in the vicinity of Joliet and elsewhere on August 3, 1940. This exhibit as interpreted by Jenkins and Dr. Moore shows that the composition of the air above the Illinois Waterway is no different from the composition of the air in other parts of the state (Report of Special Master Lemann, p. 35).

Opponents' Exhibit No. 15 (JA-I, 503) is a report made by Dr. M. Starr Nichols concerning an analysis of the air and water in the vicinity of Joliet, Illinois, made on September 28, 1940 (JA-I, 502-521). This exhibit discloses that the quantity and kinds of bacilli to be found in the vicinity of Joliet, Illinois, do not differ from the number and kind to be found elsewhere (Report of Special Master Lemann, p. 37). Illinois offered no proof of analyses of the air in or near Joliet.

(b) There is in the record no proof that any concentrations whatsoever of hydrogen sulphide have been or may be found in the air at Joliet or Lockport or any other place along the Illinois Waterway.

The witness Bergman (JA-I, 485-487) testified to the analysis of the air made at Lockport and Joliet, Illinois, on August 3, 1940, with respect to the amount of hydrogen sulphide, if any, in the air. Bergman testified that he was unable to find any trace of hydrogen sulphide in the air (JA-I, 485; Report of Special Master, 34). It should be noted that neither the petitioner, State of Illinois, which has been making many exaggerated claims concerning pollution of the air in the vicinity of Joliet and Lockport, nor its agency, the Sanitary District, made any attempt to analyze the air at Joliet for hydrogen sulphide. No record whatsoever as to what amount of hydrogen sulphide, if any, has been or may be found either in the water of the Brandon Road Pool or in the air above Brandon Road Pool or elsewhere along the Illinois Waterway was ever made by Illinois or the Sanitary District (Report of Special Master Lemann, 37). On the other hand, numerous witnesses testified that it would be utterly impossible for a sufficient concentration of hydrogen sulphide to be present in the air above the Illinois Waterway which would or could be detrimental to the health of individuals on or near such Waterway and thus constitute a menace to health (Dr. Enzer, R. 2173; Dr. Krumbiegel, R. 2198-2199 and 2188; Howson, R. 1948; Nichols, R. 3131-3132).

The evidence is clear that hydrogen sulphide diffuses very rapidly in the air (Dr. Krumbiegel, JA-I, 559, 562; Dr. Enzer, R. 2168, 2174, JA-I, 548, 551; Dr. McNally, JA-I, 492). Dr. McNally testified that at 500 to 1000 feet away from the point of origin, hydrogen sulphide would diffuse into the air many thousand times (R. 2673, JA-I, 492; Report of Special Master Lemann, 38).

(c) The record in these proceedings conclusively establishes that none of the ailments or illnesses complained of was due to hydrogen sulphide from the Illinois Waterway.

We submit that the record conclusively establishes that none of the ailments or illnesses complained of by the Joliet witnesses was due to the hydrogen sulphide from the Illinois Waterway. Muehlberger in testifying to the symptoms of sub-acute hydrogen sulphide poisoning stated "they are symptoms of irritation, irritation of the mucus surfaces, *primarily those of the eyes which result in a burning sensation of the eyes;* * * *" (Italics ours—R. 2791, JA-I, 297).

Dr. Mohlman testified that at the Sanitary District of Chicago they "had times when the operating of the hydrogen sulphide did result in some sickness and effect on the eyes of the men working there, and that condition does not apply now, but it did happen" (R. 1917, JA-I, 219-220). Mohlman further testified that when the old West Side plant first started up hydrogen sulphide in the enclosed operating gallery did affect their eyes (R. 1917, JA-I, 219-220).

According to the above testimony of Muehlberger, toxicologist, called by the State of Illinois, one of the first effects of hydrogen sulphide on the human system would be to attack the mucus membrane of the eyes causing irritation and a burning sensation. Mohlman, sanitary expert for the Sanitary District, likewise testified that the only case of illness that he knows of to workmen caused by hydrogen sulphide gases in the plants of the Sanitary District was in the old operating gallery of the old West Side plant when in an enclosed space the hydrogen sulphide gas irritated the eyes of the workmen.

It is significant that not a single witness at Joliet testified to suffering from a burning sensation of the eyes or of any irritation of the eyes. Had the various ailments and illnesses testified to by the Joliet witnesses, such as nausea, headaches, inability to find sleep easily, loss of appetite, and the like, been due to hydrogen sulphide gas, it is clear that such gas in concentrations sufficient to cause the ailments complained of would also have been sufficient to have caused irritations of the eyes in at least some of the cases.

10. *The records in the office of the United States District Engineer at Chicago, Illinois, confirm the conclusion that the Illinois Waterway constitutes no menace to the health of persons residing, working or traveling near or on such waterway.*

At the request of the Special Master, the United States District Engineer's office at Chicago, Illinois, prepared a statement, dated February 3, 1941, showing the amount of time lost from work during the years 1938, 1939 and 1940 through illness and injuries by male employees of the United States War Department in the Chicago District:

	Average Days sick leave per 305 work days		
	1938	1939	1940
Chicago District office	2.22	5.65	5.74
Joliet area	2.94	5.46	4.88
Calumet Harbor and Blue Island area	2.69	5.97	4.58
Peoria area	2.34	2.43	3.83

This exhibit shows that the total number of days' absence on sick leave in the Joliet area was greater in 1939 than in 1938, but there was a similar increase in the Chicago District office and in the Calumet Harbor-Blue Island area in the year 1939 as compared with 1938. This demonstrates conclusively that the increase in days of absence on sick leave at Joliet during 1939 was not due to any special conditions prevailing at Joliet. Moreover, the percentage of days sick leave in the Joliet area in 1940 was less than in the Chicago District office during 1940. Only in the Peoria area does the ~~total number~~ of days of absence on sick leave seem to be substantially less than either in the Chicago District office, in the Joliet area or in the Calumet Harbor-Blue Island area.

The conclusion to be drawn from the statement dated February 3, 1941, submitted to the Special Master showing the record of absences on sick leave and injury, is that the Illinois Waterway was and is not responsible for any illness or ailments resulting in sick leave on the part of the male employees of the United States District Engineer's office at Joliet by reason of any special conditions prevailing at Joliet, Illinois.

The Special Master in his Report, at pages 20 and 21, comments on the above figures and also reaches the conclusion that the Illinois Waterway does not constitute any menace to the health of persons residing or working along or on the said Waterway at Joliet.

11. *The medical testimony with respect to the effect of the actual condition of the Illinois Waterway on the health of the inhabitants of Joliet and Lockport, conclusively establishes that the Illinois Waterway has not and does not now constitute a menace to the health of such persons.*

(a) The record establishes that the Illinois Waterway has not in the past and does not now constitute a menace to health.

The medical experts called by the State of Illinois and the opposing Great Lakes States were divided in their opinions and conclusions concerning the effect of the actual condition of the Illinois Waterway on the health of the persons working on or near or residing near such Waterway. Among witnesses who testified for the opposing Great Lakes States on the health question were Doctors Enzer, Krumbiegel, Gute, Perkins, McNally and Moore.

1. *Dr. Norbert Enzer.*

Dr. Enzer testified that in his opinion any odors emanating from the Illinois Waterway at any season of the year would not constitute a menace to the health of the people of Joliet or other communities along the Illinois Waterway who inhale such odors (R. 2148, 2149, JA-I, 538-539).

Dr. Enzer further stated that the Illinois Waterway does not constitute in any sense an actual menace to the health of the inhabitants at Joliet and Lockport inasmuch as such Waterway is not used as a source of domestic water supply and is not used for bathing or other recreational purposes at Lockport (R. 2149-2150, JA-I, 539). Dr. Enzer stated further that such Waterway would not constitute a menace by reason of any airborne diseases from a structure of that nature and that at the most one might suffer discomfort or annoyance from an odor to which one might not be accustomed (R. 2150-2151, JA-I, 539-540).

He was of the opinion that the present conditions along the Illinois Waterway would not be materially improved from a health standpoint by an increase in the present diversion of 1500 c. f. s. to 5000 c. f. s. plus domestic pumpage (R. 2152-2153; 2166-2167, JA-I, 540-541, 547).

Dr. Enzer assumed in his opinion that the water was heavily polluted and heavily filled with bacteria and the like (R. 2158-2160, JA-I, 543-544). Dr. Enzer disagreed with the opinion expressed by Dr. Frederick, Health Commissioner of Joliet, with respect to the spreading of disease from the sewage in the Canal by insects, flies and the like (R. 2152, 2162, JA-I, 540, 545-546).

Dr. Enzer also testified that in his opinion it would be utterly impossible for concentrations of hydrogen sulphide sufficient to be harmful or constitute a menace to health to be present on or along the Illinois Waterway (R. 2173-2174, JA-I, 551). Dr. Enzer stated that he had been to Mt. Clemens, Michigan, and French Lick Health Resorts where the hydrogen sulphide content in the water and the air is very high and that those are places where people go for health purposes (R. 2175-2176, JA-I, 552; Report of Special Master Lemann, p. 36).

2. *Dr. Edward R. Krumbiegel.*

Dr. Krumbiegel, Health Commissioner of the City of Milwaukee, a witness for the opposing Lakes States, testified that in his opinion no odor emanating from the Illinois Waterway in the regions of Joliet or Lockport directly and solely of itself is the cause of any disease in the people living along the Waterway (R. 2179, JA-I, 554) and that the Illinois Waterway does not constitute an actual menace to the health of the inhabitants of Joliet or Lockport at any time of the year (R. 2180, JA-I, 554).

Dr. Krumbiegel was of the opinion it would ~~be~~ difficult to conceive of this Illinois Waterway giving off so much hydrogen sulphide as to cause illness in the people living along the course of the Waterway (R. 2186, 2198-99, JA-I, 557, 562). It was his judgment that if you exclude the possibilities of the water of the Illinois Waterway being used for drinking or bathing, there would be no potential menace from the presence in the stream of untreated or partially treated sewage (R. 2190, JA-I, 558). He testified further that he knew of no figures of any experience as to epidemics having been caused solely by hydrogen sulphide in the air and that he knew of no recorded cases indicating that the health experience, in health work, where illnesses among a substantial number of people, had been traced solely to hydrogen sulphide in the air (R. 2194, JA-I, 560). He then stated that in connection with this problem, when one speaks of nausea, loss of appetite and things of that type, one is speaking of symptoms which are not open to proof of any kind and that one could say he had a terrific headache and no one in the world could prove or disprove whether he did or did not have that headache; and that if a person vomited today and didn't vomit after today, one could not say he was sick, but if one vomited every day it might produce serious results (R. 2195, JA-I, 560). He concluded then that the present conditions along the Illinois Waterway did not constitute a real and immediate menace to the health of the people working thereon or residing nearby (R. 2198, JA-I, 561).

Dr. Krumbiegel testified that hydrogen sulphide diffuses immediately into the atmosphere and people could develop symptoms from hydrogen sulphide only if there were enough hydrogen sulphide to affect them and that would vary with the individual (R. 2193, JA-I, 559); for example, some people might find the fecal material of cows very obnoxious and yet millions of farmers live in and around such fecal material daily (R. 2193).

3. *Dr. Edwin B. Gute.*

Dr. Edwin B. Gute of Milwaukee, Wisconsin, Health Commissioner and Director of School Hygiene of the Village of Fox Point, Wisconsin, and Director of School Hygiene of the Village of White Fish Bay, Wisconsin, testimony was the same as Drs. Enzer and Krumbiegel (R. 2209-2211, JA-I, 565; Report of Special Master Lemann, pp. 36-37).

4. *Dr. James E. Perkins.*

Dr. James Eliab Perkins, Director of the Division of Communicable Diseases of New York State Department of Health, testified that in his opinion an additional diversion of 3500 c. f. s. would not decrease the amount of typhoid germs present in the water and that there was a possibility that they might even increase (R. 2468, JA-I, 523) and that the only communicable diseases in the Waterway would be typhoid and bacillary dysentery (R. 2468, JA-I, 523) and that individuals could only contract these diseases by swallowing water from the Canal (R. 2469, JA-1, 524). He stated that an adequate concentration of chlorine would kill the typhoid bacillus (R. 2469) and that flies are not of importance in the transmission of typhoid germs from the Canal (R. 2470, JA-I, 524) since the house fly is the only one who transmits typhoid fever but that this type of fly does not light upon the water, but the house fly might carry germs from open privies and open pits filled with fresh excreta from men and carry them to mess kitchens and mess halls, etc. (R. 2470-2471, JA-I, 524-525).

Dr. Perkins disagreed with the opinion of Dr. Frederick, Health Commissioner of Joliet, that the scum on the Waterway dries and might be carried away by winds for miles (R. 2471, JA-I, 525) since typhoid bacillus is readily destroyed by sunlight and drying and under the circumstances present at Joliet you would not have any live typhi bacilli (R. 2471, JA-I, 525). Dr. Perkins testified that a polluted stream containing hydrogen sulphide would not be a menace to the health of the surrounding country because in his opinion a polluted stream could not give off sufficient hydrogen sulphide (R. 2476, JA-I, 526). He stated that you could have enough hydrogen sulphide to give a very distinct odor and yet have it below the amount necessary to cause toxic symptoms (R. 2480, JA-I, 527). Dr. Perkins in response to questions by the Master testified that in his experience he had never heard of germs being wafted through the air from a polluted stream (R. 2491, JA-I, 530) and that the only possibility of health trouble from this stream would be either by drinking the water or swimming in it (R. 2491, JA-I, 530).

He disagreed with testimony given by some of the doctors at Joliet that there were streptococci germs in this water and that trouble could be experienced with nose and throat and sinus ailments (R. 2491, JA-I, 530).

5. *Dr. William D. McNally.*

Dr. William D. McNally, a toxicologist, called by the opposing Great Lakes States testified that in his opinion the Illinois Waterway, as the result of receiving untreated or partially treated sewage, is not a menace to the health of the inhabitants of the communities of Joliet and Lockport or the people working or sleeping on boats over such Waterway, from the presence of hydrogen sulphide (R. 2669, 2700, JA-I, 491). Dr. McNally testified that at 100 or 500 or a thousand feet away, the concentration of hydrogen sulphide gas would be diluted many thousand times (R. 2672, JA-I, 492) because it diffuses in the air very rapidly (R. 2673, JA-I, 492). He stated that there are no recorded cases of epidemics of illness from hydrogen sulphide breathing from open waterways like the Illinois Waterway (R. 2678, JA-I, 494) and that the literature of toxicology says nothing about deleterious effects of hydrogen sulphide from the Waterway (R. 2679, JA-I, 494).

Dr. McNally further testified that automobiles give off a poisonous gas and that a 1% concentration of carbon monoxide gas would kill within 2 or 3 minutes (R. 2699, JA-I, 501) and that the characteristics of carbon monoxide and hydrogen sulphide are similar in reactions and they are very toxic gases (R. 2699, JA-I, 501) and that a sufficient quantity of hydrogen sulphide could be introduced into the air from railroad trains to cause discoloration of painted houses located some distance away (R. 2702, JA-I, 501).

6. *Dr. Josiah J. Moore.*

Dr. Josiah J. Moore, a physician and pathologist of Chicago, a witness for the opposing Great Lakes States, was of the opinion that any bacteria from the scum on the surface of a polluted waterway, or germs or bacteria present in the scum on the sides or wall of a polluted waterway would not be blown away in such a way as to cause a hazard, producing disease to people along the Waterway (R. 2652, JA-I, 531). He stated that no epidemic could occur in a community adjoining a Waterway containing untreated or partially treated sewage as a result of the transmission of germs or bacteria from such a waterway by air (R. 2652, JA-I, 531). Dr. Moore testified that in his opinion from a bacteriological study of an analysis of the air in the vicinity of Joliet and Lockport along the Illinois Waterway as indicated by tests shown on Opponents' Exhibit 7, that the air in that vicinity would constitute no danger to the health of the people along the Waterway (R. 2653, JA-I, 531-532). He stated there was no basis for any suggestion that germs from this waterway might cause streptococcic infections in the throat (R. 2657, JA-I, 532) or nose (R. 2658, JA-I, 532) and that any such infection would be due to contact carriers, one individual to another and not by water (R. 2658, JA-I, 532). He was of the opinion that one could not get streptococcus sore throat from sewage odors and you could not get it by living on the banks and breathing the air (R. 2659-2660, JA-I, 533). He stated there was no source of danger from B. coli since in its proper place it is not pathogenic and if there were any other organisms in the water containing B. coli we could drink water and simply increase the number in our own intestinal tract without causing a disease in the intestinal tract (R. 2768-2769, JA-I, 534); and the only danger from B. coli would be where they had gotten out of the intestines of the patient or by penetration of the skin (R. 2770, JA-I, 534); but one could not get B. coli by breathing the air over this Waterway (R. 2771, JA-I, 535).

(b) The conclusions of the Medical Experts called by the State of Illinois with respect to conditions which they suggested should obtain at Joliet were based upon generalities and Standards which do not exist in any other Industrial Community in America.

1. *Professor Anton J. Carlson.*

The chief medical expert on the health question for Illinois was Dr. Carlson. He inspected the Illinois Waterway on October 13, 1940 and had read much of the testimony at Joliet. He testified that in his opinion "the present condition is more than a menace to health; it is inimical to health" and he stated that the factors he would consider in determining what constituted an actual menace to health means that conditions exist in the Waterway that through accident or ordinary course of human events can lead to injury to health (JA-I, 284-285). He was of the opinion that one does not have to prove actual injury to health but that you have to prove that conditions exist there which through accident or ordinary course of human events may result in injury to health. Dr. Carlson further indicated his view that there was an actual menace from dysentery bacilli, from typhoid bacilli and from the amoeba of dysentery. It was his view that water does not have to be used for drinking or cooking to constitute such a menace and it does not have to occur either for 10 or 15 years, but it is still a menace (JA-I, 284). The fact that the present communicable disease rate in Joliet is no higher than in Joliet is of no importance whatsoever in dedetermining whether the Canal is a menace to health. He was of the opinion that either they have been lucky or that the medical statistics were not what they were supposed to be (R. 2891, JA-I, 285). It was also his view that the Waterway has been a menace to health since 1934 but that the menace has now been increased but he agreed that if the diversion from Lake Michigan were restored to 5,000 c. f. s. there would still be a menace to health, but that it would be less (R. 2980, JA-I, 289). Dr. Carlson likewise agreed that carbon monoxide from automobiles in the City of Chicago is a constant detriment to the health of the people residing therein (R. 2975-2978; JA-I, 288, See also: Report of Special Master Lemann, pp. 41-43).

2. *Professor Andrew C. Ivy.*

Professor Ivy was of the opinion that smoke, dust, noise, stray dogs, streams containing untreated sewage, pollution of air from any source, and the like all constituted a menace to health (R. 3037, 3052, 3058, 3060-61, 3075, JA-I, 306, 315, 318, 319) and should be abated. He was further of the opinion that an increase in the amount of the diversion would not eradicate the menace but would only decrease it (R. 3052-3053, JA-I, 315). He stated that the public health of Chicago was good insofar as communicable diseases, infant mortality, typhoid are concerned (R. 3070, JA-I, 324) but that due to smoke, dust, noise and other factors of that sort, the public health of Chicago is not so good (R. 3071, JA-I, 324; Report of Special Master Lemann, pp. 43-45).

3. *Professor Hugh A. McGuigin.*

Professor McGuigin was of the opinion that there may be conditions which are detrimental to health at Joliet which are unknown because the causes are unknown (R. 3087, JA-I, 330) and that if you do not know the cause you cannot eradicate it but that in many cases one could ameliorate it (R. 3088, JA-I, 330). He admitted that there were certain deterrents operating and producing ill health among people the causes of which are not known but that this condition is universal and not confined to Joliet (R. 3088, JA-I, 330). He admitted that if a large number of people were ill in a community the death rate would be higher because of the reduced resistance of ill people to most diseases (R. 3089, JA-I, 330; Report of Special Master Lemann, p. 45).

4. *C. W. Muehlberger.*

Mr. Muehlberger testified that hydrogen sulphide in dilute quantities acts as an irritant; it irritates the mucous membranes, primarily those of the eyes, causing a burning sensation of the eyes, irritation of the nose and throat (R. 2791, JA-I, 297), while in high concentrations there is a nervous depression resulting in symptoms of drowsiness, stupor, coma, finally causing death (R. 2788, JA-I, 295). He was of the opinion that people are entitled to a decent place to live, comfortable surroundings where the air they breathe is perfectly good healthy air and that anything which can be overcome which contaminates the air so that people aren't in a good sound state of health is a menace (R. 2810, JA-I, 303). He was unable to cite any specific instance of an individual having been overcome by hydrogen sulphide gas in the open from a waterway polluted with sewage (Report of Special Master Lemann, p. 40). He knew the Drainage Canal smelled prior to 1939 but he never noticed any irritation of his eyes or throat, or didn't notice them, prior to 1938 (R. 3011, JA-I, 303; Report of Special Master Lemann, p. 40).

12. *The Record Establishes that the State of Illinois has never Seriously Regarded the Illinois Waterway as a Menace to the Health of the Inhabitants of the Complaining Communities.*

As has been indicated elsewhere in this Brief, the Illinois Waterway has been a polluted stream for more than forty years and it has given off odors during all of that time and complaints concerning its condition have been made from time to time for more than twenty years. It is significant that at no time has the State Board of Health of Illinois or the Health Commissioners of Joliet ever officially declared that the Illinois Waterway constituted a menace to health or that an emergency existed by reason of the condition of the Illinois Waterway at Lockport and Joliet.

The Special Master points out that no representative of the Illinois State Board of Health or any Sanitary officer of the State of Illinois appeared before him to testify concerning health conditions (Report of Special Master Lemann, pp. 45-46). The Chief of the Illinois State Waterway Survey, Dr. A. M. Buswell testified for the Respondent Great Lakes States in support of their contentions concerning their ameliorating measures but he was not asked concerning health issues.

13. *The proper test of a "menace to health" is the effect of the conditions complained of upon persons in normal health and not the effect upon sickly persons or those below average health.*

Illinois complains that the Special Master failed to accept the proper definition of "menace to health" as presented by the testimony. We respectfully submit that the conclusion of the Special Master that "the test is the effect of the acts complained of upon persons of ordinary sensibilities and in normal health" is correct and that the effect of the odors upon invalids or persons of less than average health could not be accepted as any test of health menace. Moreover the record establishes conclusively that the ailments complained of by the witnesses who testified at Joliet are trivial, inconsequential, transient and such as are common to all persons everywhere and that such ailments have not resulted from, or been caused by, the Illinois Waterway. The witnesses who testified at Joliet were, with one or two exceptions, healthy, normal persons, most of whom inclined to overweight. As the Special Master points out, even in private cases the test has never been the effect of the acts complained of on sickly, invalid or neurotic individuals.

PART FIVE.

A. MISCELLANEOUS MATTERS.

1. *Illinois' Contention that No Measurable Harm Will be Done the Great Lakes States by the Increased Diversion from Lake Michigan, Suggested by the Modified Petition of Illinois, is Wholly Without Merit.*

It is settled that the illegal diversion of water from Lake Michigan by Illinois and its agency, the Sanitary District of Chicago, has substantially lowered the levels of the Great Lakes and such lowering of the natural levels of the Great Lakes has caused great continuing damage to the respondent Great Lakes states and their citizens and that the restoration of normal lake levels and the termination of such continuing damages to the respondent Great Lakes states and their citizens will require a period of fire years after the termination of the illegal diversion of water from Lake Michigan by Petitioner and its agency, the Sanitary District of Chicago.

These matters are all severally *res adjudicata* under the decisions and decree of this Court (*Wisconsin et al* v. *Illinois et al,* 278 U. S. 367; Decree of April 21, 1930, 281 U. S. 696).

The modification of the decree as requested by the petitioner State of Illinois would, if granted, postpone the restoration of normal lake levels and the termination of these continuing damages to respondents and their citizens for a period of several years. During most of the navigation season of 1940 the draft of vessels carrying the great ore, coal and grain traffic between the head of the lakes and lower lake ports was very much restricted greatly reducing the loads which could be carried by vessels carrying ninety per cent of this traffic, in comparison with the loads which could have been carried but for the lowered lake levels caused by the diversion through the Chicago Drainage Canal.

The lowering effect which would result from the temporary increased diversion from Lake Michigan, as requested in the modified petition of Illinois, would cause great and irreparable damage, regardless of whether such lowering would be one-third of an inch, or one-half of an inch, or one inch, inasmuch as any slight lowering of lake levels of even a fraction of an inch will result in great damage to the respondent Great Lakes states and their citizens. (Report of Special Master Hughes (1927), pages 114-115. See also the opinion of Secretary of War Stimson denying a request for increased diversion which opinion is quoted in part in the report of Special Master Hughes, page 62. Secretary Stimson points out that every drop of water taken at Chicago tends to nullify costly improvements made by Congress, as well as inflict a heavy loss upon navigation interests. *Wisconsin et al* v. *Illinois et al,* 278 U. S. 367, 409).

And as Special Master, Honorable (now Chief Justice) Charles Evans Hughes pointed out the damages and losses to the respondent Great Lakes states and their people are greatest when the mean water levels on the Great Lakes are the lowest. (Report of Special Master Hughes (1927) page 116).

It is clear the court considered the matter of damages to the opposing Great Lakes States by an increase in diversion at Chicago to be closed and not open to consideration again. Illinois raised the issue of damages in its petition, this issue was controverted in the return of the respondent Great Lakes states, and the Court did not include this issue among the subjects of inquiry by Special Master Lemann, thereby closing the door to a further discussion of this subject.

2. *The Special Master's Recommendation for a Decree dismissing the petition and modified Petition of the State of Illinois with costs against the State of Illinois should be affirmed.*

The record in this case establishes that the Special Master's Recommendation for a Decree should be affirmed. It is clear that costs, including the fees and disbursements of the Special Master, should be taxed against the State of Illinois.

On the previous decision in these causes, the court found that Illinois and the Sanitary District had for many years mantained an unlawful diversion in contravention of the rights of the states of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York, and that through such illegal action on the part of Illinois and the Sanitary District of Chicago, the opposing Lake States had sustained great damages to their navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other interests, and to riparian property in general (*Wisconsin et al* v. *Illinois et al,* 278 U. S. 367, at 407-9). The respondent Great Lakes States were compelled to prosecute long and expensive litigation to vindicate their rights and the rights of their citizens. There is no instance of such vast injuries being suffered with such great patience as has been exhibited by the respondent Great Lake States and their peoples in connection with this controversy. All other recourse failing, they were compelled to resort to litigation before this Court. The right of the states of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York to relief has been sustained; and we regard it as clear under the decisions of this Court that said Lake States are entitled on the record to a recovery of their costs (including the fees and disbursements of the Special Master) from the State of Illinois. (*North Dakota* v. *Minnesota,* 263 U. S. 583; *Wisconsin et al.* v. *Illinois et al,* 281 U. S. 200; 289 U. S. 395, 77 L. Ed. 1292.) Moreover, Illinois and its agency, the Sanitary District of Chicago should be compelled, in all fairness, to reimburse the Lake States for all expenses by way of expert witness fees, and the like, from the sum of $12,500.00 which was realized as additional profit from the 10 day flushing test to which the Lake States agreed (Report of Special Master Lemann, p. 82).

CONCLUSION.

We respectfully submit that upon the whole record herein the recommendation of the Special Master that a decree be entered dismissing the petition and the modified petition of the State of Illinois for modification of the Decree of April 21, 1930 and taxing costs (including fees and disbursements of the Special Master) against the State of Illinois, should be affirmed.

Respectfully submitted,

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Filed April 30, 1941.

APPENDICES

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1940

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA, *Complainants*, *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 2 Original
STATE OF MICHIGAN, *Complainant*, *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 3 Original
STATE OF NEW YORK, *Complainant*, *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 4 Original

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ARGUMENT IN SUPPORT OF EXCEPTIONS FILED BY THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK TO THE REPORT OF SPECIAL MASTER LEMANN, DATED MARCH 31, 1941.

APPENDIX I.

PREFACE.

The exceptions filed by the opposing Great Lakes States to the report of the Special Master, as we have noted hereinbefore arise only in the event that it should be held by the Court that an actual menace to the health of the inhabitants of the complaining communities exists. No health menace in fact exists. It will therefore be unnecessary for the court to consider arguments and discussion which follow herein. However for the convenience of the Court and to preserve for the record the position of the opposing Great Lakes States, in order to protect their right to findings on the matters discussed herein, if, at any time an issue is raised in which those matters become important, we have included an argument in support of such exceptions as an appendix to this brief.

1. ARGUMENT ON THE EXCEPTION RELATING TO REMEDIAL OR AMELIORATING MEASURES.

III. "WITH RESPECT TO THE FEASIBILITY OF REMEDIAL OR AMELIORATING MEASURES AVAILABLE TO THE STATE OF ILLINOIS WITHOUT AN INCREASE IN THE DIVERSION OF WATER FROM LAKE MICHIGAN."

The third issue of fact (discussed in this Brief at pages 77 to 104) with respect to the feasibility of ameliorating or remedial measures available to the State of Illinois without any increase in diversion of water from Lake Michigan, arises only in the event that the Court should hold that an actual menace to the health of the complaining communities exists. The finding of the Special Master that no actual menace to health exists disposes of the issues raised on the Reference of April 3, 1940. This finding of the Master is amply sustained by the record and will, we believe, be affirmed by the Court. Hence it will be unnecessary for the Court to consider the discussion herein of the available feasible remedial measures. However, as we indicated in our Exceptions which were filed with this Court on April 15, 1941, we wish to place upon the Record our position with respect to feasible ameliorating measures available to the State of Illinois without an increase in diversion of water from Lake Michigan. This is to protect the respondent Great Lakes States in the event that this question should again arise in the future to the end that appropriate findings thereon may be made.

(a) The accumulation of sewage wastes and sludge in the Sanitary District Canal and in the Brandon Road Pool has not created at any time any nuisance condition affecting public health, nor has the actual condition of the Illinois Waterway at any time constituted an actual menace to the health of the inhabitants of the complaining communities and, while no remedial or ameliorating measures are in any wise necessary to protect the interests of public health, neverthless there are a number of remedial or ameliorating measures available to the State of Illinois without an increase in water from Lake Michigan which would improve the present condition of the Illinois Waterway.

It is the position of the respondent Great Lakes States that it has been proven and established by evidence that the actual condition of the Illinois Waterway, by reason of the introduction of untreated sewage, has not at any time and does not now constitute a menace to the health of the inhabitants of the complaining communities and that the accumulation of sewage wastes and sludge in the Sanitary District Canal and in Brandon Road Pool has not created any nuisance condition, affecting public health, and that the adoption of remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan is in no wise necessary to protect the interests of public health or navigation, nevertheless there are a number of remedial or ameliorating measures available to the State of Illinois without an increase in diversion of water from Lake Michigan which could be undertaken, either singly or by a combination of one or more thereof.

(b) The remedial or ameliorating measures which are feasible and practicable and available to the State of Illinois without an increase in the diversion of water from Lake Michigan are many.

1. *The lagooning of all sludge from the west-southwest area not converted into fertilizer nor deposited on spoil banks so as to keep out of the main channel all sludge from partially or completely treated sewage. Lagooning is now being practiced by the Sanitary District of Chicago.*

The lagooning of all of the sludge from the West-Southwest Side area not converted into fertilizer nor deposited on spoil banks to the end that such sludge may be kept out of the main channel is now being practiced by the Sanitary District of Chicago. As the Special Master points out, lagooning as a partial ameliorating measure was only adopted by the Sanitary District of Chicago since the hearings before the Master began (Report of Special Master Lemann, p. 65). The suggestion of the opposing Great Lakes States that lagooning be practiced by the Sanitary District was at first strenuously opposed but was later adopted so that after October, 1940, no more sludge is discharged into the Illinois Waterway except what appears in the suspended solids contained in the incompletely treated effluents of the West and Southwest plants. The adoption of lagoons by the Sanitary District of Chicago is one of the most important steps that could be taken to obtain and maintain satisfactory sanitary conditions in the Illinois Waterway (Warrick, R. 2108, JA-I, 475; Ellms, R. 2089-90, JA-I, 454; Enslow, R. 1985, JA-I, 393; Howson, R. 1940-1942, JA-I, 338-339; Pearse, R. 210, JA-I, 103; Mohlman, R. 1875, JA-I, 216; Calvert, R. 2622-2623, JA-I, 268).

2. *The use of chlorine in the water of the Main Channel of the Chicago Drainage Canal and in the water of the Brandon Road Pool for odor control and reduction of B. O. D. This could be undertaken during the summer of 1941.*

(a) In general.

One of the remedial or ameliorating measures available to the State of Illinois without any additional diversion of water from Lake Michigan is the use of chlorine for odor control and for the reduction of B. O. D. Examination of the evidence in the present record discloses that chlorine may be effectively used to prevent odors and to reduce the B. O. D. in the waters of the Main Channel of the Chicago Drainage Canal and in the Brandon Road Pool so as to improve the unsatisfactory conditions which obtained in the year 1939.

The controversy between petitioner's witnesses and the witnesses of the respondent Great Lakes States relates to the amount of chlorine to be used, the places where the chlorine is to be applied and the cost to the Sanitary District of Chicago in the use of chlorine as an ameliorating or remedial measure herein.

The Special Master observed:

> " . . . as I have followed the testimony, I believe everybody would agree that chlorine is an effective

> agent. My impression is that hasn't been denied even by the experts for Illinois, and the whole contention is going to be about the amount of cost that would be required for effective chlorination in an enterprise of this character. Of course, we know Chicago is the second largest city in the United States and the third largest in the world, and everything in Chicago is on a large scale. . . ." (R. 2110).

Mr. Enslow, one of the witnesses called by the respondent Great Lake States to testify concerning the use of chlorine as a remedial or ameliorating measure available to the State of Illinois without the use of additional water from Lake Michigan, testified that the amount of chlorine required for odor control and the reduction of B. O. D. so as to provide pasteurization, not sterilization, would be a minimum of 27 tons per day (R. 2070-2072, JA-I, 408-409); with a maximum of 75 tons per day (R. 2072, JA-I, 409). He estimated the cost of the chlorine treatment plants required at the Southwest Side Plant and at the Brandon Road Pool at no more than $85,000 for each building, which was the cost of the 27-ton chlorine plant at Detroit, Michigan (R. 2025-2027, JA-I, 407-408).

Mr. Enslow in the light of his vast experience with the use of chlorine for odor control and for the reduction of B. O. D. was satisfied that the proper use of chlorine would greatly ameliorate the conditions complained of on the Illinois Waterway (R. 1987-1990, JA-I, 393-394). While he stated that in his opinion there was no exact parallel case in existence for the use of chlorine because of such a deep river underlaid by sludge (R. 2924, JA-I, 415), he was nevertheless confident that because of his knowledge of worse conditions elsewhere, of waterways which were improved by the use of chlorine, that chlorine would be an effective agent in ameliorating or remedying the conditions in the Main Channel of the Chicago Drainage Canal and in Brandon Road Pool (R. 1987-1990, JA-I, 393-394).

Mr. Enslow further testified that the use of chlorine as an ameliorating measure for odor control and reduction of B. O. D. would be more effective than the additional diversion of 350 c. f. s. from Lake Michigan (R. 2003).

Dr. A. M. Buswell, chief of the Illinois State Waterway Survey, another witness called by Respondent Great Lakes States testified that chlorine is widely used for the prevention of odors and is effective in the reduction of B. O. D. (R. 1896, JA-I, 435). He stated that chlorine properly applied in the Canal would prevent the odors complained of (R. 1897-1898, JA-I, 435-436), and that chlorine in the amount of one to three p. p. m. would be enough (R. 1899, JA-I, 436). He was of the opinion that the amounts of chlorine he testified to would be as effective in ameliorating the condition complained of as the oxygen from an additional diversion of 3500 c. f. s. (R. 2256, JA-I, 442). He estimated the cost of chlorine over a 100 day period in summer for controlling odors at Lockport and Joliet would run between $1000 and $1200 per day (R. 2255, JA-I, 441).

The testimony of Dr. Buswell may be summed up in the following colloquy (R. 2262, JA-I, 444):

(The Master)

Q. "Summing up, Doctor, I understand you are confident without further examination (a) that the quantities of chlorine that you have referred to would substantially ameliorate conditions, although you could not be confident it would eliminate all odors without experiment—"

A. "That is right."

Q. (b) "that you are confident that the quantities of chlorine that you have referred to would give as much amelioration as 3500 additional c. f. s. from Lake Michigan; is that a correct summation?"

A. "That is my opinion" (R. 2262, JA-I, 444).

Joseph W. Ellms, Commissioner of the Division of Sewage Disposal in the Department of Public Utilities in Cleveland, Ohio, testified that the use of chlorine for control of odors complained of in the Illinois Waterway, and particularly in the Brandon Road Pool, would reduce and perhaps eliminate such odors (R. 2093, JA-I, 456). Mr. Ellms testified that a chlorine plant to apply 50 tons per day could be built for considerably less than $300,000 (R. 2315, JA-I, 467). Mr. Ellms estimated that the construction of a 50-ton chlorination plant would take about 6 to 7 months for completion and perhaps a month or a month and a half longer for an additional 75-ton plant (R. 2314, JA-I, 467), but that if the contractor was building those machines it would not make very much difference in time whether he were building the number for 50 tons a day or for 75 tons a day (R. 2314, JA-I, 467). He testified further that sufficient chlorine storage could be provided for a 15 or 20 day supply (R. 2315, JA-I, 467).

Mr. Ellms further testified that in his practice he has applied chlorine to water and also to sewage (R. 2302, JA-I, 461); that chlorine is applied to the influent at the two plants in Cleveland, Ohio, and also to the effluent as well. The quantities applied to the influent run from 3 to 5 p. p. m. and to the effluent, in the one case, 4 or 5 p. p. m. and in the activated sludge effluent 2 to 3 p. p. m. (R. 2303, JA-I, 461). Chlorine has been applied for the purpose of preventing any odors which may arise from the sewage entering the plant and in effluent from the plant it has been applied to keep down the pollution of the lake water in the vicinity of the bathing beaches of Cleveland that has been carried on through about 100 days during the summer months or during the bathing beach season (R. 2304, JA-I, 462).

Mr. Joseph Warrick, State Sanitary Engineer of Wisconsin, testified that the use of chlorine would tend to ameliorate or remedy conditions complained of in the Illinois Waterway and particularly at the Brandon Road Pool without any increase in the diversion of water from Lake Michigan (R. 2105, JA-I, 476).

Mr. Warrick testified that the range in quantities of chlorine to be used would be from 3 to 5 p. p. m. for a treated effluent, completely treated effluent, from 5 to 10 p. p. m. for a primary treated effluent, that is, with the settleable solids removed, and from 10 to 20 p. p. m. for a screened or raw sewage, those being recognized as rough brackets of chlorination with some sewages (R. 2111-2112, JA-I, 477). Mr. Warrick testified that the application of chlorine at Brandon Road Pool or immediately above would be the most beneficial as regards conditions at Joliet and Lockport (R. 2248, JA-I, 483-484).

Mr. Warrick pointed out that the placing of chlorine in at several points would have a pasteurizing effect; that even though there was no available chlorine showing up by tests there would be a beneficial action and that experience has shown that chlorine applied ahead of septicity has reduced the amounts of chlorine, the overall amounts that are necessary and therefore several points of application would be beneficial (R. 2248, JA-I, 483-484).

Louis R. Howson, a witness called on behalf of the opposing Great Lakes States, is a consulting hydraulic and sanitary engineer.

He testified that chlorination is a very effective and positive method of controlling odors and that in his opinion it would be practicable and effective along the Illinois Waterway to relieve the conditions complained of, particularly at Joliet and Lockport (R. 1943-4, JA-I, 339). Mr. Howson testified that in his opinion one or a combination of the ameliorating or remedial measures suggested by him to ameliorate or remedy the conditions complained of along the Illinois Waterway would afford the same relief that would be afforded by the addition of 3500 feet of water from Lake Michigan (R. 1951, JA-I, 340).

In a chart introduced by Mr. Howson, Opponent's Exhibit 11 (R. 2832, JA-II, 104) Mr. Howson estimated that 6 p. p. m. of chlorine would be required on the entire canal flow of 3130 c. f. c. and that this would cost $360,000 to provide the installation of the equipment required to utilize the chlorine for chlorination of the canal water and that the annual operating cost would be approximately $70,000 to $300,000 (Opponent's Exhibit 12, R. 2847, JA-II, 105); that the time required to provide this equipment would be from 6 to 9 months (Opponent's Exhibit 12, R. 2847; JA-II, 105). Mr. Howson's estimate of 6 p. p. m. of chlorine required to control the odors complained of with a total flow of 3130 c. f. s. measured at Lockport, would amount to about 50 tons of chlorine per day (Opponent's Exhibit 11, Item 5, R. 2832, JA-II, 104).

Among the witnesses who were called by the Petitioner State of Illinois to testify concerning the use of chlorine for odor control and for reduction of B. O. D. were Mr. Langdon Pearse, Dr. Floyd W. Mohlman of the Sanitary District of Chicago, and Mr. C. K. Calvert of Indianapolis, Indiana. The witnesses disagreed with the Lake States' theory that chlorination would be an effective feasible ameliorating measure because of the cost and alleged doubt as to the efficacy of this treatment as applied to such a heavily polluted stream as the Illinois Waterway (Report of Special Master Lemann, pp. 87-89).

3. *Chlorination of the West Side Imhoff tank effluents.*

In addition to the use of chlorine by applying the chlorine to the waters of the Main Channel of the Chicago Drainage Canal and to the Brandon Road Pool, another ameliorating measure which could be adopted is the application of chlorine directly to the West Side Imhoff tank effluents (Howson, R. 2840-2842, JA-I, 344-345; Ellms, R. 2089-2093, JA-I, 454-456; Enslow, R. 2024, JA-I, 406-407; Opponents' Exhibit 12, Item 9, R. 2847, JA-II, 105). Mr. Howson testified concerning the application of chlorine directly to the West Side effluent that chlorination of the effluent of the West Side Imhoff tanks would do most of what could be accomplished by chemical precipitation and at a vastly lower expense (R. 2840-42, JA-I, 344-345). It would cost about $100,000 to install the equipment for chlorinating this effluent for 150 days a year, and would cost less to operate such equipment. He stated that such installation could be made in from six to nine months and that Mr. Enslow had advised him the figures of cost given for this item on Opponent's Exhibit 12 are sufficient to effect a reduction of 15 parts or more in the B.O.D. of the West Side Imhoff tanks. That would be equivalent to approximately 50,000 pounds of B.O.D. removed as compared to 76,000 pounds by the chemical precipitation method as shown on Opponents' Exhibit 11, JA-II, 104 (R. 2840-2841, JA-I, 344-345).

Mr. Ellms testified (R. 2090-2093, JA-I, 454-456) that the effluents of the sewage disposal plants at Cleveland, Ohio, have received treatment with chlorine for the past 17 years; that the City of Cleveland discharges the effluents of its disposal plants into the same body of water from which the City draws its water supply and that chlorine is used as a sanitary protection, to a certain extent, to the water supply, and that the orders of the Ohio State Board of Health were that Cleveland should also use chlorine in connection with keeping the marginal waters in as clean a condition as possible during the bathing season (R. 2091, JA-I, 455). Ellms testified that chlorine is used at two of the sewage treatment plants but that the plant whose effluent is discharged in the Cuyahoga River is not treated with chlorine, but during the summer bathing season, between the last of May and the middle of September, chlorine is applied to the effluents of the two lake front plants (R. 2091-2092, JA-I, 455-456).

Mr. Ellms then gave his opinion that based on his experience in controlling odors which he assumed were as applicable to the effluent of the Sanitary District of Chicago as those of Cleveland, Ohio, chlorine has a beneficial effect upon odor nuisances, particularly those odor nuisances that might be derived from the development of hydrogen sulphide (R. 2092, JA-I, 455-56). Mr. Ellms' conclusion was that for reduction or elimination of hydrogen, sulphide, chlorine is an effective agent (R. 2093, JA-I, 456).

Mr. Enslow gave it as his opinion that considering the difference in cost involved between what is obtainable with chemical precipitation and what is obtainable with chlorination, that chlorination would be the quicker and simpler thing to use and that chlorine so used by application to the West Side effluent a much lesser amount of chlorine would be applied to the Canal waters direct (R. 2024, JA-I, 406-407).

Considering the fact that chlorination is now so universally used in modern sewage treatment as an effective agent for the reduction of B. O. D. and for odor control (Howson, R. 2841, JA-I, 344) and considering the experience had at Cleveland, Ohio, as related by Mr. Ellms (R. 2090-2093, JA-I, 454-456), it is clear that chlorination of the West Side Imhoff tank effluent would be an effective ameliorating agent in improving conditions in the Illinois Waterway, particularly at the Brandon Road Pool.

The cost of an installation to provide chlorination of the West Side effluent would be $100,000. Such an apparatus could be installed in from 6 to 9 months and the annual operating cost for 150 days of warm weather each year would be $105,000 (Opponents' Exhibit 12, R. 2847, JA-II, 105; Howson, R. 2840, JA-I, 340).

4. *Properly constructed cascades at the site of the old controlling works near Lockport which would provide an average dissolved oxygen pickup of at least 6¾ parts per million with an average flow of 3130 c. s. f.*

The use of cascades by the construction of temporary structures at the site of the old controlling works about one mile northeast of the present power house and controlling works of the Sanitary District of Chicago would be very effective in providing, through reaeration, additional dissolved oxygen of about 6¾ parts per million with an average flow of 3130 c. s. f. (Opponents' Ex. 10, R. 2828, JA-II, 103; Warrick, R. 2107, JA-I, 476; 2233-2236, JA-I, 479; Pearse, R. 195, JA-I, 97; Mohlman, R. 239, JA-I, 195).

In his direct testimony Mr. Pearse, Sanitary Engineer for the Sanitary District of Chicago, in discussing the reasons why activated sludge was chosen to supplement the West Side Imhoff tanks, stated:

> "Second: In studying the problem of maintaining The Illinois Waterway in a suitable condition a number of unknown factors or contingencies have appeared which are beyond the control of the Sanitary District, such as the development of water power, which would practically stop all reaeration at dams. Such reaeration is of value in the self-purification of the waterway" (R. 195, JA-I, 97).

Dr. Mohlman in discussing dissolved oxygen in the waterway said, in part:

> "That brings in assets of dissolved oxygen. Then we can also get additional assets from the absorption of oxygen in the air. We can get it from aeration going over dams, or any such method of agitation. There is

a certain amount in the effluents from the sewage treatment works, although a rather low amount'' (R. 239-240, JA-I, 195).

Warrick based his opinion upon results obtained at the Hastings Dam below Minneapolis, where considerable dissolved oxygen was gained in the water through reaeration over this dam (R. 2233-2236, JA-I, 479).

The experience of the Sanitary District itself is definite proof of the value of the use of cascades in providing additional dissolved oxygen through reaeration for purification of the Illinois Waterway. The Sanitary District of Chicago has provided cascades in the outfall sewers of the North Side Sewage Treatment Plant, and the following table, taken from State of Illinois Exhibit No. 20 (R. 142-147), shows during the period 1934-1939 inclusive an average of 6.7 parts per million of dissolved oxygen has been provided by the cascades in the outfall sewers at this plant:

		Average for Year P.P.M. Dissolved Oxygen		P.P.M.
Record	Year	Final Settling Tanks	Outfall Sewers	Gained Through Cascading
142	1934	1.4	8.0	6.6
143	1935	2.5	9.3	6.8
144	1936	2.2	9.0	6.8
145	1937	2.0	8.9	6.9
146	1938	2.7	9.4	6.7
147	1939	2.2	8.7	6.5
		Average gain for six years		6.7

It will be seen from the foregoing that the results obtained by the Sanitary District by cascading at this particular point confirms Mr. Howson's estimates that 6¾ parts per million of dissolved oxygen can be supplied by this means.

The record of tests made by Mohlman further establishes that the results of the ten-day tests undertaken from December 2nd to December 12th, 1940, show there was a gain through reaeration over the Brandon Road Dam of an average of about 9½ parts per million of dissolved oxygen.

Mr. Warrick pointed out that if the percentage saturation at the point of cascading is around zero it is possible to put in as much as 50 to 75% of saturation by the cascading procedure (R. 2240, JA-I, 481-482) and that under summer conditions the figure of about 8½ to 9 parts per million is taken as 100% saturation and the amount restored would be 50% to 65% of that amount.

Mr. Warrick pointed out that while it was difficult to state how long the dissolved oxygen would last, yet such oxygen is all the time using, that is, satisfying the B.O.D. as it is passing downstream (R. 2240, JA-I, 481-2). Mr. Warrick also pointed out that the addition of dissolved oxygen to the water through reaeration by cascading is an ameliorating step to the extent to which it would supply oxygen to the water (R. 2244, JA-I, 482-483).

Mr. Howson estimated that the time required for building temporary cascades at the old controlling works would be from three to six months and that the cost would run from $50,000 to $100,000 (Opponents' Exhibit 12, item 4; R. 2847, JA-II, 105).

The suggestions that the cascades would create a local odor and waste $1500 worth of power per day are wholly without merit. As Enslow pointed out (R. 2009, JA-I, 402-3) any local odor nuisance could be taken care of by chlorine. The objection that it would waste $1500 worth of power per day is untenable because if an emergency exists and there is a health hazard, which we do not admit, profits of quasi-municipal corporations derived from the development of power should give way to the overwhelming demands of health protection. However, as we have shown before there is no emergency, nor is there any actual menace to the health of inhabitants due to the condition of the Illinois Waterway as a result of receiving untreated sewage.

The contention made by Illinois that the construction of cascades would provide a very inadequate means for improvement of conditions in Brandon Road Pool in 1941 and 1942 and would in no way compare with the advantage of diluting water is first an admission that the construction of cascades would provide some improvement while their argument in favor of additional diversion is not properly made because not within the scope of reference, which specifically refers to ameliorating measures without additional diversion of water from Lake Michigan.

The fact that the Sanitary District of Chicago uses cascades successfully in its outfall sewers at the North Side and Southwest Plants demonstrates that properly constructed cascades would be a feasible ameliorating measure.

5. *The installation of chemical treatment as a temporary measure for the further purification of the Imhoff tank effluent at the West Side treatment works.*

Another emergency measure which is practicable and which could be undertaken for the years 1941 and 1942 or until the completion of the additions required under permanent program of the Sanitary District of Chicago is the addition of chemicals to Imhoff tank effluent at the West Side plant.

Howson suggested the installation of chemical treatment for further purification of the Imhoff tank effluent at the West Side plant as an emergency measure for a two year period (R. 2830). Opponents' Exhibit 11, JA-II, 104, shows that chemical treatment at the West Side plant would reduce the B.O.D. of the West Side sewage by 21 parts per million. Howson's opinion is supported by A. M. Buswell who made a study of the use of chemical treatment at the West Side works for the P.W.A. Engineering Board of Review in 1932 (R. 1888-1889, JA-I, 431-432). Dr. Buswell then reported that with proper dosage of chemicals to the West Side effluent a 75% purification could be obtained (R. 1890, JA-I, 432) and Dr. Buswell testified that it was still his opinion that if the existing Imhoff tanks were supplemented with proper chemical treatment of the Imhoff tank effluent a 75% purification could be obtained instead of the present average purification of about 50%.

The cost of chemical treatment at the West Side plant is shown on Opponents' Exhibit No. 12 (R. 2847, JA-II, 105) and the initial investment would be approximately $1,300,500. The necessary equipment could probably be installed by the summer of 1941.

Buswell estimated the operating cost of a chemical plant for further purification of the Imhoff tank effluent at the west Side plant at from $6,000 to $8,000 per day (R. 2291, JA-I, 452).

There is no dispute whatsoever concerning the feasibility of the final permanent program adopted by the Sanitary District and the only question here is whether chemical treatment at the West Side works for further purification of the West Side Imhoff tank effluent is an ameliorating measure which is available to the State of Illinois without the diversion of additional water from Lake Michigan. We believe the record amply establishes that if any further assurance is required by the inhabitants of Lockport or Joliet concerning the condition of the Illinois Waterway, particularly the Brandon Road Pool, during the summers of 1941 and 1942, the State of Illinois and its agency, the Sanitary District of Chicago, can and should give proper consideration to the use of chemical treatment at the West Side works as an ameliorating measure.

6. *Increased use of air at the North Side and Calumet activated sludge plants. This would be an effective ameliorating measure in improving the conditions complained of on the Illinois Waterway.*

Additional oxygen to balance the B.O.D. in the Illinois Waterway could be obtained by the increased use of air at the North Side and Calumet Plants (Howson, R. 2825; Warrick, R. 2105, JA-I, 476; Ellms, R. 2090, JA-I, 454; Buswell, R. 1892-1895, JA-I, 433-434; Opponents' Exhibit 10, R. 2828, JA-II, 103; Opponents' Exhibit 12, Item 1, R. 2847, JA-II, 105). The equipment is already installed; hence there would be no initial capital expenditure for installations and the only cost would be some additional cost in the purchase of electricity for operating the equipment already there (Opponents' Exhibit 12, R. 2847, JA-II, 105). The annual operating cost based on 5 months operation, would be $89,000 while the annual cost based on 12 months operation, would be $216,000. There would be no time required for installations which are already available. By the use of increased air the equivalent of 55,000 pounds of oxygen could be added per day in the form of nitrate and nitrite oxygen (Towson, R. 2825).

Dr. Buswell, a witness testifying on behalf of the respondent Great Lakes States, stated that an increase in air beyond that required to merely produce bio-precipitation results in the formation of nitrates and nitrites from the nitrogenous material in the sewage and that it has been known for many years that nitrates carry oxygen available for the stabilization of the B.O.D. load in a polluted stream, and that in fact, up to 1920 an analytical method based on that property was used to estimate the B.O.D. load. Buswell stated that he did not know of any streams with nitrates and nitrites present in the water where septic conditions occurred. He stated further that nitrates, in his experience, tend to oxidize hydrogen sulphide if it is produced in some portion of the stream, and also to prevent the formation of hydrogen sulphide. The bacteria, in decomposing organic matter, require oxygen in order to burn the organic matter and supply energy for their own growth and they take the oxygen first from the dissolved oxygen and then from nitrates and then from sulphates; and the end product left when they take the oxygen away from sulphates is hydrogen sulphide (R. 1892-1894; JA-I, 433-434).

Mr. Warrick, State Sanitary Engineer of Wisconsin, testified that the use of an increased amount of air at the several activated sludge plants in the Chicago Sanitary District would have a beneficial effect on the Illinois Waterway, particularly from the point of view of putting additional oxygen into the effluent from the point of view of production of nitrates with the available oxygen from nitrates and tending to ameliorate conditions in the water in which they are discharged (R. 2106, JA-I, 476).

Ellms testified that one of the ameliorating measures available to the State of Illinois without an increase in diversion of water from Lake Michigan to ameliorate the conditions complained of along the Illinois Waterway, would be by the use of a large quantity of air at the activated sludge plants which might produce a large quantity of residual dissolved oxygen and also, possibly by the presence of certain amounts of nitrates which become available if the dissolved oxygen were doubled (R. 2090, JA-I, 454).

Ellms, when asked what is available as oxygen for biochemical activity by the presence of nitrates and nitrites, stated that—

> "The ordinary sodium nitrate would provide about one pound of oxygen for every 1.77 pounds of nitrate, * * * or to put it another way—one pound of nitrogen as nitrate will produce about 3.4 p. p. m. of oxygen." (R. 2090, JA-I, 454).

While it might be more economical to use as little air as possible consistent with a high degree of B.O.D. removal under ordinary cricumstances, it is manifest that in the case of an emergency or where temporary ameliorating measures are necessary to grant assurances to inhabitants on the Watercourse into which the effluent from sewage treatment plants is placed, then economies should be dispensed with and additional monies expended in increasing the air so as to obtain additional oxygen and nitrates and nitrites to balance the B.O.D. in polluted watercourses. The use of increased air at the North Side and Calumet plants is clearly an ameliorating measure which could be undertaken at once with existing installations without any initial capital cost and with an operating cost for five months of only $89,000 (Opponents' Exhibit 12, R. 2847, JA-II, 105). The benefits from the adoption of this measure would be very appreciable and coupled with the increased degree of purification of the sewage of the Sanitary District of Chicago, would assist in maintaining satisfactory conditions on the Illinois Waterway and particularly at Brandon Road Pool.

7. *The planned use of water permitted under the decree of April 21, 1930, will allow the Sanitary District of Chicago to divert approximately 2200 c.s.f. plus domestic pumpage or a total flow of 3850 c.s.f. during the four warm months of each year.*

The State of Illinois' Exhibits 12, R. 56-57, 13 R. 62, and 40 A (JA-II, 39) show the amount of diversion of water from Lake Michigan during the years 1939 and 1940. It will be noted from an examination of these exhibits that during critical warm months the dry weather diversion from May to October in the year 1939 (Illinois' Exhibits 12 and 40) amounted to an annual average of 1090 c.f.s. (R. 56-57, JA-II, 39). It is obvious that if the direct diversion permitted under the Supreme Court decree of April 21, 1930, limiting the annual average diversion to 1500 c.s.f. plus domestic pumpage were budgeted so as to provide an increased flow during the four warm months of the summer, that conditions in the Illinois Waterway during the hot weather would be improved by the additional oxygen in the water at the time when it is most needed.

Under the planning, suggested by Howson (Opponents' Exhibit 10, item 5, R. 2828, JA-II, 103) there would be provided during the four warm months of each year a total of 4200 c.f.s. measured at Lockport. This planned use of the water would double the dry weather diversion in the times when more oxygen is needed and could be so arranged that it could be taken either during the months of June, July, August and September or from the middle of May to the middle of September of each year.

It is admitted by Ramey that the Sanitary District could operate very nicely with a total flow of 2400 c.s.f. each month, and adding to this the average storm flow of 400 c.s.f. would permit a total withdrawal of water measured at Lockport of 2800 c.s.f. for eight months of the year or during the Fall, Winter and Spring months. During the remaining four months of hot weather the amounts that have been saved during the eight months of cool weather would be utilized to provide additional oxygen so as to improve the conditions of the Illinois Waterway during the summer months of each year. This regulation of the annual flow so as to equalize the pounds of oxygen which might be obtained in additional water diverted would provide about 22,000 pounds of extra oxygen per 24 hours and would be beneficial in ameliorating conditions along the Illinois Waterway (Opponents' Exhibit 10, R. 2828, JA-II, 103).

The Sanitary District has, it is true, since the opening of hearings before the Special Master, adopted a limited plan of budgeting the diversion within the decree so as to provide a flow of 3,700 c.f.s. during the summer months, as compared with the 4200 c.f.s. thought feasible by Mr. Howson. We believe the Sanitary District could enlarge its planned use of water under the decree to provide a diversion of 4200 c.f.s. during the summer months (Report of Special Master Lemann, pp. 99-102).

8. *Cleansing of the Brandon Road Pool by Hydraulic Dredging.*

It is agreed by the Sanitary Engineers that a part of the trouble caused in the Brandon Road Pool is traceable to the deposits of light flocculent active sludge and heavier deposited materials in the Brandon Road Pool. The sludge exerts an oxygen demand and contributes to the unsatisfactory conditions in that reach of the Illinois Waterway concerning which complaints have been made.

The Special Master called as a witness C. R. Andrew, Principal Civilian Assistant to the U. S. District Engineer at Chicago, Illinois, who testified to the location and physical characteristics of the Brandon Road Pool and to the character and extent of the deposit of solids therein (R. 2033-2034, JA-I, 255; Andrew's Exhibits 4 and 5). Mr. Andrew was asked by the Special Master whether the sludge that is present in the Brandon Pool and at other points in the Sanitary Canal could be removed by hydraulic means (R. 1501, JA-I, 250) Mr. Andrew defined sludge as having reference to that "material which has settled out of the water and is so much heavier than the water that it has formed deposits so solid that the surface may be detected by ordinary sounding methods, that is, by sounding line or lead line. In the case in question, the survey was made with a lead line, with a 10 lb. lead weight, and attached to the bottom of that was a 10″ disk, so that that defines the surface of any material which I may call sludge" (R. 1501, JA-I, 250). Mr. Andrew testified that the depth of the sludge deposited in the Brandon Road Pool was from 2 to 10 feet deep (R. 1503, JA-I, 250), that the deposits were mainly below Jefferson Street in Joliet with no appreciable deposits above Jefferson Street (R. 1503, JA-I, 250). Mr. Andrew testified that the material he spoke of could be removed by hydraulic methods (R. 1503, JA-I, 250). Mr. Andrew's best judgment was that it would cost between $500,000 and $750,000 to remove the deposits of sludge which were between a million and a quarter and a million and a half yards (R. 1504, JA-I, 251). He stated that it would take from 6 to 9 months to do this and that it would not necessarily interfere with navigation and that the sludge removed could be deposited in vacant areas in what is known as Hickory Creek Valley (R. 1504, JA-I, 251), and that it would take between 200,000 and 250,000 square yards which would be about 400 acres (R. 1505, JA-I, 255). The land available, Mr. Andrew stated that this deposited material had accumulated during all of the years, even during the period when the amount of water taken from Lake Michigan was considerably greater than it is today—that is, even when the flow was 8500 c.f.s. and when it was 5000 c.f.s. (R. 1505-1506, JA-I, 251).

Mr. Andrew testified further that an increase in diversions to 500 c.f.s. would not remove the accumulated deposits (R. 1506, JA-I, 251).

Mr. Howson presented his views on dredging of the Brandon Road Pool to remove the more compact solids and some of the lighter flocculent active solids in Opponents' Exhibit 12 (R. 2847, JA-II, 105). He stated that the approximate cost would be between $400,000 and $750,000 with no annual operating cost.

The removal of the more solid deposits and some of the lighter flocculent active material by hydraulic dredging and the deposit of such material in the lagoon downstream near Hickory Creek (R. 1504, JA-I, 251), would cause no trouble and be the source of no complaints.

While there may be some doubt as to the actual benefits to be derived from the removal of all of the deposited heavier sludge in the Brandon Road Pool, yet it is certain that if there is any question as to the effect of such heavy deposited material or the lighter sludge above such heavier solids, then in order to provide additional assurances of satisfactory conditions in Brandon Road Pool the removal of such heavy solids should be undertaken by hydraulic dredging and such removed material be deposited in Hickory Creek Valley section or farther downstream along the banks of the Dresden Island pool where no people reside who could complain of the odors caused by the presence of this deposited material.

9. *The additional treatment of the West Side effluent in the Southwest aeration tanks would provide increased purification of all of the sewage of the West-Southwest area.*

Another ameliorating measure available to the State of Illinois without an increase in diversion of water from Lake Michigan and which would not interfere in any way with their permanent program would be to provide additional final settling tanks for the Southwest Activated Sludge Plan (Opponents' Exhibit 12, R. 2847, JA-II, 105). The expenditure of funds in this way would, as an emergency measure, provide conditions which would be permanently useful and would not interfere with the permanent construction program of the Sanitary District (Howson, R. 2838-2839, JA-I, 343-344).

Mr. Howson, a witness for the opposing Great Lakes States in explaining Opponents' Exhibit 12, Item 8, testified that: The diversion of all West Side effluent to the Southwest aeration plant, all of which is a part of the permanent program of the Chicago Sanitary District, would require the expenditure of about three million dollars; that this could be done so as to be all or very largely in use by the summer of 1941 if it were organized and pushed immediately; that such diversion of the West Side effluent and treatment at the Southwest plant would reduce the present B.O.D. demand about 200,000 pounds per day, or some 40% (R. 2838-2839, JA-I, 343-344).

Mr. Pearse, a witness called on behalf of the State of Illinois, criticised this suggestion ameliorating measure on the ground that it would interfere with the permanent program of the Sanitary District and also on the ground that Mr. Howson had not included several items which in the judgment of Mr. Pearse would increase the cost considerably.

It will be seen, however, that the suggestion of Mr. Howson, for a slight change in the permanent construction program as to items of construction and with the expenditure of but a small additional amount of money, the Sanitary District could have available in 9 months, and in any event, have ready by the spring of 1942 the necessary additions required to provide aeration for the West Side effluent which would decrease or reduce the B. O. D. load to the Canal by about 200,000 pounds per day or some 40%. If this were organized and pushed at once this could be done so as to very largelybe in use by the summer of 1941 (Howson, R. 2839, JA-I, 343-344).

10. *Universal metering of the water supply of the City of Chicago.*

Universal metering of the entire water supply of the City of Chicago if undertaken at once and vigorously pressed would permit the installation of 30-50,000 meters in one year (Howson, R. 3253, JA-I, 362-363). This would reduce the domestic sewage flow principally in the Southwest area if the metering program were concentrated therein (Howson, R. 3253). Metering of the water supply of Chicago has been advocated for a great many years and a report was made in 1915 recommending meters (Howson, R. 3254, JA-I, 363). Moreover, metering of the Chicago water supply has been urged by various agencies. The permit of the Secretary of War dated March 3, 1925, to the Sanitary District of Chicago required metering as a part of the permit (Opponents' Exhibit 9, R. 2820). The report of the Board of Review (P. W. A.) dated April 30, 1934, likewise required metering in the South Side of Chicago as a part of the agreement between the P. W. A. and the City of Chicago in the construction of the South Side water filter plant (Howson, R. 2821).

If the Chicago water supply were metered this would unquestionably reduce the per capita consumption of water in Chicago (R. 2818). That has been the universal experience of all states where a metering program has been adopted (Opponents' Exhibit 8, R. 2818).

A cut in the water consumption would mean that a longer period of detention of the sewage could be provided in the aeration tanks which would increase the efficiency and degree of purification so that the effluent from the activated sludge plants would reach the Illinois Waterway with 1 or 2 p. p. m. more of dissolved oxygen in the effluent and with nitrates and nitrites to balance the oxygen demand in the Waterway. Moreover, a cut in the flow of sewage by metering would make available more capacity in the sewage treatment plants for storm water in the intercepting sewers (Pearse, R. 1795). A cut in the sewage flow would also extend the useful life of the sewage disposal plants (Pearse, R. 1783, JA-I, 155).

While it may be difficult to give any relief through metering in 1941, it is certain that metering ought to be undertaken at once to stop the enormous wastage of water now taking place and to preserve the useful life of the Sanitary District's plants (Report of Special Master Lemann, pp. 102-104).

11. *The State of Illinois Should Be Required to Proceed with Each and Every Remedial or Ameliorating Measure Suggested at the Hearings, either Singly or in Combinations, before any Additional Diversion of Water from Lake Michigan Is Recommended as an Ameliorating Measure.*

The record establishes that no additional diversion of water from Lake Michigan is necessary to protect the health of the inhabitants of the complaining communities. However, in the event that the State of Illinois wishes to furnish any additional assurances to the inhabitants of the complaining communities or to improve the present condition of the Illinois Waterway at Lockport and Joliet, the State of Illinois should be required to proceed first with each and every ameliorating or remedial measure suggested at the hearings and discussed by the Master in his Report, either singly or in combinations, before any additional diversion of water is recommended as an ameliorating measure.

The respondent Great Lakes States have consistently urged in connection with other suggestions of the use of chlorination as well as their other suggestions for ameliorating measures, that admitting but not conceding that there might be room for doubt as to the efficacy of such measures, and admitting that some expense would be involved in the use of each of them, Illinois should be required to try each and all of them before being permitted to divert any more water from the Great Lakes-St. Lawrence Watershed. As the Special Master points out there is much force in this contention from the standpoint of the general principles of law and equity which control in ordinary litigation (Report of Special Master Lemann, p. 90). We submit that it is clear on the record that in view of Illinois' lack of equity herein and in view of the admissions of the experts for the State of Illinois, that some good might be accomplished from the use of the remedial measures suggested. It would seem reasonable to require Illinois to try each and all of the available ameliorating measures before being permitted to take one drop of additional water from Lake Michigan.

At this point, we wish again to point out that the unsatisfactory conditions in the Illinois Waterway, particularly at the Brandon Road Pool, of which complaints were made, were and are caused in part by the fact that the municipalities and private industries located along or adjacent to the Sanitary Drainage Canal and the Des Plaines and Illinois Rivers dump their raw sewage into the Illinois

Waterway; and that among such municipalities and private industries are the Texas Company, Argo, Lemont, Lockport and Joliet and the State of Illinois which operates the two State Prisons at Joliet, the raw sewage of which is dumped into the Chicago Drainage Canal (Pearse, R. 1656, 1781, 2555-2558, JA-I, 124-125, 163; Cheadle, R. 435-436, JA-I, 585-586; Testim, R. 1391, JA-I, 697; Jones, R. 294, 296, JA-I, 570.

Illinois in its exceptions suggests that these communities are now undertaking to complete sewage disposal plants. We are unable to find anything in the record which bears out this contention except that the record does show that Joliet had discussed sewage disposal plans with a sanitary engineer but that there was nothing definite in its plans to complete in the near future any sewage disposal plant. Likewise the other communities are all apparently waiting until the Sanitary District of Chicago completes its entire project before engaging in such an undertaking (Cheadle, 435-436).

2. ARGUMENT ON OPPOSING THE LAKE STATES EXCEPTION WITH RESPECT TO THE FAILURE OF THE SPECIAL MASTER TO MAKE A FINDING THAT THE ACTUAL CONDITION OF THE ILLINOIS WATERWAY AT JOLIET AND LOCKPORT, ILLINOIS, WILL RESULT IN NO NUISANCE CONDITIONS WITH RESPECT TO ODORS DURING THE SUMMER MONTHS OF 1941.

The record conclusively establishes that the actual condition of the Illinois Waterway today is such as to result in no nuisance conditions affecting health and that no increase in diversion though temporary in nature is necessary to protect the health of the inhabitants of the complaining communities to-wit: Lockport and Joliet, Illinois. We believe further, that the actual condition of the Illinois Waterway at Joliet and Lockport during the summer months of 1941 and thereafter will result in no nuisance conditions with respect to odors. We have discussed in this brief hereinbefore at pages 33 to 36 in general the conditions which will exist at Lockport and Joliet in 1941 and thereafter. We respectfully refer the Court to this discussion on this exception of the opposing states.

3. ARGUMENT ON EXCEPTION RELATING TO THE MANIPULATION OF THE DIVERSION OF WATER FROM LAKE MICHIGAN FOR POWER PURPOSES.

3. *While the petition of Illinois is based on a claim of a menace to public health the record conclusively establishes that one of the motives behind the request for increased diversion is to obtain additional water at Chicago from Lake Michigan for power purposes.*

The State of Illinois in its petition for increased diversion through the year 1942 predicates its case entirely on the alleged menace to public health. We submit, however, that the record conclusively establishes that the claims of injury to health to persons residing or working on or along the Illinois Waterway at Joliet and Lockport are grossly exaggerated and not sustained by the record. The record does establish that one of the motives behind this demand for additional water from Lake Michigan is power. The record further establishes that with the direct flow of 1500 c. f. s. plus domestic pumpage, the Sanitary District of Chicago, the agency of the State of Illinois, has earned a profit of at least $1500 per day (Report of Special Master Lemann, p. 91) During the ten day flushing test from December 2nd through December 12, 1940, the Sanitary District made a profit of $12,500 in addition to their regular $1500 per day profit from the direct diversion authorized by the Supreme Court (Report of Special Master Lemann, p. 82).

The Master found that the odors at Joliet along the Illinois Waterway were worse at night or in the early morning than they were during the day (Report of Special Master Lemann, p. 15). As in the past, the Sanitary District of Chicago is manipulating the flow through the Chicago Drainage Canal for power purposes to provide greater flows during the nighttime when the power load goes on (Christman, R. 630, 632-633; JA-I, 609; Cheadle, R. 426-427; Ramey, R. 1586; JA-1, 50; Illinois Exhibit 43, R. 1431-1432; JA-II, 41; Deneau, R. 799; JA-I, 626). It is manifest from the foregoing that the increased flow was a contributing factor to the creation of odors in the Waterway when such odors occurred.

As the Special Master suggests, the entire attitude of the Sanitary District of Chicago has been influenced not by any desire for speed or for an early completion of the large building operations necessary to complete the sewage disposal program as required by the decree of this court of April 21, 1930, but by the purpose to complete its program at as little expense as possible to its taxpayers (Report of Special Master Lemann, p. 107). And as the Special Master further points out, "another conflict in interest arises from the fact that the taxpayers of the Sanitary District do not appear to have suffered from any nuisance conditions due to delay in completing sewage treatments; the complaints come only from those residing near the Canal in Joliet and Lockport, who are not taxpayers of the District (Report of Special Master Lemann, p. 107). Moreover, as Mr. Pearce, Sanitary Engineer for the Sanitary District of Chicago, testified, that since the water in the Illinois Waterway was not used for drinking purposes he did not concern himself with B. Coli figures and that their work primarily was not concerned with destroying bacteria (Report of Special Master Lemann, p. 36).

It will thus be seen that the State of Illinois, and particularly the Sanitary District of Chicago have at no time been particularly concerned about any health problem at Joliet or Lockport. The chief concern has been to economize and to obtain as large a profit from the development of water power at Lockport as possible. The amount of profit from water power is, of course, directly proportionate to the amount of diversion of water from Lake Michigan.

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IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original.

October Term, A. D. 1940.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 3 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 4 Original.

BRIEF AND ARGUMENT OF THE STATE OF ILLINOIS IN SUPPORT OF EXCEPTIONS HERETOFORE MADE BY IT TO THE REPORT OF THE SPECIAL MASTER, MONTE M. LEMANN, DATED MARCH 31, 1941.

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BRIEF AND ARGUMENT OF THE STATE OF ILLINOIS IN SUPPORT OF EXCEPTIONS HERETOFORE MADE BY IT TO THE REPORT OF THE SPECIAL MASTER, MONTE M. LEMANN, DATED MARCH 31, 1941.

FOREWORD.

The State of Illinois desires to express and acknowledge of record its sincere appreciation to Special Master Monte M. Lemann for his fairness and patience in the conduct of the extended hearings in this cause.

The Special Master's report itself is indicative of his competency and thoroughness. In promptly and properly grasping and describing the complicated science of sewage treatment and its attendant problems, he displayed remarkable ability. The clarity of expression in his report in reducing technical definitions of that art to lay understanding, deserves special commendation.

It is therefore, with all due deference to the integrity and ability of Special Master Lemann, that the State of Illinois finds it necessary to except to that portion of the Special Master's report and his conclusions as to health conditions resulting from the pollution of the waterway, and to except to his failure to recommend the form of decree requested by the State of Illinois to permit a temporary increase in diversion of water, properly supervised, during the summer months of 1941 and 1942, which is the only measure available to ameliorate such conditions pending the final completion in 1942 of the sewage treatment works of the Sanitary District, which work is being vigorously prosecuted.

Introduction.

In the belief that the Secretary of War, acting upon the recommendation of the Chief of Engineers, had authority to abate the existing nuisance on the now Federal Waterway Project by authorizing the diversion of more water, a plea for relief was addressed to the Secretary of War on June 5, 1939, by the City of Joliet, Illinois. The Secretary of War, on September 1, 1939, replied, advising that the report of the United States District Engineer at Chicago, Illinois, stated conditions in the Brandon Road Pool, which extends throughout the City of Joliet, were unsightly, filthy and noisome and much worse than they were last year; that unquestionably the waterway was contaminated by sewage from the Chicago area to a greater extent than contemplated and that remedial action was necessary; that a temporary increase in diversion to 5,000 cubic feet per second was necessary in the interest of public health and to remedy the unsightly and odorous conditions existing in Joliet.

The Secretary of War further stated that, while he was entirely sympathetic with the view of the citizens of the city, he was of the opinion that the War Department was without legal authority to permit any increase in the flow of water from Lake Michigan through the Chicago Drainage Canal and its auxiliary channels or otherwise, and that the withdrawal of lake water was now governed by the decree of the Supreme Court of the United States entered April 21, 1930, and he suggested that it might be appropriate for the State or Sanitary District authorities to apply to the Supreme Court for such modification of the above decree with regard to the diversion of water from Lake Michigan as was necessary under present conditions; that such an application presented a method by which the present unsatisfactory conditions at Joliet might be relieved.

The State of Illinois, in the belief that the Court would not take the inflexible position that nothing short of a fatal epidemic or some similar catastrophe must actually occur or be imminent before any temporary increase in diversion could be considered, filed its petition in this cause for a modification of paragraph 3 of the decree of this Court entered on April 21, 1930, wherein the diversion of water from Great Lakes-St. Lawrence system through the Chicago Drainage Canal was restricted after December 31, 1938, to an annual average of 1,500 cubic feet per second in addition to domestic pumpage, and prayed that the limited diversion be temporarily increased to an annual average of 5,000 cubic feet per second in addition to domestic pumpage until December 31, 1942, so as to avert the obnoxious, noisome, unhealthy and dangerous condition now existing in the Main Channel and Brandon Pool, otherwise known as the upper end of the Illinois Waterway.

Thereafter, the Court appointed the Honorable Monte M. Lemann as Special Master to make summary inquiry as to conditions, effect and ameliorating measures available and to report to the Court.

The Special Master started the conduct of such hearings in July, 1940. They were conducted intermittently thereafter, concluding in January, 1941. Briefs and reply briefs were submitted by both sides. Arguments were concluded before the Special Master February 19, 1941. The Special Master submitted his comprehensive report to the Court on March 31, 1941. Exceptions were filed to said report by both parties on April 15, 1941, pursuant to the order of the Court. This brief in support of its exceptions is submitted on behalf of the State of Illinois.

Modification of the Petition.

This Court, in its decision, (278 United States 367, page 419) when providing for the graduated reduction of diversion of water from Lake Michigan did so not only with a view of protecting the rights of the complaining states, but also intended thereby to provide for a gradual reduction in diversion of water to avoid any unnecessary hazard to the health of the people of the State of Illinois. The reduction to 1,500 cubic feet per second, in addition to domestic pumpage, after December 31, 1938, was predicated on the assumption that The Sanitary District of Chicago could and would on December 31, 1938, complete the entire sewage treatment program (see also 281 U. S. 179, page 198). The entire sewage treatment program will not and can not be completed by the Sanitary District until the end of 1942.

The evidence and the report of the Special Master shows that conditions prior to 1939 were not satisfactory but The Sanitary District of Chicago, by the installation of its sewage treatment plants and the treatment of sewage, was able until 1939 to keep pace with and overcome the disadvantages of the reduction of diversion ordered by the Supreme Court. Thus the condition of the Main Channel was kept in status quo from 1929 through 1938 (Illinois Exh. 37). Since January 1, 1939, however, when the diversion was drastically reduced from 5,000 c.f.s. to 1,500 c.f.s., the canal has become heavily polluted, with the result that a very acute and serious condition has existed and continues to exist in the Joliet-Lockport area, which is not only a hazard or menace to health, but has produced an actual injury to the health of persons living in the vicinity thereof.

The evidence adduced and the Report of the Special Master further shows that conditions at Joliet are acute and most serious during the warmer months of the year extending from the beginning of April through October. The State of Illinois, in view of the evidence and the Master's conclusions (Report p. 72 to 109 and 110 to 113, incl.) that there are no other available ameliorating measures, and in accordance with the proof that an increased diversion during the warmer months of the year will remedy the conditions which caused actual injury to health and which will continue to occur during the warmer months of 1941 and 1942, modifies its request for a temporary increase of diversion of water (Special Master's Report, p. 4) and prays that the allowance of increased diversion of water be during the warmer months of the year, extending from the beginning of April through October, and in such amounts of cubic feet of water per second so that a minimum dissolved oxygen content of one part per million is maintained in the water above the dam at Brandon Pool at Joliet, Illinois; and further prays that the decree be modified so that the actual amount of increased diversion of water and the periods of time of such diversion be based on the results of a continuation of the actual analyses made by The Sanitary District of Chicago and verified by a competent expert, either an engineer or chemist, appointed by this Court with a provision that the daily reports of the results, together with the record of the increased diversion of flow, be transmitted to the United States Engineer in Chicago and a monthly report filed with the Clerk of this Court and copies thereof transmitted to the respective Attorneys General of the opposing Lake States.

On the basis of the exhibits introduced into the record (Report, p. 4) the expected need for increased diversion in 1941 will be 1,000 cubic feet per second in April; 3,000 cubic feet per second in May; 5,000 cubic feet per second in June; 6,000 cubic feet per second in July; 5,000 cubic feet per second in August; 3,000 cubic feet per second in September; and 1,000 cubic feet per second in October, or an average annual increase in 1941 of approximately 2,000 cubic feet per second. In 1942, the expected need for increased diversion will be 2,000 cubic feet per second in May; 4,000 cubic feet per second in June; 5,000 cubic feet per second in July; 3,000 cubic feet per second in August; and 1,000 cubic feet per second in September, or an annual increase in 1942 of 1,250 cubic feet per second, instead of 3,500 cubic feet per second requested in the original petition filed herein.

Illinois has presented evidence to show what the conditions are expected to be in 1941 and 1942, and the Master has so found (Report, p. 71). If, as contended by the Opponents, the Great Lakes States, such conditions do not arise then, of course, no increase in diversion of water will be necessary. However, if such conditions do occur, and the State of Illinois maintains they will, and the status be established by scientific analyses as proposed in this modified petition, then and then only does Illinois seek a temporary increase in diversion to the extent of producing one part per million of dissolved oxygen in the water above the dam at Brandon Pool so as to ameliorate not only the menace but the actual injury to health until The Sanitary District of Chicago has completed its construction program, which the proof shows is possible by the end of 1942, but cannot be finished before that time.

No measurable harm will be done to the Great Lakes States by the increased diversion from Lake Michigan, suggested by this modified request of the State of Illinois, which will result in a trifling temporary lowering of the lake levels of Lakes Michigan, Huron and Erie during the years 1941 and 1942. From the findings of the Special Master, Charles Evans Hughes, in 1927, the conclusion is reached that if the aforesaid temporary diversions are allowed, then the temporary lowering effect will be not more than one-half inch in 1941 and not more than one-third inch in 1942 on Lakes Michigan, Huron and Erie (Hughes Original Report 95-96, 104-105; Hughes Re-reference Report 139-140).

The State of Illinois considers that as a result of the able and painstaking report of the Special Master, the issues now before the Court have been narrowed to the following main questions:

(I) What is the actual effect upon the health of the inhabitants of Joliet and Lockport by reason of the introduction of untreated sewage into the Illinois Waterway?

(Illinois Exceptions I and II.)

(II) What was the actual past condition of the Illinois Waterway, by reason of such pollution, and what will be the reasonably anticipated future condition in the summer months of 1941 and 1942, pending the completion at the end of 1942, of complete sewage treatment by the Sanitary District?

(Illinois Exceptions III and IV.)

(III) In view of the Special Master's finding that there are no other ameliorating measures available, is this Court justified in authorizing a temporary increase in diversion during the summer months of 1941 and 1942, in the amounts and under the conditions proposed in Illinois' Petition as modified, in view of the fact the actual effect upon health is serious and in view of the fact that the offensive conditions in the Illinois Waterway at Brandon Road Pool will continue to exist in the summer months of 1941 and 1942?

(Illinois Exceptions V, VI, VIII and IX.)

The Brief and Argument of the State of Illinois will hereafter be directed to these three main questions, in the order designated, without direct reference to the applicable specific exceptions of Illinois. It therefore is to be accepted that such exceptions are embraced under these respective designations.

Illinois Exceptions VII (Exceptions to miscellaneous statements and findings of fact) are considered self explanatory. It will therefore not be necessary to here repeat such exceptions or to present arguments in support thereof.

Note: In the references to the Record which follow, reference to the Joint Abstract is also given, preceded by the abbreviation J. A. Direct quotations are not referred to the Joint Abstract.

I.

What is the actual effect upon the health of the inhabitants of Joliet and Lockport by reason of the introduction of untreated sewage into the Illinois Waterway?

(A) THE ISSUE AS TO HEALTH INJURY.

The petition of the State of Illinois for temporary modification of Paragraph 3 of the decree of April 21, 1930, sets forth allegations with respect to the conditions of the Waterway and the effect upon the health of persons living in the vicinity of the Waterway. That part of the petition with respect to health is as follows:

> "Subsequent to December 31, 1938, when the diversion of lake water was reduced to 1500 cubic feet per second there has been stagnation in the Sanitary District Canal and the Illinois Waterway. This stagnation has resulted in the formation of thick, black, bubbling scum for long distances along the Sanitary District Canal and the Illinois Waterway. Because of the effluent of sewage from the Sanitary District of Chicago into said Sanitary District Canal and the Illinois Waterway a putrescent, obnoxious, noisome and unhealthful odor exists, causing nausea, insomnia, loss of appetite, irritation of the mucous membrane of the nose and throat and in general the undermining of the health of those persons living or working along the Sanitary District Canal and the Illinois Waterway. This condition aggravates illness and retards the recovery of patients ill in hospitals located along said Sanitary District Canal and the Illinois Waterway."

The petition, together with the allegations therein contained, were presented to the Supreme Court of the United States and any reference or further proceeding thereon was resisted by the opposing States. In spite of this opposition the Supreme Court of the United States referred the petition to the Special Master to determine if certain conditions existed. The Court in its reference must have felt that the petition of the State of Illinois set forth certain allegations which, if proved, merited the serious consideration of the Court, otherwise, it would not have entertained the petition, nor taken any further action on it. It is also obvious that the Supreme Court did not contemplate that the conditions which were adverse to health had to be more serious or more aggravated than was alleged in the petition.

It is also evident that this Court considered the allegations in the petition with reference to injury to health to be sufficient to justify a reference to a Master for the purpose of determining whether or not such conditions actually existed and if there was such injury to health as therein stated.

The allegations of this petition were proved by the witnesses that testified at the hearings, and the allegations as to the offensive odors and their effect upon persons living in the vicinity of the waterway were found by the Special Master to be as alleged in the petition. The Special Master's Report on pages 13 to 26 and 41 to 46 sets forth the testimony of the witnesses which conclusively proved the allegations of the petition of the State of Illinois with respect to health. The Special Master found that the conditions of the Waterway caused witnesses or members of their family to complain of nausea, lack of appetite and inability to sleep, sore throats and nose or sinus trouble, asthma, diarrhea, summer complaint and that children at school were made restless and hard to keep at work, that they had to shut the windows in the school because the odors were offensive; that school children became sick with nausea and had to be taken out of their classes and sent home for a day or so; that the paint on the homes in the neighborhood was ruined by the gas from the canal; that people kept their windows closed to keep out the odors, drove out at night to avoid the odors; that at the hospital Sisters and nurses and many of the patients of the hospital suffered nervousness, nausea, vomiting, inability to sleep and headaches and some of the patients were anxious to go home because of the odors, and some were so anxious to leave the hospital that they left before their sutures had been removed; that some of the Sisters' and nurses' throats became sore or dry and they had sinus trouble; that windows in the operating room had to be kept shut to keep odors out; that windows in the maternity ward of the hospital had to be kept shut at times, on account of the odors; that patients had asked to be transferred to the side away from the canal on account of the odors; nevertheless he concluded that such conditions causing the complaints aforesaid did not constitute a menace to health within the meaning which he thought the Court intended that phrase to have. He did say, however, on page 54 of his Report (as to such a condition) that the issue is one which only the Court itself can determine.

(B) Menace to Health.

One of the questions of fact to be determined by the Special Master in the order of reference by the Court was with respect to the actual conditions of the Illinois Waterway by reason of the introduction of untreated sewage and whether, and to what extent, if any, that condition constituted an actual menace to the health of the inhabitants of the complaining communities.

Upon an examination of the order of reference the word "menace" immediately comes to our minds as one that requires consideration and definition. The Special Master, in his Report on pages 51 to 54 specifically refrains from defining "menace to health" and leaves the interpretation of this phrase to the Court itself. On p. 54 of the said Report the Master states that the issue of "menace to health" is one which only the Court itself can determine. When it is necessary to interpret or define words in the English language, it is customary to examine the dictionary for a definition, or if the word or phrase is not adequately defined by the dictionary, then we solicit persons who are experts or specialists in their respective field to give their definition or interpretation of the word or phrase as commonly used, which was done in this case.

Webster's New International Dictionary defines "menace" as being, "projecting, threatening; the show of an intention; to inflict evil; the threat, indication of probable evil or catastrophe to come." In view of the evidence that has been presented in this case it is important for the Court to keep in mind the significant words of this definition, namely, "indication of probable catastrophe to come".

The only definition of "menace to health" which appears in the record in this case was presented by Professor Anton J. Carlson and Dr. Andrew Ivy, witnesses for the State of Illinois. Professor Anton J. Carlson on page 2880 of the Record (J. A. 283) in defining "menace" stated that, "An actual menace to health means that conditions exist that through accidents or ordinary course of human events can lead to injury to health. We must prove that conditions exist which through accidents or in ordinary course of human events, *may* result in injury to health. In other words, it is sufficient to show that a menace is present if a certain condition exists that *may* cause injury to health." This seems to be a reasonable interpretation of the phrase "menace to health", yet the Master on page 52 of his Report does not believe that the Court intended to use the expression "menace to health" in this sense as employed by Professor Carlson. The Master stated that it would not have been necessary to refer the case to him if this definition was followed, because it was apparent on the face of the papers (petition) that the sewage treatment program had not been completed, and that sewage was being discharged into the waterway. He further stated that under these conditions, if the interpretation of Dr. Carlson was used, then a menace would necessarily be found to exist. Because the Master finds the definition of Prof. Carlson an obvious one should be no reason why the use of it should be denied. The Court referred the cause to the Master to determine if certain facts and conditions existed to prove the allegations of the petition of the State of Illinois and the mere fact that the face of the petition sets forth allegations which constitute a menace is no reason why the Master should not accept the reasonable and logical interpretation of the phrase "menace to health" as defined by Prof. Carlson.

It is reasonable to assume that the Court when referring this cause to the Master, wanted to determine if a condition existed which *may* possibly injure the health of the residents in the vicinity of the Waterway.

In proving a menace to health was it necessary for Illinois to show that an epidemic with increased deaths and illness actually existed? It would appear all that is required is proof that a condition exists which does or may result in injury to health. If petitioner was required to show that an actual epidemic existed, then the Waterway would no longer be a menace or threat, but would be the culmination of the menace into a reality. The State of Illinois in trying to protect its citizens filed its petition in the Supreme Court for relief before more serious injury to health occurred and while the condition that existed was still a menace. It was not incumbent on the petitioner to wait until many people were stricken as a result of the polluted condition of the Waterway before it asked for relief in the Supreme Court.

It is the contention of the State of Illinois that from the evidence, it is readily apparent that a condition exists which is not only threatening and which indicates a "probable catastrophe to come," but is also an actual unhealthful existing condition not based on theories.

The health problem presented in this case may be divided into two parts, as presented by Dr. Ivy on Page 3036 of the Record (J. A. 306), (1) the potential hazard or threat or damage to health occasioned by the foul or polluted condition of the Waterway; (2) the present actual existing injury to health resulting from the gaseous odors. It is the contention of the State of Illinois that the evidence and the Master's findings fully supports its position that not only is the health of the people being menaced, but in addition their health is now being actually injured by the foul odors which emanate from the pool. This was found by the Master on p. 50 of his Report, wherein he states that the offensive odors given off by the Waterway caused various ailments.

(C) BRANDON POOL.

1. *Physical Condition.*

The apparent source of the unhealthful condition seems to be that part of the Waterway known as Brandon Pool. Its actual physical condition and appearance is not disputed by opponent States. After the reduction in diversion to fifteen hundred c.f.s. on January 1, 1939, there was no immediate change in physical appearance perceptible to the casual observer, but with the advent of warm weather starting in the Spring of 1939, a definite change occurred in the appearance of the Pool. A great accumulation of sludge or scum on the surface of the water was evident, the heat causing sludge sewage materials to disintegrate in the lower depths of the water (Rec. 292; J. A. 569) being accompanied by the liberation of gases in the form of bubbles.

Dr. Carlson in describing the Pool on page 2990 of the Record observed "now even today from my examination of Brandon Pool, no matter what they have done, or are doing in the way of adequate treatment, the Brandon Road Pool is still an open sewer."

Professor Ivy stated that the Pool impressed him as being a cess-pool that was uncovered.

One witness who lives near the Pool testified that she saw "about three inches of scum, and that on top of that scum were dead rodents." (Rec. 1172.) Other witnesses stated that the water was black as ink—that it would be bubbling continuously and great gobs of sludge would come up from the bottom. The report of the Secretary of War to Mayor Jones of Joliet, dated December 1, 1939, stated that the conditions in Brandon Pool, which extended throughout the city, were unsightly, filthy and noisome. The record indicates that there was an excess of six feet of sludge accumulated at the bottom of the pool.

2. *Odors.*

The motivating cause for the application of Illinois for relief was the unprecedented foul, putrid and noxious gases and odors liberated from the Waterway after the 1939 reduction in diversion. The residents of the Joliet-Lockport areas are the chief sufferers from these conditions because of the high degree of putrefaction at Brandon Pool, but the problem is by no means confined to this immediate area.

The gaseous odors which emanate from the Pool are explained from a chemical standpoint as the result of a disappearance of oxygen from the water and the creation of an anaerobic condition, which is measured through two types of chemical analyses reflecting the dissolved oxygen and biochemical oxygen demand. The Brandon Pool has reflected a sharp increase in biochemical oxygen demand since the reduction in diversion.

There is no controversy in the record as to how these gases are generated. The dormant condition of the sludge in the winter and the sudden putrefaction of these sludge deposits when the temperature rises is the major factor in causing the emission of gases and odors.

The record indicates that the vile and nauseous gases and odors which permeate the atmosphere in the vicinity of the Waterway combine two distinct odors, namely, the odor of hydrogen sulfide gas, and second—a fecal stench produced by other putrefactive ingredients.

Hydrogen sulfide gas is a common product of sewage putrefaction and is the most toxic. In the absence of chemical tests, the best way to detect hydrogen sulfide gas is by its characteristic rotten egg odor. The Record in many instances, by the testimony of the professional witnesses, as well as lay witnesses, describes this characteristic odor which is present in the vicinity of the Waterway.

There is no dispute in the record from either respondent's witnesses, or petitioner's witnesses, that hydrogen sulfide gas emanates from the Pool and is in the air in the vicinity of the Pool.

The Master in his report on page 50 found that the odors emanating from the pool are due in part to hydrogen sulfide and in part to other unidentifiable gases.

State of Illinois contends, as proved by the record, that not only is there suffering from hydrogen sulfide, but other putrefactive odors and gases which emanate from the Pool, also work a very definite injury to health. The fecal stench which arises from the Pool is composed of certain unknown ingredients and certain known materials, namely, mercaptan, indol, skatol and cadaverin, which are as injurious to the human organisms as hydrogen sulfide. These odors set up a series of chemical processes known as "nervous impulses" which definitely affect the heart and circulation. Such impulses produce salivation, headache, nausea and loss of appetite (Rec. 2888; J. A. 284). The symptoms which result from these gases, namely, nausea and headache, loss of sleep and loss of appetite definitely injure and undermine the health of the suffering persons. It may be that these persons who suffer from these ailments may continue with their work, or business and every-day life, yet if these symptoms continue, a permanent injury to the human organism will ultimately manifest itself.

This is explained by Professor Carlson in his following statement:

> "* * * a good many men think of these things as psychological, as something that happens not in our material being. The fact is that these things I have described are just as definitely material, the material sequence of events, and have as definite an effect on health as if we were bitten by malaria-carrying mosquitoes, and that mosquito injected a germ into our blood. So these odors, hydrogen sulfide and the other odors, do set up these direct irritants and the secondary sequence in the nervous systems which produce these effects. The present condition down there, certainly as I saw it in the summer of 1939, is more than a menace to health; it is inimical to health." (Rec. 2889.)

In explaining, these odors comprising the fecal stench that bring about a condition of nausea, headache, or loss of appetite, Professor Carlson submitted the following explanation on page 2893 of the Record,

> "What happens there is largely reflex through the nervous system as a result of our social condition. We have associated feces and sewage with dangers to health and in some way or other developed early, no one of us remembers at what time, fecal odors became noxious to all sound human adults that I have met. Fecal odors are noxious."

Dr. Curtis on page 585 of the Record observed that,

> "You cannot become accustomed to that odor. I believe biologically it is impossible because it is the law in life that you cannot live in an atmosphere of your own excreta."

It is quite clear from the record, and there is no dispute as to the condition of the Pool. There is no dispute that certain toxic gases emanate from this Pool. There can likewise be no argument but that these gases are and may be injurious to the health of the residents in the vicinity of the Waterway.

(D) Effect of the Pollution of the Waterway on Persons.

1. *Hospital Patients.*

One of the most devastating results of the condition of the Waterway which indicates a serious menace to health is borne out by the testimony of the nurses, patients and doctors of St. Joseph's Hospital in Joliet, which is located about two blocks from the Waterway. Their testimony was to the general effect that the odors were extremely offensive. The witnesses testified that expectant mothers were affected by the unpleasant smell, and that the windows of the nursery where newly-born babies were kept had to be closed on hot days because of the odors, and because the odors might affect the tender skins of the infants. The patients desired to leave the hospital early because of the stench. Many of the patients complained of nausea and vomiting because of the odor. It was sometimes necessary for the nurses to put cotton in the noses of the patients to prevent the smell. Many left the hospital before their stitches were removed because of the offensive odor. The patients could not rest or get the proper amount of sleep, and the odors were especially harmful to persons with poor or delicate stomachs. The odors generally retarded the recovery of the patients because they were not able to take the prescribed nourishment that they were supposed to take.

The Master rightfully found on page 18 of his Report that the extremely offensive odors caused many of the patients to be nervous, vomit, have nausea, to be unable to sleep, and have headaches; that many of the patients were anxious to go home and leave the hospital early before their sutures were removed; that some of the Sisters and nurses complained that their throats became sore or dry, and some of them had sinus trouble; that windows in operating rooms had to be kept shut to keep the odors out; that windows also had to be kept shut at times in the maternity ward and nursery, especially when a boat goes by; that odors have a worse effect on new patients, those with delicate stomachs, or very sick patients.

It is quite obvious from this testimony and the findings of the Master in this respect that the odors given off by the Waterway permeated the entire hospital and retarded the normal convalescence of patients hospitalized there, and were and are a distinct and actual menace to the health of these persons.

2. *Lay Witnesses.*

Eighty-one lay witnesses testified as to the effect of the odors upon them or their families. It was also stipulated in the record that if two-hundred additional witnesses were called that they would testify substantially along the same lines. The character of the odors was described by various witnesses as the odor of sewers, out-houses, or rotten eggs, and they deemed the odor "terrible", "vile", "very offensive", and "unbearable." The witnesses testified that because of the odors either they or members of their families suffered from nausea, lack of appetite, inability to sleep, as was found by the Master on page 13 of his Report.

The evidence indicates that in addition to these ailments the odors resulted in additional ailments such as sinus trouble, skin disease and impetigo, headaches, sore throat, diarrhea, dysentery, asthma and secondary anemia. In addition, persons also suffered from skin infections resulting from contact with the water in the Waterway.

The summary of the testimony of the lay witnesses and the effect upon their health is more fully set forth on pages 14, 15, 16, and 17 of the Master's Report. In addition, many of the lay witnesses testified as to the effect of the offensive odors on their every-day life. Many testified that they had to keep the windows of their bedrooms closed at night in order to keep out the smell, and others were forced to spray perfume around their bedrooms. Some had to leave the city to eat their meals, because the odors were so bad.

3. *School Children.*

Probably the greatest menace to health resulting from the condition of the Waterway is indicated by the testimony showing the effect of these odors on school children. The majority of the lay witnesses who were parents testified that the intense odor produced more violent effects upon the children than upon themselves. Nausea, vomiting, loss of appetite, restlessness and diarrhea were the general symptoms observed in the children. Mrs. Marie Bush, Superintendent of the Schools at Lockport, testified (Rec. 335; J. A. 575) that the bad odor was sent through the ventilating fans of the school and that it was the odor of rotten eggs. The Principal of McKinley Public School in Joliet stated that the children complained of the offensive odors; that they were restless and could not get their minds on their work; several children were taken quite sick in school and it was necessary for her to send a child home because of the odor; that it was almost impossible for the children to play in the playground or continue their nature studies because of the unbearable odor. Children were absent from school because of illness resulting from the odors.

The Master on page 51 of his Report concluded that on hot and sultry days school children had been nauseated, and had to lose a day from school.

Providing healthful conditions for children has long been one of the great objectives of government and if the health of children is menaced while they are in the growing ages, it may not immediately be indicated or shown by health statistics, but it is clear that the results of this menace to their health will be apparent in future years.

4. *Joliet Physicians.*

Probably the best source of information to determine whether the condition of the Waterway is in any way jeopardizing the health of the residents adjacent to the Waterway is that testimony given by the officers and doctors of Joliet and Lockport who treated these people, and who were in continuous contact with their unhealthful condition. The City Engineer of Joliet testified that the odor was so bad that he had to leave town, and that the odor was strong enough to wake him out of his sleep. The Health Commissioner of Joliet testified that he had received hundreds of complaints from persons stating that because of the stench from the Canal, persons could not eat, could not sleep, could not work, and that they suffered from nausea, vomiting and insomnia. He further stated that the stench was nerve wracking and produced nausea, loss of sleep, loss of appetite, and the lack of rest and lack of eating brought on a condition of degeneration and lowering of vitality which would lead to more serious conditions.

Dr. G. J. Wilcox, a physician in Joliet affirmed the Health Commissioner's conclusions and Dr. Robert W. Lennon, an eye, ear, nose and throat specialist of Joliet noted an increase in sinus cases in July, August and September of 1939, and (Rec. 529; J. A. 599) stated that the odor from the Brandon Pool was definitely a factor in causing this increase of sinus infections.

Dr. Thomas H. Wagner, the Government Surgeon in the community of Joliet who takes care of many men who work on the Canal stated that since 1939 the Canal was absolutely a menace. (Rec. 881; J. A. 636.) He has had many cases of skin diseases, pustular eruptions and boils involving the exposed portions of the body which were all traceable to the foul water where persons came in contact with it. Dr. Henry M. Beckwith, a Joliet physician, stated that (Rec. 929; J. A. 639) the gases that emanate from the Pool displace the oxygen of the blood and that produces secondary anemia, and this is one of the resulting effects upon persons who convalesce from illness.

Many other Joliet physicians testified to the same general effect that the health of Joliet citizens was being menaced by the conditions of the Waterway.

5. *Expert Testimony.*

Dr. Clarence W. Muehlberger, an authority on toxicology, who testified for the State of Illinois stated that he was of the opinion that the nausea, headaches, insomnia and loss of appetite of which the persons in the vicinity of Joliet complained, may have been caused by the hydrogen sulfide which emanated from the Pool. He also stated that the condition surrounding the Waterway constitutes a very definite menace to the health of the people in the region of Joliet. This was found by the Special Master in his Report on pages 39 and 40.

Dr. Hugh McGuigan affirmed the testimony of Drs. Carlson and Ivy, and added that hydrogen sulfide was not the only thing in the air adjoining the Waterway, but that there were other unknown things which may even be more toxic than hydrogen sulfide. This, the Master found on page 45 of his Report.

The principal witness for the State of Illinois on the question of health was the eminent scientist, Dr. Anton J. Carlson. The experiences and qualifications of Dr. Carlson are more fully set forth on page 41 of the Special Master's Report. His testimony in this case is particularly significant in that it is based not upon a casual superficial survey or inspection of the Waterway, but rather upon study and scientific analysis of sewage and drainage conditions for many years. He is an outstanding authority and has been called upon on many occasions by Governmental bodies to give the benefit of his knowledge and experience in this type of work. His testimony in this case must therefore be accepted with greater weight because it is based upon extensive knowledge, experience and absence of bias.

On page 2882 of the Record, Dr. Carlson stated his opinion as to the effect of the hydrogen sulphide gas upon the human nervous system, heart and other organs that would be affected by the inhalation of this gas. He stated:

> "A". The hydrogen sulphide gas is a highly poisonous gas to the human and animal organism. A great deal of work has been done on this gas because of its industrial importance and health hazards, both on animals and on human beings, particularly on animals. It is about three times as poisonous as carbon monoxide, but not quite as poisonous as the deadliest of all known gases, namely,—I can't recall the gas just this minute—cyanide. We know the acute effects and the chronic effects. It is an irritant gas. It affects the delicate membranes of the eye, conjunctiva, the nose and the throat. There it produces irritation, hyperemia, coughing, and if it goes on longer or in stronger concentration, actual edema of the lung. Some

> of the gas, though, acting on this respiratory epithelium or respiratory canal actually gets into the blood and there affects the organs, produces instability of the nervous processes, affects consciousness and reflexes, injures the liver so that in the long run you get varying degrees of anemia.
>
> Now, these are well-known effects if the concentration is sufficient and acts a sufficient length of time. What we are not certain of is as to the minimum in the breathed air that is actually safe for man, and the reason for our ignorance there is this: That the human system can be tremendously injured before we are sick. We can lose over half of the liver before there is any impairment of liver function. Even laymen know that we can lose half of our kidney function before there is any sickness. We can lose more than nine-tenths of our glands of internal secretion before we can demonstrate any defects, so that tremendous amount of injury can be done in the smallest insidious way before the keenest of physicians, the keenest of pathologists or the keenest of investigators can actually prove that injury has been done."

On page 2887 of the Record, Dr. Carlson when asked whether the odors constituted a menace to health, made the following answers:

> "A. Well, then my answer is based on the observation of the odors in the summer of '39, the observation of the odors, the kind and intensity yesterday, which was a cool and a calm day, and the testimony in the record that I have read regarding the bacteriology and chemistry of the water, and then my wide experience with human physiology and health and disease and the agencies that act on them.
>
> Yes, those odors, both the putrefactive odors and the hydrogen sulphide, are more than a menace, because a menace is something that may occur but hasn't. Those are injurious to health under certain conditions down there. May I explain?
>
> The Master: Certainly.
>
> A. First, there is no question of hydrogen sulphide being generated and liberated there. The

amount, the concentration, probably varies from time to time. I don't know what it is. It is enough to be smelled. That is a heavy gas, and particularly the homes of the people who live lower than that water level, that will roll over the retaining wall and concentrate down there, unless the wind is very strong.

There is no reason for me to go further into the action of that hydrogen gas. We don't know at what dilution it ceases to be a menace.

Now, the other unpleasant odors, the putrefactive odors, fecal odors, mercaptan and indol and skatol and cadaverin, and so forth, a number of sewer gases that come up. Now, they are quite as material and their effect on the human body, unfavorable effect, is quite as material as the chemical we can see and weigh, acting on the system. In other words, these are different chemicals going through the air affecting the material substance which is our nose or organs. There they set up a series of chemical processes that we call the nervous impulses that affect, in turn, favorably or unfavorably our state of being, our consciousness. They will affect the heart; they will affect the circulation. It may produce headache, produce salivation, nausea, lack of appetite.

Now, if the court please, stop me if I seem impertinent, but a good many laymen think of these things as psychological, as something that happens not in our material being. The fact is that these things I have described are just as definitely material, the material sequence of events, and has as definite an effect on health as if it were bitten by malaria-carrying mosquitoes and that mosquito injected a germ into our blood.

So these odors, hydrogen sulphide, and the other odors do set up these direct irritations and these secondary sequences in the nervous system which produce these effects. The present condition down there, certainly as I saw it in the summer of 1939, is more than a menace to health; it is inimical to health.

Now, the actual menace lies in a different direction, serious menace, apart from the fact that we don't know just the concentration of hydrogen sulphide which is absolutely noninjurious to man. A pool, if the court please, an open sewer covering six or seven hundred acres in the center of the city laden with the B-coli and the streptococci as shown by the testimony, and I saw nothing to the contrary, and knowing where this comes from, human excreta, there inevitably will be a menace from dysentery bacillus, from typhoid bacillus and from the amoeba of dysentery, and the water doesn't have to be used for drinking or cooking to constitute such a menace, and it doesn't have to occur either for 10 or 15 or 5 years. It is still a menace.

Typhoid Mary cooked for the family for three, four or five years and no typhoid developed and then it happened, and the drinking water at Manteno was just as much a menace five years before the outbreak occurred as that year. I was detached from the Army in the winter of 1919 and did government service in Serbia and in Poland. At that time in those two countries there was a great deal of typhus everywhere, and body lice were everywhere. Now, we know that body lice carry typhus. I couldn't get away from the lice in either country for weeks. I did not get typhus. But while I was there, two or three Americans got typhus, and died from it. Now, simply because I didn't get typhus, that typhus and those lice were still a menace to my health.

Now, the way it works down there is this: These highly polluted—this highly polluted body of water may through accident, through flies or mosquitoes, or spray or wind get on the surface of man, on his clothes, on his skin, or in his food, or even in his drinking water, even in his lunch pail, and anything—we know anything that gets on our skin anywhere—flies don't have to bite, mosquitoes don't have to bite, they don't have to settle on the water. This stuff splashes up on the sides when the boats go through, when they empty their locks and fill them and when the wind blows. Such a polluted, highly infectious body of water of that extent is an actual menace, if I have made my answer clear."

In discussing "menace," the following questions and answers were put to Dr. Carlson by the Master on p. 2901 of the Record:

> "Q. Now, this menace, as I understand you, proceeds chiefly from the odors and the hydrogen sulphide, or does it proceed, in your opinion, also from the danger of typhoid and amoebic dysentery? I would like to be as specific as possible.
>
> A. I will be very specific there, if I can. The actual menace would be largely from the infectious organism in the water, and from the hydrogen sulphide.
>
> Q. Well, now, from the infectious organism in the water, how would that translate itself into danger to the human being?
>
> A. By the transfer of these organisms to the surface or into human beings.
>
> Q. How would that take place?
>
> A. That would take place in various ways, by people going in, by flies and other insects getting these organisms on their legs and on their feet and then getting to human beings." * * *

Dr. Carlson on p. 2904 of the Record when questioned by the Master very distinctly sets forth his opinion of the difference between actual injury to health and menace to health as exists in this case. The following were the questions and answers by the Master and Dr. Carlson:

> "Q. Now, do you think the menace proceeds chiefly from this danger of infection from flies and insects carrying germs or do you think it proceeds chiefly from these odors?
>
> A. The odors are not a menace; they are actual injury. If the court please, my understanding of menace is something that threatens but doesn't do. When it does, then it is no longer a menace; then it is actual injury.
>
> Q. So the—
>
> A. The odors and the—the odors including hydrogen sulphide are more than a menace; I don't speak of them when I speak of a menace. They are actually injurious now. The menace are these other things,

and what this minimum amount of hydrogen sulphide might do to the human system, there I have an open mind, and, if the court please, that is one of the terrible public health and medical questions before civilization today: What do these little drops of water do to the living machinery, the drops of water that don't produce a recognizable disease today?"

In further discussing the question of menace to health, the Master put to Dr. Carlson the following questions, and he gave the following answers: (Rec. p. 2981)

"Q. Then, for the information of the Supreme Court in considering your testimony I would like to ask whether you think that there is a menace to health to everybody working in a sewerage plant where these odors are more or less constantly present?

A. I should say if the odors are due to gases other than sulphur dioxid, that is sulphuretted hydrogen, the health of those people working there, if the odors produce these symptoms in them, their health is unfavorably affected; that is correct.

Q. As I understand your view, even if these people were never incapacitated from work they would still be a menace to their health, because it is scientifically possible that they may not be prevented from work, there is some undetectable damage going on to their systems which would constitute a menace to health even if they were able to work. Am I understanding you right?

A. Yes, you are understanding me right. You have to have a tremendous amount of injury before you are incapacitated for work.

Q. But you would say that there would still be a menace to health even though you did not receive that amount of injury?

A Oh yes; certainly, certainly.

Q. You see, the Supreme Court is going to have to define what is meant by menace to health, and from the standpoint of a man of science it may very well be given one meaning when, from the standpoint of what the Court has in mind here, it may have another meaning. Nobody but the Court can finally say that.

> But I want the Court to be sure that when you use the word 'menace' to health you are using it in a scientific sense, as a theoretical danger which cannot be measured in any statistics, or even in any outward observation by the physician; am I right about that?
>
> A. You are right to a certain extent, but may I correct you to this extent: that I am not testifying here or giving my opinion from theory. I am testifying as to facts, and I have tried to make it plain what I understand by menace and also what I understand by actual injury or unfavorable influence on the human system, quite short of frank disease or incapacitation, as we describe it. I appreciate what you say, that the Supreme Court will have to decide what it has in mind by those terms, but I am also aware that law and courts ultimately will have to square their decisions and their judgment with the facts of science and medicine; and, ultimately, if my judgment—stop me if you want to—
>
> Q. No, you go ahead fully, Doctor.
>
> A. I think the policy that guides us and you and the courts is to take all measures to minimize all these, any or all of these unfavorable conditions, that we can do within the practicability of our knowledge and our civilization."

Dr. Carlson on p. 2986 of the record stated that:

> "insomnia, sleeplessness, is not a trifling thing in the matter of health. As a matter of fact we die from lack of sleep much more quickly than we die from lack of food, and sleeplessness, lack of sleep, is one of the serious questions in connection with disturbances of the nervous system. I hope the court will not take lightly any condition that disturbs a person's sleep."

The Special Master on pages 41, 42 and 43 of the Report found the testimony of Dr. Carlson to be substantially as set forth herein, and in his conclusions on the question of health on p. 52 of said Report stated that if the test of menace to health was such as urged by Professors Carlson and Ivy, then a menace would necessarily be found to exist.

Dr. Andrew Ivy, a Physiologist and Professor at Northwestern University, testified substantially the same as Dr. Carlson. Dr. Hugh Alister McGuigan, Professor of Pharmacology and Therapeutics at the University of Illinois agreed in the main with the testimony of Doctors Carlson and Ivy.

The State of Illinois respectfully submits that the testimony of such eminent authorities as Dr. Carlson, Dr. Ivy and Dr. McGuigan should be accepted to indicate that the conditions which exist at Brandon Pool are causing injury to the health of the persons in the vicinity thereof by reason of the offensive odors which emanate therefrom, and that there is also a menace to the health of these individuals by reason of the threat or possibility of an epidemic that may arise at any time from the bacteria present in the Pool.

These authorities have presented the only definition of menace to health and it is a reasonable and logical basis for determining the true conditions affecting health which exist at Brandon Pool. There can be no doubt that the court in making its reference to the Master to determine conditions desired to know in what way the health of the persons living in the vicinity thereof was being affected or threatened or menaced. The record is very clear that many persons are actually suffering by reason of the odors. From a medical standpoint they are suffering to a greater degree than they themselves may realize. The effect of the odors upon their system which cause sleeplessness, loss of appetite, vomiting and numerous other results are daily undermining their health to the extent that it may not be actually discernible or result in loss of work until several years thereafter.

6. *Effect of Odors on Nervous System.*

In recent years, medical science has given more and more attention to the nervous system of human beings in relation to health.

When the Supreme Court asked the Master to determine the question of menace to health, it is to be presumed that the word "health" included its present-day scientific meaning, namely, health from the standpoint of the condition of the physical organs, as well as health from the standpoint of the nervous system of the individual. It is not difficult to imagine the effect on the nervous system of this continuous night and day stench, or odor of rotten eggs, on children in schools, workers at work, and housewives at home cooking their meals. If we were to go so far as to assume that there is no immediate menace to the *physical* health of the human being, namely, the physical organs that make up the human being,—what about the menacing disturbances to their nervous systems that result from the stench continuously in the nostrils of these persons? Individuals become disagreeable, ugly, nervous, irritable, dissatisfied, and this as physicians and psychologists have pointed out—is in itself an unhealthful condition because it is not a normal healthful condition of the nervous system. Therefore, if these symptoms are present in individuals as a result of the odors which come from the Waterway—then that part of the health of the individual that makes up his nervous system is being seriously menaced. Not only is the nervous system itself being impaired by these symptoms, but they have a direct effect upon the physical organs of the body, especially the stomach, colon and heart, and tend to break down their resistance and immunity to disease.

The State of Illinois presented the testimony of several hundred witnesses regarding the condition that exists in the vicinity of the Waterway, as it affected them, but it must be kept in mind by the Court that the condition and effects to which these few hundred witnesses testified is not a condition which affects these witnesses alone. Their testimony merely indicates the condition that exists in the vicinity of the Waterway, and also indicates that if this condition continues there is an additional threat that an epidemic may spread to include fifty thousand people in the City of Joliet alone, and possibly hundreds of thousands of others in that vicinity. Therefore, this condition is not merely an injury and a menace to the few hundred witnesses who were heard by the Master, but is also a menace and injury to the many thousand of innocent citizens who do not even know of this proceeding.

The Master on page 53 stated that we cannot accept as a test of a health menace, the effect of odors upon invalids and persons of less than average health. The State of Illinois does not contend that the condition of the Waterway with its resulting odors is affecting the health merely of persons of less than the average health. The contention of Illinois is that the health of normal persons, as well as those below the average is being affected. The community or the Government must protect those who are below the average in health, as well as those who are of average health. In fact, the condition of the Waterway is a greater actual injury and menace to persons who are below the average in health and thus there is greater reason why the obnoxious condition of the Waterway should be alleviated.

It is significant in this case that the opposing States who contend that no menace to health existed by reason of the condition of the Waterway, did not present a single lay witness who resided in the vicinity of the Waterway to testify that the Waterway was not harmful and did not affect them unfavorably. Surely, if the condition of the Waterway and the odors were not harmful, the opposing States could have found at least one lay witness who might have testified to this effect.

Counsel for the opposing States before the Master presented a Supplemental Brief which contained a table showing a summary and analysis of the testimony of the witnesses at Joliet with respect to the ailments suffered by them or members of their family. The State of Illinois contends that this summary of the opposing States supports its position, namely, that there really is an actual serious health injury and problem and that many persons are suffering and inasmuch as the said table impressively sets forth the facts as contended by Illinois, we are taking the liberty of presenting in this brief the said table of opposing States, which is as follows:

"TABLE SHOWING SUMMARY AND ANALYSIS OF TESTIMONY OF WITNESSES AT JOLIET.

Impetigo, skin infections, etc.

3 testified they had personally suffered from infections resulting from contact with the water from the canal or as a result of bite by insects carrying germs from canal.

7 testified they knew of cases of impetigo and infection which originated at such source.

Loss of sleep—disturbance of sleep—difficulty of sleeping, etc.

61 testified they were personally so affected.

9 testified that the odors had no effect on their sleep.

29 testified they knew of others whose sleep was affected.

Loss of appetite—inabilty to eat, etc.

27 testified they were personally so affected.

5 testified the odors had no effect on them.

37 testified they knew of others whose appetite was affected.

Nausea.

37 testified to being personally nauseated by the odors.

27 testified to others being so affected.

Vomiting.

9 testified that they personally had been caused to vomit.

9 testified to vomiting in others.

Headaches.

14 testified to suffering from headaches as result of odor.

8 testified to others suffering from headaches.

General.

16 persons testified to no ailments or sickness—but merely that the odor was offensive.

Condition of health.

32 testified that their health was good, fine, O. K. or nothing wrong with it.

3 testified their health was not so good.

3 doctors testified they knew of no case of illness which they could say was attributable to canal.

1 doctor says Joliet is free from typhoid and intestinal infection.

Observation of doctors.

3 doctors testified they personally didn't know of anyone ill from the canal and couldn't say definitely cases of illness were due to the canal (454, J. A. 588, 481, J. A. 592, 503, J. A. 593).

1 doctor testified Joliet has been free from typhoid and intestinal infections (555, J. A. 601).

1 doctor testified odor was a factor in causing increase in sinus condition (529).

1 doctor testified condition at Joliet not a menace to health of average healthy individual (892, J. A. 637).

Miscellaneous ailments and complaints.

13 testified to suffering from throat, nose and sinus difficulties due to the odors.

1 testified to fainting spells.

1 doctor (Lennon) says there is no question about the odor being a factor in causing an increase in sinus infections.

1 testified to school children being restless.

1 testified to school children being sick (no specific type of sickness mentioned).

4 nurses testified to patient going home from hospital before stitches were removed from operation.

1 testified to a patient being committed to Manteno because of hallucinations of a nasal character, caused by the canal odors.

1 testified to patient suffering from gastroenteritis.

2 testified to knowing of cases of dysentery.

3 testified to knowing of diarrhea and summer complaint.

1 testified to member of family suffering sore throat.

3 testified to members of family suffering sores and rashes on body and limbs.

1 testified to member of family suffering from sinus trouble.

2 testified to members of family suffering from asthma.

1 doctor testified to patient suffering from secondary anemia.

1 doctor testified to patient dying from aspirated pneumonia as result of attempted suicide in the canal.

Proximity of Joliet Witnesses to Waterway.

72 resided or worked up to 1½ blocks away from Waterway.

23 resided or worked 2 to 4 blocks away from Waterway.

20 resided or worked over 4 blocks and up to 1 mile away from Waterway.

6 resided or worked more than 1 mile away from Waterway.

14 didn't say or map doesn't show location of their street addresses.

Weight of Witnesses at Joliet.

31 witnesses who testified concerning their weight, obviously were overweight.

1 witness who stated she was then underweight but testified she always regained weight in winter (Mrs. Colvin, R. 1067, J. A. 654).

95 witnesses gave no statement as to weight.

Odors from Waterway in 1939 as compared to 1940.

77 witnesses testified odors from the Illinois Waterway in 1939 were worse than odors from the Waterway in 1940.

20 witnesses testified that odors in 1940 were about the same as in 1939 or were worse in 1940 than in 1939.

Effect of Illinois Waterway on eyes of witnesses.

No Joliet witnesses testified that they suffered from any irritation of the eyes or burning sensation of the eyes.

Effect on persons who fell into the Illinois Waterway.

3 persons who fell or jumped into the Illinois Waterway suffered no permanent ill effects.

1 person who attempted suicide by drowning was rescued and later died of pneumonia.

It should not be forgotten that this is an equity proceeding and equitable principles should apply. The State of Illinois is not asking for any permanent relief that will definitely fix any property rights for many future years. It is merely requesting in equity for a sufficient increase in water that will give its citizens temporary relief from the condition which actually injures and menaces their health. In an equity proceeding the Court must consider the relative values of the rights which may be given up by one side for the temporary benefit of the other. On the side of the Illinois citizens for their claim in equity we have persons who are suffering from nausea, loss of sleep, nervousness, loss of appetite, vomiting, sinus infections; persons who are not able to eat in their own homes because of the odor; many who cannot sleep in their own homes because of the odor; many who cannot sleep with the windows up at night because of the odor; some persons who have to spray perfume around the bedroom to counteract the odors at night; school children who are absent from school because of the odors, who are nervous and inattentive in the class room, and who are unable to go out and play in their playgrounds, nurses having to put cotton in the noses of the patients because of the odors; patients having to leave hospitals before their stitches were removed; mothers who are about to give birth to children who are unable to keep food on their stomachs because of the odors.

On the one hand we have human beings suffering and menaced, and on the other we have a possible temporary deprivation of a property right. On the side of the petitioner we have health and lives of thousands, and on the side of the respondents we have the alleged property right of a relatively small number.

Equitable principles should guide this Court in exercising its great power to protect the health rights of the many thousands of citizens that are asking only for temporary relief for two summers.

This Court in recent years has tended to strengthen, preserve and protect the rights of the greatest number of individuals, and on the basis of equity it should continue its policy and give temporary relief to the people of the State of Illinois.

I. Conclusions as to Health.

Illinois concludes that it has established that the condition of the Illinois Waterway at Lockport and Joliet is a menace and an actual injury to the health of the residents of these cities. The Court appointed a Special Master who was instructed to determine whether there was an actual menace, as claimed by Illinois. The Special Master found many cases of nausea, vomiting, headaches, sleeplessness, lack of appetite, and similar manifestations of illness, but he concluded that these illnesses were not severe enough to be designated as a menace to health, as he interprets the Court's instructions. It is Illinois' contention that these illnesses were proof of actual injury to health, and that the menace to health still continues in the foul, putrid and odorous condition of the Waterway. Illinois offered eighty-one lay witnesses, and it was stipulated two hundred more could have been called, to testify as to the toxic effect of the gases and odors on their health. Hospital patients, nurses, internes, doctors and school teachers testified as to the actual injury to health caused by the foul condition of the Waterway in 1939 and 1940. The opposing Lake States did not present a single witness from Joliet or Lockport to controvert this testimony, but did offer a supplemental brief in which the cases of illness of Illinois witnesses at Joliet and Lockport were summarized and classified.

Illinois presented testimony of distinguished medical authorities, particularly Dr. Anton J. Carlson, of the University of Chicago, to prove that the stench and toxic gases from the Waterway produce an actual injury to health, which is not shown in statistics of communicable diseases or other reportable health statistics, but which injury insidiously undermines the health of those continuously exposed to such stench and toxic gases. Dr. Carlson asked the Court to recognize the fact that the human system can be tremendously injured before we are sick; that fecal odors and nau[illegible]ous gases can set up nervous impulses which will affect the heart, may produce headache, nausea, lack of appetite; that sleeplessness is not a trifling thing in the matter of health; and that these injuries to the human system are more than a menace—they are actually injuries to the health of those people who are subject to the continuous effect of such foul and nauseating odors.

The enlightened, broad and challenging position of Carlson as to the meaning of a menace to health is respectfully presented to the consideration of this Court, as constituting proof of Illinois' position that the condition of the Waterway is a menace to health of the inhabitants of the complaining communities.

II.

What was the actual past condition of the Illinois Waterway by reason of such pollution, and what will be the reasonably anticipated future condition in the summer months of 1941 and 1942, pending the completion at the end of 1942 of complete sewage treatment by the Sanitary District?

The Supreme Court instructed the Special Master to report on "the actual condition of the Illinois Waterway by reason of the introduction of untreated sewage." The actual condition was shown by results of chemical analyses, which provided a precise, scientific basis for comparing past and present conditions. Reliance on these data, rather than on the memory of various witnesses, would have enabled the Special Master to conclude that

(A) The actual condition of the Waterway has been much worse since the flow was cut on January 1, 1939, than at any time since 1925.

(B) The improvement effected by the increasing degree of treatment of sewage in 1940 was nullified by the outcome of the flushing test, during which test 62,887 additional tons of putrescible sludge and 4,827 additional tons of B.O.D. were deposited and now remain in Brandon Pool.

(C) The condition of Brandon Pool will be worse in the summer of 1941 than in the summer of 1940; worse than in the summer of 1938, worse than in any summer at least as far back as 1925; and almost as bad as in the summer of 1939.

(D) The need for increased diversion will be most acute in the early summer of 1941. Relief from these deplorable conditions, which will soon recur for the third successive summer, can be had only by a modification of the existing decree by the Supreme Court in accordance with Illinois' Modified Petition, which seeks only to relieve the bad condition of Brandon Pool brought about by the premature reduction of diversion to 1,500 c.f.s. before completion of the sewage treatment program of The Sanitary District of Chicago.

(A) The Special Master in his Report relied mainly on the memory of witnesses to compare past and present conditions of the Waterway, and also on his personal brief inspections of July 8, 23, and 24, 1940, to determine the present condition (with no earlier inspections for his own comparison of past and present conditions) rather than on the record of chemical analyses of the water at Lockport shown in Illinois Ex. 37A. He gave some consideration to the analyses in this exhibit (page 70) but apparently did not attach the proper weight to these data which represent a true measure of the actual condition of the Waterway, from March, 1925, through January, 1941. These results must be relied on to answer the Court's question concerning "The actual condition of the Illinois Waterway."

It is remarkable that the results of such exhaustive analyses were available to provide a scientific, quantitative measurement of the changing conditions of the water from month to month, in fact from day to day, over this long period of nearly sixteen years. The record of these results was introduced early in the course of the inquiry (Rec. 271; J. A. 200) as Illinois Ex. 37, which included the average results of analyses from March, 1925, through June, 1940. Later the results were extended, as Illinois Ex. 37A, through December, 1940. Results for January, 1941, were introduced as Mohlman Ex. 20.

Exhibit 37A represents the average results of approximately 115,000 determinations of dissolved oxygen and 29,000 determinations of biochemical oxygen demand, all made in the same laboratory and by the same analytical methods for nearly sixteen years. The results therefore warrant thorough study as an authoritative and precise measurement of the actual condition of the Waterway from year to year, from season to season and from month to month.*

(1) Exhibit 37A starts in March, 1925. The chart shows biochemical oxygen demand on the upper line, dissolved oxygen below it, temperature next, and discharge at Lockport at the bottom. Samples were collected from the Main Channel at Lockport. The results are plotted as monthly averages.

Biochemical oxygen demand expresses the avidity of the sample for dissolved oxygen. It is the standard test to determine the strength of sewage or the degree of pollution of rivers. (See Report of the Special Master, pages 55 and 56.) The monthly results shown in Exhibit 37A show considerable variation from month to month, but in general the range of results throughout the years is remarkably uniform from 1925 through 1938, during a period in which the diversion had been successively reduced from

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* For the convenience of the Court in obtaining a graphic picture of conditions in the Waterway from 1925 to 1941, Illinois Exhibit 37A is reproduced in the Appendix hereto. The Court will undoubtedly find that reference to this exhibit will be helpful in the discussion following.

8,500 to 6,500 c.f.s. on July 1, 1930, and from 6,500 to 5,000 c.f.s. on January 1, 1936 (Report of Special Master, p. 2). The results show no increase in B.O.D. at the times these reductions were made, which times corresponded with the increases in sewage treatment, thus indicating the wisdom of the Supreme Court in the decree limiting the diversion to 5,000 c.f.s. in 1936. From 1930 through 1938, in not a single month did the B.O.D. exceed 24 parts per million.

The results took a sudden turn for the worse, however, when the diversion was reduced to 1,500 c.f.s. on January 1, 1939. The B.O.D. increased to 28.5 p.p.m. for the month of January, 1939, which was much greater than for any previous month. In May, 1939, the B.O.D. reached an all-time maximum of 42.3 p.p.m. There is nearly always a reduction later in the summer, in August and September, as the initial explosive effect of sludge putrefaction wears off (see Mohlman Exhibit 8). In 1939 the B.O.D. receded to a minimum of 13.2 p.p.m. in December, but in the spring of 1940, it again reached an average of 28 p.p.m. in May. A great increase occurred in December, 1940, as a result of the scouring out of sludge solids during the 10-day flushing test. It was expected that the B.O.D. should be substantially lower after this test, but on the contrary the B.O.D. for January, 1941, was much greater than in January, 1940, slightly greater than in January, 1938, but less than in January, 1939 (Report of Special Master, p. 70).

The actual condition of the water therefore in 1941 has suffered a setback and the need for additional diversion will be greater in 1941 than in 1940.

Dissolved oxygen results are indicative of the condition of the water. The dissolved oxygen results in Exhibit 37A show an annual fluctuation of quite similar type until January 1, 1939. Each year the dissolved oxygen decreased nearly to zero in the summer, but there was always several tenths of a part per million remaining. In 1939, however, the dissolved oxygen was zero for six months, May through October, and in 1940 four months, June through September. Exhibit 37A shows that in no previous year was there such a bad condition. There can be no sub-zero in dissolved oxygen, therefore the magnitude of the B.O.D. must be considered when dissolved oxygen records show zero. An excessive B.O.D. is shown in 1939 and 1940 and is expected in 1941.

(2) The Special Master apparently relied on the testimony of Callaghan and Andrew to compare past and present conditions of the Waterway, based on their memory of past conditions, which is proven to be faulty by an inspection of Exhibit 37A. Callaghan (Report of the Special Master, p. 27) said that in 1930 the water "was so thick you could almost paint with it. We almost had to get clothespins to put on our nose. Conditions are nowheres near as bad as they were then. They have been clearing up that water. Cleared it up, I would guess, at least 60 per cent."

The testimony of Mr. C. R. Andrew as to past and present conditions of the Waterway represents the best attempt of a competent engineer to recall, from memory only, the changes that have occurred in the condition of the water. He stated (Report of the Special Master, pages 19 to 21) that (a) "in 1933, when the dams were put into operation, the water continued to improve year by year", whereas Exhibit 37A shows no such improvement; (b) "in 1938 they were the best they had ever been," whereas Exhibit 37A shows as good or better conditions in 1928, 1931 and 1934. In fact the B.O.D. and dissolved oxygen results for 1934 and 1938 were quite similar, which would not bear out the Special Master's conclusion (p. 51) that conditions were steadily improving from 1930 to 1938, so that, as he concludes, the people of Joliet felt this improvement should continue.

The testimony of Callaghan and Andrew is contradictory; the former stated conditions were very bad in 1930, and cleared up about 60 per cent by 1940; whereas the latter (Master's Report, p. 20) stated that conditions in 1925 were very bad (as bad as in 1939) but "had improved greatly in 1930" (p. 19). The conflicting and uncertain nature of testimony of this sort should warrant its rejection in favor of the impersonal, quantitative data given in Exhibit 37A.

The data in Exhibit 37A prove conclusively that the condition of the water since January 1, 1939 has been much worse than at any time from 1925 through 1938. The flow prior to 1932 was more rapid below Joliet than after Brandon Dam was completed in 1933, but the analyses for B.O.D. show lower results for the years 1925 to 1930 than for the years 1933 to 1938.

(B) The results of analyses in Exhibit 37A show a decided improvement in the latter half of 1940, similar to the improvement in 1939. The flushing test from December 2 to 10, 1940, resulted in a greatly increased B.O.D. during the month of December, but it was expected that the partial cleanout of sludge from the Main Channel would result in much lower B.O.D. in January, 1941. However, as shown in Mohlman Exhibit 18a, b, c, d and 20, the actual conditions in 1941 are worse than in 1940 (Master's Report, p. 70), and also worse than in 1938.

The record at Lockport in 1940 and 1941 was as follows:

	January, 1940	January, 1941
Dissolved Oxygen	1.8	0.6
B.O.D.	14.8	22.9
Discharge, C.F.S.	2,949	2,781

The Special Master noted the lower flow in 1941 and stated (p. 70) that the lower dissolved oxygen in 1941 might be partly explainable because of the lower flow. However, the lower flow in 1941 is practically negligible in accounting for the greatly increased B.O.D. and lower dissolved oxygen in 1941. The flow decreased only 6 per cent, whereas the dissolved oxygen decreased 67 per cent, and the B.O.D. increased 55 per cent.

The fact is quite apparent that there has been no improvement in the condition of the Waterway since the flushing test, but an actual deterioration. The Master concludes (p. 71) that, "insofar as one can reason from January to June, the B.O.D. figures seem to support the view that conditions in June, 1941, will be a great deal better than in 1939." However, he could have added, "but worse than in June, 1940" as shown by the data on page 70 of his Report. He concludes (p. 71) that "to the extent that more putrescible material has been deposited in the Pool, conditions in 1941 will be adversely affected," but hopes that the flushing test may have improved the conditions above Lockport, although the analyses do not indicate that this hope may be realized.

(C) The results of the flushing test certainly do not warrant any optimism as to the condition of Brandon Pool in the summer of 1941. The deposit of 4,827 tons of B.O.D. in the Pool (Table XIX, Mohlman Exhibit 17. Report on Flushing Experiment) is equivalent to an increase of B.O.D. next summer of about 6 p.p.m., for a period of three months and with a flow of 3,500 c.f.s., above that which would have occurred if the test had not been made. Referring to Ex. 37A, where the summer B.O.D. at Lockport in 1940 is shown to be 19 p.p.m., it is apparent that an increase of the magnitude of 6 p.p.m. would be of serious import in the summer of 1941. The maximum summer B.O.D. at Lockport, in 1939, averaged 28 p.p.m. It is therefore likely that the effect of the flushing test will be to make conditions in Brandon Pool in the summer of 1941 almost as bad as they were in the summer of 1939, and considerably worse than in 1940 or in earlier years.

The Master also concludes that conditions in Brandon Pool in the summer of 1941 will again be very bad, *vide*:

> (p. 71) "I conclude that while it is reasonably certain that the B.O.D. conditions in the summers of 1941 and 1942 will be better than those of 1939, it is also most probable that there will be no dissolved oxygen at the Pool in the summer of 1941 and that there are likely again to be offensive odors at Joliet and Lockport."

> (p. 113) "The extent of relief from offensive odors which will be afforded at Lockport and Joliet in the summer months of 1941 is very doubtful, but there is a better outlook for the summer months of 1942."

(D) The need for additional diversion in 1941 and 1942 will become acute in the early summer, particularly in May, June and July, when the sludge deposits begin to putrefy after lying dormant throughout the winter and spring months. (Mohlman Ex. 8) The Master's Report states (p. 31):

> "In the chemical processes which are responsible for the development of gases and odors, the temperature of the water is controlling, not the temperature of the air. It was testified that actual sulfate decomposition does not occur when the temperature of the water falls below 62° Fahrenheit. The mean temperature of the water at Lockport in the months from April to September, in the years 1939 and 1940, according to the Sanitary District records, was as follows:

	1939	1940
April	56	50
May	71	58
June	71	70
July	76	74
August	77	73
September	75	72

> Thus, water temperature was lower at Lockport in 1940 than in 1939 in each of the summer months."

In other parts of the Special Master's Report, he refers to weather conditions as affecting the putrefaction of the water in the Pool:

> (p. 71) "Weather conditions will undoubtedly have a large influence not only upon the existence of odors but also upon the susceptibility of individuals to them."
>
> (p. 113) "Weather conditions will have an important influence."

The Special Master's emphasis on the effect of weather conditions is important, because the menace from foul conditions in Brandon Pool in the summer of 1941 will be greatly magnified if unseasonably high temperatures raise the water temperature in May, as occurred in 1939. An early rapid rise of temperature produces an explosive ebullition of gas which brings sludge to the surface of Brandon Pool, greatly increases the B.O.D. of the water, and disseminates nauseous odors far more intensively than occurs when the rise of temperature is slow and steady. With the greatly increased deposits of sludge in Brandon Pool, of greater putrescibility as shown in the Report on the Flushing Experiment (p. 22), an early rapid increase of water temperature will result in worse odors than those that occurred in the early summer of 1939. Therefore the need for relief by increased diversion of lake water will become very urgent in May, June and July, 1941. The Supreme Court should take cognizance of the danger of this disaster, which would subject the people of Joliet and Lockport to worse conditions than any heretofore endured.

II. Conclusions as to the Actual Conditions of the Illinois Waterway.

Illinois concludes that the record of analyses of water taken from the Waterway, as introduced in Ex. 37A, is the only reliable and impartial evidence regarding past and present conditions. These results show conclusively that the conditions were very much the same from 1925 through 1938. The Supreme Court's Decree which cut the diversion to 6,500 c.f.s. on July 1, 1930, and again to 5,000 c.f.s. on January 1, 1936, did not result in any appreciable deterioration in the condition of the Waterway, because the reductions of diversion were justified by the increasing degree of sewage treatment by the Sanitary District of Chicago.

The reduction to 1,500 c.f.s. on January 1, 1939, however, resulted in a very great deterioration in condition of the water in the Waterway, to a far worse condition than at any time since 1925. The conditions in 1939 were deplorable. In 1940 there was some improvement, but in January, 1941, the water was much worse than in January, 1940, almost as bad as in January, 1939, and much worse than in any previous January, as demonstrated in Illinois Ex. 37A. The data presage a very bad condition in the summer of 1941, such that the relief necessary will be more urgent than in the summer of 1940. These conclusions are based upon analyses which are considered by Illinois to be the only reliable measure of the actual condition of the Illinois Waterway.

III.

In view of the Special Master's finding that there are no other ameliorating measures available, is this Court justified in authorizing a temporary increase in diversion during the summer months of 1941 and 1942, in the amounts and under the conditions proposed in Illinois' Petition as modified, in view of the fact that the actual effect upon health is serious and that the offensive and deplorable conditions in the Illinois Waterway at Brandon Pool will continue to exist in the summer months of 1941 and 1942?

The Special Master has concluded (pages 110-112 of his Report) that the following ameliorating measures, which include all the remedial or ameliorating measures first suggested by the opponent Lake States, were either not feasible or not available in 1941 and 1942:

(a) Dredging of Brandon Road Pool.

(b) Draining of Brandon Road Pool.

(c) Chlorinating Brandon Road Pool or its influent.

(d) Cascading water at Lockport.

(e) Supplying additional oxygen to influent of Brandon Road Pool through production of nitrates at North Side and Calumet Treatment plants.

(f) Chemical treatment at West Side plant.

(g) Chlorinating effluent from West Side Imhoff tanks.

(i) Compulsory water metering by the City of Chicago.

The Special Master has concluded (pages 112-113 of his Report) that the following measures, already adopted by the Sanitary District of Chicago, will ameliorate conditions in the Brandon Road Pool, but will either afford no substantial relief or will not be available for effective relief before the end of 1942:

(h) Budgeting of present water diversion.

(j) Constructing facilities at the Southwest plant for the treatment of the West Side Imhoff tank effluent by activated sludge.

(k) Installing additional equipment at the Southwest plant to provide complete treatment for increased quantities of sewage.

Ameliorating measure (h), namely, Budgeting of water presently available, has been in effect since January 1, 1939 in substantially the manner suggested in the Special Master's Report, with results conforming to the budgeted flow in the months in which the storm run-off approximated that which had been estimated, but with results radically different in certain other months when the storm flow departed widely from normal. The Special Master has rightly concluded that this ameliorating measure will not afford any substantial relief.

Ameliorating measure (j), namely, the construction of activated sludge treatment facilities, at the Southwest plant, to provide final treatment for the West Side sewage, which has already received preliminary treatment in the West Side Imhoff tanks, is a definite ameliorating measure. There has been complete agreement on this point between the technical experts representing Illinois and those representing the opponent Lake States. A program for the construction of these permanent facilities was adopted by the Sanitary District of Chicago before the present hearings in this case were started. Reasonable progress is being made on this construction, considering delays caused by the National Defense Program; but, for the reasons set forth in the Report of the Special Master (pages 105-109), it is obvious that these new facilities will not be completed before the end of 1942 and therefore the Special Master is justified in his conclusion that it is doubtful if this ameliorating measure can be made operative before the end of 1942.

Ameliorating measure (k), namely, installation of additional equipment at the Southwest plant to provide complete treatment for increased quantities of Southwest Side sewage, is another part of the permanent program, and will provide some improvement in the condition of Brandon Road Pool. The Special Master has stated that the extent of relief in 1941 is very doubtful, with a better outlook for the summer months of 1942, but that weather conditions will have an important influence.

It is apparent that no immediate feasible remedial or ameliorating measure is available for relief of the critical situation at Brandon Road Pool in 1941 and 1942 except the diversion of additional water.

Pearse (Rec. 218) testified that a diversion of 5,000 c.f.s. would improve the conditions over those existing prior to 1939. No temporary measures are available which can be quickly applied to obviate the conditions in Brandon Pool other than an increased diversion (Rec. 206).

Calvert (Rec. 3202) compared the beneficial effect of dilution with other remedial measures that have been suggested, and stated:

> "The dilution of polluted water improves the condition simply because of the dilution, because it makes possible the growth of more different kinds of life in that water. There is a better balanced biological life in the water. It also dilutes the organic matter so that its odor is reduced, and it reduces the time of holding in the Channel, or time of flow through the Channel, in addition to supplying oxygen which can be utilized by growing things."

Mohlman (Rec. 278; J. A. 202) stated that in time sewage treatment will improve conditions but the only immediate relief, until the West Side supplementary treatment is completed, is by increase of diversion, giving more dilution; an increase of diversion (Rec. 3284; J. A. 229) results in dilution of the polluted and nauseating conditions and practically halves the B.O.D., something none of the other emergency measures can accomplish.

Buswell was confident that chlorination would provide more certain relief at Brandon Pool than diversion of 3,500 additional c.f.s. (Rec. 2256; J. A. 442), yet he admitted that dilution reduces the B.O.D. more certainly than chlorine (Rec. 2271; J. A. 448) and he estimated that doubling the flow of water would approximately halve the time of flow to reach the Kankakee River, where additional dilution would occur (Rec. 2274; J. A. 448).

Andrew (Rec. 1509; J. A. 252) stated that an additional diversion will reduce the odors and that removing the pollution at its source or adding such amount of water as will prevent the odors are the only two feasible methods known to him.

Prof. Carlson indicated (Rec. 2898-2900; J. A. 286) that the reduction in flow on December 31, 1938, increased the menace to health, and he further noted that by increasing the flow the menace would be lessened and a very great reduction made in hydrogen sulfide and other odors, because of the increased dissolved oxygen, increased flow and increased current (Rec. 2980; J. A. 289).

Inasmuch as witnesses for Petitioner and Opponents agree that the critical period of nuisance and health hazard occurs during the warmer months, and there is no complaint or health hazard with 1,500 c.f.s. diversion in addition to domestic pumpage during the colder months, it is logical to budget increased diversion on a graduated scale, reaching a maximum in mid-summer and tapering off in spring and fall to the present authorized 1,500 c.f.s. in addition to domestic pumpage.

The critical temperature was stated by Enslow to be 62 deg. Fahr. (Rec. 1992-1993; J. A. 395).

The temperature record of the water at Lockport is as follows (Exhibit 34 and Rec. 1840; J. A. 210):

Month	Deg. Cent.		Deg. Fahr.	
	1939	1940	1939	1940
Jan.	5.0	1.5	41	35
Feb.	3.5	5.0	38	41
Mar.	6.5	5.5	45	42
Apr.	13.5	10.0	56	50
May	17.5	14.5	64	58
June	21.5	21.0	71	70
July	24.5	23.5	76	74
Aug.	25.0	23.0	77	73
Sept.	24.0	22.0	75	72
Oct.	18.0	18.5	64	65
Nov.	11.5	—	53	—
Dec.	8.0	—	46	—

A graduated scale of increased diversion was suggested for 1941 and 1942 (Mohlman Exhibit 14a to 14e), which would provide additional diversion as follows:

ADDITIONAL DIVERSION IN CUBIC FEET PER SECOND.

Month	1941	1942
April	1,000	......
May	3,000	2,000
June	5,000	4,000
July	6,000	5,000
August	5,000	3,000
September	3,000	1,000
October	1,000	......

This budgeting of increased diversion is more effective than a uniform additional flow of 3,500 c.f.s. every month in the year, and yet, on an annual basis, the variable increases suggested would average only 2,000 c.f.s. for 1941, and 1,250 c.f.s. for 1942. The actual requirements should be based on the results of analyses of the dissolved oxygen content of the water above the dam at Brandon Pool. At least 1 p.p.m. of dissolved oxygen should be present (Mohlman Exh. 14e).

Illinois' Petition, as modified, for regulated diversion to produce a minimum of one part per million of dissolved oxygen in the water of Brandon Pool, is based upon a scientific and feasible procedure for affording relief from the deplorable conditions that have occurred in the Waterway in the summers of 1939 and 1940, and threaten to recur with greater intensity in the summer of 1941.

(A) The Master recognized the necessity for the presence of dissolved oxygen for prevention of odors of putrefaction:

> (p. 56) "The 5-day B.O.D. indicates the avidity for oxygen. The supply of oxygen in a stream to meet this demand is determined by the amount of dissolved oxygen in the water. The relation between B.O.D. and available oxygen is known as the oxygen balance. If the dissolved oxygen is less than the oxygen demand, the water is putrescible. However, so long as dissolved oxygen is present, the water is not actually in a putrefactive state. When the dissolved oxygen is exhausted, putrefaction sets in, accompanied by offensive odors."

(B) The Special Master found (p. 56) that "The weight of opinion seems to be that the presence of any dissolved oxygen is sufficient; compare *New York* v. *New Jersey*, 256 U. S. 296, 311, decided in 1921".

The Court in the case of *New York* v. *New Jersey, supra*, considered that 25 to 50 per cent of saturation is the amount of dissolved oxygen necessary to prevent the appearance of offensive odors from decomposition of organic matter deposited in the body of water under consideration. The evidence shows that Lake Michigan has about 8 p.p.m. dissolved oxygen in summer and 12 p.p.m. in winter, so that upon applying the yardstick laid down in the *New York* v *New Jersey* case to the instant situation, there would be required during the warmer months in the Brandon Pool 2 to 4 p.p.m. of dissolved oxygen to prevent the noxious and foul gaseous odors.

(C) Pearse (Rec. 195) testified that the amount of dissolved oxygen necessary should be a minimum of 3 p.p.m.

(D) Illinois, in its Petition, as modified, did not, however, request from 2 to 4 p.p.m. (average 3 p.p.m.) as a standard for maintenance of satisfactory conditions in Brandon Pool, but voluntarily lowered the standard to a minimum of 1.0 p.p.m., as a temporary standard designed to afford a reasonable degree of amelioration of the condition of Brandon Pool during the emergency in the summers of 1941 and 1942.

It is not feasible to maintain a minimum of, say 0.1 or 0.2 p.p.m. of dissolved oxygen in Brandon Pool in summer, because of the hourly variations which might quickly change within an hour from several tenths, or even one p.p.m. down to zero, or less if there could be a sub-zero. When zero is recorded, it is impossible to determine any sub-zero value, except as two samples might have a zero dissolved oxygen and one might have a 5-day B.O.D. of, say, 10 p.p.m. while the other one might have a 5-day of 40 p.p.m. or more. In this case the sample with the higher B.O.D. would obviously be far more putrescible and odorous than the sample with the lower B.O.D., but this difference would not be indicated in any way by the dissolved oxygen determination. It would require five days to make the B.O.D. determination. Therefore it is impossible to use zero dissolved oxygen as a minimum standard, and even several tenths p.p.m. is not a feasible standard.

For these reasons, the minimum standard of dissolved oxygen in Illinois' Petition as modified was set at one p.p.m. It is a low standard, and not in any way an excessive requirement.

(E) The Master may have considered the standard of

1.0 p.p.m. more than necessary because he stated (pages 70-71):

> "in the summer of 1938 there was only 0.2. This 1938 figure would fall below the minimum of 1 p.p.m. of D.O. which the Sanitary District (*sic*—should be State of Illinois) in its modified petition claims to be essential."

The reasons why the standard was placed at a minimum of 1.0 p.p.m. dissolved oxygen have been given above. However, if as implied by the Special Master, this is a high standard, as compared with 0.2 p.p.m. mentioned by him as the average for the summer of 1938, it might be helpful to compute the additional amount of lake water required to make up the difference between 0.2 and 1.0 p.p.m., when added to a flow of 3,700 c.f.s., the maximum available for summer months with the present diversion. An additional flow of 423 c.f.s. of lake water at 8.0 p.p.m. D.O. would increase the D.O. from 0.2 to 1.0 p.p.m. if the sludge demand did not abstract D.O. from the additional flow of lake water.

The increased diversions requested by Illinois are necessary to satisfy demands of effluents and sludge deposits, and not to build up an excess of dissolved oxygen at Brandon Pool. If 0.2 p.p.m. were maintained it would take only 423 c.f.s. more to bring the D.O. up to 1.0 p.p.m. It would be difficult to adjust the diversion closer than plus or minus 400 c.f.s. to produce a given D.O. content at Brandon Pool, considering the rapid variations in hourly and daily results, shown for example in the individual hourly fluctuations during the flushing test.

The standard of a minimum of 1.0 p.p.m. D.O. at Brandon Pool is therefore as low as it is possible to go safely; it is a standard that would require only a small additional amount of diversion above that necessary to attempt to maintain a minimum of 0.2 p.p.m.; and it is a standard substantially lower than the one specified in *New York* v. *New Jersey*, mentioned *supra*.

The modified request of Illinois "prays that the Decree be modified so that the actual amount of diversion of water and the periods of time of such diversion be based on the results of a continuation of the actual analyses made by The Sanitary District of Chicago and verified by whomsoever this Court may designate, with a provision that the daily reports of the results, together with the record of the increased diversion of flow, be transmitted to the United States Engineer in Chicago and monthly reports filed with the Clerk of this Court and copies thereof transmitted to the respective Attorney Generals of the opposing Lake States."

The proposal of Illinois can be accomplished by a modification of the Decree of April 21, 1930, to provide for maximum limitations as specified in the modified request of Illinois, and minimum diversions to be determined by scientific analyses to be made on samples of water collected hourly above Brandon Dam, the collection and analyses to be made by the present personnel of the Illinois River Investigations of The Sanitary District of Chicago, which have acted continuously since 1925. The results of analyses and diversions of water from Lake Michigan can be reported for each 24-hour period to a competent expert, either an engineer or a chemist, appointed by the Supreme Court for the purpose of checking and verifying the accuracy of such reports. Copies therefor can be transmitted by such Court appointees to the Attorneys General of the Great Lakes States and to the U. S. District Engineer at Chicago, cooperation between The Sanitary District of Chicago and the U. S. District Engineer to be continued as heretofore, with reference to daily or hourly rates of diversion.

No measurable harm will be done to the Great Lakes States by the increased diversion from Lake Michigan, suggested by the modified request of Illinois, which will result in a trifling temporary lowering of the lake levels of Lakes Michigan, Huron and Erie during the years 1941 and 1942. From the findings of the Special Master, Charles Evans Hughes, in 1927, the conclusion is reached that if the aforesaid temporary diversions are allowed, then the temporary lowering effect will be not more than one-half inch in 1941 and not more than one-third inch in 1942 on Lakes Michigan, Huron and Erie (Hughes Original Report 95-96, 104-105; Hughes Re-reference Report 139-140).

In the Report of Special Master Charles E. Hughes on Re-reference (1929), the following recommendation was made (p. 138):

> "Provision should be made for further examination, after the sewage treatment plants have been completed, and the effect of the effluent therefrom with the storm water flow on the navigable channels has been observed, to the end that the question of any further or other relief may have appropriate consideration in the light of actual conditions."

This statement reflects the concern felt by Special Master Hughes as to the actual conditions of the Waterway, *after* the sewage treatment works have been completed, with a diversion of 1,500 c.f.s., and the decree of the court as thereafter entered, which permitted any of the parties to apply thereafter for relief, likewise contemplated further consideration if the conditions so warranted. The conditions in the Waterway will obviously be better, after the treatment works are completed, than they will be in 1941 and 1942. Therefore the examination of the actual conditions by the court is even more necessary now, with incomplete treatment of sewage, than it will be after completion of the sewage treatment program.

"In the light of actual conditions" is interpreted by Illinois to mean "as shown by chemical analysis." The actual conditions are shown in the results of analyses presented in Exhibit 37A. These results show plainly the great deterioration in the condition of the Waterway since

January 1, 1939, and demonstrate the need of additional diversion to restore conditions to those that prevailed prior to January 1, 1939.

III. Conclusions as to a Temporary Decrease in Diversion.

Illinois concludes that this Court is justified in authorizing a temporary increase in diversion during the summers of 1941 and 1942 in accordance with Illinois' Petition as modified, because there is no other feasible ameliorating measure available; the condition of the Waterway will be worse in the summer of 1941 than in 1940 or any summer prior to 1939; a reasonable standard of dissolved oxygen content is requested, that is lower than specified in *New York* v. *New Jersey,* 256 U. S. 296, 311; and the actual conditions warrant appropriate consideration by this Court, to the end that relief may be granted until the sewage treatment program of the Sanitary District is finished.

Summary and Recommendations for a Decree.

The State of Illinois in seeking relief herein bases its argument upon the balance of equity and limits its request to such increase in diversion as to enable the maintenance of a minimum of 1 p.p.m. of dissolved oxygen during the warm weather months of 1941 and 1942 in the water above the dam at Brandon Pool.

The evidence demonstrates without refutation and the Special Master so reported (p. 51) that conditions in 1939 were far more serious than in any previous year, and the Waterway was contaminated, as stated by the Secretary of War, "to a greater extent than contemplated." It was further shown by the evidence that in 1940 the conditions were worse than in any years previous to 1939, and that such conditions will continue to exist until the sewage treatment construction program of the Sanitary District is completed, which cannot be accomplished before the end of 1942.

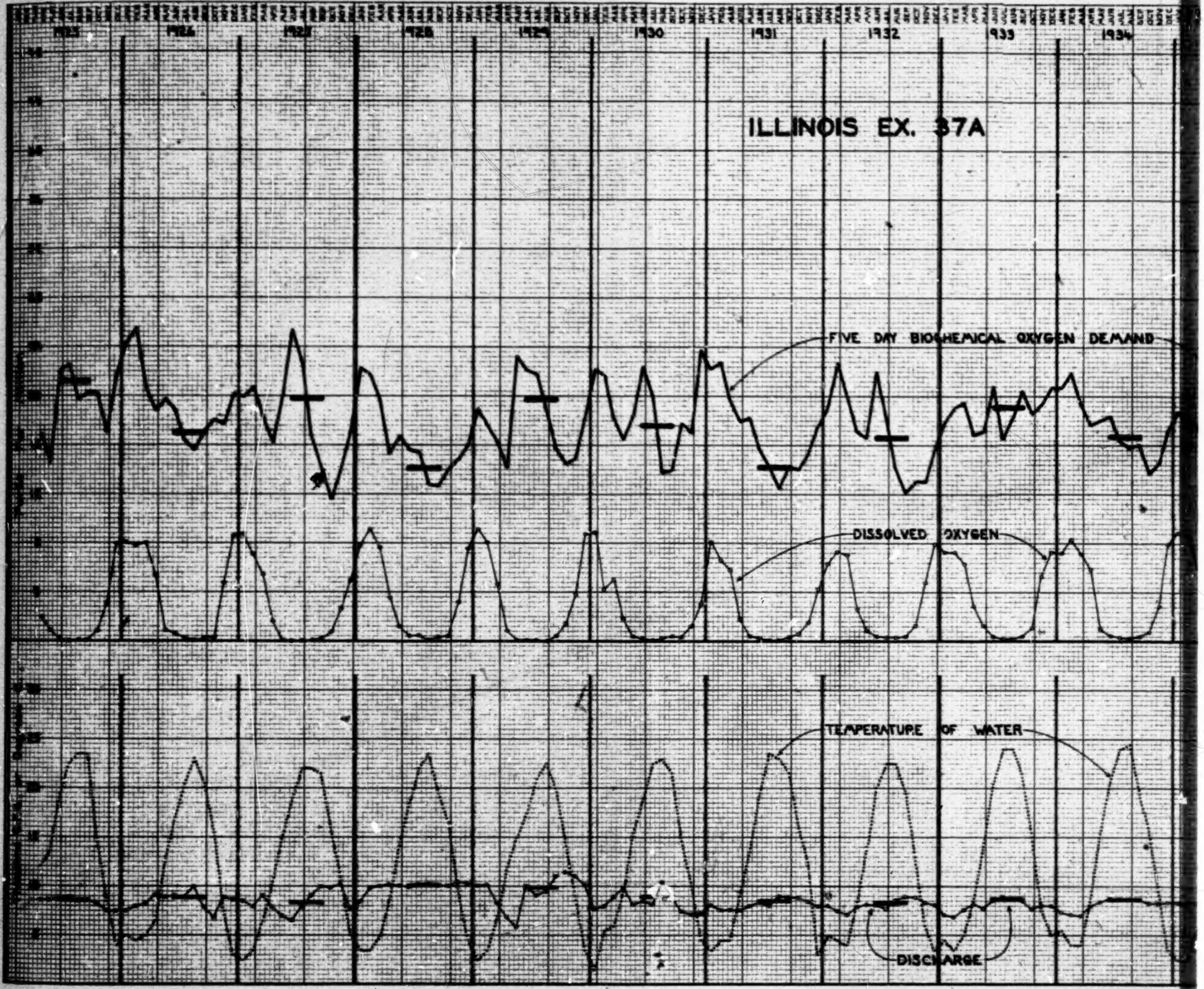
By the reduction in diversion on December 31, 1938, there was produced an actual menace to health through the high concentration of pollution in the Waterway; that beyond this unnecessary health hazard the conditions have caused an actual injury to health resulting from the gaseous odors. The evidence further shows and the Special Master so found (p. 72 to 109 and 110 to 113) that there are no temporary feasible, remedial or ameliorating measures to reduce such menace to health, or to minimize the injury to health, available to the State of Illinois. A temporary increase in the diversion of fresh water from Lake Michigan during 1941 and 1942, therefore is the only feasible remedial or ameliorating measure available.

WHEREFORE, the State of Illinois respectfully urges that Paragraph 3 of the decree of the Court of April 21, 1930, in this cause be temporarily modified so as to permit a temporary increased diversion of water during the summer months of 1941 and 1942, subject to the supervision prescribed and in accordance with the petition of the State of Illinois as modified, and set forth in this brief and argument.

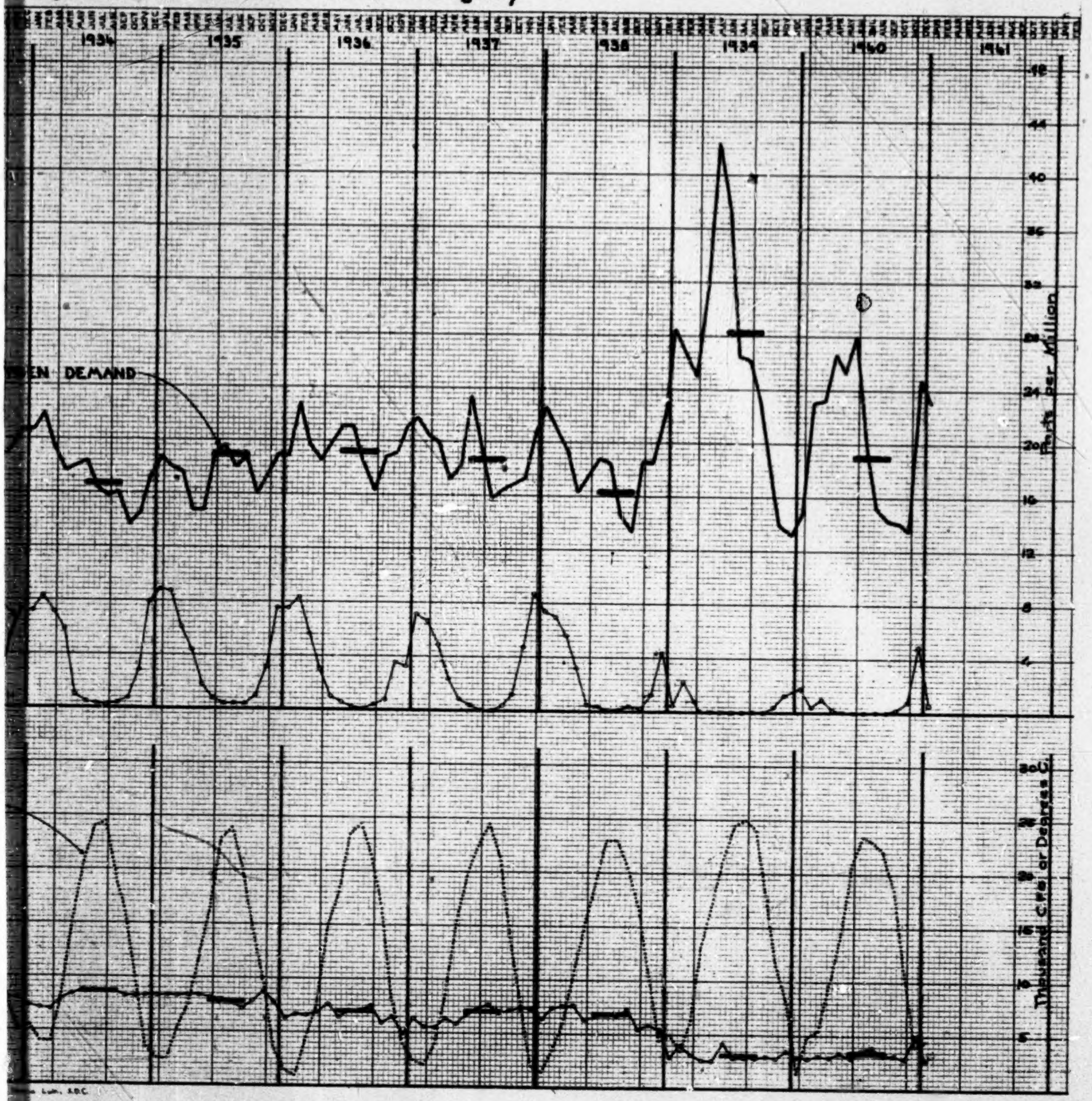
Respectfully submitted,
STATE OF ILLINOIS,
GEORGE F. BARRETT,
Attorney General of the State of Illinois,
Attorney for the Petitioner.

WILLIAM C. CLAUSEN,
ALBERT J. MESEROW,
Assistant Attorney Generals,
Of Counsel.

MAIN CHANNEL at LOCKPORT (292 miles from Grafton Ferry: 35



Ferry: 35 miles from Lake Michigan.)



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Supreme Court, U. S.
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JAN 11 1940
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1939

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, Complainants,
v.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, Defendants,
No. 2 Original.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI AND ARKANSAS, Intervening Defendants.
STATE OF MICHIGAN, Complainant,
v.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.
No. 3 Original.

STATE OF NEW YORK, Complainant,
v.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.
No. 4 Original.

Notice of Filing

PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

JOHN E. CASSIDY,
Attorney General of the State of Illinois,
Attorney for Petitioner.

14 (A-12817—100)

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1939

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, Complainants, v. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, Defendants,	No. 2 Original.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI AND ARKANSAS, Intervening Defendants. STATE OF MICHIGAN, Complainant, v. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.	No. 3 Original.
STATE OF NEW YORK, Complainant, v. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.	No. 4 Original.

NOTICE

To: John E. Martin, Attorney General of the State of Wisconsin, Madison, Wisconsin.

J. A. A. Burnquist, Attorney General of the State of Minnesota, St. Paul, Minnesota.

Claude T. Reno, Attorney General of the State of Pennsylvania, Harrisburg, Pennsylvania.

Thomas J. Herbert, Attorney General of the State of Ohio, Columbus, Ohio.

Raymond W. Starr, Attorney General of the State of Michigan, Lansing, Michigan.

John J. Bennett, Jr., Attorney General of the State of New York, Albany, New York.

You, and each of you, are hereby notified that on the 15th day of January, 1940, I shall file with the Clerk of the Supreme Court of the United States the petition of the State of Illinois for temporary modification of Paragraph 3 of Decree of April 21, 1930, in the above entitled cause.

John E. Cassidy
Attorney General of the State of Illinois.

PROOF OF SERVICE

STATE OF ILLINOIS }
COUNTY OF COOK } ss.

WILLIAM C. CLAUSEN, being on his oath first duly sworn, deposes and says that at the direction of John E. Cassidy, Attorney General of the State of Illinois he served a copy of the Petition of the State of Illinois for temporary modification of Paragraph 3 of Decree of April 21, 1930, in the foregoing entitled cause, on the 8th day of January, 1940, on

John E. Martin, Attorney General of the State of Wisconsin, Madison, Wisconsin.

J. A. A. Burnquist, Attorney General of the State of Minnesota,
St. Paul, Minnesota.

Claude T. Reno, Attorney General of the State of Pennsylvania,
Harrisburg, Pennsylvania.

Thomas J. Herbert, Attorney General of the State of Ohio,
Columbus, Ohio.

Raymond W. Starr, Attorney General of the State of Michigan,
Lansing, Michigan.

John J. Bennett, Jr., Attorney General of the State of New York,
Albany, New York.

by depositing in the United States Post Office at Chicago, Illinois, envelopes containing a copy of the above notice and a copy of the petition therein referred to; each envelope bearing..12......cents uncancelled United States postage stamps and addressed to each of the addresses of said notice at their respective addresses as in said notice stated.

William C. Claussen.....

SUBSCRIBED AND SWORN TO BEFORE
ME this..8th..day of..January.......,
A. D. 1940.

..........Mary...Griffin...
Notary Public.

FILE COPY

Office - Supreme Court, U. S.
FILED
JAN 11 1940
CHARLES ELMORE CROPLE
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1939

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, COMPLAINANTS, v. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, DEFENDANTS,	No. 2 Original.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI AND ARKANSAS, INTERVENING DEFENDANTS. STATE OF MICHIGAN, COMPLAINANT, v. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., DEFENDANTS.	No. 3 Original.
STATE OF NEW YORK, COMPLAINANT, v. STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., DEFENDANTS.	No. 4 Original.

PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

JOHN E. CASSIDY,
Attorney General of the
State of Illinois,
Attorney for Petitioner.

14 (A-12316—100)

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1939

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, Complainants,

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, Defendants,

No. 2 Original.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI AND ARKANSAS, Intervening Defendants.

STATE OF MICHIGAN, Complainant,

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.

No. 3 Original.

STATE OF NEW YORK, Complainant,

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.

No. 4 Original.

To the Honorable,
the Chief Justice and Associate Justices
of the Supreme Court of the United States:

The State of Illinois presents this its petition for a temporary modification of Paragraph 3 of the decree of this Court, entered on April 21, 1930, in this cause, wherein the diversion of the water from the Great Lakes—St. Lawrence system or water shed after December 31, 1938, was restricted to 1500 cubic feet per second, in addition to domestic pumpage and prays that the limited diversion be temporarily increased to 5,000 cubic feet per second, in addition to domestic pumpage, until December 31, 1942, so as to avert the obnoxious, noisome, unhealthy and dangerous condition now existing in the Illinois Waterway and the Sanitary District Canals, and for causes in support of said petition represents:

That this petition is filed under and pursuant to the provisions of Paragraphs 6 and 7 of the decree entered April 21, 1930, which permits applications, after due notice, for a modification of said decree if conditions should so warrant.

That due notice has been given to the complainants of the filing of this petition.

That the temporary increase now sought will not adversely affect present lake levels as the water levels in the Great Lakes are now in the rising period of one of the fluctuating cycles so that such levels during the temporary period of relief herein asked for will average a foot or more higher than they have averaged over the past eight years.

The State of Illinois has cooperated with The Sanitary District of Chicago in complying with the Court's decree.

In 1933 it passed an act authorizing The Sanitary District of Chicago, in order to provide further funds required for paying the costs of the works made necessary by the decree of this Court, to issue, in addition to all other bonds, an amount not to exceed one hundered millions dollars, without submitting the question of such issuance to a referendum. In 1935 it passed enabling legislation permitting The Sanitary District of Chicago to refund its bond obligations, both defaulted and not yet matured, totaling $139,000,000. This legislation corrected defaults and restored the credit of The Sanitary District. It also passed enabling legislation permitting the sale or transfer to the Federal Government property of The Sanitary District provided proceeds thereof should be used to pay costs of necessary works to comply with decree of United States Supreme Court. It also passed enabling legislation authorizing The Sanitary District to charge for treatment of Industrial Wastes. In 1939 it passed a Pegged Levy Statute permitting The Sanitary District to levy corporate taxes (operating purposes) up to $5,500,000 for years 1940, 1941, 1942 and 1943. (Present maximum corporate rate, 15c on each $100.00 assessed valuation, produces approximately $3,600,000 and the increase was necessary due to added costs of operating the new treatment plants which were constructed to comply with the Supreme Court decree.)

Since the decree of this Court in this cause The Sanitary District has constructed its intercepting sewers along the Chicago River and installed control works at the mouth of said river so as to prevent reversals in the Chicago River and contamination of the waters of Lake Michigan and has diligently prosecuted its sewage treatment program despite the depression and serious financial difficulties. It has completed all the construction necessary for the collection of more than ninety-nine per cent of all the sewage within the Sanitary District and the treatment to some degree of all the sewage. The facilities for complete sewage treatment have been provided in its North Side Sewage Treatment Works, its Calumet Sewage Treatment Works, and its Southwest Side Sewage Treatment Works and for primary treatment at its West Side Sewage Treatment Works. It has expended on sewage treatment construction in addition to the expenditure of approximately $120,000,000.00 on its dilution system, the following amounts and on the respective dates set forth:

Prior to April 21, 1930 (Date of original decree.)............	$ 89,812,847.25
From April 21, 1930, to June 1, 1933, (Date of amended decree May 22, 1933.)	10,973,720.42
From June 1, 1933, to December 1, 1938, (As in final semi-annual report).......	59,008,764.03
Total to December 1, 1938........	$ 159,795,331.70
The Sanitary District of Chicago has since expended, to December 1, 1939...	4,177,748.57
Total to December 1, 1939........	$ 164,073,080.27

so that construction work of approximately sixty million dollars was performed by The Sanitary District since January 1, 1934.

As reported to the Court on May 23, 1934, The Sanitary District, acting upon the recommendation of the report of a commission appointed by the Federal Emergency Administration of Public Works to review the plans of the West-Southwest Treatment Project, presented a modification in the construction program procedure originally submitted to and considered by the Court, and said Public Works Administration Commission's report recommended the construction of certain works to provide complete treatment for the Southwest Side area instead of the original plan to supplement the existing West Side Treatment Works for complete treatment in view of the facts that such funds would provide for the immediate purification of the Southwest Side sewage and permit time for further investigation as to the best methods of supplementing the existing West Side Imhoff Tank Plant and provide added protection against pollution of the lake water supply and, in accordance with said report filed with this Court by The Sanitary District, it proceeded with this modification in the construction program.

Plans have been prepared for the construction of secondary or complete sewage treatment facilities at the West Side Works and construction will proceed on the necessary works as quickly as funds are available. It is estimated that the cost of said works will not exceed nine millon dollars and the estimated time required for the physical construction of said complete treatment for the West Side Sewage Treatment Works will be two working seasons.

The debt-incurring capacity of The Sanitary District of Chicago, which is based on the constitutional debt limitation of five per cent of the assessed valuation of property within its territorial limits and the amount of bonds outstanding in recent years and presently, has been as follows:

Date	Debt Incurring Capacity	Based on Assessed Valuation	Bonds Outstanding
Dec. 31, 1932	$ 195,245,880	1931	$ 107,032,000
Dec. 31, 1933	183,183,629	1932	148,970,000
Dec. 31, 1934	138,746,862	1933	143,420,055
Dec. 31, 1935	132,268,808	1934	139,945,890
Jan. 2, 1937	119,915,555	1935	133,322,390
Jan. 2, 1938	115,732,909	1936	124,992,890
Jan. 2, 1939	122,861,672	1937	117,484,390
Nov. 1, 1939	115,430,278	1938	114,484,390
Jan. 2, 1940	115,430,278	1938	111,948,390 (Estimated)

On December 31, 1933, at the time The Sanitary District had concluded its sale of bonds in the amount of approximately $42,000,000 to the Public Works Administration to finance the construction of the needed works, there was then an unexercised bonding power of approximately $34,000,000; since then The Sanitary District has retired its outstanding bonds in the approximate amount of $32,000,000 and if the assessed valuations had remained the same in 1939 as they were in 1933 the present available additional Sanitary District bonding capacity would be $66,000,000. However, the assessed valuations of property decreased from December 31, 1933, to December 1, 1939, and the debt incurring capacity was reduced approximately

$68,000,000 so that as of December 1, 1939, the outstanding bonds and other legal obligations of The Sanitary District of Chicago are approximately equal to the debt incurring capacity and there is at this date no unexercised bonding capacity.

Assuming as presently anticipated, $2,500,000 of bonds will be redeemed on January 1, 1940, the difference between the debt incurring capacity and the amount of bonds outstanding of The Sanitary District will be $3,445,888 on January 2, 1940, and as contractual obligations of The Sanitary District amount to approximately $2,400,000, including an obligation of $1,400,000 on a contract for the purchase of power from the Public Service Company of Northern Illinois, the unencumbered debt incurring capacity of The Sanitary District of Chicago will then be about $1,000,000 on January 2, 1940.

It is expected additional bonds will be redeemed by The Sanitary District at the rate of about $5,000,000 per year over the next three years and that such a rate of redemption will then enable the selling of bonds for the remaining necessary construction within the next three years, provided the assessed valuation of property within the Sanitary District does not become materially less than it was for 1938, the latest assessment for which figures are available.

Delay in the construction work due to mechanical difficulties has been experienced in placing the Southwest

Treatment Works in complete service through circumstances beyond the control of The Sanitary District, resulting from rejection of bids, readvertising for new bids, construction delays caused by strikes, all of which were duly reported to this Court by The Sanitary District, and a further delay has resulted in the Racine Avenue Pumping Station, which, however, it is expected will be in operation in January, 1940.

By reason of the unavoidable delays in the construction of said treatment works and intercepting sewers and in the installation of complete facilities in the West Side Works, coupled with the drought conditions in the Des Plaines and Illinois Valleys, an obnoxious noisome, filthy, unsanitary and dangerous condition to public health has resulted in the Sanitary District Canal and the Illinois Waterway.

Subsequent to December 31, 1938, when the diversion of lake water was reduced to 1500 cubic feet per second there has been stagnation in the Sanitary District Canal and the Illinois Waterway. This stagnation has resulted in the formation of thick, black, bubbling scum for long distances along the Sanitary District Canal and the Illinois Waterway. Because of the effluent of sewage from the Sanitary District of Chicago into said Sanitary District Canal and the Illinois Waterway a putrescent, obnoxious, noisome and unhealthful odor exists, causing nausea, insomnia, loss of appetite, irritation of the mucous membrane of the nose and throat and in general the undermining of the health of those persons living or working along the Sanitary District Canal and the Illinois Waterway. This condition aggravates illness and retards the recovery of patients ill in hospitals located along said Sanitary District Canal and the Illinois Waterway.

Innumerable protests against the deplorable condition which has arisen since December 31, 1938, have been filed with the State of Illinois by barge operators and crews thereof and by citizens, Chambers of Commerce and various Civic Association from the cities of Argo, Lemont, Lockport, Joliet, Morris, Marseilles, Ottawa and LaSalle, Illinois, which cities or towns border upon said waterway, and the deplorable conditions in the various parts of said waterway are not only detrimental and dangerous to the health of the citizens along said canal and waterway, but also to those in the service of navigation. There has been an increase of vessel traffic on the Chicago Sanitary and Ship Canal (Chicago Drainage Canal) between Damen Avenue and Lockport, Illinois, from 92,228 tons in 1930 to 2,962,560 tons for the year 1938.

During the early part of 1940, the sewage treatment in operation by the Sanitary District will be on the sewage of a population equivalent of 6,350,000 treated to such a degree that it will be equal to the 100% treatment of the sewage of a population of 4,535,000, and giving a total percentage treatment of approximately 70% which may be compared to the ultimate expected 85% treatment considered by Special Master Hughes in his report on re-reference;

and upon the installation of final complete treatment facilities at the West Side Sewage Treatment Works, The Sanitary District will raise the degree of treatment on the sewage of said West Side area amounting to a population of 1,800,000 from 33 1/3% to 85% which will increase the total sewage treatment of The Sanitary District to that of a population equivalent of 6,439,000 to such a degree that it will equal a total percentage treatment of approximately 85%, which is the degree of treatment anticipated.

A table showing conditions for the treatment of sewage as of June, 1938, and the ultimate treatment expected at various dates by The Sanitary District is as follows:

	Total Population Equivalent	Percentage Treatment	Treatment 100 Per Cent Basis	Sewage and Wastes Remaining Equivalent to Sewage from Population of
As of June 1938				
Treated	3,705,000	62.8	2,328,000	
Not treated	2,770,000	0	0	
Total	6,475,000	35.9	2,328,000	4,147,000
As of December 31, 1938				
Treated	3,888,000	62.8	2,442,000	
Not treated	2,606,000	0	0	
Total	6,494,000	37.7	2,442,000	4,052,000
As of November 1, 1939				
Treated	4,919,000	67.4	3,318,000	
Not treated	1,575,000	0	0	
Total	6,595,000	50.9	3,318,000	3,176,000

As of January 1940....				
Treated	6,350,000	71.5	4,535,000	
Not treated	144,000	0	0	
Total	6,494,000	70.4	4,535,000	1,959,000
As of May 1940, with plants operated as designed,				
Treated	6,439,000	71.5	4,565,000	
Not treated	55,000	0	0	
Total	6,494,000	70.4	4,565,000	1,929,000
As of May 1940, with one-third of West Side sewage diverted to Southwest Works,				
Treated	6,439,000	75.8	4,876,000	
Not treated	55,000	0	0	
Total	6,494,000	75.1	4,876,000	1,618,000
After Complete Treatment at West Side Works,				
Treated	6,439,000	85.4	5,500,000	
Not treated	55,000	0	0	
Total	6,494,000	84.7	5,500,000	994,000
Ultimate Treatment Total	6,494,000	85	5,520,000	974,000

The sewage and wastes remaining equivalent to the sewage from the various populations and the fresh water available for the dilution and the ultimate natural purification of such remaining wastes has been and will be as follows, with the diversion of the water from the Great Lakes-St. Lawrence system or water shed of 5000 cubic feet per second annual average prior to December 31, 1938, and reduction to this diversion to 1500 cubic feet per second thereafter:

	Diluting Water C. F. S. Annual Average	Sewage and Wastes Remaining Equivalent to Sewage from Population of	Diluting Water Per 1000 Persons C. F. S. Annual Average
June to December 1938......	5,000	4,147,000	1.21
January to August 1939......	1,500	4,052,000	0.37
November 1939 to January 1940.....................	1,500	3,176,000	0.47
January 1940 to May 1940...	1,500	1,959,000	0.76
May 1940 until complete treatment at West Side Works...	1,500	1,618,000	0.93
After Complete Treatment at West Side...............	1,500	994,000	1.51
Ultimate...............	1,500	974,000	1.54

The dilution ratio in effect during 1938, viz: 1.21 cubic feet per second of fresh water per 1000 persons was not sufficient to prevent nuisance and the dilution ratio in effect during 1939, viz: 0.37 cubic feet per second of fresh water per 1000 persons prior to August and 0.47 cubic feet per second after October, was so inadequate as to cause a serious nuisance. The dilution ratio to be in effect from the spring of 1940 until the completion of the final sewage facilities to the West Side Sewage Treatment Works of The Sanitary District will be limited to 0.93 cubic feet per second of fresh water per 1000 persons which will be inadequate to prevent the continuation of the nuisances as during the major portion of the time and particularly, during dry weather when diluting water will be most needed. The dilution ratio will then be about two-thirds of the annual average ratio, because about 500 cubic feet per second or one-third of the diluting water will be used in storm runoff. The effect of the operation of the completed program will be to leave available for the dilution of sewage treatment plant effluent, equivalent to the raw sewage of 974,000 people, fresh water in the amount of 1,500 cubic feet per second, annual average, or 1,000 cubic feet per second during times of dry weather. This will give an average of 1.5 cubic feet per second of diluting water per 1000 persons or slightly better than the 1.2 cubic feet per second average available during 1938. It of course must be realized that only actual experience can show whether or not this will be sufficient to eliminate the nuisance.

The reduction in diversion from 5,000 cubic feet per second in 1938 to 1,500 cubic feet per second in 1939 resulted in a very great deterioration in the sanitary condition of the South Branch of the Chicago River, the Main Channel of the Sanitary District, the lower Des Plaines River, and the upper Illinois River, as measured by the content of dissolved oxygen in the water and by the biochemical oxygen demand of the water. It is commonly recognized that the absence of dissolved oxygen is peculiarly significant of deterioration, as it indicates a condition of nuisance and the fact that fish life must be absent.

The diluting water diverted from Lake Michigan starts down the South Branch of the Chicago River with approximately 8.5 parts per million of dissolved oxygen in summer and 12 parts per million in winter and its biochemical oxygen demand is almost zero and as the flow receives sewage or sewage effluent, the dissolved oxygen content is decreased by the biochemical oxygen demand, considerably faster in summer than in winter. In 1939 in the South Branch of the Chicago River, at Damen Avenue, the dissolved oxygen ranged from zero to 2 parts per million as against 5.1 to 9.4 in 1938, from April to September and the minimum day in the like period in 1939 was less than 0.4 parts per million, whereas in 1938 it was never lower than 4.2. In July, August and September, 1939, most of the water samples contained no dissolved oxygen but, on the other hand, the concentration of pollution markedly increased in May, from a biochemical oxygen demand of 10.7 parts per million in 1938 to 55.1 parts per million in 1939, with a single day showing in May, 1939, of 156 parts per million.

In 1939 at Summit, Illinois, the monthly average content of dissolved oxygen was markedly lower than in 1938. From April to September of 1939, except for 0.2 parts per million in June, no dissolved oxygen was found at Summit, whereas in 1939 the minimum month was 0.6 parts per million and the maximum 6.6 parts per million in the same period. The concentration of pollution was markedly increased in 1939, with a very great rise in May, the monthly average of 18.0 parts per million biochemical oxygen demand in 1938 having risen to 66.9 parts per million in 1939, with a maximum day of 102 parts per million. In January, 1938, at Lockport, Illinois, the dissolved oxygen averaged 7.4 parts per million, with a discharge of 6,408 cubic feet per second; whereas, in January, 1939, the average dissolved oxygen content dropped to 0.5 parts per million with a discharge of 2,911 cubic feet per second. Prior to 1939, the content of dissolved oxygen had always been high in the winter. In June, 1938, at Lockport the biochemical oxygen demand averaged 18.8 parts per million with a discharge of 6,701 cubic feet per second and in June, 1939, the average increased to 37.8 with a discharge of 4,227, and in May, 1939, was even higher, averaging 42.3 parts per million. In 1939, at Lockport, not only was the dissolved oxygen lowered markedly in the winter, but from May to October it was found to be zero, whereas in 1938 from 0.1 to 0.5 parts per million was present. The concentration of pollution increased markedly in every month of 1939 as compared with 1938, the biochemical oxygen demand ranging from 23 to 42.3 parts per million in 1939 as against 13.4 to 22.6 parts per million in 1938. Above the Marseilles dam, the river shows the effect of the dilution coming from the Kankakee River. In 1939 the average monthly dissolved oxygen was generally lower than in 1938, and reached zero on minimum days in May and June, as against minimums in those months of 1938 of 6.1 and 4.5 parts per million.

In the belief that the Secretary of War, acting upon the recommendation of the Chief of Engineers, had authority to abate the existing nuisance on the now Federal Waterway Project by authorizing the diversion of more water, a plea for relief was addressed to the Secretary of War on June 5, 1939, by the Mayor of the City of Joliet, Illinois. The Secretary of War, on September 1, 1939, replied, advising that the report of the United States District Engineer at Chicago, Illinois, stated conditions in the Brandon Road Pool, which extends throughout the City of Joliet, were unsightly, filthy and noisome and much worse than they were last year; that unquestionably the waterway was contaminated by sewage from the Chicago area to a greater extent than contemplated and that remedial action was necessary; that a temporary increase in diversion to 5,000 cubic feet per second was necessary in the interest of public health and to remedy the unsightly and odorous conditions existing in Joliet. The Secretary of War further stated that, while he was entirely sympathetic with the view of the citizens of the city, he was of the opinion that the War Department was without legal authority to permit any increase in the flow of water from Lake Michigan through the Chicago Drainage Canal and its auxiliary channels or otherwise, and that the withdrawal of lake water was now governed by the decree of the Supreme Court of the United States entered April 21, 1930, and he suggested that it might be appropriate for the State or Sanitary District authorities to apply to the Supreme Court for such modification of the above decree with regard to the diversion of water from Lake Michigan as was necessary under present conditions; that such an application presented a method by which the present unsatisfactory conditions at Joliet might be relieved.

On October 27, 1939, Major General Julian L. Schley, Chief of Engineers of the United States Army, writing on the same subject-matter, substantially reiterated the findings of the Secretary of War.

WHEREFORE, the State of Illinois respectfully petitions that paragraph 3 of the decree of this Court of April 21, 1930, in this cause, be temporarily modified to permit an annual average diversion of not more than 5000 cubic feet per second of water from the Great Lakes-St. Lawrence System or Water Shed, in addition to domestic pumpage, until December 31, 1942, at which time it is expected complete treatment of the sewage of the Sanitary District as heretofore submitted to the Court will have been provided, so as to eliminate the obnoxious, noisome and unhealthy conditions now existing in Illinois Waterway, or if this Court should determine that the Secretary of War, under existing law, has authority to grant a temporary increase in this diversion if conditions so warrant, that this Court accordingly issue such a pronouncement, as the Secretary of War, in his letter of September 1, 1939, addressed to the Mayor of the City of Joliet and referred to herein, has assumed the position that under the provisions of said decree of April 21, 1930, the War Department is without legal authority, regardless of conditions, to permit any increase whatsoever in the said diversion.

Respectfully submitted,

STATE OF ILLINOIS,
By John E. Cassidy
Attorney General of the
State of Illinois.

STATE OF ILLINOIS }
COOK COUNTY } ss.

WILLIAM C. CLAUSEN, being first duly sworn, on oath deposes and says: That he is a duly appointed and acting Assistant Attorney General of the State of Illinois; that he has read the foregoing petition and that the matters and things therein set forth are true in substance and in fact.

William C. Clausen

Subscribed and sworn to before me
this 8th day of January A. D. 1940.
Mary Griffin
Notary Public.

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CLERK

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

OCTOBER TERM, 1940

States of Wisconsin, Minnesota, Ohio and
Pennsylvania, Complainants,
vs.
State of Illinois and the Sanitary District
of Chicago, Defendants.
No. 2, Original

State of Michigan, Complainant,
vs.
State of Illinois and the Sanitary District
of Chicago, et al., Defendants.
No. 3, Original

State of New York, Complainant,
vs.
State of Illinois and the Sanitary District
of Chicago, et al., Defendants.
No. 4, Original

REPORT OF THE SPECIAL MASTER

March 31, 1941

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REPORT OF THE SPECIAL MASTER

March 31, 1941

I.

PRELIMINARY STATEMENT

History of Litigation

On May 9, 1922, the original proceeding in this cause was begun when the State of Wisconsin moved for leave to file a bill for an injunction to prevent the State of Illinois and the Sanitary District of Chicago from diverting water from Lake Michigan at Chicago. The States of Minnesota, Ohio, Pennsylvania, Michigan and New York subsequently joined as complainants or filed independent bills. After a reference to Charles Evans Hughes, Esq., as Special Master, the Court on January 14, 1929, rendered an elaborate opinion through Chief Justice Taft (278 U. S. 367), holding the diversion of water from Lake Michigan to be illegal, except insofar as it might be required to maintain navigation in the Chicago River.

The case was again referred to Special Master Hughes for a report upon the practical measures necessary for the disposition of the sewage of the Sanitary District through other means than the diversion of water from Lake Michigan, the time which would be required therefor, what reduction in diversion would meanwhile be practicable, and the diversion which would be permanently necessary to maintain navigation in the Chicago River.

On April 21, 1930, following the report of the Master upon this reference, a decree was entered pursuant to an opinion of Mr. Justice Holmes (281 U. S. 696), enjoining the State of Illinois and the Sanitary District of Chicago from diverting any of the waters of the Great Lakes-St. Lawrence System or watershed through the Chicago Drainage Canal or otherwise in excess of the following annual averages, in addition to domestic pumpage:

From July 1, 1930 to December 31, 1935	6500 c.f.s.[1]
From December 31, 1935 to December 31, 1938	5000 c.f.s.
From December 31, 1938	1500 c.f.s.

On October 10, 1932, (287 U. S. 568) upon the application of the complainants, Illinois and the Sanitary District were ordered to show cause why they had not taken appropriate steps to effect compliance with the requirements of the decree of April 21, 1930. After a reference to Edward F. McClennen, Esq., as Special Master, the Court, through Mr. Chief Justice Hughes, handed down an opinion enlarging its original decree by directing the State of Illinois to take all necessary steps, including the provision of necessary moneys, to secure the completion of adequate sewage disposal plants, together with any necessary controlling works to prevent reversals of the Chicago River (289 U. S. 395).

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[1] C.f.s. will be used in this report as an abbreviation for cubic feet per second. One cubic foot per second is approximately two-thirds of a million gallons per day.

On January 11, 1940, Illinois applied for a modification of the decree entered on April 21, 1930, to permit a temporary increase of the diversion to 5,000 cubic feet per second, in addition to domestic pumpage, until December 31, 1942. After a hearing upon this application, the Court on April 30, 1940, rendered a *per curiam* opinion (309 U. S. 569), in which it said:

> "The State of Illinois has failed to show that it has provided all possible means at its command for the completion of the sewage treatment system as required by the decree as specifically enlarged in 1933 (289 U. S. 395, 710). No adequate excuse has been presented for the delay. Nor has the State submitted appropriate proof that the conditions complained of constitute a menace to the health of the inhabitants of the complaining communities or that the State is not able to provide suitable measures to remedy or ameliorate the alleged conditions without an increase in the diversion of water from Lake Michigan in violation of the rights of the complainant States as adjudged by this Court.
>
> "In order, however, that the Court may be satisfied as to the actual condition of the Illinois

> Waterway by reason of the introduction of untreated sewage, and as to the actual effect, if any, of that condition upon the health of the inhabitants of the complaining communities, and also with respect to the feasibility of remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan, the Court appoints a Special Master to make a summary inquiry as to such condition, effect and measures, and to report to this Court with all convenient speed."

Modification of the Petition of Illinois

After the hearings before me had been completed, Illinois in the brief which it submitted to me and the findings which it requested me to enter, modified its petition so as to ask for an additional diversion during the months from April to October, in each of the years 1941 and 1942 to the extent necessary to provide a minimum of 1 part per million[1] of dissolved oxygen in the water above the dam at Brandon Pool at Joliet, subject to the following maximum increases above the 1500 c.f.s. now permitted:

	1941	1942
April	1000	0
May	3000	2000
June	5000	4000
July	6000	5000
August	5000	3000
September	3000	1000
October	1000	0

According to the schedule set out by Illinois in its modified petition, the total increase in diversion of water, if the modified application were granted, would amount, on an annual basis, to 2,000 c.f.s. in 1941 and to 1,250 c.f.s. in 1942.

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[1] Parts per million will be hereinafter referred to as p.p.m.

Conduct of the Hearings

On July 8, 1940, accompanied by counsel for all parties, I went by automobile from Chicago to Joliet, Ill., a distance of about 45 miles by road (the distance by rail is about 40 miles), and there at a point below the Brandon Road Dam, took a boat provided by the Sanitary District and proceeded through the Brandon Road Pool, a distance of about 5 miles. On July 10th, accompanied by counsel, I made an inspection of the sewage disposal plants situated on the West Side and the Southwest Side. The taking of testimony was begun in Chicago on July 11, 1940 and continued through July 12. Beginning July 22, 1940, I spent four days at Joliet, where the testimony of a large number of witnesses was taken, and upon this visit I again took a boat and made an inspection of the Waterway from the Brandon Road Dam to the Lockport Dam. I also drove by automobile along the Canal to Lockport. While the testimony was being taken at Joliet, I resided at the Louis Joliet Hotel, which is four blocks from the Canal.

The taking of testimony was resumed in Chicago in September, 1940, and hearings were had from time to time in September and October. Another hearing was held in Chicago in January, 1941, primarily for the purpose of recording the results of the experimental flow of 10,000 c.f.s over a period of ten days which was authorized by the Court's order of November 25, 1940, as well as for the purpose of receiving final reports as to the status of the sewage disposal works and the conditions in the Waterway.

Argument was heard in New Orleans on February 20, 21 and 22, 1941. Additional documentary evidence was then received. Full briefs and reply briefs

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were filed on both sides. The record comprises approximately 4,000 pages. The total number of witnesses heard aggregated 161. A large number of exhibits were received.

II.

HISTORICAL AND PHYSICAL DETAILS CONCERNING WATERWAY AND DIVERSION FROM LAKE MICHIGAN

General Description of Illinois Waterway

Full historical details with respect to the Waterway are to be found in the original report of Special Master Hughes filed on May 23, 1927, some of the facts stated in which are summarized in the opinion of Chief Justice Taft reported in 278 U. S. 367. Only a few of the more important facts will be noticed here.

The Illinois Waterway extends from Lake Michigan at Chicago to the Mississippi River at Grafton, Ill., a distance of approximately 327 miles. It comprises the Chicago River, the Chicago Sanitary and Ship Canal (an artificial channel constructed by the Sanitary District of Chicago[1]) and the Des Plaines and Illinois Rivers. The Canal Section was constructed between 1892 and 1900 and was opened for use on January 17, 1900. Up to that time the Chicago River flowed into Lake Michigan, carrying with it the sewage of Chicago, which was discharged into the river. The river before 1865 "in its natural state was a sluggish stream, especially in its lower reaches. Receiving the sewage of a rapidly growing city, together with the waste of industrial plants, it became very offensive"; see 1927 report of Special Master Hughes, page 12. In 1872 "the canal was grossly polluted", *ibid*, page 13. In 1891 "as the city continued to grow the nuisance along the canal was at times as bad as ever", *ibid.*

---

[1] The Sanitary District was organized under the Illinois Act of 1889 and its organization was completed in 1890. Its area comprised 185 square miles extending from the Illinois State line on the south and east to the northern boundary of Cook County on the north, with about 34 miles of frontage on Lake Michigan, thus embracing the metropolitan area of Chicago, consisting of Chicago and its suburbs. The area now comprises 442 square miles.

After the Canal was opened, the flow of the Chicago River was reversed so that it was made to flow away from Lake Michigan. All sewage in the District was turned into the main channel, completely untreated.

In January, 1900, the State of Missouri filed a suit in this Court against Illinois to restrain the discharge of sewage by Chicago into the Illinois River on the ground that it came from the Illinois River to the Mississippi River at a point about 43 miles above the City of St. Louis and might endanger the health of the inhabitants of that City. A demurrer to the bill was overruled; *Missouri vs. Illinois*, 180 U. S. 208, decided January 28, 1901. The case was then heard on the merits and a decree entered on February 19, 1906, dismissing the bill on the ground that the complainant had failed to establish the allegations of the bill, particularly in view of the considerable distance from the origin of the sewage to Missouri and the oxidizing qualities of the water from Lake Michigan and the Mississippi River; *Missouri v. Illinois*, 200 U. S. 496.

The Canal Section of the Waterway extends from the Chicago River at Damen Avenue (sometimes called Robey Street), which is about 6 miles from Lake Michigan, and extends thence 30 miles to Lockport. Two miles west of Lockport the Canal connects with the Des Plaines River. Further south the stream is joined by the Kankakee River and becomes known as the Illinois River.

Since 1930 a controlling works and lock have been constructed by the Sanitary District at the mouth of the Chicago River to prevent reversals into Lake Michigan.

From Grafton to just below Lockport (a distance of approximately 290 miles) the Waterway is generally 300 feet wide and 9 feet deep. From Lockport to Chicago Harbor, the channel is generally 160 feet wide and 21 feet deep.

A series of dams and locks with resulting pools above the dams have been constructed in the Waterway in order to assist navigation by eliminating rapids in the stream. In the order in which they are approached from Chicago, these are situated at Lockport, Brandon Road Pool, Dresden Island, Marseilles, Starved Rock, Peoria, LaGrange and Alton. All of these are now operated by the federal government. At the time of the rendition of the 1930 decree of this Court, the Lockport Dam and Pool were in existence, but not the others. The section of the Waterway directly involved in the present controversy contains only the pools at Lockport and Brandon Road. The Brandon Road Pool is situated at Joliet and appears to be the chief source of the complaints at this time. Further details with respect to it are accordingly here noted.

Brandon Road Pool

The construction of Brandon Road Lock and Dam was begun by the State of Illinois but taken over by the federal government in 1930. It was completed in 1933. Prior to its creation there was an old dam at Jackson Street in Joliet, and the Des Plaines River between that point and the Brandon Road Bridge flowed rapidly over rocks, creating considerable turbulence. The channel was comparatively narrow, varying in depth from a minimum of 1 to 2 feet to a maximum of 6 to 8 feet, and navigation was possible only through the old Illinois and Michigan Canal. As technically defined by the United States Engineers, the Brandon Road Pool extends from the power house of the Sanitary District near Lockport to the Brandon Road Dam just below Joliet, a distance of approximately 5 miles. For the greater part of the distance, however, the Pool is not much wider than the Waterway. At a point below the McDonough Street Bridge at Joliet, the width expands from approximately 270 ft. to a maximum of 1,400 ft. The maximum width extends for about half a mile. The Joliet city map indicates that this wide section of the Pool is at the southern end of Joliet, for the most part outside the corporate limits, and it appears to be one to two miles from the residences of most of the Joliet witnesses. It is this lower wide section that is generally referred to as the Brandon Road Pool.

Diversion from Lake Michigan

Including domestic pumpage, the water directly abstracted from Lake Michigan by the Sanitary District in earlier years ranged from 2,990 c.f.s. in 1900 to 7,839 c.f.s. in 1913 (1927 report of Special Master Hughes, p. 22). The quantities thus abstracted substantially exceeded the amounts authorized by permits issued from time to time by the Secretary of War. In October, 1913, the United States brought suit against the Sanitary District in the District Court for the Northern District of Illinois, to enjoin the Sanitary District from diverting more water than that authorized by the permit then outstanding, which allowed a maximum diversion of 250,000 ft. per minute, equal to 4,167 c.f.s., including domestic pumpage. After many years of delay, a decree was entered in favor of the United States on June 18, 1923, which was affirmed by this Court in an opinion rendered on January 5, 1925, by Mr. Justice Holmes; *Sanitary District of Chicago vs.*

United States, 266 U. S. 405. The decree was without prejudice to any permit that might be issued by the Secretary of War.

Following this decision, on March 3, 1925, the Secretary of War issued a permit authorizing the diversion of an amount not exceeding 8,500 c.f.s. in addition to domestic pumpage. This permit expired by limitation on December 31, 1929, and the Secretary of War then issued a permit for 8,500 c.f.s., including domestic pumpage, to expire June 30, 1930. This permit was in effect set aside by the decree entered by this Court on April 21, 1930, in the injunction suit filed by Wisconsin and other Lake States (281 U. S. 696), and the Secretary of War on June 26, 1930, issued a permit to conform with the Court's decree, which provided for a reduction of the flow as stated, *supra, page* 2.

The decree of April 21, 1930 provided that the amount to be diverted was to be determined by deducting from the total average flow at Lockport the amount of domestic pumpage, i. e. water pumped from Lake Michigan by the City of Chicago into its water mains. During the years 1938, 1939 and 1940 the (a) total average monthly flow at Lockport and (b) Chicago domestic pumpage were as follows in c.f.s.:

	1938	1939	1940
Average total flow at Lockport	6,648	3,132	3,319
Domestic pumpage	1,604	1,620	1,589
Inflow from Des Plaines River	45	13	49
Net water taken from Lake Michigan, exclusive of domestic pumpage	4,999	1,499	1,681

The 1940 figures were increased by the temporary flow of 10,000 c.f.s. for a period of ten days from December 2 to December 12, 1940, permitted for experimental purposes in accordance with the stipulation of the parties, by the Court's order of November 25th, 1940 to which further reference is hereinafter made. Excluding this 10-day experimental period, the 1940 total flow at Lockport averaged 3,138 c.f.s., and the domestic pumpage 1,592 c.f.s., leaving a net amount diverted from the Lake, in addition to pumpage and excluding the 10-day experimental flow period, of 1,546 c.f.s.

III.

COMPLAINTS AND HEALTH CONDITIONS ALONG WATERWAY

Complaints of Lay Witnesses at Joliet

The complaints as to the Waterway which were presented to me emanated entirely from residents of Lockport and Joliet, and chiefly from the residents of Joliet. Lockport is situated on the Waterway about 35 miles from Chicago. Joliet is similarly situated about 40 miles from Chicago.

The population of Joliet was reported in the last three censuses as follows:

1920	38,414
1930	42,993
1940	42,365

The Health Commissioner of the City estimated the number of people living in Joliet and surrounding territory who were likely to be affected by health conditions in and near Joliet at 50,000. A number of large industries are situated in the city and several important railroads traverse it. The Des Plaines River joins the Waterway just below Lockport, three or four miles above Joliet. The Waterway flows through Joliet and is crossed by eight bridges there.

No water from the Waterway is used for drinking purposes and there is no swimming in it. All of the complaints were based upon the offensive odors from the Canal and the effects ascribed thereto. The complaints proceeded almost entirely from persons residing alongside the Canal or near it.

A total of 127 witnesses appeared before me during the four days of the hearings at Joliet, made up as follows:

Lay residents of Joliet	81
Physicians residing in Joliet	15
Nurses and employees of St. Joseph's Hospital at Joliet	24
Lay residents of Lockport	7[1]
	127

On the fourth day of the hearings at Joliet, in order to avoid cumulation of testimony, it was stipulated that if 200 additional witnesses were called, they would testify substantially along the same lines.

Of the 81 lay witnesses residing at Joliet who appeared before me in person, 38 were men and 43 were women. The residences of these witnesses with respect to the location of the Canal may be thus summarized:

Within two blocks of the Canal	46
Within three blocks	10
Within four blocks	4
Within five blocks	2
Within one-half mile	7
Within one mile	4
More than one mile	5
Not stated	3
	81

Thus, approximately three-fourths of the witnesses resided within four blocks of the Canal, and more than half within two blocks. Their residences were within one to two miles of the wide portion of the Brandon Road Pool, which, below the McDonough St. Bridge, extends to a width of 1400 feet for a distance of approximately half a mile.

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[1] Included in the Lockport figure are the United States Lock Master at Lockport and his assistant, whom I encountered upon a tour of inspection. They were not subpoenaed by Illinois, but I took their testimony on my own initiative as to the conditions at Lockport; they found no cause for complaint.

The complaints were generally to the effect that the Canal in the hot summer months of 1939 gave off extremely offensive odors, which, in the case of many of the witnesses, caused them or members of their family to suffer from nausea, lack of appetite and inability to sleep. Some who complained of nausea had no trouble in sleeping; others complained of inability to sleep and not of nausea.

A substantial number of the witnesses who complained that the odors caused lack of appetite or nausea appeared to be overweight. A number of the witnesses said that they suffered no ill effects themselves, but testified as to the ill effects suffered by members of their family.

The character of the odors was described by various witnesses as the odor of sewers or outhouses or of rotten eggs. Many witnesses used the general terms, "terrible", "vile", "very offensive", "unbearable".

All of the witnesses agreed that the Canal had always given off objectionable odors (as would be expected from a stream into which untreated sewage has for many years been deposited), but, with practically no exceptions, they testified that in 1939 the odors were much more offensive and disturbing than they had been in previous years[1]

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[1] In their brief before me counsel for Illinois said (p. 17):

"* * the State of Illinois admits that conditions were never wholly satisfactory even prior to 1939, but insists that the conditions did not become acute or serious until December 31, 1938 when the diversion was cut from 5,000 c.f.s. to 1,500 c.f.s."

A former lieutenant governor of Illinois testified that he had lived within about 3 blocks of the Canal for about 34 years; that there had been "disagreeable odors" from the Canal from time to time in the past "but the odor now seems to be a combination of unpleasant, disagreeable and nauseous odors". The witness further testified:

> "I have believed that we who are here locally are becoming somewhat immune to this condition, that it is more noticeable when strangers, visitors, come to the place. I believe that there is a feeling that residence within the close proximity to this channel is not desirable and, maybe, possibly affects the valuation of property in the immediate vicinity of the channel."

Asked if he had ever known of any illness or temporary discomfitures traceable to this condition, the witness replied:

> "No, I don't think so, save the psychological effect that it would have on a person who might attribute his illness to that and, believing in it, would, perhaps, become more or less of an invalid from a psychological effect, perhaps a state of mind."

Practically all of the witnesses were agreed that the odors from the Canal were much worse in the summer of 1939 than in 1938, which was ascribed by the witnesses to the fact that the diversion from Lake Michigan was cut on December 31, 1938, from 5,000 c.f.s. to 1,500 c.f.s.

There was some difference of opinion as to how the conditions in 1940, when the witnesses were testifying, compared with those in 1939, but the great weight of the testimony was that conditions in July, 1940, when the testimony was given, were better than they had been in 1939. Some of the witnesses ascribed this to the fact that the weather had not been as hot in 1940 as in 1939, without referring to the fact that the treatment of sewage at the plants of the Sanitary District had advanced substantially since 1939. A number of witnesses were of the opinion that the odors were as bad in 1940 as they had been in 1939, and a few thought that they were worse in 1940.

All witnesses examined on the subject agreed that the odors were worse when the weather was hot. A number testified that they were worse when the weather was humid and sultry and after rains. The witnesses were also agreed that the odors were intermittent, not constant; that they were more noticeable when boats or barges moved through the water and stirred up the water; and that they were also worse at night or in the early morning than during the day.

A number of the witnesses testified that the water was dirty and black and that they had observed thick scum on the Canal in 1939. A photograph offered by Illinois taken in June, 1939, at a point between Summit and Willow Springs (about 20 miles above Joliet) showed considerable scum. A photograph taken by the opposing States at the same point in September, 1940, showed no scum. The testimony indicated that scum was also noticed in earlier years, but not to the same extent as in 1939.

There were approximately a dozen complaints of sore throat and nose or sinus trouble.

Two witnesses testified that their children had asthma.

The family of one witness had diarrhea; the children of another had a summer complaint. The grandchildren of another had dysentery.

Another witness testified that his children became sick from the odors without specifying the nature or duration of the illness.

One witness who jumped into the Canal to rescue a man who was trying to commit suicide, had skin trouble, which cleared up under treatment. The pilot of a deckboat had some sores on his lips, which were made worse by water or spray splashing against his lips and "the doctor thinks it might have been that water". Apparently the sores cleared up and no time was lost from work because of them. The witness testified that during the six years he got "sick to my stomach" every once in a while. It was not entirely clear from his testimony whether he thought conditions much worse in 1939 than in other years.

A diver employed for many years by the United States Engineers to work upon the Waterway testified that the gases were worse than they had been and the water was blacker and contained more muck. The brass on his diving suit had turned black. His health is good.

A lockman employed at Brandon Road could not eat his lunch on two hot days in July, 1940; the water is black since they cut the flow and the fish die. "Oh, my health is pretty fair, only when them obnoxious gases and odors come up once in a while, it pretty near turns your stomach. We work right along the locks though." He has had no sick leave for several years.

A young woman employed as a school teacher had a scar on her foot that she received from a fly infection which she blamed upon the water though it does not appear that she had had any direct contact with the water.

A teacher of sixth grade children, of the average age of eleven, at a school situated about 3 blocks from the Waterway, testified that the odors were terrible in June, 1939, and the children were made very restless and hard to keep at work. Another teacher, the principal of the McKinley Public School situated within 600 feet of the Canal, where the children are in the first six grades, ranging up to an average of 12 to 13 years old, testified that the odors were very offensive in 1939, and the teachers complained that they had to shut the windows in order to keep the children's minds on their work, and they were restless. Children have become suddenly sick with nausea. Two or three at a time would be taken out of their classes, sent home and were kept home for a day or so. The witness thought that the conditions were worse in 1939 than in other years.

A woman who lived about half a block away, testified that the gas from the Canal had ruined the paint on the homes in the neighborhood, turned it all black; this happened in 1939 and some of her glassware had been discolored.

The witnesses agreed that the odors were not as noticeable at a distance from the Canal as near it. Some of the witnesses drove out at night during the summer to avoid the odors. Many of them testified that they kept their windows closed to keep the odors out.

Only a small proportion of the witnesses testified that they had had any occasion to consult a doctor, and it did not appear that anyone was confined to bed by illness which could be attributed to the Waterway. Most of the witnesses were working people and members of their families. Most of them rented the houses in which they lived, under leases running from month to month.

Testimony from St. Joseph's Hospital

St. Joseph's Hospital is situated in Joliet about a block and a half to two blocks from the Canal on the west side. It covers an area of about two square blocks and has about 220 beds. It is operated by the Franciscan Order of the Sacred Heart and has been in its present location since 1875 or 1876. The Silver Cross Hospital is also located in Joliet, but apparently not close to the Waterway; no witness from it appeared before me.

In the hearings at Joliet, testimony was given by 15 Sisters occupying various positions at the hospital and also by 7 lay nurses and 1 resident intern. Their testimony was to the general effect that the odors from the Canal were extremely offensive in 1939 and caused to many of them, and to many of the patients, nervousness, nausea, vomiting, inability to sleep and headaches. Some of the patients are anxious to go home because of the odors, and some of them are so anxious to leave the hospital that they go before their sutures have been removed. Some of the Sisters and nurses complained that their throats became sore or dry, and some had sinus trouble. Windows in operating room have to be kept shut to keep odors out. Windows also have to be kept shut at times in the maternity ward and in the nursery, especially when a boat goes by.

The odors are noticeable chiefly in the summer. They are worse at night or in the early morning and when the weather is sultry or after rains and when boats go through the Canal, stirring it up. A few of the witnesses were not themselves affected, and some of those affected by inability to sleep were not affected by loss of appetite, and vice versa. With very minor exceptions, no one loses any time from work.

Several of the witnesses referred to the fact that hot weather also oppresses people and makes sleeping difficult and affects their appetites.

The patients in rooms on the east side of the hospital adjoining the Canal were more troubled than those on the other side and some asked to be transferred, but not all did so. The odors have a worse effect upon new patients, those with delicate stomachs or very sick patients. Some patients are not susceptible.

One of the Sisters who entered the hospital in 1917, testified that the odor from the Canal had always been very offensive. Another Sister who came to Joliet first in 1910, said: "Well, whenever there was an odor, we would say to each other, 'What is the smell?' 'It is the old dirty Canal.' "

The average period of stay in St. Joseph's Hospital during 1939 was about one day less than the average for general hospitals in the country as shown by the records of the American Hospital Association.

Testimony of Principal Civilian Assistant to United States District Engineer

Mr. C. R. Andrew, the principal civilian assistant of the United States District Engineer at Chicago, has worked along the Illinois Waterway continuously since 1925. He testified that prior to the building of the locks in the Illinois River, there were concentrations of pollution at Lake Joliet, which is a short distance below Brandon Road and also at the old Marseilles Dam and Peoria Lake, which are, respectively, about 50 and 120 miles below Joliet. He was first located in 1925 at Starved Rock Lake, (about 60 miles below Joliet). At that time the odors from the river at that point and at the old Marseilles Dam were extremely offensive. The odors in Joliet at that time were also very offensive. Conditions had improved greatly in 1930. In 1933, when the dams were put into operation, the water continued to improve year by year, and from 1933 to 1938, generally speaking, there was no nuisance of any kind, that is no odors except at times when the water was shaken up with a strong wind, and close by the dam where you got the spray. In 1939 the conditions in Joliet were considerably worse than in 1938. In 1925 up to 1932 the water at Joliet flowed rapidly over rocks and the odor was much worse than when the water was quiescent. It was the witness' opinion that the odor conditions in Joliet in 1925 and 1939 were about the same. Summarizing, up to 1925, the conditions were very bad; from 1925 to 1938, they were improving and in 1938 they were the best they had ever been; in 1939 they were worse. The witness had made comparatively few trips in 1940, but thought 1940 was not as bad as 1939.

At my request, Mr. Andrew compiled figures as to the number of sick leave absences during the years 1938, 1939 and 1940 of the employees of the United States Engineers employed along the Waterway in the Joliet area, which covers a stretch of about 60 miles from Lockport to Starved Rock and in which during the 3-year period there was an average of about 170 employees. In accordance with my suggestion, Mr. Andrew included in the tabulation for comparative purposes similar data with respect to the employees in the Chicago, Peoria and Calumet Harbor areas. The tabulation showed that the percentage of days absent on such leave to total work days sick leave in the Joliet area in the three years in question was 4.34, which was practically the same as in the other areas, except in Peoria where the percentage was slightly under 3. The percentage of sick leave days in 1939 was higher than in 1938 in all areas except Peoria, but the 1939 percentage for Joliet was slightly less than for the Chicago District Office (which includes office employees). The sick leave absences were also slightly less in the Joliet area in 1939 than in the area known as Calumet Harbor and Blue Island, which covers sections of the Waterway north of

Lockport, from which there was no proof of any complaint of conditions along the Waterway. In 1940 the percentage of sick leave absences was slightly more in the Joliet area than in the Calumet Harbor and Blue Island area, but substantially less than in the District Office area. The percentage of sick leave absences in the Joliet area in 1940 was substantially less than in 1939.

The total number of men employed on non-government craft moving over the Waterway through Brandon Road was estimated at 75 to 100. Only one person employed on any boat appeared before me as a witness; he was the pilot above referred to. There was no suggestion from any quarter that nuisance conditions at Joliet and Lockport or elsewhere along the Waterway had interfered with or impeded navigation.

Testimony of Physicians at Joliet

Fifteen physicians residing in Joliet, including the Health Commissioner of the City, testified before me.

The Health Commissioner testified to receiving hundreds of complaints in June, July and August, 1939. These were from persons who resided not far from the banks of the Canal. He personally had not observed any evidence of temporary illness resulting from the odor, but in his opinion there was danger of an epidemic by flies and mosquitoes lighting on the scum and carrying away germs which might mean dysentery or typhoid fever. "The stench is nerve-wracking and by producing nausea, loss of sleep and loss of appetite might bring on a condition of degeneration." Gases from the odor may set up irritation of the mucous membrance of the nose, throat and sinus. However, the health conditions in Joliet are "very good, very." They were not any worse in 1940 or 1939 than in 1938. "The only difference in the canal is the odor. That is all."

The testimony of the other doctors was substantially to the same effect. In general terms they all considered the Canal a menace to health for the reasons given by the Health Commissioner. One of them suggested that germs from the Waterway might be blown through the breeze. Another thought the Canal might be responsible for streptococcic sore throat. Another thought sinus trouble might be due to it. One of the physicians testified he was a government surgeon and took care of the men working on the Canal for the government and had many cases of skin diseases, making it necessary to take them off their jobs for a while, attributable to the foul water they came in contact with.[1] This witness testified:

> "I must honestly state that I don't believe it is a menace to the health of the average healthy individual, but it certainly is a menace to the health of the individual who is not strong and is ill from other causes. It certainly shortens their life. It menaces their after-health in every way. It can't help but do it."

No cases of specific illness clearly attributable to the Canal were cited by the physicians. The few cases to which they referred were chiefly of persons ill from other causes whose illness was thought by them to be aggravated by the odors from the Canal.

The Joliet city chemist and bacteriologist testified that samples of the water in the Canal taken in June, 1940, showed bacilli coli ranging from a low of 10,000 per c.c. to a high of 40,000 per c.c. No tests or analyses were made in earlier years. United States Public Health standards for potable water permits presence of 1 bacillus coli in 100 c.c. Joliet is situated on a limestone bed. The fact that the Waterway was constructed by blasting led the witness to believe that fissures have been created in the rock, through which it would be possible that water might leak into wells. If the flow were increased to 5,000 c.f.s., there would still be a source of contamination from the water, although the danger would be reduced; it would not be possible to sterilize the Waterway so as to kill all the B. coli in it. Joliet gets its water from two deep wells, which are not in close proximity to the Waterway. The water from them is as safe as any water can be. All requirements of the State Health Department have been met. If the city needed more water, it could build more wells at a safe distance from the Waterway. It would be correct to say that there had always been a potential menace with sewage carried in an open Canal like this and theoretically it is very undesirable.

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[1] On this point the testimony does not seem to be supported by the statistics of the office of the United States Engineers at Chicago hereinbefore referred to.

Health Statistics of Joliet

The annual reports of the Illinois Department of Public Health show, with respect to certain communicable diseases, the number of cases and deaths in Joliet, Will County (in which Joliet and Lockport are situated) and other counties in Illinois. The diseases reported upon are diphtheria, encephalitis, influenza, malaria, measles, menengitis, pneumonia, poliomyelitis, scarlet fever, smallpox, tuberculosis, typhoid fever and whooping cough. In 1939 the rate of reported cases per 100,000 inhabitants was less in Wills County than the average for the State of Illinois as to every one of the enumerated diseases except poliomyelitis, malaria and influenza. In 1939 the death rate was lower in Will County with respect to every one of the diseases than the average death rate for the State as a whole.

In 1939 the typhoid case rate per 100,000 inhabitants for Will County was 7.3 while the rate for the State as a whole was 11.9. In the 9 years from 1930 to 1938 typhoid cases in Will County were at the rate of 19.1 per 100,000, whereas in 1939 the rate had declined to 7.3. The typhoid case rate in Will County was less in 1939 than in any year beginning with 1930 except in 1938, when it was 6.4. The typhoid death rate in Will County in 1939 was .9 per 100,000 inhabitants as compared with an average of 1.8 for the years 1930 to 1938, and a rate of 1.4 for the State as a whole.

With respect to Joliet proper, no separate evidence was offered as to rates of typhoid cases and deaths, but proof was offered as to the number of typhoid cases and deaths in Joliet from 1930 through 1938 and also as to the number of cases in 1939. There were 9 reported typhoid cases in Joliet in 1939 as compared with 1 in 1938, 10 in 1937, 11 in 1936, 10 in 1935 and as many as 20 in 1930. There appear to have been no typhoid deaths in Joliet since 1936, when there were 3; in 1933 there were as many as 7.

A comparison of rates of reported typhoid cases and deaths per hundred thousand population in (a) 22 Illinois counties adjoining the Waterway and (b) 80 counties not adjoining the Waterway, shows the following:

Rate Per Hundred Thousand Population of
Reported Typhoid Cases and Deaths

	Counties Adjoining Waterway		Counties Not Adjoining Waterway	
	Cases	Deaths	Cases	Deaths
Average from 1923 through 1939		0.9		3.9
Year 1939	2.9	0.4	12.0	3.1
Year 1938	4.1	0.4	11.5	1.4
Year 1937	3.3	0.4	13.4	1.5

Testimony from Residents of Lockport

Lockport is a small community located about four miles north of Joliet. Its population in 1930 was 3,383; in 1940 it was 3,433. Four of its residents appeared before me. They included the Mayor, the secretary of the Chamber of Commerce, the superintendent of a grade school and an employee of the Texas Company. Testimony was also given by the engineer of an oil plant situated between Lemont and Romeo, some distance above Lockport. In addition, I took the testimony of two government employees residing at Lockport.

The Mayor of Lockport testified that he had had numerous complaints of odors, but knew of only one resident leaving Lockport because of conditions and this was a family which lived "very, very close" to the Canal bank. The secretary of the Chamber of Commerce testified that the Canal had always been a source of complaint as they had always objected to it being "a cesspool for the City of Chicago or any other territory". Odors at Lockport from the Texas Company's oil refinery are, he said, "slightly disagreeable, but not intense".

An employee of the Texas Company who had lived in Lockport 35 years and was a former Mayor, testified that conditions in the warm months of 1939 were 'terrible", due to the very bad odor. There was no current and there was a lot of sludge on top of the water. Asked what effect the odors had upon the people, he said:

> "Well, not very pleasant * * * I would not say it actually made them sick. It was not very pleasant to breathe. * * * You could not sleep when it was working real good. * * * The only way you could sleep was by closing the windows."

The superintendent of grade schools at Lockport testified that during April and May of 1939, children had to be sent home "because they were sick to their stomachs, had headaches and threw up at school; some of them had dysentery. They were absent just a day or two". Also in May, 1940, as many as 10 or 12 children would be absent, just for a day, with nausea and dysentery. The witness said that the odors did not affect her ability to sleep, but "it was very disagreeable—it would be very much nicer to have fresh country air".

The chief engineer of the Globe Oil Company, which has a plant situated about 3½ miles out of Lemont, some distance above Lockport, testified that his company takes water out of the Canal for cooling condensing equipment and its men have to clean the sediment out of condenser boxes. Some of the men doing this work have to lie down, sick and blue, and have to be sent home. Men with open sores who have come in contact with the water have had infections. His plant gives off a malodorous odor to one who is not accustomed to it, but people who know the plant is there get accustomed to it.

Master's Inspection of Conditions at Joliet and Lockport

On Monday, July 8th, 1940, I went from Chicago to Joliet by automobile and we took a boat below the Brandon Road Dam and proceeded to the Lockport Dam. On that day at Joliet the maximum temperature was 88° and the minimum temperature 65°. I did not at that time observe any very offensive odor.

On July 23, 1940, after the adjournment of the hearings at approximately 6 P. M., I visited the Lockport Grade School of Lockport, accompanied by counsel and the court reporter. At 6:25 P. M. it was 92° in the shade on a wall thermometer in the school. I noted that at that time there was no perceptible odor in the office of the principal, that the day was very hot and there was no breeze in motion.

From the school I went to the 9th Street Bridge in Lockport leading across the Canal, which was about 3/4ths of a mile from the Lockport Grade School. I walked across the bridge with counsel and noted that there was a very slight odor with a good breeze from the Southwest and a perceptible current. I observed some scum floating down which contained also logs and sticks of wood and was apparently only on the surface of the water. There seemed to be a greasy, oily substance on the surface of the water. I noted a perceptible odor along the wall of the Canal, which appeared to me slight.

I then proceeded in an automobile on the road along the side of the Canal to the Lockport lock. Driving along the Canal I noted a slight odor. Arriving at the lock there was a good breeze blowing, but I could observe very little odor, notwithstanding the water was dammed at this point.

At the lock I found the United States Lockmaster, Edward P. Callaghan, whose testimony I took.

Mr. Callaghan has been employed as Lockmaster continuously since 1932. In 1930 he painted the towers adjoining the dam. He said:

> " * * * At that time the water out there was so thick you could almost paint with it. * * * We almost had to get clothes pins to put on our nose. * * * Conditions are nowheres near as bad as they were then. They have been clearing up that water. Cleared it up, I would guess, at least 60%."

The odors have not affected his health nor that of his wife or of his grandchildren who visited him recently in the summer.

I also took the testimony of the Lock Mate. He thought conditions better in 1940 than in 1939. His family, wife and daughter, live about three-fourths of a mile away and had suffered no ill effects. He thought you got used to the odor. He had fallen into the water several times and suffered no effect. A young woman who had fallen in it had also been pulled out without ill effects.

On Wednesday, July 24th at 7:30 P. M. I took a speedboat above the Jackson Street Bridge at Joliet. I was accompanied by counsel for the opposing States and by two employees of the Illinois Waterway Division. The attorneys for Illinois were unable to attend because of conferences with witnesses. I dictated my impressions to the court reporter as we went along. We proceeded under the bridges crossing the Waterway at Cass, Jefferson and McDonough streets, through the Pool to the Brandon Road Dam. We then turned about and proceeded north to the Lockport lock, which we reached at 8:30 P. M. We then turned back to Joliet, which we reached at 9 P. M. The thermometer outside the hotel at this hour registered 92°.

My notes show that in this inspection trip I could detect an odor from time to time but only intermittently; it would last for a few seconds or a minute and then I would lose it for several minutes and then catch it again. It seemed to be more noticeable as I came under bridges, and it was suggested by one of the Waterway representatives that the odor would have been more noticeable if we had stayed along the walls continuously than it was in the middle of the stream. While it was perceptible, it did not seem to me terrible or particularly bad at any time. I noted that it would not bother me very much, although it might bother others and I would not call it pleasant, although it was not strong. It did not seem to be any worse at the wider section of the Pool than at other points. I did not observe any flies and had only one mosquito bite, although it was dusk. At times there was a good breeze, which at other times died out. I saw a number of bubbles on the water, which I was told represented operation of gas from sludge underneath the surface. At first I saw little scum. Then as we proceeded I saw along the walls a rather thick surface layer, which appeared to be scum and which contained pieces of wood, paper, miscellaneous debris and a good many grease spots, which might have been due to oil. This scum varied in extent at different points. At one point it was 2 or 3 feet in width; at others perhaps 10 to 20 feet; it was usually on the side along the walls, but I observed it also at points in the middle of the Waterway. Bubbles were apparent for the whole width of the Waterway. At one point I detected an oily odor.

After returning from this inspection trip I noted at 11:30 P. M. in my room at the hotel (which was about 4 blocks from the Waterway) an odor which lasted a minute or two; a few minutes later I got another odor for a minute or two, and then detected no more odors. I slept four nights at Joliet and was not troubled by odors. The only trouble I had in sleeping was due to the heat, which was so great that I kept an electric fan constantly going all night. The City Hall, in which the hearings were held, was about three blocks from the Canal on the east side; I detected an odor only on one day and then only for a few minutes. The four days I spent in Joliet were the hottest of the summer, the temperature reaching 103 degrees on July 25th.

Weather Conditions at Joliet in 1939 and 1940

The maximum, minimum and mean temperatures according to government records, at Joliet during the months of May to September, inclusive, in 1939 and 1940 were as follows:

	1939			1940		
	Highest	Lowest	Mean	Highest	Lowest	Mean
April	82	21	46.1	76	23	46.8
May	90	30	63.5	86	28	56.4
June	93	44	72.3	91	40	70.2
July	96	52	73.6	103	43	74.2
August	90	52	71.4	98	45	73
September	100	41	69.2	91	31	63.2

The departures from normal in temperatures at Joliet in the months from May to September in each of the years 1939 and 1940 were as follows:

	1939	1940
April	−2.7	−2.0
May	+3.7	−3.4
June	+3.7	+1.6
July	+0.1	+0.7
August	−0.2	+1.4
September	+4.2	−1.8

Thus, May, June and September were hotter in 1939 than in 1940 while July and August were hotter in 1940 than in 1939. In the four days during which testimony was taken in Joliet (July 22nd to 25th) the maximum temperatures in 1940 were 94, 97, 100 and 103, while minimum temperatures were 75, 70, 65 and 80. On the same days of 1939, the maximum temperatures were 86, 86, 90 and 82 and the minimum temperatures were 60, 61, 63 and 69.

The departures from normal in precipitation at Joliet in the months from April to September in 1939 and 1940 were as follows:

	1939	1940
April	+0.26	+0.17
May	−1.89	+0.51
June	+5.03	−1.03
July	−0.81	−3.08
August	−1.38	+2.92
September	−3.09	−3.38

In the chemical processes which are responsible for the development of gases and odors, the temperature of the water is controlling, not the temperature of the air. It was testified that actual sulphate decomposition does not occur when the temperature of the water falls below 62° Fahrenheit. The mean temperature of the water at Lockport in the months from April to September, in the years 1939 and 1940, according to the Sanitary District records, was as follows:

	1939	1940
April	56	50
May	64	58
June	71	70
July	76	74
August	77	73
September	75	72

Thus, water temperature was lower at Lockport in 1940 than in 1939 in each of the summer months.[1] It seems clear, however, that the susceptibility of human beings to annoyance from odors increases with higher temperature of the air.

Discharges of Sewage and Oil into Waterway Between Chicago and Joliet

The Texas Company has an oil refinery at Lockport which discharges its waste into the Canal two miles below Lockport. The oil refinery odors are "slightly disagreeable, not intense". The waste from the refinery contributes to the oily appearance of the surface of the water below Lockport. A number of the witnesses testified to detecting the odor of oil along the Waterway, and it appears that scum and grease on the surface of the Waterway are due in part to discharges of waste from the oil refinery.

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[1] The records of the Sanitary District indicate that the water temperature was higher at Lockport in 1939 than in many years.

Lockport, with a population of about 3,500, empties its sewage into the Waterway below the locks.

The old Illinois State prison outside of Joliet and the new Illinois State prison at Stateville, about two miles north of Joliet, discharge their sewage into the Waterway. These two prisons have an aggregate population of about 6,400, which includes inmates and employees.

Lemont, a town of about 2,500 people, situated in Cook County above Lockport, empties its sewage into the main channel of the Waterway.

The City of Joliet, with a population of about 42,000 discharges its sewage into the Waterway below the Brandon Road Dam. Various small communities above Lockport, including Lemont with a population of about 2,500 people, Argo and Summit, also discharge this raw sewage into the Waterway.

Objections to Increased Diversion by Illinois Communities Below Joliet

Four witnesses who were not subpoenaed by any of the parties appeared before me and asked to be heard. These were George P. Moore, Thomas H. Detweiller, Dr. J. P. Kerr and Harry F. Goodell.

Messrs. Moore and Detweiller reside at Peoria, which has a population of about 105,000 and is situated on the Waterway about 120 miles below Joliet. Mr. Moore is Secretary of the Pleasure Driveway and Park District of Peoria, and Mr. Detweiller is a Park Trustee at Peoria. They objected to any increase in the diversion from Lake Michigan on the ground that it might bring more sewage down to Peoria. Sewage has been coming down the Waterway for thirty years, but conditions have materially improved in recent years. Fish life has begun to reappear and offensive odors formerly present have been absent in the last year or two.

The testimony of Dr. Kerr was along the same lines. He is President of the Association of the Drainage & Levee Districts of Illinois, comprising people owning property and farms in the Illinois River Valley. He has represented these people for twenty years and has constantly opposed the introduction of sewage into the Illinois River or increased diversion from the Lake. His Association has adopted resolutions urging that increased diversion be not permitted. He testified that in former years "great islands of floating untreated sewage" were discernible all the way down from Joliet through Marseilles, Ottawa and Peru and even down to Peoria. Particles of untreated sewage were discovered on the surface of the water at Peoria, and conditions were indescribably worse than at Joliet today. Bathing in the Waterway is now practised all the way up to Peoria, when it was formerly not possible. Peoria treats its sewage, but other towns along the river as far down as Beardstown empty their sewage into the river.

Mr. Goodell is a graduate in civil engineering of the University of Illinois and is employed by eleven Drainage and Levee Districts in southern Illinois Counties. He resides at Beardstown, a town of about 6,000 population, situated about 80 miles downstream from Peoria and about 200 miles from Lockport by river. He began to work and live on the river in 1918. The river was polluted then and there seemed to be more or less of a boil in it. People were advised not to swim in it although they did occasionally. During the year 1930 there was a great improvement of the water conditions and fish life has returned. While the water condition in Beardstown is now much improved and there are bathing beaches, they do not meet the requirements of the Public Health Department. In his opinion, conditions at Joliet are no worse than they were during the '20's and may be better. He had worked upon and in streams polluted by sewage giving off highly offensive odors, but he never observed any ill effects, although the pollution was sufficient to discolor the paint on houses situated near the streams. Peoria formerly discharged its sewage into the Waterway but has recently completed a treatment plant. The Illinois River during past years has been a menace to the health of the residents of areas tributary thereto and is still a menace to those residents notwithstanding the improvement. It would be practicable to periodically flush the Brandon Road Pool, and he did not think that the organizations which he represented would offer any objection thereto as material from the Pool would be fairly well decomposed when it passed Starved Rock, but they objected to increased diversion from the lake which might bring down fresh sewage.

Expert Testimony as to Health Conditions

On August 3, 1940, Willard L. Bergman, a chemist employed at Rush Medical College, at the request of the opposing States, made tests for hydrogen sulphide (1) under the Ninth Street bridge in Lockport and (2) alongside the Jackson Street bridge in Joliet. In each case he took a 3-gallon sample of air. These tests disclosed no trace of hydrogen sulphide. He discerned no odors except one of lubricating oil. The temperature was about 90° or so.[1]

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[1] The methods employed by Dr. Bergman were criticized as inadequate by Dr. Clarence W. Muehlberger, a toxicologist, who testified for Illinois.

On July 16, 1940, tests to determine bacteria in the air in the vicinity of the Sanitary Canal from Lockport to Joliet were made by Dr. Josiah J. Moore and Robert C. Jenkins, a clinical laboratory technician. Dr. Moore is a graduate of the University of Chicago and Rush Medical College, has taught bacteriology and pathology at the University of Illinois and is pathologist for several hospitals. The tests were made at ten locations along the banks of the Canal, six locations about seven miles west and six locations about four miles east. The tests showed no pathogenic bacteria present at any of the locations. The bacteria found were the usual bacteria one might find in air at any place. Dr. Moore testified that germs and bacteria present in scum on the surface of the Waterway or along the sides of banks or walls could not be blown through the air in such a way to cause a hazard producing disease to people along the Waterway. It would not be possible for an epidemic to break out in a community adjoining the Waterway by the transmission of germs or bacteria by air. In the opinion of Dr. Moore, based upon his analysis of the air, there was no danger to the health of people along the Waterway. He testified that there is no basis for any suggestion that germs from the water might cause streptococcic infection in the throat without drinking the water; you could not get a streptococcic sore throat by living along the banks of the Canal and breathing the air. Disease could be contracted only by eating food contaminated by germs carried by flies or other insects. Flies usually alight only on solid material. If insects had gotten on the culture plates, that would have been shown. In only one case was there a form of insect shown on the plate, and this was away from the Pool. The presence of B. coli in the Canal indicates presence of fecal material, but would not indicate pathogenic bacteria. Even the smallest amount of B. coli in water makes it unfit for human consumption.[1]

The testimony of Dr. Moore was confirmed by that of Dr. Norbert R. Enzer, Director of Laboratories at Mt. Sinai Hospital, a graduate in medicine of McGill University. In his opinion any bacteria that may be in the scum formed from sewage are not the bacteria with pathogenic qualities; these have been destroyed long since.[2] Flies lighting on the surface of that water would not pick up anything very damaging to carry away and deposit on people's food or hands. Flies ordinarily alight on dry surfaces, not wet ones; there are many thousands of times more flies on a refuse or garbage heap than on the surface of a stagnant pool. If it could be assumed that the Waterway presented a menace, increasing the flow to 5,000 c.f.s. would not change it.

Testimony substantially to the same effect was given by Drs. James E. Perkins, Edward R. Krumbiegel and Edwin B. Gute. Dr. Perkins holds the degrees of Master of Public Health and Doctor of Public Health from the Johns Hopkins School of Hygiene and Public Health and is Director of the Division of Communicable Diseases of the New York State Department of Health. Dr. Krumbiegel holds the degree of M. D. from Marquette

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[1] Mr. Langdon Pearse, Sanitary Engineer of the District, testified that since the water in the Canal was not used for drinking, he did not concern himself with B. coli figures. He said, "Our work primarily is not concerned with destroying bacteria. As I have said, we want them in the stream, such as they are, to help us do the work of self-purification."

Compare *Missouri vs. Illinois*, 200 U. S. 496, where the court said at page 525:

> "It seems to be conceded that the purification of the Illinois by the large dilution from Lake Michigan (nine parts or more in ten) would increase the danger, as it now generally is believed that the bacteria of decay, the saprophytes, which flourish in stagnant pools, destroy the pathogenic germs."

[2] The Joliet city chemist and bacteriologist testified that the scum was acted on by the sun, which was germicidal to a certain degree, and in his opinion the scum was less likely to contain organisms than the water under the scum.

University and is Commissioner of Health for Milwaukee. Dr. Gute is a graduate of Rush Medical School, Commissioner of Health for the Villages of White Fish Bay and Fox Point, Wis., and Chairman of the Milwaukee County Association of Suburban Health Commissioners.

On September 17, 1940, an examination of the bacterial content of the air at (1) points in Joliet and Lockport both along the Waterway and removed therefrom and (2) points in other Illinois towns a considerable distance from the Waterway, was made by Dr. M. Starr Nichols. Dr. Nichols is professor of sanitary chemistry at the University of Wisconsin, and is employed by the Wisconsin State Board of Health as chemist and bacteriologist, specializing in sewage chemistry; he is the author of numerous papers. He testified that the number of bacteria found at the locks at Brandon Road and Lockport were only approximately 1/10th as many as those found at the other stations. Otherwise there was no remarkable difference between the number of bacteria in Joliet and those at other points. No attempt was made to isolate any pathogenic organisms or to identify the species of bacteria. Typhoid germs are destroyed more quickly in polluted water than in pure water.

On September 17, 1940, Dr. Nichols also examined scum taken from the Canal walls at Brandon Lock and from the Waterway near the lock, also below the Texas Oil Refinery at Lockport. In all of these samples oil-like material was found. On September 28, 1940, he took samples of water from the Canal at the Brandon Locks below the Jefferson Street bridge in Joliet and at the Lockport Lock and tested them for hydrogen sulphide. They showed 0.1 and 0.2 parts per million.[1] The temperature in Joliet that day ranged from 34° to 74°.

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[1] No tests for hydrogen sulphide in the area above the waters of the Canal have been made by the Sanitary District.

Testimony as to the effect of hydrogen sulphide in the air was given for the opposing States by Drs. Nichols, Enzer, Krumbiegel, Gute ,and Perkins, and also, particularly, by Dr. Wm. H. McNally.

Dr. McNally is a toxicologist, a graduate of Rush Medical College and a member of its faculty, and the author of two books and a large number of articles on Toxicology. He testified that nausea can be produced in many individuals with as low a concentration as 50 p.p.m. of hydrogen sulphide in the air. A concentration of 100 p.p.m. might cause local irritation and depression of the nervous system; he did not think it would be possible to get such a concentration in the open air from a stream polluted with sewage wastes. A concentration as small as 25 p.p.m. might cause discoloration of paint, which is the most delicate test there is. Alice Hamilton and Drinker of Boston believe that not more than 20 p.p.m. should be tolerated in industry and this is the figure adopted by the Massachusetts code. One would have to be right over floating particles of sewage to get a concentration of 100 p.p.m. When you get 500 or 1,000 feet away from the Waterway, the concentration of hydrogen sulphide would be diluted many thousand times. Some people are more sensitive than others to the smell of hydrogen sulphide. Also one may become accustomed to the odor. In the literature of toxicology there is no recorded instance of damage to health from hydrogen sulphide in a waterway like the Illinois Waterway.

The testimony of the other witnesses for the opposing States was substantially to the same effect. These witnesses included all the doctors above named and also Messrs. Louis F. Warrick and Louis R. Howson, sanitary experts. Mr. Warrick holds the degree of Master of Science from Cornell University and is the State Sanitary Engineer of Wisconsin. Mr. Howson is a consulting sanitary engineer who has specialized in sewage treatment work.

All the physicians, health authorities and sanitary experts who appeared as witnesses for the opposing States—nine in all—testified that it was their opinion that the Waterway did not constitute any menace to the health of persons living along it. This opinion was also shared by Mr. Joseph W. Ellms, Commissioner of the Division of Sewage Disposal of the City of Cleveland, Ohio. Mr. Ellms testified that upon his visit to the Brandon Road Pool, it appeared to him to be in better shape than the Cuyahoga River.[1]

Testimony for Illinois on the particular question of the effect of hydrogen sulphide was given by Dr. Clarence W. Muehlberger, a graduate of the Armour Institute of Technology and of the University of Wisconsin, holding degrees of Master of Science and Doctor of Philosophy. He is a lecturer on Toxicology in the medical schools of the Universities of Chicago, Illinois, Loyola and Northwestern and the author of a chapter in Dr. McNally's book on Toxicology. He had read the transcript of the testimony of the Joliet witnesses and was of the opinion that the nausea, headaches, insomnia and loss of appetite of which they complained "may have been caused by hydrogen sulphide". He could not refer to any case recorded in medical literature of any individual having been overcome in the open from the air from a waterway polluted by untreated or partially treated sewage. He had no idea how fast the gas might be diluted in the air; it would depend on how strong the breeze was and how fast the gas was coming off the Canal. To the average person the symptoms produced by exposure to over 20 p.p.m. but under 50 p.p.m. would be irritation of the mucous surfaces of the eyes, nose and throat. Some persons are more susceptible than others. Decomposing sewage gives off organic sulphide compounds, including indol, skatol, mercaptans and cadavrin, all having offensive odors. The intensity of odor is an unreliable test of gas present, especially hydrogen sulphide, because the nerve ends in the nose become paralyzed by use. In his opinion the conditions surrounding the Waterway constitute "a very definite menace" to the health of the people of the region of Joliet. People have not died or been rendered so ill as to require hospital treatment necessary but "they might have been rendered very uncomfortable and very unhappy". "I believe that people are entitled to a decent place to live, comfortable surroundings where the air that they breathe is perfectly good, healthy air, and I believe that anything that can be overcome which contaminates the air so that they aren't in a good, sound state of health, is a menace."

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[1] It appears from the testimony of Mr. Ellms that the Cuyahoga River, which is 300 to 400 feet wide, and perhaps wider, and has a very low velocity, is grossly polluted by sewage and industrial waste from oil refineries for a distance of about 10 or 12 miles in the metropolitan district of Cleveland. A nuisance condition obtains there today and has obtained there for many years. For a distance of 9 miles, no dissolved oxygen was found in the water in samples taken by Mr. Ellms in September, 1940. Mr. Ellms testified that the Cuyahoga River is a foul stream (although he did not think the odors "are so particularly noticeable") but he did not consider it as a health menace unless people insisted on bathing in it. Nor did he consider the Sanitary Canal a health menace as long as it was not used for drinking or for bathing.

It appears also that the Ohio River is grossly polluted during six months of the average year; see 104 Transactions of the American Society of Civil Engineers (1939) p. 873.

Dr. Muehlberger testified that the odor of the Canal in 1939 had irritated his throat and nasal passages. He knew that the Waterway prior to 1939 always gave off odors, especially in summer, but would not say that he had ever noticed this irritation before.

The principal witness on the health issue for Illinois was Dr. Anton J. Carlson. Dr. Carlson received the degree of Doctor of Philosophy in physiology from Stanford University in 1903 and the degree of Doctor of Medicine from the University of Lund in 1917. He has never practiced medicine privately, but has trained over 5,000 doctors. Since 1904 he has been on the medical faculty of the University of Chicago and for the last twenty-five years has been professor and chairman of the department of physiology in that university. He is a member and officer of many medical and scientific societies, a member of the Public Advisory Committee of the United States Public Health Service and a consultant to that service, advisor of the Department of Public Health of Chicago, and for the last twenty-five years Chairman of the Public Health Committee of the City Club of Chicago.

Dr. Carlson inspected the Waterway on October 13th, 1940, and had read much of the testimony given at Joliet. He testified that in his opinion "the present condition is more than a menace to health; it is inimical to health". Asked what factors he would consider in determining what constituted an actual menace to health, he answered:

> "Why, an actual menace to health to me means that conditions exist in that pool that through accidents or any ordinary course of human events in the district can lead to health injury—injury to health. We don't have to prove actual injury to health. We have got to prove that conditions exist there which, through accidents or any ordinary course of human events, business and life, may result in injury to health".

Dr. Carlson further indicated his view that there was also an actual menace from dysentery bacilli, from typhoid bacilli and from the amoeba of dysentery.

> " * * * the water doesn't have to be used for drinking or cooking to constitute such a menace, and it doesn't have to occur either for 10, 15, or 5 years. It is still a menace. * * * the highly polluted body of water may through accident, through flies or mosquitoes, or spray or wind get on the surface of man, on his clothes, on his skin, or in his food, or even in his drinking water, even in his lunch pail, and anything—we know anything that gets on our skin anywhere— * * * flies don't have to bite, mosquitoes don't have to bite, they don't have to settle on the water. This stuff splashes up on the sides when the boats go through, when they empty their locks and fill them and when the wind blows. Such a polluted, highly infectious body of water of that extent is an actual menace, if I have made my answer clear."

Dr. Carlson testified that the fact that the present communicable disease rate in Joliet is no higher than in other places is no factor whatever in determining whether the Canal is a menace to health. Either they have been lucky or the medical statistics are not what they are supposed to be. It is unimportant that the water is not used for drinking purposes or bathing. "People will drop in by accident and the children will jump in by choice, no matter what you say". Bacteria can reach them by flies and mosquitoes carrying this stuff mechanically and "under extreme conditions might reach them if they walk close by the Canal in a spray in a high wind."

Dr. Carlson has been familiar with the Waterway for many years. It has constituted a menace to health since 1934, but now it has been increased. He agreed that when he used the words "menace to health" he was using them in a scientific sense as a theoretical danger which cannot be measured in any statistics or even in any outward observation by a physician.

> "The policy that guides us and you and the courts is to take all measures to minimize all these, any or all of these unfavorable conditions, that we can do within the practicability of our knowledge and our civilization. * * * The amount of water asked for by the State of Illinois, temporarily or even during the summer, could not conceivably have any health significance for the other States, and I think it insignificant and uneconomic."

Dr. Carlson agreed that if the diversion from Lake Michigan were restored to 5,000 c.f.s., there would still be a menace to health, but, he said, it would be less. He also agreed that carbon monoxide in Chicago from automobiles is a constant detriment to the health of the people in Chicago.

Testimony substantially to the same effect was given by Dr. Carlson's associate, Dr. Andrew C. Ivy, who holds degrees of Bachelor of Science, Master of Science and Doctor of Philosophy from the University of Chicago and the degree of Doctor of Medicine from Rush Medical College. Dr. Ivy has taught physiology and pharmacology at the Medical Schools of Loyola, University of Chicago and Northwestern University. He is President of the American Physiological Society and the American Gastrointeriological Society, and a member of the Public Health Committee of the City Club of Chicago, and has had occasion to study questions relating to sewage disposal, procural of water from Lake Michigan, and water pollution. He had visited the Waterway with Dr. Carlson and read the transcript of testimony given at Joliet. The testimony that the odor had caused nausea, disturbances of appetite and sleep, showed, in his opinion, an unhygienic condition working as a detriment to the health of the people that the odor so affects. This would be particularly true of children with poor appetites, convalescent patients in a hospital and invalids. He considered that the Brandon Road Pool and the Sanitary District Canal constitute an actual menace to the health of the community of Joliet. He explained his answer by saying:

> "I am convinced of the truth of the dictum or general principle that pollution of the air or streams is unhygienic, or unhealthful, and that they should be abated, if possible. All the time or continuously in society we are trying to improve unhygienic conditions of living because we regard them as being unhealthful. We abate smoke; we abate noise; we abate dust; we try to abate pollen distribution because of the hayfever sufferers; we abate stray dogs because of the threat of rabies and the spread of disease by stray dogs, and when a water supply is even threatened with pollution, there is any question that the water supply might be polluted, we immediately take steps to take care of the situation, and it is on the basis of generalizations and principles of that sort that I believe that there is an actual menace to health existing there now."

Dr. Ivy further testified that diluting the water would not eradicate the menace, but, he said, it would decrease it. Any stream polluted with untreated sewage is a menace to health. Oil odors are at times detrimental to health and should be abated, but they do not affect one psychologically as sewage odors. The odors of stockyards may contain hydrogen sulphide, which should also be abated. Noises in the city such as that caused by the operation of elevated railroads constitute a menace to health because an unhygienic condition, which should be reduced. Dr. Ivy knew of no recorded case of an individual being overcome by hydrogen sulphide from a waterway. Generally, his testimony was to the same effect as that of Dr. Carlson.

Dr. Hugh Alister McGuigan accompanied Drs. Carlson and Ivy on their visit to the Waterway on October 13th. Dr. McGuigan holds the degree of Ph. D. in physiology and chemistry from the University of Chicago, and the degree of M. D. from Rush Medical College. He was professor of pharmacology at Northwestern University for seven years, and since 1917 has been professor of pharmacology and therapeutics at the College of Medicine of the University of Illinois. He is a member of various professional societies and has written several books on pharmacology. He is not a practising physician though licensed to practise and having some consultations. His field is pharmacology, which deals with the application of drugs to the treatment of disease. He had read or heard the testimony of Drs. Carlson and Ivy and agreed in the main therewith. He added that hydrogen sulphide which had been dwelt on so much was not the only thing in the air adjoining the Waterway. "The cadaverin, putrescin and all the other things mentioned in there, those are positive things, but there are many other things that we don't know anything about in there which may be even more toxic than the hydrogen sulphide. We simply don't know."

No representative of the Illinois Department of Health or any sanitary officer of the State of Illinois appeared before me. The Chief of the Illinois State Waterway Survey, Dr. A. M. Buswell, was placed upon the stand by the opposing States in support of their contentions as to several ameliorating measures,[1] but gave no testimony with respect to the existence of any health menace.

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[1] Dr. Buswell's testimony is referred to *infra* at pages 84, 96, 97.

General Authorities on Sewage Odors

In a report of the Committee on Sewage Disposal of the Public Health Engineering Section of the American Public Health Association, on "Chlorination in Sewage Treatment" (of which Mr. Langdon Pearse was Chairman and Dr. Mohlmann was a member) it is said:

> "A long prevalent theory that sewage odors are directly responsible for disease has been definitely refuted. It is now realized that the physiological effect, if any, is indirect. Odors, by causing worry, loss of sleep, loss of appetite, etc., may be a contributory cause of ill health, and certainly cause discomfort. The courts, in general, have held that the creators of an odor nuisance are responsible therefor, and as far as municipal sewage disposal is concerned, the odor hazard appears to have been shifted from the public health to the public pocketbook."[1]

In his work on Preventive Medicine and Hygiene,[2] Professor Milton J. Rosenau of the Harvard Medical School, says:

> "While odors may be unpleasant, they are not known seriously to influence health; contrary to common opinion, they are not by any means a reliable sign of danger. * * * (p. 898).
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> "The odors from marshes and from decomposing organic matter are not apparently hurtful. One of the most famous stenches that has been recorded, if not the most famous, was that which arose in 1858 and 1859 from the Thames, which

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[1] Report of Committee on Sewage Disposal of the Public Health Engineering Section, on "Chlorination in Sewage Treatment" (1934), p. 30.

[2] See Rosenau, Preventive Medicine and Hygiene, Sixth Edition, (1935) pp. 898, 899, 900, 928.

at that time was grossly polluted with the sewage of London (Sedgwick). It was commonly believed to be the cause of pestilence. Budd insisted that no serious results followed. After giving his proof, Budd states, 'Before these inexorable figures, the illusion of half a century vanished in a moment.' We now know that odors in the air bear no reference to contagion or infection and, however unpleasant, need not be feared as sources of disease. * * * (p. 899).

"The effect of odors upon health is not well understood. When we sense a pleasant smell, we involuntarily take deeper breaths; on the other hand, unpleasant odors tend to diminish the respiratory exchange. Odors influence the nervous system in various ways; some stimulate, others depress psychic activity. Some odors have a well known influence upon sexuality. Occasionally, odors are so disagreeable that they induce nausea, even vomiting. It is remarkable how quickly we may become accustomed to odors, but the fact that our sense of smell has been dulled is no guarantee that the cause of the odors may not continue to produce its effects. * * * Winslow and Palmer found that 'odors' of vitiated air have an unfavorable influence upon appetite." (p. 900).

"Sewage gas, once a hygienic bugaboo, is now not seriously regarded by sanitarians. Sewer gas became the residual legatee of Murchison's pathogenic theory, namely, that typhoid fever was 'produced by emanations from decaying organic matter.' People naturally cling to the notion that anything that smells bad must be detrimental to health. Sanitarians know, however, that our sense of smell is a poor sanitary guide." * * * (p. 928).

Condition of Waterway in Earlier Years

In considering the weight to be given to the claims of Illinois that the situation in Joliet and Lockport presents a menace to health which makes imperative an increase in the diversion, it seems pertinent to consider the situation which has prevailed in past years.

The Waterway has always been a polluted stream due to the discharge of untreated sewage from Chicago. It appears from the first (1927) report of Special Master Hughes, quoted *supra*, pages 6, 7, that the Canal was grossly polluted in 1872, and that in 1891 the nuisance along the Canal was at times as bad as ever. The 1925 report of the Engineering Board of Review of the Sanitary District gives particulars of offensive conditions in 1911, 1912, 1913, 1919 and 1921. In September, 1911, the water of the DesPlaines River at Lockport had a "grayish look and a filthy smell", and its organic contents were evidently in an advanced state of decomposition. In 1919 there was a marked septic action at all points of the river from the head as far as Ottawa (about 60 miles below Joliet). At Morris (about 30 miles below Joliet), "there was considerable scum and there were numerous patches about 12 inches square of semi-solid, black sludge which had the appearance of being 'throw-ups' from the bottom". Seen from a distance as from a bridge, the water had a deep black, foul appearance. At Marseilles (about 50 miles below Joliet),

> "the river had a very bad appearance,—practically covered with black, slimy scum accompanied by very strong septic action. This scum had the appearance of being sludge from the bottom which had been softened and disintegrated. There was a marked septic sewage odor at all points as far as Marseilles, where it was the worst, being very noticeable in the business district of the town, at a distance of a quarter of a mile from the river."

Between Peru and Spring Valley (about 70 miles below Joliet), "the septic action was so violent as to be fairly boiling, forming a thick scum from shore to shore, with the whole surface covered with patches of sludge from a few inches to 3 feet square."

In 1921 the water in the west arm of the Chicago River was almost black and the surface was covered with a thick scum. In May, 1922, large amounts of dead fish were observed floating on the surface of the stream at Lockport and there was a moderate odor. At Brandon Bridge in 1922 thousands of dead minnows were noted along the margins of the stream, and odors were given off from these dead fish; there was a slight sewage odor.

Mr. Langdon Pearse, Sanitary Engineer of the District, testified before Special Master Hughes in 1927:

> "The condition in the canal and rivers is now bad. It constitutes a condition of nuisance and has been going on for a number of years; in fact, ever since I have been connected with the District there has been a passage of solids from the canal down the rivers lodging behind dams and creating consequent nuisance in the water pools, and the water behind the dams can be smelled for a distance of half a mile. Fish have been driven out of the upper river as far down as Chillicothe, and conditions of odor are noticeable at Chillicothe, a distance, roughly, of 110 miles from Lockport."[1]

Note has already been made of the testimony of Mr. C. R. Andrew, principal civilian assistant to the United States Engineer at Chicago, that conditions in Joliet were as bad in 1925 as in 1939, and of the testimony as to conditions in earlier years at Joliet and points further down the Waterway which was given by Dr. Kerr and Messrs. Moore, Detweiller and Goodell.[2]

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[1] Abstract of evidence on re-reference, page 720.

[2] See *supra*, pages 19, 20, 32-34.

Conclusions as to Health Conditions

I summarize the facts as found by me regarding health conditions as follows:

The present complaints as to the condition of the Waterway are confined to residents of Joliet and Lockport and proceed chiefly from persons living in close proximity to the Canal. Health conditions in Joliet are very good. Fewer communicable diseases exist in counties adjoining the Waterway than in other Illinois counties. The typhoid rates for Will County and the other counties adjoining the Waterway have substantially declined since 1930. The typhoid death rate for Will County in 1939 was not much more than half that for the State as a whole. No water from the Canal is used for drinking. There is no swimming in the Waterway. Germs cannot be blown through the air from the Waterway and, in order for germs in the Canal to cause illness, one would have to drink the water or germs would have to be carried by flies or other insects and brought into contact with food. There is no evidence that flies or other insects have in fact carried any germs which have contaminated food and caused illness. On the contrary, the health statistics indicate that no illness has in fact been caused in this way.

The complaints as to the condition of the Waterway are based entirely upon the very offensive odors given off by it in the summer time and the effect of such odors upon persons living close to the Canal, in causing loss of appetite, nausea (in a few cases vomiting) and inability to sleep or difficulty in sleeping. These odors are due in part to hydrogen sulphide and in part to other unidentifiable gases. The dilution of such gases in the open air is very great. The odors from the Canal are intermittent but extremely unpleasant and disagreeable to those living in close proximity to the Canal on hot and sultry days and nights in summer, particularly when the water in the Canal is stirred up by boats. Nervous persons or invalids are especially susceptible to the odors. On hot and sultry days school children have been nauseated and caused to lose a day from school. Many persons living alongside the Canal are not affected by the odors and have become accustomed to them, but a substantial number are disturbed by them. Independently of odors, hot and sultry weather makes sleep difficult and affects the appetite.

For many years the Waterway has been an offensive stream containing Chicago sewage wholly untreated or only partly treated. There have always been odors from the stream at Joliet and Lockport. In 1925 when the river at Joliet flowed over rapids in the stream, the odors were very offensive. From 1930 to 1938 conditions at Joliet improved, notwithstanding reductions in the flow from Lake Michigan because of the added treatment which the Chicago sewage gradually received. The people at Joliet had become accustomed to this improvement. When the flow from Lake Michigan was reduced on December 30, 1938, conditions retrogressed and complaints ensued from residents, who compared the 1939 conditions with those prevailing in 1938 and immediately prior thereto. They had either forgotten the conditions prevailing prior to 1930 or, not unnaturally, felt that the improvement should continue. The nuisance conditions in 1939 were much worse than in 1938. They were not as bad in 1940 as in 1939.

The foregoing statement sufficiently discloses the facts as found by me. Whether these facts constitute a "menace to the health" of the inhabitants of the complaining communities within the meaning which the Court intended that phrase to have, requires a decision as to which I have no certain guide. Counsel have gone to the dictionaries for definitions of menace, but it seems to me beside the point to cite such definitions to the Court, which itself used the phrase and will itself determine what it meant. In this report I can only give the phrase the meaning and scope which it seems to me that it was intended to have in this case. I do not believe that the Court intended to use the expression "menace to health" in the sense in which it was employed by Professor Carlson and Professor Ivy. On such a view it would not have been necessary to refer the case to me because it was apparent on the face of the papers that the sewage treatment program of the Sanitary District had not been completed and that untreated and incompletely treated sewage continued to be discharged into the Waterway.[1] Under this condition, if the test is to be that which was urged by Professors Carlson and Ivy, it is clear that a menace would necessarily be found to exist. Accepting this definition the increase of the flow to 5,000 c.f.s. would not eliminate the menace, as these witnesses agreed; the stream would continue a menace within the suggested definition as long as any untreated sewage is discharged into it.[1] It is obvious that the presence of untreated sewage in an open stream is not in accordance with proper standards of sanitation and should be abated. So also, as pointed out by the scientists, should be abated excessive noises in large cities, vibrations from elevated trains, carbon monoxide from automobiles, offensive odors from stockyards and oil plants, and, one might doubtless add, dust, smoke, soot, and other impurities in the air, inadequate milk control and numerous other undesirable conditions present in many communities. The improvement of these conditions is a local responsibility upon which too much emphasis cannot be placed.

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[1] This comment is also applicable to the argument urged upon me by Illinois that the opinion and decree of April 21, 1930, did not contemplate that the diversion should be reduced below 5,000 c.f.s. unless the sewage treatment program which is in contemplation had been completed and the sewage of Chicago treated to the extent of 85%. If this were the view of the Court, there would have been no occasion for a reference to me. It seems to me quite clear that by its opinion and decree of April 3, 1940, the Court intended to announce a final decision that additional diversion should not now be permitted unless shown by convincing evidence to be required by paramount considerations of health.

The suggestions made by Professors Carlson and Ivy as to possible danger to children swimming in the Waterway without authority and the possibility of water seeping by accident through fissures in the rock to wells from which Joliet obtains its drinking water, present possibilities too remote for consideration. Conclusions must be rested upon consequences reasonably and naturally to be anticipated and not upon mere possibilities. The record leaves no reasonable room for doubt as to the safety of the water supply of Joliet and Lockport. Nor can the effect of odors upon invalids and persons of less than average health be accepted as any test of health menace; even in cases of private nuisances the test is the effect of the acts complained of upon persons of ordinary sensibilities and in normal health. In the present case it is Illinois itself which is creating the nuisance of which it complains and of which it seeks to be relieved by water which has in effect been adjudged by the Court to belong to the opposing States.

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[1] According to the Sanitary District estimates there will be some incompletely treated sewage going into the Canal even in 1943 and 1944, which years are not included in the present application of Illinois for a modification of the decree of April 21, 1930. Even sewage completely treated by the activated sludge system is not completely sterilized; see Report of Special Master Hughes on re-reference (1929) at p. 30. Even when the Sanitary District program is completed, the water in the Waterway will not be fit to drink.

Apparently it is uncertain whether there may not still be some (though doubtless greatly moderated) nuisance condition in the summer months at Joliet and Lockport even when the Sanitary District treatment plants have been completed. Mr. Pearse testifying in January, 1941, said: "I think we testified in the beginning, and there was very little cross-examination, if any, that we believed the condition would improve in the Pool in '41 and '42 and that after '42 with the equipment that we expect to put in, that the conditions would be as good as our plant and the like could produce; in other words, that they should be relatively free from nuisance down there * * * ".

My conclusion is that the facts proven do not establish any menace to the health of the inhabitants of Joliet and Lockport or elsewhere along the Waterway requiring an increase in diversion in water from Lake Michigan. However, as the issue is one which only the Court itself can determine, I necessarily proceed to discuss the other points covered by the order of reference.

IV.

PRESENT STATUS OF SEWAGE TREATMENT BY SANITARY DISTRICT; OUTLOOK FOR SUMMERS OF 1941 AND 1942

Notwithstanding the importance of condensing this report, it seems impossible to discuss adequately the present condition of the Waterway or the various ameliorating measures (other than diversion of water) which have been put forward for consideration, without a statement with respect to the sewage treatment plants of the Sanitary District and the work which they are doing. This in turn requires some explanation of terms used in sewage treatment.

Meaning and Importance of the Terms "Sludge", "B.O.D." and "Dissolved Oxygen"

The term "sludge" as used in sewage discussions means the so-called solids removed from the sewage by sedimentation. These are not solid at all as the layman would understand that term. They contain from 90 to 98 or 99% water, which is difficult to remove because of the very slimy, greasy nature of the solids. The term "solids" in a chemical sense means undissolved material or material in suspended form. The solids containing organic matter are known as volatile. The term "sludge" as used in this case includes only material settled out in settling tanks. It does not include putrefactive material contained in effluents of incompletely treated sewage from sewage treatment plants. Since October 1, 1940, no more sludge is being deposited into the Waterway, but putrefactive material in suspended solids continues to be deposited in effluents from the plants, particularly from the West Side and Southwest Plants.[1]

The standard test to determine the strength of sewage is the ascertainment of its five day biochemical oxygen demand. This is a chemical test by which samples of sewage are incubated for five days at 20 degrees Centigrade. The loss of oxygen within this period is reported as the five day biochemical demand, abbreviated as 5 day B.O.D.[2] The percentage of reduction of B.O.D. is the test of efficiency of sewage treatment. According to Dr. Mohlman, the removal of settleable solids in Imhoff tanks accomplishes a reduction of from 35 to 45% of the B.O.D., chemical treatment removes 60 to 65% and activated sludge treatment 90 to 93%.

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[1] It appears, however, that in the discussions of the continuing nuisance effect of deposits of "sludge" in past years, the term as used in the record would include incompletely treated sewage which was discharged into the Canal in effluents and formed sludge banks.

[2] Water containing much dissolved oxygen and suitable for drinking may have a slight B.O.D. The evidence in this case shows B.O.D. of water in the mouth of the Chicago River at Lake Michigan in June, 1940, to have been 1.3 p.p.m., although the water contained 9.9 p.p.m. of dissolved oxygen.

The B.O.D. of raw sewage varies according to its strength, ranging in this case, on 1940 averages, from a low of 107 at the Calumet Plant to a high of 193 at the Southwest plant, where the stockyards sewage is received. The 1940 average B.O.D. of the effluents from the treatment plants ranged from a low of 7 at the North Side plant to a high of 64 at the West Side, where the treatment is only by Imhoff tanks.

Special Master Hughes found that the proposed sewage treatment plants of the Sanitary District should attain an annual average of not less than 85% purification of the sewage treated, and that it was probable that the degree of purification would be 90% or more.[1] In fact, on the 1940 performances in all the sewage plants, the weighted average of percent reduction in 5 day B.O.D. was only 67.8, although at the Calumet and North Side plants it was 90.7 and 94.6 respectively; see *infra*, page 62 and table 8 in appendix.

The 5 day B.O.D. indicates the avidity for oxygen. The supply of oxygen contained in a stream to meet this demand is determined by the amount of dissolved oxygen in the water.[2] The relation between B.O.D. and available oxygen is known as the oxygen balance. If the dissolved oxygen is less than the oxygen demand, the water is putrescible. However, so long as dissolved oxygen is present, the water is not actually in a putrefactive state. When the dissolved oxygen is exhausted, putrefaction sets in, accompanied by offensive odors.[3] Mr. Pearse, the Sanitary Engineer of the District, and Dr. Mohlman, its Director of Laboratories, in this case contend that at least 1 p.p.m. of dissolved oxygen is necessary to prevent nuisance; and that is the basis for the modified petition of Illinois (*supra*, page 4). The weight of opinion, however, seems to be that the presence of any dissolved oxygen is sufficient; compare *New York v. New Jersey*, 256 U. S. 296, 311, decided in 1921. In the complete absence of dissolved oxygen, an odor nuisance may be expected in the presence of a substantial B.O.D.[1]

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[1] Report of Special Master Hughes on re-reference (1929) p. 35.

[2] The dissolved oxygen in Lake Michigan water ranges from a minimum of less than 8 p.p.m. in summer to a maximum of approximately 14 p.p.m. in winter. The percentage of saturation ranges from 90 to 105%; see Report of Engineering Board of Review of the Sanitary District of Chicago (1925), table 10, page 43.

Dissolved oxygen is from time to time in this report referred to as D.O.

[3] This explanation is taken from page 43 of Report of the Engineering Board of Review, cited *supra*.

General Description of Sanitary District Treatment Plants

A general description of the treatment works and methods of the Sanitary District, including those then complete and those then planned, will be found in the 1929 reports of Special Master Hughes on re-reference at pages 8, ff. The following summary of the plants as actually constructed, is taken from the testimony of Mr. H. P. Ramey, Assistant Chief Engineer of the Sanitary District.

The Sanitary District comprises 442 miles of area. It is divided into four projects:

1. **North Side Plant.** This plant is of the activated sludge type, originally designed for an average flow of 175 m.g.d. with a maximum of 263 m.g.d. It went into service on October 3, 1928, but was not in complete operation until June 28, 1930. On May 19, 1937, an average capacity of 250 m.g.d. was obtained by the addition of twelve new settling tanks. The effluent passes to the North Shore channel. The excess activated sludge and the preliminary sludge from the preliminary settling tanks are pumped 17.5 miles to the Southwest works for ultimate disposal.

2. **Calumet Plant.** This is also of the activated sludge type, designed for an average flow of 136 m.g.d. and a maximum of 200 m.g.d. and has been in service since September 3, 1935. The effluent is discharged into the Calumet-Sag channel, east of Blue Island. The excess

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[1] The extent of B.O.D. rather than the amount of dissolved oxygen is the final test of extent of pollution. But there may be a B.O.D. in drinking water which contains much dissolved oxygen. Thus the water at the mouth of the Chicago River in June, 1940, had a B.O.D. of 1.3, although it contained 9.9 p.p.m. of dissolved oxygen.

sludge is conditioned, de-watered, dried for burning or sold for fertilizer.

3. **West Side Plant.** This is of the Imhoff tank type, designed for an average flow of 472 m.g.d. with a maximum of 700 m.g.d. From these tanks sludge is pumped to drying beds. After the sludge is dried to a workable condition, it is cleaned off the beds by stripping machines and hauled three miles to a dumping area. The effluent is discharged into the main channel. The result is poorer than that obtained at the North Side and Calumet plants because treatment by the Imhoff tank method does not provide a complete degree of treatment. Present plans call for giving activated sludge final treatment to West Side sewage at the Southwest plant now to be known as the West-Southwest plant.

4. **Southwest Side Plant.** This is now known as the West-Southwest plant, but in this report is usually referred to as the Southwest plant. It is of the activated sludge type, and said to be the largest sewage treatment plant in existence. It was originally designed for an average flow of 400 m.g.d. with a maximum of 600 m.g.d. Final plans contemplate its enlargement to a capacity of 900 m.g.d., of which 600 would be completely treated and 300 partially treated; the West Side sewage would be given secondary treatment. The first battery of activated sludge was put in service on June 27, 1939, and de-watering and incineration of sludge has operated continuously since August 28, 1939. The Racine Avenue pumping station, which handles about half the sewage in the project, was not put into service until March 20, 1940. The effluent is discharged into the main Canal. To this plant comes all industrial waste from the stockyards. The excess activated sludge is mixed with the North Side sludge, concentrated into sludge concentration

tanks, treated, de-watered, dried for burning or sold as fertilizer. The Southwest plant is known as the West-Southwest plant because ultimately it will provide complete treatment for the Southwest Side sewage, and final treatment for the West Side sewage. So far the only sewage treated is the Southwest side sewage (and that only incompletely).

Cost of Sewage Treatment Plants and Progress Made in Their Construction and in Treatment of Sewage

Up to December 31st, 1928, the Sanitary District had expended on sewage treatment works $63,355,422 and the District then estimated that the additional cost of completing the program would be $176,166,000.[1] The grand total cost of the program would, upon these figures, have been $239,521,422. At January 1st, 1941, the District estimated that the total cost would be $178,075,611. This is about $61,000,000 less than the 1928 figures. The difference is due to a number of changes in the plans of the Sanitary District as well as to savings in cost.

Of the total of $178,075,611 there was incomplete at January 14, 1941, work estimated ~~to~~ cost $11,756,900, of which $2,392,000 had been contracted for on that date and $9,364,900 had not yet been contracted for. The work to be done after January 14, 1941 is chiefly at the West-Southwest plant, the largest item being for additional final settling tanks and aeration tanks and completion of the sludge handling plant.

Some changes in the program of the Sanitary District were made as a result of recommendations in 1934 by a Commission appointed by the PWA (Federal

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[1] The figures appear in the report of Special Master Hughes, on re-reference at p. 6, ff.

Emergency Administration of Public Works), from whom the Sanitary District obtained a loan and grant. After these recommendations were made the District made studies and tests with respect to treatment of West Side effluent which extended over three years. In May, 1940, following a report from the District a Board of Review of the PWA recommended that the best method of supplementing the treatment now given to the West Side sewage lay in enlarging the Southwest activated sewage plant. Grants made by the PWA to the Sanitary District aggregate $16,692,000 and there is pending an application for an additional grant of $1,900,000.

On July 1st, 1940, the Sanitary District had on hand in cash and debt incurring capacity, monies estimated to be sufficient to pay for 90% of all future work, and if assessed valuations remain the same, the District's debt incurring capacity will increase at the rate of about five million dollars a year. The District's financial resources are now adequate to assure the completion of its program without further interference because of financial difficulties, but this was not true until May, 1940, when for the first time in the past three years the bonds outstanding were substantially less than the debt incurring capacity. The record contains numerous statements by Mr. Pearse, Sanitary Engineer of the District, indicating that the progress of the work has been constantly delayed by lack of funds up to as recently as May, 1940.

At the outset of the hearings, I stated that I understood the *per curiam* opinion of the Court handed down on April 3, 1940 (309 U. S. 569), to be a final adjudication that Illinois had "failed to show that it had provided all possible means at its command for the completion of the sewage treatment system" as required by the Court's decree of April 21, 1930, as specifically enlarged in 1933, and that "no adequate excuse had been presented for the delay", and that I did not construe the reference to me as authorizing any inquiry into excuses for delays. I did not, therefore, inquire into the reasons for delays in making applications to the PWA or the reasons for the delays in letting contracts or the circumstances justifying the delay of three years in making studies for a definite program following the PWA recommendations in 1934.

The various tables which accompany this report as appendices show the following pertinent facts:

(1) The flow at all the treatment works in millions of gallons daily increased from 67.9 m.g.d. in 1928 to 338.3 m.g.d. in 1931. There was then comparatively little increase until 1936, when the flow became 464.9 m.g.d. In 1937 there was a further increase in flow of about 80 m.g.d. with little change in 1938. In 1939 the flow became 669.9 m.g.d. and in 1940 it reached 929.9 m.g.d.[1] The system today is stated to collect all but 40 m.g.d. of a total sewage flow of over 1,000 m.g.d.

(2) Volatile solids discharged into the Canal amounted in tons in 1938 to 123,100 and in 1939 to 115,658. In 1940 the figure had declined to 76,472 and in 1941 it is estimated that it will be 40,910, or only about one-third of the 1939 total.[2] Volatile solids represent organic matter and most of the putrescible material in the sewage.

(3) The total sludge and grit discharged into the Canal aggregated 53,970 tons in 1939. This was more than in any of the three preceding years; in 1938 it was 44,198. In 1940 it was only 20,224. Since the end of

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[1] See Table 2 in appendix. See also Table 3 showing increase in dry solids removed from 54.1 tons in 1929 to 422.7 in 1940.

[2] See Table 4 in appendix.

September, 1940, no sludge and grit has been discharged into the channel.[1]

(4) The efficiency of the various plants in the last three years, as reflected in reduction of B.O.D., is as follows:

	1938	1939	1940
North Side	92.2	93.5	94.6
Calumet	83.1	87.0	90.7
West Side	47.4	53.7	50.0
Southwest			67.3[2]

The weighted average percentage of B.O.D. reduction in all plants for 1940 was 67.8.[3]

The particularly poor result at the West Side plant is due to the fact that the treatment there is only by Imhoff tanks and not by activated sludge. The poor result at the Southwest plant appears to be due at least in part to the inadequacy of the present equipment of the plant.

(5) The report of the Southwest treatment plant by months for 1940 shows a striking decline in efficiency of result, as indicated by the following summary:[4]

Month	Total Flow m.g.d.	Complete Treatment	B.O.D. Reduction
January	287	287	91.3
April	252	122	64
July	287	168	70.8
October	361	248	65.1
December	358	139	47.1
Average	313	192	67.3

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[1] See Tables 5 and 6 in appendix.

[2] 1940 was the first year of complete operation of the Southwest plant.

[3] See Table 8 in appendix.

[4] See Table 7 in appendix.

In argument it was suggested that one reason for the decline in results was that the Racine Avenue pumping station, which carries stockyards sewage, had been cut in only on March 20, 1940. As the stockyards sewage is strong, this would explain a decline in B.O.D. reduction from January to April, but it would not explain the decline in total flow between those months, nor would it explain the extreme further decline in B.O.D. reduction from 70.8 in July to 47.1 in December. It was also suggested that the strength of the raw sewage B.O.D. had increased within these months. However, the strength of the raw sewage in December was not substantially greater than in November, while the percentage of reduction in December was only 47.1 as compared with 67.2 in November. The strength of the raw sewage in October was substantially the same as in January, but the percentage in reduction in B.O.D. in October was only 65.1 as compared with 91.3 in January. It may also be noted that at the Southwest plant the total number of gallons receiving complete treatment in December was only 139 as compared with 222, 248 and 236 in the three preceding months.[1]

Mr. Pearse said in answer to my inquiry as to the poor recent showing at the Southwest plant, "we are hoping for better and more consistent operation during 1941" and "I think that it will necessitate a closer watch on the operators in the plant than we have had heretofore by those of us in the main office. That is the best explanation I can give you."

Mr. Pearse explained the deficiencies of operation at the Southwest plant chiefly on the ground that there was not sufficient blower capacity to carry continuously a flow of 400,000,000 gallons per day. He said,

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[1] See Table 7 in appendix.

> "I am afraid that we are under-blowered because our money did not go far enough to buy sufficient blowers with a nominal capacity of 400,000,000 gallons, and as a matter of fact, I believe the PWA, if I am not mistaken, cut out one blower that we urged them to buy at the time."

There is also a shortage of compressors, which were "advertised for within the last few months probably." Mr. Pearse could not answer offhand why contracts were not let sooner, "I think one answer was that we were waiting until the end of the winter, early spring, to find out how much money would be available and to what extent they should go ahead." Following the action of the Board of Review of the PWA, steps were taken to get out the specifications and advertise for the blowers. There is also a need for additional vacuum filters and eight now are under contract, bringing the total up to 32. "We are trying to put in vacuum filters in connection with the other equipment as fast as we can get the money. We have got eight on order and we will be buying more."

The deficiency in equipment is particularly at the end of the treatment process in that portion thereof which consists of de-watering, heating and drying the residue of the sludge and making it marketable for fertilizer. The shortage of equipment at this point makes it impossible to run all the sludge through the plant. A substantial part of the sewage flow was discharged as sludge into the channel without complete treatment, i.e., only after a short period of preliminary settlement. Thus, in the first six months of 1940 there continued to be a substantial amount of sludge discharged into the channel from the Southwest treatment plant.

In August, 1940, shortly after the hearings before me had begun, arrangements were made to send to the West Side plant the sludge which was then being discharged into the channel from the Southwest plant. This sludge is now being run through the Imhoff tanks at the West Side plant and then placed into lagoons. In the last few months of 1940 lagoons were constructed on the site of the West and Southwest works covering an area of 37 acres. The cost was about $38,000 as a WPA project, of which the Sanitary District contributed about 38%. There is available at this location a further area of about 20 acres on which additional lagoons might be constructed. Based upon the present short period of preliminary settling (13 minutes) given at the Southwest works to the flow which is then sent over to the West Side plant, the lagoon capacity available should suffice into 1943. If a longer period of settling be employed, the capacity would be exhausted in the winter of 1941-42. Further land for lagoons is available at a point four miles removed. These lagoons are situated in an industrial area and their use will create no nuisance complaints.

As a result of this lagooning (but only since the hearings before me began) the discharge of sludge into the Waterway by the Sanitary District has entirely ceased. Other putrefiable material, however, continues to be discharged into the Waterway, chiefly in suspended solids contained in the incompletely treated effluents of the West Side and Southwest plants.

Probable Conditions at Lockport and Joliet in the Summers of 1941 and 1942

In prognosticating the situation at Lockport in 1941 and 1942, the experts on both sides agreed that there were to be taken into account, on the one hand, the sources of B.O.D. and, on the other hand, the sources of dissolved oxygen.

The liability side (sources of B.O.D.) is made up in part of the demand asserted by the old sludge deposits in the Canal and in the Pool. All the experts agreed that it is impossible to evaluate precisely the demand exerted by these deposits in pounds of B.O.D. One can only guess at this. As previously noted, all of the experts agreed that the B.O.D. of sludge decreases about one-half after four months of summer, that at the end of the second summer, it will be only about one-fourth the initial demand and at the end of three summers, possibly only 3 to 5% thereof. Therefore, the B.O.D. exercised at Lockport in 1941 by old sludge deposits will be materially less than in 1939 because the sludge deposits of the two years preceding 1939 materially exceeded in volume the deposits for the two years preceding 1941.[1] In 1942 the situation as to the influence of old sludge will be further improved by the considerable further reduction of deposits in the channel in 1941.

According to the estimates of the Sanitary District, the chief source of B.O.D. at Lockport in 1941 and 1942 will be the B.O.D. from the West Side and Southwest effluents.[2]

The Sanitary District concedes that the B.O.D. demands at Lockport in the summers of 1941 and 1942 will be far less than they were in 1939, which is the summer in which the complaints at Joliet were the most pronounced, and also far less than in 1940.[1] A comparison of the years upon the revised figures submitted by the Sanitary District is as follows:[2]

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[1] See record of volatile solids deposited in channel in appendix, Table 4.

[2] This will be due to (a) incomplete treatments afforded by Imhoff tanks at West side and (b) inadequacy of equipment at Southwest plant to permit complete treatment of the plant's capacity flow and the consequent necessity of discharging into the Canal effluent incompletely treated.

Sources of B.O.D. lbs. per day—	1938	1939	1940	1941	1942
B.O.D. demands from old sludge deposits	519,000	475,000	237,000	118,500	60,000
B.O.D. demands from current deposits of sludge and/or effluents	763,800	749,000	529,000	406,000	406,000
Total	1,282,800	1,224,000	766,000	524,500	466,000
Conditions at Lockport—					
Flow—c.f.s.	6,752	3,336	3,469	3,200	3,200
5-day B.O.D.					
—p.p.m.	17.3	30.2	20.6	21.0	17.6
—lbs. per day	630,800	562,300	386,000	364,500	303,000
Dissolved Oxygen—					
—p.p.m.	0.2	0.0	0.0	0.0	0.0
—lbs. per day	6,070	0	0	0	0

After submitting his revised figures, Mr. Pearse testified that he would be disposed to again revise them so as to reduce to 346,000 the figure of 406,000 appearing in the 1941 and 1942 columns (as B.O.D. demands from current deposits of sludge and/or effluents) in order to give proper weight to probable decreases in B.O.D. from West Side and Southwest effluents.

The accuracy of the Sanitary District figures is challenged by Mr. Howson, who contends that the conditions at Lockport in the summers of 1941 and 1942 will be materially better than estimated by the Sanitary District.[1]

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[1] Illinois originally put in evidence estimates which showed much greater anticipated improvement in the B.O.D. at Lockport in 1941 and 1942. At the time of oral argument it was stated that these estimates had been made up in error and the estimates shown in the text were substituted.

[2] The District's revised figures appear in full in the appendix, Table 9.

It would take too much space to attempt to set out a full analysis of the conflicting views. Mr. Howson's figures are apparently based upon his view that by proper diligence in completing work at the Southwest plant, no effluent from it would contribute B.O.D. in 1941 and 1942 and that the West Side effluent would also be completely treated in 1942. In the actual present status of the Sanitary District program, it seems clear that this expectation cannot be realized as to 1941 and doubtful if it will be accomplished by 1942. Mr. Howson also contends that the Sanitary District has overestimated the B.O.D. effect of old sludge deposits and has failed to give sufficient weight to the re-aeration which will be acquired through the flow to Lockport, particularly in view of the scouring of the channel as a result of the 10-day experimental flow. Here again are presented issues upon which a layman must have difficulty in resolving a conflict between experts.[2] It is probable that

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[1] Mr. Howson originally calculated that in the three summer months of 1941 and 1942 the B.O.D. at Lockport would be 7.3 p.p.m. and 4.8 p.p.m.

On the figures originally submitted by the Sanitary District, the B.O.D. at Lockport in 1941 was not extended, but on the other figures shown, Mr. Howson calculated that the B.O.D. in Lockport would have been 10.3 p.p.m. as compared with the figure of 21.0 p.p.m. which appears in the revised District figures.

Even upon the revised figures of the District, Mr. Howson contends that the B.O.D. at Lockport in the summer months of 1941 and 1942 should be determined by taking that proportion of the estimated sources of B.O.D. in those years which (a) the actual B.O.D. at Lockport in the earlier years was to (b) the total sources of B.O.D. in earlier years. On this basis, even upon the revised figures of the District Mr. Howson claims that the B.O.D. at Lockport in the summer months of 1941 and 1942 will be 13.5 p.p.m. and 11.5 p.p.m. instead of the District's revised estimates of 21.0 and 17.6.

[2] I considered from time to time whether I should call experts of my own selection, but concluded not to do so, in part, for the reasons assigned for a similar conclusion by Special Master Hughes in his report upon re-reference (1929), p. 127, and in part, because such employment would have occasioned additional delay in an inquiry which I have already found it difficult to make "summary", as directed in the order of reference.

Mr. Howson's figures are too optimistic, while those of the Sanitary District go too far in the other direction. However, it seems sufficient to note that even upon the Sanitary District's figures, the total sources of B.O.D. demands in 1941 in pounds will be less than half of the 1939 figure, and the 5-day B.O.D. (which Dr. Mohlman agrees to be the final test of pollution) will in 1941, in parts per million, be only two-thirds of the 1939 figure. In 1942 there will be further substantial reductions according to the District estimates. The figures, therefore, seem to make it clear that the pollution at Lockport (and correspondingly at the Pool) will be materially less in 1941 and 1942 than in 1939. This result would indeed seem to be the necessary consequence of the great reduction in tons of volatile solids discharged into the Canal in 1940, and to be discharged in 1941 and 1942, as compared with amounts discharged in 1939 and earlier years.[1] This is further confirmed by the testimony given before me by the experts for Illinois, who at the outset of the hearings, agreed that conditions in 1941 at Joliet and Lockport would be better than in 1940, and *a fortiori* substantially better than in 1939. They also agreed that an additional improvement was to be expected in 1942, when further progress will have been made in sewage treatment and the effect of past sludge deposits will have been further reduced.

It is true that there will be, according to the Sanitary District estimates, no dissolved oxygen at Lockport in the summer of 1941 or 1942. There was also none in the summer of 1939 and even in the summer of 1938 there was only 0.2.[1] This 1938 figure would fall below the minimum of 1 p.p.m. of D. O. which the Sanitary District in its modified petition claims to be essential. Yet in 1938 the authorized diversion from the Lake was 5,000 c.f.s., the actual flow at Lockport was 6,702 c.f.s. (including domestic pumpage), and there were no special complaints in Lockport or Joliet (although annoyance and discomfort from the odors have always been experienced and expressed).

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[1] See appendix, Table 4.

The following are the average D.O. and B.O.D. figures at Lockport for January of the last four years:[2]

	1938	1939	1940	1941
Dissolved Oxygen	7.4	0.5	1.8	0.6
B.O.D.	22.6	28.5	14.8	22.9

The dissolved oxygen for the month of January in 1941, was substantially the same as in 1939, but materially less than in 1940,[3] and greatly less than in 1938, when the diversion was larger. The B.O.D. for January was, however, substantially less in 1941 than in 1939, and about the same as in 1938 (when the diversion was

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[1] Dr. Mohlman testified, "I do not think conditions prior to 1939 are by any means satisfactory conditions. We had zero dissolved oxygen at Lockport. We are merely keeping up with what we have had for many years, and we are not improving conditions down there after the expenditure of all this money for our treatment plants."

[2] The Sanitary District has records of the L.O.D. and dissolved oxygen at Lockport extending back as far as 1925. These records show in 1939 a higher B.O.D. and a more extended period of no dissolved oxygen than in any other year. However, in every other year there was a period in the summer in which the dissolved oxygen went down nearly to zero for a few months; in many of the years the dissolved oxygen in the summer was actually zero for a part of the time.

[3] The lower dissolved oxygen figures in January, 1941, as compared with January, 1940, may be partly explainable by the slightly lower flow at Lockport in 1941 (2,781 c.f.s. as compared with 2,949 c.f.s. in 1940). The District states that the low average in 1941 is due to the effort to conserve diversion this winter in preparation for the demands next summer.

6,752 c.f.s.)[1]

Insofar as one can reason from January to June, the B.O.D. figures seem to support the view that conditions in June, 1941, will be a great deal better than in 1939. The dissolved oxygen figures indicate that June, 1941, will be no better as to odor conditions than 1939; but, as has been noted, the District representative testified that the B.O.D. figures are the controlling evidence of degree of pollution.

As a subsequent statement shows, the 10-day flushing in December appears to have cleaned much sludge out of the channel as a whole, while at the same time leaving more in the Pool than there was before flushing.[2] To the extent that more putrescible material has been deposited in the Pool, conditions in 1941 will be adversely affected. A counterbalancing influence will be the cleaning out of the channel above the Pool, which should reduce the B.O.D. in the water on the way to the Pool and enable it to contribute more dissolved oxygen. In the opinion of Dr. Mohlman the hopes entertained in this regard are denied by the fact that the dissolved oxygen at Lockport in January, 1941, was less than in January, 1940, and not much more than in January, 1939.

I conclude that while it is reasonably certain that the B.O.D. conditions in the summers of 1941 and 1942 will be better than those in 1939, it is also most probable that there will be no dissolved oxygen at the Pool in the summer of 1941 and that there are likely again to be offensive odors at Joliet and Lockport. Weather conditions will undoubtedly have a large influence not only upon the existence of odors but also upon the susceptibility of individuals to them.

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[1] For the full years 1938, 1939 and 1940, the average B.O.D. and D.O. figures at Lockport were as follows:

	1938	1939	1940
Dissolved Oxygen	2.5	0.4	0.8
B.O.D.	18.4	26.0	20.1

[2] See *infra*, pp. 78-82.

V.

AVAILABLE REMEDIAL OR AMELIORATING MEASURES

The opposing States pointed out that the first step in the improvement of conditions in the Waterway would be to discontinue the discharge into it of sludge. As shown by the statement *supra*, page 55, this was actually accomplished as of the end of September, 1940, after the hearings before me had begun, but a considerable quantity of putrescible material continues to be deposited into the Canal in the form of partly treated effluents.

Other possible remedial measures which were suggested in the hearings before me are now taken up in order.

Dredging, Draining or Flushing Brandon Road Pool

As the complaints which led to the present hearing emanate chiefly from those residing along the banks of the Waterway at Joliet, within one to two miles of the Brandon Road Pool, it seems quite clear that they are attributable chiefly to the conditions at the Pool. I therefore gave particular attention to various suggestions as to what might be done to ameliorate conditions there.

As noted at page 9, the wide section of the Brandon Road Pool, which reaches a maximum of 1,400 feet, extends for about half a mile at the southern end of Joliet, between one and two miles from the residences of most of the complaining witnesses. The depth of the Pool varies from 10 to 20 feet below the water surface to the sludge deposits; in the center this depth was estimated by Dr. Mohlman of the Sanitary District at 18½ feet and by Mr. Andrew of the United States District Engineer's office at 19 to 22 feet. The elevation of the Pool is 539 feet above sea level. It contains a water volume of about 120 million cubic feet. The original volume was about 151 million cubic feet.

The United States Engineers made soundings in 1934, 1936 and 1939. Between the 1934 and 1936 soundings and those made in 1939, Mr. Andrew estimated that there had accumulated in the Pool from 1,250,000 to 1,500,000 cubic yards of deposited material. Of this about 107,000 cubic yards represented materials deposited by the United States from dredging, and the balance represented accumulated sludge deposits. The deposited material extends at some points for 2 feet and at other points from 6 to 10 feet. At other points in the Sanitary Canal, there are deposits ranging from 2 to 4 feet, but nothing comparable to those in the Pool.[1]

Mr. Andrew testified that in his opinion an increase in the flow to 5,000 c.f.s. would not remove this accumulated deposit, nor would it flow out by opening the gates of the locks. It would have to be taken out by hydraulic dredging, the moisture content ranging from 60 to 99%. Most of this material is in the lower quarter of the Pool. The dredging would cost about 40 cents per cubic yard or between $500,000 and $750,000; it would take from 6 to 9 months. The material removed would have to be deposited on adjacent land. Several hundred acres would be required, but there is vacant land available for this purpose.

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[1] The sludge deposits accumulated even while the authorized diversion from Lake Michigan was 6,500 c.f.s. and 5,000 c.f.s.

Mr. Howson, the expert for the opposing States,[1] thought that the dredging of the material referred to by Mr. Andrew might not cost more than $400,000. The material would probably have to be lagooned on spoil banks. A nuisance condition might be caused at the point of lagooning. This might be controlled to some extent by the use of chlorination at a further expense, no figures as to which were furnished me.

The experts on both sides agreed that the denser material deposited in the Pool represents accumulations of previous years which have largely lost any potency to cause nuisance. Studies which have been made indicate that after four months of summer, the B.O.D. of sludge decreases about one half; that at the end of a second summer, the B.O.D. will be only about one fourth of the initial rate; and after three years, the rate is reduced to possibly 3 to 5% of the initial rate. It appears that the hydraulic dredging of the deposited material in the Pool would remove for the most part material no longer the cause of offense.

While Mr. Howson said that "some good" might be accomplished by dredging this material, he had his "doubts about its practicability as compared to more effective and positive methods such as chlorination and methods of that type."

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[1] Mr. Howson was the leading sanitary expert witness for the opposing States. He is a graduate of the University of Wisconsin, and since 1913 has been a member of the firm of Alvord, Burdick & Howson, who specialize in hydraulic and sanitary engineering, including sewage and sewage disposal.

Leading witnesses on technical questions for Illinois were Mr. Langdon Pearse, Sanitary Engineer of the Sanitary District, Dr. F. W. Mohlman, its Director of Laboratories, and Mr. Horace P. Ramey, its Assistant Chief Engineer. Mr. Pearse is a graduate of Harvard College and of the Massachusetts Institute of Technology, and has been connected with the Sanitary District since 1909. Dr. Mohlman is a graduate of the University of Illinois and came to the Sanitary District in 1919 as Chief Chemist. Mr. Ramey is a graduate in civil engineering of the University of Michigan and has been connected with the District since 1907.

All these gentlemen testified also in the hearings before Special Master Hughes on re-reference.

Dr. Mohlman thought that the dredging of the Pool would dislodge sludge deposits and disseminate the sludge, bringing it to the surface of the water and thereby intensifying odors. Dredging might remove some of the large bulky deposits, "but whether it would remove the actual putrefactive material, I think, is questionable, and it doesn't seem to me a practical method of getting rid of the odors and the putrefaction in those channels there and the pool." If the sludge is deposited on spoil banks, "there would be odors wherever it was deposited, even if it was covered with water, and the escaping gases would cause a nuisance."

Mr. Pearse deemed it impractical to accomplish much by dredging and removing material which had been decomposing for two or three years. He thought it an "intensely speculative question. * * * "I would think a good many times before I would want to spend the public's money on such a venture."

In view of the foregoing and particularly of the agreement of the experts on both sides that most of the material that would be taken out by dredging is the old material which has largely lost its potency as a cause of nuisance, I do not think that hydraulic dredging of the Pool could be counted upon to eliminate the odors complained of at Joliet. Dredging would also raise a new set of problems as to odors from material deposited on spoil banks.

After hearing Mr. Andrew's original statement, I abandoned for the time being any further inquiry as to the possibility of draining the Pool by opening the locks since it appeared from his testimony that the material to which he referred would not flow out if the locks were opened. It developed, however, from subsequent testimony of the sanitary engineers that the material in the Pool which they considered responsible for the odors complained of was light flocculent material containing from 90 to 98 or 99% moisture, which they believed would flow out of its own weight if the locks at Brandon Road were opened and the Pool drained. Mr. Howson was strongly of the view that the draining or flushing of the Pool would be beneficial in removing active sludge represented by the flocculent material. He thought that the objectionable material would cause no trouble down the river as it could be deposited in the Dresden Island Pool, which is several times larger than Brandon Pool and in a very sparsely settled area, and that the balance would go downstream. The other experts shared the view that this flocculent material would flow out upon a flushing or draining.

I thereupon renewed my inquiry as to the feasibility of draining the Pool. The United States Engineers were of the opinion that this was not feasible for a variety of reasons. They were of the opinion that the operation would have to be repeated two or three times as the flocculent material would not come through at one time. The gates could not be opened completely without causing risk of damage to navigation. The opening of the gates at Brandon Road would necessitate operations at the locks and dams at Dresden Island and Marseilles. If the gates were only partly opened and the Pool drained only in part from time to time, operations would be necessary at the locks at Dresden Island and Marseilles. They feared that the flocculent material carried down to other points might cause nuisance conditions at those points.[1] It was also suggested that the Government would then be required to do more dredging down the river to maintain navigation channels at increased expense and possible incidental interference with navigation, particularly at the pools at Dresden Island and Marseilles. To empty the Brandon Road Pool or even to reduce its level would interfere with water intakes of several industries. The opinion was expressed by the Government engineers that to completely drain the Pool at one time by cutting off the flow from the Sanitary District might result in reversals of flow in the river and pollution of the lake water at the mouth of the Calumet River. Even a reduction in the diversion to a total flow of 1,700 c.f.s. (including domestic pumpage), it was suggested, might make difficulty in the event of a rainfall or if seiches occurred in Lake Michigan materially lowering the lake levels during that period. Draining the Pool would not remove the sludge deposits other than the flocculent material and such other material could be removed only by hydraulic dredging. The Government engineers stressed their view that the removal of the flocculent material, if it could be accomplished, would not give complete relief as long as additional material continued to be deposited in the channel from the treatment plants of the Sanitary District.

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[1] It appears that the region immediately below Joliet is relatively sparsely settled. The nearest large town is Ottawa with a population of about 16,000, at a distance of about 50 miles south of Joliet. Other towns on the Waterway below Joliet, and their approximate populations and distances from Joliet, are:

	Approximate Population	Approximate Distance from Joliet in Miles
Peru	9,000	60
LaSalle	13,000	65
Peoria	105,000	130
Beardstown	6,500	200

Additional water from the convergence of the Kankakee and Fox Rivers between Joliet and Peru affords additional dilution in the Waterway.

For all of these reasons the Chief of Engineers stated definitely his unwillingness to agree to the drainage of the Pool at this time.

Notwithstanding the views thus expressed by the Chief of Engineers, reference continued to be made during the course of the hearings to the possibility of relieving nuisance conditions by removing from the Brandon Road Pool some of the flocculent material of recent origin which was arrested there as in a catch basin. The suggestion finally developed that a 10-day flow of 10,000 c.f.s. would be of material benefit in washing out this material without necessitating any opening of the locks. All of the experts agreed that such a flushing of the Waterway would be helpful and desirable. At my suggestion counsel for the opposing States stipulated that the Court might enter such an order upon the understanding that their position in the case would not be in any manner prejudiced by the agreement. I ascertained from the Chief of Engineers that the War Department would offer no objection from the standpoint of interference with navigation. Accordingly on November 25, 1940, the Court entered an order permitting a flow of 10,000 c.f.s., in addition to domestic pumpage, for 10 days beginning on December 2, 1940.

Results of Experimental 10-Day Flushing

During the test the total flow at Lockport averaged 9,973 c.f.s. and the diversion flow at Lockport, less water pumpage in the Chicago area, was 8,430 c.f.s. This was less than the amount permitted by the stipulation and the order of the Court, but was the maximum flow capacity of the drainage Canal at the time of the test. The weather in the experimental period was very cold, which decreased the flow from tributaries, and, accordingly, the expected stages in the lower reaches of the Waterway were not reached and damages to low lying lands, which had been feared, were not suffered.

The level of the Pool at the Brandon Road Dam was lowered half a foot to induce the flow. The experts had thought that a lowering of the level by about 5 feet would make the experiment more effective. The War Department was unwilling to permit a lowering to this extent because of suggested difficulties with the intake pipes of various industries. A further lowering of the level by one foot was, however, permitted for 36 hours over the weekend of December 7th and 8th.

The flushing appears to have scoured out the Waterway above the Brandon Road Pool pretty well. However, much of the material deposited in the upper reaches of the Waterway, which was swept down the stream by the increased flow, did not carry through the Pool. The figures are shown as follows in the report upon the test prepared by Dr. Mohlman:

Total tons suspended solids carried into Pool	84,010
Total tons suspended solids carried out of Pool	21,123
Balance deposited in Pool	62,887
Percent deposited	74.8%
Percent transmitted	25.2%

The above totals include both volatile and non-volatile suspended solids. Figures as to the volatile suspended solids are as follows:

Deposited in Brandon Pool	27,067 tons
Transported out of Pool	7,512 "
Percent transported	27.8%

The volatile material is that which is the chief source of nuisance as it represents chiefly organic matter.[1]

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[1] Volatile solids are determined by heating dried solids to a temperature of 650° C.; the loss of material is the volatile or organic matter.

Thus, of the offensive material carried into the Pool by the flushing, a larger percentage was taken out than of the total material taken into the Pool. This was confirmed by the fact that 52.8% of the tons of B.O.D. carried into the Pool were carried out of it.

The average velocity in the middle of the Pool during the experimental flow ranged only from .47 to .55 feet per second. The maximum velocities ranged from 1.33 to 1.58 and the minimum velocities near the banks ranged from 0 to 0.07. Mr. Ramey estimated that velocities in the Pool are generally about one-third or one-fourth of the velocities in the main channel.

Dr. Mohlman estimated that the additional deposits of material carried into the Pool by the 10-day flushing amounted to as much as 2 to 2½ feet and perhaps aggregated 524,000 cubic yards. Mr. Andrew said that soundings indicated increased deposits of as much as 9 feet at certain points, but that there is still a minimum depth of 13 feet in the channel, which is in excess of the minimum required of 9 feet and more than that at other points in the Waterway, and the government does not anticipate more dredging at this time.

Opinions were in conflict as to whether a lowering of the level of the Pool by 5 feet while the flushing was in progress would have resulted in sweeping out more flocculent material. Mr. Howson thought it would have done so, but this view was not shared by Messrs. Andrew and Ramey, who felt that, in view of the low velocity in the middle of the stream, a lowering of 5 feet would have been of no appreciable benefit. Mr. Howson frankly said that there could be no certainty on this point without a series of prolonged experiments and more data than was available.

I inquired of all the experts as to why their expectations as to the effect of the flushing in removing the flocculent material from the Pool had not been realized. Mr. Andrew felt that he had been mistaken in his estimate as to the character and extent of the flocculent material and had thought that there was more light material that would be carried through readily at extremely low velocities. Mr. Ramey thought it was because there had been "such a tremendous quantity of material scoured out of the main channel above the Brandon Road Pool and not scoured out as quickly as hoped", which had retarded the movement through the Pool. Dr. Mohlman had hoped that there would be more localized velocity. Mr. Howson thought that the trouble was due to the fact that the material was 4 or 5 times as dense as he had expected.

The result seems to indicate the degree of uncertainty which must attend all expert opinion, even where it is in accord.

Opinions differed as to the results accomplished by the flushing experiment. All witnesses agreed that taking the stream as a whole from the point where the sewage enters the channel through the Brandon Road Pool, a considerable benefit had been accomplished since a very considerable amount of deposited material was taken out of the Waterway between these points. All witnesses also agreed that the effect of the extensive scouring out of the channel above the Brandon Road Pool should have a beneficial effect on the conditions in the Pool since the water in the upper stretches of the Waterway would come to the Pool removed from the effect of the sludge deposits which had been swept out, and therefore richer in oxygen content. Mr. Howson felt that this would offset the disadvantage of the deposit in the Pool of the material which had been brought down from the upper stretches. Mr. Ramey and Dr. Mohlman conceded a beneficial effect from the relative purification of the water above the Pool, but Dr. Mohlman was doubtful whether this would offset the effect of the additional material deposited in the Pool. The difficulty of prognostication is indicated by the fact that the dissolved oxygen at Lockport in January, 1941, is less than it was in 1940, notwithstanding the fact that the flushing experiment scoured out of the channel at Lockport so much of the material that had been accumulated at and above that point. During the experimental flow and for about a week thereafter dissolved oxygen at Lockport was considerably in excess of the year before, but thereafter the dissolved oxygen declined.

If the flushing experiment should in fact prove to have made the conditions in the Pool any more unfavorable in 1941 than they would otherwise have been, the rights of Illinois should not be enlarged or those of the opposing States diminished by that fact, as it was understood that the experiment was for the benefit of Illinois and should not prejudice the opposing States in any way, and counsel for those States agreed to the flushing upon that understanding. Illinois had all the chance of gain by the additional diversion, to which the opposing States consented for the ten day period of the test, and it took whatever risks were involved. The additional water which during the test came through the wheels of the Sanitary District powerhouse at Lockport generated power worth $12,500, of which the District had the benefit.

Chlorination of Waterway

The opposing States urged the use of chlorine to eliminate the odors complained of at Lockport and Joliet. On this point their leading witness was Mr. Linn H.

Enslow, a sanitary engineer and chemist, editor of a trade magazine known as "Waterworks and Sewage", and consultant and adviser of the Chlorine Institute, which is composed of chlorine manufacturers. He is a graduate of the Virginia Polytechnic Institute and attended Johns Hopkins University for two years; he is a member of various professional societies and has participated in numerous studies of the use of chlorine.

Mr. Enslow said that the sludge condition at Brandon Pool presented "a bad situation". By that he said he meant that it might require from three to four times as much chlorine to do the same work than if the sludge were not there. He favored the use of chlorine at the Southwest plant and also at Lockport. He thought 3 p.p.m. would be sufficient at the former point, but 6 p.p.m. would be required at Lockport, although 3 might be enough. These estimates were based on the assumption that no new deposits of sludge came into the Pool. If sludge continued to go into the Pool, it might take 12 p.p.m. or even more—"It would be anybody's guess * * * *." "In that situation all you would have would be a giant septic tank served from Chicago. I would not know whether it would take 15 parts or 25".

If the discharge of sludge to the Canal were discontinued by January 1, 1941, Mr. Enslow (testifying in September, 1940) still thought it would take 3 p.p.m. of chlorine at Lockport in addition to 3 p.p.m. at the Southwest plant or a total of 6 p.p.m., to relieve the odor conditions at Joliet and it might take more. At one point he said, "It is a speculation; it is a speculation in anybody's sense."

Mr. Enslow estimated the cost of chlorination at a minimum of $700 and a maximum of $3,000 per day, based upon a unit price of $43.20 a ton; 3 p.p.m.

would be equal to 25 tons. This would have to be continued through the summer months. In addition to costs of chlorine, there would be a cost for equipment. For this Mr. Enslow made a "rough estimate" of $85,000, and thought it would probably cost $115,000 at Chicago to complete the construction of the necessary plant and auxiliaries. He recommended one plant at the Southwest treatment plant and another larger one at Lockport.

Dr. A. M. Buswell, Chief of the Illinois State Waterway Survey, thought that the sludge in the Brandon Pool had received undue emphasis from a technical standpoint in view of its age. He believed an application of 2 to 3 p.p.m. of chlorine below the dam at Lockport costing from $700 to $1,000 a day over a period of not over 100 days would be sufficient to remove odorous substances. In the wider portions of the Brandon Pool, which was a more or less stagnant basin, he thought a chlora-boat (which would "probably" not cost over $10,000) might be used to apply 1 p.p.m. per day in that Pool, which would be adequate there. Thus, it was his "checked opinion" that an average of 3 p.p.m. per day should take care of the situation if sludge were no longer discharged into the Canal, but if sludge continued to be discharged, he thought an average of 5 p.p.m. would be required. Later he estimated that the expenditure of between $1,000 and $1,200 per day for chlorine for a summer's operation would "very largely alleviate the conditions." He said that these were estimates only, not based on accurate survey as he had not expected to testify with respect to the use of chlorine, but it remained his opinion that the use of chlorine to the extent indicated would be as effective as increased diversion in relieving the odor conditions.

Mr. Joseph W. Ellms, Commissioner of the Division of Sewage Disposal in Cleveland, testified with respect to the use of chlorine at Cleveland. Mr. Ellms was educated at the Massachusetts Institute of Technology and has been consultant at various plants. Cleveland has three sewage treatment plants and a total sewage flow of about 125 m.g.d., or about one-eighth of that of Chicago. Cleveland discharges its sewage effluents into the same water from which it draws its water supply (Lake Erie, directly or through the Cuyahoga River) and has used chlorine since about 1922 "as a sanitary protection to a certain extent to the water supply", but also "to keep the marginal waters in as clean a condition as possible during the bathing season and to prevent any odors which may arise from sewage entering the plants." The application has been at the plants, not to the Cuyahoga River or to the sewers entering the river. 5 to 6 tons a day of chlorine are used in all for about 100 days during the summer months, and the chlorine contracts generally run from about 1,000,000 to 1,200,000 pounds per season. Mr. Ellms said that the cost of a 150-ton plant would be "considerably less than $300,000" and would take 6 to 7 months to build. He agreed that it would be better to apply chlorine before septic conditions had developed and it would be helpful to apply it in several places rather than one since the efficacy of chlorine wears off. Mr. Ellms was familiar generally with the Sanitary Canal and the Brandon Pool and thought that chlorine "could reduce, perhaps eliminate", the odors from hydrogen sulphide that may be produced as a result of decomposition of organic matter in the Brandon Road Pool, "but the continuous feeding in that Pool of partially decomposed organic matter is going to provide a continuing source of hydrogen sulphide, which is, perhaps, the chief cause for complaints at, in and around that Pool."

Mr. Warrick, the State Sanitary Engineer of Wisconsin, testified that he believed chlorination "would have a decided beneficial effect" upon the Waterway. He said it was not possible to determine how long the effect of chlorine would last as this would depend upon sludge, temperature and other conditions. "As a very rough statement" he though the effect of chlorine applied at the Southwest plant might last as much as half an hour, but it might last two hours or "considerably longer". This also would be true of its application at other points. From the standpoint of Brandon Pool, the most beneficial effect would be chlorination at or above the Pool, but it would also be advantageous to put in chlorine at several places above the Pool.

Mr. Howson, the chief expert witness for the opposing States, testified generally to the opinion that chlorination "is a very effective and positive method of controlling odors", and that he believed it would be practical and effective to relieve the conditions complained of at Joliet and Lockport. However, his testimony on the subject of chlorination was based chiefly on that of Mr. Enslow. He calculated that 6 p.p.m. of chlorine would remove a total of 200,000 lbs. of B.O.D. at Lockport. The cost of installing chlorinating equipment at two points (as recommended by Mr. Enslow), one of 25 ton capacity near the Southwest plant and the other of 50 ton capacity near the Lockport powerhouse, would aggregate $360,000. Construction would require from 6 to 9 months. The cost of operation would range from $70,000 to $300,000 for the summer months. He said this was a range of figures given by Mr. Enslow, the application of which would depend upon the quantity of chlorine used. The $300,000 was figured on the continuous application of 9 p.p.m. of chlorine over a 100-day period. 12 p.p.m. would cost one-third more, or $400,000. It seems clear that these estimates are very rough.

The witnesses for Illinois testified that the most important use of chlorine was to protect drinking water by destruction of bacteria. They said that they had never given any consideration to its use for that purpose and were not concerned with it because no community along the Waterway used any water from it for drinking.

The Illinois experts conceded that chlorine is in many situations effectively used to prevent odors. The Sanitary District uses it to a limited extent in two of its small plants for odor control and also uses a small quantity at the Southwest plant, where, however, there is little or no trouble with odors. But, in view of the large accumulations of sludge from past deposits of partially treated sewage and the continued deposit of only partially treated sewage, they were of the opinion that chlorine could not be effectively used in the Waterway to eliminate the odor conditions complained of by the residents of Joliet, even if large quantities were used at great expense.

Dr. Mohlman testified that he had made studies of the use of chlorine fourteen or fifteen years ago and had made chlorine demand tests in the Canal in July, 1940. Laboratory tests could not be depended upon for results in practice. In view of the accumulated sludge deposits and the B.O.D. of the water in the channel and in the Pool, he did not think enough chlorine could be used to prevent putrefaction in the Pool on any basis which would make it a "satisfactory and dependable proposition". The chlorine would be quite quickly absorbed by the B.O.D. demands of the water and if it were to be used with any hope of success, it would have to be administered at least at three points; Damen Avenue, Summit and Lockport, and large enough doses would have to be applied at each point to preserve the effect until another dose was administered later on. On this basis Dr. Mohlman estimated that you might require as much as 150 tons of chlorine a day at a cost of between $40 and $50 a ton, or between $6,000 and $7,000 a day during the summer months. If chlorine were used only at Lockport you would need somewhere between 75 and 125 tons. Even at this expense, he did not think that the use of chlorine would be practically effective to accomplish any substantial amelioration of the conditions complained of at Joliet.

Mr. Pearse supported the views of Dr. Mohlman. Chlorine, he testified, does not get rid of the organic matter which causes the nuisance complained of at Joliet. It merely delays decomposition to a point where the chlorine is exhausted in its sterilizing effect and then you have the same nuisance over again. "You could, of course, soak chlorine in and keep down decomposition for miles, but the cost from our situation we regard as impractical."

Mr. C. K. Calvert also testified for Illinois with respect to the use of chlorine. Mr. Calvert holds a degree of Bachelor of Science from Earlham College and since 1936 has been Superintendent of Purification of the Indianapolis Water Company. He was formerly superintendent of the sewage disposal plant at Indianapolis, which has a population of 385,000. Indianapolis has an activated sludge plant with a capacity of about 55 m.g.d., which was brought into service in 1925 but operated for only a partial degree of treatment until 1936. Mr. Calvert testified with particular reference to the disappointing experiences in Indianapolis in 1930 when chlorine was used in the White River in the hope of improving sewage treatment conditions, as the plant was too small and they had no money to build a larger plant. The river is a small one and was badly polluted. An average of 10 p.p.m. of chlorine was applied and an aggregate of 150,000 pounds was used. The chlorine went into the river with the sewage which had in part been treated with the activated sludge treatment and in part was settled. Laboratory tests had indicated that a reduction of 35% in B.O.D. could be expected, but this did not work out in practice and the reduction obtained in plant effluent was only about 10%. This was at the rate of about 2 p.p.m. of B.O.D. per p.p.m. of chlorine added. Usually the chlorine was gone as soon as the sewage was mixed with the river water. Indianapolis sewage is much stronger than that of Chicago and the B.O.D. at the point at which the chlorine was applied at Indianapolis was about 8 times as great as that of the B.O.D. of Brandon Pool. Residual chlorine was found only on one occasion further away than about 2,000 feet. Mr. Calvert thought Dr. Mohlman's estimate of 150 tons per day for the Chicago-Joliet situation would be very moderate and this would have to be continued for five or six months. Considering the results in Indianapolis, he did not think the expenditure involved would be justified, as he did not believe the nuisance would be measurably reduced.

After reviewing all of the testimony with respect to the use of chlorine upon the Waterway and the Pool, I do not think it possible to say more than that the use of chlorine in large quantities would relieve the odor situation to some extent. In order for one to have any substantial hope of accomplishing appreciable results, it would probably be necessary to use quantities ranging from 75 to 100 tons per day at a per diem cost of $3,000 to $4,000 over a period of not less than 100 days, and it would also be necessary to install chlorinating equipment to cost, on very rough estimates, $360,000 (this figure was given so roughly that I could not have confidence in its accuracy). It would seem too late now to install the necessary chlorinating equipment for use in the summer of 1941. Upon the concensus of the expert opinion, including that for the opposing States, the Court could have no assurance that even these large expenditures would eliminate the odors in the Pool, although they should reduce them.

The opposing States urge, in connection with their suggestion of chlorination as well as their other suggestions for ameliorating measures, that, conceding room for doubt as to the efficacy of such measures and also conceding a considerable expense to be involved in them, Illinois should be required to try each and all of them before being permitted to divert any more water from Lake Michigan. There is much force in this contention from a standpoint of the general principles of law and equity which would control in an ordinary litigation. As noted in a later section of this report, I interpret the Court's opinion of April 3, 1940 to indicate a view by the Court that if there is actually substantial danger to public health in the situation at Joliet and Lockport, the Court might see fit to allow a temporary additional diversion without regard to the general lack of equity in the position of Illinois unless the Court could be assured that other ameliorating measures are now available which would meet a public health emergency otherwise existing. It may be, however, that even if the Court considered a menace to health to exist, it might deem it proper, in view of all the circumstances in this case, to require that Illinois should exhaust every remedy other than diversion of water which is open to it before being permitted to divert more water from Lake Michigan, even though the proof left it uncertain how much amelioration might be accomplished by a particular measure and even though the experiment would cost very considerable sums. This question will not have to be resolved if the Court should find that there is no menace to health. It does not seem that an expression of my inclination upon the argument suggested is within the terms of the reference to me or would be of any material aid to the Court, which can itself resolve the point upon the findings of fact that I have made. These findings indicate the uncertainty that must exist as to the extent of relief which the use of chlorine would give even upon the expenditure of large sums.

Cascades at Lockport

The water at Lockport above the dam is diverted through the wheels of a powerhouse and used to generate electric power, which is worth $1,500 a day to the Sanitary District. In 1939 the District generated about 70 million k.w. hours of electricity at Lockport. It transmits this power to Chicago and there sells it to the City at 8½ mills per k.w. hour. The District purchases the power it needs from Commonwealth Edison Company and the Public Service Company of Northern Illinois for something less than 8 mills. The City of Chicago owes the Sanitary District about 4 million dollars for power bills accumulated over a period of years, for which the Sanitary District holds judgments against the City. The present balance of 4 million dollars is substantially less than the amount which was due in 1933 because of payments made in intervening years.

Mr. Howson proposed that instead of using the water at Lockport to generate power, the District should send it over a cascade, which would pick up oxygen that would be available for the B.O.D. demand in the Pool. He estimated that on the present flow, 113,000 lbs. of oxygen could be picked up in this way, at the rate of 6¾ p.p.m. of D. O., which would be equivalent to the oxygen available from 2,650 c.f.s. of lake water. Mr. Howson estimated that a wooden cascade could be constructed at a cost of between $50,000 and $100,000. This, again, is evidently a rough figure. There would be no operating expense but there would be a loss of $1,500 a day from the sale of power which would be a substantial item. Mr. Howson based his estimate of the amount of oxygen which would be picked up by the cascade, in part upon the experience at Hastings Dam built by the United States Government in the canalization of the Mississippi River below Minneapolis and St. Paul, and in part upon the amount of oxygen picked up in the North Side plant of the Sanitary District, where the effluent flows down through steps.

Mr. Warrick also testified that he believed cascades near Lockport "would have a beneficial effect." He gave particulars of the results obtained at Hastings Dam in 1933 and 1934, where about 7.8 p.p.m. of dissolved oxygen was obtained. He said, however, that he would be unable to express any opinion as to how long the dissolved oxygen picked up by cascades at Lockport would be retained. He doubted whether any would be carried through Brandon Pool, "particularly with the sludge deposits that are testified to in this case", but it would be "an ameliorating step to an extent to which it would supply oxygen to the water."

Mr. Calvert, testifying for Illinois, thought cascades at Lockport would improve conditions "very slightly." "The passage of water over such a cascade would rid it of a great many of the noxious gases already there, pick up a little oxygen perhaps but certainly would not last for a very long time and not remain in the water as dissolved oxygen." He supported his views by reference to an experiment with a dam built in White River below his plant at Indianapolis where the oxygen picked up was found to be gone within a quarter of a mile to half a mile, with a B.O.D. of around 10. He testified also that cascades would create a local odor nuisance by the agitation of the water containing sludge.

Dr. Mohlman and Mr. Pearse did not think that the experiment in picking up oxygen in the North Side effluent as it flowed out of final settling tanks was sufficient to show that oxygen would be picked up by the cascade at Lockport to the extent claimed by Mr. Howson. They conceded that some oxygen is picked up by cascading and the re-aeration caused by the agitation of the water, but thought the amount picked up in the manner proposed would not exceed 3 p.p.m. and that the effect thereof would be entirely lost before the Pool was reached because of the anaerobic condition of the water.

Mr. Howson contended that the dissolved oxygen picked up by the proposed cascade at Lockport would not be lost because there was a fifteen foot fall from that point to the Pool, which was somewhat comparable to the condition that prevailed at Joliet before the construction of the Brandon Road Dam when they used to pick up about 400,000 pounds of oxygen per day, partly in dissolved oxygen and partly through satisfaction of B.O.D., as shown by the 1925 report of the Sanitary District Board of Review.

Mr. Enslow testified that he agreed with Dr. Mohlman that the re-aeration which would be obtained by the cascading "would not justify the cost in comparison with the value attained on the score that the period is short. You can only pick up a definite amount of oxygen in that period, you cannot go any further and that does not last very long afterwards in summer conditions, and he is eminently right." Later he said that if you would add some form of pasteurization, preferably chlorine, the aeration scheme might "accomplish something"; otherwise "it would just create a local odor nuisance." Later he said that chlorine with cascading would be beneficial and more so than chlorine alone, but still he thought the 37 foot head existing at Lockport was pretty expensive to use for that purpose.

Mr. Pearse said that if the suggestion of cascading had merit, it would not be necessary to spend the money on cascades as Mr. Howson had proposed, as there would be enough fall over the dam at Lockport to serve the same purpose as the cascades. But he did not think enough dissolved oxygen would be gained for the Pool to justify the loss to the District of the $1,500 which it now realizes through the power generated by sending the water through the wheels at the power house at Lockport instead of over the dam.

It was pointed out by the opposing States that during the ten day flushing test, substantially the same amount of dissolved oxygen was found at the Cass Street Bridge in Joliet (a little over 3 miles below the Lockport power house) as at Lockport, which supported the contention that dissolved oxygen picked up by cascading would be retained as far as the Pool. Dr. Mohlman pointed out, however, that the Des Plaines River enters the stream between Lockport and Cass Street, also that the 10-day experimental flow was made in winter; conditions would be entirely different in summer, he said, as dissolved oxygen would be more rapidly used up in hot weather.

My conclusion upon this suggestion of cascades at Lockport is that while the cascades would develop some dissolved oxygen, the proof is not sufficient to make it reasonably certain that enough of this would be retained when the wide section of the Pool was reached to sensibly ameliorate conditions there during the summer. There might be some improvement in the short stretch between the point of location of the cascades and the McDonough Street Bridge at Joliet, but this would be offset for a portion of this area by the local nuisance condition which would be created unless chlorine were used; no evidence was offered as to how much it would cost to apply chlorine to the necessary extent.

The opposing States argue that Illinois should be required to try every measure which might possibly ameliorate conditions even though at considerable expense, before becoming entitled to divert additional water from the Lake, and that accordingly the District should submit to the loss of $1,500 a day in power, in order to exhaust the possibility of benefiting conditions in the Waterway through the development of dissolved oxygen by sending water over cascades or over the dam at Lockport. In other words, conceding uncertainty as to the accuracy of Mr. Howson's estimate that cascading would pick up as much dissolved oxygen as 2,650 c.f.s. of Lake water and that this would be retained to Joliet, Illinois should be required to make the experiment even at a considerable expense for the taxpayers of the Sanitary District equal (at the rate of $1,500 a day) to $45,000 a month. The point is the same as that made with respect to chlorination and is sufficiently covered by the comments which appear on pages 90-91 *supra*, although the cost to the District of experimenting with respect to cascades (including the use of chlorine to control the odor nuisance which would result) would apparently be very much less than it would cost to attempt chlorination of the Waterway on any scale likely to produce substantial results.

Supply of Additional Oxygen through Production of Nitrate by Increased Use of Air at North Side and Calumet Plants

Mr. Howson suggested that 40,500 lbs. of additional oxygen might be developed in the effluents in the North Side and Calumet Plants by increased operation of the aeration equipment now existing in those plants at an operating cost of $89,000 for a 5 months period and $216,000 for a 12 months period.

Mr. Warrick thought that the use of an increased amount of air would have a beneficial effect by putting additional oxygen into the effluent and "tending to ameliorate conditions in the water into which it is discharged."

The suggestion was supported in general terms by Mr. Ellms. Dr. Buswell, the Chief of the Illinois State Waterway Survey, testified, also in general terms, that it had been known for many years that nitrates carried oxygen available for B.O.D. satisfaction, and he knew of no streams with nitrates and nitrites present in the water where septic conditions occurred, as nitrates in his experience tendered to oxidize hydrogen sulphide and prevent its formation.

Dr. Mohlman and Mr. Pearse were of the opinion that the production of nitrates by increased use of air would have very little value in ultimate result. Mr. Pearse testified that nitrates do not become available until the dissolved oxygen is exhausted and then you are at the point of nuisance, and the small amount you have obtained is "a drop in the bucket." The production of nitrates would require an increase in the detention period in aerating tanks from the present period of 4.6 or 5 hours to 7 hours, and sufficient aeration tank capacity does not now exist to permit this. In his opinion "the making of nitrates is not an efficient use of the public's money by a process of this kind." Dr. Mohlman thought that the cost of producing nitrates would be "money thrown away". They would increase the growth of green plant and algae in the North Shore channel, and these plants "die, putrefy and create secondary sources of B.O.D." No dilution would be provided, and the suggestion in his opinion would not result in any increase in dissolved oxygen available at Brandon Pool.

Upon a point of this character it is difficult for a layman to evaluate conflicting opinions of experts. The testimony leaves me in considerable doubt as to the efficacy of the suggestion to make any substantial improvement in the conditions in the Pool. Even upon Mr. Howson's figures, the amount of oxygen which would be provided would be only a small percent of the B.O.D. demand in the Pool. The adoption of the suggestion would, upon the testimony of the District representatives, require a substantial increase in the aeration tanks at the North Side and Calumet plants, which could not now be provided for the summer of 1941.

Chemical Treatment at West Side Plant

Another ameliorating measure proposed by the opposing States and supported by the testimony of Dr. Buswell and Mr. Howson was the installation of chemical treatment for further purification of the Imhoff tank effluent at the West Side Plant. It was estimated that such a treatment would reduce the B.O.D. at that point by 21 p.p.m., which on the May, 1940, flow at that plant of 437 m.g.d.[1] would effect a reduction of 76,000 lbs. of B.O.D. Mr. Howson estimated that this would require an installation costing about $1,300,000 based upon figures given in the April, 1940, report of the Sanitary District to the PWA. This would be a building of a permanent nature. He estimated that the cost of operation would range from $200,000 for five months' to $481,700 for twelve months' operation. When he gave his testimony in September, 1940, Mr. Howson said that the installation, if immediately proceeded with, "full speed ahead", could be completed by the summer of 1941, although according to the 1940 District report to the PWA, it would have taken 2½ years. It is clear that this cannot be done now in time to be effective in 1941. It is conceded that the activated sludge program to which the District is committed will be more effective than chemical treatment and that it was chosen for that reason. Chemical treatment would reduce B.O.D. at the West Side from 57 p.p.m. to 36 p.p.m., whereas activated sludge treatment is expected to reduce it to 10 p.p.m. In its April, 1940, report to the PWA Review Board, the Sanitary District estimated that it would cost approximately $555,000 per year to operate a chemical plant at the West Side as compared with $320,000 per year for an activated sludge plant. Consideration of these figures led the PWA to approve the recommendation of the Sanitary District that the Imhoff effluent at the West Side be not chemically treated, but that it be taken to the Southwest plant for activated sludge treatment after the facilities at the latter plant had been sufficiently enlarged. This program has been definitely adopted and by the summer of 1942 substantial progress in its completion should have been made. It would be difficult to maintain at this stage a suggestion that chemical treatment should be adopted as a temporary or emergency measure to care for the summer of 1942 at the cost involved, when it would be almost immediately superseded by the superior activated sludge treatment.

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[1] The average 1940 flow at the West Side Plant was only 362 m.g.d.

Chlorination of West Side Imhoff Tank Effluents

The application of chlorine to the West Side Imhoff tank effluents was described by Mr. Howson as an alternative to the chemical treatment at that point which has been discussed in the immediately preceding section of this report. The alternative was suggested by Mr. Enslow at the hearings. Mr. Howson estimated that such chlorination would reduce B.O.D. to the extent of 50,000 lbs. as compared with the reduction of 76,000 lbs. which would be obtained by the use of chemicals. The cost of the necessary chlorinating equipment was estimated at $100,000 and the time for construction at 6 to 9 months. The operating expense was placed at $105,000 for a period of 150 days. These estimates were only approximate and not supported by any detailed figures.

It is obvious that the suggested work could not now be done before 1942. The extent of amelioration afforded at that time, would be limited. In view of these circumstances and of the improvement in conditions which should otherwise develop by that time through the permanent program of the Sanitary District, I do not think I would be justified in making a finding that this measure should be adopted.

Planned Use of Water Permitted Under Decree of April 21, 1930

The decree now in force permits the diversion of 1,500 c.f.s. in addition to domestic pumpage, to be determined by the discharge at Lockport. In 1939 the average total flow at Lockport including domestic pumpage was 3,132 c.f.s. while in 1940 it was 3,319. In 1940 domestic pumpage averaged 1,589 c.f.s. Lake Michigan water contains dissolved oxygen ranging from 14 p.p.m. in winter to 8 or 9 p.p.m. in summer. The demand of the sludge upon the dissolved oxygen in the water is greater in summer than in winter. It is, therefore, more helpful to the avoidance of nuisance to have water in the summer months. Mr. Howson suggested, accordingly, that the conditions at Lockport and in the Pool in the summer months could be improved if the Sanitary District would budget its water supply so as to take a flow of 4,200 c.f.s. during four summer months and correspondingly less in the rest of the year.

Illinois conceded that there was merit in this suggestion, but contended that its application was limited because of the necessity of providing for storm run-offs. In stormy weather considerable water comes into the Chicago and Calumet Rivers. It is necessary to maintain a sufficient flow in the Waterway to prevent a reversal of the stream. If there were such a reversal, there would be danger that the Waterway would flow into Lake Michigan at the Calumet River (the controlling works are only at the mouth of the Chicago River) and thereby pollute the Lake water which is used by Chicago for drinking and bathing. While the controlling works would prevent the escape of any water into the Lake at the mouth of the Chicago River, it is said that a reversal in that river might cause basements in the area of the Chicago Loop to be overflowed. These risks are eliminated by increasing the flow at Lockport when storms occur, thereby increasing the current through the Waterway to the extent necessary to offset any reverse flow tendencies which might be caused by storm waters. Mr. Ramey testified that as rainy seasons vary, the Sanitary District felt it necessary to be on the safe side by making a reserve of water for use in the event of storm.

The opposing States contend that their suggestion can be accomplished without interfering with an adequate storm reserve. They point out that in July, 1939, (for example) out of the 1,500 c.f.s. which the decree permits, the District took only 995 c.f.s. from Lake Michigan, while in 1940 in the same month the amount taken was 1,700. On December 27, 1940 the flow at Lockport was only 2,397 c.f.s. as compared with a flow in 1939 on that day of 3,895 c.f.s.[1]

In its modified petition Illinois has indicated that it proposes to take only 1,150 c.f.s. of water, in addition to domestic pumpage, in the months of January, February, March, November and December. Thus, it would appear that Illinois really considers no more than 1,150 c.f.s., in addition to domestic pumpage, necessary in the stated months. Tables 10 and 11 in the appendix show that in these months in 1939 and 1940, Illinois actually diverted considerably more than 1,150 c.f.s., in addition to domestic pumpage. The difference between the amounts so diverted and 1,150 c.f.s. might have been made available in the summer months and to that extent would have ameliorated conditions in 1939 and 1940. The amelioration will be available in 1941 and 1942. It appears from the record that the flow at Lockport in January, 1941, was reduced to 2,781 c.f.s. as compared with 2,949 c.f.s. in 1940.

The program set out in the modified petition of Illinois falls somewhat short of the suggestion made by Mr. Howson because the aggregate difference between 1,500 c.f.s. and 1,150 c.f.s. for five months is 1,750. This amount, if divided among the four summer months, would permit in each of those months an additional flow of approximately 400 c.f.s. Adding this amount to the regular permitted flow of 1,500 c.f.s. and to the average domestic pumpage of 1,700 c.f.s. in the summer months, would give a total flow in each of those months at Lockport of 3,700 c.f.s. as compared with the flow of 4,200 c.f.s. which Mr. Howson thought feasible.

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[1] See Appendix, Tables 10 and 11.

In view of the paramount importance to the health of Chicago of avoiding any reversals of the river, I should hesitate to make a finding that the Sanitary District should be required to go further in budgeting than in its modified petition it admits to be possible. As Mr. Howson's original suggestion would contribute only 22,000 lbs. of oxygen to the B.O.D. situation at Lockport, the lesser amount which will be available upon the admission of the Sanitary District would not be substantially ameliorating.

Metering of Chicago Domestic Water Supply

To a large extent the domestic water consumption is not metered in Chicago. The opposing States offered in evidence a table showing that the Chicago per capita consumption was 214% above the average of 19 other American cities. Of 412,228 water services in 1940, only 115,025 were metered. Universal metering would reduce the amount of water consumed. This in turn would reduce the volume of sewage, which would permit a longer period of detention in aeration tanks and increase the amount of sewage which could be given complete treatment. Reduction in domestic pumpage would, it is true, reduce dilution and the total quantity of B.O.D. in the sewage would remain the same, although less diluted by water. Upon the balance, however, there would be apparently a substantial gain in the amount of sewage which could be completely treated if the water consumption were diminished. I find no evidence in the record sufficient to enable me to appraise the extent of the benefit which would result.

The desirability of limiting water consumption in

Chicago has been frequently urged. The permit of the Secretary of War dated March 3, 1925 (which authorized the diversion of not exceeding 8,500 c.f.s. in addition to domestic pumpage) contained a condition that Chicago meter at least 90% of its water services at the rate of 10% per year. The PWA Board of Engineers in its report of April 30, 1934, stated that the "great and unreasonable waste of water from the Chicago waterworks system" had "added millions of dollars to the cost of sewage and sewage disposal work," and recommended that every effort be made to reduce such waste and "that the capacity of future treatment plants be predicated upon the reasonable use of water". In August, 1938, an offer of grant from the PWA in connection with the construction of the South Side water filtration plant contained a condition that the City must satisfy the Administrator that it would install approximately 115,260 meters. In the spring of 1939, the City was permitted to defer the installation of the meters until a later date than originally specified.

Illinois offered evidence through the City Engineer of Chicago that to provide universal metering, 300,000 meters would be required which would cost in excess of $10,000,000 and would require more than 6 years to install if 50,000 meters could be installed each year. In the 10 year period from 1930 through 1939 the City installed 41,564 meters, or an average of 4,156 meters per year. The greatest number of meters placed in any one year was 16,864 in 1931. The City Council of Chicago has made no appropriation for the purchase of meters. If such an appropriation were made, an indefinite delay would be experienced in contracting for and obtaining delivery of meters.

Mr. Howson testified that he thought it would be practicable to put in 30,000 to 50,000 meters in one year's time. Even at this rate, it would take 6 to 10 years to accomplish the metering; and the opinion of one man is not a sufficient basis for a finding that the indicated rate of progress could be made.

The matter of the metering of Chicago's water supply was discussed in the report of Special Master Hughes on the re-reference.[1] It was there pointed out that the City of Chicago was not a party to this proceeding and its entry as a party had been successfully resisted by the complainants; that the City had the riparian right to take water from Lake Michigan for the ordinary use of its inhabitants and that if it was sought to prevent an abuse of that right through the taking of an unreasonable amount, it would be necessary to present that issue in an appropriate manner. It is true that the point is presented here in a somewhat different aspect, because upon the re-reference the contention was that Chicago should be required to return to the Lake the water which it was withdrawing for domestic pumpage, whereas in the present hearing it is contended that the reduction of the water consumption of Chicago by metering is an ameliorative measure which is open to Illinois as a substitute for increased diversion from the Lake. The considerations referred to by Special Master Hughes would, however, appear to have force also in connection with the issues now presented. Moreover, there is not before me sufficient evidence to enable me to make a finding that a substantial amelioration of the odor conditions at Joliet would be assured if a considerable curtailment in the domestic pumpage by Chicago could be assured. It seems quite certain that the suggestion could in no event be made operative in time to give any relief in 1941 and very doubtful whether it could give any in 1942.

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[1] See report on re-reference (1929), p. 120.

Activated Sludge Treatment at Southwest Plant for West Side Imhoff Effluent

The effluent from the West Side Imhoff tanks is now being discharged into the channel of the Waterway. As the B.O.D. reduction at the West Side plant in 1940 was only 50%, this effluent in the months of June, July and August, 1940, contributed 205,000 pounds of B.O.D. demand per day at Lockport out of a total demand of 529,000 pounds. If the West Side effluent were taken over to the Southwest plant and there given complete activated sludge treatment, the B.O.D. of such effluent would be reduced by 90%. The Sanitary District is committed to doing this; it is a part of its permanent program upon the completion of which it is now engaged. Mr. Howson was of the opinion that if this part of the program were "organized and pushed at once, it could be done so as to be all or largely in use by next summer". To do this would involve the construction of the following items included in the Sanitary District's permanent program figures:

Conduits	$ 341,300
16 Final Settling Tanks	1,059,700
24 Final Settling Tanks	1,256,200
Conduits, Gate Houses, etc.	610,000
	$3,267,200

Mr. Pearse confirmed that all of these items were taken from the Sanitary District figures but said that there should be added other items aggregating approximately $700,000, which would bring the total up to $4,048,000. The Sanitary District estimate for the entire extension of the activated sludge plant is $4,878,500. Testifying in October, 1940, Mr. Pearse stated that plans for the sixteen tanks referred to in the second item were now under preparation, work having been started thereon in September, 1940, and the District expected to have the work under contract by March of 1941 and completed some time between June and December, 1942. He gave as the reason for the time spent on the preparation of plans, "We are studying our present tanks to determine how they can be bettered. We do not get the results out of them that we had expected and we have, therefore, got to modify those tanks to some degree".

As to other items, Mr. Pearse stated that the expectation was to put the work under contract by September of 1941 and have it completed by December of 1942. In the opinion of Mr. Pearse, Mr. Howson's proposal eliminated certain essential items without the provision of which it would be impossible to give complete activated sludge treatment to the West Side effluent. Aeration tanks which Mr. Howson's program eliminated would be needed. Also, he said, there would not be, upon Mr. Howson's program, sufficient blower equipment available to permit the de-watering and drying of the output sold as fertilizer, and this would make it impossible to run all the West Side effluent completely through the enlarged plant.

The argument for the opposing States upon this suggestion seems to reduce itself to the contention that by proper diligence the Sanitary District might by the summer of 1941 have given activated sludge treatment to all the West Side effluent and that by proper effort now it can certainly accomplish this before the summer of 1942. As an ameliorating method now in fact available for 1941, the suggestion is no longer open to consideration. As an ameliorating provision for 1942, the decision must rest upon a conclusion as to what the Sanitary District by proper effort could do in the completion of its program by the summer of 1942. The measure proposed is not a temporary or emergency one to meet 1942 conditions; in substance it is a contention that the permanent program of the District for the complete treatment of West Side flow by the activated sludge method might by special effort be completed by the summer of 1942 instead of only at the end of 1942, as the District claims.

The contention may be well founded. In his report on re-reference Special Master Hughes commented that:

> "Much time can be saved or lost in large building operations according to the attitude which is taken as to the importance of early completion. In the present case, the Court has already laid down the requirement that the work shall proceed 'with all reasonable expedition.' "[1]

The record indicates that the Sanitary District has been influenced, not so much by the desire to make speed, as by the purpose ultimately to complete an efficient system at as little expense as possible to its taxpayers. These are praiseworthy motives when considered from the standpoint of the District alone, but they may not place the emphasis upon expedition to which the legitimate protection of the interests of the opposing States entitles them. Another conflict in interest arises from the fact that the taxpayers of the Sanitary District do not appear to have suffered from any nuisance conditions due to delay in completing sewage treatments; the complaints come only from those residing near the Canal in Joliet and Lockport, who are not taxpayers of the District. The record contains numerous references by representatives of the District to the importance of saving the taxpayers' money as a controlling consideration.[1]

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[1] Report of Special Master Hughes on re-reference, p. 69.

Notwithstanding the foregoing, considering the extent of the work remaining to be done and conceding the possibility that by special effort it may be somewhat expedited, I would not be warranted upon the record before me and in reliance solely upon the opinion of Mr. Howson, which is challenged by Mr. Pearse and Mr. Ramey, in making a finding that the additions to the Southwest plant could be completed in time to permit the treatment at that plant of all the West Side effluent by the summer of 1942. Six months have already passed since Mr. Howson testified that this could be done. The total cost of the work remaining to be done and not yet contracted for was estimated on January 1, 1941 to be about $9,000,000, and Mr. Pearse pointed out that the National Defense Program has created additional problems in procuring materials and men.

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[1] A somewhat similar conflict of interest was presented to Secretary of War Stimson when, on January 8, 1913, he held that a diversion then sought by the Sanitary District would interfere with navigation and that in the absence of direct Congressional sanction, he was not warranted in granting it "however clearly demanded by the local interest of the sanitation of Chicago."

At that time the conflict of interest was between the sanitary needs of Chicago on the one hand and the commerce of the nation and our relations and obligations to Canada on the other, while at this time the conflict of interests is between the sanitary needs of Chicago and the saving of money for the taxpayers of the District, on the one hand, and the property interests of the opposing States, on the other.

Conclusions similar to those reached by Secretary Stimson were expressed by Secretary Taft in his opinion of March 14, 1907, when he denied an application for the Calumet Sag channel. The Sanitary District then was urging that the change was "essential to the healthful sanitation of Chicago" and that "the threatened injury to navigation is so small as to be negligible." There is a corresponding argument here that the effect upon the level of the Great Lakes of permitting the diversion of the amount of water sought by Illinois in its modified petition is so small as to be negligible.

The opinions of Secretary Stimson and Taft above referred to are quoted in the original report of Special Master Hughes (1927) p. 49, 51, 52. Both of these opinions referred to the possibility of submitting the questions presented to the Congress. A bill authorizing and directing the Secretary of War to withdraw from Lake Michigan, in addition to all domestic pumpage, an annual flow of 5,000 cubic feet per second, to flow into the current of the Lakes-to-the-Gulf Waterway, was introduced by Congressman Parsons of Illinois in the 75th Congress. There were extensive hearings in January, 1938, before the Rivers and Harbors Committee of the House of Representatives, but the bill was never reported out of committee. The bill was re-introduced into the 76th Congress, but no action was taken thereon.

It is true that the District is not entitled to any grace for delays which have transpired during the hearings or since it filed its petition in January, 1940, for additional water from Lake Michigan. But it is one thing to say that Illinois must suffer the penalty for failure of the District to act with more speed, and another thing to make a finding that in the time now remaining the work can be done. The *per curiam* opinion of April 3, 1940 seems to indicate that the Court might yet permit additional diversion, if paramount considerations of health demanded it and no other adequate ameliorating measures were in fact available, notwithstanding that Illinois was in unexcused default. It would seem that the more time that elapses, the greater will be the difficulty in the position of Illinois. Every increased diversion from the Lakes removes a stimulus to Illinois to speed the work. More than two years have already elapsed since December 31, 1938. That date itself represented an allowance of 9 years from January 1, 1930 for carrying out the entire sewage treatment program, and more than 11 years have now elapsed.[1]

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[1] As long ago as January 8, 1913, in denying a then pending application of the Sanitary District to withdraw 10,000 c.f.s., Secretary Stimson observed:

> "It is manifest that so long as the city is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage. This is particularly true in view of the fact that by so doing it may still further diminish its expenses by using the amount of water diverted from the Lakes for water power at Lockport. * * *" This opinion is quoted in the report of Special Master Hughes on the original reference (1927), p. 65.

VI.

SUMMARY AND RECOMMENDATIONS FOR DECREE

Summary of Conclusions

(1) The actual condition of the Illinois Waterway by reason of the introduction of untreated sewage creates in the summer months a nuisance through offensive odors at Joliet and Lockport, but does not present a menace to health. No nuisance conditions were proven to exist along the Waterway at any other points.

(2) With respect to remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan, my findings are as follows:

(a) The dredging of Brandon Road Pool would remove chiefly old accumulations of sludge which have completely or largely lost their potency as causes of nuisance and would therefore be of extremely doubtful efficacy. It would cost between $400,000 and $750,000, plus the cost of providing spoil banks and lagoons. It would present problems as to possible nuisance from such spoil banks and lagoons and require further expense for chlorination. I do not think this is a feasible ameliorating measure.

(b) The draining of Brandon Road Pool cannot be accomplished without some interference with navigation, to which the War Department, which has sole jurisdiction over navigation problems, will not consent. For this reason I do not think this suggestion feasible. There would also be presented problems with respect to the water intake pipes of several industries which take water for industrial purposes from the Pool.

(c) Chlorine is an effective measure to reduce and eliminate odors, but owing to the size of the Brandon Road Pool and the large sludge deposits therein and the continuing discharge into the Waterway of incompletely treated sewage, it is impossible to make a reasonably certain estimate of the amount of chlorine which would have to be applied to produce a substantial result.

In order to have a reasonable prospect of substantially controlling offensive odors, it would be necessary to spend from $3,000 to $4,000 a day for chlorine, plus several hundred thousand dollars for chlorinating equipment.

(d) Cascading the water at Lockport or sending it over the dam there would be remedial to the extent of producing some oxygen at Lockport. How much oxygen would be produced and how much of it would reach Joliet and the Brandon Road Pool is uncertain and could only be determined by actual trial. The use of the water in this way would cost the Sanitary District $1,500 a day in the loss of power and it would be necessary to use an undetermined amount of chlorine to prevent an odor at the point of cascading.

(e) The supply of additional oxygen through production of nitrates by increase of air on the North Side and Calumet plants is not a feasible ameliorating suggestion for the summer of 1941. The evidence before me is not sufficient to prove that it is feasible for 1942, in view of the testimony of the Sanitary District experts that it would require an increase in aeration tank capacity. The proof before me is insufficient to support a conclusion that this suggestion, if it could be put into effect for the summer of 1942, would be substantially ameliorating.

(f) Chemical treatment at the West Side plant would involve a very large permanent expenditure, which could not be made effective in 1941 and if it could be installed by 1942 would be almost immediately superseded by the activated sludge treatment which is provided for by the District's permanent program. This does not seem to me a feasible ameliorating measure.

(g) The estimates as to cost of chlorinating West Side Imhoff tank effluents are too uncertain and the opinions of the experts too conflicting as to the extent of amelioration which it would afford, to enable me to make any finding that such chlorination is a feasible ameliorating measure.

(h) It is feasible for the Sanitary District to budget the 1,500 c.f.s. of water now permitted to be diverted in addition to domestic pumpage so as to divert only 1,150 c.f.s. in the months of January, February, March, November and December, and to allocate the aggregate saving in diversion in those months to the summer months. This ameliorating measure will not, however, materially reduce the B.O.D. at Lockport, and will not, therefore, substantially relieve the odor nuisance.

(i) The adoption of compulsory water metering by Chicago is an ameliorating measure, but the evidence before me is not sufficient to enable me to make any finding as to the extent of amelioration which it would afford or the time within which it could be made available.

(j) The provision of activated sludge treatment at the Southwest plant for the West Side Imhoff tank effluent is a very important and feasible ameliorating measure to which the Sanitary District is committed, and toward which it has made some progress. The extent of the progress will depend upon the industry and enterprise of the Sanitary District. There is no prospect that this ameliorating measure will be operative in the summer of 1941. It is possible, but doubtful, that by special diligence it might be made operative in the summer of 1942 instead of only by the end of 1942, as claimed by the District.

(k) As additional equipment is installed, it will become possible to give complete treatment during the course of 1941 and 1942 to increased quantities of sewage at the Southwest plant. The progress which will be made during these years and the gradually declining influence of sludge deposits from past years will be operative in the summer of 1941 to improve conditions at Lockport and Joliet as compared with 1939 and 1940, and will be operative to a further extent in 1942. The extent of relief from offensive odors which will be afforded at Lockport and Joliet in the summer months of 1941 is very doubtful, but there is a better outlook for the summer months of 1942. Weather conditions will have an important influence.

Notwithstanding every effort on my part to press the hearings and consideration of this case, one of the three years as to which Illinois originally petitioned for relief (1940) has already passed. The people in Joliet and Lockport have submitted to the conditions which prevailed in the summers of 1939 and 1940 without serious consequences to health. If relief is denied for the years 1941 and 1942, the authorities of the Sanitary District may be spurred to increased efforts in the treatment of Chicago sewage. The hearings before me have already resulted in the putting into effect of provisions as to lagooning of incompletely treated sewage which had not previously been adopted.

Recommendations for Decree

I recommend that a decree be entered dismissing the petition and the modified petition of the State of Illinois for a modification of the decree of April 21, 1930, and taxing costs against the State of Illinois.

Respectfully submitted,

MONTE M. LEMANN,
Special Master.

APPENDIX

LIST OF TABLES

Table No.

1. Expenditures of Sanitary District
2. Total Flow of Sewage, Treated and Untreated
3. Tons of Dry Solids Removed from Sewage
4. Tons of Dry Volatile Solids Discharged to Canal in Sludge, Raw Sewage and Effluents.
5. Sludge Discharged to Canal by Years for 1936 to 1940
6. Sludge and Grit Discharged to Main Channel in Tons per Month, 1939-1940
7. Southwest Treatment Works: Flow, B.O.D., D.O. and Suspended Solids in 1940
8. Percent reduction in B.O.D. and Suspended Solids at Major Treatment Works in 1940
9. Sanitary District Estimates of B.O.D. and Dissolved Oxygen Sources and Conditions from Lake Michigan to Lockport, June-August—1938-1944
10. Flow in Main Dranage Canal—Monthly Averages—1939
11. Flow in Main Drainage Canal—Monthly Averages—1940

APPENDIX—Continued

TABLE 1

Total Expenditures of Sanitary District on Treatment Plants as of December 1 of Each Year[1] as Shown by Reports filed with the United States Supreme Court[1]

1928	$ 63,355,422
1930	95,152,224
1931	99,838,941
1932	100,544,411
1933	100,969,212
1934	107,724,805
1935	118,939,159
1936	135,284,080
1937	150,224,345
1938	159,795,331

As of June 1, 1940 the total expenditures were $165,106,519.

As of January 14, 1941 the total expenditures were $166,318,711; future work remaining to be done was estimated to cost $11,756,900, of which $2,392,000 had been contracted for at that date and $9,364,900 had not yet been contracted for.

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[1] The 1928 figures are as of December 31. The reports filed with the Court do not disclose the figures as of December 1, 1929, and the last report filed is as of December 1, 1938.

APPENDIX—Continued

TABLE 2

Total Flow of Sewage Treated and Untreated in Millions of Gallons Daily (Calculated on Yearly Averages)

	Sewage-Treated	Sewage-Untreated
1928	67	
1929	121	
1930	219	880
1931	338	748
1932	380	686
1933	395	697
1934	374	720
1935	372	663
1936	465	641
1937	546	530
1938	568	469
1939	670	377
1940	930	123

TABLE 3

Dry Solids from Sewage at Treatment Works, Tons Per Day, Yearly Average, Calculated from Suspended Solids Removed

1929	54.1
1930	100.5
1931	150
1932	147.6
1933	167.3
1934	166.7
1935	142.5
1936	196.3
1937	199.1
1938	222.5
1939	305.6
1940	422.7

APPENDIX—Continued

TABLE 4

Dry Volatile Solids Discharged to Canal in Sludge, Raw Sewage and Effluents

Tons Per Year

	As Sludge	As Raw Sewage	As West Side Effluent	As Southwest Effluent	Total
1936	21,432	111,960	12,180	0	145,572
1937	24,613	90,450	20,070	0	135,133
1938	22,450	81,490	19,160	0	123,100
1939	33,865	63,150	14,969	3,674	115,658
1940	14,937	20,290	28,305	12,940	76,472
1941	0	6,720	27,650	6,540	40,910
1942	0	6,720	24,360	6,960	38,040
1943	0	6,720	7,128	4,872	18,720

Years 1941-3 in above table are shown as estimated by Dr. Mohlman

TABLE 5

Record of Sludge Discharged to Canal

Tons Per Year

Year	Sludge and Grit to Channel
1936	36644
1937	42495
1938	44198
1939	53970
1940	20224

APPENDIX—Continued

TABLE 6

Record of Sludge and Grit to Main Channel

Tons Per Month—1939-1940

	1939	1940
January	3318	3949
February	2946	3699
March	3305	2518
April	3319	3080
May	4325	2010
June	4316	2287
July	5942	1866
August	5473	315
September	5338	500
October	6435	0
November	4994	0
December	4259	0
Total	53970	20224
Average	4498	1685

APPENDIX—Continued

TABLE 7

Southwest Sewage Treatment Works

Flow, B.O.D., D.O. and Suspended Solids

1940 Month	Flow M.G.D.	5-day B.O.D. % Reduction	Dissolved Oxygen Outfall	Suspended Solids % Reduction
January	287	91.3	8.6	93.1
February	267	93.0	8.3	92.8
March (a)	197		9.5	
April (b)	252	64.0	7.4	74.0
May (c)	310	59.1	6.0	69.4
June (d)	365	53.8	4.2	63.8
July (e)	287	70.8	4.2	77.0
August (f)	340	61.1	5.1	70.2
Sept. (g)	358	68.1	5.1	73.5
October (h)	361	65.1	5.6	73.6
Nov. (i)	374	61.2	6.4	63.3
Dec. (j)	358	47.1	8.5	50.2
Average (k)	313	67.3	6.6	73.4

(a) Complete Treatment on 161 m.g.d.
(b) Complete Treatment on 122 m.g.d.
(c) Complete Treatment on 142 m.g.d.
(d) Complete Treatment on 130 m.g.d.
(e) Complete Treatment on 168 m.g.d.
(f) Complete Treatment on 176 m.g.d.
(g) Complete Treatment on 236 m.g.d.
(h) Complete Treatment on 248 m.g.d.
(i) Complete Treatment on 222 m.g.d.
(j) Complete Treatment on 139 m.g.d.
(k) Complete Treatment on 192 m.g.d.

APPENDIX—Continued

TABLE 8

Per Cent Reduction
5-Day B.O.D. and Suspended Solids
Major Treatment Works—1940

5-Day B.O.D.

Month	Calumet	North Side	Southwest	West Side	Wtd. Avg.
January	92.0	94.0	91.3	51.9	82.5
February	92.4	94.3	93.0	43.2	80.1
March	91.5	94.0	......	44.0	70.9
April	91.0	93.8	64.0	45.2	63.9
May	89.7	93.3	59.1	49.5	64.4
June	91.6	93.9	53.8	51.9	63.3
July	91.8	95.0	70.8	51.2	68.0
August	90.8	95.2	61.1	58.6	68.4
Sept.	90.7	96.3	68.1	58.5	71.1
October	88.5	95.4	65.1	57.4	69.3
November	86.1	95.5	[illegible]1.2	47.2	63.7
December	90.4	94.5	4[illegible].1	40.6	56.5
Average	90.7	94.6	67.3	50.0	67.8
Average April-Dec., Inc.	90.2	94.7	60.7	51.1	65.3

Suspended Solids

Month	Calumet	North Side	Southwest	West Side	Wtd. Avg.
January	88.4	88.7	93.1	57.2	82.9
February	90.2	91.2	92.8	48.9	80.5
March	89.4	91.0	......	52.2	73.6
April	90.9	91.7	74.0	50.2	68.4
May	89.8	93.0	69.4	55.2	69.8
June	91.3	93.2	63.8	61.3	70.3
July	91.6	94.6	77.0	57.8	72.7
August	92.2	94.0	70.2	68.1	75.2
Sept.	91.5	94.4	73.5	65.3	75.3
October	88.4	94.1	73.6	66.8	75.8
November	91.0	91.5	63.3	55.2	67.2
December	90.0	90.1	50.2	49.7	60.3
Average	90.1	92.4	73.4	58.0	72.5
Average April-Dec., Inc.	90.8	93.0	68.5	59.6	71.1

APPENDIX—Continued

The Sanitary District of Chicago
Estimates of B.O.D. and Dissolved Oxygen
Sources and Conditions from Lake Michigan to Lockport

TABLE 9

Average June, July, August, 1938-1944.

LOCATION	1938	1939	1940	1941	1942	1943	1944
	Actual Data			Computed Data			
SOURCES OF B. O. D. Lbs. per day							
North Side Effluent	11,500	11,100	9,300	9,000	9,000	9,000	9,000
Calumet Effluent	7,800	7,300	4,400	4,000	4,000	4,000	4,000
West Side Effluent	106,200	82,000	205,000	200,000	200,000	67,000	67,000
Southwest Effluent	-------	28,600	155,000	160,000	160,000		
Untreated Sewage	528,000	460,000	85,000	33,000	33,000	33,000	33,000
North Side Sludge	100,000	110,000	36,000	0	0	0	0
Calumet Sludge	10,500	0	0	0	0	0	0
Southwest Sludge	-------	50,000	34,300	0	0	0	0
Total, excl. effect of Sl. Deposits	763,800	749,000	529,000	406,000	406,000	113,000	113,000
Sludge Deposits (Computed Data)	519,000	475,000	237,000	118,500	60,000	24,000	24,000
CONDITIONS AT LOCKPORT							
Flow—c.f.s.	6,752	3,336	3,469	3,200	3,200	3,200	3,200
5 Day B. O. D.—p.p.m.	17.3	30.2	20.6	21.0	17.6	4.3	4.3
—Lbs. per day	630,800	562,300	386,000	361,500	303,000	74,000	74,000
Diss. Oxygen—p.p.m.	0.2	0.0	0.0	0.0	0.0	4.4	4.4
—Lbs. per day	6,070	0	0	0	0	76,000	76,000
SOURCES OF DISSOLVED OXYGEN Lbs. per day							
North Side Effluent	15,800	14,700	12,400	12,000	12,000	12,000	12,000
Calumet Effluent	3,800	4,200	4,100	4,000	4,000	4,000	4,000
West Side Effluent	11,100	8,000	14,300	16,000	13,000	50,000	50,000
Southwest Effluent	-------	7,800	12,400	19,000	26,000		
Dilution Water	216,000	67,200	74,000	64,000	64,000	64,000	64,000
Total	246,700	101,900	117,200	115,000	119,000	130,000	130,000

APPENDIX—Continued

TABLE 10

Flow in Main Drainage Canal

Monthly Averages—1939

Month	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Des Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan C.F.S.
January	2911	10	1488	1413
February	3989	40	1504	2445
March	3200	31	1515	1654
April	2718	23	1689	1006
May	2623	18	1532	1073
June	4227	16	1669	2542
July	2880	7	1878	995
August	2902	3	1801	1098
September	2826	0	1733	1093
October	3022	4	1619	1399
November	2820	4	1518	1298
December	3469	4	1487	1978
Average	3132	13	1620	1499

APPENDIX—Continued

TABLE 11

Flow in Main Drainage Canal

Monthly Averages—1940[1]

Month	Total Flow from Main Channel at Lockport C.F.S.	Inflow from Des Plaines River C.F.S.	Domestic Pumpage Chicago Metropolitan Area C.F.S.	Net Diversion from Lake Michigan C.F.S.
January	2949	19	1566	1364
February	2802	36	1538	1228
March	3167	68	1521	1578
April	3026	66	1523	1437
May	3344	118	1528	1698
June	2876	53	1662	1161
July	3609	38	1854	1717
August	3923	47	1750	2126
September	3125	32	1673	1420
October	3186	27	1525	1634
November	2824	34	1459	1341
December	4996	59	1465	3472
Average	3319	49	1589	1681

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[1] The 1940 figures were increased by the temporary flow of 10,000 c.f.s. for a period of 10 days from December 2 to December 12, 1940, permitted by order of the United States Supreme Court entered on November 25, 1940. Excluding this 10-day experimental period, the 1940 total flow at Lockport averaged 3,138 c.f.s. and the net amount diverted from the Lake, in addition to pumpage and excluding the 10-day experimental flow, was 1,546 c.f.s.

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IN THE

Supreme Court of the United States

Nos. 2, 3, and 4, Original

October Term, A. D. 1949.

STATE OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original.

PETITION OF THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO TO THE UNITED STATES SUPREME COURT FOR AN INTERPRETATION AND CLARIFICATION OF THE DECREE OF APRIL 21, 1930.

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Printed by Authority of the State of Illinois

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IN THE

Supreme Court of the United States

Nos. 2, 3, and 4, Original

October Term, A. D. 1949.

STATE OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, Complainants, vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, Defendants.	No. 2 Original.
STATE OF MICHIGAN, Complainant, vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.	No. 3 Original.
STATE OF NEW YORK, Complainant, vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.	No. 4 Original.

PETITION OF THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO TO THE UNITED STATES SUPREME COURT FOR AN INTERPRETATION AND CLARIFICATION OF THE DECREE OF APRIL 21, 1930.

The State of Illinois and the Sanitary District of Chicago, a Municipal Corporation, herein petition this Court for an interpretation and clarification of its decree of April 21, 1930, as enlarged May 22, 1933, in the Case of

Wisconsin et al. v. *Sanitary District of Chicago and the State of Illinois,* Nos. 7, 11 and 12 Original—October Term, 1929 and Nos. 5, 8 and 9 Original—October Term, 1932.

This interpretation and clarification is requested in the light of the marked change in conditions, as hereinafter more fully set forth, which have taken place since the entry of the original decrees herein.

Summary of original actions and decrees.

These original suits were brought by certain Great Lakes States to prevent the State of Illinois and The Sanitary District of Chicago from diverting water from Lake Michigan for the purpose of diluting and carrying away the sewage of Chicago and its environs.

The facts were set forth in detail, and the law governing the parties was established, by the decision of January 14, 1929 (Mr. Chief Justice Taft Opinion), reported in 278 U. S. 367, 73 Law Ed. P. 426. The diversion of water for the disposal of sewage, not having been authorized by Congress, was held illegal and the case was referred a second time to Special Master Hughes to consider the following: the practical measures for disposition of the sewage of The Sanitary District of Chicago through means other than diversion of lake water; the time in which sewage disposal works could be constructed and placed in operation; what reductions in diversion could be made from time to time pending completion of all the sewage disposal works; and what diversion of water was necessary for navigation in the Chicago River after the sewage disposal works were in full operation.

At the Hearing before Special Master Hughes on Re-Reference, the State of Illinois and The Sanitary District of Chicago presented testimony as to the construction program required by the Court's decision of January 14, 1929, (278 U. S. 367, 73 Law Ed. p. 426). The future construction program was submitted to the Court as Defendants' Exhibit No. 1387. A copy of said Exhibit is hereto attached.

Based upon the construction program submitted in Defendants' Exhibit No. 1387 and the time estimated for the completion of the respective works, a Decree was entered April 21, 1930, (281 U. S. 679, 74 Law Ed. p. 1123), ordering the progressive reductions in the diversion of water from Lake Michigan to 6,500 cubic feet per second July 1, 1930, to 5,000 c.f.s. December 31, 1935 and to 1,500 c.f.s. December 31, 1938, all on an annual average basis and all in addition to domestic pumpage; also, for the filing by The Sanitary District of semi-annual reports to the Court, July 1 and January 1, setting forth progress on the sewage treatment construction program, the extent and effects of sewage treatment plant operation, and the average diversion of water. The Decree also provided:

> "7. That any of the parties hereto, complainants or defendants, may irrespective of the filing of the above described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy."

In October 1932, complainant States, Wisconsin, Minnesota, Ohio and Michigan, complained of delay in the construction of the sewage treatment program of The Sanitary District of Chicago; and the Court appointed Edward F. McClennen as Special Master to consider this matter. The subsequent hearings developed the fact that the delay was due to a financial stringency, local to the County of

Cook, in the State of Illinois, which county embraced all of The Sanitary District of Chicago, and that for the then halting of construction work The Sanitary District was not responsible as it was then virtually at the end of its financial resources. (289 U. S. 395, 77 Law Ed. p. 1283.)

The Decree of the Court was thereupon enlarged May 22, 1933, (289 U. S. 710, Law Ed. 1465) as follows:

> "On consideration whereon, it is ordered by this Court that the decree of April 21, 1930, be, and the same is hereby, enlarged by the addition of the following provision:
>
> "That the State of Illinois is hereby required to take all necessary steps, including whatever authorizations or requirements, or provisions for the raising, appropriation and application of moneys, may be needed in order to cause and secure the completion of adequate sewage treatment or sewage disposal plants and sewers, together with controlling works to prevent reversals of the Chicago River if such works are necessary, and all other incidental facilities, for the disposition of the sewage of the area embraced within the Sanitary District of Chicago so as to preclude any ground of objection on the part of the State or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence system or watershed to the extent, and at the times and in the manner, provided in this decree.
>
> "And the State of Illinois is hereby required to file in the office of the Clerk of this Court, on or before October 2, 1933, a report to this Court of its action in compliance with this provision."

How the State of Illinois and The Sanitary District of Chicago fulfilled their obligation under the former decrees.

It is and has been since prior to the entry of the original decree in 1930, the legislative policy of the State of Illinois to require municipal bodies to submit construction bond projects to a referendum vote.

Upon the entry of the enlarged decree of May 22, 1933, which placed the financial obligation upon the State of Illinois for the completion of the construction program submitted to the Court as detailed in Exhibit No. 1387, The Sanitary District of Chicago stood ready to assume and continue the primary responsibility for the completion of such program, provided only that the State of Illinois, by appropriate means, would enable it to obtain the financial resources for such completion. The District reasoned that only its taxpayers would benefit by the works required, not those of the State at large. It stood ready to construct them if enabled to do so financially.

Accordingly, in June 1933, the legislature of the State of Illinois authorized the issuance, at that time, of $100,000,000 of Sanitary District of Chicago construction bonds without a referendum. This was duly reported in October 1933.

There was considerable delay in the construction program, even after the authorization of such bonds, as is hereinafter more fully set forth. The proceeds of the $100,000,000 of construction bonds was expended or binding commitments for such program had been entered into by The Sanitary District of Chicago upon the convening of the 66th General Assembly of the State of Illinois on January 2, 1949. Such expenditures and such commitments were in furtherance of the construction program outlined in Sanitary District of Chicago Exhibit No. 1387.

Request was made by The Sanitary District of Chicago, to the 66th General Assembly in 1949, for authority to issue an additional $28,000,000 of non-referendum construction bonds. The purpose for the proceeds of such bonds was in furtherance of the program set forth in said Exhibit No. 1387 (as such program has been subsequently modified), and to complete certain additional works which have been necessitated by the changed conditions since the original decree, which changed conditions are more fully hereinafter set forth.

Because of the State legislative policy to require such bonds to be submitted to referendum in the municipality requesting them, the 66th General Assembly, 1949, authorized the issuance of only $21,000,000 of non-referendum construction bonds, the proceeds of which were ear-marked for the completion of certain projects included in said Exhibit No. 1387, as shown in Exhibit "A" hereto attached. It was conceded by The Sanitary District of Chicago that the $21,000,000 was all that could be planned and committed by contract prior to the 67th General Assembly which convenes January 2, 1951.

An understanding was worked out concurrently with the authorization by the legislature of the $21,000,000 of construction bonds without referendum, that the State of Illinois and The Sanitary District of Chicago would apply to this Court for an interpretation and clarification of its decree, as enlarged, to ascertain the obligation of the state of Illinois to provide additional funds, in the light of the changed circumstances since the entry of the original decree, which changed circumstances are hereinafter more fully set forth and the work necessitated thereby shown in Exhibit "B" hereto attached.

The construction program carried on by The Sanitary District of Chicago to date, in pursuance of the decree entered herein.

Upon the authorization of the original $100,000,000 in non-referendum construction bonds, as above set forth, such bonds could not be sold at that time because of the financial standing of the municipalities embraced in Cook County, Illinois, which situation was worsened by the serious national economic conditions existing at that time. However, in December 1933, $41,938,000 of said bonds were sold to the Federal Emergency Administration of Public Works. With the proceeds of such bonds construction on the sewage treatment program outlined in said Exhibit No. 1387 was resumed in January 1934. Adequate progress was thereafter made on the unprecedented construction schedule, but because of the time lost in 1932 and 1933 the entire completion thereof by December 31, 1938 became a physical impossibility.

All of such facts were duly reported in detail to this Court in the semi-annual reports July 1, 1930 to January 1, 1939. In the last report, January 1, 1939, attention was called to the fact that $159,795,331.70 had been expended on sewage treatment construction and that immediately essential work estimated to cost $14,460,000 remained, which it was hoped could be completed within two years.

The two to three year $14,460,000 program of essential work of 1939 became a six year program by 1946, with the cost approximately trebled.

Certain items in the construction program, as originally outlined in said Exhibit No. 1387 submitted to the Court in 1929, were eliminated from the program of essential construction in 1937. The semi-annual report of July 1, 1937, stated that these items, estimated at $22,940,000, could be deferred—some until after 1940 and some until 1945.

The delay in construction due to World War II and its aftermath has caused all such items to now become essential and their costs have been nearly trebled. Some of this work has been financed by funds from the $100,000,000 bond authorization of 1933, some has been included in the $21,000,000 authorization of 1949 (Exhibit A), and the portion not now financed is included in Exhibit B, herewith.

The ultimate reduction in the diversion of water from Lake Michigan to 1,500 cubic feet per second, annual average, in addition to domestic pumpage, had been made by December 31, 1938, as was reported to this Court in the report of January 1, 1939.

World War II had started in 1939 and, although the United States of America was not at first directly involved, the scarcity of construction materials had by 1940 become serious and by 1941 acute. The Office of Production Management had been organized by the Government and it became necessary to obtain priorities in order to perform any new construction. The request of The Sanitary District of Chicago for priorities for $5,000,000 of its construction as outlined in said Exhibit No. 1387 was denied in October 1941. Work on five large contracts for equipment, previously awarded, was halted because the manufacturers could not obtain steel and other materials without priorities; and these had been denied. Such work was not resumed until the fall of 1945, after V-J Day.

Chaotic conditions have prevailed in the construction industry following the war from 1946 to 1948, and such conditions have militated against progress toward the completion of The Sanitary District sewage treatment construction program.

The change in conditions since entry of the original decree.

On April 21, 1930, The Sanitary District of Chicago embraced 60 cities and villages and an area of 442.35 square miles. Since that time the legislature of the State of Illinois has authorized annexation of additional areas and additional communities at eight different legislative sessions. The area of the district at the present is 470.18 square miles and embraced within this area are 70 cities and villages.

The human population of The Sanitary District was 3,901,569 in 1930, increased 61,745 to 3,963,314 by 1940, and further by about 180,700 to 4,144,000 in 1949. The greatest portion of this increase, by far, was in the suburban areas. Industrial wastes were equivalent to a population of 1,732,000 in 1930, to 2,082,000 in 1940 and to 3,135,000 in 1949. Total equivalent population was about 5,634,000 in 1930, about 6,045,000 in 1940 and 7,279,000 in 1949. This increase in area and in population or population equivalent was without any action by or on behalf of the officials of the Sanitary District of Chicago.

Since April 21, 1930 the increase in human population of the district, greater since 1940 and largely in the outlying areas, has necessitated the construction of new sewers in areas at that time having none. The increase in total equivalent population, also greater since 1940, has necessitated increased capacity in sewage treatment works and in sewers in areas already served in 1930.

It thus can readily be seen that there are four classes of construction by The Sanitary District of Chicago yet to be accomplished: (a) the remainder of the construction program, as modified, outlined in said Exhibit No. 1387. This is largely provided for by the additional $21,000,000 construction bonds authorized without referendum by the Illinois General Assembly in 1949; (b) enlarged sewers and sewage treatment capacity engendered by the increase of population and industrial wastes in the area embraced within the Sanitary District in 1930; (c) the installation and construction of new sewers or sewer extensions mainly in suburban areas within the Sanitary District in 1930 but not then served with sewers or with sewage treatment works; (d) construction and installation of sewers and extension of sewers in areas annexed to The Sanitary District of Chicago since 1930.

The latter three classes of construction are outlined and set forth in Exhibit B hereto attached. Said projects as so outlined and detailed, constitute the completion of the construction program of The Sanitary District of Chicago.

Future Financing Required.

The only practicable means to assure the proper financing of this program by The Sanitary District of Chicago is for it to apply to the 67th General Assembly in 1951 for authority to sell additional bonds without a referendum at that time to continue the construction of essential sewage facilities.

The State of Illinois and The Sanitary District of Chicago do herewith therefore respectfully petition the Supreme Court for an interpretation and a clarification of its decree of April 21, 1930, as enlarged May 22, 1933, in the case of *Wisconsin et al.* v. *The Sanitary District and the State of Illinois*, to determine—

1. Whether or not the decree of this Court applies to and requires the construction of the uncompleted necessary projects as submitted originally to this Court in Defendants' Exhibit No. 1387, as adjusted to meet the needs and improvements made necessary by increased population;

2. Whether or not said decree also applies to and requires the construction of the necessary sewage disposal facilities to provide for territories annexed to The Sanitary District of Chicago, subsequent to the entry of the original decree.

All of said projects referred to in 1 and 2 are the construction projects detailed in Exhibit "B" attached.

All of which is respectfully submitted.

State of Illinois,

Ivan A. Elliott,
Attorney General.

The Sanitary District of Chicago,
Ernst Buehler,
Attorney.

DEFENDANTS' EXHIBIT 1387.

DEFENDANTS' EXHIBIT 1387—Continued

THE SANITARY DISTRICT OF CHICAGO.

Tabulation of Estimates on Sewage Treatment Program Up to 1945 After Dec. 31, 1928.

	Estimated Cost	
DESPLAINES RIVER PROJECT:		
(In its entirety including the proposed Des Plaines Intercepting Sewer extending to the City of Des Plaines, hooking up the sewage of the Des Plaines River Valley and bringing it to the West Side Works)	$ 4,025,000.00	
Hillside Berkeley Outlet Sewer	230,000.00	
		$ 4,255,000.00
CALUMET PROJECT:		
(This project will include enlarging the Calumet Sewage Treatment Works for complete treatment and to take care of the additional territory which is to be brought in)		
Calumet Sewage Treatment Works Enlargement	$11,718,000.00	
Calumet Intercepting Sewers (To bring in Colfax and South Park Avenues areas)	2,359,000.00	
Harvey Intercepting Sewer	1,500,000.00	
Calumet City Intercepting Sewer	1,500,000.00	
California Ave. Outfall Sewer	940,000.00	
Evergreen Park-Mt. Greenwood Sewer	725,000.00	
Blue Island Extension	750,000.00	
California Ave.-Evergreen Pk. Extension	1,000,000.00	
		$20,492,000.00
NORTH SIDE PROJECT:		
North Side Sewage Treatment Works (Enlargement)	$ 700,000.00	
Howard Street Intercepting Sewer	2,268,000.00	
North Shore Relief Sewer	815,000.00	
Additional North Side Int. Sewer	1,000,000.00	
		$ 4,783,000.00

	Estimated Cost	
WEST SIDE PROJECT:		
West Side Sewage Treatment Works (To complete sedimentation plant)	$ 8,679,000.00	
West Side Sewage Treatment Works. (This will include the additional works required for complete treatment)	31,890,000.00	
West Side Intercepting Sewer....... (Remaining contracts)	15,750,000.00	
Additional West Side Intercepting Sewers	2,000,000.00	
Oak Park Intercepting Sewer, District's Share	3,500,000.00	
		$61,819,000.00
SOUTHWEST SIDE PROJECT:		
Southwest Side Sewage Treatment Works .... (This will provide complete treatment)	$38,870,000.00	
Southwest Side Intercepting Sewer..	7,900,000.00	
South Side Intercepting Sewer......	18,640,000.00	
Racine Avenue Pumping Station....	4,025,000.00	
Connections	943,000.00	
Miscellaneous	439,000.00	
		$70,817,000.00
MISCELLANEOUS PLANTS AND SEWERS:		
Allowance for unforeseen additions or extensions of intercepting sewers and treatment works to provide complete treatment		$10,000,000.00
		$172,166,000.00
Chicago River Controlling Works......		4,000,000.00
GRAND TOTAL		$176,166,000.00

EXHIBIT "A"

CONSTRUCTION PROGRAM FINANCED BY $21,000,000 OF BONDS AUTHORIZED BY ILLINOIS LEGISLATURE 1949

	Estimated Cost
NORTH SIDE PROJECT	
North Shore Int. Sewer, No. 8	$ 2,970,000
North Shore Int. Sewer, No. 9 (Connections)	130,000
Golf-Glenview Pump. Sta., Add'l. Pump. Cap.	47,000
Total North Side Project	$ 3,147,000
CALUMET PROJECT	
Calumet Int. Sewer, No. 13-A (So. Holland Br.)	$ 1,210,000
Calumet Int. Sewer, No. 13-C (Dolton Branch)	330,000
Calumet Int. Sewer, No. 18 (Ext. along Cal. Sag)	3,080,000
Calumet Int. Sewer, 100% Collection	363,000
Calumet Sewage Tr. Works, Final Settling Tank	44,000
Calumet Sewage Tr. Works, Add'l. Prel. Settl. Tanks	157,000
Oak Lawn Sewage Treatment Works	121,000
Total Calumet Project	$ 5,305,000
WEST-SOUTHWEST PROJECT	
West-Southwest Sewage Treatment Works (11 Contracts)	$ 2,996,000
Racine Ave. Pump. Sta. Extension (5 Contracts)	4,378,000
Racine Ave. Pump. Sta., Div. K (Control Struct.)	440,000
South Side Int. Sewer, No. 5 (Connections)	1,185,000
Upper Des Plaines Int. Sew., No. 10 (North Ave.)	2,200,000
Westchester Pump. Sta., New Pumping Station	280,000
Salt Creek Int. Sewer, No. 1-A (Forest View)	165,000
Southwest Side Int. Sewer, No. 13 (Stickney Twp. Outlet)	440,000
West Side Int. Sewer, Elec. Sewer Controls	396,000
Total West-Southwest Project	$12,480,000
Grand Total	$20,932,000
Say	$21,000,000

THE SANITARY DISTRICT OF CHICAGO.
1950 FUTURE CONSTRUCTION PROGRAM.

EXHIBIT "B"

Contract	Part of Item in Def. Exhibit 1387	Estimated Cost 1950	Reason For Construction		
			Natural Growth	Area in SDC in 1929 but not sewered	Annexation since 1929
North Side Project					
North Shore Int. Sew., No. 10 (Tower Rd.)	No. Sh. Rel.	$ 1,045,000		$ 1,045,000	
North Side Int. Sew., No. 12 (Howard St.)	Howard St.	6,160,000		6,160,000	
North Side Int. Sew., Pratt Ave. Syphon	Add. N. Side	138,000	$ 138,000		
North Side Int. Sew., Conn. for City Sewers	Add. N. Side	77,000	77,000		
North Side Int. Sew., Revised Controls	Add. N. Side	66,000	66,000		
Harms Rd. Int. Sew., Ext. to Northfield	Howard St.	770,000		770,000	
Evanston Int. Sew., New Outfall and P. S.	None	4,400,000	4,400,000		
Golf-Glenview Int. Sew., Ext. to Northbrook	Howard St.	1,430,000	400,000	800,000	$ 230,000
Calumet Project					
Calumet Sew. Tr. Wks., Add'l. Sludge Drying	Wks. Enl'g.	445,000	445,000		
Calumet Int. Sew., No. 19 (Kedzie Ave.)	Calif. Ave.	2,750,000	200,000	2,400,000	150,000
Calumet Int. Sew., No. 19A (Markham, Bel-Aire)	Calif. Ave.	330,000		330,000	
Calumet Int. Sew., No. 20 (Oak Lawn Outlet)	None	3,850,000			3,850,000
Calumet Int. Sew., Revised Controls	Bl. Is. Ext.	248,000	248,000		
Calumet Sew. Tr. Wks., New Outfall	Wks. Enl'g.	1,100,000	1,100,000		
Calumet City P. S., New Storm Pump. Sta.	Cal. City	495,000	495,000		
95th St. P. S., New Storm Pumps	None	440,000	440,000		
West-Southwest Project					
West-Southwest Tr. Wks., Completion	W. S. Com. Tr.	4,055,000	4,055,000		
Upper DesPlaines Int. Sew., No. 11 (Wellers)	DesPl. Proj.	1,100,000	100,000	300,000	700,000
Upper DesPlaines Int. Sew., 100% Collection	DesPl. Proj.	187,000		187,000	
Salt Creek Int. Sew., No. 2B (Lyons Outlet)	DesPl. Proj.	660,000		660,000	
Salt Creek Int. Sew., Revised Controls	DesPl. Proj.	88,000	88,000		
Southwest Int. Sew., No. 12B (McCook Outlet)	SW. Sewer	110,000	10,000	20,000	80,000
Southwest Int. Sew., Elec. Sew. Controls	SW. Sewer	193,000	193,000		
Southwest Int. Sew., Cont. for City Sew.	SW. Sewer	110,000		110,000	
Broadview-Bellwood Relief Sewer	DesPl. Proj.	2,750,000	150,000	300,000	2,300,000
West Towns Outlet Sewer, No. 4 (Oak Pk. Outlet)	Oak Pk. Sew.	682,000	632,000		
Totals		$33,629,000	$13,287,000	$13,082,000	$ 7,310,000

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In The

SUPREME COURT OF THE UNITED STATES

Nos. 2, 3, and 4, Original

OCTOBER TERM, A. D. 1949

STATE OF WISCONSIN, MINNESOTA, OHIO
and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 4 Original

MOTION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK TO DISMISS THE PETITION OF THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO FOR AN INTERPRETATION AND CLARIFICATION OF THE DECREE OF APRIL 21, 1930.

Thomas E. Fairchild, Attorney General, State of Wisconsin
J. A. A. Burnquist, Attorney General, State of Minnesota
Herbert S. Duffy, Attorney General, State of Ohio
Charles J. Margiotti, Attorney General, State of Pennsylvania
M. Vashti Burr, Deputy Attorney General, State of Pennsylvania
Stephen J. Roth, Attorney General, State of Michigan
Graydon G. Withey, Deputy Attorney General, State of Michigan
Edmund E. Shepherd, Solicitor General, State of Michigan
Nathaniel L. Goldstein, Attorney General, State of New York
Edward L. Ryan, Assistant Attorney General, State of New York
Herbert H. Naujoks, Special Assistant to Attorneys General

THE GILLIAN PRESS, MADISON, WISCONSIN

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In The

SUPREME COURT OF THE UNITED STATES

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OCTOBER TERM, A. D. 1949

STATE OF WISCONSIN, MINNESOTA, OHIO
and PENNSYLVANIA,
Complainants,
vs. No. 2 Original
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

STATE OF MICHIGAN,
Complainant,
vs. No. 3 Original
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

STATE OF NEW YORK,
Complainant,
vs. No. 4 Original
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

MOTION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK TO DISMISS THE PETITION OF THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO FOR AN INTERPRETATION AND CLARIFICATION OF THE DECREE OF APRIL 21, 1930.

To the Honorable, the Chief Justice and Associate Justices of the Supreme Court of the United States:

Comes now the State of Wisconsin by Thomas E. Fairchild, Attorney General; the State of Minnesota by J. A. A. Burnquist, Attorney General; the State of Ohio by Herbert S. Duffy, Attorney General; the State of Pennsylvania by

Charles J. Margiotti, Attorney General and M. Vashti Burr, Deputy Attorney General; the State of Michigan by Stephen J. Roth, Attorney General, Graydon J. Withey, Deputy Attorney General and Edmund E. Shepherd, Solicitor General; the State of New York by Nathaniel L. Goldstein, Attorney General, and Edward L. Ryan, Assistant Attorney General; and Herbert H. Naujoks, Special Assistant to the Attorneys General, and move this Court to dismiss with costs the petition of the State of Illinois and the Sanitary District of Chicago for an interpretation and clarification of the Decree of April 21, 1930, as amended, upon the following grounds:

1. The Decree of April 21, 1930, as amended on May 22, 1933, is clear and unambiguous and requires no interpretation or clarification.
2. The Decree of April 21, 1930, as amended, clearly applies to and requires the construction of the uncompleted necessary projects as submitted in Petitioners' Exhibit No. 1387, as adjusted to meet the needs and improvements made necessary by increased population.
3. The Decree of April 21, 1930, as amended, clearly applies to and requires the construction of the necessary sewage disposal facilities to provide for territories annexed to the Sanitary District of Chicago, subsequent to the entry of the original Decree.

Respectfully submitted,

Thomas. E. Fairchild, Attorney General
State of Wisconsin

J. A. A. Burnquist, Attorney General
State of Minnesota

Herbert S. Duffy, Attorney General
State of Ohio

Charles J. Margiotti, Attorney General
State of Pennsylvania

M. Vashti Burr, Deputy Attorney General
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State of Michigan

Edmund E. Shepherd, Solicitor General
State of Michigan

Nathaniel L. Goldstein, Attorney General
State of New York

Edward L. Ryan, Assistant Attorney General
State of New York

Herbert H. Naujoks, Special Assistant to
Attorneys General

Dated this 15th day of September, 1950.

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DISTRICT OF CHICAGO,
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STATE OF NEW YORK,
Complainant,
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STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.
No. 4 Original

BRIEF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK IN SUPPORT OF MOTION TO DISMISS THE PETITION OF THE STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO FOR AN INTERPRETATION AND CLARIFICATION OF THE DECREE OF APRIL 21, 1930.

Thomas E. Fairchild, Attorney General, State of Wisconsin
J. A. A. Burnquist, Attorney General, State of Minnesota
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Nathaniel L. Goldstein, Attorney General, State of New York
Edward L. Ryan, Assistant Attorney General, State of New York
Herbert H. Naujoks, Special Assistant to Attorneys General

THE GILMAN PRESS, MADISON, WISCONSIN

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Nos. 2, 3, and 4, Original

OCTOBER TERM, A. D. 1949

STATE OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs. No. 2 Original
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF MICHIGAN,
Complainant,
vs. No. 3 Original
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF NEW YORK,
Complainant,
vs. No. 4 Original
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

BRIEF IN SUPPORT OF MOTION TO DISMISS PETITION FOR INTERPRETATION AND CLARIFICATION OF DECREE OF APRIL 21, 1930

A. PRELIMINARY STATEMENT

It is a strange fact that during the twenty years that petitioners, the State of Illinois and The Sanitary District of Chicago, have been subject to the terms and conditions of the original decree of April 21, 1930, as amended on May 22, 1933, petitioners have found this mandate clear, unambiguous and understandable, and then, after living under the decree for twenty years petitioners suddenly claim to discover that the terms and conditions of the decree are obscure and doubtful and, they now say, the decree should be interpreted and clarified.

The petition makes no request for increased diversion but relates solely to the application of the decree with reference to certain construction required to provide necessary sewage disposal facilities for the Sanitary District of Chicago.

An examination of the decree herein, as amended, considered in the light of the history of this litigation, establishes conclusively that the original decree, as amended, is today as clear and unambiguous as it was the day it was issued and requires no clarification. Moreover, there exists no such change in conditions or circumstances since the entry of the original decree, as amended, as would require any interpretation or clarification of the said decree. The alleged change in circumstances set forth in the petition did not warrant the present application to this court for an interpretation and clarification of the decree.

B. HISTORY OF THE LITIGATION

I. *The Original Suits Were Filed in the Year 1922.*

These are original actions brought in this court under Section 2 of Article III of the United States Constitution. The State of Wisconsin filed the first of the several bills of complaint on July 14, 1922. The Wisconsin bill of complaint was amended on October 5, 1925, and the States of Minnesota, Ohio and Pennsylvania became co-plaintiffs with the State of Wisconsin. The amended bill, filed in 1925, sought an injunction to restrain the State of Illinois and The Sanitary District of Chicago from causing any water to be taken from the Great Lakes-St. Lawrence water shed in such a manner as permanently to abstract and divert the same from that water shed. On April 8, 1926, the State of Michigan filed a separate bill of complaint for the same relief. On October 18, 1926, the State of New York likewise filed a separate bill of complaint, also asking for the same relief. Subsequently, on November 23, 1926, this court ordered the three suits consolidated for hearings before the Special Master. (Wisconsin, et al. vs. Illinois, et al., 273 U. S. 642; see also 278 U. S. 367, 369, 370.)

II. *The Amended Bills Sought to Enjoin the Abstraction of the Waters of the Great Lakes-St. Lawrence System for Sewage Disposal Purposes.*

The amended bills alleged that the abstraction by the State of Illinois and its Agency, The Sanitary District of Chicago, of huge quantities of water through the Chicago Sanitary Canal had lowered the levels of Lakes Michigan, Huron, Erie and Ontario through connecting waterways, and of the St. Lawrence River above tidewater, not less than 6 inches, to the serious injury of the complainant Lake States, their citizens and property owners and that the Acts of Illinois and the Chicago Sanitary District had never been authorized by Congress but were in violation of the rights of the complainant Lake States and their peoples, and that the withdrawals of the water from Lake Michigan were for the purpose of taking care of the sewage of the Chicago area and were not justified by any control Congress had attempted to exercise or could exercise in inter-state commerce over the waters of the Great Lakes, and that such withdrawals of water were in palpable violation of the Act of Congress of March 3, 1899. These bills of complaint prayed that the State of Illinois and its Agency, The Sanitary District of Chicago, be enjoined permanently from diverting water from Lake Michigan or from dumping or draining sewage into its waterways so as to render it unsanitary, or obstruct the people of the complainant Lake States in navigating them. After the filing of motions, the State of Illinois and The Sanitary District of Chicago filed their respective answers in which they denied the injuries alleged and averred that authority was given for the diversion under the Acts of the Legislature of Illinois and Acts of Congress and permits issued by the Secretary of War as authorized by Congress in the regulation of interstate commerce.

III. *The Findings of Special Master Hughes on the Original Reference Show a Lowering by Petitioners of the Levels of Lake Michigan-Huron of 6 Inches, Thereby Causing Substantial Damage to the Lake States.*

This court referred these causes to Honorable Charles Evans Hughes, as Special Master, and after full hearings the Special Master filed his report on November 23, 1927. The Special Master made a finding that the lowering of lake levels due to the Chicago diversion was approximately 6 inches based on a diversion of 8,500 cubic feet per second, and that this resulted in a substantial and injurious effect upon the carrying capacity of vessels and that it deprived navigation and commercial interest of the facilities which otherwise the Lake States would have enjoyed in commerce on the Great Lakes. After enumerating the evidence, the Special Master made the following finding, to-wit:

> "I therefore find that the complainants have established that the diversion through the Chicago drainage canal has caused substantial damage to their navigation, commercial and other interests as above stated. * * *" (Report of Special Master Hughes, November 25, 1927, p. 118.)

In his conclusions of law, Special Master Hughes ruled that the permit of the Secretary of War, dated March 3, 1925, under which petitioners were diverting 8,500 c. f. s. was valid and he recommended the dismissal of the suits.

IV. *The Decision of January 14, 1929, Affirmed the Master's Findings as to the Great Losses to the Lake States and Ordered a Reduction in Diversion and the Speedy Construction of Adequate Sewage Treatment Works and Facilities.*

This court in its decision January 14, 1929 (278 U. S. 367 at p. 420-421), overruled the Special Master on his conclusions as to the validity of the permit of March 3, 1925, but affirmed the findings of the Special Master as to the damage and great losses to the complainant Lake States and their citizens and their property owners, which resulted through the illegal diversion at Chicago, and then said:

> "It, therefore, is the duty of this court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis, and thus to restore the navigable capacity of Lake Michigan to its proper level. The sanitary district authorities, relying

> on the argument with reference to the health of its people, have much too long delayed the needed substitution of suitable sewage plants as a means of avoiding the diversion in the future. Therefore, they cannot now complain if an immediately heavy burden is placed upon the district because of their attitude and course. The situation requires the district to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the lake diversion.
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> "Though the restoration of just rights to the complainants will be gradual instead of immediate, it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project.
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> "The court expresses its obligation to the master for his useful, fair, and comprehensive report.
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> "To determine the practical measure needed to effect the object just stated and the period required for their completion there will be need for the examination of experts; and the appropriate provisions of the necessary decree will require careful consideration. For this reason, the case will be again referred to the Master for a further examination into the questions indicated. * * *" (278 U. S. 367 at pp. 420-421.)

The court further held that the Lake States were entitled to a decree which would be "effective in bringing that violation and the unwarranted part of the diversion to an end." (278 U. S. 367 at p. 418.)

V. *The Suits Were Referred Back to Special Master Hughes to Determine the Practical Measures Needed to Dispose of the Chicago Area Sewage Without Diversion and the Time Required for the Completion of Such Works.*

The matter was then again referred back to Honorable Charles Evans Hughes who was directed to take testimony on the practical measures needed to dispose of the sewage without the unlawful diversion of water, the time required for their completion, and the flow from the lake needed for the Port of Chicago, and to report his conclusions for the formulation of a decree. On December 17, 1929, the report of Special Master Hughes on re-reference was filed.

VI. *The Decision on Re-reference (April 14, 1930) Ordered Reduction in Diversion to 1,500 c.f.s. by December 31, 1938 by Which Date the Sewage Treatment Works and Facilities Were to be Completed.*

On April 14, 1930, the decision of this court on re-reference was handed down. (281 U. S. 179) The court, in affirming the findings and recommendations of the Special Master, speaking through Mr. Justice Holmes, again pointed out it was already decided that:

> "the defendants, the State of Illinois and the Sanitary District of Chicago, are doing a wrong to the complainants and that they must stop it. They must find a way out of their peril. We have only to consider what is possible if the state of Illinois devotes all its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awakened. It can base no defenses upon difficulties that it has itself created. If its constitution stands in the way of prompt

action, it must amend it or yield to an authority that is paramount to the state." (281 U. S. 179 at p. 197.)

The court further held that the cost should be paid by the State of Illinois and the Sanitary District of Chicago "who have made this suit necessary by persisting in unjustifiable acts." (281 U. S. 179 at p. 200)

VII. *The Decree of April 21, 1930 Ordered a Reduction in Diversion to 6,500 c.f.s. on and After July 1, 1930; to 5,000 c.f.s. on and After December 31, 1935 and to 1,500 c.f.s. on and After December 31, 1938.*

On April 21, 1930, the decree of the Court was entered (281 U. S. 696). This decree provided in part, that: (1) on and after July 1, 1930, the diversion of the waters of the Great Lakes-St. Lawrence system through the Chicago Drainage Canal should be reduced to an annual average of 6,500 cubic feet per second, in addition to domestic pumpage, (2) on and after December 31, 1935 this diversion should be reduced to 5,000 cubic feet per second, in addition to domestic pumpage, and (3) on and after December 31, 1938, this diversion should be reduced to 1,500 cubic feet per second, in addition to domestic pumpage. (Paragraphs 1, 2, 3 of the decree of April 21, 1930, 281 U. S. 696 at pp. 696-697.) The decree further provided that:

> "* * * the defendant the Sanitary District of Chicago shall file with the clerk of this Court semi-annually on July 1st and January 1st of each year, beginning July 1st, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects

> of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report." (281 U. S. 696 at pp. 697-698.)

The final report of the Sanitary District of Chicago to the court, under paragraph 5 of the decree of April 21, 1930, was dated January 1, 1939. In this report the court was notified that thereafter the amount of water diverted from the Great Lakes water shed at Chicago would not exceed 1,500 cubic feet per second, plus domestic pumpage, in accordance with the terms of the decree of April 21, 1930. However, the final report further showed that all of the sewage treatment plants and appurtenances required for treatment of the sewage of the Sanitary District of Chicago, as outlined in the program as proposed by the Sanitary District of Chicago, *had not been completed.* The report stated that work estimated to cost about $14,460,000.00 remained to be completed in the near future. Actually, much work required under the program, adopted by the Sanitary District of Chicago and approved by the Court, still remains to be done as the petition herein shows.

VIII. *The Decree of April 21, 1930 Provided for a Gradual Reduction in the Unlawful Diversion of Water and a Gradual Instead of Immediate Restoration of the Rights of the Lake States in Irder to Permit the Construction of Works Claimed to be Necessary to Protect the Health of the Residents of the Chicago Area.*

The decree of April 21, 1930, as the Lake States are severally informed and believe, provided for a gradual reduction in the unlawful diversion of water and a gradual, rather than immediate, restoration of the rights of the Lake States and their citizens in order to permit the State of Illinois and Sanitary District of Chicago to construct works claimed to be necessary to safeguard the health of the residents of the Sanitary District of Chicago; and the dates and amounts of the progressive reductions in the unlawful diversion provided by the decree of this Court were fixed and determined by the findings of fact as to the time within which the various works, claimed by the defendants to be essential to purify the sewage of Chicago and protect the health of its people, could be constructed and placed in operation. (*Wisconsin et al. v. Illinois et al.*, 281 U. S. 179 (1930).)

The basis and reasons for the progressive rather than instantaneous termination of the unlawful diversion were set forth in the opinion of this Court, rendered by Mr. Chief Justice Taft, in *Wisconsin v. Illinois*, 278 U. S. 367 (1929), where the Court said:

> "* * * If the view urged by the complainants is right, the necessity for the use of the 8,500 cubic feet a second to save the health of the inhabitants of the Sanitary District will then present the problems of the

> power and discretion of a court of equity to moderate the strict and immediate rights of the parties complainant to a gradual one which will effect justice as rapidly as the situation permits. The framing of the decree will then require the careful consideration of the Court." (pp. 410-411)

and further:

> "* * * In these circumstances we think they are entitled to a decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end. But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section, our decree should be so framed as to accord to the Sanitary District a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction." (pp. 418-19)
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> "* * * The situation requires the District to devise proper methods for providing sufficient money and to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the Lake diversion.
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> *"Though the restoration of just rights to the complainants will be gradual instead of immediate, it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project."* (pp. 420-421) (Italics ours)

The decisions of January 14, 1929 (278 U. S. 367) and April 14, 1930 (281 U. S. 179) and the decree of April 21, 1930 (281 U. S. 696), finally adjudged and determined the rights of the Lake States and the duty and obligation of the petitioner. The rights of the Lake States and their peoples so adjudged and determined, were to have the diversion over and above 1,500 cubic feet per second plus domestic pumpage terminated immediately to the end that the great continuing damage to the Lake States and their peoples caused by said illegal diversion should be brought to an end as speedily as possible and "must include everything that is essential to an effective project." The restoration of the adjudged rights of Lake States and their peoples was postponed and made gradual, as a matter of favor to the State of Illinois and its agency, The Sanitary District of Chicago, upon the representation of the State of Illinois and its said agency, The Sanitary District of Chicago, that, notwithstanding their adjudged wrong, they should be given an opportunity and a reasonable time (to December 31, 1938) within which to construct sewage disposal works and all ancillary facilities necessary for the complete treatment of all of the sewage of The Sanitary District of Chicago. The decree specifically imposed upon the petitioner the duties: (1) to reduce the diversion at the time and in the amounts specified in the decree, and (2) to complete by December 31, 1938 everything in the way of sewage treatment works and ancillary facilities that was essential to an effective project. As the court decreed in 1933, the requirement concerning the construction, completion of the sewage treatment works and ancillary facilities "was to preclude any ground of objection on the part of the State of Illinois or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence system or water shed to the extent, and at the times and in the manner, provided in this decree." (289 U. S. 710, 711)

IX. *This Court Found That the Time Fixed for the Final Completion of the Required Works Was As Liberal as the Evidence Allowed.*

This court found that the times fixed by the Special Master for the completion of the various sewage disposal works proposed by the State of Illinois and its said agency, The Sanitary District of Chicago, were as liberal as the evidence permitted (281 U. S. 179, 199 (1930)). With any reasonable diligence, all of said sewage disposal works and ancillary facilities could easily have been fully completed and placed in operation before the time fixed for the ultimate termination of the illegal diversion on or before December 31, 1938.

After inexcusable delays during 1930-1932 in the construction program proposed by the State of Illinois and its agency, The Sanitary District of Chicago, they in November 1932, filed a response to a rule to show cause issued by this court on October 10, 1932, in which the said State of Illinois and its agency, The Sanitary District of Chicago, advised this Court that, notwithstanding previous delays, *adequate time remained for the completion of the sewage disposal works and ancillary facilities within the time fixed by the decree for the ultimate termination of the illegal diversion.*

Although the State of Illinois and its agency, The Sanitary District of Chicago, were never reasonaby diligent in prosecuting the construction program involved in providing complete treatment for all of the sewage of The Sanitary District of Chicago, the progress of construction, as measured by the construction expenditures reported from year to year to this court by The Sanitary District of Chicago, plainly showed that all of these works could have been

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completed and placed in operation well before the time fixed for termination of the illegal diversion, if the construction program were prosecuted with any reasonable diligence and funds were provided for that purpose.

X. *In October 1932, Wisconsin, Minnesota, Ohio and Michigan, Complaining of the Delay in the Construction Program, Petitioned the Court for Appointment of a Commissioner or Special Officer to Execute the Decree of April 21, 1930.*

In October, 1932, the States of Wisconsin, Minnesota, Ohio and Michigan applied for the appointment of a Commissioner or other special officer to execute the decree of April 21, 1930 (281 U. S. 696), on behalf of and at the expense of the defendants. The four Lake States complained of the delay in the completion of the sewage treatment works and facilities embraced in the program of the Sanitary District of Chicago for the disposition of sewage so as to obviate danger to the health of the inhabitants of the District on the reduction in diversion on December 31, 1935 and December 31, 1938, as the decree provided, in the diversion of water from the Great Lakes water shed through the Chicago Drainage Canal.

The court directed The Sanitary District of Chicago and the State of Illinois to show cause why they had not taken appropriate steps to effect compliance with the provisions of the decree of April 21, 1930.

XI. *The Court Appointed Edward F. McClennen to Make Summary Inquiry and to Report to the Court His Findings and Recommendations.*

After hearing upon the return of the rule, the court appointed Edward F. McClennen as Special Master to make summary inquiry and to report to the court: (1) as to the cause of the delay in obtaining approval by the Secretary of War of the construction of controlling works in the Chicago River and the steps necessary to obtain such approval and prompt construction; (2) as to the causes of the delay in providing for the construction of the Southwest Side Treatment Works and the steps which should be taken for that purpose, and (3) as to the financial measures on the part of The Sanitary District or the State of Illinois which should be reasonable and necessary to carry out the decree of the court (287 U. S. 578 (1932)).

The Special Master proceeded accordingly and after full hearings submitted his report and recommendations. In his report Special Master McClennen pointed out that:

> "the decree is painful to the defendants (the State of Illinois and the Sanitary District of Chicago) and * * * they have been influenced by a hope that something would happen so that the flow at Lockport need not go as low as the 1,500 c.f.s. to which the decree now limits them, after December 31, 1938, * * *" (Report of Special Master Edward F. McClennen dated March 13, 1933, p. 6).

XII. *The Report of the Special Master Placed the Blame on Petitioners for Failure to Proceed to a Decision on a Site and for Failure to Prepare Plans, Designs, Etc., for the Key Southwest Side Treatment Plant, and for Failure to Apply for Approval of Controlling Works in the Chicago River.*

In his findings the Special Master concluded that: (1) the causes of the delay in obtaining approval of the construction of controlling works in the Chicago River "are a total and inexcusable failure of the defendants to make an application to the Secretary of War for such approval," and (2) the causes of delay in providing for the construction of the Southwest Side Treatment Works are (a) "an inexcusable and planned postponement of the beginning of construction of these works to January 1, 1935, which left an inadequate time for their completion before December 31, 1938, at the rate of progress expected or to be expected under the methods pursued by the Sanitary District," and (b) "the failure to proceed to a definite decision as to site and to the acquisition of a site so chosen," and (c) "the failure to proceed with reasonable diligence to prepare designs, plans and specifications for the works at this site or some other site of the West Side Works." (Report of Special Master Edward F. McClennen, dated March 13, 1933, pp. 5-60, 125-126.)

XIII. *The Special Master Recommended Enlargement of the Decree So As to Require Illinois to Furnish the Money Necessary and to Take Appropriate Steps to Secure Completion of the Facilities Required to Carry Out the Decree of the Court.*

The Special Master concluded, with respect to the steps to be taken to secure completion of the works above mentioned, that because of its financial situation, The Sanitary District is at present powerless to contract "for the design or construction of controlling works or for the construction in a large way of the Southwest Side Treatment Works." He further concluded that "in the conditions which now exist, there is no reasonable financial measure which the Sanitary District can take, which it is failing to take"; and that "no way has come to light whereby this decree can be performed under tolerable conditions, *unless the State of Illinois meets its responsibility and provides the money*" (Italics ours). (Report of Special Master Edw. F. McClennen, dated March 13, 1933, pp. 61-88, 126.) The Special Master then recommended that the decree of April 21, 1930 be enlarged so as to require the State of Illinois to provide the moneys necessary and to take the appropriate steps, to secure the completion of adequate facilities for the treatment and disposition of the sewage in order to carry out the decree of the United States Supreme Court. (Report of Special Master, Edw. F. McClennen, dated March 13, 1933, pp. 61-112, 126-128.)

Upon that report, this court on May 22, 1933, rendered its decision (*Wisconsin et al. v. Illinois et al.*, 289 U. S. 395), affirming the Special Master's report.

XIV. *The Court Approved the Master's Report and Ordered That the Original Decree be Enlarged to Require the State of Illinois to Provide the Money Necessary and to Take Appropriate Steps to Secure Prompt Completion of Treatment Works and Facilities Required by the Decree of April 21, 1930.*

In approving the report of Special Master, Edward F. McClennen, this court held that it was the special responsibility of the State of Illinois to provide the money needed to effect the construction and prompt completion of the sewage treatment works and complementary facilities required to give complete treatment of all of the sewage of The Sanitary District of Chicago, in order to carry out the decree. In this connection, the court said:

> "The question, then, comes down to the procuring of the money necessary to effect the prompt completion of the sewage treatment works and the complementary facilities. To provide the needed money is the special responsibility of the State of Illinois. For the present halting of its work the Sanitary District is not responsible. It appears to be virtually at the end of its resources. The Master states that, due to its financial situation, the Sanitary District cannot go forward in any adequate manner with either contracts or construction. We find that the Master's conclusion, that there is no way by which the decree can be performed under tolerable conditions 'unless the State of Illinois meets its responsibility and provides the money,' is abundantly supported by the record.
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> "That responsibility the State should meet. Despite existing economic difficulties, the State has adequite resources, and we find it impossible to conclude that the State cannot devise appropriate and adequate financial measures to enable it to afford suitable pro-

tection to its people to the end that its obligation to its sister States, as adjudged by this Court, shall be properly discharged." (Wisconsin et al. v. Illinois et al., 289 U. S. 395, 410-411.)

XV. *On May 22, 1933, the Original Decree of April 21, 1930, Was Enlarged So As to Require the State of Illinois to Take All Necessary Steps to Secure the Moneys Needed for the Completion of Adequate Sewage Disposal Plants and Incidental Facilities for the Disposition of the Sewage of the Area Embraced Within the Area of the Sanitary District of Chicago.*

On the same day this court enlarged the original decree of April 21, 1930, by the addition of the following provisions:

> "That the State of Illinois is hereby required to take all necessary steps, including whatever authorizations or requirements, or provisions for the raising, appropriation and application of moneys, may be needed in order to cause and secure the completion of adequate sewage treatment or sewage disposal plants and sewers, together with controlling works to prevent reversals of the Chicago River if such works are necessary, and all other incidental facilities for the disposition of the sewage of the area embraced within the Sanitary District of Chicago so as to preclude any ground of objection on the part of the State or of any of its municipalities to the reduction of the diversion of the waters of the Great Lakes-St. Lawrence system or watershed to the extent, and at the times and in the manner, provided in this decree." (289 U. S. 710)

XVI. *In 1940, Illinois Petitioned the Court for a Temporary Increase Until December 31, 1942, in Diversion of Lake Michigan Water to 5,000 Cubic Feet Per Second, Pus Domestic Pumpage on the Ground That a Dangerous Condition to Public Health Existed Along the Sanitary District Canal and the Illinois Waterway.*

On January 11, 1940, the State of Illinois filed its petition in this court for temporary modification of the decree of April 21, 1930, so as to obtain increased diversion of water from Lake Michigan. In its petition, which the State of Ilinois filed at the insistence of certain communities bordering on the Illinois waterway, including Lockport and Joliet, it was alleged that the system for the treatment of sewage had not yet been completed and would not be completed until the end of the year 1943, and that, as a result of the introduction of untreated sewage into the Illinois waterway an "obnoxious, noisome, filthy, unsanitary and dangerous condition to public health" exists along the Sanitary District Canal and the Illinois waterway. The petition asked for a temporary increase to 5,000 cubic feet per second of water from Lake Michigan, plus domestic pumpage for the preservation of the health of the inhabitants of the complaining communities.

On January 29, 1940, a rule to show cause was issued by this court to the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York requiring the said states to show cause why the petition for temporary modification of the decree of April 21, 1930 should not be granted. On February 26, 1940, the return of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York to the rule to show cause on the application of the State of Illinois for temporary modification of the decree of April 21, 1930, was filed in this court. On April 3, 1940, after having heard oral argument and after having considered the briefs of petitioner and the opposing Great Lake States, this court filed a per Curiam opinion (309 U. S. 569 at 571) in which the Court pointed out that:

> *"The State of Illinois has failed to show that it has provided all possible means at its command for the completion of the sewage treatment system as required by the decree as specifically enlarged in 1933* (289 U. S. 395, 710, 77 L. ed. 1283, 1465, 53 S. Ct. 671, 788). *No adequate excuse has been presented for the delay.* Nor has the State submitted appropriate proof that the conditions complained of constitute a menace to the health of the inhabitants of the complaining communities or that the State is not able to provide suitable measures to remedy or ameliorate the alleged conditions without an increase in the diversion of water from Lake Michigan in violation of the rights of the complainant States as adjudged by this court.
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> "In order, however, that the Court may be satisfied as to the actual condition of the Illinois Waterway by reason of the introduction of untreated sewage, and as to the actual effect, if any, of that condition upon the health of the inhabitants of the complaining communities, and also with respect to the feasibility of remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan, the Court appoints a Special Master to make a summary inquiry as to such condition, effect and measures, and to report to this Court with all convenient speed." (Italics ours)

XVII. *Special Master Monte M. Lemann Was Appointed to Make Summary Inquiry and Report to the Court.*

Honorable Monte M. Lemann was appointed as Special Master to make summary inquiry and to report to the court with all convenient speed, with respect to the actual condition of the Illinois waterway and whether that condition "constitutes an actual menace to the health of the inhabitants of the complaining communities, and also with respect to the feasibility of remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan." (309 U. S. 636)

XVIII. *The Report of Special Master Lemann Recommended Dismissal of Illinois' Petition for Increased Diversion.*

After extended hearings the report of the Special Master, dated March 31, 1941, which recommended dismissal of the petition for increased diversion of lake waters was filed. The report pointed out among other things, that the State of Illinois and its agency, The Sanitary District of Chicago, have never been influenced by a desire to complete the sewage treatment plants as soon as possible as required by the decree but that petitioners have always been governed by the thought of completing a sewage system at as little expense as possible regardless of the time element. In this connection Special Master Lemann states (p. 107):

> "In his report on re-reference Special Master Hughes commented that:
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> > 'Much time can be saved or lost in large building operations according to the attitude which is

> taken as to the importance of early completion. In the present case, the Court has already laid down the requirement that the word shall proceed "with all reasonable expedition."'
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> "The record indicates that the Sanitary District has been influenced, not so much by the desire to make speed, as by the purpose ultimately to complete an efficient system at as little expense as possible to its taxpayers. These are praiseworthy motives when considered from the standpoint of the District alone, but they may not replace the emphasis upon expedition to which the legitimate protection of the interests of the opposing States entitles them." (Report of Special Master Lemann, March 31, 1941, at p. 107.)

The Special Master made the finding that "the facts proven did not establish any menace to the health of the inhabitants of Lockport and Joliet, or elsewhere along the waterway in requiring an increase in the diversion of water from Lake Michigan." (Report of Special Master Lemann, March 31, 1941, p. 54.) The Special Master's recommendation for a decree was:

> "That a decree be entered dismissing the petition and the modified petition of the State of Ilinois for a modification of the decree of April 21, 1930, * * *." (Report of Special Master Lemann, March 31, 1941, p. 114.)

XIX. *The Court on May 26, 1941, Dismissed the Petition and Modified Petition of Illinois, with Costs.*

This court, on May 26, 1941, in a Per Curiam opinion, overruled all exceptions to the report of the Special Master and dismissed the petition and modified petition of the State of Illinois, with costs (313 U. S. 547).

C. THE ALLEGED CHANGE IN CONDITIONS SINCE THE ENTRY OF THE ORIGINAL DECREE MAKES NO CASE FOR CLARIFICATION OR INTERPRETATION OF THE DECREE

The gist of the petition herein respecting the alleged change in conditions is the claim that the human population of the Sanitary District in 1930 was 3,901,569 and that this had increased to 4,144,000 in 1949, plus the fact that the Legislature of Illinois had authorized, since the decree, annexation of additional communities thereby increasing the area of the Sanitary District from 442.35 square miles with 60 communities in 1930 to 470.18 square miles with 70 cities and villages in 1950.

We submit that the increase in population in the District by 242,431 people in the 20 years since entry of the original decree plus the addition of 27.83 square miles of territory including 10 municipalities in that time makes no case for clarification and interpretation of the decree of April 21, 1930, as amended in 1933.

The fact is that the entire construction program of the Sanitary District of Chicago was a long-range program in which the population factor was a very important one. This construction program was predicated upon an average growth within the Sanitary District of from 700,000 to 750,000 people every ten years. (See Special Master Charles Evans Hughes' exhibit B on the 1929 re-reference, joint abstract of record of hearings upon exceptions to Special Master's report on re-reference, filed February 20, 1930, pp. 116, 140-141, testimony of petitioner's witness, George M. Wisner, transcript of testimony, p. 3681, joint abstract of record filed February 20, 1930, p. 430, petitioner's exhibit 1157 on original hearings, 1926-1927.)

In November and December of 1889, the Sanitary District of Chicago was organized under the Illinois Statute entitled "An act to create sanitary districts and remove obstructions in the Des Plaines and Illinois Rivers," approved May 29, 1889, and published in the Illinois laws for the year 1889 commencing at page 186 and has continuously existed under said act of 1889 and the acts amendatory thereof and supplementary thereto. At the time of its organization in 1889 the Sanitary District of Chicago consisted of a territory 185 miles in area. By successive acts the area of the Sanitary District of Chicago was enlarged to embrace 395 square miles by the year 1925 when the Motion to Amend Bill of Complaint herein was filed by Wisconsin, Minnesota, Ohio and Pennsylvania. (See pages 7-9, Motion of Wisconsin, Minnesota, Ohio and Pennsylvania to Amend Bill of Complaint, 1925.)

On April 21, 1930 the area of the Sanitary District of Chicago embraced an area of 442.35 square miles. (See pending petition of the State of Illinois and the Sanitary District of Chicago, page 8.)

In Special Master's exhibit B, p. 116, appears the following:

> "Population and Growth:
>
> "In planning works for sewage disposal, it is necessary to consider the future population of the locality. It is not financially practicable to make expenditures now for a problematical future. It is necessary, however, to determine the future populations approximately and to adopt works capable of construction in units that may be increased in capacity from time to time

as occasion requires, without destroying previous expenditures. Thus, each dollar expended will provide a link in a complete chain of sewage disposal works.

"We have examined the forecast of population as estimated by the Sanitary District of Chicago, and we believe it represents future probabilities as accurately as required for the above purpose. This estimate covering the population of the Sanitary district is as follows:

1920 census,	2,978,635
1930	3,710,000
1940	4,425,000
1950	5,140,000
1960	5,850,000
1970	6,580,000"

The testimony of petitioner's witness, Langdon Pearse, summarized in Special Master Hughes' report on re-reference, filed December 17, 1929, p. 13, is as follows:

"Mr. Pearse has been connected with the Sanitary District of Chicago since 1909, and as sanitary engineer has made a comprehensive and thorough study of its sewage disposal problems. He prepared the plans for, and supervised, the construction of the Calumet, Des Plaines River, Northbrook, Glen View, Morton Grove and North Side Treatment Plants, of the Sanitary District and has provided plans for, and supervised, the existing work on the West Side Sewage Treatment Plant. He has also had considerable experience as consulting sanitary engineer in private practice. In connection with the Sanitary District work he has visited sewage plants of the United States, England, France and Germany for the purpose of ascertaining the best and latest methods. Mr. Pearse testified that the population served by these works at the end of fifteen years (1945) would be 6,366,000, including a human popula-

> tion of 4,785,000 and an additional number estimated at 1,581,000 for what is called 'the population equivalent allowed for industrial wastes.' In his opinion, the plan submitted 'for sewage treatment up to 1945 is the best plan that can be devised to take care of all the sewage of the population, whether the effluent goes to the Mississippi watershed or whether it goes to the Lake.'
>
> "The growth of the population, with the District, after the year 1945, has been estimated at from 60,000 to 100,000 a year. Additional works will have to be added to carry the treatment forward and the Sanitary District has estimated an amount of $9,070,000 to make provision for this purpose to the year 1955."

Exhibit No. 1157, entitled "The Technical Basis for the Recommendation of the Board of Review," dated January 23, 1925, and being a report of the Engineering Board of Review of the Sanitary District of Chicago, was introduced by the State of Illinois and the Sanitary District of Chicago on the original hearings in 1926-1927 in Wisconsin et al. v. Illinois et al. This exhibit discussed the size of the Sanitary District and the growth of the population therein, past and prospective, as follows:

> "The boundaries of the Sanitary District are fixed by State laws. The original area was 185 square miles, containing a population of 1,140,000. The same conditions which forced the original start of the City of Chicago have maintained to the present day a phenomenal rate of growth, a rate almost unprecedented among the large cities of the world. This rapid growth has accentuated its difficulties in coping with natural deficiencies such as lack of good drainage. Furthermore, the Sanitary District of Chicago has grown even more than the City. The area has several times been en-

larged since it was first organized and now includes the whole of Chicago and 49 other cities and villages, containing in all 437.39 square miles, with a population of about 3,300,000 in 1924, and an assessed valuation of $1,965,000,000. The population is increasing steadily at the rate of about 70,000 persons a year and the assessed valuation increases about $50,000,000 per year. (See Tables 1 and 2):

"TABLE 1—GROWTH OF POPULATION PAST AND PROSPECTIVE

Year	Chicago	Sanitary District
1900	1,699,000	1,640,000
1901	1,748,000	1,688,000
1902	1,796,000	1,736,000
1903	1,845,000	1,934,000
1904	1,893,000	1,985,000
1905	1,942,000	2,035,000
1906	1,991,000	2,090,000
1907	2,039,000	2,144,000
1908	2,088,000	2,195,000
1909	2,136,000	2,250,000
1910	2,185,000	2,308,000
1911	2,239,000	2,370,000
1912	2,294,000	2,432,000
1913	2,348,000	2,509,000
1914	2,403,000	2,589,000
1915	2,457,000	2,652,000
1916	2,511,000	2,716,000
1917	2,566,000	2,782,000
1918	2,620,000	2,846,000
1919	2,675,000	2,916,000
1920	2,729,000	2,986,000
1921	2,784,000	3,063,000
1922	2,839,000	3,143,000
1923	2,894,000	3,214,000
1924	2,949,000	3,284,000
1925	3,004,000	3,355,000
1926	3,059,000	3,426,000
1927	3,114,000	3,497,000
1928	3,169,000	3,568,000
1929	3,224,000	3,639,000
1930	3,279,000	3,710,000
1931	3,334,000	3,782,000
1932	3,389,000	3,854,000
1933	3,444,000	3,926,000
1934	3,499,000	3,998,000
1935	3,554,000	4,070,000
1936	3,609,000	4,142,000
1937	3,664,000	4,214,000
1938	3,719,000	4,283,000
1939	3,774,000	4,354,000
1940	3,829,000	4,425,000
1941	3,884,000	4,497,000
1942	3,939,000	4,569,000
1943	3,994,000	4,641,000
1944	4,049,000	4,713,000
1945	4,104,000	4,785,000

(Petitioner's Exhibit 1157, Part II, pp. 8-9, on original hearings, 1926-1927)

And again, in discussing the alleged dilution requirements in 1945 and in 1955, the Sanitary District of Chicago, in its estimate of the prospective growth in population, Exhibit 1157 further shows:

> "81. *Dilution Requirements in 1945.* It is estimated that in 1945 the human population will be 4,785,000 and the industrial-equivalent population 2,000,000, or a total of 6,785,000.
>
> "87. *Dilution Requirements in 1955.* It is estimated that in 1955 the human popuation will be 5,500,000 and the industrial wastes equivalent-population 2,200,000, or a total of 7,700,000."
>
> (Exhibit 1157, Part II, pp. 56 and 57)

Exhibit 1174 introduced by the State of Illinois and the Sanitary District of Chicago at the original hearing, the 1926-1927 reference, is an estimate of human population and population-equivalent of industrial wastes within the Sanitary District of Chicago and shows:

> ". . . in 1920 a human population of 3,000,000 and a population-equivalent of 1,500,000; in 1925, 3,355,000 human and 1,600,000 population-equivalent; in 1930, 3,710,000 human and 1,700,000 equivalent; in 1935, 4,070,000 human and 1,800,000 equivalent; in 1940, 4,425,000 human and 1,900,000 equivalent; in 1945, 4,785,000 human and 2,000,000 equivalent; in 1950, 5,140,000 human and 2,100,000 equivalent; in 1955, 5,500,000 human and 2,200,000 equivalent; in 1960, 5,860,000 human and 2,300,000 equivalent, and in 1970, 6,580,000 human and 2,500,000 equivalent."
>
> (From Joint Abstract of Record for Hearing upon Exceptions to the Special Master's Report on Re-reference, pages 509 and 510)

This exhibit which was introduced by Langdon Pearse who then was and who still is the Chief Sanitary Engineer of the Sanitary District of Chicago shows an estimate of the population of the District to the year 1970.

One of the principal witnesses called by the State of Illinois and the Sanitary District of Chicago at the original hearing was George M. Wisner, who was then a consulting engineer for the Sanitary District and who had been connected with the Sanitary District since July 1892. Mr. Wisner, in discussing the population growth of the City of Chicago testified that:

> "In 1890 the population of the City of Chicago was about a million. When the canal was opened in 1900, it had 1,500,000 people, and by 1910 that had increased, speaking from memory, over 500,000, and by 1920 it had reached nearly 3,000,000 people. *At the present time, as nearly as we can estimate it, it is increasing at the rate of from seven hundred to seven hundred and fifty thousand every ten years.* It is a real problem, with the engineers to keep track of the population and its increase, as it becomes a real problem in taking care of the sewage as the city grows, particularly when one appreciates that this seven hundred to seven hundred and fifty thousand is a population that is fifty per cent, in round numbers, in excess of the present population of the City of Milwaukee." (Italics ours)
>
> (From Joint Abstract of Record for Hearing upon Exceptions to the Special Master's Report on Re-reference, filed Feb. 20, 1930, page 430)

In the report of the Special Master, Honorable Charles Evans Hughes, filed in this court November 23, 1927, the organization and increase in area of the Sanitary District of Chicago was discussed at pages 17 and 18 as follows:

> "4. *The Sanitary District of Chicago.* The defendant, the Sanitary District of Chicago, was organized under the Illinois Act of 1889. Its organization was completed in 1890. Originally, the district embraced an area of 185 square miles. By later acts this was increased so that the district now comprises approximately 438 square miles, extending from the Illinois State line on the south and east, the northern boundary of Cook County on the north, with about 34 miles of frontage on Lake Michigan, thus embracing what may be called the metropolitan area of Chicago, consisting of Chicago and its suburbs, a total of 54 cities, towns and villages."

It is manifest from the foregoing that the Special Master, Honorable Charles Evans Hughes, and this court had before them full information with respect to the long range program of the Sanitary District of Chicago. The inevitable increases in population and size within the Sanitary District of Chicago manifestly were known and considered in the judgment of the court and in the formulation of the decree. There was no reason to suppose that Chicago would stand still while the rest of the nation increased in population. That the area and population of the District would increase in the future as in the past was both known and scientifically appraised by petitioners, the Special Master and the court. It seems strange beyond words that it took the petitioners twenty years to discover that to their way of thinking the decree of April 21, 1930 is ambiguous.

This petition represents another in the long chain of attempts by petitioners to avoid compliance with the decree of April 21, 1930, or to justify petitioners' inexcusable negligence or wilful failure to comply fully with said decree.

We respectfully submit that the petition should be dismissed with costs.

Thomas E. Fairchild, Attorney General
State of Wisconsin

J. A. A. Burnquist, Attorney General
State of Minnesota

Herbert S. Duffy, Attorney General
State of Ohio

Charles J. Margiotti, Attorney General
State of Pennsylvania

M. Vashti Burr, Deputy Attorney General
State of Pennsylvania

Stephen J. Roth, Attorney General
State of Michigan

Graydon G. Withey, Deputy Attorney General
State of Michigan

Edmund E. Shepherd, Solicitor General
State of Michigan

Nathaniel L. Goldstein, Attorney General
State of New York

Edward L. Ryan, Assistant Attorney General
State of New York

Herbert H. Naujoks, Special Assistant to
Attorneys General

Dated this 15th day of September, 1950.

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JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

PETITION FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930

LATHAM CASTLE,
Attorney General of the State of Illinois,
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Chicago 1, Illinois,
Attorney for State of Illinois.

Deft.

William C. Wines,
Assistant Attorney General,
Of Counsel.

CHAMPLIN-SHEARY COMPANY, CHICAGO 365

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IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 2 Original
STATE OF MICHIGAN, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants,* STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS, *Intervening Defendants.*	No. 3 Original
STATE OF NEW YORK, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 4 Original

PETITION FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930

The State of Illinois seeks the temporary modification hereafter prayed of paragraph 3 of this Court's decree entered on April 21, 1930, in this cause, with respect to the diversion of water from the Great Lakes-St. Lawrence Watershed into the Mississippi River *via* the Illinois Waterway.

The reason for this motion is that there exists an already urgent and increasingly critical emergency upon the Mississippi River, as a result of which some 200 barges essential to interstate transportation of vital materials on navigable waters are already stalled, the health of many riparian cities and smaller communities upon the river is endangered and other grave harm to national welfare is threatened.

This Court's above mentioned decree restricted withdrawals of water from the Great Lakes-St. Lawrence Watershed into the Mississippi channel to 1500 cubic feet per second in addition to domestic pumpage.

Illinois prays temporary relief permitting the pumpage of 10,000 cubic feet of water per second in addition to domestic pumpage for a period of 100 days, as an aid to navigation on the Mississippi River.

For causes in support of this petition, the State of Illinois represents:

This petition is field under and pursuant to the provisions of Paragraphs 6 and 7 of the decree entered April 21, 1930, which permit application, after due notice, for a modification of said decree if conditions should so warrant.

Due notice has been given to the complainants of the filing of this petition.

The temporary increase in the rate of diversion now set will not adversely affect present lake levels in the Great Lakes-St. Lawrence system or watershed for the reason that the total quantity of water proposed to be diverted is not sufficient materially to affect such levels.

As a result of unprecedented drought conditions in the midwest the quantity and flow of water in the Mississippi

River is fast approaching an all-time low. On October 11, 1956, the discharge of the Mississippi River at St. Louis was 58,000 cubic feet per second which was barely sufficient for navigation. Of these 58,000 cubic feet per second, 35,000 came from the Missouri River, 18,000 came from the Upper Mississippi River and 5,000 came from the Illinois Waterway. Barring unforeseen rains the discharge of the Upper Mississippi is expected to decline to about 12,000 cubic feet per second by December 1, 1956, and the discharge from the Illinois Waterway is expected to decline to 3,500 cubic feet per second by December 1, 1956. Early in November the controlled discharge of the Missouri River will be reduced from 35,000 cubic feet per second to 15,000 cubic feet per second and by December 1, 1956, will be further reduced to about 8,000 cubic feet per second. The expectation is that by December 1, 1956, the discharge at St. Louis will total only 23,000 cubic feet per second. The seriousness of this situation can best be appreciated by comparison with the fact that the lowest rate of discharge previously recorded at St. Louis was 38,000 cubic feet per second, in January, 1940.

It is apparent that when these low stages are reached navigation through the Alton Lock will come to a standstill and navigation between Cairo and Alton and between Alton and LaGrange on the Illinois Waterway will be more seriously handicapped than ever before if not stopped altogether. As a result of this condition, shipping on the Mississippi River and the Illinois Waterway already has been severely curtailed and within a matter of weeks may be halted entirely. Should this occur the State of Illinois will be irreparably injured as a result of curtailment of the commerce which moves to and from this state *via* the Mississippi River which includes such commodities as coal, steel, grain, sulphur, phosphate rock, and other products which move *via* river barge lines. In addition, even at the time this petition is written many barge loads of fuel oil consigned to destinations in Illinois are stranded below Alton Lock, unable to proceed to their respective destinations. This oil is critically needed both for industrial use and to heat private homes located throughout the State of Illinois during the coming winter months. It is therefore submitted that a state of emergency exists, brought about by natural causes for which the State of Illinois is in no respect responsible, which justifies and require temporary modification of the outstanding decree of this Court to permit diversion of additional water from Lake Michigan for the purpose of improving navagation conditions on the Illinois Waterway and the Mississippi River at the earliest practicable date.

As above indicated, the emergency condition which prompts the filing of this petition already exists and will have reached a crucial stage before the first of December. In the circumstances, if the relief sought herein is to be effective it must be granted without undue delay. To this end the Court is respectfully requested to modify the requirements of Paragraph 5 of Rule 9 of its Rules and to call upon the other parties to this proceeding, i.e., the States of Arkansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, New York, Pennsylvania, Ohio, Tennessee and Wisconsin, to file their reply, if any, to this petition within twenty days of the date of service hereof. In support of this request the attention of the Court is directed to the fact that the instant petition is more analogous to a motion than to an initial pleading and the time modification requested would conform with the practice of the Court in the case of motions as provided in Paragraph 4 of Rule 35.

WHEREFORE, The State of Illinois respectfully petitions that Paragraph 3 of the decree of this Court of April 21, 1930, in this cause, be temporarily modified to permit a diversion of ten thousand cubic feet of water per second from the Great Lakes-St. Lawrence system or watershed, in addition to domestic pumpage, for a period of one hundred days following the entry of the Court's order authorizing such modification, within which time it is anticipated that the impairment to navigation which now exists on the Mississippi River and the Illinois Waterway can and will be ameliorated.

Respectfully submitted,

STATE OF ILLINOIS
By LATHAM CASTLE,
Attorney General of the State of Illinois

State of Illinois }
Cook County } ss:

The undersigned, being first duly sworn, deposes and says that he is a duly appointed and acting Assistant Attorney General in the State of Illinois; that he has read the foregoing petition; and that the matters and things therein set forth are true in substance and in fact. Deponent further certifies that copies of the foregoing petition have this day been mailed by first class United States mail, or United States air mail, to all parties to this proceeding, such service has been addressed, sufficient postage prepaid, as follows:

Hon. Vernon W. Thomson
Attorney General
State Capitol
Madison, Wisconsin

Hon. J. A. A. Burnquist
Attorney General
State Capitol
St. Paul 1, Minnesota

Hon. C. William O'Neill
Attorney General
State Capitol
Columbus, Ohio

Hon. Robert E. Woodside
Attorney General
State Capitol
Harrisburg, Pennsylvania

Russell W. Root General Counsel
The Metropolitan Sanitary District of Greater Chicago
Law Dept., 100 E. Erie St.
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Hon. Frank G. Millard
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State Capitol
Lansing, Michigan

Hon. J. D. Buckman, Jr.,
Attorney General
State Capitol
Frankfort, Kentucky

Hon. Fred S. LeBlanc
Attorney General
State Capitol
Baton Rouge 4, Louisiana

Hon. T. J. Gentry
Attorney General
State Capitol
Little Rock, Arkansas

Hon. John M. Dalton
Attorney General
State Capitol
Jefferson City, Missouri

Hon. Roy H. Beeler
Attorney General
State Supreme Court Building
Nashville, Tennessee

Hon. John P. Coleman
Attorney General
State Capitol
Jackson, Mississippi

Hon. Nathaniel L. Goldstein
Attorney General
State Capitol
Albany, New York

....

Subscribed and sworn to before me this .... day of November, A. D. 1956.

....
Notary Public

LATHAM CASTLE,
Attorney General of the State of Illinois,
Suite 900, 160 N. La Salle St.,
Chicago 1, Illinois,
Attorney for State of Illinois.

WILLIAM C. WINES,
Assistant Attorney General,
Of Counsel.

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IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, A. D. 1956.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2.
Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3.
Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al.,
Defendants.

No. 4.
Original.

REPLY TO PETITION.

✓ NAT TIPTON,
Advocate General,
Supreme Court Building,
Nashville 3, Tennessee,
Attorney for Intervenor. deft.

GEORGE F. McCANLESS,
Attorney General of Tennessee,
Supreme Court Building,
Nashville 3, Tennessee,
Of Counsel.

St. Louis Law Printing Co., 415 North Eighth Street. CEntral 1-4477.

IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, A. D. 1956.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
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No. 2. Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.
No. 3. Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al.,
Defendants.
No. 4. Original.

REPLY TO PETITION.

To the Honorable Chief Justice and Associate Justices of the Supreme Court of the United States:

May It Please the Court:

The State of Tennessee, an intervening defendant in this cause, presents this, its reply to the petition filed by the State of Illinois, requesting a temporary modification of the decree of this Court entered on April 21, 1930, which prohibits the diversion of water from the Great Lakes-St. Lawrence Watershed into the Mississippi River by way of the Illinois Waterway in excess of 1500 cubic feet per second, in addition to domestic pumpage by the State of Illinois or the Sanitary District of Chicago.

The State of Tennessee admits the existence of emergency conditions on the Mississippi River as described in the petition by the State of Illinois and avers that navigation on the Mississippi River at all ports thereon in Tennessee, and therefrom to the Tennessee ports located on the Tennessee and Cumberland Rivers has been greatly impaired as the result of the conditions described in such petition and irreparable damage to the people and industries of the State of Tennessee resulting therefrom.

The State of Tennessee, therefore, respectfully represents that the temporary modification of the decree of this Court entered in this cause on April 21, 1930, should be ordered as prayed by the State of Illinois and this State expressly joins with the State of Illinois in the prayer of its petition.

Respectfully submitted,

NAT TIPTON,
Advocate General,
Supreme Court Building,
Nashville 3, Tennessee,
Attorney for Intervenor.

GEORGE F. McCANLESS,
Attorney General of Tennessee,
Supreme Court Building,
Nashville 3, Tennessee,
Of Counsel.

State of Tennessee,
Davidson County.

Nat Tipton, first being duly sworn, makes oath in due form of law that he is the Advocate General of the State of Tennessee, that he has read the foregoing reply and that to the best of his knowledge, information and belief the matters set forth therein are true. He further certifies that copies of the foregoing reply have been duly mailed to counsel for all parties to this proceeding.

Nat Tipton.

Sworn to and subscribed before me this the 16th day of November, 1956.

(Seal)

Glenn E. Frazier,
Notary Public.

My Comm. Exp. 5/9/59.

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IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO) TO THE SUPREME COURT OF THE UNITED STATES FOR CLARIFICATION OF THE DECREE OF APRIL 21, 1930, AND ANSWER TO PETITION OF STATE OF ILLINOIS FOR MODIFICATION OF PARAGRAPH 3 OF SAID DECREE.

✓ RUSSELL W. ROOT,
Attorney for The Metropolitan Sanitary District of Greater Chicago,
100 East Erie Street, Chicago 11, Illinois

✓ LAWRENCE J. FENLON,
Principal Assistant Attorney,
Of Counsel.

CHAMPLIN-SHEALY COMPANY, CHICAGO 365

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,* vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 2 Original
STATE OF MICHIGAN, *Complainant,* vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 3 Original
STATE OF NEW YORK, *Complainant,* vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 4 Original

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MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO) TO THE SUPREME COURT OF THE UNITED STATES FOR CLARIFICATION OF THE DECREE OF APRIL 21, 1930, AND ANSWER TO PETITION OF STATE OF ILLINOIS FOR MODIFICATION OF PARAGRAPH 3 OF SAID DECREE.

To the Honorable Chief Justice and Associate Justices of the Supreme Court of the United States:

May It Please the Court:

The Metropolitan Sanitary District of Greater Chicago (formerly, The Sanitary District of Chicago), a Municipal

Corporation, a party defendant in the above entitled Original causes, presents this Motion to the Court for a clarification of its decree of April 21, 1930.

This clarification is requested whereby the Congress, acting through its agencies, the Secretary of the Army upon recommendation of the Chief of Engineers, in the interest of navigation, may be authorized to direct The Metropolitan Sanitary District of Greater Chicago to temporarily divert, for a period of 100 days, or for such other period of time as may be required, 10,000 cubic feet of water per second (c.f.s.) at Chicago from Lake Michigan to the Illinois Waterway and the Mississippi River, so as to ameliorate present serious navigation conditions existing in said waterways.

This action is required because of unprecedented drought conditions in the area resulting in critical emergency conditions presently existing upon the Illinois and Mississippi Rivers whereby the health of many riparian cities and smaller communities upon the said waterways is endangered due to extreme difficulties being experienced in their water supply; commercial navigation on the rivers has been seriously impaired and grave harm to the national welfare is threatened; all as more specifically detailed in the *Petition For Temporary Modification of Paragraph 3 of Decree of April 21, 1930*, as heretofore filed in this Court by the State of Illinois.

The Governor of Illinois on October 16, 1956, petitioned the Secretary of Defense for an increase of diversion of water from Lake Michigan to meet the crisis and to relieve this critical emergency on the waterways. This Petition by the Governor of Illinois was rejected by the Honorable Wilber M. Brucker, Secretary of the Army, who stated:

> "With respect to increasing diversion of Great Lakes waters, such diversion is now restricted to an annual

> average of 1,500 second feet plus domestic pumpage pursuant to a decree of the Supreme Court of the United States dated 21 April 1930 (281 U. S. 696). The Court retained jurisdiction 'for the purpose of any orders or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy.'
>
> Accordingly, no authority is known to exist under which any change in the diversion of water from Lake Michigan could be permitted by this Department contrary to the restrictions imposed by the Supreme Court."

Thereupon the State of Illinois, through its Attorney General, presented its "Petition For Temporary Modification of Paragraph 3 of Decree of April 21, 1930."

The Metropolitan Sanitary District of Greater Chicago considers that the Secretary of the Army misconstrued the Decree of this Court of April 21, 1930, in so advising the Governor of Illinois as to the purported restrictions of the Decree, and considers that it is unnecessary to secure a Modification of the Decree, but that a *Motion* to immediately *clarify* the decree, in lieu of a *Modification* thereof, is proper and desirable.

The Metropolitan Sanitary District of Greater Chicago considers that it was not the intention of this Court, in its opinion of April 14, 1930, (preceding the actual decree of April 21, 1930) 281 U. S. 179, 74 Law Ed. 799, or by its decree of April 21, 1930, (following the Opinion of April 14, 1930) 281 U. S. 696, 74 Law Ed. 1123, to deprive the Congress or its deputies of the power to determine the amounts of diversion required for actual navigation purposes, such as presently involved, and therefore respectfully presents this Motion for a clarification of its decree of April 21, 1930, accordingly, so as to provide that the Congress, acting upon the expert recommendations of its deputies (the Corps of Engineers and the Secretary of the Army) may now promptly determine and authorize the amount of diversion required for actual navigation purposes in the present instance.

SUMMARY OF ORIGINAL ACTIONS AND DECREES.

These Original Actions were instituted by certain Great Lakes States to prevent the State of Illinois and The Sanitary District of Chicago from diverting water from Lake Michigan for the purpose of diluting and carrying away the sewage of Chicago and the surrounding metropolitan area.

The facts were as detailed in, and the controlling law governing both the facts and the law was established by the decision of this Court of January 14, 1929, reported in *Wisconsin, et al.* v. *Illinois, et al.*, 278 U. S. 367, 73 Law Ed. page 426.

In January 1925, in the case of *Sanitary District of Chicago* v. *United States,* 266 U. S. 405, 69 Law Ed. 352, this Court decreed that The Sanitary District of Chicago should be enjoined from diverting in excess of 250,000 cubic feet per minute (4,167 c.f.s.) from Lake Michigan, to go into effect in 60 days, "without prejudice to any permit that might be issued by the Secretary of War according to law."

Immediately after the foregoing decision of January 1925, the Sanitary District applied to the Secretary of War for a permit to divert more than the 4,167 c.f.s. specified in that decree. On March 3, 1925, the Secretary of War issued a permit to the Sanitary District authorizing an annual average diversion of 8,500 cubic feet per second from Lake Michigan with an "instantaneous" maximum not to exceed 11,000 c.f.s., upon conditions requiring the installation of artificial treatment of one-third of Chicago's population sewage within a designated period. The Sanitary District complied with these requirements.

The permit of March 3, 1925, certified that the foregoing diversion was made by the Secretary of War upon the recommendation of the Chief of Engineers, under *Paragraph 10 of the Act of March 3, 1899, Chap. 425, 30 Stat. at L. 1151, U. S. C. title 33, par. 403.*

This Court in its Opinion (1929) in *Wisconsin, et al.* v. *Illinois, et al., 278 U. S. 367*, recognized that the Congress had the right, in the interest of navigation, to authorize a diversion from Lake Michigan at Chicago, and the Congress could vest the determination as to the amount of such diversion in the Secretary of War upon recommendation of its Chief of Engineers. This Court held such action would not be invalid as being a delegation by Congress of its legislative power.

The Court held:

> "The determination of the amount that could be safely taken from the lake is one that is shown by the evidence to be a peculiarly expert question. It is such a question as this that is naturally within the executive function that can be deputed by Congress * * * (Citing numerous authorities) * * *"

Wisconsin, et al. v. *Illinois, et al.*, 278 U. S. 367, 73 Law Ed. p. 426 at 433.

The Court in the above Opinion (1929), held, however, that as the permit of March 3, 1925, of the Secretary of War was based upon *sanitation* and not *navigation* purposes, it was outside of the limited scope of the Secretary's authority. The Court likewise held that as the Congress had not then directly authorized a waterway from Lake Michigan to the Mississippi River, a diversion for such a waterway was not to be considered, and *only the diversion necessary for the purpose of maintaining navigation in the*

Chicago River, as a part of the Port of Chicago, should be considered. The Court then directed that the matter be again referred to Special Master Charles Evans Hughes to take further testimony as to the time required for Chicago to complete the necessary artificial sewage treatment facilities and to determine the time for the gradual reductions in diversion of water from Lake Michigan, pending the completion of such works, *such diversion to be necessary for navigation in the Chicago River as a part of the Port of Chicago.*

Special Master Hughes made his Report on Re-Reference, as ordered by the Court, on December 17, 1929, as to the amount of water to be eventually necessary by diversion from Lake Michigan, "for the purpose of maintaining navigation in the Chicago River, as a part of the Port of Chicago." *The needs of diversion, if any, for the Illinois Waterway were not considered by Special Master Hughes, as it was not then a federal project authorized by the Congress.*

Special Master Hughes recommended a gradual diminution of diversion from Lake Michigan, geared to the time for completion of certain works by The Sanitary District of Chicago, as follows: an annual average of 6,500 c.f.s. after July 1, 1930; annual average of 5,000 c.f.s. after December 31, 1935, and, an annual average of 1,500 c.f.s. after December 31, 1938, said amounts to be in addition to domestic pumpage.

The Supreme Court in the Opinion of April 14, 1930, *Wisconsin, et al.* v. *Illinois, et al.*, 281 U. S. 179, 74 Law Ed. 799, concurred in the recommendations of Special Master Hughes and directed that a decree be accordingly entered. On April 21, 1930, the decree was entered in *Wisconsin, et al.* v. *Illinois, et al.*, 281 U. S. 696, 74 Law Ed. 1123, pursuant to the Opinion of April 14, 1930.

SUBSEQUENT EVENTS EFFECTING DIVERSION SINCE ENTRY OF DECREE OF APRIL 21, 1930.

On June 26, 1930, the Secretary of War, issued a permit to The Sanitary District of Chicago to divert water from Lake Michigan at Chicago, in the annual average amounts specified in the decree of the Supreme Court of April 21, 1930, in addition to domestic pumpage.

This permit is being and has been followed by The Metropolitan Sanitary District of Greater Chicago, as the legal successor to The Sanitary District of Chicago.

On July 3, 1930, the Congress passed the Rivers and Harbors Act of 1930, under which $7,500,000.00 was appropriated to complete the Illinois Waterway, and the project was taken over by the Federal Government as an authorized navigation project. It was completed by the Army Engineers at Government expense and officially opened June 22, 1933. The Rivers and Harbors Act of 1930, provided that the water authorized to be diverted from Lake Michigan by the decree of April 21, 1930, of the Supreme Court "is hereby authorized to be used for navigation of said waterway." The Congress further directed that subsequent studies be made by the Secretary of the Army as to the minimum amount of flow required to meet the needs of the waterway.

PRIOR TEMPORARY INCREASED DIVERSIONS FOR NAVIGATION.

There have been three occasions since April 21, 1930 when abnormal drafts of water have been required from Lake Michigan to aid navigation in the Illinois and Mississippi Rivers. These were August 14 to September 18, 1930 (9,030 cubic feet per second); July 8 to August 7, 1936 (increase of 1,500 cfs over existing diversion); and January 25-27, 1944 (increase from 1,450 cfs to 5,000 cfs).

The increase in 1930 was due to low water in the Illinois River. The authorized diversion then was 6,500 cfs. The increase in 1936 was due to low water in the Mississippi River above the mouth of the Illinois. Greater depth was needed there to move certain boats during the construction of some of the locks and dams in the Mississippi. The authorized diversion at that time was 5,000 cfs, annual average. Both of the foregoing increases were before the complete canalization of the Illinois and upper Mississippi Rivers.

The increase in January 1944, from a budgeted diversion of 1,450 cubic feet per second to 5,000 cfs planned for twenty days, was to provide greater water depth in the Mississippi River at Chain of Rocks, to permit the passage of Naval craft to the Gulf of Mexico. The maintenance of sufficient depth at this place during a period of prolonged drought, September 1943 to January 1944, had used all the water available in the Mississippi River reservoirs and in the Fort Peck reservoir of the Missouri. It became necessary, in the words of the Acting Secretary of the Navy, in order *"to continue the promotion of the war effort,"* confirmed by the Secretary of War, to draw on "the only other source, Lake Michigan via the Chicago Sanitary and Ship Canal and the Illinois Waterway," to obtain the required 9 feet of draft. After this increase in diversion had been in effect for two days, a general rain fell over the upper Mississippi River basin and immediately relieved the situation.

The increased diversion, in effect on each of the above three occasions mentioned, was offset by reduced diversions later by the Sanitary District, to bring the annual average diversion within the authorized limits, at the times, as specified in the Supreme Court Decree of April 21, 1930.

PRESENT CRITICAL CONDITIONS IN MISSISSIPPI AND ILLINOIS WATERWAYS.

Because of the prolonged drought in the areas tributary to the Missouri, Upper Mississippi and Illinois Rivers, as reported by Colonel George E. White, Jr., District Engineer, Corps of Engineers, U. S. Army of the St. Louis District, on October 15, 1956, and as detailed in the "Petition For Temporary Modification of Paragraph 3 of Decree of April 21, 1930," herein filed by the State of Illinois, in order to partly alleviate the critical situation, upon recommendation of the Division Engineer, Great Lakes Division at Chicago, Corps of Engineers, U. S. Army, The Metropolitan Sanitary District of Greater Chicago increased the authorized diversion of water from Lake Michigan at Chicago on October 23, 1956, for a period of ten (10) days by 1,900 c.f.s. This was the maximum increase that could be permitted by the Sanitary District if the annual average diversion for 1956 would be contained within the amount allowed for diversion by the decree of the Supreme Court of April 21, 1930 and the permit of the Secretary of War of June 26, 1930.

NEED AND AUTHORITY FOR INCREASED DIVERSION.

The Court will undoubtably take judicial notice of the prolonged drought in the mid-west area and the critical condition on these waterways as a result thereof. The Secretary of the Army, through its Corps of Engineers is likewise fully aware of these critical conditions requiring immediate action if the emergency is to be eased in any reasonable way. The only practicable relief available, if these inland waterways are to function, is by the clarification of the decree of April 21, 1930, and the immediate authorization of a temporary increase in diversion from Lake Michigan for *navigation purposes* by the *Congress* acting upon recommendation of the Corps of Engineers, as authorized by existing Statutes.

Wherefore, THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO respectfully moves this Court to clarify its Decree in this cause, of April 21, 1930, so as to: 7.

(1) Reiterate recognition of the authority and right of the Congress, in the interest of navigation, to authorize a diversion of water from Lake Michigan at Chicago:

(2) That the Congress may properly vest the determination as to such diversion, for navigation purposes, in the Secretary of the Army, upon recommendation of its Chief of Engineers;

(3) That, in the specific instance, the Congress acting upon the recommendation of its proper deputed agencies, in the interest of navigation, may authorize that the diversion of water at Chicago from Lake Michigan be increased from the present authorized 1,500 c.f.s. to a total of 10,000 c.f.s., in addition to domestic pumpage, for a period of 100 days or for such other period of time as may be required to ameliorate the present serious navigation conditions existing in the Illinois Waterway and the Mississippi River.

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO respectfully further requests that its Motion herein may stand as its Answer to the Petition of the State of Illinois for Temporary Modification of Paragraph 3 of the decree of April 21, 1930, in Original Causes Nos. 2, 3 and 4, as ordered to be filed by this Court on November 17, 1956.

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO further respectfully requests that consideration of this Motion be made simultaneously with the Hearing on the Petition of the State of Illinois, heretofore filed, and the Answers thereto as may be filed by the other parties to these Original Causes.

Respectfully submitted,

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO,
By: RUSSELL W. ROOT,
Attorney.

STATE OF ILLINOIS }
COUNTY OF COOK } SS

The undersigned, Lawrence J. Fenlon, being first duly sworn, deposes and says that he is a duly appointed and acting Principal Assistant Attorney of The Metropolitan Sanitary District of Greater Chicago; and that the matters and things herein set forth are true in substance and in fact. Deponent further certifies that copies of the foregoing Motion and Answer have this day been mailed by first class United States mail, or United States airmail, to all parties to this proceeding, such service has been addressed, sufficient postage prepaid, as follows:

Hon. Latham Castle
Attorney General
Suite 900
160 No. La Salle Street
Chicago 1, Illinois

Hon. Niles Lord
Attorney General
State Capitol
St. Paul 1, Minnesota

Hon. T. J. Gentry
Attorney General
State Capitol
Little Rock, Arkansas

Hon. John M. Dalton
Attorney General
State Capitol
Jefferson City, Missouri

Hon. C. William O'Neill
Attorney General
State Capitol
Columbus, Ohio

Hon. Herbert Cohen
Attorney General
State Capitol
Harrisburg, Pennsylvania

Hon. Thomas M. Kavanaugh
Attorney General
State Capitol
Lansing, Michigan

Hon. J. D. Buckman, Jr.,
Attorney General
State Capitol
Frankfort, Kentucky

Hon. Jack P. E. Gremillion
Attorney General
State Capitol
Baton Rouge 4, Louisiana

Hon. Nat Tipton
Advocate General
State Supreme Court Building
Nashville, Tennessee

Hon. Vernon W. Thomson
Attorney General
State Capitol
Madison, Wisconsin

Hon. John P. Coleman
Attorney General
State Capitol
Jackson, Mississippi

Hon. Jacob G. Javits
Attorney General
State Capitol
Albany, New York

....

Subscribed and sworn to before me this .... day of November, A. D. 1956.

....

Notary Public

RUSSELL W. ROOT,

Attorney for The Metropolitan Sanitary District of Greater Chicago,
100 East Erie Street, Chicago 11, Illinois

Lawrence J. Fenlon,
Principal Assistant Attorney,
Of Counsel.

FILE COPY

FILED
NOV 26 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA,
OHIO and PENNSYLVANIA
Complainants
vs.
STATE OF ILLINOIS and the
SANITARY DISTRICT OF CHICAGO
Defendants

No. 2
Original

STATE OF MICHIGAN
Complainant
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al.
Defendants

No. 3
Original

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS
Intervening Defendants

STATE OF NEW YORK
Complainant
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al.
Defendants

No. 4
Original

PETITION OF THE COMMONWEALTH OF KENTUCKY, AN INTERVENING DEFENDANT, IN SUPPORT OF THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930

JO M. FERGUSON
ATTORNEY GENERAL

M. B. HOLIFIELD
ASSISTANT ATTORNEY GENERAL

COUNSEL FOR INTERENING DEFENDANT, COMMONWEALTH OF KENTUCKY.

DAVID B. SEBREE
ASSISTANT ATTORNEY GENERAL
STATE CAPITOL
FRANKFORT, KENTUCKY

OF COUNSEL.

DUNNE PRESS, LOUISVILLE, KY. 22

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA,
OHIO and PENNSYLVANIA
Complainants
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STATE OF ILLINOIS and the
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STATES OF MISSOURI, KENTUCKY,
TENNESSEE, LOUISIANA,
MISSISSIPPI and ARKANSAS
Intervening Defendants

STATE OF NEW YORK
Complainant
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al.
Defendants

No. 4
Original

PETITION OF THE COMMONWEALTH OF KENTUCKY, AN INTERVENING DEFENDANT, IN SUPPORT OF THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930

TO THE HONORABLE CHIEF JUSTICE AND ASSOCIATE JUSTICES OF THE SUPREME COURT OF THE UNITED STATES:

MAY IT PLEASE THE COURT:

The Commonwealth of Kentucky, an intervening defendant in this cause, presents this, its petition in support of the petition filed by the State of Illinois requesting a temporary modification of the decree of this Court entered on April 21, 1930, which prohibits the diversion of water from the Great Lakes-St. Lawrence Watershed into the Mississippi River by way of the Illinois Waterway in excess of 1500 cubic feet per second, in addition to domestic pumpage, by the State of Illinois or the Sanitary District of Chicago.

The Commonwealth of Kentucky recognizes the existence of the emergency conditions on the Mississippi River as are set forth in the petition made by the State of Illinois and avers that the conditions described in the said petition have seriously impaired the navigation and water transportation among the Kentucky ports located on the Mississippi River, and has done so to the irreparable damage of the Commonwealth of Kentucky and its citizens.

The Commonwealth of Kentucky, therefore, respectfully concurs in the petition heretofore filed by the State of Illinois for a temporary modification of the decree of this Court of April 21, 1930 in order to relieve the critical shortage of water which now exists in the Mississippi River.

Respectfully submitted,
JO M. FERGUSON
ATTORNEY GENERAL
M. B. HOLIFIELD
ASSISTANT ATTORNEY GENERAL
COUNSEL FOR INTERVENING DEFENDANT, COMMONWEALTH OF KENTUCKY.

DAVID B. SEBREE
ASSISTANT ATTORNEY GENERAL
STATE CAPITOL
FRANKFORT, KENTUCKY
OF COUNSEL.

I, M. B. Holifield, one of the attorneys for the Commonwealth of Kentucky, an intervening defendant herein, and a member of the bar of the Supreme Court of the United States, hereby certify that on the 6th day of December, 1956 I served copies of the foregoing petition for temporary modification of paragraph 3 of the decree of April 21, 1930 to the Supreme Court of the United States on the several parties thereto listed as follows:

1. On the State of Wisconsin by mailing a copy in a duly addressed envelope with postage prepaid to the Hon. Vernon W. Thomson, Attorney General of the State of Wisconsin, at the offices of the Attorney General in the State Capitol, Madison, Wisconsin.

2. On the State of Minnesota by mailing a copy in a duly addressed envelope with postage prepaid to the Hon. Miles Lord, Attorney General of the State of Minnesota, at the offices of the Attorney General in the State Capitol, St. Paul 1, Minnesota.

3. On the State of Ohio by mailing a copy in a duly addressed envelope with postage prepaid to the Hon. C. William O'Neill, Attorney General of the State of Ohio, at the offices of the Attorney General in the State House, Columbus, Ohio.

4. On the State of Pennsylvania by mailing a copy in a duly addressed envelope with postage prepaid to the Hon. Herbert B. Cohen, Attorney General of the State of Pennsylvania, at the offices of the Attorney General in the State Capitol, Harrisburg, Pennsylvania.

5. On the State of Michigan by mailing a copy in a duly addressed envelope with postage prepaid to the Hon. Thomas M. Kavanagh, Attorney General of the State of Michigan, at the offices of the Attorney General in the State Capitol at Lansing, Michigan.

6. On the State of New York by mailing a copy in a duly addressed envelope with postage prepaid to the Hon.

Jacob K. Javits, Attorney General of the State of New York, at the offices of the Attorney General in the State Capitol at Albany, New York.

M. B. Holifield

M. B. Holifield
Assistant Attorney General for the
Commonwealth of Kentucky

Office - Supreme Court,
FILED
NOV 28 1956
JOHN T. FEY, Cler

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

PETITION OF THE STATE OF IOWA, INTERVENING DEFENDANT, IN SUPPORT OF THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

DAYTON COUNTRYMAN,
Attorney General of Iowa,
Attorney for Petitioner.

CHAMPLIN-SHEALY COMPANY, CHICAGO 365

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

PETITION OF THE STATE OF IOWA, INTERVENING DEFENDANT, IN SUPPORT OF THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

To the Honorable

THE CHIEF JUSTICE AND ASSOCIATE JUSTICES OF THE SUPREME COURT OF THE UNITED STATES:

The State of Iowa, an intervening defendant in this cause, presents this, its petition, in support of the petition heretofore filed by the State of Illinois, and joins with the State of Illinois in praying for temporary modification of the decree of this Court entered on April 21, 1930, which prohibits diversion of water from the Great Lakes-St. Lawrence system or watershed in excess of 1,500 cubic feet per second, in addition to domestic pumpage, by the State of Illinois or the Sanitary District of Chicago.

That as fully set forth in the petition of the State of Illinois, unprecedented drought conditions in the Midwest and, in particular, in the area which forms a watershed for the Mississippi River, have resulted in a continuing decline of the water level of the Mississippi River to a point where navigation already is impaired and is imminently threatened with further impairment. That as a result of such drought conditions, the water level in the Mississippi River is continuing to decline, and it is apparent that within a matter of weeks navigation on the river, even by shallow draft vessels, will be completely halted unless relief is granted. That riverborne commerce moving to and from the states of the mid-continent is of vital importance to the economy of the states which are dependent, both for industrial and domestic use, upon barge transportation for the movement of bulk commodities such as iron ore, grain, fuel oil, and other items of commerce which must be moved by barge.

That there is no prospect of relief from this condition by natural means and the only means by which the necessary relief can be accomplished in time to avert the emergency conditions which already exist, and which are daily becoming more critical, is through the diversion of water from Lake Michigan via the Chicago Sanitary Canal and the Illinois River as prayed for in the petition of the State of Illinois. That as stated in that petition, the amount of water required to alleviate the present shortage of water in the Mississippi River, would have no appreciable effect upon the water level of Lake Michigan or of the Great Lakes-St. Lawrence system or watershed, and would in no respect impair or obstruct navigation thereon.

WHEREFORE, the State of Iowa respectfully concurs in the petition heretofore filed by the State of Illinois for temporary modification of the decree of this Court of April 21, 1930, to permit a diversion of 10,000 cubic feet of water per second from the Great Lakes-St. Lawrence system or watershed, in addition to domestic pumpage, for a period of one hundred days following the entry of the Court's order authorizing such modification, in order to relieve the critical shortage of water which now exists in the Mississippi River.

Respectfully submitted,

STATE OF IOWA,

By DAYTON COUNTRYMAN,

Attorney General of Iowa.

State of Iowa }
Polk County } ss.

Dayton Countryman, being first duly sworn, deposes and says he is a duly appointed and acting Attorney General in the State of Iowa; that he has read the foregoing petition; and that the matters and things therein set forth are true in substance and in fact as I verily believe.

....

Subscribed and sworn to before me this 20th day of November, A. D. 1956.

....
Notary Public in and for Polk County, Iowa.

Office - Supreme Court, U
FILED
DEC 5 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.,*
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.,*
Defendants.

No. 4 Original

ANSWER OF THE STATE OF NEW YORK, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

JACOB K. JAVITS,
Attorney General of the State
of New York,
Attorney for Complainant,
The Capitol,
Albany 1, N. Y.

JAMES O. MOORE, JR.,
Solicitor General of the
State of New York,
Of Counsel.

BATAVIA TIMES, LAW PRINTERS,
BATAVIA, N. Y.

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,

Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,

Defendants.

No. 2 Original

STATE OF MICHIGAN,

Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.*,

Defendants.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,

Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,

Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.*,

Defendants.

No. 4 Original

ANSWER OF THE STATE OF NEW YORK, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

To the Honorable The Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of New York, complainant in Original Cause No. 4, by Jacob K. Javits, its Attorney General, presents this answer to the petition filed by the State of Illinois, requesting temporary modification of the decree of April 21, 1930, which enjoins the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them,

> "from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage."

In support of the allegation in its petition as to the existence of a critical emergency in respect to navigation at Alton Lock in the Mississippi River, the State of Illinois by its duly authorized agents has represented to the State of New York:

(1) The Corps of Engineers, United States Army, St. Louis District has issued a notice of low water conditions (a) which presently hamper navigation on the Mississippi River, in particular passage through the Alton Lock (No. 26), serving, among other places, the Chicago Area, (b) which are expected to become progressively worse to the extent that commercial navigation may come practically to a halt at the lock, and (c) which will seriously affect the

Chicago area especially in respect to shortages of fuel oil and coal.

(2) The Corps of Engineers advises that the maximum legally allowable flow from Lake Michigan is now being utilized.

(3) The Secretary of the Army has advised Honorable Everett M. Dirksen, United States Senator from Illinois, with respect to the problem, in part, as follows:

> "With respect to increasing diversion of Great Lakes Waters, such diversion is now restricted to an annual average of 1,500 second feet plus domestic pumpage pursuant to a decree of the Supreme Court of the United States dated 21 April 1930 (281 U. S. 696). The Court retained jurisdiction 'for the purpose of any orders or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy'.
>
> "Accordingly, no authority is known to exist under which any change in the diversion of water from Lake Michigan could be permitted by this Department contrary to the restrictions imposed by the Supreme Court."

(4) The Acting Assistant Chief of Engineers for Civil Works, Corps of Engineers, has advised Senator Dirksen, in part, as follows:

> "The report of the Board of Engineers for Rivers and Harbors dated June 19, 1956 recommended construction of a dam near Chain of Rocks for the purpose of increasing the depth over the lower sills at Lock and Dam No. 26, Mississippi River, at times of low flow. During the preparation of this report, studies were made of every feasible way of alleviating the condition which develops at Lock No. 26 during low flow periods. No way was found to initiate corrective construction within our present authorities for improvement of

> the middle and upper Mississippi River. The construction of the proposed dam to remedy the situation is dependent upon the enactment of authorizing legislation, and subsequent appropriation of the necessary funds."

(5) The State of Illinois is of the opinion that the necessary authorization and funds will be forthcoming at the next session of the Congress, and that the construction and operation of the Chain of Rocks Dam will provide a permanent and sufficient solution of the low water problems at Alton Lock. If authorized with sufficient funds, it is estimated that the Chain of Rocks Dam could be constructed and in operation not later than September, 1958.

(6) The Deputy Assistant to the President of the United States has advised Senator Dirksen as follows:

> "I have looked into the matter of providing an additional diversion from Lake Michigan to meet the low water problem at Alton, Illinois, which you referred to in your letter of October 16.
>
> "I am told, and I understand that you have been so advised by the Secretary of the Army, that the diversion at Chicago is now restricted to an annual average of 1,500 second feet plus domestic pumpage by a 1930 Supreme Court decree. There appears to be no authority under which the Federal Government could increase the diversion as you request in view of the restrictions imposed by the Supreme Court. As you know, the Secretary of the Army is taking all practical steps to alleviate the low water conditions by coordinate and basin wide regulations of all available waters in the Mississippi-Missouri River system.
>
> "The Bureau of the Budget informs me that it is in process of getting additional information from the Corps of Engineers concerning the proposed project at Lock 26, Alton, Illinois. I have asked that every effort be made to conclude all Executive Branch review of this proposal prior to the reconvening of Congress."

(7) The Corps of Engineers, United States Army, has advised the State of Illinois that it will not be necessary or feasible to divert ten thousand cubic feet of water per second in addition to domestic pumpage from the Great Lakes-St. Lawrence system through the Illinois waterway in order to facilitate navigation at the Alton Lock; that the present critical emergency in respect to navigation at Alton Lock can be alleviated by the diversion of substantially less than ten thousand cubic feet of water per second, and that in the interest of navigation not more than approximately six to seven thousand cubic feet of water per second need or should be temporarily diverted.

Therefore, the State of New York admits that a temporary critical navigation condition exists at Alton Lock on the Mississippi River which can be alleviated by the diversion from the Great Lakes-St. Lawrence system of less than ten thousand cubic feet of water per second for a period of not exceeding 100 days.

The State of New York denies the allegation in the petition of the State of Illinois that:

> "The temporary increase in the rate of diversion now set will not adversely affect present lake levels in the Great Lakes-St. Lawrence system or watershed for the reason that the total quantity of water proposed to be diverted is not sufficient materially to affect such levels." (Pet. p. 2)

With respect to the statements in the Petition of the State of Illinois as to the existence of critical conditions on the Mississippi River, other than at Alton Lock, the State of New York alleges that there exist other means of remedying these alleged conditions than by diverting water from the Great Lakes-St. Lawrence system.

Solely because of the aforestated temporary critical emergency in respect to navigation at the Alton Lock, the State of New York does not oppose the petition of the State of Illinois provided that the State of Illinois will stipulate and agree to the following conditions, and to the inclusion thereof in any order of this Court temporarily modifying Paragraph 3 of the Decree of April 21, 1930:

1. The State of New York does not waive any position which it has heretofore taken respecting the injurious or detrimental affect of diversion of water from the Great Lakes-St. Lawrence system and expressly reserves the right to take such position in any future proceedings concerning this subject.

2. The granting of any relief upon the present petition of the State of Illinois will not be used as a precedent by any party for any future request for any additional temporary diversion in excess of the amounts fixed by this Court in its decree of April 21, 1930.

3. The amount of increased diversion shall be restricted to such amount as may be necessary, but shall not exceed 8,500 cubic feet per second.

4. The time during which such increased diversion may be made shall be limited to such period as may be necessary, but not exceeding 100 days from the date of entry of the Court's decree of modification.

5. The amounts and times of diversion as may be necessary to carry out the decree of temporary modification shall be determined by the Corps of Engineers, United States Army.

6. Any increased diversion authorized by the temporary decree of modification shall be and remain under the supervision and control of the Corps of En-

gineers, United States Army during the period for which such increased diversion may be authorized.

7. After the expiration of the period for which the increased diversion may be authorized all the provisions of the decree of this Court heretofore entered in this action on April 21, 1930 (281 U. S. 696) shall be and remain in full force and effect until further order of the Court.

8. The relief granted is based solely upon the petition of the State of Illinois and does not constitute an acknowledgement or recognition of any cause for, or right to relief which may be asserted by any other party to these causes.

9. There is no need for any clarification of the decree of April 21, 1930.

10. The fact that the State of New York does not oppose the petition of the State of Illinois for temporary modification of Paragraph 3 of the Decree of April 21, 1930, shall not be construed as an admission or evidence of the right of the State of Illinois, or any of its political subdivisions or other agencies, to divert any waters of the Great Lakes-St. Lawrence system except as provided in the Decree of April 21, 1930, as modified herein.

Respectfully submitted,

Jacob K. Javits
Attorney General of the State
of New York

By: James O. Moore, Jr.
Solicitor General of the State
of New York

December 1, 1956.

Office - Supreme Court, U.S.
FILED
DEC 5 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.,*
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.,*
Defendants.

No. 4 Original

MOTION OF THE STATE OF NEW YORK, COMPLAINANT, FOR DISMISSAL OF THE MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO), DEFENDANT, FOR CLARIFICATION OF THE DECREE OF APRIL 21, 1930, OR, IN THE ALTERNATIVE, FOR APPOINTMENT OF AND REFERENCE TO A SPECIAL MASTER.

JACOB K. JAVITS,
Attorney General of the State of New York,
Attorney for Complainant,
The Capitol,
Albany 1, N. Y.

JAMES O. MOORE, JR.,
Solicitor General of the State of New York,
Of Counsel.

BATAVIA TIMES, LAW PRINTERS,
BATAVIA, N. Y.

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
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STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.*,
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No. 4 Original

MOTION OF THE STATE OF NEW YORK, COMPLAINANT, FOR DISMISSAL OF THE MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO), DEFENDANT, FOR CLARIFICATION OF THE DECREE OF APRIL 21, 1930, OR, IN THE ALTERNATIVE, FOR APPOINTMENT OF AND REFERENCE TO A SPECIAL MASTER.

To the Honorable The Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of New York, complainant in Original Cause No. 4, by Jacob K. Javits, its Attorney General, presents this motion for dismissal of the motion of the Metropolitan Sanitary District of Greater Chicago (formerly the Sanitary District of Chicago), defendant, for clarification of the decree of April 21, 1930, or, in the alternative, for the appointment of a Special Master and the reference to him for hearing and report on the issues raised by the motion of the Metropolitan Sanitary District.

The motion to dismiss the motion of the Metropolitan Sanitary District is made on the grounds that:

1. There is no need for clarification of the decree of April 21, 1930.

2. The State of Illinois has petitioned this Court for temporary modification of Paragraph 3 of the Decree of April 21, 1930, and its petition does not ask or evince any need for clarification as distinguished from modification of that decree.

3. The Metropolitan Sanitary District has failed to show cause for modification on its behalf of the decree of April 21, 1930.

4. The Metropolitan Sanitary District lacks capacity to seek clarification or modification of the decree of April 21, 1930 with respect to matters concerning navigation.

5. The Metropolitan Sanitary District has not shown that it and the interests it purports to represent are not adequately represented by the State of Illinois.

6. The State of Illinois in its sovereign capacity and as *parens patriae* is the only party defendant authorized to seek relief due to the temporary emergency condition in respect to navigation as set forth in its aforestated petition.

7. The Metropolitan Sanitary District has no standing to speak for or to seek additional powers or jurisdiction on behalf of the Congress of the United States, the Secretary of the Army or the Chief of Engineers, United States Army.

8. The Metropolitan Sanitary District is not entitled to the declaratory relief sought by its motion so long as the treaty of January 11, 1909 with Great Britain remains in effect. In *Sanitary District* v. *United States*, 266 U. S. 405, 426, this Court held, in part, that the aforesaid Treaty "expressly provides against uses 'affecting the natural level or flow of boundary waters' without the authority of the United States or the Dominion of Canada within their respective jurisdictions and the approval of the International Joint Commission"; that withdrawal of water from Lake Michigan at the rate of ten thousand cubic feet per second will affect the level or flow of boundary waters, and that "that is a matter which cannot be done without the consent of the United States, even were there no international covenant in the case."

9. The procedure adopted by the Metropolitan Sanitary District of making its answer to the aforesaid petition of the State of Illinois the vehicle of a motion to clarify the decree of April 21, 1930 is not sanctioned by the rules of

this Court, would deny to the other parties to the above-entitled original causes sufficient time within which to oppose the motion, and can serve only to delay a determination of the application of the State of Illinois, which would be contrary to the stated desires of all the other parties and to the needs of the situation.

The alternative motion for the appointment of a Special Master and the reference to him for hearing and report of the issues raised by the motion of the Metropolitan Sanitary District is made on the grounds that:

(a) If the motion of the Metropolitan Sanitary District is not dismissed for the reasons above-stated, the motion presents complicated questions of fact and of law.

(b) The motion of the Metropolitan Sanitary District has for its ultimate purpose nullification of the decree of April 21, 1930.

(c) Since the Decree of April 21, 1930 the following actions, among others, have been taken in reliance thereon:

(1) The Legislature of the State of New York has enacted the Power Authority Act creating the Power Authority of the State of New York as a corporate municipal instrumentality of the State, and directing it to effectuate the declared policy of the State of New York to develop the inalienable natural resources of the State in the St. Lawrence and Niagara Rivers for commerce and navigation and for hydroelectric power. (Laws of 1931, Chapter 772, as amended; Public Authorities Law § 1000, *et seq.*)

(2) The governments of the United States and Canada submitted to the International Joint Commission established under the 1909 Treaty applications for its approval of the construction jointly by entities to be designated by the respective governments of certain works for the development of power in the International Rapids section of the St. Lawrence River. (U. S. Dept. of State Bulletin, Vol. 27, Dec. 29, 1952, pp. 1019-1024.)

(3) The International Joint Commission issued an order approving the construction of the aforesaid power works. (id; St. Lawrence Seaway Manual, Sen. Doc. No. 165, 83rd Cong. 2nd Sess.)

(4) The Federal Power Commission issued to the New York Power Authority a license under Section 4-e of the Federal Power Act for the construction, operation and maintenance of certain power facilities in the International Rapids section of the St. Lawrence River. (Op. No. 255 of the Federal Power Commission.)

(5) The President of the United States, by executive order, declared the New York Power Authority to be the designee of the government of the United States of America for the construction of the works referred to in the order of approval of the International Joint Commission. (18 Fed. Reg. 7005, Nov. 6, 1953.)

(6) The New York Power Authority has issued bonds in the sum of $335,000,000, backed by revenue to be derived from the sale of power and not by public credit, to finance its share of the construction of the aforesaid power works in conjunction with the

designee of the Canadian government, Hydroelectric Power Commission of Ontario.

(7) The designees of the governments of the United States and Canada are now in the process of completing the aforesaid power works.

(8) The New York Power Authority is now in the process of contracting for the sale of all the power that can be generated by its part of such works and the rates for the sale of such power have been initially fixed on the basis of anticipated power generation resulting from the stream flow as fixed by the Decree of April 21, 1930.

(9) By Act of Congress there was created the St. Lawrence Seaway Development Corporation with authority to construct in United States territory deep water navigation works substantially in accordance with the "Controlled single stage project 238-242" set forth in the report of the Canadian Temporary Great Lakes-St. Lawrence Basin Committee and the United States St. Lawrence Advisory Committee. (Public Law 358, 83rd Cong.)

(10) The Seaway Corporation is now engaged in constructing the aforesaid deep water navigation works, and the canals, locks and channel improvement it is making are based upon the historical stream flow.

(11) The United States and Canada signed on February 27, 1950 and put into effect a Treaty Concerning the Uses of the Waters of the Niagara River, which terminated the provisions of the 1909 Treaty only in respect to the waters of the Niagara

River, provided for the construction of certain remedial works in the Niagara River to preserve and enhance the beauty of Niagara Falls, specified the amount of water to flow over the Falls for scenic purposes and the amount of water that might be diverted from the River for power purposes, stated that the waters available for power purposes should be divided equally between the United States and Canada, that representatives be designated to determine the amount of water available for purposes of the Treaty, and that until such time as there are facilities in the territory of one party to use its full share of the diversion waters for power purposes, the other party may use the portion of that share for use of which facilities are not available. (T I A S 2130.)

(12) Canada is completing construction on its side of the Niagara River of new facilities, by the use of which together with some old facilities, which it will ultimately abandon, it is using its share and part of the United States' share of the waters made available for power purposes pursuant to the terms of the 1950 Treaty. When its new facilities are completed, it will be able to use its and the United States' full share of the waters of the Niagara River until facilities are available for use in United States of the United States' share of the waters.

(d) The motion of the Metropolitan Sanitary District for clarification of the Decree of April 21, 1930 is not its first effort to secure judicial or congressional sanction for an increase in the diversion of waters from Lake Michigan. To date, both this Court and the Congress have refused to deprive other users of such waters in Canada and the United States of their rights, except to meet a temporary critical emergency. See *Sanitary District of Chicago* v. *United States*, 266 U. S. 405; *Wisconsin* v. *Illinois*, 278 U. S. 367; 281 U. S. 179, 696; 311 U. S. 107; 340 U. S. 858; H. R. 3210, 83rd Cong. (1955); H. R. 2310 and S. 2550, 84th Cong. (1956); Marquette Law Review Vol. 30, Dec. 1946, Feb. 1947, May 1947.

(e) The parties complainant in the above entitled Original Causes should be afforded an opportunity to present evidence, if evidence is necessary, to show that any change in the decree of April 21, 1930, which would permit a greater diversion of waters from the Great Lakes-St. Lawrence system than is specified therein, will affect the natural level or flow of boundary waters to the prejudice and detriment of not only the complainants but also the United States and Canada, the people of the respective countries, the investors in the bonds of the New York Power Authority, the future consumers of the electrical power generated from the waters of the Niagara and St. Lawrence Rivers and the users of the navigation facilities of both countries.

WHEREFORE, the State of New York respectfully moves this Court for an order dismissing the motion of the Metropolitan Sanitary District of Greater Chicago (formerly the Sanitary District of Chicago) for clarification of the decree of April 21, 1930, or, in the alternative, for an order appointing a Special Master and referring to him for hearing and report the issues raised by the motion of the Metropolitan Sanitary District of Greater Chicago, with leave to the State of New York otherwise to oppose the motion of the Metropolitan Sanitary District of Greater Chicago by answer and brief and by the production of oral and documentary evidence.

Dated: December 1, 1956.

Respectfully submitted,

Jacob K. Javits
Attorney General of the State
of New York

By: James O. Moore, Jr.
Solicitor General of the State
of New York

Office - Supreme Court,
FILED
DEC 5 1956
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IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

MOTION OF THE STATE OF ILLINOIS THAT ITS PETITION FOR TEMPORARY MODIFICATION OF DECREE BE DECIDED SEPARATELY FROM THE MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO FOR CLARIFICATION OF THE DECREE.

LATHAM CASTLE,
Attorney General of the State of Illinois,
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William C. Wines,
Assistant Attorney General,
Of Counsel.

CHAMPLIN-SHEALY COMPANY, CHICAGO 388

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants*, vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants*.	No. 2 Original
STATE OF MICHIGAN, *Complainant*, vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants*.	No. 3 Original
STATE OF NEW YORK, *Complainant*, vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., *Defendants*.	No. 4 Original

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MOTION OF THE STATE OF ILLINOIS THAT ITS PETITION FOR TEMPORARY MODIFICATION OF DECREE BE DECIDED SEPARATELY FROM THE MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO FOR CLARIFICATION OF THE DECREE.

Illinois' motion for temporary modification of this Court's decree of April 21, 1935, so as to authorize diversion of water in an amount not exceeding 10,000 cubic feet per second, presented in view of the urgent and critical emergency described in that motion, is now pending before this Court.

Answers to that petition by the parties are due on or before December 7, 1956.

The Metropolitan Sanitary District of Greater Chicago, one of the parties to this cause, has filed a motion for clarification of the decree.

It is unnecessary to decide simultaneously the motion of the Metropolitan Sanitary District of Greater Chicago in conjunction with decision of Illinois' petition for temporary modification. Illinois desires that this Court's consideration of the Sanitary District's motion do not delay decision of this Court on the emergency petition.

Wherefore, Illinois respectfully moves that this Court consider her petition for emergency relief as soon after December 7, 1956, as is possible, Illinois again emphasizing the urgent nature of her application for temporary relief.

Respectfully submitted,

LATHAM CASTLE,
Attorney General of the State of Illinois,
Suite 900, 160 N. La Salle St.,
Chicago (1), Illinois,
Attorney for State of Illinois.

William C. Wines,
Assistant Attorney General,
Of Counsel.

CERTIFICATE

William C. Wines, Assistant Attorney General, hereby certifies that he has caused copies of the foregoing motion to be mailed to the following counsel at the following addresses, respectively:

Hon. Vernon W. Thomson
Attorney General
State Capitol
Madison, Wisconsin

Hon. Miles Lord
Attorney General
State Capitol
St. Paul 1, Minnesota

Hon. C. William O'Neill
Attorney General
State Capitol
Columbus, Ohio

Hon. Herbert Cohen
Attorney General
State Capitol
Harrisburg, Pennsylvania

Russell W. Root
Attorney for
The Metropolitan Sanitary
District of Greater Chicago
Law Dept., 100 E. Erie St.
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Hon. Thomas M. Kavanaugh
Attorney General
State Capitol
Lansing, Michigan

Hon. J. D. Buckman, Jr.,
Attorney General
State Capitol
Frankfort, Kentucky

Hon. Jack P. F. Gremillion
Attorney General
State Capitol
Baton Rouge 4, Louisiana

Hon. T. J. Gentry
Attorney General
State Capitol
Little Rock, Arkansas

Hon. John M. Dalton
Attorney General
State Capitol
Jefferson City, Missouri

Hon. George F. McCanless
Attorney General
State Supreme Court Building
Nashville, Tennessee

Hon. John P. Coleman
Attorney General
State Capitol
Jackson, Mississippi

Hon. Jacob G. Javits
Attorney General
State Capitol
Albany, New York

William C. Wines.

Office - Supreme Court, U.
FILED
DEC 6 1956
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IN THE

SUPREME COURT OF THE UNITED STATES.

NOS. 2, 3 AND 4, ORIGINAL.

OCTOBER TERM, A. D. 1956.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.
No. 2, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 3, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
No. 4, Original.

ANSWER

Of State of Missouri to Petition of State of Illinois and to Motion of Metropolitan Sanitary District of Greater Chicago.

JOHN M. DALTON,
Attorney General of the State of Missouri,
Supreme Court Building,
Jefferson City, Missouri,
Attorney for State of Missouri.

St. Louis Law Printing Co., 415 North Eighth Street. CEntral 1-4477.

IN THE

SUPREME COURT OF THE UNITED STATES.

NOS. 2, 3 AND 4, ORIGINAL.

OCTOBER TERM, A. D. 1956.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, Complainants, vs STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, Defendants.	No. 2, Original.
STATE OF MICHIGAN, Complainant, vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.	No. 3, Original.
STATE OF NEW YORK, Complainant, vs. STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al., Defendants.	No. 4, Original.

ANSWER

Of State of Missouri to Petition of State of Illinois and to Motion of Metropolitan Sanitary District of Greater Chicago.

To the Honorable Chief Justice and Associate Justices of the Supreme Court of the United States:

May It Please the Court:

The State of Missouri, an intervening defendant in this cause, for answer to the petition of the State of Illinois seeking modification of the decree of this Court entered on April 21, 1930, recognizing the existence of emergency drought conditions in the Mississippi Valley and the consequent detrimental effects of such conditions to navigation on the Mississippi River and the Illinois Waterway, interposes no objection to the relief prayed by the State of Illinois if it appears to this Court that modification of the decree of April 21, 1930, is justified or necessary.

The State of Missouri does join in the motion of the Metropolitan Sanitary District of Greater Chicago in requesting clarification of the decree of April 21, 1930, because of the construction apparently placed on such decree by the Secretary of the Army, as indicated by his reply to the petition of the Governor of Illinois.

A study of the background cases on this subject, as set out in the motion of the Metropolitan Sanitary District of Greater Chicago, does not indicate that it was ever the intention of the Supreme Court to deny to Congress or those delegated by it, i. e., the Secretary of the Army upon recommendation of the Chief of Engineers, the authority to determine when and how much diversion of water from the Great Lakes-St. Lawrence Watershed into the Mississippi Valley Watershed should be permitted for **navigation purposes.**

Wherefore, the State of Missouri respectfully adopts the motion of the Metropolitan Sanitary District of Greater Chicago and joins with it in requesting clarification of the decree of April 21, 1930, so as to make it clear that the limitations prescribed therein apply only to diversions for **sanitation purposes** and not to diversions for **navigation purposes.**

Respectfully submitted,

STATE OF MISSOURI,
By: JOHN M. DALTON,
Attorney General of the State of Missouri,
JOHN W. INGLISH,
Assistant Attorney General,
Supreme Court Building,
Jefferson City, Missouri.

State of Missouri, } ss.
County of Cole. }

The undersigned, John W. Inglish, being first duly sworn, deposes and says that he is a duly appointed and acting Assistant Attorney General of the State of Missouri and that the matters and things herein set forth are true in substance and in fact. Deponent further certifies that copies of the foregoing Answer have this day been mailed by first class United States mail, or United States air mail, to all parties to this proceeding, such service has been addressed, sufficient postage prepaid, as follows:

Hon. Latham Castle,
Attorney General,
Suite 900,
160 No. La Salle Street,
Chicago 1, Illinois.

Hon. T. J. Gentry,
Attorney General,
State Capitol,
Little Rock, Arkansas.

Hon. Herbert Cohen,
Attorney General,
State Capitol,
Harrisburg, Pennsylvania.

Hon. Jo M. Ferguson,
Attorney General,
State Capitol,
Frankfort, Kentucky.

Hon. Nat Tipton,
Advocate General,
State Supreme Court Bldg.,
Nashville, Tennessee.

Hon. Joe T. Patterson,
Attorney General,
State Capitol,
Jackson, Mississippi.

Hon. Russell W. Root,
Attorney for The Metropolitan
District of Greater Chicago,
100 East Erie Street,
Chicago 11, Illinois.

Hon. Miles Lord,
Attorney General,
State Capitol,
St. Paul 1, Minnesota.

Hon. C. William O'Neill,
Attorney General,
State Capitol,
Columbus, Ohio.

Hon. Thomas M. Kavanagh,
Attorney General,
State Capitol,
Lansing, Michigan.

Hon. Jack P. F. Gremillion,
Attorney General,
State Capitol,
Baton Rouge 4, Louisiana.

Hon. Vernon W. Thomson,
Attorney General,
State Capitol,
Madison, Wisconsin.

Hon. Jacob K. Javits,
Attorney General,
State Capitol,
Albany, New York.

....

Subscribed and sworn to before me this.........day of December, A. D. 1956.

....

Notary Public.

My commission expires.....................

Office - Supreme Court
FILED
DEC 7 1956
JOHN T. FEY, Cle

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
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STATE OF MICHIGAN,
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STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

MOTION OF THE STATE OF WISCONSIN TO DISMISS THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930

VERNON W. THOMSON
Attorney General of Wisconsin
ROY G. TULANE
Assistant Attorney General of Wisconsin
Attorneys for the State of Wisconsin

THE GILMAN PRESS, MADISON, WISCONSIN

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

MOTION OF THE STATE OF WISCONSIN TO DISMISS THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930

To the Honorable

The Chief Justice and Associate Justices
of the United States:

Comes now the State of Wisconsin by Vernon W. Thomson, Attorney General, and Roy G. Tulane, Assistant Attorney General, and moves this Court to dismiss with costs the petition of the State of Illinois for a temporary modification of paragraph 3 of the decree of April 21, 1930, as amended, upon the following grounds:

1. The State of Wisconsin has, as has the United States of America itself, a paramount interest in maintaining the levels of the Great Lakes as an international waterway serving the ports of Wisconsin and in opposing the diversion of waters properly allocable to the watershed of the Great Lakes to any other watershed or drainage basin.

2. The water level in Lake Michigan has declined more than 2½ feet from the high stages of 1952 and all reasonable prospects are that this decline will continue in effect for substantial periods in the future.

Respectfully submitted,

VERNON W. THOMSON
Attorney General of Wisconsin

ROY G. TULANE
Assistant Attorney General of Wisconsin

Attorneys for the State of Wisconsin

Dated December 5, 1956.

Office - Supreme Court,
FILED
DEC 7 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,* *v.* STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 2 Original
STATE OF MICHIGAN, *Complainant,* *v.* STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants,* STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS, *Intervening Defendants.*	No. 3 Original
STATE OF NEW YORK, *Complainant,* *v.* STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 4 Original

MOTION OF THE STATE OF WISCONSIN TO DISMISS THE MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO FOR CLARIFICATION OF THE DECREE OF APRIL 21, 1930

VERNON W. THOMSON
Attorney General of Wisconsin
ROY G. TULANE
Assistant Attorney General of Wisconsin
Attorneys for the State of Wisconsin

THE GILMAN PRESS, MADISON, WISCONSIN

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA,
OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY
DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY,
TENNESSEE, LOUISIANA,
MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY
DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

MOTION OF THE STATE OF WISCONSIN TO DISMISS THE MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO FOR CLARIFICATION OF THE DECREE OF APRIL 21, 1930

To the Honorable

The Chief Justice and Associate Justices
of the United States:

Comes now the State of Wisconsin by Vernon W. Thomson, Attorney General, and Roy G. Tulane, Assistant Attorney General, and moves this Court to dismiss with costs the petition of ~~the State of Illinois~~ Chicago for a temporary clarification ~~modification~~ of paragraph 3 of the decree of April 21, 1930, as amended, upon the following grounds:

1. The decree of April 21, 1930, on May 22, 1933, is clear and unambiguous and requires no interpretation or clarification.

2. The Metropolitan Sanitary District of Greater Chicago has no interest in the maintenance of navigation on the Mississippi River.

3. Under date of October 23, 1950 a similar request by the petitioner, joined at that time by the State of Illinois, for clarification of the decree of April 21, 1930 was dismissed by this Honorable Court. 340 U. S. 858, 95 L. ed 628.

Respectfully submitted,

VERNON W. THOMSON
Attorney General of Wisconsin

ROY G. TULANE
Assistant Attorney General of Wisconsin

Attorneys for the State of Wisconsin

Dated December 5, 1956.

Office - Supreme Court,
FILED
DEC 7 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

REPLY OF THE STATE OF OHIO, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

C. WILLIAM O'NEILL,
Attorney General of the
State of Ohio,
Attorney for Complainant.

CHAMPLIN-SHEALY COMPANY, CHICAGO 365

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IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 2 Original
STATE OF MICHIGAN, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants,* STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS, *Intervening Defendants.*	No. 3 Original
STATE OF NEW YORK, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 4 Original

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REPLY OF THE STATE OF OHIO, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

To the Honorable

THE CHIEF JUSTICE AND ASSOCIATE JUSTICES
OF THE SUPREME COURT OF THE UNITED STATES:

The State of Ohio, one of the complainants in this cause, presents this, its reply, to the petition filed by the State of Illinois, requesting temporary modification of the decree of this Court entered on April 21, 1930, which prohibits diversion of water from the Great Lakes-St. Lawrence system or watershed in excess of 1500 cubic feet per second, in addition to domestic pumpage, by the State of Illinois or the Sanitary District of Chicago.

The State of Ohio recognizes the existence of the emergency conditions on the Mississippi River as set forth in the aforesaid petition filed by the State of Illinois. Without waiving any position which it has heretofore taken respecting diversion of water from the Great Lakes-St. Lawrence system, and expressly reserving the right to take such position in any future proceedings concerning this subject, the State of Ohio interposes no objection to the temporary modification of the Court's decree as requested in the petition of the State of Illinois.

Respectfully submitted,

STATE OF OHIO,
C. WILLIAM O'NEILL,
Attorney General of the State of Ohio,
Attorney for Complainant.

By LARRY H. SNYDER,
Assistant Attorney General of the State of Ohio.

State of Ohio }
Franklin County } ss.

Larry H. Snyder, being first duly sworn, deposes and says that he is a duly appointed and acting Assistant Attorney General in the State of Ohio; that he has read the foregoing reply; and that the matters and things therein set forth are true in substance and in fact. Deponent further certifies that copies of the foregoing reply have this day been mailed by first class United States mail, or United States airmail, to all parties to this proceeding.

....

Subscribed and sworn to before me this 15th day of November, A. D. 1956.

....

Notary Public, State of Ohio.

My commission expires August 31, 1959.

Office - Supreme Court, U.
FILED
DEC 7 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

REPLY OF THE STATE OF MINNESOTA, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

MILES LORD,
Attorney General of the
State of Minnesota,
Attorney for Complainant.

CHAMPLIN-SHEALY COMPANY, CHICAGO 365

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

REPLY OF THE STATE OF MINNESOTA, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

To the Honorable

THE CHIEF JUSTICE AND ASSOCIATE JUSTICES
OF THE SUPREME COURT OF THE UNITED STATES:

The State of Minnesota, one of the complainants in this cause, presents this, its reply, to the petition filed by the State of Illinois requesting temporary modification of the decree of this Court entered on April 21, 1930, which prohibits diversion of water from the Great Lakes—St. Lawrence system or watershed in excess of 1500 cubic feet per second, in addition to domestic pumpage, by the State of Illinois or the Sanitary District of Chicago.

The State of Minnesota recognizes the existence of the emergency conditions on the Mississippi River as set forth in the aforesaid petition filed by the State of Illinois. Without waiving any position which it has heretofore taken respecting the injurious or detrimental effect of excessive diversion of water from the Great Lakes—St. Lawrence system, and expressly reserving the right to take such position in any future proceedings concerning this subject, the State of Minnesota interposes no objection to the temporary modification of the Court's decree as requested in the petition of the State of Illinois.

Respectfully submitted,

STATE OF MINNESOTA,
MILES LORD,
Attorney General of the
State of Minnesota,
Attorney for Complainant.

By JOSEPH J. BRIGHT,
Asst. Attorney General of the
State of Minnesota.

State of Minnesota } ss:
Ramsey County }

Joseph J. Bright, being first duly sworn, deposes and says that he is a duly appointed and acting Asst. Attorney General in the State of Minnesota; that he has read the foregoing reply; and that the matters and things therein set forth are true in substance and in fact. Deponent further certifies that copies of the foregoing reply have this day been mailed by first class United States mail, or United States airmail, to all parties to this proceeding.

....

Subscribed and sworn to before me this 9th day of November, A. D. 1956.

....

Notary Public.

Office - Supreme Court, U.S.
FILED
DEC 7 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

PETITION OF THE STATE OF ARKANSAS, INTERVENING DEFENDANT, IN SUPPORT OF THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

TOM GENTRY,
Attorney General
State of Arkansas,
State Capitol,
Little Rock, Arkansas.

JAMES L. SLOAN,
Chief Assistant Attorney General,
State of Arkansas,
State Capitol,
Little Rock, Arkansas.
Attorneys for Petitioner.

CHAMPLIN-SHEALY COMPANY, CHICAGO 365

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA,
OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO, et al.,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and THE SANITARY
DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

PETITION OF THE STATE OF ARKANSAS, INTERVENING DEFENDANT, IN SUPPORT OF THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

To the Honorable
THE CHIEF JUSTICE AND ASSOCIATE JUSTICES
OF THE SUPREME COURT OF THE UNITED STATES:

The State of Arkansas, an intervening defendant in this cause, presents this, its petition, in support of the petition heretofore filed by the State of Illinois, and joins with the

State of Illinois in praying for temporary modification of the decree of this Court entered on April 21, 1930, which prohibits diversion of water from the Great Lakes-St. Lawrence system or watershed in excess of 1,500 cubic feet per second, in addition to domestic pumpage, by the State of Illinois or the Sanitary District of Chicago.

As fully set forth in the petition of the State of Illinois, unprecedented drought conditions in the Midwest and, in particular, in the area which forms a watershed for the Mississippi River, have resulted in a continuing decline of the water level of the Mississippi River to a point where navigation already is impaired. As a result of such drought conditions, the water level in the Mississippi River is continuing to decline, and it is apparent that within a matter of weeks navigation on the river, even by shallow draft vessels, will be completely halted. River-borne commerce moving to and from the State of Arkansas is of vital importance to the economy of the state.

There is no prospect of relief from this condition by natural means and the only means by which the necessary relief can be accomplished in time to avert the emergency conditions which already exist, and which are daily becoming more critical, is through the diversion of water from Lake Michigan via the Chicago Sanitary Canal and the Illinois River as prayed for in the petition of the State of Illinois. As stated in that petition, the amount of water required to alleviate the present shortage of water in the Mississippi River, would have no appreciable effect upon the water level of Lake Michigan or of the Great Lakes-St. Lawrence system or watershed, and would in no respect impair or obstruct navigation thereon.

Wherefore, the State of Arkansas respectfully concurs in the petition heretofore filed by the State of Illinois for temporary modification of the decree of this Court of April

21, 1930, to permit a diversion of 10,000 cubic feet of water per second from the Great Lakes-St. Lawrence system or watershed, in addition to domestic pumpage, for a period of one hundred days following the entry of the Court's order authorizing such modification, in order to relieve the critical shortage of water which now exists in the Mississippi River.

Respectfully submitted,

STATE OF ARKANSAS,
TOM GENTRY,
Attorney General,
State Capitol,
Little Rock, Arkansas,

By: JAMES L. SLOAN,
Chief Assistant Attorney General,
State Capitol,
Little Rock, Arkansas,
Attorneys for Petitioner.

State of Arkansas }
Pulaski County } ss.

James L. Sloan, being first duly sworn, deposes and says that he is a duly appointed and acting Assistant Attorney General in the State of Arkansas; that he has read the foregoing reply; and that the matters and things therein set forth are true in substance and in fact. Deponent further certifies that copies of the foregoing Petition has this day been mailed by first class United States mail, or United States airmail, to all parties to this proceeding.

....

Subscribed and sworn to before me this .... day of ...., A. D. 1956.

....

Notary Public, State of Arkansas.
My commission expires ....

Office - Supreme Court,
FILED
DEC 7 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

PETITION OF THE STATE OF LOUISIANA, INTERVENING DEFENDANT, IN SUPPORT OF THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

JACK P. F. GREMILLION,
Attorney General of the
State of Louisiana,
Attorney for Petitioner.

CHAMPLIN-SHEALY COMPANY, CHICAGO 365

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

PETITION OF THE STATE OF LOUISIANA, INTERVENING DEFENDANT, IN SUPPORT OF THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

To the Honorable

The Chief Justice and Associate Justices
of the Supreme Court of the United States:

The State of Louisiana, an intervening defendant in this cause, presents this, its petition, in support of the petition heretofore filed by the State of Illinois, and joins with the State of Illinois in praying for temporary modification of the decree of this Court entered on April 21, 1930, which prohibits diversion of water from the Great Lakes-St. Lawrence system or watershed in excess of 1,500 cubic feet per second, in addition to domestic pumpage, by the State of Illinois or the Sanitary District of Chicago.

As fully set forth in the petition of the State of Illinois, unprecedented drought conditions in the area forming the watershed of the Mississippi River have resulted in a continuing decline of water level of the Mississippi River to a point where navigation has been and will continue to be seriously impaired.

The State of Louisiana concurs in the petition of the State of Illinois, and in the petition of intervention of the State of Missouri, and in addition submits the following reasons, among others, for the granting of the relief prayed.

In addition to the lowered water levels causing serious impairment of navigation and transportation of resources in domestic and international commerce, other problems develop which are peculiar to the lower reaches of the river. Lack of fresh water flow in sufficient volume has three direct results on navigation; first, a wedge of salt water from the Gulf of Mexico moves along the bottom in an upstream direction, and flocculated material, commonly called sludge, is deposited as a result of the fresh-salt water contact, this material being a serious navigation hazard, causing ships to lose rudder response and to lose headway;

second, an increase in sedimentation of other material held in suspension ahead of the salt water intrusion results in channel shallowing, and further impairment of navigation; third, reduced volume of fresh water in the main channel causes increased sedimentation in distributary channels. The Atchafalaya River is one such distributary, and millions of dollars are now being spent by the United States Corps of Engineers at the confluence of this river and the Mississippi River to preserve and maintain the channel unaffected by additional sedimentation.

A critical shortage of crude oil has developed as a direct result of the Arab-Israeli war, and the seizure of the Suez Canal by Egypt. Louisiana has been petitioned to satisfy part of the new demand for domestic oil because of its ready availability from pipeline terminal directly into tanker transportation by water. The many terminals necessary to allow Louisiana to meet the increased demand for fuel oil must be maintained in operating capacity and some dredging must be done. Additional flow of fresh water would help alleviate the three sedimentation problems caused by abnormally low river states.

There is, too, the probability of serious health problems developing and becoming critical as the drinking water supply of cities, such as New Orleans, among others, becomes threatened by contamination from salt, should the decline of fresh water flow continue.

Barring unforeseen relief by nature, it is thus apparent that curtailment of commerce and threats to health will cause irreparable and unnecessary injury. The only means by which the necessary relief can be accomplished in time to avert the emergency conditions which already exist, and which are daily becoming more critical, is through the diversion of water from Lake Michigan via the Chicago Sanitary Canal and the Illinois River as prayed for in the petition of the State of Illinois. As stated in that petition, the amount of water required to alleviate the present shortage of water in the Mississippi River, would have no appreciable effect upon the water level of Lake Michigan or of the Great Lakes-St. Lawrence system or watershed, and would in no respect impair or obstruct navigation thereon.

Wherefore, the State of Louisiana respectfully concurs in the petition heretofore filed by the State of Illinois for temporary modification of the decree of this Court of April 21, 1930, to permit a diversion of 10,000 cubic feet of water per second from the Great Lakes-St. Lawrence system or watershed, in addition to domestic pumpage, for a period of one hundred days following the entry of the Court's order authorizing such modification, in order to relieve the critical shortage of water which now exists in the Mississippi River.

Respectfully submitted,

STATE OF LOUISIANA,

By JACK P. F. GREMILLION,
Attorney General of the State of Louisiana.

Marc Dupuy, Jr.,
Baton Rouge, Louisiana
Of Counsel.

State of Louisiana
East Baton Rouge County } ss.

Jack P. F. Gremillion, being first duly sworn, deposes and says that he is a duly appointed and acting Attorney General in the State of Louisiana; that he has read the foregoing reply; and that the matters and things therein set forth are true in substance and in fact. Deponent further certifies that copies of the foregoing reply have this day been mailed by first class United States mail, or United States airmail, to all parties to this proceeding.

....

Subscribed and sworn to before me this ...... day of November, A. D. 1956.

....

Notary Public

Office - Supreme Court, U.
FILED
DEC 7 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

REPLY OF THE STATE OF PENNSYLVANA, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

HERBERT COHEN,
Attorney General of the
State of Pennsylvania,
Attorney for Complainant.

CHAMPLIN-SHEALY COMPANY, CHICAGO 365

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

REPLY OF THE STATE OF PENNSYLVANA, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

To the Honorable

THE CHIEF JUSTICE AND ASSOCIATE JUSTICES OF THE SUPREME COURT OF THE UNITED STATES:

The State of Pennsylvania, one of the complainants in this cause, presents this, its reply, to the petition filed by the State of Illinois, requesting temporary modification of the decree of this Court entered on April 21, 1930, which prohibits diversion of water from the Great Lakes-St. Lawrence system or watershed in excess of 1500 cubic feet per second, in addition to domestic pumpage, by the State of Illinois or the Sanitary District of Chicago.

The State of Pennsylvania recognizes the existence of the emergency conditions on the Mississippi River as set forth in the aforesaid petition filed by the State of Illinois. Without waiving any position which it has heretofore taken respecting the injurious or detrimental effect of excessive diversion of water from the Great Lakes-St. Lawrence system, and expressly reserving the right to take such position in any future proceedings concerning this subject, the State of Pennsylvania interposes no objection to the temporary modification of the Court's decree as requested in the petition of the State of Illinois.

Respectfully submitted,

STATE OF PENNSYLVANIA

By HERBERT B. COHEN,
Attorney General of the
State of Pennsylvania
Attorney for Complainant.

By LOIS G. FORER,
Deputy Attorney General

State of Pennsylvania }
Philadelphia County } ss:

Lois G. Forer, being first duly sworn, deposes and says that she is a duly appointed and acting Deputy Attorney General in the Commonwealth of Pennsylvania; that she has read the foregoing reply; and that the matters and things therein set forth are true in substance and in fact according to information and belief. Deponent further certifies that copies of the foregoing reply have this day been mailed by first class United States mail, or United States airmail, to all parties to this proceeding.

....

Subscribed and sworn to before me this 16th day of November, A. D. 1956.

....

Notary Public.

FILED
DEC 8 1956
JOHN T. FEY, Clerk

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA
Complainants
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO
Defendants

No. 2
Original

STATE OF MICHIGAN
Complainant
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.
Defendants
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS
Intervening Defendants

No. 3
Original

STATE OF NEW YORK
Complainant
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al.
Defendants

No. 4
Original

REPLY OF THE STATE OF MISSISSIPPI, AN INTERVENING DEFENDANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930

JOE T. PATTERSON
Attorney General
of the State of Mississippi

DUGAS SHANDS
Assistant Attorney General

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA Complainants vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO Defendants	No. 2 Original
STATE OF MICHIGAN Complainant vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al. Defendants STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS Intervening Defendants	No. 3 Original
STATE OF NEW YORK Complainant vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO et al. Defendants	No. 4 Original

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REPLY OF THE STATE OF MISSISSIPPI, AN INTERVENING DEFENDANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF THE DECREE OF APRIL 21, 1930

To the Honorable Chief Justice and Associate Justices of the Supreme Court of the United States:

May it Please the Court:

The State of Mississippi, an intervening defendant in this cause, presents this, its reply, to the petition filed by the State of Illinois requesting a temporary modification of the decree of this Court entered on April 21, 1930, which prohibits the diversion of water from the Great Lakes-St. Lawrence Watershed into the Mississippi River by way of the Illinois Waterway in excess of 1500 cubic feet per second, in addition to domestic pumpage, by the State of Illinois or the Sanitary District of Chicago.

The State of Mississippi recognizes the existence of the emergency conditions on the Mississippi River as are set forth in the petition made by the State of Illinois and avers that the conditions described in the said petition have seriously impaired the navigation and water transportation among Mississippi ports located on the Mississippi River, and has done so to the irreparable damage of the State of Mississippi and its citizens.

The State of Mississippi, therefore, respectfully concurs in the petition heretofore filed by the State of Illinois for a temporary modification of the decree of this Court of April 21, 1930 in order to relieve the critical shortage of water which now exists in the Mississippi River.

Respectfully submitted,

JOE T. PATTERSON
Attorney General
of the State of Mississippi

DUGAS SHANDS
Assistant Attorney General

Counsel for Intervening Defendant,
State of Mississippi

STATE OF MISSISSIPPI
COUNTY OF HINDS

This day personally appeared before me, the undersigned Secretary of State of the State of Mississippi, Joe T. Patterson, who after being by me first duly sworn, states on oath that he is the duly elected, qualified and acting Attorney General of the State of Mississippi, that he has read the foregoing reply and that the things and matters therein set forth are true and correct as stated, and that true copies of the foregoing reply have this day been duly mailed to counsel for all parties to this proceeding.

Joe T. Patterson, Attorney General
of the State of Mississippi

Sworn to and subscribed before me, this the 8th day of December, 1956.

Heber Ladner, Secretary of State
of the State of Mississippi

(SEAL)

My commission expires January, 1960.

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JOHN T. FEY, C

Nos. 2, 3 and 4 Original

In the Supreme Court of the United States

October Term, 1956

States of Wisconsin, Minnesota, Ohio and Pennsylvania, complainants

v.

State of Illinois and the Sanitary District of Chicago

State of Michigan, complainant

v.

State of Illinois and the Sanitary District of Chicago, et al.

States of Missouri, Kentucky, Tennessee, Louisiana, Mississippi, and Arkansas, intervening defendants

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State of New York, complainant

v.

State of Illinois and the Sanitary District of Chicago, et al.

ON PETITION OF THE STATE OF ILLINOIS FOR A TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930

MEMORANDUM ON BEHALF OF THE UNITED STATES AS AMICUS CURIAE

J. LEE RANKIN,
Solicitor General,
JOHN F. DAVIS,
Assistant to the Solicitor General,
DAVID R. WARNER,
Attorney,
Department of Justice, Washington 25, D. C.

In the Supreme Court of the United States

OCTOBER TERM, 1956

No. 2 Original

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, COMPLAINANTS

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO

No. 3 Original

STATE OF MICHIGAN, COMPLAINANT

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, INTERVENING DEFENDANTS

No. 4 Original

STATE OF NEW YORK, COMPLAINANT

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.

ON PETITION OF THE STATE OF ILLINOIS FOR A TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930

MEMORANDUM ON BEHALF OF THE UNITED STATES AS AMICUS CURIAE

STATEMENT

By its petition the State of Illinois seeks modification of the present limitation imposed by Paragraph 3 of this Court's Order of April 21, 1930, to permit the diversion of 10,000 cubic feet a second of water, in addition to domestic pumpage, from Lake Michigan into the "Illinois Waterway" for a period of 100 days. The alleged purpose of the increased diversion is to provide sufficient water in the Mississippi River between Cairo and Alton, Illinois, in the Alton Lock, and in the Illinois Waterway between Alton and La Grange, for the movement of barges during an anticipated period of very low flow in the Mississippi River resulting from unprecedented drought conditions in the midwest.

The decree of which modification is sought was entered on April 21, 1930.[1] By its terms, paragraph 3, the State of Illinois and the Sanitary District of Chicago were enjoined, after December 31, 1938, "unless good cause be shown to the contrary", from diverting "any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage". The Court retained jurisdiction of the several suits "for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy".

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[1] 281 U. S. 696.

The United States is not a party to any of the entitled actions. However, the national and international interests involved in the proposed modification, and the fact that they have not been called to the attention of the Court by the parties, are such that the filing of this brief on behalf of the United States as *amicus curiae* is deemed necessary.

INTEREST OF THE UNITED STATES

The major interests of the United States arise under the Commerce clause of the Constitution,[2] and from its obligations to Canada under existing treaties.[3]

That the proposed increased diversion from Lake Michigan may have an effect upon navigation on Lake Michigan and the other Great Lakes is apparent from the Court's original opinion herein.[4] The interest of the United States in the matter of aid to navigation on the Illinois Waterway and the Mississippi River is equally apparent.

It is also clear that any diversion of the waters of Lake Michigan out of the watershed of the Great

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[2] Article I, Section 8. See *Sanitary District of Chicago* v. *United States*, 266 U. S. 405, 426 (1925) "* * * and that [a withdrawal of water from Lake Michigan which will affect the level of the Great Lakes] is a matter which cannot be done without the consent of the United States, even were there no international covenant in the case."

[3] Convention between the United States of America and Canada signed at Washington, February 27, 1950, Treaties and Other International Acts, Series 2130; Treaty between the United States and Great Britain Relating to Boundary Waters, and Questions Arising between the United States and Canada, signed at Washington January 11, 1909, Treaty Series 548, 36 Stat., pt. 2, 2448.

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[4] 278 U. S. 367, 409.

Lakes System will decrease to some extent the levels and flows of Lakes Huron, Erie, and Ontario and their connecting waterways. The interest of the United States in the proposed increased diversion from the standpoint of its effect upon international waters and the consequent need, in the proper conduct of foreign relations, for consultations with Canada prior to authorization thereof is therefore plain.

In addition, the treaty dated February 27, 1950 (*supra*, footnote 3) provides that the "total outflow" of Lake Erie, less requirements for domestic and sanitary purposes and for the service of canals for purposes of navigation (Article III), shall be utilized first to maintain certain stipulated flows over Niagara Falls (Article IV) and that the excess may be diverted for power purposes (Article V). The waters made available for power purposes are to be divided equally between the United States and Canada (Article VI). A diminution of the outflow of Lake Erie by increased diversions from Lake Michigan, without the express consent of Canada, might be considered a violation of the provisions of this treaty.

The treaty dated February 27, 1950, replaces the third, fourth and fifth paragraphs of Article V of the treaty dated January 11, 1909 (*supra,* footnote 3). Otherwise, the earlier treaty continues in force. By Article I thereof, the parties agreed that "the navigation of all navigable boundary waters shall forever continue free and open" and that "this same right of navigation shall extend to the waters of Lake Michigan". Although under Article II each of the parties reserved to itself, or the several State Governments on the one side and the Dominion or Provincial Governments on the other, the exclusive control over the use and diversion of all waters on its own side which, in their natural channels, would flow into boundary waters, nevertheless it was agreed that any interference with or diversion from their natural channel of waters on either side of the boundary "shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion or interference occurs". Article II further provides that neither party surrenders any right, which it may have, "to object to any interference with or diversions of waters on the other side of the boundary the effect of which would be productive of material injury to the navigation interests on its own side of the boundary". Thus, without regard to whether or not the waters of Lake Michigan constitute boundary waters within the definition thereof in the treaty dated January 11, 1909, the possibility of liability under the provisions of Article II establishes an interest of the United States in the proposed modification of the decree herein.

DISCUSSION

There have been periodic attempts by the State of Illinois and the Sanitary District of Chicago to obtain some modification of the restrictions of diversion of water to the Mississippi waterway imposed by the decree of this Court. The most recent of these attempts was in the form of legislation authorizing a temporary diversion. It was passed by the 83d Congress, 2d Session, as H. R. 3300, and was vetoed by the President on September 3, 1954 (100 Cong. Rec. 15569). A second similar act was passed by the 84th Congress, 2d Session, as H. R. 3210, and was vetoed on August 9, 1956 (102 Cong. Rec. (unbound) A6471). Among the reasons in the first veto message was the following: "The diversion of waters into and out of the Great Lakes has historically been the subject of negotiations with Canada. To proceed unilaterally in the manner proposed in H. R. 3300 is not wise policy. It would be the kind of action to which we would object if taken by one of our neighbors." 100 Cong. Rec. 15569. Both messages refer to reports in progress by the Corps of Engineers and by the International Joint Commission which would determine the best methods of obtaining improved control of the levels of the Great Lakes.

The same international considerations which led to these vetoes have a bearing on the present petition. The rights of Canada as well as those of the States of the United States bordering on the Great Lakes, are involved. We attach as an Appendix to this memorandum a letter from the Legal Adviser of the Department of State relating to this phase of the matter.

There appears to be no dispute among the parties that an emergency does exist with respect to low water imperiling navigation at points on the Mississippi waterway. The Corps of Engineers has informed us that the proposed diversion would serve to raise the water level at the Alton Lock about 1.3 feet, the full effect of which on navigation has not been ascertained, although it is reported that it would be sufficient to alleviate to some extent the present emergency. Moreover, there is an indication that the diversion urged by petitioner, even if regulated, would increase the velocity of the flow in certain reaches of the Illinois waterway to an extent that would result in a hindrance to navigation.

We submit this information for the consideration of the Court in addition to the legal issues which were before the Court at the time of its original decision. *Wisconsin* v. *Illinois,* 278 U. S. 367. Information from the reports referred to above (*supra,* p. 6) should be available early in January to aid in assessing the effect of the diversion.

J. Lee Rankin,
Solicitor General.
John F. Davis,
Assistant to the Solicitor General.
David R. Warner,
Attorney.

December, 1956.

APPENDIX

December 13, 1956.

Dear Mr. Attorney General: The Office of the Solicitor General has orally requested the views of this Department on the position that the United States should present to the Supreme Court with respect to the petition of the State of Illinois to divert additional water from Lake Michigan to the Mississippi waterway.

The only interest of this Department in the controversy stems from the fact that we have with the Government of Canada a treaty concerning boundary waters signed January 11, 1909 (36 Stat. 2448) and a treaty relating to the uses of the water of the Niagara River signed February 27, 1950 (1 U. S. Treaties and Other International Agreements 694). If the proposed diversion should have a material effect on Canadian navigation of the Great Lakes or should result in any injury on the Canadian side of the boundary such as a diminution of the power development, it is conceivable that Articles 1 or 2 of the 1909 treaty might be involved. Canada also might conceivably make a claim under the 1950 treaty. If it should do so the Department would have to examine the claim to ascertain whether in its view it was well founded.

Canada was promptly notified of the pendency of the present proceeding and has not raised any objection with this Department. Under the circumstances, and as presently advised by the Corps of Engineers as to the factual situation, the Department does not wish to request you to oppose the petition, but does feel that the two treaties above mentioned should be brought to the attention of the Court.

Sincerely yours,

HERMAN PHLEGER
The Legal Adviser.

For the Acting Secretary of State:
The Honorable
HERBERT BROWNELL, JR.,
Attorney General.

U. S. GOVERNMENT PRINTING OFFICE: 1958

FILED
DEC 13 1956
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
et al.,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
et al.,
Defendants.

No. 4 Original

MOTION OF THE STATE OF MICHIGAN, COMPLAINANT, FOR DISMISSAL OF THE MOTION OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO), DEFENDANT, FOR CLARIFICATION OF THE DECREE OF APRIL 21, 1930, OR, IN THE ALTERNATIVE, FOR APPOINTMENT OF AND REFERENCE TO A SPECIAL MASTER.

Thomas M. Kavanagh
Attorney General of the State of Michigan

By Edmund E. Shepherd
Solicitor General

Attorneys for Complainant
The Capitol—Lansing 2, Michigan

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IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,

Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,

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To the Honorable The Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of Michigan, complainant in Original Cause No. 3, by Thomas M. Kavanagh, its Attorney General and Edmund E. Shepherd, its Solicitor General, presents this motion for dismissal of the motion of the Metropolitan Sanitary District of Greater Chicago (formerly the Sanitary District of Chicago), defendant, for clarification of the decree of April 21, 1930, or, in the alternative, for the appointment of a Special Master and the reference to him for hearing and report on the issues raised by the motion of the Metropolitan Sanitary District.

The motion to dismiss the motion of the Metropolitan Sanitary District is made on the grounds that:

1. There is no need for clarification of the decree of April 21, 1930.

2. The State of Illinois has petitioned this Court for temporary modification of Paragraph 3 of the Decree of April 21, 1930, and its petition does not ask or evince any need for clarification as distinguished from modification of that decree.

3. The Metropolitan Sanitary District has failed to show cause for modification on its behalf of the decree of April 21, 1930.

4. The Metropolitan Sanitary District lacks capacity to seek clarification or modification of the decree of April 21, 1930 with respect to matters concerning navigation.

5. The Metropolitan Sanitary District has not shown that it and the interests it purports to represent are not adequately represented by the State of Illinois.

6. The State of Illinois in its soverign capacity and as *parens patriae* is the only party defendant authorized to seek relief due to the temporary emergency condition in respect to navigation as set forth in its aforestated petition.

7. The Metropolitan Sanitary District has no standing to speak for or to seek additional powers or jurisdiction on behalf of the Congress of the United States, the Secretary of the Army or the Chief of Engineers, United States Army.

8. The Metropolitan Sanitary District is not entitled to the declaratory relief sought by its motion so long as the treaty of January 11, 1909 with Great Britain remains in effect. In *Sanitary District* v. *United States,* 266 U. S. 405, 426, this Court held, in part, that the aforesaid Treaty "expressly provides against uses 'affecting the natural level or flow of boundary waters' without the authority of the United States or the Dominion of Canada within their respective jurisdictions and the approval of the International Joint Commission"; that withdrawal of water from Lake Michigan at the rate of ten thousand cubic feet per second will affect the level or flow of boundary waters, and that "that is a matter which cannot be done without the consent of the United States, even were there no international covenant in the case."

9. The procedure adopted by the Metropolitan Sanitary District of making its answer to the aforesaid petition of the State of Illinois the vehicle of a motion to clarify the decree of April 21, 1930 is not sanctioned by the rules of this Court, would deny to the other parties to the above-entitled original causes sufficient time within which to oppose the motion, and can serve only to delay a determination of the application of the State of Illinois, which would be contrary to the stated desires of all the other parties and to the needs of the situation.

The alternative motion for the appointment of a Special Master and the reference to him for hearing and report of the issues raised by the motion of the Metropolitan Sanitary District is made on the grounds that:

(a) If the motion of the Metropolitan Sanitary District is not dismissed for the reasons above-stated, the motion presents complicated questions of fact and of law.

(b) The motion of the Metropolitan Sanitary District has for its ultimate purpose nullification of the decree of April 21, 1930.

(c) Since the Decree of April 21, 1930 the following actions, among others, have been taken in reliance thereon:

(1) The Legislature of the State of New York has enacted the Power Authority Act creating the Power Authority of the State of New York as a corporate municipal instrumentality of the State, and directing it to effectuate the declared policy of the State of New York to develop the inalienable natural resources of the State in the St. Lawrence and Niagara Rivers for commerce and navigation

and for hydroelectric power. (Laws of 1931, Chapter 772, as amended; Public Authorities Law § 1000, *et seq.*)

(2) The governments of the United States and Canada submitted to the International Joint Commission established under the 1909 Treaty applications for its approval of the construction jointly by entities to be designated by the respective governments of certain works for the development of power in the International Rapids section of the St. Lawrence River. (U. S. Dept. of State Bulletin, Vol. 27, Dec. 29, 1952, pp. 1019-1024.)

(3) The International Joint Commission issued an order approving the construction of the aforesaid power works. (id; St. Lawrence Seaway Manual, Sen. Doc. No. 165, 83rd Cong. 2nd Sess.)

(4) The Federal Power Commission issued to the New York Power Authority a license under Section 4-e of the Federal Power Act for the construction, operation and maintenance of certain power facilities in the International Rapids section of the St. Lawrence River. (Op. No. 255 of the Federal Power Commission.)

(5) The President of the United States, by executive order, declared the New York Power Authority to be the designee of the government of the United States of America for the construction of the works referred to in the order of approval of the International Joint Commission. (18 Fed. Reg. 7005, Nov. 6, 1953.)

(6) The New York Power Authority has issued bonds in the sum of $335,000,000, backed by revenue

to be derived from the sale of power and not by public credit, to finance its share of the construction of the aforsesaid power works in conjunction with the designee of the Canadian government, Hydroelectric Power Commission of Ontario.

(7) The designees of the governments of the United States and Canada are now in the process of completing the aforesaid power works.

(8) The New York Power Authority is now in the process of contracting for the sale of all the power that can be generated by its part of such works and the rates for the sale of such power have been initially fixed on the basis of anticipated power generation resulting from the stream flow as fixed by the Decree of April 21, 1930.

(9) By Act of Congress there was created the St. Lawrence Seaway Development Corporation with authority to construct in United States territory deep water navigation works substantially in accordance with the "Controlled single stage project 238-242" set forth in the report of the Canadian Temporary Great Lakes-St. Lawrence Basin Committee and the United States St. Lawrence Advisory Committee. (Public Law 358, 83rd Cong.)

(10) The Seaway Corporation is now engaged in constructing the aforesaid deep water navigation works, and the canals, locks and channel improvement it is making are based upon the historical stream flow.

(11) The United States and Canada signed on February 27, 1950 and put into effect a Treaty Concerning the Uses of the Waters of the Niagara

River, which terminated the provisions of the 1909 Treaty only in respect to the waters of the Niagara River, provided for the construction of certain remedial works in the Niagara River to preserve and enhance the beauty of Niagara Falls, specified the amount of water to flow over the Falls for scenic purposes and the amount of water that might be diverted from the River for power purposes, stated that the waters available for power purposes should be divided equally between the United States and Canada, that representatives be designated to determine the amount of water available for purposes of the Treaty, and that until such time as there are facilities in the territory of one party to use its full share of the diversion waters for power purposes, the other party may use the portion of that share for use of which facilities are not available. (T I A S 2130.)

(12) Canada is completing construction on its side of the Niagara River of new facilities, by the use of which together with some old facilities, which it will ultimately abandon, it is using its share and part of the United States' share of the waters made available for power purposes pursuant to the terms of the 1950 Treaty. When its new facilities are completed, it will be able to use its and the United States' full share of the waters of the Niagara River until facilities are available for use in United States of the United States' share of the waters.

(d) The motion of the Metropolitan Sanitary District for clarification of the Decree of April 21, 1930 is not its first effort to secure judicial or congressional sanction for an increase in the diversion of waters from Lake Michigan. To date, both this Court and the Congress have refused to deprive other users of such waters in Canada and the United States of their rights, except to meet a temporary critical emergency. See *Sanitary District of Chicago* v. *United States*, 266 U. S. 405; *Wisconsin* v. *Illinois*, 278 U. S. 367; 281 U. S. 179, 696; 311 U. S. 107; 340 U. S. 858; H. R. 3210, 83rd Cong. (1955); H. R. 2310 and S. 2550, 84th Cong. (1956); Marquette Law Review Vol. 30, Dec. 1946, Feb. 1947, May 1947.

(e) The parties complainant in the above entitled Original Causes should be afforded an opportunity to present evidence, if evidence is necessary, to show that any change in the decree of April 21, 1930, which would permit a greater diversion of waters from the Great Lakes-St. Lawrence system than is specified therein, will affect the natural level or flow of boundary waters to the prejudice and detriment of not only the complainants but also the United States and Canada, the people of the respective countries, the investors in the bonds of the New York Power Authority, the future consumers of the electrical power generated from the waters of the Niagara and St. Lawrence Rivers and the users of the navigation facilities of both countries.

WHEREFORE, the State of Michigan, joining the State of New York, respectfully moves this Court for an order dismissing the motion of the Metropolitan Sanitary District of Greater Chicago (formerly the Sanitary District of Chicago) for clarification of the decree of April 21, 1930, or, in the alternative, for an order appointing a Special Master and referring to him for hearing and report the issues raised by the motion of the Metropolitan Sanitary District of Greater Chicago, with leave to the State of Michigan otherwise to oppose the motion of the Metropolitan

Sanitary District of Greater Chicago by answer and brief and by the production of oral and documentary evidence.

Dated: December 7, 1956.

Respectfully submitted,

Thomas M. Kavanagh
Attorney General of the
State of Michigan

By Edmund E. Shepherd
Solicitor General

Attorneys for Complainant
The Capitol—Lansing 2, Michigan

Office - Supreme Court,
FILED
DEC 13 1956
JOHN T. FEY, Cle

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No. 4 Original

ANSWER OF THE STATE OF MICHIGAN, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

Thomas M. Kavanagh
Attorney General of the State of Michigan

By Edmund E. Shepherd
Solicitor General

Attorneys for Complainant
The Capitol—Lansing 2, Michigan

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:THE HONORABLE JOHN T FEY, CLERK SUPREME COURT OF THE
UNITED STATES=

IN NUMBERS 2, 3 AND 4 ORIGINAL, STATE OF MICHIGAN ADOPTS AND STANDS UPON ANSWER OF STATE OF NEW YORK TO PETITION OF STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930. MICHIGAN ALSO APPROVES AND JOINS IN MOTION OF STATE OF NEW YORK FOR DISMISSAL OF MOTION OF METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO FOR CLARIFICATION OF DECREE OF APPOINTMENT OF SPECIAL MASTER. FOR THE RECORD FORMAL PRINTED ANSWER AND MOTION WILL BE FILED BY US NEXT WEEK:

=THOMAS M KAVANAGH ATTORNEY GENERAL OF THE STATE OF
MICHIGAN EDMUND E SHEPHERD SOLICITOR GENERAL OF THE
STATE OF MICH

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IN THE

Supreme Court of the United States

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ANSWER OF THE STATE OF MICHIGAN, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR TEMPORARY MODIFICATION OF PARAGRAPH 3 OF DECREE OF APRIL 21, 1930.

To the Honorable The Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of Michigan, complainant in Original Cause No. 3, by Thomas M. Kavanagh, its Attorney General, and Edmund E. Shepherd, its Solicitor General, presents this answer to the petition filed by the State of Illinois, requesting temporary modification of the decree of April 21, 1930, which enjoins the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them,

> "from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage."

In support of the allegation in its petition as to the existence of a critical emergency in respect to navigation at Alton Lock in the Mississippi River, the State of Illinois by its duly authorized agents has represented to the State of Michigan:

(1) The Corps of Engineers, United States Army, St. Louis District has issued a notice of low water conditions (a) which presently hamper navigation on the Mississippi River, in particular passage through the Alton Lock (No. 26), serving, among other places, the Chicago Area, (b) which are expected to become progressively worse to the extent that commercial navigation may come practically to a halt at the lock, and (c) which will seriously affect the

Chicago area especially in respect to shortages of fuel oil and coal.

(2) The Corps of Engineers advises that the maximum legally allowable flow from Lake Michigan is now being utilized.

(3) The Secretary of the Army has advised Honorable Everett M. Dirksen, United States Senator from Illinois, with respect to the problem, in part, as follows:

> "With respect to increasing diversion of Great Lakes Waters, such diversion is now restricted to an annual average of 1,500 second feet plus domestic pumpage pursuant to a decree of the Supreme Court of the United States dated 21 April 1930 (281 U. S. 696). The Court retained jurisdiction 'for the purpose of any orders or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy'.
>
> "Accordingly, no authority is known to exist under which any change in the diversion of water from Lake Michigan could be permitted by this Department contrary to the restrictions imposed by the Supreme Court."

(4) The Acting Assistant Chief of Engineers for Civil Works, Corps of Engineers, has advised Senator Dirksen, in part, as follows:

> "The report of the Board of Engineers for Rivers and Harbors dated June 19, 1956 recommended construction of a dam near Chain of Rocks for the purpose of increasing the depth over the lower sills at Lock and Dam No. 26, Mississippi River, at times of low flow. During the preparation of this report, studies were made of every feasible way of alleviating the condition which develops at Lock No. 26 during low flow periods. No way was found to initiate corrective construction within our present authorities for improvement of

> the middle and upper Mississippi River. The construction of the proposed dam to remedy the situation is dependent upon the enactment of authorizing legislation, and subsequent appropriation of the necessary funds."

(5) The State of Illinois is of the opinion that the necessary authorization and funds will be forthcoming at the next session of the Congress, and that the construction and operation of the Chain of Rocks Dam will provide a permanent and sufficient solution of the low water problems at Alton Lock. If authorized with sufficient funds, it is estimated that the Chain of Rocks Dam could be constructed and in operation not later than September, 1958.

(6) The Deputy Assistant to the President of the United States has advised Senator Dirksen as follows:

> "I have looked into the matter of providing an additional diversion from Lake Michigan to meet the low water problem at Alton, Illinois, which you referred to in your letter of October 16.
>
> "I am told, and I understand that you have been so advised by the Secretary of the Army, that the diversion at Chicago is now restricted to an annual average of 1,500 second feet plus domestic pumpage by a 1930 Supreme Court decree. There appears to be no authority under which the Federal Government could increase the diversion as you request in view of the restrictions imposed by the Supreme Court. As you know, the Secretary of the Army is taking all practical steps to alleviate the low water conditions by coordinate and basin wide regulations of all available waters in the Mississippi-Missouri River system.
>
> "The Bureau of the Budget informs me that it is in process of getting additional information from the Corps of Engineers concerning the proposed project at Lock 26, Alton, Illinois. I have asked that every effort be made to conclude all Executive Branch review of this proposal prior to the reconvening of Congress."

(7) The Corps of Engineers, United States Army, has advised the State of Illinois that it will not be necessary or feasible to divert ten thousand cubic feet of water per second in addition to domestic pumpage from the Great Lakes-St. Lawrence system through the Illinois waterway in order to facilitate navigation at the Alton Lock; that the present critical emergency in respect to navigation at Alton Lock can be alleviated by the diversion of substantially less than ten thousand cubic feet of water per second, and that in the interest of navigation not more than approximately six to seven thousand cubic feet of water per second need or should be temporarily diverted.

Therefore, the State of Michigan admits that a temporary critical navigation condition exists at Alton Lock on the Mississippi River which can be alleviated by the diversion from the Great Lakes-St. Lawrence system of less than ten thousand cubic feet of water per second for a period of not exceeding 100 days.

The State of Michigan denies the allegation in the petition of the State of Illinois that:

> "The temporary increase in the rate of diversion now set will not adversely affect present lake levels in the Great Lakes-St. Lawrence system or watershed for the reason that the total quantity of water proposed to be diverted is not sufficient materially to affect such levels." (Pet. p. 2)

With respect to the statements in the Petition of the State of Illinois as to the existence of critical conditions on the Mississippi River, other than at Alton Lock, the State of Michigan alleges that there exist other means of remedying these alleged conditions than by diverting water from the Great Lakes-St. Lawrence system.

Solely because of the aforestated temporary critical emergency in respect to navigation at the Alton Lock, the

State of Michigan does not oppose the petition of the State of Illinois provided that the State of Illinois will stipulate and agree to the following conditions, and to the inclusion thereof in any order of this Court temporarily modifying Paragraph 3 of the Decree of April 21, 1930:

1. The State of Michigan does not waive any position which it has heretofore taken respecting the injurious or detrimental affect of diversion of water from the Great Lakes-St. Lawrence system and expressly reserves the right to take such position in any future proceedings concerning this subject.

2. The granting of any relief upon the present petition of the State of Illinois will not be used as a precedent by any party for any future request for any additional temporary diversion in excess of the amounts fixed by this Court in its decree of April 21, 1930.

3. The amount of increased diversion shall be restricted to such amount as may be necessary, but shall not exceed 8,500 cubic feet per second.

4. The time during which such increased diversion may be made shall be limited to such period as may be necessary, but not exceeding 100 days from the date of entry of the Court's decree of modification.

5. The amounts and times of diversion as may be necessary to carry out the decree of temporary modification shall be determined by the Corps of Engineers, United States Army.

6. Any increased diversion authorized by the temporary decree of modification shall be and remain under the supervision and control of the Corps of Engineers, United States Army during the period for which such increased diversion may be authorized.

7. After the expiration of the period for which the increased diversion may be authorized all the provisions of the decree of this Court heretofore entered in this action on April 21, 1930 (281 U. S. 696) shall be and remain in full force and effect until further order of the Court.

8. The relief granted is based solely upon the petition of the State of Illinois and does not constitute an acknowledgement or recognition of any cause for, or right to relief which may be asserted by any other party to these causes.

9. There is no need for any clarification of the decree of April 21, 1930.

10. The fact that the State of Michigan does not oppose the petition of the State of Illinois for temporary modification of Paragraph 3 of the Decree of April 21, 1930, shall not be construed as an admission or evidence of the right of the State of Illinois, or any of its political subdivisions or other agencies, to divert any waters of the Great Lakes-St. Lawrence system except as provided in the Decree of April 21, 1930, as modified herein.

Respectfully submitted,

Thomas M. Kavanagh
Attorney General of the
State of Michigan

By Edmund E. Shepherd
Solicitor General

Attorneys for Complainant
The Capitol—Lansing 2, Michigan

December 7, 1956.

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JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1957

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.,*
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 4, Orig.

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.,*
Defendants.

MOTION OF THE STATE OF NEW YORK, COMPLAINANT, FOR MODIFICATION OF THE DECREE OF APRIL 21, 1930, SO AS TO REQUIRE THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO), DEFENDANT, TO RETURN TO LAKE MICHIGAN THE WATER TAKEN THEREFROM AS DOMESTIC PUMPAGE, OR, IN THE ALTERNATIVE, FOR APPOINTMENT OF AND REFERENCE TO A SPECIAL MASTER.

LOUIS J. LEFKOWITZ,
Attorney General of the State of New York,
By: John R. Davison,
Solicitor General of the State of New York.

BATAVIA TIMES, LAW PRINTERS,
BATAVIA, N. Y.

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STATE OF ILLINOIS and the SANITARY DISTRICT
OF CHICAGO, *et al.,*
Defendants.
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STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT
OF CHICAGO, *et al.,*
Defendants.

MOTION OF THE STATE OF NEW YORK, COMPLAINANT, FOR MODIFICATION OF THE DECREE OF APRIL 21, 1930, SO AS TO REQUIRE THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO), DEFENDANT, TO RETURN TO LAKE MICHIGAN THE WATER TAKEN THEREFROM AS DOMESTIC PUMPAGE, OR, IN THE ALTERNATIVE, FOR APPOINTMENT OF AND REFERENCE TO A SPECIAL MASTER.

To the Honorable the Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of New York, complainant, by Louis J. Lefkowitz, its Attorney General, presents this motion for modification of the decree of April 21, 1930, so as to require the Metropolitan Sanitary District of Greater Chicago (formerly the Sanitary District of Chicago), defendant, to return to Lake Michigan the water taken therefrom as domestic pumpage, or, in the alternative, for the appointment of a Special Master and reference to him for hearing and report of the issues raised by this motion.

The decree of this Court of April 21, 1930 in the above entitled actions provides, so far as is here pertinent, as follows (281 U. S. 696, 697, 698):

> "3. That on and after December 31, 1938, unless good cause be shown to the contrary, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage.
>
> "4. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for domestic water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area."

* * *

> "7. That any of the parties hereto, complainants or defendants, may, * * * apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy."

In addition to the affirmative relief mentioned above, modification of the decree is here sought to the extent of striking therefrom the words "in addition to domestic pumpage" in paragraph number 3 and all of paragraph number 4.

The grounds of this motion are:

1. The original complaints in these actions did not demand that the water taken from Lake Michigan as domestic pumpage be returned to the Lake. This Court, therefore, rejected the demands which complainants made upon the argument for such return. The Court said (281 U. S. 179, 200):

> "Perhaps the complainants would not be very insistent with regard to the 1,000 or 1,500 c. f. s. which earlier in this case they seemed to admit to be reasonable, if their demand were allowed that the domestic pumpage be purified and returned to the Lake—a demand not contemplated by their bill. But purification is not absolute. How nearly perfect it will be with the colossal works that the defendants have started is somewhat a matter of speculation. The master estimates that with efficient operation the proposed treatment should reach an average of 85 per cent purification and probably will be 90 per cent or more. Even so we are somewhat surprised that the complainants should desire the effluent returned. The withdrawal of water for domestic purposes is not assailed by the complainants and we are of opinion that the course recommended by the master is more reasonable than the opposite demand. If the amount

withdrawn should be excessive, it will be open to complaint. Whether the right for domestic use extends to great industrial plants within the District has not been argued but may be open to consideration at some future time."

2. On the hearing before the Special Master (Honorable Charles E. Hughes), the "suggestion" that the water taken from Lake Michigan as domestic pumpage be returned to the Lake was made only "in a general way", and the Special Master said that the evidence was "by no means convincing that it would be a reasonable requirement" (Report of Special Master, Appendix A p. 82).

3. At the time the Special Master made his report, the population was estimated at 3,500,000, with an additional population equivalent of industrial waste of 1,500,000. It was also then estimated that in 1945 the total of human population and population equivalent of industrial waste would be 6,800,000 (Report of Special Master, Appendix A p. 81).

4. The Special Master found that 100% purification of the sewage taken to the treatment works was not practicable at that time, and that the expected degree of purification would be between 85% and 90% (Report of Special Master, Appendix A p. 81).

5. The Special Master also found that it was not clear whether the return of domestic pumpage to the Lake would be "compatible with the interests of navigation in the Chicago harbor" at that time (Report of Special Master, Appendix A p. 82).

6. The Special Master also found that it was not clear at that time whether "there would be a serious danger of contaminating the water supply and creating offensive con-

ditions at the bathing beaches of the city" (Report of Special Master, Appendix A p. 82).

7. The Special Master also found that there remained a problem with respect to the storm flow (Report of Special Master, Appendix A p. 82).

8. The Special Master concluded that provision should be made for further examination "after the sewage treatment plants have been completed, and the effect of the effluent therefrom with the storm water flow on the navigable channels has been observed, to the end that the question of any further or other relief may have appropriate consideration in the light of actual conditions".

9. The amount of water now being withdrawn from the Lake for domestic and industrial purposes is excessive in that there is being withdrawn for such purposes as domestic pumpage, which is not returned, an amount required to serve a human population of over 4,600,000, and an additional population equivalent of industrial waste of over 3,800,000, a total of over 8,400,000, which total is expected to increase within the next 20 years to 15,000,000 to 20,000,000.

10. The present and ever-increasing withdrawal of water from the Lake as domestic pumpage invades and increasingly will invade complainant's rights by lowering the water levels of the Great Lakes upon which it borders, and by decreasing the volume of outflow from the Great Lakes through the Niagara and St. Lawrence Rivers.

11. This deprivation of complainant's rights is not only prejudicial and detrimental to complainant but also to the other States which border the Great Lakes, the United States and Canada and their respective people, the Power Authority of the State of New York which is

directed by licenses of the Federal Power Commission to develop hydroelectric power from the waters of the Niagara and St. Lawrence Rivers, the investors in the bonds of that Authority, the future consumers of the electrical power which it will generate, and all who make use of these natural resources for purposes of navigation, commerce, recreation and power development.

12. It is now practicable to have a greater percentage of purification than is presently being accorded.

13. Return of domestic pumpage to the Lake would be in the interest of navigation.

14. Return of domestic pumpage to the Lake would not contaminate the water supply or create any offensive condition.

15. The problem with respect to storm flow can be solved.

16. Experience has shown that it is not only right but reasonable to require the domestic pumpage to be returned to the Lake.

17. The right to divert water from the Lake for domestic use does not extend to great industrial plants.

18. Complainant should be afforded an opportunity to present evidence, if evidence is necessary, to show that the present withdrawal of water from Lake Michigan as domestic pumpage by defendant, State of Illinois, and the expected increase in such withdrawal illegally and unnecessarily lowers and will continue so to lower the natural level and flow of the waters of the Great Lakes-St. Lawrence system and that this deprives and will continue to deprive complainant, its agencies, subdivisions and people of their rights in these natural resources, and causes them to suffer substantial financial losses.

Wherefore, complainant, State of New York, respectfully moves this Court for an order modifying the decree of April 21, 1930 by striking therefrom the words "in addition to domestic pumpage" in paragraph number 3 and all of paragraph number 4, and requiring the Metropolitan Sanitary District of Greater Chicago to return to Lake Michigan the water taken therefrom as domestic pumpage, or, in the alternative, for the appointment of a Special Master and reference to him for hearing and report of the issues raised by this motion.

Dated: December 14, 1957.

Respectfully submitted,

Louis J. Lefkowitz,
Attorney General of the State
of New York,

By: John R. Davison,
Solicitor General of the State
of New York.

APPENDIX A.

Excerpts From Report of Special Master on Re-Reference.

The difficulties of prediction inhere in the attempt to estimate results on such a vast and wholly unprecedented scale of sewage treatment as that involved in the disposal of the sewage of a population now estimated at over 3,500,000, with an additional population equivalent of industrial wastes of 1,500,000, and an estimated total of human population and population equivalent of industrial wastes of 6,800,000 in 1945. The experience of very much smaller communities affords little aid in determining the effect of this enormous volume of effluent from the sewage treatment works, and the storm water run-off containing untreated sewage, flowing into the channels of the Drainage Canal and the Chicago River. If the flow at Lockport were entirely stopped, the result would be, as Colonel Townsend, testifying for the complainants, said, "that the only water from the Lake would be that which comes in as the Lake rises and falls." In that case, with the water held at Lockport, there would be "absolutely no slope in the river and its connections." The large sewage treatment works—the West Side and the Southwest Side plants—adjoining the Drainage Canal will pour their effluents into the canal, and if there is no flow at Lockport, these effluents will pass directly into the Chicago River. It is found that one hundred per cent. purification of the sewage taken to the treatment works is not practicable with present knowledge. The expected degree of purification is found to be a minimum of eighty-five per cent. and it is probable that it will be ninety per cent. or more (*supra*, p. 28). This means that an amount not exactly determinable, which may be less than ten per cent. or possible as high as fifteen per cent., of the sewage will not have been purified and will be represented in the effluent. While the residual organic matter in the effluent may be very different from an equal percentage of the raw sewage as a potential source of nuisance, it is far from demonstrated, in my judgment, that with all flow stopped at Lockport, the concentration of such a vast volume of effluent as will flow from the proposed sewage plants, together with the untreated sewage and wastes carried with the storm flow into the limited channels of the Drainage Canal and Chicago River will not create conditions in these channels seriously detrimental to navigation.

The complainants ask that the decree provide that on and after the date fixed for the completion of the sewage treatment program, that the State of Illinois, the Sanitary District, and all persons acting under the authority of either, be ordered to refrain from so polluting the Chicago River, and the auxiliary navigable channels of the Sanitary District, by the discharge of sewage or otherwise as to create an obstruction to or interference with navigation or navigable capacity. It seems to me that the best way, and the reasonably sure way, of accomplishing this result is to permit an outflow from the Drainage Canal at Lockport. The suggestion that outfall sewers or tunnels might be built to take the effluents directly to Lake Michigan has been made in a general way, but the evidence is by no means convincing that it would be a reasonable requirement to compel the Sanitary District or the city to build such sewers or tunnels to take the effluents from the sewage treatment plants across the city to the Lake (*supra*, p. 134). The problem of the storm flow would still remain and would be especially serious in view of the volume which may be expected in the run-off of this large area with its great and growing population. The pumping of circulating water into the Drainage Canal and the Chicago and Calumet Rivers would, as pointed out in the testimony (*supra,* p. 135) carry whatever filth there would be in these rivers to the Lake more rapidly. It is not clear that this course would be compatible with the interests of navigation in the Chicago harbor, and that there would be a serious danger of contaminating the water supply and of creating offensive conditions at the bathing beaches of the city is quite evident. As to the water supply, it is urged that water filtration plants should be constructed. The fact remains that the effluents from the sewage treatment plants and the storm water must go somewhere, and if they are taken away from the Lake and discharged through the canal at Lockport, both the danger to the water supply will be removed and conditions suitable to navigation can be maintained.

But if the effluent from the sewage treatment plants and the storm water are to be discharged through the Drainage Canal at Lockport, it is well established that some flow from the Lake will be required. This it appears should not be less than a mean annual diversion of 1,000 c. f. s., in addition to pumpage; and it does not at present appear that it is necessary that the diversion should exceed a mean annual amount of 1,500 c. f. s., in addition to pumpage.

My conclusion is that, so far as the question can be determined at this time, the interests of navigation in the Chicago River as a part of the Port of Chicago, when the above described sewage treatment program has been carried out, will require that the flow of the Drainage Canal be discharged at Lockport, and that for this purpose there will be necessary a diversion of water from Lake Michigan of an annual average of not less than 1,000 c. f. s. and that it would be safer to allow a mean annual diversion of 1,500 c. f. s., in addition to pumpage. Provision should be made for further examination, after the sewage treatment plants have been completed, and the effect of the effluent therefrom with the storm water flow on the navigable channels has been observed, to the end that the question of any further or other relief may have appropriate consideration in the light of actual conditions.

This disposition is believed to be in accord with the equitable principles which appropriately govern the exercise of the jurisdiction to determine controversies between States, a jurisdiction which is unfettered by technicalities and in the last analysis is for the purpose of establishing substantial justice. In the present instance, equitable considerations are those applicable with appropriate regard to the substantial rights of the complainants, as determined by this Court, after the Sanitary District has carried out the above described comprehensive program for sewage treatment. The injury sustained by the complainants is through the lowering of the levels of the Great Lakes in consequence of the diversion, and it is the substance of that injury which demands consideration in formulating the provisions of the decree.

In my former report it was found that it was possible to determine with approximate accuracy the full extent of a particular diversion of water from the Great Lakes; that a diversion did not operate to cause a continuous and never-ending lowering of levels, but that within practical limits, under present conditions, an approximate equilibrium would be reached within a period of time which could be calculated, after which the effect of the diversion would cease to increase. Accordingly, it was determined that the full effect of a mean annual diversion of 8,500 c. f. s. of water from Lake Michigan at Chicago, through the Drainage Canal of the Sanitary District, was to lower the levels of Lakes Michigan and Huron approximately six inches at mean lake levels; the levels of Lakes Erie and Ontario approximately five inches at mean lake levels; and the levels of the connecting rivers, bays and harbors, so far as they have the same mean levels as the above mentioned lakes, to the same extent respectively. It was also found that if the diversion at Chicago were ended, assuming that other diversions from the Great Lakes remained the same, the mean levels of the lakes and rivers affected by the Chicago diversion would be raised in the course of several years (about five years in the case of Lakes Michigan and Huron and about one year in the case of Lakes Erie and Ontario) to the same extent as they had been lowered, respectively, by that diversion.

On a similar calculation, the entire effect of a mean annual diversion of 1,000 c. f. s. by the Sanitary District would be a lowering of Lakes Michigan and Huron approximately seven-tenths of an inch, and of a mean annual diversion of 1,500 c. f. s., approximately one inch, at mean lake levels.

Assuming that a mean annual diversion of 8,500 c. f. s. would effect a lowering of six inches, a cessation of the diversion of water by the Sanitary District beyond the annual average of 1,500 c. f. s., that is, a cessation of 7,000 c. f. s. of the diversion of the 8,500 c. f. s. at present allowed, would have the effect of raising the levels of Lakes Michigan and Huron to the same extent as they were lowered by that diversion except by the amount of about one inch.

It can hardly be maintained that a diversion not exceeding an annual average of 1,500 c. f. s. would produce such a substantial injury to the complainants, when the fluctuations of lake levels due to other causes than diversions are considered, as to preclude attention to the serious consequences which may result from a

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failure to maintain suitable conditions in the interest of navigation in case all flow at Lockport should be terminated. In my opinion such an extreme requirement, after the Sanitary District has provided for sewage treatment so far as practicable, should await more exact knowledge as to its effect.

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Summary.

My conclusions are:

(1) That the completion of the North Side, West Side, Calumet, and Southwest Side Sewage Treatment Works, above described, with their appurtenances and the necessary intercepting sewers, and the efficient operation of these plants will afford practical measures from the standpoint of present sanitary engineering knowledge for the complete treatment of the dry weather flow of sewage and wastes of all the area comprised within the Sanitary District of Chicago, and also, in times of storm, of approximately 150% of the ordinary dry weather flow of sewage and wastes; that in the actual operation of these plants it may appear that a greater amount of the storm flow can be treated at least in part.

(2) That what is described as "complete treatment" of the sewage taken to the sewage treatment works (that

is, apart from the excess storm flow which remains untreated) does not amount to 100% purification; that with efficient operation the proposed sewage treatment plants should attain not less than an annual average of 85% purification of the sewage treated, and that it is probable that the degree of purification will be 90% or more.

(3) That the remainder of the storm flow, in excess of the volume treated in the sewage treatment plants will pass into the Chicago River and its branches, and into the canals of the Sanitary District, and any storm flow so passed into the river, its branches and the canals, at storm times will contain sewage and wastes which have not been treated by the sewage treatment works.

(4) That the time that should be allowed for the completion of the sewage treatment works above described is as follows:

(a) That the North Side Sewage Treatment Works, with appurtenances, should be completed on or before July 1, 1930;

(b) That the Calumet Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1933;

(c) That Batteries A and B of the Imhoff tanks of the West Side Sewage Treatment Works should be completed on or before July 1, 1930.

(d) That the West Side Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1935;

(e) That the Southwest Side Sewage Treatment Works, with appurtenances, should be completed on or before December 31, 1938;

(f) That the necessary intercepting sewers pertaining to the above described sewage treatment works should be completed within the time allowed for the completion of the sewage treatment works, respectively.

(g) That in the foregoing estimate allowance is made for ordinary contingencies, but not for strikes or other occurrences beyond the control of the Sanitary District or its contractors.

(5) That the diversion by the Sanitary District of water from Lake Michigan should be reduced on July 1, 1930, to an annual average diversion of 6,500 c. f. s., in addition to domestic pumpage.

(6) That subject to the approval of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to the applicable statute, controlling works should be constructed by the Sanitary District for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan; that for this purpose the Sanitary District should immediately submit plans for such works to the Chief of Engineers of the War Department; and that such controlling works should be constructed by the Sanitary District within two years after receiving the authorization of the Secretary of War.

(7) That when such controlling works have been constructed, the diversion by the Sanitary District of water from Lake Michigan should not exceed the annual average of 5,000 c. f. s. in addition to domestic pumpage.

(8) That there should be provision in the decree for an appropriate examination of results from time to time as the work of sewage treatment progresses to the end that

there may be such further reduction of the diversion by the Sanitary District as may be found to be feasible pending the completion of the sewage treatment works.

(9) That, after the installation of controlling works as above provided, and on the completion of all the sewage treatment works above described, and in the absence of competent action by Congress in relation to navigation lawfully imposing a different requirement, the diversion by the Sanitary District of water from Lake Michigan should not exceed an annual average of 1,500 c. f. s. in addition to domestic pumpage.

(10) That by the term "diversion" in the foregoing conclusions is meant the flow diverted by the Sanitary District exclusive of the water drawn by the City of Chicago for water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. Such diversion is determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and, as so computed, it includes the run-off of the Chicago and Calumet drainage area.

(11) That provision should be made in the decree for an examination of results after the completion of the sewage treatment works so that there may be such further or other relief in respect to the diversion of water from Lake Michigan as may be found to be feasible.

RECOMMENDATIONS AS TO THE DECREE

In their proposed findings both parties include provisions with respect to the times of completion of the sewage treatment works. The defendants, however, suggest that the Court should merely find the works necessary to be installed, in order practically to dispose of the sewage of

Chicago, and that then the constituted administrative agencies of the Government, the Chief of Engineers and the Secretary of War may act. It is suggested that the Court should not enter a mandatory or coercive form of decree; that if the Court declares what works

shall be installed and the time within which they should be completed, it must be assumed that out of respect to the Court the State of Illinois and the Sanitary District will perform what the findings conclude they should do, unless obstacles arise which make such compliance impossible; and that the Court should retain jurisdiction until the works are installed and in operation.

The Court will undoubtedly give to this suggestion the consideration which is thought to be appropriate. As its opinion, pursuant to which the order of re-reference was made, is understood to contemplate directions as to the diminishing of the diversion, these directions will properly be found in the decree. But, as such provisions will necessarily depend upon the times fixed for the completion of the sewage treatment works, and as the terms of the decree will follow the findings, as finally confirmed or modified by the Court in this respect, it would not be a matter of substance to exclude from the decree provisions as to the times of completion. Accordingly, they are included in the form of decree proposed.

It is recommended that the Court should retain jurisdiction as there are questions which it is impossible to dispose of at this time in full justice to the parties; as, for example, with respect to the extent to which the diversion of water from Lake Michigan by the Sanitary District may be reduced below 5,000 c. f. s., in addition to pumpage, after the installation of controlling works in the Chicago

River and pending the completion of the sewage treatment works, and also with respect to any further or other provisions as to the diversion which may be found to be appropriate after the sewage treatment works have been completed and the results of their operation with respect to the effluent and the condition of the navigable waters have been observed. As construction work will be conducted on a large scale for several years, and unforeseen contingencies may arise, it would also seem to be important that there should be opportunity for the parties to come before the Court at any time to obtain such further directions as the facts may warrant.

To the end that the rights of all parties may be protected, there should be some measure of supervision as the contemplated work progresses. If it is deemed to be impracticable, in view of the long period involved, to appoint a commissioner for this purpose, provision may be made in the decree for the filing at stated periods by the Sanitary District of reports as to the progress of the work, on the coming in of which either party may make application to the Court for such action as may seem to be suitable. It is suggested that the Sanitary District should file semi-annual reports with the Clerk of this Court.

On the basis of the conclusions above stated, and in accordance with the direction of the order of re-reference, the following proposed form of decree is submitted. No recommendation is made as to costs.

PROPOSED FORM OF DECREE

(After formal parts and confirmation or modification of findings):

1. That the defendant Sanitary District of Chicago complete and place in full operation the North Side Sewage

Treatment Plant and Batteries A and B of the Imhoff tanks at the West Side Sewage Treatment Plant (as outlined in the program proposed by the Sanitary District of Chicago) on or before July 1, 1930.

2. That the defendant Sanitary District of Chicago continue the operation of the Calumet sedimentation sewage disposal plant.

3. That the defendant Sanitary District of Chicago complete and place in full operation the Calumet Sewage Treatment Plant (as outlined in the program proposed by the Sanitary District of Chicago) on or before December 31, 1933.

4. That the defendant Sanitary District of Chicago complete and place in full operation the West Side Sewage Treatment Plant (as outlined in the program proposed by the Sanitary District of Chicago) on or before December 31, 1935.

5. That the defendant Sanitary District of Chicago complete and place in full operation the Southwest Side Sewage Treatment Plant (as outlined in the program proposed by the Sanitary District of Chicago) on or before December 31, 1938.

6. That the foregoing requirements as to times of completion include allowances for ordinary contingencies but not for strikes or other occurrences beyond the control of the Sanitary District or its contractors.

7. That on and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great

Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 c. f. s. in addition to domestic pumpage.

8. That subject to the approval of the Secretary of War upon the recommendation of the Chief of Engineers, pursuant to the applicable statute, controlling works shall be constructed by the Sanitary District of Chicago for the purpose of preventing reversals of the Chicago River at times of storm and the introduction of storm flow into Lake Michigan; that for this purpose the Sanitary District of Chicago shall forthwith submit plans for such works to the Chief of Engineers of the War Department; and that such controlling works shall be completed and placed in full operation by the Sanitary District of Chicago within two years after receiving the authorization of the Secretary of War.

9. That when such controlling works have been constructed and placed in operation, the defendants, the State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 5,000 c. f. s. in addition to domestic pumpage.

10. That after the installation of controlling works as above provided, and on the completion of all the sewage treatment works as outlined in the program proposed by the Sanitary District of Chicago, and in the absence of competent action by Congress in relation to navigation lawfully imposing a different requirement, the defendants the

State of Illinois and the Sanitary District of Chicago, their employees and agents, and all persons assuming to act under the authority of either of them, be and they hereby are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 1,500 c. f. s. in addition to domestic pumpage.

11. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area.

12. That the defendant the Sanitary District of Chicago shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

13. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

14. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy.

Respectfully submitted,

CHARLES E. HUGHES,
Special Master.

Office - Supreme Court,
FILED
DEC 2 1957
JOHN T. FEY, Clerk

IN THE SUPREME COURT OF THE UNITED STATES
OCTOBER TERM A. D. 1957

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 AND THE GRANTING OF FURTHER RELIEF.

BRIEF IN SUPPORT THEREOF

STATE OF WISCONSIN
Stewart G. Honeck
Attorney General
Ray Tulane
Assistant Attorney General

STATE OF MINNESOTA
Miles Lord
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Melvin J. Peterson
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STATE OF OHIO
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STATE OF MICHIGAN
Thomas M. Kavanagh
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Solicitor General
Nicholas V. Olds
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STATE OF NEW YORK
Louis J. Lefkowitz
Attorney General
John R. Davison
Acting Solicitor General

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IN THE SUPREME COURT OF THE UNITED STATES

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,

Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,

Defendants.

STATE OF MICHIGAN,

Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,

Defendants.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,

Intervening Defendants.

STATE OF NEW YORK,

Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,

Defendants.

Application of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York for a Reopening and Amendment of the Decree of April 21, 1930 and the Granting of Further Relief.

To the Honorable The Chief Justice and Associate Justices of the Supreme Court of the United States:

The application of the states of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York by their respective attorneys general appearing at the foot of this application respectfully show to the Court that:

I

This application is filed for a reopening and further relief in the above-entitled actions under and pursuant to the provisions of paragraphs 5, 6, and 7 of the decree entered in these causes on April 21, 1930, which decree, among other things, provides:

> "1. On and after July 1, 1930, the defendants, the State of Illinois and the Sanitary District of Chicago, are enjoined from diverting any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of an annual average of 6,500 c. f. s. in addition to domestic pumpage.
>
> "2. That on and after December 31, 1935, unless good cause be shown to the contrary that said defendants are enjoined from diverting as above in excess of an annual average of 5,000 c. f. s. in addition to domestic pumpage.
>
> "3. That on and after December 31, 1938, the said defendants are enjoined from diverting as above in excess of an annual average of 1,500 c. f. s. in addition to domestic pumpage.
>
> "4. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for domestic water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the

amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area.

"5. That the defendant the Sanitary District of Chicago shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

"6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

"7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy."

II

A. That by an act passed by the legislature in 1955 of the State of Illinois the name of the Sanitary District of Chicago was changed to the Metropolitan Sanitary District of Greater Chicago, which District comprises and includes the City of Chicago and 106 adjoining municipalities, having a combined total area of 920.14 square miles, said District serving a human population as of 1955 of 4,600,000 and industrial waste equivalent of 3,800,000 people, or a total of 8,400,000 persons.

B. That in 1930, the year in which this Court entered its decree, said District then known as the Sanitary District of Chicago comprised and included the City of Chicago and 54 cities, towns and villages, having a combined total area of 438 square miles, with a population of 3,901,569 as of 1930.

C. That although according to the Special Master's report filed in 1929 with the Court, the then projected human population for 1960 was 5,860,000 persons and that for 1970 was 6,580,000, the present projected human population for the greater and metropolitan Chicago area to be served by said Metropolitan Sanitary District of Greater Chicago, according to a publication recently issued by said District, will increase to 15 or 20 millions in human population in the present foreseeable future.

III

A. That the public water supplies serving the people, commercial establishments, and industrial plants situated within the boundaries of said District are taken from Lake Michigan by six or more municipalities and numerous industries; that said water after use is discharged as sewage and industrial wastes into local government or District-owned sewers by which said sewage and wastes are conveyed to one of three sewage disposal plants for treatment; that said plants, owned and operated by the said District, have been constructed pursuant to the aforesaid decree issued by this Court as will fully appear from records and files of this Court and the reports filed with the Clerk of this Court by said District until 1938.

B. That said collecting system of sewers are of the so-called "combined" type being required to convey not only sewage and industrial wastes, but during times of storm such amounts of run-off as are permitted to find their way into said collecting system of sewers; that under such conditions, mixtures of sewage and industrial wastes with variable amounts of storm water not entering the sewage disposal plants for treatment are overflowed without treatment or other refinement through regulator-operated relief outlets into the Chicago River or the Sanitary and Ship Canal and its tributary waterways; that all of said overflows, independent of other causes, create unsanitary conditions and noxious odors during certain seasons of the year in said Canal and waterways as the result of this contamination and sludge accumulations; further, that on several occasions in recent years the volume of polluted storm water in said canals was so great as to overflow control gates or locks and escape back into Lake Michigan in violation of the purposes for which the said District was created.

C. That while the said Sanitary District acknowledges that the statute under which it was created imposes upon it the duty to collect and treat all human sewage and industrial waste produced within its territorial limits, these complainants charge that the said District has not fully and effectively exercised the duties granted it, in that said District has not and is not now collecting all sewage and industrial waste within its jurisdiction, but is permitting volumes of sewage and industrial waste to be discharged untreated to said waterway under both dry weather and wet weather conditions; that the waters contained in the said Chicago River and Sanitary and Ship Canal and its tributary waterways have been, are, and these complainants charge, will continue to be polluted and contaminated to a degree which cannot be expected to be overcome by any amount of additional diversion from Lake Michigan that can be passed through said canals and waterway and still maintain navigation. Further, these complainants charge that as the said service area of the District continues to increase in population, commercial establishments, and industrial plants, accompanied by the resulting increase in sewage, industrial wastes and storm run-off, that the polluted condition of the Chicago River and the Sanitary and Ship Canal will become increasingly aggravated so long as the said District is permitted to attempt to continue to discharge its purified treatment plant effluents and overflow from its combined sewers into the said waterways, these now being the slack-water navigation facilities under control of the Federal Government.

IV

That the Sanitary District through its experts and witnesses who appeared before the Special Master on re-reference outlined a program of constructing sewage treatment works which would satisfactorily and adequately treat the sewage and industrial wastes as follows:

> "* * * in 1920 a human population of 3,000,000 and a population-equivalent of 1,500,000; in 1925, 3,355,000 human and 1,600,000 population-equivalent; in 1930, 3,710,000 human and 1,700,000 equivalent; in 1935, 4,070,000 human and 1,800,000 equivalent; in 1940, 4,425,000 human and 1,900,000 equivalent; in 1945, 4,785,000 human and 2,000,000 equivalent; in 1950, 5,140,000 human and 2,100,000 equivalent; in 1955, 5,500,000 human and 2,200,000 equivalent; in 1960, 5,860,000 human and 2,300,000 equivalent; and in 1970, 6,580,000 human and 2,500,000 equivalent."
>
> (From Joint Abstract of Record for Hearing upon Exceptions to the Special Master's Report on Re-Reference, pages 509 and 510)

The Sanitary District assured this Court that its treatment works and facilities would be operated in such an efficient manner that the effluent discharged into the Sanitary Canal would in no wise create nuisance conditions which might endanger and injure public health in the area thereof; nevertheless officials and representatives from said Sanitary District and the State of Illinois have on repeated occasions following the entry of this Court's decree been instrumental in the introduction of bills into the Congress of the United States which would authorize an increase in the volume of water diverted from Lake Michigan into said Sanitary Canal beyond the 1,500 c.f.s. permitted by the decree of this Court; that the said increase has been demanded by said District as necessary to further dilute and flush the pollutional wastes discharged into said Canal; that on two occasions said bills, after having been passed by both houses of the Congress, were vetoed by the President. In the first of said vetoes the President said:[1]

> "I have withheld my approval of H. R. 3300 'To authorize the State of Illinois and the Sanitary District of Chicago, under the direction of the Secretary of the Army, to help control the lake level of Lake Michigan by diverting water from Lake Michigan into the Illinois waterway.'
>
> "The bill would authorize the State of Illinois and the Sanitary District of Chicago, under the supervision and direction of the Secretary of the Army, to withdraw from Lake Michigan, in addition to all domestic pumpage, a total annual average of 2,500 cubic feet of water per second into the Illinois waterway for a period of 3 years. This diversion would be 1,000 cubic feet per second more than is presently permitted under a decree of the Supreme Court of the United States dated April 21, 1930. The bill also would direct the Secretary of the Army to study the effect in the improvement in conditions in the Illinois waterway by reason of the increased diversion, and to report to the Congress as to the results of the study on or before January 31, 1957, with his recommendations as to continuance of the increased diversion authorized.
>
> "The bill specifies that the diversion would be authorized in order to regulate and promote commerce, to protect, improve, and promote navigation in the

---

[1] See "Documents on the Use and Control of the Waters of Interstate and International Streams," published by the U. S. Department of the Interior, Great Lakes Litigation, pp. 590, 591, 592.

Illinois waterway and Mississippi Valley, to help control the lake level, to afford protection to property and shores along the Great Lakes, and to provide for a navigable Illinois waterway. No mention is made of possible improvement of sanitary conditions or increase in hydroelectric power generation on the waterway.

"I am unable to approve the bill because (1) existing diversions are adequate for navigation on the Illinois waterway and Mississippi River, (2) all methods of control of lake levels and protection of property on the Great Lakes should be considered before arbitrarily proceeding with the proposed increased diversion, (3) the diversions are authorized without reference to negotiations with Canada, and (4) the legitimate interests of other States affected by the diversion may be adversely affected. I wish to comment briefly on each of these points.

"I understand that waterborne traffic on the Illinois waterway has grown in the last 20 years from 200,000 tons to 16,000,000 tons annually. The Corps of Engineers advises, however, that the existing diversions of water are adequate for navigation purposes in the Illinois waterway and the Mississippi River. Surveys are now under way by the International Joint Commission and the Corps of Engineers to determine the best methods of obtaining improved control of the levels of the Great Lakes and of preventing recurrence of damage along their shores. Reasonable opportunity to complete these surveys should be afforded before legislative action is undertaken.

"The diversion of waters into and out of the Great Lakes has historically been the subject of negotiations with Canada. To proceed unilaterally in the manner

> proposed in H. R. 3300 is not wise policy. It would be the kind of action to which we would object if taken by one of our neighbors. The Canadian Government protested the proposed authorization when it was under consideration by the Congress and has continued its objection to this bill in a note to the Department of State dated August 24, 1954. It seems to me that the additional diversion is not of such national importance as to justify action without regard to the views of Canada.
>
> "Finally, as is clear from the report of the Senate Committee, a major purpose of the proposal to divert additional water from Lake Michigan into the Illinois waterway is to determine whether the increased flow will improve existing adverse sanitation conditions.
>
> *The waters of Lake Michigan are interstate in character. It would seem to me that a diversion for the purpose of one State alone should be authorized only after general agreement has been reached among all the affected States.* (Emphasis supplied)
>
> Officials of several States adjoining the Great Lakes, other than Illinois, have protested approval of the bill as being contrary to their interests and not in accord with the diversion authorized under the 1930 decree of the Supreme Court. Under all of these circumstances, I have felt that the bill should not be approved."

And complainants are informed and believe, and charge the facts to be, that unless the Sanitary District and the State of Illinois are further enjoined in the manner and to the extent hereinafter set forth in the prayer, the State of Illinois and the Sanitary District will continue to demand an increase in the amount of diversion, contrary to the just rights of the complainants, in violation of the rights and obligations of the Federal Government in the conduct of international affairs, and in the maintenance and operation of the aforesaid Canal as a Federal waterway.

V

That by the decree entered by this Court on April 21, 1930, the Sanitary District was allowed to divert from Lake Michigan into the Sanitary Canal an annual average not to exceed 1,500 c.f.s. for the purpose of maintaining navigation in the Port of Chicago and the connecting Illinois waterway in addition to the quantity of water abstracted from Lake Michigan for the purpose of domestic pumpage; that in 1939, at the time the diversion was fully reduced pursuant to the terms of said decree the total diversion of 1,500 c.f.s. for navigation plus domestic pumpage amounted to 3,110 c.f.s.; the diversion increased to 3,205 c.f.s. in 1954, and to 3,500 c.f.s. in 1956; complainants aver that as the population of greater Chicago increases, as the Sanitary District takes in larger areas, and as the industrial development in the geographical area served by the Sanitary District continues to expand, the volume of water to be abstracted from Lake Michigan and discharged into the Sanitary Canal by the Sanitary District as domestic pumpage will increase beyond the limits that were estimated at the time the Court entered its decree in 1930; in fact, this Court, in foreseeing that the withdrawals for domestic pumpage might be shown to be excessive, recognized the right of complainants to seek modification of the decree and stated:

> "If the amount withdrawn should be excessive, it will be open to complaint. Whether the right for domestic use extends to great industrial plants within

the District has not been argued but may be open to consideration at some future time."

(281 U. S. 179 at page 200)

VI

And complainants are informed and believe, and charge the facts to be, that many industrial plants have established themselves within said District since the date of said decree. that many were located within the municipalities annexed by the Sanitary District since said decree; and, in fact, said Sanitary District openly advertises for and attracts many new and additional commercial and industrial enterprises, all of which are substantial users of water; that with the projected growth in population and industry within the next 20 years to 15 or 20 million persons the quantities of water abstracted from Lake Michigan in the form and guise of "domestic pumpage" and permanently diverted from the Great Lakes Basin will become more and more excessive, to the irreparable harm and injury of the complainants.

VII

A. And complainants aver that the capacity of the present Canal as constructed by the United States Corps of Engineers in 1933 is such that it cannot accommodate sufficient dilution to enable it to adequately carry the increased pollutional load which will be discharged into the slack waters of said Canal as a result of the sewage and industrial wastes generated by the aforesaid projected increases in population and industry.

B. In addition to the greater hazards to public health thereby created, the complainants will be further injured by the continued lowering of the water levels of the Great

Lakes with the resultant detriment to their navigational, power development and recreational uses.

C. Further the decrease in the volume of the outflow from the great lakes through the hydro-electric plants at Niagara and the International Rapids will cause substantial losses in power and generation and corresponding financial loss particularly to the State of New York and such other states as are inter-connected with the New York power grid.

VIII

And complainants further aver that to allow the State of Illinois and the Sanitary District to continue to abstract increasing quantities of water from the Great Lakes Basin and divert it into another basin under the form and guise of "domestic pumpage" will cause complainants great and irreparable harm to their rights as sovereign states and as *parens patriae* of the rights of their citizens. Since the entry of this Court's decree in 1930 the following events have occurred which render it most imperative that *NO WATER* be abstracted from the Great Lakes Basin by the State of Illinois and the Sanitary District under the form and guise of "domestic pumpage," and thereafter diverted to another basin, among which are the following:

(1) The Legislature of the State of New York has enacted the Power Authority Act creating the Power Authority of the State of New York as a corporate municipal instrumentality of the State, and directing it to effectuate the declared policy of the State of New York to develop the inalienable natural resources of the State in the St. Lawrence and Niagara Rivers for commerce and navigation and for hydro-electric power. (Laws of 1931, Chapter 772, as amended; Public Authorities Law Sec. 1000, et seq.)

(2) The governments of the United States and Canada submitted to the International Joint Commission established under the 1909 Treaty applications for its approval of the construction jointly by entities to be designated by the respective governments of certain works for the development of power in the International Rapids section of the St. Lawrence River. (U. S. Dept. of State Bulletin, Vol. 27, Dec. 29, 1952, pp. 1019-1024.)

(3) The International Joint Commission issued an order approving the construction of the aforesaid power works. (St. Lawrence Seaway Manual, Sen. Doc. No. 65, 83rd Cong. 2nd Sess.)

(4) (a) The Federal Power Commission issued to the New York Power Authority a license under Section 4-e of the Federal Power Act for the construction, operation and maintenance of certain power facilities in the International Rapids section of the St. Lawrence River. (Op. No. 255 of the Federal Power Commission, FP 2000.)

(5) The President of the United States, by executive order, declared the New York Power Authority to be the designee of the government of the United States of America for the construction of the works referred to in the order of approval of the International Joint Commission. (18 Fed. Reg. 7005, Nov. 6, 1953.)

(6) The New York Power Authority has issued bonds in the sum of $335,000,000, backed by revenue to be derived from the sale of power and not by public credit, to finance its share of the construction of the aforesaid power works in conjunction with the designee of the Canadian government, Hydroelectric Power Commission of Ontario.

(7) The designees of the governments of the United

States and Canada are now in the process of completing the aforesaid power works.

(8) The New York Power Authority is now in the process of contracting for the sale of all power that can be generated by its part of such works and the rates for the sale of such power have been initially fixed on the basis of anticipated power generation resulting from the stream flow as fixed by the decree of April 21, 1930.

(9) By act of Congress there was created the St. Lawrence Seaway Development Corporation with authority to construct in United States territory deep water navigation works substantially in accordance with the "Controlled single stage project 238-242" set forth in the report of the Canadian Temporary Great Lakes-St. Lawrence Basin Committee and the United States St. Lawrence Advisory Committee. (Public Law 358, 83rd Cong.)

(10) The Seaway Corporation is now engaged in constructing the aforesaid deep water navigation works, and the canals, locks, and channel improvements it is making are based upon the historical stream flow.

(11) The United States and Canada signed on February 27, 1950 and put into effect a Treaty Concerning the Uses of the Waters of the Niagara River, which terminated the provisions of the 1909 Treaty only in respect to the waters of the Niagara River, provided for the construction of certain remedial works in the Niagara River to preserve and enhance the beauty of Niagara Falls, specified the amount of water that might be diverted from the river for power purposes, stated that the waters available for power purposes should be divided equally between the United States and Canada, that representatives be designated to determine the amount of water avail-

able for purposes of the Treaty, and that until such time as there are facilities in the territory of one party to use its full share of the diversion waters for power purposes, the other party may use the portion of that share for use of which facilities are not available. (T I A S 2130.)

(12) Canada is completing construction on its side of the Niagara River of new facilities, by the use of which together with some old facilities, which it will ultimately abandon, it is using its share and part of the United States' share of the waters made available for power purposes pursuant to the terms of the 1950 Treaty. When its new facilities are completed, it will be able to use its and the United States' full share of the waters of the Niagara River until facilities are available for use in the United States of the United States' share of the waters.

(13) Since the beginning of Seaway construction Congress has appropriated nearly 100 million dollars for the deepening of connecting channels on the upper lakes, without which the Seaway project would be valueless to Michigan, Wisconsin, Illinois and Minnesota. This work is now in progress.

(14) The 85th Congress enacted Public Law 85-159 (approved August 21, 1957; 71 Stat 401), authorizing and directing the Federal Power Commission to issue to Power Authority of the State of New York a license for a power project on the Niagara River to utilize all of the waters thereof which it is permissible to divert for power purposes in the United States under the terms of the February 27, 1950 treaty between the United States and Canada. (1 U.S.T. 694.)

(15) By order issued September 19, 1957 the Federal Power Commission issued to the Power Authority of the

State of New York a license under the provisions of Section 4 (e) of the Federal Power Act and Public Law 85-159 (71 Stat 409) for the construction, operation and maintenance of the Niagara Project No. 2216 located on the Niagara River in the vicinity of Niagara Falls for the purpose of developing all of the waters of the Niagara River which it is permissible to divert under the terms of the 1950 treaty between the United States and Canada.

IX

Complainants aver that recent studies made by the United States Corps of Engineers have established that a diversion of 1,500 c. f. s. is adequate to maintain navigation in the Port of Chicago and the Illinois waterway. It is not the intention of complainants to challenge this diversion of 1,500 c. f. s. herein, but complainants do aver that no further diversion in the guise of "domestic pumpage" or otherwise is necessary for navigational purposes, and the complainants do challenge and demand a cessation of diversion of water for "domestic pumpage" from the Great Lakes Basin.

X

In further support of their allegation that no water should be diverted and permanently abstracted from the Great Lakes Basin for "domestic pumpage," complainants aver that it is possible and feasible to return the effluent from the Sanitary District's treatment plants to Lake Michigan without endangering the domestic water supply taken from said lake by the City of Chicago because of the many advances and developments which have taken place since 1930 in the science and technology of the treatment and purification of sewage and industrial wastes; that at the present time it is the claim of the Sanitary District that its treatment works and facilities provide up to 90% treatment of all of the sewage and industrial wastes collected in said District; that said 90% treated effluent after proper chlorination where necessary could be returned to the waters of Lake Michigan through pipes and tunnels running from said treatment plants to appropriate locations in Lake Michigan, whose waters are in such volume and contain such a high content of dissolved oxygen as to render said prechlorinated effluent innocuous immediately upon its diffusion throughout a large area of said waters. Complainants further aver that all of the municipalities except Chicago lying along the Great Lakes and receiving their domestic water supply therefrom, both American and Canadian, after treatment return their "domestic pumpage" to the waters of the lake from which such "domestic pumpage" is abstracted in the manner herein related without experiencing any danger or hazard to their domestic water supply and public health.

XI

And complainants aver that the classes of injuries found by the Special Master to have been sustained by the complainants because of the unlawful diversion of water by the State of Illinois and the Sanitary District of Chicago (which findings were approved by this Court) still continue to exist; and said injuries will be augmented because of the ever increasing diversion of water from the Great Lakes Basin; and the damages to complainants resulting from said diversion will be multiplied in direct proportion to the development of the navigational facilities of the St. Lawrence Seaway and the connecting channels and the further development of the greatly expanded facilities for the generation of hydro-electric power.

WHEREFORE COMPLAINANTS PRAY:

(1) That respondents State of Illinois and the Metropolitan Sanitary District of Greater Chicago be perpetually enjoined from diverting any water used for domestic pumpage from the Great Lakes Basin, and that it be ordered and directed at a time and manner to be fixed by this honorable Court to return to the waters of Lake Michigan all purified effluent of the sewage treatment plants of the said District, other than the diversion of 1,500 c. f. s. for navigation.

(2) That this honorable Court appoint a Master to take testimony and make recommendations and findings as to the time and manner in which the return of the purified effluent to Lake Michigan shall be accomplished.

Respectfully submitted,

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BRIEF IN SUPPORT OF PETITION TO AMEND DECREE OF APRIL 21, 1930 ON BEHALF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK.

I

Introduction

Despite the warnings of this Court expressed in its opinions and decrees with respect to the diversion of water from Lake Michigan by the State of Illinois and its creature, the Sanitary District of Chicago (recently changed to the Metropolitan Sanitary District of Greater Chicago), these defendants still suffer from an insatiable thirst for more diverted water for a purpose which this Court has declared to be constitutionally inadmissible, namely, sanitation.[1] This voracious appetite brings to our minds the unappeasable hunger of the beast encountered by Dante in the first canto of his Inferno.[2]

> "That never doth she glut her greedy will,
> And after food is hungrier than before."

Fearful that these insistent and seemingly unappeasable demands for more diverted water by the Sanitary District of Chicago might cause or bring about, unless opposed by the complainants, a situation from which they could not be rescued even by this Court, the complainant States join in filing the instant petition with this Court. We have felt it to be imperative that this be done before the course of events, if allowed to proceed unchecked, might make it difficult, if not impossible, even for this Court, to turn back the clock of time.

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[1] Wisconsin v. Illinois 278 U.S. 367; 281 US 179

[2] Longfellow Translation, Inferno, Canto I, lines 98, 99.

II

History

By way of history, we call the Court's attention to the brief that was filed on behalf of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, New York, and Michigan, dated the 15th day of September, 1950, in support of Motion to Dismiss Petition for Interpretation and Clarification of Decree of April 21, 1930. This brief contains an excellent and succinct account of the legal history of this protracted and extensive litigation. Since that date only one additional proceeding has occurred consisting of the petition filed by the State of Illinois in November 1956. In these proceedings the State of Illinois petitioned for a temporary modification of the decree "to permit a diversion of ten thousand cubic feet of water per second from the Great Lakes-St. Lawrence system or watershed, in addition to domestic pumpage, for a period of one hundred days following the entry of the Court's order authorizing such modification, within which time it is anticipated that the impairment to navigation which now exists on the Mississippi River and the Illinois Waterway can and will be ameliorated."

The states of Minnesota, Ohio, New York, Pennsylvania and Michigan, appreciating the emergency that was facing the commerce on this waterway because of the drought that continued throughout the summer of 1956 in the Mississippi and Illinois watersheds, after due deliberation, decided to consent to allowing a temporary increased diversion. In consonance with this decision of the complainant States (with the exception of Wisconsin), the State of

Michigan on pages 6 and 7 of her brief dated December 7, 1956, stated that it did not oppose the petition of the State of Illinois, provided that the State of Illinois would stipulate and agree to the inclusion of the following conditions in any order of this Court:

> "1. The State of Michigan does not waive any position which it has heretofore taken respecting the injurious or detrimental affect (*sic*) of diversion of water from the Great Lakes-St. Lawrence system and expressly reserves the right to take such position in any future proceedings concerning this subject.
>
> "2. The granting of any relief upon the present petition of the State of Illinois will not be used as a precedent by any party for any future request for any additional temporary diversion in excess of the amounts fixed by this Court in its decree of April 21, 1930.
>
> "3. The amount of increased diversion shall be restricted to such amount as may be necessary, but shall not exceed 8,500 cubic feet per second.
>
> "4. The time during which such increased diversion may be made shall be limited to such period as may be necessary, but not exceeding 100 days from the date of entry of the Court's decree of modification.
>
> "5. The amounts and times of diversion as may be necessary to carry out the decree of temporary modification shall be determined by the Corps of Engineers, United States Army.
>
> "6. Any increased diversion authorized by the temporary decree of modification shall be and remain under the supervision and control of the Corps of

Engineers, United States Army during the period for which such increased diversion may be authorized.

"7. After the expiration of the period for which the increased diversion may be authorized all the provisions of the decree of this Court heretofore entered in this action on April 21, 1930 (281 U. S. 696) shall be and remain in full force and effect until further order of the Court.

"8. The relief granted is based solely upon the petition of the State of Illinois and does not constitute an acknowledgment or recognition of any cause for, or right to relief which may be asserted by any other party to these causes.

"9. There is no need for any clarification of the decree of April 21, 1930.

"10. The fact that the State of Michigan does not oppose the petition of the State of Illinois for temporary modification of Paragraph 3 of the Decree of April 21, 1930, shall not be construed as an admission or evidence of the right of the State of Illinois, or any of its political subdivisions or other agencies, to divert any waters of the Great Lakes-St. Lawrence system except as provided in the Decree of April 21, 1930, as modified herein."

The State of Wisconsin, in a short memorandum motion dated December 5, 1956, not only refused to join in the granting of the petition but moved that the petition of the State of Illinois be dismissed.

The Solicitor General of the United States, J. Lee Rankin, filed a Memorandum on Behalf of the United States as Amicus Curiae, in which was pointed out the interests of the United States both with regard to the paramount power of Congress in the regulation of navigation and the treaties between the United States and Canada which affected the total problem of diversion.

During the pendency of this petition before this Court, the Sanitary District of Chicago filed a motion and attempted to inject itself into the scene by asking again for a clarification of the decree of April 21, 1930, or in the alternative for the appointment of a Special Master. The states of Wisconsin, Ohio, Michigan, and New York filed motions to dismiss the foregoing motion of the Metropolitan Sanitary District of Greater Chicago, pointing out that the matter then pending on the petition of the State of Illinois for increased diversion for navigation purposes was of no concern to the Sanitary District. The records of this Court will show that the motion of the Sanitary District was dismissed; that the Court granted the petition of the State of Illinois to a modified extent sufficient to relieve the emergency conditions that existed in the Illinois and Mississippi waterways.

III

Discussion of Complainants' Present Petition

By an act of the Illinois legislature, the Sanitary District of Chicago changed its name in 1955 to the Metropolitan Sanitary District of Greater Chicago. Apparently this was made necessary because of the tremendous increase in size, both of the area served by the District as well as the population and industries which it encompasses. At the time the Court entered its decree in 1930 this District comprised an area of 438 square miles serving the City of Chicago and 54 additional municipalities, and having a combined population equivalent of 3,901,569—human and industrial.

According to the Special Master's report filed in 1929 with this Court, it was projected that in 1960 the then Sanitary District would be serving a human population of 5,860,000 and an industrial waste equivalent population of 2,300,000; that in 1970 the then District would be serving a human population of 6,580,000 and an industrial waste equivalent population of 2,500,000. We emphasize these estimates as having been based on the growth trends of the District as it existed in 1930.

At the present time, since the assumption of its more comprehensive title, this District is now serving a human population of 4,600,000 and an industrial waste equivalent population of 3,800,000, making a total of 8,400,000. We point out that since 1930 the District has doubled in population, in area, and in municipalities served by it. Further, according to reports and prospectus published recently by the District, it is stated that the population of this District is expected to increase to 15 to 20 millions in human population alone in the immediately foreseeable future.

Inasmuch as the District has not filed any reports with this Court since 1938, the complainant States have been at a disadvantage in determining what kind and how efficient have been sewage treatment operations conducted by the Sanitary District. It has made public claims that it gives its sewage and industrial wastes from 85% to 90% treatment, including the removal of all solids. The Sanitary District is not subject to the authority of the Illinois Sanitary Water Board, as evidenced by the following language contained in the state statute creating the said board:[3]

> "Nothing in this Act contained shall apply to or be effective within the territorial limits of or be construed in any manner to affect the property, real, personal or mixed, wherever situated, or the channels, adjuncts and additions, drains, ditches and outlets, and their use, operation and maintenance and the right to the flow of water therein, and in rivers, streams and navigable waters connected thereto, for sewage, dilution, nor affect the jurisdiction, rights, powers, duties and obligations of any existing sanitary district which now has a human population of one million or more within its territorial limits. 1929, June 25, Laws 1929, p. 386, § 16; 1945, July 25, Laws 1945, p. 382, § 1."

Consequently, the presently known Metropolitan Sanitary District of Greater Chicago is a kingdom unto itself, from which even the State of Illinois, its creator, has excluded itself. Despite this legal iron curtain with which the Sanitary District has surrounded itself, the complainant States have been able to secure information concerning the operations of the sewage collection system and treatment works constructed and maintained by the District, which information is indicative of the laxity with which these works are operated, as well as their ineffectiveness in doing a proper and adequate job of sewage and industrial waste treatment.

During the years, the District, in deciding on a course of action in the methods and manner of handling this sanitation problem, has committed two grievous errors:

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[3] Smith-Hurd Ill. Ann Stat, Ch. 19, § 144.

(1) Many years ago, before this controversy reached this Court, the District chose to dispose of its untreated sewage by discharging it to the Sanitary and Ship Canal. By diverting large volumes of fresh clean water from Lake Michigan, the District hoped to not only dilute the polluted waters but also to flush them on down the Illinois waterway. There is no need here to take time and space in describing the "mess" which the District had created in its own backyard. Needless to say, in an attempt to ameliorate these conditions, the District was forced to divert greater and greater volumes of water from Lake Michigan.

Even with the completion of the sewage treatment works, compelled by the decree of this Court of 1930, this District has not resolved its sewage disposal problem. It still claims that it needs greater quantities of diverted water for diluting the effluent which is discharged from its sewage treatment plants. Not only the records of this Court, but the records and archives of Congress are replete with insistent and repeated demands for greater quantities of diverted water for dilution purposes. Consequently, it would seem that the method chosen by the District of discharging the effluent from its sewage treatment plants into the waters of the Sanitary and Ship Canal does not meet the requirements of today, any more than the Sanitary Canal met the requirements in 1930 and prior years. The reason why the present waterway is not capable of doing a satisfactory job of dilution is set forth in this petition, particularly Paragraph III thereof.

The gist of the trouble is:

The Sanitary and Ship Canal, a federalized waterway, through a system of locks, operates as a slack water navigation facility. Such a system requires a minimum of velocity in order that large traffic may safely utilize the facility.

This canal system is also the receiving waters for all effluents discharged by the District's sewage treatment plants, numerous trade waste, as well as vast volumes of storm water which accumulates in the District's sewer system during periods of surface runoff. Storm water overflow from such a "combined system" is mixed with the raw sewage and when such a mixture is discharged untreated to a waterway, it carries large quantities of solids and biochemical oxygen demand substances.

The effect of these operations as practiced by the District has resulted in creating nothing more than an "open sewer" of the Sanitary and Ship Canal. The present pollution loading on the waters of this slack water canal system is so great that no amount of dilution water diverted from Lake Michigan can adequately satisfy the biochemical oxygen demand of this "open sewer" and still allow utilization of the canal for navigation purposes. It should be noted further that the low velocities of the waterway are not sufficient to flush or move out the solids resulting from these "operations" of the District. Consequently these solids settle out as sludge deposits at numerous points along the waterway and aggravate further the pollution problem.

Actually, the District, in following these practices, is utilizing the Sanitary and Ship Canal as a huge disposal adjunct or facility for the collection and treatment system it has failed to provide as ordered by the 1930 decree of this Court.

Although an inspection of the finally treated effluent visible in the last stages of treatment at the sewage disposal plants indicates that such effluent is substantially colorless, containing a minimum of suspended matter and but 10% or less of the incoming raw sewage and wastes; nevertheless it was observed that the waters of the Canal contained numerous types of solids and as late as November 11, 1957 in the vicinity of at least two oil refineries, the water contained the acrid odor of oil refinery wastes and the Canal banks were covered with oil sludge deposits.

(2) Faced with the sanitation problem created by rapidly increasing population, booming industries and an ever increasing area of service, the District has committed its second error. It has failed to provide and construct adequate sewage and industrial waste collection and treatment facilities to match this growth. Yet on the other hand, it has encouraged and enticed industrial expansion and accepted the sanitation problems of contiguous municipalities by connecting their sewers to its already overloaded collection system, further aggravating the basic problem of complete collection and treatment of the sewage and industrial waste of "Chicagoland."

Simply put, the District, after this court decree of 1930, reluctantly constructed the sewage treatment facilities as ordered. By 1939 these works were finally completed and in operation. However, since then the population and service area of the District has more than doubled and has far exceeded the estimated population and industrial growth made by it in the early 1930's. Yet the District looks backward to its past history for the answer—discharge the wastes, some treated, others not, to the Sanitary and Ship Canal, dilute them with Lake Michigan water and flush the "mess" on down the waterway into the Mississippi Basin. This was and is their "answer" to this basic problem. Not really very different than prior to 1930. True, the District operates several large sewage treatment plants and does a reasonably efficient job at these works. Yet this waterway, referred to on federal navigation maps as the Sanitary and Ship Canal, remains grossly polluted, and consequently the District continues by every means at its command to seek greater amounts of dilution water from the Great Lakes Basin.

We say most emphatically that so long as the District is allowed, through the decrees of this Court, to discharge the effluent coming from its sewers and sewage disposal plants directly into the waters of this Canal together with storm water overflows and other untreated waste, the District will never solve this problem but will merely augment the unsanitary conditions which it creates; and as a result there will be heard insistent and repeated demands for more water from Lake Michigan with which to dilute the contaminated waters of the Canal, as well as to flush away the sludge deposits which have settled on its bottom and banks.

Solution of the District's Sewage Disposal Problem Propounded by Complainant States

It should be recalled that in the second Master's report the Sanitary District of Chicago convinced Special Master Charles Evans Hughes that it be allowed to divert into the Sanitary Canal not only the 1,500 c. f. s. needed for navigation, but also all of its "domestic pumpage." The complainant States filed objections against allowing the Sanitary District to discharge into the Canal the water comprehended under the term "domestic pumpage," and they proposed that the water in the Canal be reversed so as to be returned to Lake Michigan. Obviously, this proposal was impractical at that time, particularly since the District in 1930 operated little, if any, sewage disposal facilities. However, the Court in its opinion indicated that it would leave the matter open for further consideration, and it is on the basis of this fact that the complainants have filed the instant petition.

What is "domestic pumpage"?

The City of Chicago through its waterworks abstracts water from Lake Michigan and, after filtration and treatment, distributes it to all its users for residential, commercial and industrial purposes. Ultimately this water finds its way into the sewers which are operated by and under the control of the Sanitary District. Obviously, as the population of Chicago and the municipalities in its periphery grow, the area served increases, and industrial development continues upward, greater quantities of water will be required to satisfy the needs of "domestic pumpage." At the present time approximately 1,800 c. f. s. is extracted for this purpose, and it is conceivable, certainly, that with the growths that have been projected, this amount will double and treble within the next fifteen to twenty years.

Under the decree of this Court of 1930, there is no limit to the amount of "domestic pumpage" which the City of Chicago may abstract from the waters of Lake Michigan for domestic, commercial and industrial uses, nor do the complainant states contend that there should be any such limitation. As a riparian owner on the Great Lakes, the State of Illinois has an undoubted right to abstract from Lake Michigan such water as it requires for the use of the inhabitants which reside within the basin comprising the Great Lakes, and we might not even quarrel with allowing even those residing outside, but within the District's service area, to make use of such water. However, the people of Chicago and its surrounding municipalities should not be allowed to abstract water from Lake Michigan under the guise of "domestic pumpage," and then after having used it and purified the resulting sewage, divert it to another and different basin. We assert (and we believe this assertion cannot be contradicted) that every municipality situated on the shores of any of the Great Lakes returns its so-called "domestic pumpage" back to the waters of the lake from which it is taken after treatment and chlorination, when necessary. Chicago and its surrounding municipalities seem to assume that they are different, that their case is so special that they should be allowed to divert the treated effluent into another drainage water basin through the Sanitary Canal and waterway. If the cities of Milwaukee, Cleveland, and Toronto are able to return their treated effluent back to lakes Michigan, Erie and Ontario, respectively, without suffering from any deleterious results, we cannot see any logical reason why Chicago should not be compelled to do likewise. If after due inquiry and consideration by this Court it should be decided that the Metropolitan Sanitary District of Greater Chicago be compelled to return its fully treated effluent back to Lake Michigan, as is done by every municipality in the Great Lakes Basin, several salutary things will be accomplished:

(1) The Basin will receive all of the water which was abstracted through "domestic pumpage," and thus levels of the Great Lakes-St. Lawrence Basin will be restored to and maintained at the level which is their due.

(2) The Sanitary District will be spurred to treat its sanitary and industrial wastes properly and adequately to the end that the source of water supply used by the City of Chicago will not be endangered or contaminated. This is presently done by every municipality on the Great Lakes.

Sanitary District Has No Right to Divert Its Treated Effluent into the Sanitary Canal — It Should be Made to Return Such Effluent to the Great Lakes Basin

It is difficult for the complainant States to understand upon what legal or equitable doctrine can the State of Illinois and the Sanitary District rely to support its insistence that it divert "domestic pumpage" into the Canal rather than return it to the Lake except as the exigencies existing at the time the Court entered its decree in 1930 made impracticable *at that time and under the conditions then prevailing.*

If we are to accept as factually true and legally sound the reasoning of Secretary of War Henry L. Stimson, contained in his denial of the application of the Sanitary District at Chicago, in 1913, for diversion of 10,000 cubic feet per second, in his day, then today this reasoning is even more compelling. The Secretary stated, among other things:[4]

> "*In a word, every drop of water taken out at Chicago necessarily tends to nullify costly improvements made under direct authority of Congress throughout the Great Lakes, and a withdrawal of the amount now applied for would nullify such expenditures to the amount of many millions of dollars, as well as inflict an even greater loss upon the navigation interests using such waters.*
>
> "On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation. * * *
>
> "* * *

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[4] The Chicago Water Diversion Controversy, Marquette Law Review, Vol. 30, December 1946, No. 3, pp. 155, 157.

"* * * The evidence indicates that at bottom the issue comes down to the question of cost. Other adequate systems of sewage disposal are possible and are in use throughout the world. The problem that confronts Chicago is not different in kind but simply larger and more pressing than that which confronts all of the other cities on the Great Lakes, in which nearly three millions of the people of this country are living. The urban population of those cities, like that of Chicago, is rapidly increasing, and a method of disposition of their sewage which will not injure the potable character of the water of the Lakes must sooner or later be found for them all. The evidence before me satisfies me that it would be possible in one of several ways to at least so purify the sewage of Chicago as to require very much less water for its dilution than is now required by it in its unpurified condition. A recent report of the Engineer of the Sanitary Commission (October 12, 1911) proposes eventually to use some such method but proposes to postpone its installation for a number of years to come, relying upon the present more wasteful method in the meanwhile. It is manifest that so long as the city is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage. This is particularly true in view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport. But it must be remembered that for every unit of horsepower realized by this water at Lockport, four units of similar horsepower would be produced at Niagara, where the natural conditions are so much more favorable. Without, therefore, going into further detail in a discussion of this question, I feel clear that no such case of necessity has been presented by the evidence before me as would justify the proposed injury to the many varied interests in the great waterways of our lakes and their appurtenant rivers."

Many great and important events and developments have occurred in the Great Lakes-St. Lawrence Basin since 1913, and in fact since 1930, which make it even more imperative that every drop of water reaching this Basin should be allowed to remain therein. Some of them are outlined in Paragraph VII of our petition and this Court cannot but help to take judicial notice of the great surge of industrial development that has taken place along the shores of the Great Lakes. The present construction of the St. Lawrence Waterway running into hundreds of millions of dollars through the joint action and efforts of Canada and the United States, the construction of tremendous hydro-electric power works on the Niagara and on the St. Lawrence River by the State of New York jointly with the Province of Ontario, the deepening of the connecting channels between lakes Erie and Huron, and the expansion of lock facilities at Sault Ste. Marie during World War II,—these are but a few of the events which have taken place, which we believe should move this Court to a re-evaluation of the terms of the decree of 1930. If as Secretary Stimson stated in 1913, and as Special Master Hughes reported, every drop of water extracted from and permanently lost to this Basin brings about nullification of the value of works running into hundreds of millions of dollars, then it is the height of absurdity to permit the Sanitary District of the State of Illinois to deprive this Basin of water which legally and equitably belongs therein, on the specious plea that it will cost money to do that which every municipality except Chicago on the Great Lakes has been and now is doing, namely, returning their treated effluent to the Basin from which it came. Exactly what will be required to be done on the part of the Sanitary District in the rearrangement of its collection facilities and in the construction of works and tunnels to accomplish the aforesaid purpose, is a matter which undoubtedly this Court through a Master would like to inquire into and consider. However, it is the position of the complainant States that regardless of the inconvenience and cost to be borne by the State of Illinois and the Sanitary District, they should be compelled to restore to the Great Lakes Basin the water which they are presently extracting as "domestic pumpage," and the greater and increasing quantities which they will unquestionably extract in this form during the not too distant future.

This Court, Through a Special Master, if Necessary, Should Inquire into and Find Answers To the Following Questions:

The complainant states would suggest to the Court that should a Special Master be appointed some of the issues confronting him would be the following:

(1) To what extent are present unsatisfactory conditions in the Chicago Sanitary and Ship Canal created by uncollected and untreated sewage or industrial wastes originating in the Sanitary District.

(2) To what extent are present unsatisfactory conditions within said Canal caused by industrial effluent from industries located within the District whose use of water cannot be termed as "domestic pumpage" within the intent and meaning of the 1930 decree.

(3) To what extent can the present treatment of sewage and industrial wastes be increased so as to reduce the demand for more diverted water for dilution purposes.

(4) What means of correcting unsatisfactory conditions in the Ship Canal are available and can be made use of other than additional diversion of water from Lake Michigan, such as:

- (a) Physical removal of present sludge deposits in canals and waterways;
- (b) Supplementing flow in Ship Canal from upstream storage of water in the Des Plaines River Basin;
- (c) Aeration of the water in the Ship Canal;
- (d) Any other alternates that might be conceived by sanitary engineers and scientists.

(5) Should a Permanent Master be appointed with full authority granted by this Court to maintain surveillance over the conduct and operation of the facilities maintained by the Sanitary District, which Master shall have authority to receive and examine periodic reports from the District, to make inquiry at all reasonable times and occasions concerning not only the accuracy of said reports but also concerning the manner and efficiency with which the Sanitary District operates and maintains its sewage disposal facilities; said Master making all of such information received by him available to the complainant states.

(6) Under what terms and conditions shall the Sanitary District of the State of Illinois be compelled to return the treated effluent of its sewage disposal plants back to the waters of Lake Michigan. Undoubtedly, this will entail the construction of expensive facilities and a time schedule should be determined after considering the exigencies that exist at the present time.

The enumeration of the foregoing issues, of course, does not preclude the consideration of and inquiry into any other pertinent issues that may arise.

The Diversion of "Domestic Pumpage" into the Ship Canal Is Not Necessary to Maintain Navigation Therein.

In Paragraph IX of this petition, the complainant states allege that it is not their intention to challenge the diversion of 1,500 c.f.s. permitted by the decree of 1930 for the purpose of maintaining navigation in the Sanitary and Ship Canal, but they do challenge the diversion of any volume of water in addition thereto in the form of "domestic pumpage" under the pretext that such is necessary to maintain navigation in this Canal.

It should be noted that in the memorandum issued by Secretary of War Stimson in 1913, it is stated:[5]

> "* * * The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a deep waterway from the Great Lakes to the Mississippi over the route of the Sanitary Canal, the maximum amount of water to be diverted from *Lake Michigan need actually be not over 1000 feet per second* or less than a quarter of the amount already being used for sanitary purposes in the Canal. This estimate is confirmed by the report of the Special Board of Engineers on the deep waterway from Lockport, Illinois, to the mouth of the Illinois River, dated January 25, 1911. It is also confirmed by the practical experience of the great Manchester Ship Canal in England. From the standpoint of navigation

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[5] The Chicago Water Diversion Controversy, Marquette Law Review, Vol. 30, December 1946, No. 3, pp. 155, 156.

> alone in such a waterway, too great a diversion of water would be a distinct injury rather than a benefit. It would increase the velocity of the current and increase the danger of overflow and damage to adjacent lands."

In a report made by the Division Engineer, North Central Division Corps of Engineers, United States Army, in January, 1957 on the subject "Effects of an Additional Diversion of Water from Lake Michigan at Chicago," it is stated:[6]

> "184. Commerce on the Illinois Waterway has increased from a total of 1,695,120 tons in 1935 to 21,362,852 tons in 1955, the latest year for which statistics have been compiled. Recent studies of present and prospective water requirements for navigation on the Illinois Waterway show that the authorized diversion of 1,500 cubic feet per second from Lake Michigan is adequate to meet those requirements."

There is ample data contained in this report supporting the foregoing conclusion of the United States Corps of Engineers; consequently, there is no merit to the plea that additional water in the form of "domestic pumpage" should be diverted into this waterway for the purpose of maintaining navigation. Another facet of the problem of increased diversion is that such increase raises the velocity of the water in the Canal, which makes it more difficult for barges to navigate the Canal. This fact was also mentioned by Secretary of War Stimson in his memorandum of 1913.

In an article written by General P. D. Berrigan, formerly with the United States Corps of Engineers, which appeared in the November-December 1957 issue of the Military Engineer, under the title "Chicago Diversion from Lake Michigan," General Berrigan discusses the adverse effects of increased diversion on navigation in the Ship Canal, which were observed during the period from December 27, 1956 through February, 1957 (such increase having been permitted by an order of this Court) and states as follows:

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[6]

85th Congress, 1st Session, Senate Document No. 28, p. 48.

> "Increased current velocities in channels of the Illinois Waterway during the period of increased diversion were of interest because of their effects on navigation. The relatively restricted reach extending from the junction of the Calumet-Sag Channel to the lock at Lockport was of particular interest. Normal velocities of a fraction of a mile per hour were increased to about 2 miles per hour. In this reach on December 24, a motor vessel lost control of several barges while rearranging its tow."

The result is that the Sanitary District of Chicago is riding both horns of a dilemma: it insists upon more water to be diverted into the Ship Canal to help dilute untreated or inadequately treated sewage and waste; and on the other hand, it is thereby causing an injury to navigation on the Ship Canal, which since 1933 has been a Federal navigable waterway. In view of this injury to Federal navigation, it would seem altogether proper that the Attorney General of the United States should be advised of the pendency of this petition and intervene in these proceedings for the purpose of protecting the paramount interests of the United States, both as to navigation and in the conduct of international affairs.

The State of Illinois and the Sanitary District Has Made Numerous and Repeated Attempts to Circumvent the Decree of this Court by Seeking Congressional Authorization of Increased Diversion for Sanitary Purposes.

Repeatedly bills have been introduced in Congress by congressional members from the State of Illinois, seeking to increase the diversion in violation of the decree of this court of 1930. Unless we be misunderstood, we hasten to assure this Court that we do not present this issue because we expect to stay the members of Congress from introducing such bills as they see fit. However, we believe it is within the province of this Court to consider this issue and make a clear and unmistakable declaration that such diversion for sanitation purposes, even though authorized and sanctioned by the Congress, would avail the State of Illinois and the Sanitary District nothing. The reasons for seeking congressional authorization of greater quantities of diverted water is to help the Sanitary District in diluting its untreated or inadequately treated sewage, as well as diluting sewage from industrial waste which is directly discharged into the Canal is evident from all the studies and reports that have been made on the subject. It has another purpose, that of increasing its income by increasing the hydroelectric energy generated by its power plant. Since the Canal does not require more than 1,500 c.f.s. for the maintenance of navigation, then obviously an additional diversion must be for non-navigational purposes. This was very clearly and emphatically pointed out in the veto message of President Eisenhower given verbatim in Paragraph IV of the petition. The question is, may Congress permit and authorize the diversion of water from the Great Lakes Basin into the Mississippi River Basin through this Canal for non-navigable purposes, and more specifically for sanitation and power purposes, to the direct injury and damage of the complainant States? It is our contention that when this court held in its opinions that the State of Illinois and the Sanitary District could not divert water for sanitation purposes and that such diversion was for an "inadmissible purpose" it meant the diversion for such inadmissible purpose could not constitutionally be sanctioned. We have no quarrel at this stage of the proceedings in these cases to the diversion of such water as may be needed, not exceeding 1,500 c.f.s. to maintain navigation in the Sanitary and Ship Canal and the federally operated Illinois waterway, but we emphatically insist that the diversion of water from the Great Lakes Basin, for a purpose other than for maintenance of navigation, cannot be sanctioned, even by Congress, since intra-state sanitation is not a subject over which Congress has any constitutional jurisdiction.

Relief Requested by Complainant States

Complainant states request the Court to amend the decree of April 21, 1930 and grant them the following relief:

(1) That the State of Illinois and the Metropolitan Sanitary District of Greater Chicago be forthwith restrained and enjoined from discharging any of the treated effluents emanating from its sewage and industrial treatment facilities into the Sanitary and Ship Canal, and that said State of Illinois and the Metropolitan Sanitary District of Greater Chicago be required by mandatory injunction of this Court to return all of said effluent to the Great Lakes Basin from which it originally came in the form of "domestic pumpage," the aforesaid injunctions to be made effective at such times and under such terms as to this Court shall seem meet and just.

(2) That if such decree is not made forthwith, a Special Master be appointed to take testimony and evidence with respect to the issues contained in this petition and to re-

port with respect to the time, method, and manner in which the State of Illinois and the Metropolitan Sanitary District of Greater Chicago shall comply with Paragraph (1) of this prayer, and with respect to whether the Court should appoint a Permanent Master invested with such authority as he may require for the purpose of maintaining surveillance over the operation of the sewers, interceptors, and other sewage and water collecting facilities and the sewage disposal and industrial treatment plants and works operated by the Metropolitan Sanitary District of Greater Chicago.

Respectfully submitted,

STATE OF WISCONSIN
Stewart G. Honeck
Attorney General
Ray Tulane
Assistant Attorney General

STATE OF MINNESOTA
Miles Lord
Attorney General
Melvin J. Peterson
Deputy Attorney General

STATE OF OHIO
William Saxbe
Attorney General
Robert E. Boyd
Assistant Attorney General

STATE OF PENNSYLVANIA
Thomas D. McBride
Attorney General
Lois G. Forer
Deputy Attorney General

STATE OF MICHIGAN
Thomas M. Kavanagh
Attorney General
Samuel J. Torina
Solicitor General
Nicholas V. Olds
Assistant Attorney General

STATE OF NEW YORK
Louis J. Lefkowitz
Attorney General
John R. Davison
Acting Solicitor General

Office - Supreme Court
FILED
JAN 12 195
JOHN T. FEY, Cl

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

MOTION OF THE STATE OF ILLINOIS FOR EXTENSION TO FEBRUARY 28, 1957, OF THE ORDER AUTHORIZING EMERGENCY DIVERSION

LATHAM CASTLE,
Attorney General of the State of Illinois,
Suite 900—160 N. La Salle Street,
Chicago 1, Illinois,
Attorney for State of Illinois.

WILLIAM C. W[redacted]s,
Assistant Attorney General,
Of Counsel.

CHAMPLIN-SHEALY COMPANY, CHICAGO 365

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 2 Original
STATE OF MICHIGAN, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 3 Original
STATE OF NEW YORK, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 4 Original

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MOTION OF THE STATE OF ILLINOIS FOR EXTENSION TO FEBRUARY 28, 1957, OF THE ORDER AUTHORIZING EMERGENCY DIVERSION

The State of Illinois seeks extension of the Order entered December 17, 1956, which authorized emergency diversion of water until January 31, 1957, so that such diversion may be continued under the same conditions and restrictions to and including February 28, 1957.

The emergency in navigation caused by low water on the Mississippi River has been alleviated by the presently existing diversion but will become critical again during February, 1957, unless the diversion is continued throughout that month. Although precipitation in 1956 and thus far in 1957 has been below normal, it is expected that warmer weather and rains, which are to be expected during the last week in February and early March, will cause sufficient run-off of water into the Mississippi and its tributaries to bring the critical emergency to an end.

The facts of the emergency and the irreparable injury to to the State of Illinois unless relief be granted are described further in the Petition of the State of Illinois filed herein in November, 1956.

If relief sought herein is to be effective, it must be granted without undue delay. The Court is therefore respectfully requested to make a special order that other parties to this proceeding file their replies, if any, to this Motion within 10 days of service hereof.

WHEREFORE, Illinois respectfully moves this Court to extend the said temporary diversion Order until February 28, 1957.

Respectfully submitted,

LATHAM CASTLE,

Attorney General of the State of Illinois,
Suite 900, 160 N. La Salle St.,
Chicago (1), Illinois,

Attorney for State of Illinois.

WILLIAM C. WINES,
Assistant Attorney General,
Of Counsel.

CERTIFICATE

State of Illinois
County of Cook } ss:

The undersigned, Stuart B. Bradley, sworn, says that he has caused copies of the foregoing motion to be mailed to the following counsel at the following addresses, respectively:

Hon. Vernon W. Thomson
Attorney General
State Capitol
Madison, Wisconsin
Hon. Miles Lord
Attorney General
State Capitol
St. Paul 1, Minnesota
Hon. C. William O'Neill
Attorney General
State Capitol
Columbus, Ohio
Hon. Herbert Cohen
Attorney General
State Capitol
Harrisburg, Pennsylvania
Russell W. Root
Attorney for
The Metropolitan Sanitary
District of Greater Chicago
Law Dept., 100 E. Erie St.
Chicago, Illinois
Hon. Thomas M. Kavanaugh
Attorney General
State Capitol
Lansing, Michigan

Hon. Jack P. F. Gremillion
Attorney General
State Capitol
Baton Rouge 4, Louisiana
Hon. T. J. Gentry
Attorney General
State Capitol
Little Rock, Arkansas
Hon. John M. Dalton
Attorney General
State Capitol
Jefferson City, Missouri
Hon. George F. McCanless
Attorney General
State Supreme Court Building
Nashville, Tennessee
Hon. Joe T. Patterson
Attorney General
State Capitol
Jackson, Mississippi
Hon. Jacob G. Javits
Attorney General
State Capitol
Albany 1, New York

Hon. Jo M. Ferguson
Attorney General
State Capitol
Frankfort, Kentucky

J. Lee Rankin
Solicitor General
Department of Justice
Washington, D. C.

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Subscribed and sworn to before me this 11th day of January, 1957.

....
Notary Public.

Office - Supreme Court, U.
FILED
JAN 22 1957
JOHN T. FEY, Cler

IN THE
SUPREME COURT OF THE UNITED STATES

Nos. 2, 3, and 4, Original

OCTOBER TERM, 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

Motion of the States of Wisconsin and Ohio to Dismiss the Motion of the State of Illinois for Extension of the Order of December 17, 1956

STEWART G. HONECK, Attorney General of Wisconsin
ROY G. TULANE, Assistant Attorney General of Wisconsin
WILLIAM SAXBE, Attorney General of Ohio
JAMES S. DeLEON, Assistant Attorney General of Ohio

THE GILMAN PRESS, MADISON, WISCONSIN

IN THE

SUPREME COURT OF THE UNITED STATES

Nos. 2, 3, and 4, Original

OCTOBER TERM, 1956

STATES OF WISCONSIN, MINNESOTA,
OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY
DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY
DISTRICT OF CHICAGO, et al.,
Defendants,
STATES OF MISSOURI, KENTUCKY,
TENNESSEE, LOUISIANA,
MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY
DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

Motion of the States of Wisconsin and Ohio to Dismiss the Motion of the State of Illinois for Extension of the Order of December 17, 1956

To the Honorable

The Chief Justice and Associate Justices
of the United States:

Comes now the State of Wisconsin by Stewart G. Honeck, Attorney General, and Roy G. Tulane, Assistant Attorney General, attorneys for the State of Wisconsin, William Saxbe, Attorney General, and James F. DeLeon, Assistant Attorney General, attorneys for the State of Ohio, and move this Court to dismiss with costs the motion of the State of Illinois for an extension of the order of this Court of December 17, 1956, which modified paragraph 3 of the decree of April 21, 1930, as amended, upon the following grounds:

1. The motion of the State of Illinois to extend the order of December 17, 1956 which authorized an increased diversion of Great Lakes waters to the Chicago Drainage Canal presents no change in circumstances which were the basis of the said order of December 17, 1956, which was to terminate on January 31, 1957 and hence presents no grounds for modifying or extending such order.

(a) The order of this Honorable Court entered December 17, 1956 was based upon the facts as set forth in the petition of the State of Illinois filed in November, 1956.

(b) Pursuant to said decree of December 17, 1956, under the supervision of the corps of engineers of the United States Army, the Metropolitan Sanitary District of Greater Chicago has increased its daily diversion to an average of 7,500 cubic feet per second, plus domestic pumpage.

(c) The present motion of the State of Illinois pleads, and we concede, that the emergency in navigation caused by low water on the Mississippi River has been alleviated by the above described diversion.

(d) The motion of the State of Illinois presents no facts to this Honorable Court as to the increase in water levels at the critical point on the Alton locks, presents no facts to this Court as to the present levels of the said critical point, presents no facts as to the nature of the barge shipping now proceeding through the Alton locks, either in the upper reaches of the Mississippi or in the Illinois waterway.

(e) On information and belief, that there is comparatively little or no barge traffic on the Mississippi River northerly of Alton, and that such traffic as exists does not proceed further than Keokuk, Iowa, that by the time substantial navigation is restored on the Mississippi, the flood stages of the Mississippi will have commenced, and that any added water coming through the Illinois waterway and the Chicago canal would constitute a detriment rather than an advantage to barge shipping upon the Mississippi River.

2. The Great Lakes States have, as has the United States of America itself, a paramount interest in maintaining the levels of the Great Lakes as an international waterway serving the Great Lakes ports and in opposing the diversion of waters properly allocable to the watershed of the Great Lakes to any other watershed or drainage basin.

3. The water level in Lake Michigan has declined more than 3 feet from the high stages of 1952 with corresponding declines in all lower Great Lakes including Lake Erie, and

all reasonable prospects are that this decline will continue in effect for substantial periods in the future.

Respectfully submitted,

STEWART G. HONECK
Attorney General of Wisconsin

ROY G. TULANE
Assistant Attorney General of Wisconsin

Attorneys for the State of Wisconsin

WILLIAM SAXBE
Attorney General of Ohio

JAMES S. DeLEON
Assistant Attorney General of Ohio

Attorneys for the State of Ohio

Dated January 21, 1957.

Office - Supreme Court, U.S.
FILED
JAN 2 2 1957
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.,*
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *et al.,*
Defendants.

No. 4 Original

REPLY OF THE STATE OF NEW YORK TO MOTION OF THE STATE OF ILLINOIS FOR EXTENSION TO FEBRUARY 28, 1957 OF THE DECREE AUTHORIZING EMERGENCY DIVERSION.

LOUIS J. LEFKOWITZ,
Attorney General of the State
of New York,
The Capitol,
Albany 1, N. Y.

JAMES O. MOORE, JR.,
Solicitor General of the
State of New York,
Of Counsel.

BATAVIA TIMES, LAW PRINTERS,
BATAVIA, N. Y.

IN THE

Supreme Court of the United States

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
et al.,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK.
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
et al.,
Defendants.

No. 4 Original

REPLY OF THE STATE OF NEW YORK TO MOTION OF THE STATE OF ILLINOIS FOR EXTENSION TO FEBRUARY 28, 1957 OF THE DECREE AUTHORIZING EMERGENCY DIVERSION.

To the Honorable The Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of New York, by Louis J. Lefkowitz, its Attorney General, does not oppose the motion of the State of

Illinois for extension to February 28, 1957 of the decree of this Court entered December 17, 1956 temporarily modifying the decree of this Court issued April 21, 1930 "to permit the diversion to and including the 31st day of January 1957, from the Great Lakes St. Lawrence system into the Illinois Waterway and the Mississippi River of such amount of water not exceeding an average of 8500 cubic feet a second, in addition to domestic pumpage, as the Corps of Engineers, United States Army, shall determine will be useful in alleviating the emergency with respect to navigation currently existing without seriously interfering with navigation on the Illinois waterway, at such times and in such amounts as the Corps of Engineers shall direct", provided that the decree allowing such extension contains the same terms and conditions set forth in the decree dated December 17, 1956, with the necessary exception of the change in the date of January 31, 1957 to February 28, 1957.

The reasons why the State of New York does not oppose the present motion of the State of Illinois are set forth in the answer of the State of New York to the petition of the State of Illinois pursuant to which the decree of December 17, 1956 was made. Since the State of New York did not oppose the petition of the State of Illinois for a temporary modification of the decree of April 21, 1930 for a period of 100 days, the present position of the State of New York is consistent with the position set forth in its answer.

The State of New York will, however, oppose any extension of the decree of December 17, 1956 beyond February 28, 1957, particularly if further extension of the decree is sought to relieve an alleged emergency in navigation caused by low water on the Mississippi River because there exist other means of remedying such a condition than by diverting water from the Great Lakes St. Lawrence system.

Dated: January 17, 1957.

Respectfully submitted,

Louis J. Lefkowitz,
Attorney General of the State
of New York,

By:

James O. Moore, Jr.,
Solicitor General of the State
of New York.

FILED
1957

[illegible]

STATE OF WISCONSIN, ET AL., COMPLAINANTS,

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.

STATE OF MICHIGAN, COMPLAINANT,

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, INTERVENING DEFENDANTS.

STATE OF NEW YORK, COMPLAINANT,

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.

ON MOTION OF THE STATE OF ILLINOIS FOR EXTENSION, FROM FEBRUARY 28, 1957, OF THE ORDER AUTHORIZING EMERGENCY DIVERSION

MEMORANDUM ON BEHALF OF THE UNITED STATES AS AMICUS CURIAE

J. LEE RANKIN,
Solicitor General,
PERRY W. MORTON,
Assistant Attorney General,
DAVID R. WARNER,
Attorney,
Department of Justice, Washington 25, D. C.

In the Supreme Court of the United States

OCTOBER TERM, 1956

No. 2 Original

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, COMPLAINANTS

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO

No. 3 Original

STATE OF MICHIGAN, COMPLAINANT

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, INTERVENING DEFENDANTS

No. 4 Original

STATE OF NEW YORK, COMPLAINANT

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.

ON MOTION OF THE STATE OF ILLINOIS FOR EXTENSION TO FEBRUARY 28, 1957, OF THE ORDER AUTHORIZING EMERGENCY DIVERSION

MEMORANDUM ON BEHALF OF THE UNITED STATES AS AMICUS CURIAE

This memorandum is submitted to aid the Court in disposing of the Motion of the State of Illinois to amend the Order of December 17, 1956, which permitted additional diversion of water from the Great Lakes into the Illinois Waterway and the Mississippi River through January 31, 1957, in order that the diversion may continue until February 28, 1957. The State of Illinois represents that low water conditions will become critical unless diversion is continued throughout February.

We have been informed by the Corps of Engineers that following the Court's Order of December 17, 1956, additional diversion was authorized bringing the volume gradually up to 8,000 cubic feet a second by the end of December. This resulted in increasing the stage at St. Louis by about 1.2 feet. During the first week of January the depth of water over the Lock 26 sill was about eight feet.

As a result of frozen river conditions in the Missouri and Mississippi above St. Louis, the stage at St. Louis fell about 1.6 feet by January 15 and the depth of water over the sill of Lock 26 declined to 6.6 feet. It was expected to fall to 6 feet within a week.

If weather conditions continue as of the present time and if the increased diversion is terminated, the clearance at Lock 26 would fall to 4.8 feet. Meanwhile the stage at St. Louis would fall to minus 6.7 feet, which is close to the minus 7.0 stage which we are informed is critical for power plants and industrial plants in the area. Colder weather would worsen the situation; warmer weather would alleviate it.

The above information from the Corps of Engineers indicates to us that the diversion already permitted has helped the situation but that the critical condition is continuing and, if the weather becomes colder, the situation may become even more serious.

The present order does not require the Corps of Engineers to permit the full diversion authorized by the Court and in fact the diversion has been held to about 8,000 cubic feet a second, which was determined to be the maximum which could be allowed without unduly impairing navigation in the Illinois Waterway. It is suggested that, if the authority for additional diversion is extended, the amount to be diverted, within a maximum set by the Court, be left to the discretion of the Chief of Engineers as appropriate to alleviate conditions as they develop. This would enable a reduction in the amount diverted in the event weather conditions should moderate.

Respectfully submitted.

J. Lee Rankin,
Solicitor General.
John F. Davis,
Assistant to the Solicitor General.
David R. Warner,
Attorney.

January, 1957

U. S. GOVERNMENT PRINTING OFFICE: 1957

Office - Supreme Court,
FILED
JAN 23 1957
JOHN T. FEY, Cle

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

ANSWER OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO) TO THE MOTION OF THE STATE OF ILLINOIS FOR EXTENSION TO FEBRUARY 28, 1957, OF THE ORDER AUTHORIZING EMERGENCY DIVERSION.

RUSSELL W. ROOT,
100 East Erie Street,
Chicago 11, Illinois,
Attorney for The Metropolitan Sanitary District of Greater Chicago.

Lawrence J. Fenlon,
Principal Assistant Attorney,
Of Counsel.

CHAMPLIN-SHEALY COMPANY, CHICAGO

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original
October Term, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2
Original

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 3
Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4
Original

ANSWER OF THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO (FORMERLY THE SANITARY DISTRICT OF CHICAGO) TO THE MOTION OF THE STATE OF ILLINOIS FOR EXTENSION TO FEBRUARY 28, 1957, OF THE ORDER AUTHORIZING EMERGENCY DIVERSION.

To the Honorable Chief Justice and Associate Justices of
the Supreme Court of the United States:

May It Please the Court:

The Metropolitan Sanitary District of Greater Chicago (formerly The Sanitary District of Chicago), a Municipal Corporation, party defendant in the above entitled original causes, files this Answer pursuant to the Order of January 16, 1957, of Mr. Justice Burton, to the Motion of the State of Illinois, filed January 12, 1957, for Extension to February 28, 1957, of the Order authorizing Diversion.

The Metropolitan Sanitary District of Greater Chicago agrees with the facts stated in the Motion for Extension filed by the State of Illinois, that the emergency in navigation caused by low water in the Mississippi River will become critical during February, 1957, unless diversion is continued during that month.

This Defendant further represents that it is informed by the Corps of Engineers that the present water level at the Alton sill is about 6½ feet and is expected to decline further. This situation is caused by the existing extreme cold weather conditions in the area, as both the Upper Mississippi and the Missouri Rivers are now completely blocked with ice and therefore, almost all water going through the Alton locks is solely from the Illinois Waterway and thus from the diversion from Lake Michigan. If the diversion is cut back to 1,500 c.f.s., plus domestic pumpage on February 1, 1957, regardless of relief of weather conditions, there will be a resulting further decline in the water level at the Alton sill of 1 foot within 7-8 days.

Wherefore, this Defendant, THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, supports the Motion of the State of Illinois that this Court should extend the temporary diversion Order, entered on

December 17, 1956, so as to continue such temporary diversion at least to include February 28, 1957.

Respectfully submitted,

THE METROPOLITAN SANITARY
DISTRICT OF GREATER CHICAGO,
By: Russell W. Root,
Attorney.

Certificate

State of Illinois
County of Cook } SS:

The undersigned, Lawrence J. Fenlon, being first duly sworn, deposes and says that he is a duly appointed and acting Principal Assistant Attorney of The Metropolitan Sanitary District of Greater Chicago; and that the matters and things herein set forth are true in substance and in fact. Deponent further certifies that copies of the foregoing Answer have this day been mailed by first class United States mail, or United States airmail, to all parties to this proceeding, such service has been addressed, sufficient postage prepaid, as follows:

Hon. Latham Castle
Attorney General
Suite 900
160 No. La Salle Street
Chicago 1, Illinois

Hon. Niles Lord
Attorney General
State Capitol
St. Paul 1, Minnesota

Hon. T. J. Gentry
Attorney General
State Capitol
Little Rock, Arkansas

Hon. Thomas M. Kavanaugh
Attorney General
State Capitol
Lansing, Michigan

Hon. J. D. Buckman, Jr.,
Attorney General
State Capitol
Frankfort, Kentucky

Hon. Jack P. E. Gremillion
Attorney General
State Capitol
Baton Rouge 4, Louisiana

1

Hon. John M. Dalton
Attorney General
State Capitol
Jefferson City, Missouri

Hon. C. William O'Neill
Attorney General
State Capitol
Columbus, Ohio

Hon. Herbert Cohen
Attorney General
State Capitol
Harrisburg, Pennsylvania

Hon. Jacob G. Javits
Attorney General
State Capitol
Albany, New York

Hon. Nat Tipton
Advocate General
State Supreme Court Building
Nashville, Tennessee

Hon. Vernon W. Thomson
Attorney General
State Capitol
Madison, Wisconsin

Hon. Joe T. Patterson
Attorney General
State Capitol
Jackson, Mississippi

Hon. J. Lee Rankin
Solicitor General
Department of Justice
Washington, D. C.

....

Subscribed and sworn to before me this .... day of January, A. D. 1957.

....
Notary Public.

Russell W. Root,
100 East Erie Street,
Chicago 11, Illinois,
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IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 2 Original
STATE OF MICHIGAN, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 3 Original
STATE OF NEW YORK, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 4 Original

RESPONSE OF THE STATE OF MICHIGAN, COMPLAINANT, TO THE PETITION OF THE STATE OF ILLINOIS FOR EXTENSION TO FEB. 28, 1957, OF ORDER AUTHORIZING EMERGENCY DIVERSION.

Thomas M. Kavanagh
Attorney General of the State of Michigan

By Edmund E. Shepherd
Solicitor General

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The Capitol—Lansing 2, Michigan

SPEAKER-HINES AND THOMAS, INC., STATE PRINTERS, LANSING, MICH.—1957

IN THE

Supreme Court of the United States

Nos. 2, 3 and 4, Original

October Term, A. D. 1956

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STATE OF NEW YORK, *Complainant,* vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., *Defendants.*	No. 4 Original

Response of State of Michigan, Complainant, to motion of State of Illinois for extension to Feb. 28, 1957 of order authorizing emergency diversion.

In view of the allegations set forth in Michigan's answer to the petition of the State of Illinois for temporary modification of Paragraph 3 of the decree in these causes issued on April 21, 1930 [281 U.S. 696], the State of Michigan does not oppose the motion of the State of Illinois for extension to February 28, 1957, of the order entered by this Court on the 17th day of December, 1956, 352 U.S. 945, subject to the terms and conditions therein set forth. The fact that the State of Michigan does not oppose the motion of the State of Illinois, shall not be construed as an admission or evidence of the right of the State of Illinois, or any of its political subdivisions or other agencies, to divert any waters of the Great Lakes-St. Lawrence system except as provided in the Decree of April 21, 1930, as modified in this Court's order of December 17, 1956 or in Michigan's answer aforesaid.

Respectfully Submitted,

Thomas M. Kavanagh
Attorney General of the State of Michigan

By Edmund E. Shepherd
Solicitor General

Attorneys for Complainant
The Capitol—Lansing 2, Michigan

CERTIFICATE

State of Illinois }
County of Cook } ss:

Edmund E. Shepherd, Solicitor General of Michigan, sworn, says that he has caused copies of the foregoing motion to be mailed to the following counsel at the following addresses, respectively:

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Hon. Miles Lord
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Washington, D. C.

....

Subscribed and sworn to before me this 11th day of January, 1957.

....

Notary Public.

Office-Supreme Court, U.S.
FILED
JAN 24 1957
JOHN T. FEY, Clerk

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, Complainants vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, Defendants	No. 2 Original
STATE OF MICHIGAN, Complainant vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., Defendants STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS, Intervening Defendants	No. 3 Original
STATE OF NEW YORK, Complainant vs. STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al., Defendants	No. 4 Original

REPLY OF THE STATE OF MISSISSIPPI, AN INTERVENING DEFENDANT TO THE MOTION OF THE STATE OF ILLINOIS FOR AN EXTENSION TO FEBRUARY 28, 1957, OF THE ORDER AUTHORIZING EMERGENCY DIVERSION

JOE T. PATTERSON
Attorney General
of the State of Mississippi

DUGAS SHANDS
Assistant Attorney General

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1956

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA **Complainants** **vs.** **STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO** **Defendants**	**No. 2 Original**
STATE OF MICHIGAN **Complainant** **vs.** **STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.** **Defendants** **STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS** **Intervening Defendants**	**No. 3 Original**
STATE OF NEW YORK **Complainant** **vs.** **STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.** **Defendants**	**No. 4 Original**

REPLY OF THE STATE OF MISSISSIPPI, AN INTERVENING DEFENDANT TO THE MOTION OF THE STATE OF ILLINOIS FOR AN EXTENSION TO FEBRUARY 28, 1957, OF THE ORDER AUTHORIZING EMERGENCY DIVERSION

To the Honorable Chief Justice and Associate Justices of the Supreme Court of the United States:

May It Please The Court:

The State of Mississippi, an intervening defendant in this cause, presents this, it[illegible]reply, to the motion of the State of Illinois requesting an extension of the order entered December 17, 1956, which authorized emergency diversion of water until January 31, 1957, so that such diversion may be continued under the same conditions and restrictions to and including February 28, 1957.

The State of Mississippi recognizes that the diversion of water permitted by the Court by its order of December 17, 1956, will, if that order be extended or the diversion of water permitted until February 28, 1957, continue to assure the water levels along the Mississippi River which are necessary to navigation and water transportation along the Ports of the Mississippi River, some of which are situated within the State of Mississippi, and that such extension of the authority to divert and the diversion of water in the Mississippi River as permitted by said order of December 17, 1956, is the most definitely certain manner of preventing a recurrence of the critical emergency in navigation caused by low water in said river for the relief of which said order of December 17, 1956, was entered.

The State of Mississippi, therefore, respectfully concurs in the motion heretofore filed by the State of Illinois to extend the said emergency diversion order until February 28, 1957.

Respectfully submitted,

JOE T. PATTERSON
Attorney General
of the State of Mississippi

DUGAS SHANDS
Assistant Attorney General
Counsel for Intervening Defendant.
State of Mississippi

STATE OF MISSISSIPPI
COUNTY OF HINDS

This day personally appeared before me, the undersigned Secretary of State of the State of Mississippi, Joe T. Patterson, who after being by me first duly sworn, states on oath that he is the duly elected, qualified and acting Attorney General of the State of Mississippi, that he has read the foregoing reply and that the things and matters therein set forth are true and correct as stated, and that true copies of the foregoing reply have this day been duly mailed to counsel for all parties to this proceeding.

Joe T. Patterson, Attorney General
of the State of Mississippi

Sworn to and subscribed before me, this the 22nd day of January, 1957.

Heber Ladner, Secretary of State
of the State of Mississippi

SEAL

My commission expires January, 1960.

Office - Supreme Court, U.S.
FILED
FEB 6 1958
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

OCTOBER TERM, 1957.

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,*

vs.

STATE OF ILLINOIS and THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, *Defendants,*

No. 2 Original.

STATE OF MICHIGAN, *Complainant,*

vs.

STATE OF ILLINOIS and THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, et al., *Defendants,*

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS, *Intervening Defendants,*

No. 3 Original.

STATE OF NEW YORK, *Complainant,*

vs.

STATE OF ILLINOIS and THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, et al., *Defendants,*

No. 4 Original.

BRIEF IN OPPOSITION TO THE MOTION OF THE STATE OF NEW YORK AND TO THE APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN, AND NEW YORK.

WILLIAM C. WINES,
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THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

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vs.

STATE OF ILLINOIS and THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, et al., *Defendants,*

No. 4 Original.

BRIEF IN OPPOSITION TO THE MOTION OF THE STATE OF NEW YORK AND TO THE APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN, AND NEW YORK.

To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

The State of Illinois and The Metropolitan Sanitary District of Greater Chicago submit that the motion of the

State of New York for a modification of the decree of April 21, 1930 and the application filed by the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan, and New York, for a reopening and amendment of the decree so as to require the return to Lake Michigan of the water taken therefrom as domestic pumpage, or, in the alternative, for the appointment of and reference to a Special Master, should be denied. The facts set forth in the motion and application, together with indisputable facts of public record, show that no ground exists for a modification, reopening, or amendment of the decree or for other relief.

INTRODUCTORY STATEMENT.

On April 21, 1930, this Court entered a decree in these causes which enjoined the defendants on and after December 31, 1938 from diverting any of the waters from the Great Lakes-St. Lawrence System or watershed through the Sanitary and Ship Canal, known as the Drainage Canal, in excess of an annual average of 1500 c.f.s. (cubic feet per second) in addition to domestic pumpage. (*Wisconsin* v. *Illinois,* 281 U. S. 179, 201 (1930).)

To carry out the provisions of the decree, The Metropolitan Sanitary District of Greater Chicago (formerly the Sanitary District of Chicago) has completed construction of vast sewage treatment projects, consisting of sewage treatment plants, intercepting sewers, and sewage pumping stations, at a cost of $316,935,000. (Hearings, Subcommittee of Senate Committee on Public Works on H. R. 3210, S. 1772, S. 2250, 84th Cong. Second Sess. pp. 18-19.)

Paragraph 4 of the decree provides (*Wisconsin* v. *Illinois,* 281 U. S. 179, 201 (1930)):

> That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City

> of Chicago for domestic water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area.

Water taken by the City of Chicago, and other municipalities in the drainage district, for domestic and sanitary purposes, and turned into the canal after treatment through sewers operated by the Sanitary District, is known as "domestic pumpage." (Report of Special Master Charles E. Hughes, filed November 23, 1927, p. 75; Report of Special Master Charles E. Hughes on Re-Reference, filed December 17, 1929, pp. 91, 120, 143; *Wisconsin* v. *Illinois,* 281 U. S. 179, 199 (1930).) Domestic pumpage includes water used by the inhabitants for drinking, cooking, washing, sanitation and other household uses, fire fighting, and industrial uses.

The Drainage Canal, which reversed the flow of the Chicago River so that it flowed away from Lake Michigan instead of into the Lake, was opened in 1900. (Master's 1927 Report, 18; *Wisconsin* v. *Illinois,* 278 U. S. 367, 403.) The cost of the Drainage Canal was approximately $82,000,000. (Hearings, Subcommittee of Senate Committee on Public Works on H. R. 3210, S. 1172, S. 2250, 84th Cong. 2nd Sess. 18, (1956).)

Between 1910 and 1923, intercepting sewers were constructed, at a cost of $109,021,613, to discharge the sewage from the area into the Chicago River instead of Lake Michigan. (Master's 1927 Report 20-21; *Wisconsin* v. *Illinois,* 278 U. S. 367, 404 (1929).)

The complainants, in the motion and application now on file, do not challenge the diversion of 1500 c.f.s. or the reversal of the flow of the Chicago River. (Application IX, 17, Argument, 38.) But they attack that part of the decree of April 21, 1930 which authorizes the discharge of water used for domestic pumpage into the Chicago River and thence into the Drainage Canal, instead of Lake Michigan.

The motion and the application differ in their allegations and in their prayers for relief, but they are alike in their demand that the defendants discontinue discharging domestic pumpage, *i. e.*, any of the treated effluents emanating from the Sanitary District sewage treatment facilities, into the Drainage Canal. They demand that such treated sewage effluent be dumped into Lake Michigan, the source of Chicago's water supply.

The effect would be not only to risk the pollution of the water on Chicago's lake front and of Chicago's water supply, complete purification of sewage effluent not being presently possible, but to compel the Sanitary District and the City of Chicago to rearrange its sewage facilities and construct new works and tunnels at tremendous cost. Regardless of cost and inconvenience to the defendants, and regardless of the threatened pollution of the lake, the complainants, after long acquiescence in the present program, now ask the Court to make a revolutionary change in the decree and order the defendants to undo portions of vast and costly projects undertaken and completed both before the 1930 decree and thereafter in compliance with its terms. (Application p. 36.)

In paragraph 7 of the decree (281 U. S. 179, 202), this Court retained jurisdiction of the suits for the purpose of any order or direction, or modification of the decree, or any supplemental decree, which it might deem at any time to be proper in relation to the subject matter in controversy.

At the time the decree of April 21, 1930 was entered, Congress had not legislated on the subject of the diversion and this Court in its 1930 opinion (281 U. S. at pp. 198-199) stated that its action and all action of the parties would "be subject, of course, to any order that Congress may make in pursuance of its constitutional powers and any modification that necessity may show should be made by this Court."

A short time after the decree was entered, Congress, on July 3, 1930, passed the Rivers and Harbors Act (c. 847, 46 Stat. 929) which expressly authorized for navigation purposes of the Illinois Waterway the withdrawal by the defendants of water from Lake Michigan, including water for domestic pumpage, which was allowed by the decree of April 21, 1930. This affirmative action by Congress is now in full force and effect.

The defendants contend that the pending motion and application are fatally defective and should be denied and dismissed on the grounds that they do not present a matter of which the Court can take judicial cognizance for the following reasons:

> (1) In retaining jurisdiction of the "subject matter in controversy", this Court did not intend to invite a rehearing of issues of law or fact which were adjudicated in its 1930 decision; the right of the defendants to withdraw water from Lake Michigan for domestic purposes and discharge the effluent into the Chicago River and the Drainage Canal was finally adjudicated by the 1930 opinion.
>
> (2) Neither the motion nor the application present material facts which were not before the Court in 1930. The population growth was projected with reasonable accuracy in the hearings before the Special Master in 1929. The amount of water withdrawn from Lake Michigan for domestic pumpage is substantially the same today as it was in 1930 when the decree was entered. No changed conditions or circumstances unforeseen in 1930 are presented by the complainants which warrant a reopening, amendment, or modifica-

tion of the decree, or the appointment of a Special Master.

(3) The amount of water now being withdrawn from Lake Michigan by the defendants, including domestic pumpage, has been authorized by Congress for the Illinois Waterway. This Congressional action, to which complainants do not refer, authorizes the discharge of domestic pumpage into the Drainage Canal, as a part of the Lakes to the Gulf waterway, for navigation purposes pursuant to its paramount power over navigable water of the United States.

Because the foregoing points can be established by the record as it now stands, and by public records of which this Court may take judicial notice, no purpose will be served by referring these causes to a Master.

A decree in which jurisdiction is retained should not be modified without a showing of changed conditions or the springing up of unforeseen circumstances, or a showing that the modification would effectuate the basic purpose of the decree. (*United States* v. *Swift & Co.*, 286 U. S. 106 (1932); *Chrysler Corporation* v. *United States*, 316 U. S. 556 (1942); *Donaldson, Postmaster General* v. *Read Magazines, Inc.*, 333 U. S. 178, 184 (1948); *U. S. Gypsum Co.* v. *National Gypsum Co.*, 352 U. S. 457, 463, 464, 474 (1957).) The motion and application have not met that burden.

In support of the reasons above set forth for denial of the pending motion and application, the defendants respectfully submit the following argument.

ARGUMENT.

I.

The Right to Discharge Domestic Pumpage Into the Drainage Canal Was Expressly Upheld in the 1930 Decision, and the Issue Raised in the Motion and Application Is Not Within the Framework of Matters Left Open for Consideration.

New York's motion asserts (p. 3):

> The original complaints in these actions did not demand that the water taken from Lake Michigan as domestic pumpage be returned to the Lake. This Court, therefore, rejected the demands which complainants made upon the argument for such return.

Significantly, the application now filed by all the original complainants, including the State of New York, does not contain a similar representation concerning the reason for the rejection. The fact is that such demands were not rejected because of a failure to include them in the original bills of complaint.

Referring to the prayers in the bills of complaint in the original suits, Mr. Chief Justice Taft said (278 U. S. 367, 399, 400):

> These are amended bills by the States of Wisconsin, Minnesota, Michigan, Ohio, Pennsylvania and New York, praying for an injunction against the State of Illinois and the Sanitary District of Chicago from continuing to withdraw 8,500 cubic feet of water a second from Lake Michigan at Chicago.
>
> * * * The bills prayed that the defendants be enjoined from permanently diverting water from Lake Michigan or from dumping or draining sewage into its waterways which would render them unsanitary

or obstruct the people of the complainant States in navigating them.

The Special Master in his 1927 Report summarized the prayers of the amended bills of complaint of the States of Minnesota, Ohio, and Pennsylvania, filed October 5, 1925, as follows (p. 7):

> The amended bill seeks an injunction restraining the defendants from causing any water to be taken from Lake Michigan, in such manner as permanently to divert the same from the lake. There is a further prayer that, if the Sanitary and Ship Canal shall be used as a navigable waterway of the United States and be subject to the same control on the part of the United States as other navigable waterways, the defendants shall be restrained against permanently diverting any water from Lake Michigan in excess of the amount which the Court shall determine to be reasonably required for navigation in and through said canal and the connecting waters to the Illinois and Mississippi Rivers, without injury to the navigable capacity of the Great Lakes and their connecting waters. It is also prayed that the defendants be restrained from dumping or draining into the Sanitary District Canal any sewage or waste in such quantity and manner as excessively to pollute and render the canal, the Chicago, Des Plaines and Illinois Rivers, unsanitary and injurious to the people of the complainant States navigating said waterways.

The State of Michigan in its bill of complaint, filed in this Court on March 8, 1926 and the State of New York in its bill filed October 22, 1926 prayed for the same relief. (Master's 1927 Report, 9.)

In discussing the demands of the complainants, at the hearings, as distinguished from the prayers of the bills of complaint, the Special Master in his 1929 Report after thorough consideration made all-important findings and reached certain conclusions which the State of New York fails to include in Appendix A of its motion. Movant's Appendix A purports to contain the pertinent portions of the Special Master's Report, but the following findings on domestic pumpage, at pages 120-122, are omitted:

> *Pumpage.* The complainants ask that all flow at Lockport be enjoined from the date fixed for the completion of the sewage treatment works. This would mean not only the entire cessation of the diversion by the Sanitary District, in the sense in which that term is used by the War Department, but also the termination of the discharge at Lockport of the pumpage, that is, of the water taken by the City of Chicago from Lake Michigan and entering the Chicago River and the Drainage Canal as sewage.
>
> So far as this pumpage is concerned, the question is merely incidental to that relating to the diversion by the Sanitary District. These bills were brought to restrain the abstraction of water from Lake Michigan by the Sanitary District, not to challenge the right of the City of Chicago to take water from the Lake for its water supply. Nor can the bills be regarded as presenting a cause of action based on the charge that the City of Chicago was taking more water from the Lake for appropriate domestic uses than it was entitled to take. The City of Chicago was not made a party to these suits, its entry as a party has been successfully resisted by the complainants, and whatever may be the effect of the proceedings against the State of Illinois, as the responsible creator and governor of the municipal corporation, that State has not been called upon to answer on the theory that the mere taking of water by the city for the ordinary uses of its inhabitants constituted an actionable wrong. In its opinion, this Court described these bills as brought "for an injunction against the State of Illinois and the Sanitary District of Chicago from continuing to withdraw 8,500 cubic feet of water a second from Lake Michigan at Chicago" (278 U. S. 367, 399). This amount of 8,500 c.f.s. is the diversion by the Sanitary District allowed by the permit of March 3, 1925, exclusive of pumpage.

Furthermore, it is not regarded as open to serious question that the City of Chicago, under authority of the State, has the riparian right to take water from Lake Michigan for the ordinary uses of its inhabitants. That would not be, *per se,* an unreasonable use. And if it were sought to prevent an abuse of that right through the taking of an unreasonable amount, it would be necessary to present that issue in an appropriate manner. (*City of Canton* v. *Shock,* 66 Ohio State, 19; *Minneapolis Mill Co.* v. *Board etc. of St. Paul,* 56 Minn. 485; *City of Philadelphia* v. *Collins,* 68 Pa. 106; *City of Auburn* v. *Union Water Power Co.,* 90 Maine, 576; *Barre Water Co.* v. *Carnes,* 65 Vt. 626; *Fisk* v. *Hartford,* 70 Conn. 720.)

If the City of Chicago is entitled to take its water supply from Lake Michigan for the ordinary and reasonable uses of its inhabitants, it cannot be said that the State or the City is subject to any established rule of law which requires it to turn into the Lake what is no longer water but sewage or the effluent of sewage treatment plants. If there were a way of destroying the sewage or sewage effluent altogether, or evaporating it, it does not appear that the State or the City would violate any right of the complainants in doing so (*Fisk* v. *Hartford,* 69 Conn. 375). The question in these suits concerns the diversion by the Sanitary District and not the pumpage independently considered.

But, as there is no means known at present of otherwise disposing of the effluent from the sewage treatment plants, when the sewage disposal program has been fully carried out, it is assumed that the effluent must be turned into the Drainage Canal and Chicago River, thence to be discharged at Lockport, the western terminus of the Canal, or be carried into Lake Michigan. The question of the disposition of the effluent from the sewage treatment plants thus demands consideration in connection with the award of relief as to the diversion by the Sanitary District.

The Master thus decided (1) that the prayers of the bills of complaint, as distinguished from the demands made by the complainants at the hearings, did not challenge the right of the City to take water from the Lake; (2) that the City has a right to take water from the Lake for the ordinary uses of its inhabitants; (3) that neither the State nor the City is required by law to return sewage effluent to the Lake; (4) that if it were sought to prevent an abuse of the right to the water through the taking of an unreasonable amount, it would be necessary to present that issue in "an appropriate manner"; and (5) that the question of the disposition of the effluent from domestic pumpage after treatment had to be disposed of.

This Court in its 1930 decision, reported in 281 U. S. 179, adopted the Master's conclusions and went two steps further. Its decision *did not* turn on the point, as stated in the New York motion, that the return of domestic pumpage to the Lake was not demanded in the bills of complaint. Rather, the Court held squarely (1) that the demands of the complainants were excessive upon the facts in the case, and (2) that the demands should not be pressed "without regard to relative suffering and the time during which the complainants have let the defendants go on without complaint." These holdings are contained in the following salient portion of the Court's opinion (281 U. S. 179, 199), immediately preceding the excerpt quoted at pages 3 and 4 in the motion of the State of New York:

> The complainants demand that this diversion cease, and the canal be closed at Lockport, with an incidental return of the Chicago River to its original course. *They also argue that what is called the domestic pumpage after being purified in the sewage works be returned to the Lake.* These demands seem to us excessive upon the facts in this case. The Master reports that the best way of preventing the pollution of navigable waters is to permit an outflow from the Drainage Canal at Lockport, and that the interests of navigation in the Chicago River as a part of the port of Chicago will require the diversion of an annual average of from 1,000 c.f.s. to 1,500 c.f.s. in addition

> to domestic pumpage after the sewage treatment program has been carried out. The canal was opened at the beginning of the century, thirty years ago. In 1900, it already was a subject of litigation in this Court. The amount of water ultimately to be withdrawn unless Congress may prescribe a different measure is relatively small. We think that upon the principles stated in *Missouri* v. *Illinois,* 200 U. S. 496, 520, *et seq.*, the claims of the complainants should not be pressed to a logical extreme without regard to relative suffering and the time during which the complainants have let the defendants go on without complaint. (Emphasis added.)

The foregoing statement from this Court's opinion, to which the State of New York does not refer, shows conclusively that the Court fully considered and rejected the contention, now being reasserted, that all water used for domestic pumpage should be returned to Lake Michigan.

If protracted acquiescence by the complainants in the Sanitary District sewage disposal system constituted a bar to their demand in 1929 and 1930 that the effluent from all domestic pumpage should be returned to the Lake, such acquiescence is even more clearly a bar today.

Earlier in the opinion the Court had said, at page 199, that its action would be subject to any modification that "*necessity* may show should be made." And in the portion of the opinion quoted in the New York motion (pp. 3-4) the Court said, "If the amount withdrawn should be *excessive,* it will be open to complaint"; also, that "whether the right for domestic use extends to great industrial plants within the District has not been argued but may be open to consideration at some future time." (Italics supplied.)

The matters left open to "complaint" and "consideration at some future time" are thus clearly defined, but defendants submit that the right to "domestic pumpage" for ordinary use and the discharge of the effluent into the canal, is settled by the opinion and decree of this Court.

Examples of "necessity" that may be shown and acted upon appear in the orders of this Court entered on December 17, 1956 and January 28, 1957. In the first order, additional diversion was allowed for 45 days, until January 31, 1957 "in view of the emergency in navigation caused by low water in the Mississippi River." (*Wisconsin* v. *Illinois,* 352 U. S. 945.) The second order extended the period for additional diversion not to exceed an average of 8,500 c.f.s., for the same reason, to and including February 28, 1957. *Wisconsin* v. *Illinois,* 352 U. S. 983.

But the relief sought in the motion and application now on file extends far beyond the modification or supplementation contemplated by the decree of 1930. The complainants do not charge an *abuse* of the defendants' right to domestic pumpage nor do they ask for a consideration of the right as applied to "great industrial plants," separate and apart from pumpage for "domestic" purposes. Instead they seek a *cessation* of *all* domestic pumpage which is not returned to the Lake, contrary to the basic purpose and intent of the decree and the final determination on this phase of the suits as contained in paragraphs 1, 2, 3 and 4 of the decree of 1930.

Of significance, also, is the fact that the Special Master's recommendation that provision should be made for "further examination," referred to in paragraph 8 of the motion, relates only to the amount of "diversion" allowed—*not to domestic pumpage.* (Appendix A, Motion pp. 17-18.) The term "diversion" as used by the Special Master and by the Court in its final opinion and decree does not include domestic pumpage which is allowed in addition to the direct diversion. (Appendix A, Motion p. 16, pars. 10, 11; p. 21, par. 11.)

Defendants therefore respectfully submit that the issue raised in the motion and the application, is not within the purview of those matters not finally resolved by this Court in 1930. Rather, the right of the defendants to withdraw water for domestic purposes and discharge the effluent into the Drainage Canal has been litigated and finally decided and should not be relitigated 28 years after that decision.

II.

Congress Has Authorized the Discharge of Domestic Pumpage Into the Canal for the Illinois Waterway.

Contrary to the statement in paragraph V of the application (p. 11), the amount of withdrawal allowed by the 1930 decree of this Court pertained only to the navigation needs of the Chicago River as a part of the Port of Chicago and did not pertain to the Illinois Waterway. (278 U. S. 367, 418; Master's 1929 Report, 126.)

But the Congress, shortly after the entry of the 1930 decree, passed the Rivers and Harbors Act of July 3, 1930 (c. 847, 46 Stat. 929) which deals with the waterway. The Act expressly authorizes, by reference to the 1930 decree, the withdrawal of 1500 c.f.s., in addition to domestic pumpage, for navigation purposes of the through Illinois Waterway. The pertinent portion of the Act is as follows:

> Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway: Provided, That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000: *Provided further, That the water authorized at Lockport, Illinois, by*

> *the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12 Original—October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway;* Provided further, That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable. (Italics supplied.)

In *Wisconsin* v. *Illinois,* 289 U. S. 395, 403-404 (1933), the Court held that by this Act the Congress took no action which affected the operation of the 1930 decree. Nevertheless, the Court recognized that the Congress had authorized for the Illinois Waterway the withdrawal permitted by the decree for the Port of Chicago..

The Rivers and Harbors Act of 1930 was the culmination of a series of Acts which made the Illinois Waterway from the Port of Chicago to Grafton, Illinois, a federal navigation project. When completed with federal funds, the waterway was opened for navigation on March 1, 1933. (House Document 184, 73rd Cong. 2nd Sess., pp. 3, 35, 39.)

A sketch of the Illinois Waterway is included as Appendix A in the appendix attached for the convenience of the Court.

Because no study had been made of the annual average flow required to meet the needs of the Illinois Waterway, as distinguished from the Chicago River as a part of the Port of Chicago, Congress in the Rivers and Harbors Act of 1930, above quoted, authorized a study to be made to determine the amount of water required. In the meantime, pending the study to be made, Congress authorized the withdrawal of water from Lake Michigan allowed by the decree in these causes entered on April 21, 1930, and this authorization is now in force.

The Constitution of the United States provides that "the Congress shall have power * * * to regulate commerce with foreign nations and among the several States * * *." (Article I, Sec. 8, cl. 3.) *Gibbons* v. *Ogden,* 22 U. S. (9 Wheat.) 1, 196, 197 (1824), held that the power of Congress, then, comprehends navigation within the limits of every State in the union; so far as that navigation may be, in any manner, connected with commerce among the several States; that the power of Congress is complete in itself and may be exercised to the utmost extent, and acknowledges no limitations other than are prescribed in the Constitution. Such a limitation is found in the Fifth Amendment, that private property shall not be taken for public use without just compensation, but the limitation is not infringed unless there has been an "actual, permanent invasion of the land, amounting to an appropriation of and not merely an injury to the property." (*Sanguinetti v. United States,* 264 U. S. 146, 149.) Riparian owners have no ground for complaint by reason of actual but incidental damage sustained, because their ownership is subject to the servitude of the exercise of governmental power. (*United States* v. *Com-*

modore Park, Inc., 324 U. S. 386 (1945), and authorities cited in the 1927 Report of the Special Master in these causes, p. 151.)

The Special Master, in rejecting the contention of the complainants, in the hearings before him, that it is beyond the power of Congress to authorize the transfer of water of Lake Michigan from the Great Lakes-St. Lawrence watershed to the Mississippi watershed, said (1927 Report, 153):

> The power to control navigation, comprehended within that commerce, is a national power, and for the purposes of this control navigable waters are the public property of the nation (*Gilman* v. *Philadelphia,* 3 Wall. 713, 725) and subject to such restraint as Congress may deem expedient from a national point of view, not limited by the interests of any particular port, harbor, state or States, watershed, or any territorial division within the national jurisdiction. As Chief Justice Marshall said in *Gibbons* v. *Ogden,* 9 Wheat. 1,197: "If, as has always been understood, the sovereignty of Congress, though limited to specified objects, is plenary as to those objects, the power over commerce with foreign nations, and among the several States, is vested in Congress as absolutely as it would be in a single government, having in its constitution the same restrictions on the exercise of the power as are found in the Constitution of the United States. The wisdom and the discretion of Congress, their identity with the people, and the influence which their constituents possess at elections, are, in this, as in many other instances, as that, for example, of declaring war, the sole restraints on which they have relied, to secure them from its abuse. They are the restraints on which the people must often rely solely, in all representative governments."

As stated by the Special Master in his 1927 Report (p. 157), the recognition of the power of Congress to control the diversion of water from Lake Michigan to the Mississippi watershed necessarily underlay the decision in *Sanitary District* v. *United States*, 266 U. S. 405, 426 (1924). The power of Congress to authorize the withdrawal of water from Lake Michigan for navigation purposes was recognized in *Wisconsin* v. *Illinois*, 278 U. S. 367, 417 (1929), and in *Wisconsin* v. *Illinois*, 281 U. S. 179, 198, 200 (1930).

It is of the essence of the power of Congress that it has the final determination of matters pertaining to navigation. (Master's 1927 Report, 161.)

A river is a navigable water of the United States within the meaning of the acts of Congress. It is patent that the Illinois Waterway is a waterway of the United States. The power of the Congress over it is absolute and "plenary". (*United States* v. *Appalachian Electric Power Co.*, 311 U. S. 377, 427 (1940); *United States* v. *Twin City Power Co.*, 350 U. S. 222 (1956); *First Iowa Coop.* v. *Power Comm'n.*, 328 U. S. 152, 182 (1946); *United States* v. *Willow River Co.*, 324 U. S. 499, 509 (1945); *United States* v. *Commodore Park, Inc.*, 324 U. S. 386 (1945); *Oklahoma* v. *Guy F. Atkinson Co.*, 313 U. S. 508 (1941).)

Congress alone has dominion over navigable waters. In authorizing the withdrawal from Lake Michigan allowed by the 1930 decree, Congress stated the purposes to be "for the navigation of said waterway." (p. 15, *supra*.) The Court cannot inquire into the motives of the members of Congress in passing the Act. The fact that purposes other than navigation will also be served could not invalidate the exercise of the authority conferred by the Act, even if those other purposes, standing alone, would not have justified an exercise of Congressional power. (*Arizona* v. *California*, 283 U. S. 423, 455-456 (1931).)

It is therefore submitted that the Rivers and Harbors Act of 1930 settles beyond all dispute the right of the defendants to discharge the effluent from domestic pumpage into the Chicago River, instead of Lake Michigan, for navigation purposes of the Illinois Waterway.

The words of the Special Master in his 1927 Report (p. 154) on this precise issue are particularly apt.

> If Congress decided that it was in the interest of the country as a whole to open and improve a waterway from Lake Michigan to the Mississippi River and the Gulf of Mexico, and for that purpose diverted water from Lake Michigan to the Mississippi watershed, there would seem to be no constitutional difficulty so far as the diversion is concerned. Its practicability, its amount, the effect on the Great Lakes-St. Lawrence watershed, and on the States bordering on the Great Lakes, the question where the balance of national interest lay after appropriate appraisal of all local interests and of international relations, would be matters for the consideration of Congress exercising the sovereign power of the nation in determining national policy.

Congress, having so decided, has put an end to the matter.

III.

Assumed Population Growth Is Not Ground for the Relief Asked and, on the Basis of Experience, Will Result in an Insubstantial Increase in Domestic Pumpage and an Insignificant Reduction in Lake Levels.

In its motion (par. 9) the State of New York charges that the amount of water now withdrawn from the Lake for "domestic pumpage is excessive" because of population and industrial growth and of a projected increase in growth within the next 20 years. The application (par. VI) specifically charges that the population will reach 15 or 20 millions within the next 20 years and that domestic pumpage will become "more and more excessive." No charge is made that more water is used for domestic pumpage than is needed to serve the area, nor do complainants charge the defendants with waste or with using an unreasonable amount of water for domestic pumpage. Their charges are based solely on population projections into the future and potential industrial development. An increase in demand for water is assumed by the complainants, but "excessive" use, in the sense of unreasonable use, is not alleged or assumed.

Of material importance is the fact that the amounts of water used for domestic pumpage as shown in the complainants' application (par. V, p. 11) for the years 1939, 1954, and 1956 are not substantially greater than the amount (1700 c.f.s.) used in 1930. The amount of water withdrawn from the Lake for domestic pumpage in the three years mentioned, as derived from paragraph V of the application and page 31 of Complainants' Argument, is as follows:

	Total Withdrawal	Direct Diversion	Domestic Pumpage
1939	3110 c.f.s.	1500 c.f.s.	1610 c.f.s.
1954	3205 c.f.s.	1500 c.f.s.	1705 c.f.s.
1956	3500 c.f.s.	1700 c.f.s.*	1800 c.f.s.

If the amount of domestic pumpage in 1939 was 1610 c.f.s., and 1705 c.f.s. in 1954, as stated in the application (par. V. p. 11) the increase over this 15 year period was 95 c.f.s. On page 31 of their argument the complainants assert that at the present time approximately 1800 c.f.s. is extracted for domestic pumpage. This means that in the 19 year period the domestic pumpage, on complainants' own statements, has increased only 190 c.f.s. But even that increase is more apparent than real. A summary of the annual pumpage and diversion, as measured by the Sanitary District and the Army Engineers from 1930 through 1956, shows an average annual pumpage of 1643 c.f.s. (See Appendix E.)** This summary is graphic proof that the complainants' claim lacks factual basis. The summary shows that the amount of domestic pumpage used annually goes up and down; that it was 1700 c.f.s. in 1930 and reached a low point of 1507 c.f.s. in 1945, and that in 1939 it was 1582 c.f.s. (not 1610 c.f.s.), the third lowest annual withdrawal in the 27 year period. It seems improper to advance an argument based on the difference between one of the lowest years in the 27 year period and the highest year in the period, which was 1956. The difference between 1930 and 1956 was only 105 c.f.s. (Appendix E, *infra*, p. 43.) But no matter how the comparison be made, from the complainants' own figures and the actual figures, it is obvious that there has been no consequential increase.

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* The direct annual average diversion of 1500 c.f.s. was increased in 1956 as a result of the order of this Court entered on December 17, 1956 (*Wisconsin* v. *Illinois,* 352 U. S. 945). While that order authorized an average increase of 8500 c.f.s., an increase of only 8000 c.f.s. was reached, according to the Army Engineers, as reported by the Solicitor General in his memorandum to the Court in January, 1957.

Colonel Dan I. Sultan, in a report made in 1933 pursuant to the Rivers and Harbors Act of 1930 (House Document 184, 73rd Congress, 2nd Session, par. 16, p. 11; pars. 90 and 94, pp. 48-49), estimated an average of 1700 c.f.s. for domestic pumpage "for some years to come."

** The data compiled on Appendix E showing the annual average amounts of diversion and pumpage for the years 1930 to 1956, inclusive, are as contained in the official records of the United States Army District Engineer at Chicago, as officially computed pursuant to the provisions of paragraph number 4 of the decree of April 21, 1930.

According to a report made in January 1957 by the Division Engineer, Brigadier General P. D. Berrigan, North Central Division Corps of Engineers, U. S. Army, submitted to the 85th Congress on H. R. 2, a withdrawal of 1,000 c.f.s. would reduce the levels of Lake Michigan and Lake Huron one inch in 15 years, and the levels of Lake Erie and Lake Ontario 5/8ths of an inch. On this basis, a withdrawal of 190 c.f.s. would result at the end of 15 years in a reduction of less than 1/5 of an inch for Lake Michigan and Lake Huron and about 1/8 of an inch for Lake Erie and Lake Ontario. But, again, even this reduction is purely fanciful because on the average there has not been such an increase in the 27 year period between 1930 and 1957, and if the difference of only 105 c.f.s. between 1930 and 1956 is taken as the criterion, the reduction in lake levels, using the same method of calculation, would be less than 1/10 of an inch for Lake Michigan and Lake Huron and less than 1/16 of an inch for Lake Erie and Lake Ontario.

This insignificant reduction is hardly that change in circumstance which would warrant the drastic revision of the decree requested by the complainants. To force an expenditure of hundreds of millions of dollars in rearranging the Sanitary District's facilities to extend tunnels miles out into the lake for the discharge of sewage effluent would appear to be grossly disproportionate to the benefit to be derived by the preservation of a conjectural 1/10 or 1/16 inch of lake levels. Moreover, this Court has said that before it can be moved to exercise the extraordinary power to control the conduct of one State at the suit of another, the threatened invasion of rights must be of serious magnitude and it must be established by clear and convincing evidence. (*North Dakota* v. *Minnesota,* 263 U. S. 365, 374, 386 (1923).)

As pointed out in Point I above, it is the defendants' contention that their right to withdraw water from Lake Michigan and discharge the sewage effluent into the canal has been adjudicated, but if the defendants should be wrong in this contention, and if the complainants' own statements are taken at face value, the whole matter of additional domestic pumpage is *de minimis.*

The complainants also purport to rely on alleged inadequacies of the estimates made in 1930 of the Chicago area's future growth. It is said (Application, p. 25) that in the hearings before the Special Master witnesses estimated that in 1960 the population served by the Sanitary District would expand to 5,860,000, with an industrial waste equivalent of 2,300,000 more, whereas in fact the present human population is 4,600,000, and an industrial waste equivalent of 3,800,000. The total is thus now 8,400,000 instead of the 8,160,000 predicted in 1929 for the year 1960. The 1929 prediction was amazingly accurate and Chicago's actual growth has conformed closely to it. Again, there has been no change justifying a rewriting of the decree.

Complainants rely on a projected growth in population and industry within the next 20 years to 15 or 20 million persons (application VI). This projection is of course nothing more than surmise. Such speculation about the future would not warrant a drastic change in the 1930 decree (*Arizona* v. *California,* 283 U. S. 423, 462-464 (1930)) even if the Rivers and Harbors Act did not stand in the way of the modification requested by the complainants.

The fact remains that the Special Master referred to the "great and growing population" (Master's 1929 Report, pp. 136, 137) and the Court could not have been oblivious to it. If anticipated population and industrial growth did not constitute a bar to the discharge of domestic pumpage into the Sanitary Canal in 1930, it should not constitute a bar now, particularly in view of the fairly accurate projected increase in population and the insignificant (100 c.f.s.) increase, on the basis of complainants' own averments, in "domestic pumpage" in 1956 as compared to 1930, when the decree was entered.

IV.

The Application Is Predicated on the Erroneous Assumption That Recent Studies Have Established a Diversion of 1500 c.f.s. Without Domestic Pumpage To Be Adequate for Navigation in the Illinois Waterway.

The complainants contend (Application, 17, 39) that recent studies made by the United States Corps of Engineers have established that a diversion of 1500 c.f.s. is adequate to maintain navigation in the Port of Chicago and the Illinois Waterway "without additional water in the form of 'domestic pumpage'."

In their argument (p. 39) complainants rely upon and quote from paragraph 184 of the report made in January, 1957 by the Division Engineer, Brigadier General P. D. Berrigan, North Central Division Corps of Engineers, United States Army. The report is entitled "Effect on Great Lakes and St. Lawrence River of an Increase of 1,000 Cubic Feet Per Second in the Diversion at Chicago," and was prepared at the request of the Director of the Budget following the President's memorandum of disapproval of H. R. 3210, 84th Congresss. This report on its face dealt with an increase in the diversion at Chicago. It did not purport to discuss the possibility of a reduction in the total withdrawal of water from Lake Michigan by the elimination of domestic pumpage. The report was submitted to the

Secretary of the Army on January 29, 1957 by Major General E. C. Itschner, Chief of Engineers, and later submitted to the 85th Congress at the House Hearing on H. R. 2, to be discussed under Point VII, *infra.*

Paragraph 184 includes this statement:

> * * * Recent studies of present and prospective water requirements for navigation on the Illinois Waterway show that the authorized diversion of 1,500 cubic feet per second from Lake Michigan is adequate to meet those requirements.

The quoted statement itself belies the interpretation placed upon it by the complainants. Manifestly, the term "authorized diversion" as used in paragraph 184 means the diversion authorized by the decree of 1930 and the Rivers and Harbors Act of 1930, discussed under Point II, *supra,* namely 1500 c.f.s. "in addition to domestic pumpage." And it is a clear fact that the Corps of Engineers, United States Army, has always used the term "diversion" as not including domestic pumpage that is, to mean the gross flow at Lockport less the amount of water used for domestic purposes. (Master's 1927 Report, 75; Master's 1929 Report, 120.) The Special Master also adopted this definition of the term "diversion". (Special Master's 1929 Report, 143.)

That General Berrigan used the term "diversion" as so defined is demonstrated conclusively by a reference to paragraph 183 of the same report relied upon by the complainants. In this paragraph reference is made to an earlier report by Colonel Dan I. Sultan made in 1933, in which General E. M. Markham, Chief of Engineers, concurred, pursuant to the Rivers and Harbors Act of 1930. Colonel Sultan and General Markham had reported (House Document 184, 73rd Congress, 2nd Sess., 6, 58) that a direct diversion of 1500 c.f.s. *in addition to domestic pumpage* was required to meet the needs of a commercially useful waterway in the Illinois River, pending a conclusive determination after the completion of the sewage treatment works at Chicago. But in summarizing this report General Berrigan in paragraph 183 said that the report "found that 1500 second feet was the minimum flow required." He did not find it necessary to say that the 1500 c.f.s. was in addition to domestic pumpage.

Since the Division Engineer in paragraph 183 of his 1957 report did not expressly include domestic pumpage in summing up the earlier 1933 reports in which domestic pumpage was specifically included, as a component part of the water withdrawal, along with the 1500 c.f.s. directly diverted, it is obvious that the Division Engineer did not deliberately intend to exclude domestic pumpage in summing up the "recent studies" referred to in paragraph 184 of his report. Instead, in both paragraph 183 and paragraph 184 he took domestic pumpage for granted, in addition to the direct diversion, as a part of the water requirements for navigation in the Illinois Waterway.

Defendants know of no reports by the United States Corps of Engineers, past or present, since the entry of the 1930 decree, which show that 1500 c.f.s. without domestic pumpage is sufficient for the navigation needs of the Illinois Waterway. Defendants submit that the complainants' construction of paragraph 184 of General Berrigan's report of January, 1957 is patently untenable.

V.

Waterpower and Seaway Projects Authorized After 1930 Afford No Grounds for Abrogating the Provisions of the 1930 Decree and the Rivers and Harbors Act of 1930 Authorizing the Withdrawal of Water for Domestic Pumpage for Navigation Purposes in the Illinois Waterway.

Equally lacking in merit, for a number of reasons, is the reliance by the complainants upon the development of hydro-electric power in the St. Lawrence and Niagara Rivers and the St. Lawrence Seaway project. (Motion, par. 11; application pp. 13-17.)

(1) The first fallacy in the complainants' argument (application p. 35) lies in the assumption that these projects enlarge rights the complainants had in 1930 when the decree was entered authorizing a diversion of 1500 c.f.s. in addition to domestic pumpage. These projects could not create rights not existing before. If complainants' legal rights did not entitle them at that time to a cessation of the withdrawal of water from Lake Michigan by the defendants for domestic pumpage without returning the effluent to the Lake, they should not be entitled to it now.

(2) Most clearly, the St. Lawrence and Niagara projects, authorized by Congress in the 1950s, came long after this Court's 1930 decree and the Rivers and Harbors Act of 1930, and must be assumed to have taken into consideration the lakes and their levels as affected by that decree and the Congressional Act. The complainants have pointed to nothing—and can point to nothing—in the history of the enabling legislation or treaties which even remotely suggests that the projects were dependent in the slightest on reducing the amount of diversion permitted

to the defendants by the 1930 decree and Act. Certainly nothing in the equities of the situation requires the defendants in their right to prior use of water, pursuant to the decree of the Court and the Rivers and Harbors Act of 1930, to yield to New York's subsequent power projects. Unquestionably, the channel depths for the St. Lawrence Seaway project, as well as the power projects, have been predicated on the Chicago diversion as authorized by this Court and by Congress.

(3) The net loss of waterfall between Lake Erie and the sea attributable to defendants' increased domestic pumpage would be infinitesimal.

(4) If the question should become one of balancing equities, or one of broad public policy, the need for water for domestic and sanitary purposes is given preference over navigation and power in both the Canadian Boundary Waters Treaty of 1909 (36 Stat. 2448) mentioned in paragraph VIII (2) of the application and in the 1950 Treaty of Niagara, between the United States and Canada (TIAS 2130) referred to in paragraph VIII (11), (12) of the application. In his 1927 Report the Special Master in commenting on the 1909 treaty said (55):

> "* * * With reference to the use of boundary waters, it was provided that the following order of precedence should be observed among the various uses enumerated in the treaty for these waters, to-wit: (1) uses for domestic and sanitary purposes; (2) uses for navigation, including the service of canals for the purposes of navigation; (3) uses for power and for irrigation purposes. These provisions were not to "apply to or disturb any existing uses of boundary waters on either side of the boundary."

Article III of the 1950 Treaty provided that the amount of water available "shall be the total outflow from Lake Erie to the Welland Canal and the Niagara River (including the Black Rock Canal) less the amount of water used for domestic and sanitary purposes and for the service of canals for the purposes of navigation."

(5) The State of New York has no "inalienable natural resources" in the St. Lawrence and Niagara Rivers as suggested in paragraph VIII (1), page 13, of the application. The rights of New York are inferior to the power of Congress over navigable waters (*Arizona* v. *California*, 283 U. S. 423, 451-452 (1931)). The rights of New York are also subject to the principle of "equitable division" which permits the removal of water to a different watershed (*New Jersey* v. *New York*, 283 U. S. 336, 342-344, 1931).

(6) As stated by the Special Master in his 1927 Report, page 154, quoted in Point II, *supra*, the appraisal of all local interests and of international relations, would be matters for the consideration of Congress exercising the sovereign power of the nation in determining national policy. Congress has exercised that sovereign power by the enactment of the Rivers and Harbors Act of 1930.

VI.

The Experience of Smaller Communities Which Have No Choice But to Return Water Used for Domestic Pumpage to Its Source Does Not Furnish a Standard for the Defendants to Follow.

In their application the complainants now contend that because other municipalities on the Great Lakes dump their sewage treatment effluents into the Great Lakes the City of Chicago should be compelled to do likewise. (Application X, pp. 18, 32.)

Special Master Hughes, 30 years ago in his Report on the original reference in 1927, disposed of an identical contention by stating (136):

> "The complainants point to conditions in other cities on the Great Lakes which take their water from the adjacent lake, into which also their sewage enters with a certain amount of treatment. These cities do not have the advantage of drawing off their sewage through a canal into another watershed. Thus, Milwaukee, Detroit, Toledo, Cleveland, and other communities must take their water supply from the adjacent waters, and at the same time use these waters as a receptacle for their sewage partially treated."

And in his report on re-reference in 1929 the Special Master said (136):

> "* * * The experience of very much smaller communities affords little aid in determining the effect of this enormous volume of effluent from the sewage treatment works, and the storm water run-off containing untreated sewage, flowing into the channels of the Drainage Canal and the Chicago River."

VII.

Complainants' Request for a Declaration by This Court Affecting Contemplated Congressional Action Should Not Be Granted.

The complainants refer to bills which have been or are now before the Congress which would authorize the temporary and experimental withdrawal of an additional 1,000 c.f.s. through the Illinois Waterway for a period of three years. (Application, 7-10, 41-42.) Two bills to that effect passed by prior Congresses have been vetoed. A third bill, H. R. 2, has passed the House in the present Congress and is now before the Senate. For the Congress to pass the bill would not be in derogation of this Court's authority or an affront to its dignity as complainants suggest. As the Court has always conceded, the Congress, not the Court, has been vested with paramount control over navigable waters of the United States.

The relevancy of the pending legislation to the prayers of the motion and application to modify the decree is not discernible. This Court has expressly recognized the power of Congress to regulate the amount of water that may be diverted. (*Wisconsin* v. *Illinois,* 281 U. S. 179, 197, 198, 199.) If the Congress chooses to further exercise its authority, to that extent this Court's decree would be superseded.

The complainant states are not seeking an injunction against the passage of a law by the Congress. The Congress has not been made and could not be a defendant. Nor do complainants profess to be seeking an injunction against efforts to induce the Congress to pass such a law.

Indeed, complainants assure the members of Congress that they may introduce such bills in Congress as they see fit (*Id.* at 41). Nevertheless, they ask this court for an injunction perpetually enjoining the defendants from diverting any water for domestic pumpage from the Great Lakes Basin (*Id.* at 19) because of their fear that the defendants will continue to demand an increase in the amount of diversion. (*Id.* at 10.) They ask the Court "to make a clear and unmistakable declaration that such diversion for sanitation purposes, even though authorized and sanctioned by Congress, would avail the State of Illinois and the Sanitary District nothing." (*Id.* at 41.)

Thus the complainants ask this Court now to assume, in advance of the actual enactment of pending legislation, that the Congress will proceed in an unconstitutional manner in passing such legislation. They seek the aid of this Court to forestall action by the Congress. Complainants intimate that such a law would be unconstitutional. If so —and defendants think the claim frivolous,—the time to complain is after the law is passed.

Attached hereto, for the convenience of the Court, as Appendix B, is a copy of H. R. 2 (85th Congress); a history of previous bills in Congress as Appendix C;

and a report by the House Committee of the 85th Congress favorably reporting H. R. 3210 as Appendix D. These documents show that the studies proposed in H. R. 2 are merely the studies recommended to be made, after the completion of the Sanitary District's sewage treatment facilities, by the Corps of Engineers in 1933, pursuant to the Rivers and Harbors Act of July 1930. (House Doc. 184, 73rd Congress, 2nd Session, page 51, par. 103.) Authorizing such studies to be made by the Secretary of the Army and requiring a report and recommendation thereon to the Congress clearly are proper exercises of the constitutional powers of the Congress over navigable waters.

Conclusion.

In conclusion, the defendants urge the Court to enter an order denying and dismissing the motion of the State of New York and the application of all the complainant states on the ground that the motion and application do not state facts sufficient to warrant the appointment of a Master and do not present an issue of which the Court can take judicial cognizance under the 1930 decree.

The original litigation involved in these suits presented a new question for the Court. The decree of 1930 required the Sanitary District to take measures at a cost of millions of dollars for the construction of vast sewage treatment plants and sewage disposal facilities. The Sanitary District proceeded to comply with the decree. Complainants admit (p. 29) that the District operates several large sewage treatment plants and does a "reasonably efficient job at these works." The American Society of Civil Engineers in 1955 classified the Chicago sewage system as one of the seven engineering wonders of America (November 1955 issue of *Civil Engineering*: Hearings, Subcommittee of Senate Committee on Public Works on H. R. 3210, S. 1772, and S. 2550, 84th Cong. 2nd Sess. 32-34 (1956)). The complainants' present request, after silence for more than 27 years, for a radical change in a basic provision of the decree is belated and unfounded and in derogation of the Rivers and Harbors Act of 1930.

Respectfully submitted,

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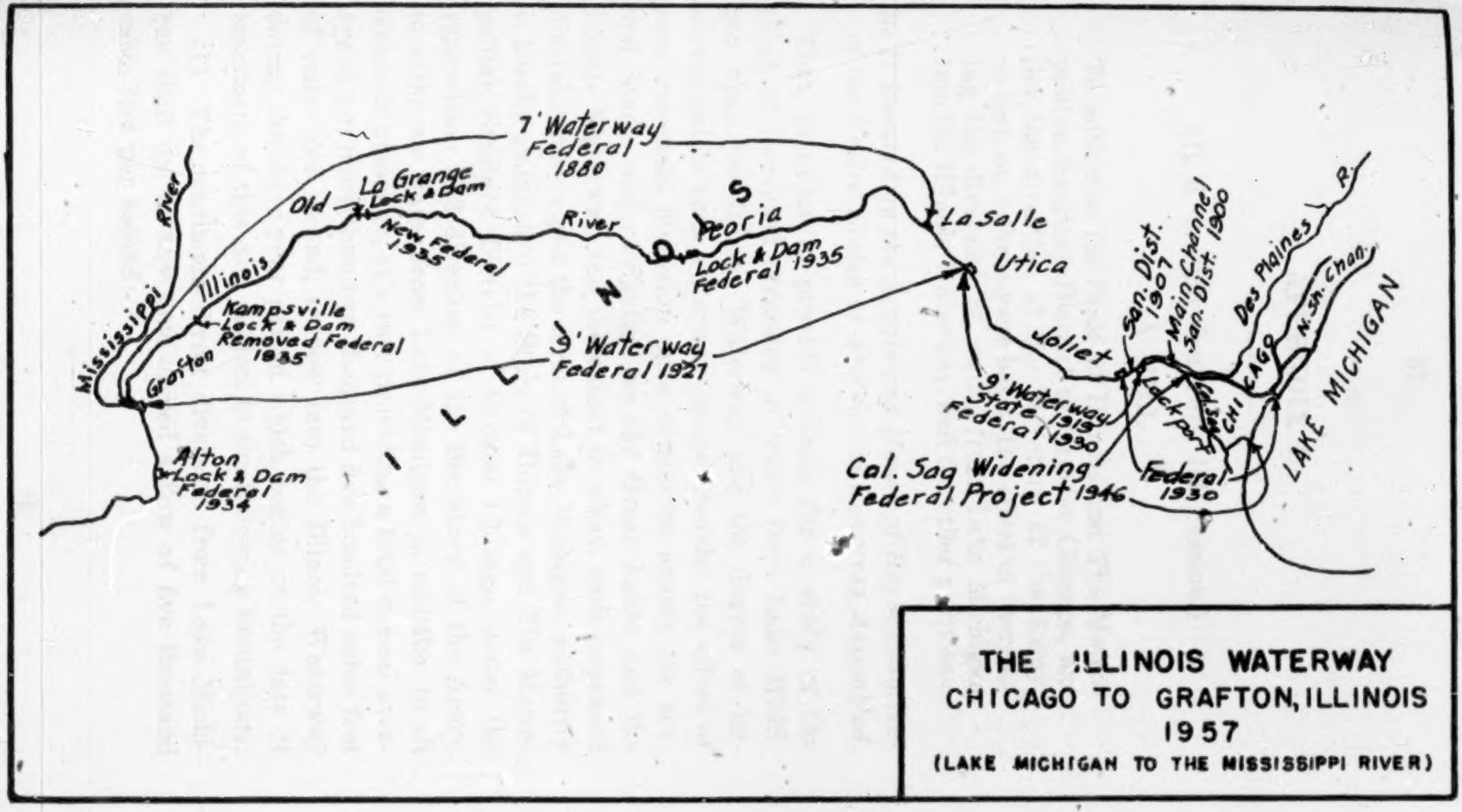
7' Waterway
Federal
1880
Mississippi
River
Illinois
Old
La Grange
Lock & Dam
New Federal
1935
River
Peoria
Lock & Dam
Federal 1935
I L L I N O I S
Kampsville
Lock & Dam
Removed Federal
1935
Grafton
9' Waterway
Federal 1927
Alton
Lock & Dam
Federal
1934
La Salle
Utica
Joliet
9' Waterway
State 1919
Federal 1930
Cal. Sag Widening
Federal Project 1946
San. Dist.
1907
Main Channel
San. Dist. 1900
Lockport
CHICAGO
Federal
1930
Des Plaines
R.
N. Sh. Chan.
LAKE MICHIGAN

THE ILLINOIS WATERWAY
CHICAGO TO GRAFTON, ILLINOIS
1957
(LAKE MICHIGAN TO THE MISSISSIPPI RIVER)

APPENDIX B.

(H. R. 2, 85th Congress, 1st Session.)

A BILL

To authorize the State of Illinois and The Metropolitan Sanitary District of Greater Chicago, under the direction of the Secretary of the Army, to test, on a three-year basis, the effect of increasing the diversion of water from Lake Michigan into the Illinois Waterway, and for other purposes.

Be It Enacted by the Senate and House of Representatives of the United States of America in Congress Assembled,

That, in order to provide a basis for a study of the effect of increased diversion of water from Lake Michigan upon the Illinois Waterway and the degree of improvement in such waterway caused thereby the effect of such increased diversion upon commerce among the several States and navigation on the Great Lakes and the Illinois Waterway and the extent to which such increased diversion may affect the level of Lake Michigan, authority is hereby granted to the State of Illinois and The Metropolitan Sanitary District of Greater Chicago, under the supervision and direction of the Secretary of the Army, to withdraw water from Lake Michigan, in addition to all domestic pumpage, at a rate providing a total annual average of not more than two thousand five hundred cubic feet of water per second, to flow into the Illinois Waterway during the three-year period which begins on the date of enactment of this Act, subject to the following limitations:

(1) The maximum direct diversion from Lake Michigan shall not at any time exceed a flow of five thousand cubic feet per second;

(2) The Secretary of the Army shall at all times have direct control and supervision of the amounts of water directly diverted from Lake Michigan; and

(3) The Secretary of the Army shall not allow any water to be directly diverted from Lake Michigan to flow into the Illinois Waterway during times of flood in the Illinois, Des Plaines, Chicago, or Calumet Rivers.

Sec. 2. As soon after the date of enactment of this Act as is possible, the Secretary of the Army shall cause a study to be made of the effect on Lake Michigan and on the Illinois Waterway of the increased diversion authorized by the first section of this Act, and the improvement in conditions along the Illinois Waterway which may result from such increased diversion. The Secretary of the Army shall report to the Congress on or before January 31, 1961, the results of such study. Such report shall contain recommendations with respect to continuing the authority to divert water from Lake Michigan into the Illinois Waterway in the amounts authorized by this Act, or increasing or decreasing such amounts.

APPENDIX C.

HISTORY OF PREVIOUS BILLS IN CONGRESS.

Congressman Blatnik, Chairman of the House Sub-Committee on Public Works, at the Hearing on H. R. 2 and others, March 26-27, 1957, presented the following summary, as reported on page 2 of the printed Committee Proceedings:

> "SUMMARY OF PREVIOUS LEGISLATION.
>
> The Chicago diversion was the subject of bills in the 83rd and 84th Congresses as well as the present Congress. The group of bills in the 83rd Congress, of which H. R. 3300 was the subject of hearings, were all similar. The bill was passed by the House and Senate and was vetoed by the President.
>
> In the 84th Congress the bill on which hearings were held was H. R. 3210. It was substantially the same as H. R. 3300 in the 83d Congress. It passed the House on July 6, 1955, and was favorably reported by the Senate Committee on Public Works on July 14, 1956. It passed the Senate on July 27, 1956, and was vetoed by the President on August 9, 1956. In his memorandum of disapproval of H. R 3210, the President quoted his memorandum of disapproval of H. R. 3300, giving as reasons for the disapproval that all methods of control of lake levels and protection of property should be considered before proceeding with the increased diversion, that negotiations with Canada should be considered before diversions are authorized, and that the legitimate interests of other States may be adversely affected. He went on to say that a report by the Corps of Engineers was under way and he was asking that it be expedited.

With respect to the present session, 17 bills have been introduced, of which the first is H. R. 2. These bills are all the same, with the exception of a difference in one concerning regulation of the flow of the Illinois River at Pekin, Ill. The 16 identical bills are substantially the same as H. R. 3210 of the 84th Congress."

APPENDIX D.

HOUSE COMMITTEE REPORT ON H. R. 3210.

The House Committee on Public Works, 84th Congress (Report No. 1029), in favorably reporting H. R. 3210, stated:

> "The committee is aware that the diversion of water at Chicago from Lake Michigan through the drainage canal of the sanitary district has been the subject of considerable controversy. It will be noted, however, that H. R. 3210 differs from bills offered in previous Congresses in that it imposes certain limitations with respect to the maximum amount of diversion that could be effected at any one time. The bill expressly specifies that the maximum direct diversion from Lake Michigan shall not at any time exceed a flow of 5,000 cubic feet per second and provides that the Secretary of the Army shall at all times have direct control and supervision of the amounts of water directly diverted from Lake Michigan. Further, it provides that the Secretary of the Army shall not allow any water to be directly diverted from Lake Michigan to flow into the Illinois Waterway during times of flood in the Illinois, Des Plaines, Chicago, or Calumet Rivers. These are safeguards which the committee believes will meet some of the objections of residents and property owners of the downriver area.
>
> The committee believes that in view of the radically changed conditions since the 1933 report was made to Congress, that the Secretary of the Army should cause a new study to be made. Testimony of representatives of the Corps of Engineers indicated that such a study should extend over a period of approximately 3 years and also that experimental temporary increases in annual average diversion of not to exceed 1,000 cubic feet per second should be authorized during the course

of the study. This amount of diversion during the study could have little adverse effect on lake or river interests and would afford an opportunity to secure much valuable information on the exact effects of an increased flow. The 3-year study period would be a test period during which time the Corps of Engineers, together with the Public Health Service, would observe and evaluate the effects of the increased diversion. At the end of that period a report would be made to the Congress containing recommendations as to whether such diversion is beneficial and whether it should be decreased or increased. The effects of the temporary diversion would be incorporated into the Great Lakes Water Levels Report which will be submitted to Congress by the Secretary of the Army as a result of a study now under way by the Corps of Engineers.

The lowering effect on the lakes of the additional 1,000 cubic feet per second would be less than 1 inch on Lakes Michigan-Huron and about one-half inch on Lakes Erie and Ontario, and these effects would not be realized until several years after the increased diversion commenced.

The committee is of the view that the experimental increases and the study authorized in this bill will afford an opportunity to secure much valuable information on the exact effects of an increased flow through the Illinois Waterway."

APPENDIX E.

ANNUAL AVERAGE METRO PUMPAGE AND DIVERSION FROM LAKE MICHIGAN BY SANITARY DISTRICT OF CHICAGO

1930 to 1956 incl.

	Metropolitan pumpage cfs	Diversion cfs	Total diversion & pumpage from Lake Michigan cfs
1930	1700	6660	8360
31	1680	6500	8180
32	1650	6450	8100
33	1690	6270	7960
34	1692	6433	8125
35	1602	6484	8086
36	1712	4862	6574
37	1665	4989	6654
38	1604	4999	6603
39	1582	1499	3081
40	1589	1681*	3270*
41	1610	1496	3106
42	1575	1528**	3103**
43	1605	1500	3105
44	1606	1531**	3137**
45	1507	1498	3005
46	1600	1495	3095
47	1616	1500	3116
48	1640	1500	3140
49	1641	1493	3134
50	1607	1499	3106
51	1616	1490	3106
52	1633	1497	3130
53	1692	1499	3191
54	1708	1497	3205
55	1739	1500	3239
56	1805	1699*	3504*

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* Increase authorized by order of U. S. Supreme Court.

** Increase authorized by order of War Department.

The foregoing figures are contained in the official records of the United States Army District Engineers at Chicago, as officially computed pursuant to the provisions of paragraph number 4 of the decree of April 12, 1930.

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Nos. 2, 3 and 4, Original

In the Supreme Court of the United States

October Term, 1957

STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN, AND NEW YORK, COMPLAINANTS

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO, ET AL.

ON APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK, AND ON MOTION OF THE STATE OF NEW YORK, FOR MODIFICATION OF THE DECREE OF APRIL 21, 1930, OR IN THE ALTERNATIVE FOR REFERENCE TO A SPECIAL MASTER

MEMORANDUM ON BEHALF OF THE UNITED STATES AS AMICUS CURIAE

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In the Supreme Court of the United States

OCTOBER TERM, 1957

Nos. 2, 3 and 4, Original

STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN, AND NEW YORK, COMPLAINANTS

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ON APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK, AND ON MOTION OF THE STATE OF NEW YORK, FOR MODIFICATION OF THE DECREE OF APRIL 21, 1930, OR IN THE ALTERNATIVE FOR REFERENCE TO A SPECIAL MASTER

MEMORANDUM ON BEHALF OF THE UNITED STATES AS AMICUS CURIAE

This memorandum is in response to an invitation from the Court, transmitted in a letter dated January 6, 1958, from the Clerk, to express the views of the Government with respect to the present application and motion in the above case.

In preparing this memorandum we have considered not only the moving papers and the brief in opposition, filed by the State of Illinois and the Metropolitan Sanitary District of Greater Chicago, but also the views of, and information provided by, the Department of State, the Department of Health, Education, and Welfare, and the Chief of Engineers of the United States Army. We have assumed that, in retaining jurisdiction over the case, 281 U. S. 698, the Court did not intend to limit further relief to the specific allegations as set forth in the original pleadings, but retained jurisdiction over the subject matter in controversy as it relates to diversions by the defendants of water from the Great Lakes into the Illinois-Mississippi waterway.

Although the United States has not been a party to these proceedings, there are federal interests which may be affected by variations in the quantity of waters diverted from the Great Lakes into the Mississippi. See *Sanitary District* v. *United States,* 266 U. S. 405. The federal power, and concomitant duty, with respect to navigable waters requires the Government to take all necessary steps to prevent any action which would impair navigability either on the Great Lakes, the St. Lawrence, the Illinois Waterway, or the Mississippi. As to the Great Lakes and the St. Lawrence River, the Government must also consider its international relations with Canada with respect not only to navigation but also hydro-electric development.

The present application and motion raise the issue of whether Illinois and its agency, The Metropolitan Sanitary District of Greater Chicago, should be required by amendment to the earlier decree to return to Lake Michigan the water which is now withdrawn for domestic uses and discharged into the Sanitary and Ship Canal from which it flows into the Illinois River and eventually into the Mississippi River. The volume of water so withdrawn appears to have varied over the past 25 years between 1,600 c. f. s. and 1,805 c. f. s. This water withdrawn for domestic uses is in addition to the 1,500 c. f. s. which the Court permitted Illinois to withdraw in order to promote navigability in the Port of Chicago.

Considering the present motion and application in the light of the various federal interests:

1. The United States has no information which indicates that the total amount of water now being diverted, namely, the domestic pumpage of 1,600 c. f. s. to 1,805 c. f. s. plus the additional diversion of 1,500 c. f. s., is materially impairing navigability on the Great Lakes or the St. Lawrence River, or interfering with hydroelectric developments. The report of the Corps of Engineers completed in January, 1957, to which reference is made by both complainants and defendants herein, deals solely with the future results of a proposed additional diversion of 1,000 c. f. s. for an experimental period of three years; it is not directed to the effect of the present diversion. We are thus unable to advise the Court at the present time whether the current diversion is resulting in materially lowering the water level in the Great Lakes or the rate of flow therefrom so as to have any appreciable effect on navigation or otherwise.

2. With respect to the effect of the present diversion on the Illinois Waterway, some diversion is essential in order to maintain its navigability. Although a

considerable current is not essential to the operation of the system, there must be enough water available to operate the locks. The Chief of Engineers has informed us that it would require further study to determine whether the 1,500 c. f. s. now permitted, without the additional volume provided by the effluent from the Chicago sewage system, *i. e.,* the residue of the water taken from the Great Lakes for domestic uses, would be sufficent to operate the waterway.

3. At the present time, diversion of water from the Great Lakes is not essential to the maintenance of sufficient depth of water at the Alton Lock on the Mississippi to handle the present traffic. This is the area where low water last winter caused the emergency resulting in the temporary increase of diversion permitted by this Court. 352 U. S. 945, 983. Although the emergency situation may recur before permanent remedial steps are taken, the Chief of Engineers has recommended to Congress a plan to avoid a repetition of the emergency without increasing the diversion.

4. Insofar as the sanitary problem arising from the deposit of sewage in the Sanitary and Ship Canal is involved, we have no information that at present there exists a condition endangering health. Essentially, as this Court pointed out in *Wisconsin* v. *Illinois,* 281 U. S. 179, if such a condition exists, it is a problem for Illinois to solve and a problem which Illinois must solve independently of diversions designed to promote navigation.

5. The United States is unable to form any judgment as to the effect on future diversion of the pros-

pective growth in population and industry in the Chicago area. From the figures appearing in Appendix E, page 43 of the Defendants' Opposition, it does not appear that there has been any material increase in the amount of domestic pumpage during the past 25 years although there has been a material increase in population and industrial activity.

In sum, on the basis of the facts related in the moving papers and the information otherwise now available to the Government, we are not able to determine that the present diversion for domestic pumpage, in addition to the 1,500 c. f. s. permitted under the order of this Court, is impairing navigation or materially hindering hydro-electric development by reducing the level of the Great Lakes or decreasing the volume of outflow therefrom. However, a belief that there is a present injury and an apprehension of increasing injury appear to be the basis for the application and the motion. We do not believe that either a present or future injury is alleged with sufficient specificity to justify the relief requested. Nevertheless, if there is basis for the complaint, interests of grave importance to the States, the United States, and Canada are involved. The United States believes, therefore, that in order to reach a determination as to whether the matter should be reopened and referred to a special master the complainant States should be given the opportunity to make more definite and certain the allegations contained in their application and motion. On the basis of such specific allegations of fact it may be possible to determine whether some present relief is justified or whether further testimony is necessary for a disposition of the motion and application.

Respectfully submitted.

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February 1958.

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IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM A. D. 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 AND THE GRANTING OF FURTHER RELIEF

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SPEAKER-HINES AND THOMAS, INC., LANSING, MICH.—1958
1

IN THE SUPREME COURT OF THE UNITED STATES

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STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al.,
Defendants.

No. 4 Original

Amended Application of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York for a Reopening and Amendment of the Decree of April 21, 1930 and the Granting of Further Relief

To the Honorable The Chief Justice and Associate Justices of the Supreme Court of the United States:

The amended application of the states of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York by their respective attorneys general respectfully shows to the Court that:

I

This amended application is for a reopening of the above entitled actions pursuant to the provisions of paragraph 7 of the decree entered therein on April 21, 1930 (281 U.S. 696), and pursuant to the order entered on March 3, 1958 (2 L. Ed. 2d 526).

These are original actions, the first of which was filed by the state of Wisconsin in 1922. The Wisconsin bill of complaint was amended in 1925 and the states of Minnesota, Ohio and Pennsylvania became co-complainants. In 1926, the state of Michigan filed a separate bill of complaint and later that year the state of New York also filed a separate bill. These bills alleged, in substance, that the diversion solely for sewage disposal proposed by the state of Illinois and its Agency, the Sanitary District of Chicago, of huge quantities of water from Lake Michigan through the Chicago Drainage Canal into the Illinois Waterway had lowered the levels of Lakes Michigan, Huron, Erie and Ontario and their connecting waterways, and of the St. Lawrence River above tidewater, not less than six inches, to the serious damage and injury of the complainant states and their peoples. The complainants sought to enjoin this diversion.

This court in its decision of January 14, 1929 (278 U.S. 367) affirmed the findings of Special Master Charles Evans Hughes as to the great losses sustained by the complainant states and ordered a reduction in diversion and the speedy construction of adequate sewage treatment plants and facilities. The Court then referred the cases back to the Special Master to determine the practical measures needed to dispose of the sewage of the Chicago area without diversion and the time required for the completion of such works. On April 14, 1930, the decision of this Court on re-reference was handed down (281 U.S. 179). And, on April 21, 1930, the Court's decree (281 U.S. 696) was entered.

The decree, among other things, provides:

> "3. That on and after December 31, 1938, the said defendants are enjoined from diverting as above in excess of an annual average of 1,500 c.f.s. in addition to domestic pumpage.
>
> "4. That the provisions of this decree as to the diverting of the waters of the Great Lakes-St. Lawrence system or watershed relate to the flow diverted by the defendants exclusive of the water drawn by the City of Chicago for domestic water supply purposes and entering the Chicago River and its branches or the Calumet River or the Chicago Drainage Canal as sewage. The amount so diverted is to be determined by deducting from the total flow at Lockport the amount of water pumped by the City of Chicago into its water mains and as so computed will include the run-off of the Chicago and Calumet drainage area.
>
> "5. That the defendant the Sanitary District of Chicago shall file with the clerk of this Court semi-annually on July first and January first of each year, beginning July first, 1930, a report to this Court adequately setting forth the progress made in the construction of the sewage treatment plants and appurtenances outlined in the program as proposed by the Sanitary District of Chicago, and also setting forth the extent and effects of the operation of the sewage treatment plants, respectively, that shall have been

placed in operation, and also the average diversion of water from Lake Michigan during the period from the entry of this decree down to the date of such report.

"6. That on the coming in of each of said reports, and on due notice to the other parties, any of the parties to the above entitled suits, complainants or defendants, may apply to the Court for such action or relief, either with respect to the time to be allowed for the construction, or the progress of construction, or the methods of operation, of any of said sewage treatment plants, or with respect to the diversion of water from Lake Michigan, as may be deemed to be appropriate.

"7. That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above described reports, apply at the foot of this decree for any or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy."

II

A. At the time the decree was entered, defendant Metropolitan Sanitary District of Greater Chicago, then known as the Sanitary District of Chicago, included the City of Chicago and 54 cities, towns and villages, having a combined total area of 438 square miles, with a population of 3,901,569 as of 1930.

B. Now the District includes the City of Chicago and 106 adjoining municipalities, having a combined total area of 920.14 square miles, with a human population as of 1955 of 4,600,000.

C. The present projected human population for the area to be served by the District, according to a recent publication issued by the Sanitary District is 15 to 20 million in human population within twenty years.

III

A. The public water supplies hereinafter referred to as "domestic pumpage" is the water used by serving the people, commercial establishments and industrial plants situated within the boundaries of the Sanitary District. The water is taken from Lake Michigan by six or more Chicago area municipalities and numerous industries. We do not question the right to use the water that is the so-called domestic pumpage provided it is then returned to the Great Lakes basin. After use, the water is discharged as sewage and industrial wastes into local government or Sanitary District owned sewers through which said sewage and wastes are conveyed to one of the three Sanitary District sewage treatment works, constructed pursuant to this Court's decree of April 21, 1930, as will appear more fully from the records and files of this Court.

B. The collecting system of sewers are of the so-called "combined" type which convey not only sewage and industrial wastes, but during times of storm such amounts of run-off as are permitted to find their way into the system. When it storms, mixtures of sewage and industrial wastes with variable amounts of storm water do not enter the sewage disposal plants for treatment but are overflowed without treatment through regulator-operated relief outlets into the Chicago River or the Chicago Drainage Canal and its tributary waterways.

C. The District is not fully and effectively collecting all sewage and industrial waste within its jurisdiction, but is permitting large volumes of sewage and industrial waste to be discharged untreated, or partially treated, into the Chicago Drainage Canal and its tributaries under both dry weather and wet weather conditions.

D. As the service area of the District continues to increase in population, commercial establishments, and industrial plants, accompanied by the resulting increase in sewage, industrial wastes and storm run-off, the polluted condition of the Chicago River and the Sanitary Canal will become increasingly aggravated so long as the Sanitary District is permitted to continue to discharge treated effluents and untreated overflow from its combined sewers into these waterways.

E. These waterways are slack-water navigation facilities under control of the Federal Government.

IV

The Sanitary District through its experts and witnesses who appeared before the Special Master on re-reference outlined a program of constructing sewage treatment works which would satisfactorily and adequately treat all of the sewage and industrial wastes of the District.

(See Joint Abstract of Record for Hearing upon Exceptions to the Special Master's Report on Re-Reference, pages 509 and 510.)

The operating efficiency of the Sanitary District sewage disposal plants has dropped sharply during the last six years. The operating efficiency of treatment attained by the Sanitary District as shown by the reduction in biochemical oxygen demand and the amount of solids removed per day during the years 1952-1957 is shown by the following tabulation:

Year	Sewage treated Million Gallons Per Day	Per Cent B. O. D. Removal	Solids Tons Per Day Raw Sewage	Per Cent Solids Removal
1952	1,112.8	93.6	786.3	91.1
1953	1,103.8	89.6	741.5	84.7
1954	1,170.6	88.1	781.2	82.9
1955	1,183.3	86.1	876.4	82.4
1956	1,149.6	85.8	937.5	88.2
1957	1,230.7	85.6	862.0	80.6

(24th) Annual Report of Operations (1957), Metropolitan Sanitary District of Greater Chicago, pages 119, 120, 122, 123, 124.

The Sanitary District in 1929 assured this Court that its treatment works and facilities would be operated in such an efficient manner that the effluent discharged into the Sanitary Canal would in no wise create nuisance conditions which might endanger and injure public health in the area. The drop from a removal of 93.6 per cent of bio-chemical oxygen demand removal in the year 1952, to a removal of 85.6 per cent in the year 1957, and from an average of 91.1 per cent solids removal in the year 1952, to 80.6 per cent solids removal in the year 1957, is due to the neglect, failure or default of the Sanitary District to operate properly and to provide sufficient disposal facilities at its sewage treatment works.

V

By the decree of April 21, 1930, the Sanitary District was allowed to divert from Lake Michigan into the Chicago

Drainage Canal an annual average not to exceed 1,500 c.f.s. for the purpose of maintaining navigation in the Port of Chicago and the connecting Illinois waterway in addition to the quantity of water abstracted from Lake Michigan for the purpose of domestic pumpage. In 1939, at the time the diversion was fully reduced pursuant to the terms of the decree, the total diversion of 1,500 c.f.s. for navigation plus domestic pumpage amounted to 3,110 c.f.s. The diversion increased to 3,205 c.f.s. in 1954, and to 3,500 c.f.s. in 1956. As the population of greater Chicago increases, as the Sanitary District takes in larger areas, and as the industrial development in the geographical area served by the Sanitary District continues to expand, the volume of water to be diverted from Lake Michigan and discharged into the Canal by the Sanitary District as domestic pumpage will increase beyond the limits that were estimated at the time the Court entered its decree in 1930. In 17 years the diversion of water as domestic pumpage from Lake Michigan at Chicago will double.

This Court, foreseeing that the withdrawals for domestic pumpage might be shown to be excessive, recognized the right of complainants to seek modification of the decree and stated:

> "If the amount withdrawn should be excessive, It will be open to complaint. Whether the right for domestic use extends to great industrial plants within the District has not been argued but may be open to consideration at some future time." (281 U. S. 179 at page 200.)

The amount withdrawn as domestic pumpage is excessive. The increasing extension of domestic pumpage to industrial plants unlawfully injures complainants.

VI

Many industrial plants have established themselves within the District since the date of the decree. Many more are located in the municipalities annexed by the Sanitary District since the decree. The Sanitary District openly advertises for and attracts many new and additional commercial and industrial enterprises, all of which are substantial users of water. With the projected growth in population and industry within the next 20 years of 15 or 20 million persons the quantities of water diverted from Lake Michigan as "domestic pumpage" will become more and more excessive, to the irreparable harm and injury of the complainants. The use of Lake Michigan water at Chicago will double within the next 17 years by 1975 with the resultant additional lowering of the Great Lakes another two inches, causing still greater damage to complainant states and their peoples. (See Par. X, infra)

VII

The capacity of the Chicago Drainage Canal is such that it cannot accommodate sufficient dilution to enable it to adequately carry the increased pollutional load discharged into the slack waters of the Canal.

VIII

Since the year 1900, the domestic pumpage of the metropolitan Chicago area has been permanently diverted from and lost to the Great Lakes watershed. The loss has been caused by action of the defendants diverting to the Mississippi Valley Watershed via the Chicago Drainage Canal the domestic pumpage after such waters leave one of the three Sanitary District plants as effluent. The annual average domestic pumpage of the metropolitan Chicago area permanently diverted from the Great Lakes-St. Lawrence watershed by the defendant Sanitary District amounted to 1805 cubic feet per second in the year 1956, and the domestic pumpage at Chicago permanently diverted and lost to the Great Lakes-St. Lawrence watershed in the year 1957 totaled 1803 cubic feet per second.

Such diversion of the waters of the Great Lakes system is in violation of the rights of complainants, and is causing extensive, substantial and continuing damages to the complainant states and their peoples.

Such diversion is not necessary for the purpose of disposing of the sewage of the Chicago area. Nor is it necessary for the protection of the water supply of the Chicago area and the health of the people of the Chicago area.

Other Great Lakes communities that take their water supply from the Great Lakes or their connecting channels return such water, after use, to the lake or watercourse from which it was obtained without any injury to the health of the people using such water and without causing any nuisance conditions in the lake or other watercourse. This is in conformity with the standards set by the United States Department of Health.

IX

Cessation of the diversion by the defendants of the waters of the Great Lakes-St. Lawrence system, as domestic pumpage, will not injure or impair the health of the people of the Chicago area or the navigability of the Port of Chicago, or of the Chicago Drainage Canal, or of the Illinois Waterway. (See Par. XIII, infra)

X

A. Substantial damage to complainants has been and is being caused by defendants' action in diverting the waters of the Great Lakes-St. Lawrence system as domestic pumpage through the Sanitary District Canal with the resultant artificial lowering of the levels of all of the Great Lakes (except Lake Superior) and their connecting channels and the St. Lawrence above Montreal. Such damage falls into four general classes, to-wit:

1. **Damage to navigation and commercial interests;**
2. **Damage to riparian property of a non-navigational character;**
3. **Damage to the proprietary and quasi-sovereign rights of complainant States:**
4. **Damage and losses caused to the state of New York and her citizens by defendants' dimunition of the flow of the waters of the Niagara and St. Lawrence Rivers which are used for the generation of hydro-electric power at power sites on the Niagara River (now under construction and to be in full operation in a few years) and on the St. Lawrence River where the New York power project is substantially completed and in operation.**

1. The diversion at Chicago of more than 1,800 cubic feet per second of domestic pumpage by defendants has caused a lowering of nearly two inches in the levels in Lakes Michigan and Huron, and one inch in the levels in Lakes Eri and Ontario, which lowering affects to the same extent the water levels in the connecting channels and outlet rivers and all the inner harbors, bays, inlets and

river mouths along the respective shore lines of these waters.

This artificial lowering of such water levels is a substantial burden upon both interstate, intrastate and foreign commerce. It decreases the carrying capacity of the large lake vessels by from 180 to 200 tons per cargo. It takes away annually more than 2,500,000 tons of carrying capacity of the Great Lakes vessels at a loss of more than $4,000,000 in annual revenue. This loss is reflected in transportation costs to the people of the Great Lakes states.

There are 400 harbors on the Great Lakes and their connecting channels, of which 100 have been improved by the Federal Government. These Federal improvements consist of the excavation and maintenance of channels from deep waters in the lakes to the harbor entrance. Inner or local harbors located inside of the Federal channels, are excavated and maintained at local expense. The port development expenditures for the Great Lakes ports for the 12-year period 1946-1957 were approximately 147 million dollars. The artificial lowering of the levels of the Great Lakes caused by defendants' diversion at Chicago of domestic pumpage from Lake Michigan, has and will continue to nullify costly improvements made by the Federal Government under direct authority of Congress, and costly improvements made by state and local government, private industries and individuals. These large and substantial losses have cost and will continue to cost, the Federal Government, the complainant states and their peoples many millions of dollars in extra dredging and maintenance work required to maintain the proper navigable depths in such waters.

The diversion by defendants as aforesaid has also obstructed the navigable capacity of all of the unimproved harbors, landings, bays, inlets, river mouths, and shallow sheltered waters used by pleasure boats, fishing boats and similar small craft along the shoreline of Lakes Michigan, Huron, Erie and Ontario in the states of Wisconsin, Michigan, Ohio, Pennsylvania and New York.

Practically all of the commerce of the ports of Minnesota and Wisconsin located upon Lake Superior is to and from the lower lakes. The usefulness and prosperity of the Lake Superior ports of Minnesota and Wisconsin are dependent upon the navigable depths obtaining in the channels and harbors of the lower Great Lakes, since the navigable capacity and usefulness of such ports is limited by the critical points of navigation necessarily traversed by their commerce to and from the lower Great Lakes ports. The obstruction of the navigable capacity of the channels and harbors in and on the lower Great Lakes has seriously damaged and interfered with the commerce of the Lake Superior ports of Minnesota and Wisconsin, resulting in substantial damage to the states of Minnesota and Wisconsin and their peoples.

The obstruction of the navigable capacity of the Great Lakes and their connecting channels, both within and without the complainant states, has substantially diminished the value and utility of the extensive and costly terminal facilities for lakeborne traffic, which facilities have been provided in the port cities of complainant states by municipalities and private citizens and residents thereof.

The impairment of the navigable capacity of the Great Lakes and their connecting channels has also seriously damaged the shipping interests on those waters by lessening the value and utility of the huge bulk carriers which carry more than 95% of the Great Lakes waterborne trade, and all this has injured and seriously threatens the welfare and prosperity of the large number of people of complainant states engaged in shipping over the Great Lakes.

2. The direct damage to property other than to navigation interests by the artificial lowering of the levels of the Great Lakes by defendants' diversion of domestic pumpage at Chicago is immense. This artificial lowering of the levels of the Great Lakes has caused substantial damage to riparian property along the hundreds of miles of shoreline of complainant states. It has depreciated the large investments in commercial summer resorts and their private sport areas, private summer cottages and homes in the summer resort regions of Wisconsin, Ohio, New York and Michigan. This causes a continuing injury to the welfare and prosperity of the people of those states. Extensive damage has been caused to fishing and hunting grounds, spawning beds, and open marshes which were the natural habitat of extensive and valuable wild life.

3. The third class of damage is to the proprietary and quasi-sovereign rights of the complainant states. These states have suffered and will continue to suffer damage to their parks, camps and fish hatcheries located on the lake shores and as users and consumers of lake-borne coal for public buildings and state institutions.

4. The artificial lowering of the Great Lakes system by the diversion of more than 1800 cubic feet per second of water from the Great Lakes-St. Lawrence system as "domestic pumpage" at Chicago results in the substantial interference with the use of the waters of the Niagara and St. Lawrence rivers for the generation of hydro-electric power by the state of New York and its Power Authority, a corporate municipal instrumentality of the State. The action of defendants in reducing the amount of water available for the generation of power at the hydro-electric power

plants located on the Niagara and St. Lawrence rivers has and will continue to deprive the state of New York and her citizens of substantial revenues. The 1800 cubic feet per second of water diverted by defendants could and would be used for the generation of power at the Niagara and St. Lawrence plants. The Niagara power project is now under construction. It will be completed in a few years at a total cost of $700,000,000. The Authority's St. Lawrence power project which cost approximately $350,000,000 is now substantially completed and in operation. Half of this power project is in the United States and half in Canada. In addition Canada has completed and has in operation a power project on the Niagara River.

The following table shows the loss to Power Authority's Niagara and St. Lawrence plants of energy, capacity, and revenue from permanent diversion of 1800 cubic feet per second at Chicago.

Annual energy loss, 1,000 Kilowatt-hours per year	
Niagara	173,566.8
St. Lawrence	48,600.
Total	222,166.8
Cost (per 1,000 Kilowatt-hours)	$2.67
Revenue Loss	$593,184.35
Annual capacity loss (Kilowatt-year)	
Niagara	29,700.
St. Lawrence	6,521.4
Total	36,221.4
Cost (Kilowatt-year)	$12.
Revenue loss	$434,656.80
Total Annual Revenue Loss	$1,027,841.15

If the equal loss to Canada's Niagara and St. Lawrence plants is considered, the diversion of 1800 cubic feet per second at Chicago results in an annual revenue loss in power generation of $2,055,682.30. In fifty years this would amount to $102,784,115.00.

XII

Complainants further allege that the injuries aforecited still continue to exist and will be accentuated because of the ever increasing diversion of water at Chicago from the Great Lakes Basin.

XIII

Recent studies made by the United States Corps of Engineers have established that a diversion of 1,500 c.f.s. is adequate to maintain navigation in the Port of Chicago and the Illinois waterway. Complainants do not challenge this diversion but allege that no diversion as "domestic pumpage" is necessary for navigational purposes and demand a cessation of diversion of water for "domestic pumpage" from the Great Lakes Basin.

XIV

In further support of their allegation that no water should be diverted and permanently abstracted from the Great Lakes Basin for "domestic pumpage," complainants allege that it is possible and feasible to return the effluent from the Sanitary District's treatment plants to Lake Michigan without endangering the domestic water supply taken from said lake by the City of Chicago and other municipalities because of the many advances and developments which have taken place since 1930 in the science and technology of the treatment and purification of sewage and industrial wastes; that the Sanitary District in its treatment works and facilities is able to provide, and has provided in 1952 up to 93.6% treatment of all of the sewage and industrial wastes collected in said District; that said 93.6% treated effluent (after proper chlorination where necessary) could be returned to the waters of Lake Michigan through pipes and tunnels running from said treatment plants to appropriate locations in Lake Michigan, whose waters are in such volume and contain such a high content of dissolved oxygen as to render said prechlorinated effluent innocuous immediately upon its diffusion throughout the waters. Complainants further allege that all of the municipalities except Chicago lying along the Great Lakes and receiving their domestic water supply therefrom, both American and Canadian, after treatment return their "domestic pumpage" to the waters of the lake from which it is taken without experiencing any danger or hazard to their domestic water supply and public health.

WHEREFORE COMPLAINANTS PRAY:

(1) That the State of Illinois and the Metropolitan Sanitary District of Greater Chicago be forthwith restrained and enjoined from discharging any of the treated effluents emanating from its sewage and industrial treatment facilities into the Sanitary and Ship Canal, and that said State of Illinois and the Metropolitan Sanitary District of Greater Chicago be required by mandatory injunction of this Court to return all of said effluent to the Great Lakes Basin from which it originally came in the form of "domestic pumpage," the aforesaid injunctions to be made effective at such times and under such terms as to this Court shall seem meet and just.

(2) That if such decree is not made forthwith, a Special Master be appointed to take testimony and evidence with respect to the issues contained in this petition and to report with respect to the time, method, and manner in which the State of Illinois and the Metropolitan Sanitary District of Greater Chicago shall comply with Paragraph (1) of this prayer, and with respect to whether the Court should appoint a Permanent Master invested with such authority as he may require for the purpose of maintaining surveillance over the operation of the sewers, interceptors, and other sewage and water collecting facilities and the sewage disposal and industrial treatment plants and works operated by the Metropolitan Sanitary District of Greater Chicago.

Respectfully submitted,

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IN THE SUPREME COURT OF THE UNITED STATES

October Term, 1959

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 4 Original

BRIEF IN SUPPORT OF AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 AND FOR THE GRANTING OF FURTHER RELIEF

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I.

INTRODUCTION

Pindar, the early Greek lyric poet, in his Ode to the Greek Games, some five hundred years before Christ, wrote:

"Best of all things is water." Today the Great Lakes are often referred to as a billion dollar asset. We can do without silver, gold, diamonds, and other precious metals and stones but we cannot do without water. Recently, at a Water Conservation Conference held at Chicago, Major-General Emerson C. Itschner, Chief of the Corps of Engineers, United States Army, stated that water is now a limited resource in the United States, and he urged a stepped-up program of water conservation to keep America strong. General Itschner estimated that in seventeen years the demand for water in the United States would double. (Chicago Sun-Times; Chicago Daily Tribune; August 28, 1958) The Illinois State Water Survey agrees that the use of water will be doubled in the next seventeen years and every seventeen years for a long time to come. (Chicago Daily News, October 10, 1958)

In addition to domestic and industrial uses of water, the use of water for navigation purposes is also important.

In the light of the present critical international situation, it is important that the levels of the Great Lakes be restored and maintained at their natural levels. Shipping on the Great Lakes must be maintained at its highest level in order to provide the low cost transportation for iron ore, coal, wheat, and manufactured products to and from the various ports on the Great Lakes and thereby maintain our economic and defense strength at the highest level possible.

The attention of the Court is invited to the fact that despite the warnings of the Court, as expressed in its opinions and decrees, with respect to the diversion of water from Lake Michigan by defendants, the defendants still suffer from an insatiable thirst for more diverted water for a purpose which this Court has declared to be constitutionally inadmissible, namely, sanitation.[1] This voracious appetite brings to mind the unappeasable hunger of the beast encountered by Dante, in the first canto of his Inferno:[2]

> "That never doth she glut her greedy will,
> And after food is hungrier than before."

Fearful that these insistent and seemingly unappeasable demands for more diverted water from the Great Lakes by the defendants might cause or bring about, unless opposed by the complainant states, a situation from which complainants and defendants alike could not be rescued even by this Court, the said complainant states join in the filing of this Amended Application with this Court. We have felt it imperative that this be done before the course of events makes it difficult if not impossible, even for this Court, to turn back the clock of time. We agree with the statement made by General Itschner that already the availability of sufficient water of good quality for industrial and community use has become critical in many areas and that the problem is becoming more acute. A good beginning in solving the problem of water shortage in the Great Lakes area would be to order the Chicago Sanitary District to return the Chicago domestic pumpage to the Great Lakes from which such domestic pumpage is taken.

II.

HISTORY OF THE LITIGATION

The state of Wisconsin filed an original action in this

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[1] Wisconsin et al. v. Illinois, et al., 278 U.S. 367 (1929); and 281 U.S. 179 (1930).

[2] Longfellow translation, Inferno, Canto I, Lines 98, 99.

Court Under Section 2 of Article III of the United States Constitution in 1922. The Wisconsin bill of complaint was amended in 1925, and the states of Minnesota, Ohio and Pennsylvania became co-complainants with the state of Wisconsin. The amended bill sought an injunction to restrain the state of Illinois and the Sanitary District of Chicago from causing any water to be taken from the Great Lakes-St. Lawrence watershed in such a manner as to abstract permanently and divert the same from that watershed. In 1926 the state of Michigan filed a separate bill of complaint for the same relief. The state of New York likewise, in 1926, filed a separate bill asking for the same relief. On November 23, 1926, this court ordered the three suits consolidated for hearings before the Special Master. (273 U.S. 642, 650; 278 U.S. 367, 369, 370)

The amended bills alleged that the diversion by the defendants of huge quantities of water through the Chicago District Canal had lowered the levels of Lakes Michigan, Huron, Erie and Ontario and their connecting channels, and of the St. Lawrence River above tidewater, not less than six inches, to the serious injury of the complainant states, their citizens and property owners, and that the acts of the defendants had never been authorized by Congress but were in violation of the rights of the complainant states and their peoples, and that the withdrawals of water from Lake Michigan were for the purpose of taking care of the sewage of the Chicago area and were not justified by any control Congress had attempted to exercise or could exercise in interstate commerce over the waters of the Great Lakes, and that such withdrawals were in palpable violation of the Act of Congress of March 3, 1899. Complainants asked that the diversion of water from Lake Michigan be enjoined.

This Court referred these causes to Charles Evans

Hughes, as Special Master, and after full hearing, the Master's report was filed on November 23, 1927. The Master's report stated that the lowering of the lake levels of the Great Lakes was 6 inches based on a diversion of 8500 cubic feet per second diversion at Chicago, and that this resulted in substantial damage to complainants' navigation, commercial, and other interests. (Master's Report, November 23, 1927, p. 118)

This Court affirmed the findings of the Master as to the losses suffered by complainant states and their peoples, which resulted through the illegal diversion at Chicago, and ordered a reduction in the diversion to a point where it would rest on a legal basis, and thereby restore the navigable capacity of the Great Lakes to their proper levels. (278 U.S. 367, 420-421) The suits were then referred back to the Special Master to determine the practical measures needed to dispose of the sewage of the Chicago area without diversion, and the time required for the completion of such disposal works. The Court's decision on reference ordered the final reduction in diversion to 1500 cubic feet per second, plus domestic pumpage, to be made by December 31, 1938 by which date the sewage disposal works and facilities were to be completed. (281 U.S. 179) In this opinion, Mr. Justice Holmes pointed out that the defendants were doing a wrong to the complainants and that they must stop it, that the defendants must find a way out at their peril, and that the state of Illinois must devote all of its powers to dealing with an exigency to the magnitude of which it seems not yet to have fully awakened, and further, that Illinois cannot base any defenses upon difficulties which it has itself created. (281 U.S. 179 at 197)

On April 21, 1930, a decree was entered which provided for a gradual reduction in the unlawful diversion of Lake Michigan water and a gradual restoration of the rights of the Lake States in order to permit the construction of the sewage disposal works claimed to be necessary to protect the health of the peoples in the Chicago area. (281 U.S. 696) Mr. Chief Justice Taft had pointed out that:

> "Though the restoration of the just rights to the complainants will be gradual instead of immediate, it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project." (278 U.S. 367, at 420-421)

This Court found that the times fixed by the Master for the completion of the sewage disposal works were as liberal as the evidence permitted (281 U.S. 179, at 199). With any reasonble diligence, all of said sewage disposal works and other facilities could easily have been fully completed and put into operation on or before December 31, 1938, the date fixed for the final reduction in diversion.

After inexcusable delays in the construction program during 1930-1932, the states of Wisconsin, Minnesota, Ohio and Michigan, complaining of the delay in the Sanitary District's construction program, petitioned this Court for the appointment of a commissioner or special officer to execute the decree of April 21, 1930, on behalf of and for the defendants. The Court appointed Edward F. McClennen to make summary inquiry and report to the Court; (1) The causes of the delay in obtaining approval for and prompt construction of controlling works in the Chicago River to prevent reversals in the Chicago River in times of storm; (2) The causes of the delay in providing for the construction of the southwest side treatment works; (3) The financial measures necessary to carry out the decree of April 21, 1930. (287 U.S. 578 (1932)) After full hearings, the Master filed his report on March 13, 1933, in which, among other things, the Master pointed out that:

> "*the decree is painful to the defendants and they have been influenced by hope that something would happen so that the flow at Lockport need not go as low as the 1500 c.f.s. to which the decree now limits them, after December 31, 1938,* * * *". (Master's Report of March 13, 1933, at Page 6.) (Emphasis supplied)

The report of the Master placed the blame for the delays on defendants for failure to proceed to a decision on a site, for failure to prepare plans, designs, etc., for the key southwest treatment works, and for failure to apply for approval for controlling works in the Chicago River. (Master's Report, March 13, 1933, at pages 5-60, 125-126.) The Master also recommended enlargement of the decree of April 21, 1930, so as to require Illinois to furnish the necessary money needed and to take appropriate steps to secure completion of the facilities required to carry out the decree of the Court. (Master's Report, March 13, 1933, pages 61-112, 126-128.) On the basis of this report, the Court, on May 22, 1933, rendered its decision affirming the Master's Report. (289 U.S. 395.) On the same day, the decree was enlarged so as to require the state of Illinois to take all necessary steps to secure the moneys needed for the completion of adequate sewage disposal plants and incidental facilities for the disposition of the sewage of the Chicago area. (289 U.S. 710)

On and after December 31, 1938, the Sanitary District reduced the diversion of waters from the Great Lakes-St. Lawrence system to 1500 cubic feet per second, plus domestic pumpage.

On January 11, 1940, the state of Illinois filed its petition for a temporary increase in diversion of Lake Michigan water to 5000 cubic feet per second, plus domestic pumpage, until December 31, 1942, on the ground that a dangerous condition to public health existed along the Sanitary District Canal and the Illinois waterway. This Court, after hearing oral argument and after having considered the petition and return thereto, and the briefs, filed a per curiam opinion, which held, in part:

> "*The state of Illinois has failed to show that it has provided all possible means at its command for the completion of the sewage treatment system as required by the decree as specifically enlarged in 1933 (289 U.S. 395, 710, 77 L. Ed. 1465, 53 S. Ct. 671, 788). No adequate excuse has been presented for the delay. (309 U.S. 569 at 571.)*" (Emphasis supplied)

Thereafter, the Court appointed Monte M. Lemann as Special Master to make summary inquiry and to report to the Court. After extended hearings, the Master filed his report on March 31, 1941, in which the Special Master recommended dismissal of defendant state of Illinois' petition for temporary increased diversion on the ground that

> "the facts proven did not establish any menace to the health of the people of Lockport and Joliet, or elsewhere along the waterway requiring an increase in diversion in water from Lake Michigan." (Master's Report, March 31, 1941, page 54).

The Court dismissed the petition of the state of Illinois, with costs, (313 U.S. 547).

In 1950, the state of Illinois petitioned the Court for an interpretation and clarification of the decree of April 21, 1930, as amended. The complainant states herein opposed such petition and moved to dismiss the petition of Illinois on the ground that the decree was clear and unambiguous. On October 23, 1950, this Court granted the motion and dismissed the petition. (340 U.S. 858.)

In November 1956, the state of Illinois petitioned this Court for temporary modification of the decree "to permit a diversion of ten thousand cubic feet of water per second, in addition to domestic pumpage, for a period of one hundred days following the entry of the Court's order authorizing such modification, within which time it is anticipated that the impairment to navigation which now exists on the Mississippi River and the Illinois Waterway can and will be ameliorated."

The states of Minnesota, Ohio, New York, Pennsylvania and Michigan agreed to allow a temporary increased diversion. Wisconsin did not so agree. The state of Wisconsin, in a short memorandum dated December 5, 1956, moved that the petition of the state of Illinois be dismissed.

The Solicitor General of the United States, J. Lee Rankin, filed a memorandum on behalf of the United States as Amicus Curiae, which pointed out the interests of the United States with regard to the paramount power of Congress in the regulation of navigation, and the treaties between the United States and Canada which affect the total problem of diversion.

The Sanitary District of Chicago filed a motion for clarification of the decree of 1930, or in the alternative for the appointment of a Special Master. The states of Wisconsin, Ohio, Michigan and New York moved to dismiss the motion made by the Sanitary District. The Court denied the motion of the Sanitary District for clarification of the decree (352 U.S. 947) but granted the petition for a temporary increase in diversion to and including January 31, 1957. On January 28, 1957, the Court granted a motion to increase further the temporary diversion to and including February 28, 1957. (352 U.S. 983)

On March 3, 1958, the Court denied an application and motion made by complainants for an amendment of the 1930 Decree to require defendants to return the domestic pumpage at Chicago to Lake Michigan, with leave to renew the application and motion with allegations made more definite and certain as a basis for the relief sought.

III

DISCUSSION OF COMPLAINANTS' AMENDED APPLICATION

Complainants' case, as stated in the amended application, boils down to this: The defendant Sanitary District has been and is continuing to divert huge quantities of water (1800 cubic feet per second) as domestic pumpage from Lake Michigan; this water is permanently lost to the Great Lakes watershed and has the effect of lowering the levels of all of the Great Lakes (except Lake Superior) and their tributary waters by approximately two inches, thereby causing substantial, irreparable and continuing damages to complainant states and their peoples; this diversion is excessive and is increasing and the decree of April 21, 1930, should be amended to provide that the domestic pumpage at Chicago must be returned to Lake Michigan.

By an Act of the Illinois legislature in 1955, The Sanitary District changed its name to the Metropolitan Sanitary District of Greater Chicago. Apparently this was done because of the tremendous increase in size, in population and the number of industries located therein. In 1930, when the Court entered its decree, the Sanitary District comprised an area of 438 square miles, including the city of Chicago and 54 municipalities with a human population of 3,710,000, plus an industrial waste equivalent population of 1,700,000. In 1955, the Sanitary District had a total area of 920.14 square miles and a human population of 4,600,000, with an industrial waste equivalent of 3,800,000. Since 1930, the District has doubled in size and number of municipalities. According to an estimate made by the Sanitary District the population of the District will increase to 15 or 20 million within twenty years, and the demand for water will double within 17 years. (The Story of the Metropolitan Sanitary District of Chicago; 1956, Published by the Sanitary District.)

The Sanitary District has not filed any reports with this Court since January 1, 1939, and there is no way of knowing exactly the efficiency of the operations of the treatment plants of the Sanitary District. The Sanitary District is not subject to the authority of the Illinois Sanitary Water Board insofar as control of pollution in streams is concerned. The Illinois state statute creating the Board, as amended, specifically excepted therefrom "any existing sanitary district which now has a human population of one million or more within its territorial limits." (Smith-Hurd Illinois Annotated statutes, Chapter 19, Par. 144)

Consequently, the present Sanitary District is a kingdom unto itself, from which even the state of Illinois, its creator, is excluded. This legal situation has placed an iron curtain around the Sanitary District and accurate information regarding the operations of the sewage collection system and the treatment works is difficult to obtain.

However, during the recent hearings before the Senate Subcommittee on Public Works and during the debate on the Senate floor of the Chicago Water Diversion bill, H.R. 2, 85th Congress, Second Session, the following data obtained from the Sanitary District by the U. S. Department of Health, Education and Welfare, indicates laxity and ineffectiveness of the present operations of the Sanitary District in the handling and treatment of the sewage of the Chicago area. In 1951, the Sanitary District attained a 92.5 per cent biochemical oxygen demand-removal; in 1952, a 93.6 per cent biochemical oxygen demand; in 1953, an 89.6 per cent biochemical oxygen demand; in 1954, a biochemical oxygen demand removal of 88.1 per cent; in 1955, an 86.1 per cent biochemical oxygen demand; in 1956, an 85.8 per cent biochemical oxygen demand removal; and in 1957, an 85.6 per cent biochemical oxygen demand. The per cent of solids removed dropped from 91.1 per cent removal in 1952 to 80.6 per cent removal of solids in 1957. The above figures show a sharp decline in the efficiency of operations of the District's sewage treatment plants. It is clear that the Sanitary District is dragging its feet insofar as the current operations of its sewage treatment works are concerned.

Over the years, the Sanitary District, in deciding on a course of action in the methods and manner of handling this sanitation problem, has committed two grievous errors:

(1) Many years ago, at the turn of the century, the Sanitary District chose to dispose of its untreated sewage by discharging it into the so-called Chicago Drainage Canal. By diverting from Lake Michigan large quantities of clean fresh water, the Sanitary District hoped not only to dilute the untreated sewage and treated sewage effluent but also to flush such sewage away from its own doorstep and down the Illinois waterway. The state law of Illinois of 1895 made it the legal duty of the defendant, Sanitary District, to divert water from Lake Michigan through the canal at the rate of 333 1/3 cubic feet per second, for every 100,000 inhabitants of the Sanitary District. As the population increased, the Sanitary District was required to increase the diversion of water from Lake Michigan. By the year 1920, the Sanitary District was obligated under the law of 1895 to divert 9,876 cubic feet per second of water from Lake

Michigan. (See p. 9, Bill of Complaint, State of Wisconsin, Oct. Term, 1921, filed 1922). The Court ordered the construction of sewage treatment plants to reduce the diversion but even with the completion of the sewage treatment program submitted by the Sanitary District at the hearings (Defendants' Exhibit 1387; Master's Report on Re-reference, Dec. 17, 1929, pages 10-11; Defendants' Ex. 1385, pages 6-7, of Master's Report on Re-reference), and approved by the Special Master (pp. 34-35 of the Report of Re-reference), the Sanitary District has not resolved its sewage disposal problems. It is clear that the Sanitary District erred in believing that dilution of its sewage effluent, and its discharge through its treatment plants into the Chicago Drainage Canal, into another drainage basin, was an effective, reasonable, and lawful method of disposing of its sewage.

The reason why dilution and subsequent discharge of sewage into the present waterway is not capable of doing a satisfactory job of sewage disposal is set forth in the amended application, particularly Paragraph III thereof. The gist of the trouble is this:

The Chicago Drainage Canal, through a system of locks and dams, operates a slack water facility. Such a system requires a minimum of velocity in order that a large waterborne traffic may safely utilize the facility. This canal system is also receiving the waters for all effluents discharged by the District's treatment plants, numerous trade wastes, as well as vast volumes of storm water which accumulate in the District's sewer system during periods of surface runoff. Storm water overflow from such "combined system" is mixed with raw sewage and when such a mixture is discharged untreated into a water, it carries large quantities of solids and biochemical oxygen demand substances. The present pollution loading in the waters of this slack water canal system is so great that no amount of dilution water diverted from Lake Michigan can satisfy adequately the biochemical demand of this "open sewer" and still allow utilization of the canal for navigation purposes. The fact is, the District is utilizing the Drainage Canal as a huge disposal facility for the complete collection and treatment system that the Sanitary District has failed to provide as required by the Special Master and the decisions of the Court. (1927 and 1929 Reports of Special Master Hughes; also 278 U.S. 367, 281 U.S. 179).

(2) Faced with the sanitation problem created by rapidly increasing population, booming industries and an ever increasing area of service, the District has committed its second error. It has failed to provide and construct adequate sewage and industrial waste collection and treatment facilities to match this growth. On the other hand, the District has encouraged and stimulated expansion and accepted the sanitation problems of contiguous municipalities by connecting their sewers to its already overloaded collection and treatment systems, further aggravating the basic problem of complete collection and treatment of the sewage and industrial waste of the Chicago area.

Simply put, after the decree of 1930 and after further amendment of the decree in 1933, the Sanitary District very reluctantly constructed certain sewage treatment facilities to treat the sewage of the District. However, even though the final reduction in diversion to 1500 cubic feet per second, plus domestic pumpage, was made on January 1, 1939, all of the needed sewage treatment works were not completed as of that date as required. In 1940, the Court, in commenting on defendants' petition for additional temporary diversion, said: (309 U.S. 569, 571)

> "The State of Illinois has failed to show that it has provided all possible means at its command for the

> completion of the sewage treatment system as required by the decree as specifically enlarged in 1933 (289 U.S. 395, 710, 77 L. Ed. 1283, 1465, 53 S. Ct. 671, 788). *No adequate excuse has been presented for the delay.*" (Emphasis supplied)

Today, with a large increase in area, in services required, and in population in the Sanitary District, we find the District still procrastinating and omitting to do all within its power to provide all of the facilities needed to treat adequately all of the sewage of the District. The Sanitary District still persists in using obsolete techniques of sewage disposal by discharging the wastes, some treated, others untreated, into the Chicago Drainage Canal, where they are diluted with Lake Michigan water. The "mess" is flushed on down the waterway into the Mississippi basin. This method was archaic and inefficent in 1930 and it is ineffecient today to an even greater degree. The Sanitary District has three huge treatment plants which are capable of much better performance than shown by the results in the last years. The efficiency of operations has dropped sharply, as indicated above. Nevertheless, the District seeks by every means at its command to obtain greater amounts of diversion of dilution water from the Great Lakes watershed to the injury and at the expense of the complainant states.

IV

DAMAGE AND INJURIES INFLICTED UPON THE COMPLAINANT STATES BY REASON OF THE LOWERING OF THE LEVELS OF THE GREAT LAKES CAUSED BY DEFENDENTS' ABSTRACTION OF THE DOMESTIC PUMPAGE AT CHICAGO

The Special Master in his report of November 23, 1927, at page 118, after discussing the question of damages sustained by complainant states, said: (Page 118)

> "I therefore find that the complainants have established that the diversion through the Chicago Drainage canal has caused substantial damage to their navigation, commerical and other interests as above stated."

This Court, in its decision of January 14, 1929 (278 U.S. 367, 421), affirmed the findings of the Special Master as to the damages suffered by complainant states and their citizens and said, in part:

> "The master finds that the damage due to the diversion at Chicago relates to navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other enterprises, and to riparian property generally, but does not report that injury to agriculture is established. * * *
>
> "The great losses to which the complainant states and their citizens have been subjected by the reductions of levels in the various lakes and rivers, except Lake Superior, are made apparent by these figures."

The amended application herein alleges that the diversion at Chicago by defendants of 1800 cubic feet per second has caused a lowering of the levels of all of the Great Lakes (except Lake Superior) of approximately two inches and the lowering of their connecting waters which has resulted in decreasing the carrying capacity of the large lake vessels which carry 95% of the lakeborne freight, by from 180 to 200 tons per cargo. This lowering has resulted in a reduction of more than 2,500,000 tons of carrying capacity of the Great Lakes vessels each year and causes an annual loss in revenue of more than $4,000,000. This loss is reflected in additional transportation costs to the peoples of the Great Lakes states. (See Paragraph X, Part A1, Amended Application).

The allegations in the Amended Application further charge that the diversion of Lake Michigan water at Chicago in the guise of "domestic pumpage", by lowering the lake levels, has nullified and will continue to nullify costly improvements in aid of navigation made by the Federal Government under direct authority of Congress, and further has nullified and will continue to nullify costly improvements made by state and local governments, private industries and individuals, in port development projects, and that the large and extensive damages so sustained by complainants amount to many millions of dollars. The Amended Application further alleges that the port development expenditures for the Great Lakes ports for the 11-year period 1946-1957 totalled approximately 147 million dollars. (World Ports magazine, August 1958, page 27, Amundsen publications, Southern Building, Washington, D.C.)

The Amended Application further shows that in addition to the obstruction of all of the Federal channels, harbors, and harbor improvements on the Great Lakes, and in the ports, harbors and inner channels located in the states of Wisconsin, Michigan, Ohio, Pennsylvania and New York, the abstraction of the domestic pumpage at Chicago by defendants has reduced the navigable capacity of all of the unimproved harbors, landings, bays, inlets, river mouths, and small sheltered waters used by pleasure boats, fishing boats and similar small craft along the shoreline of Lakes Michigan and Huron, Erie and Ontario, and along the St. Lawrence River, in the states of Wisconsin, Michigan, Ohio, Pennsylvania and New York. Such action by defendants has resulted in substantial damage to the complainant states.

In addition, the states of Minnesota and Wisconsin and their peoples have sustained substantial damages by reason of the impairment of the usefulness of their ports and harbors located on Lake Superior. Since the usefulness and prosperity of the Lake Superior ports are dependent upon obtaining in the lower Great Lakes adequate channels and harbors, and the lowering of the navigable channels in the lower Great Lakes seriously damages and interferes with the commerce of the Lake Superior ports of Wisconsin and Minnesota.

The direct damage to property in complainant states, other than damage directly to navigation interests, caused by defendants' abstraction of the domestic pumpage at Chicago which results in a lowering of the levels of the Great Lakes includes to the substantial damage inflicted upon riparian property along the hundreds of miles of shoreline of complainant states where large investments have been made in commercial summer resorts, private summer cottages and homes in the summer resort areas of Wisconsin, Michigan, Ohio and New York. The value of this resort property as aforesaid is seriously depreciated by the artificial lowering of the Great Lakes and the recession of the waters of such lakes near their shorelines during low water cycles. Extensive damage has also been caused to fishing and hunting grounds, spawning beds and open marshes which are the habitat of extensive and valuable wildlife in complainant states.

Complainant states have suffered injuries in relation to their proprietary and quasi-sovereign rights. They have been hampered in the performance of their obligations as parens patriae of the rights of their citizens.

The next class of injury and damages suffered by the complainant state of New York and its Power Authority, an instrumentality of the state, relates to the interference with the uses of the Niagara and St. Lawrence Rivers due to the lowering of the levels thereof by reason of the abstraction by defendants of huge quantities of water from the Great Lakes—St. Lawrence watershed. This will be discussed in the next section. The annual revenue loss to the New York Power Authority's Niagara and St. Lawrence plants from a permanent diversion of 1800 cubic feet per second at Chicago, is estimated at $1,027,841.15 by the New York Power Authority.

V.

DAMAGES SUSTAINED BY COMPLAINANT STATE OF NEW YORK RELATED TO INTERFERENCE WITH THE USE OF THE WATERS OF THE NIAGARA AND ST. LAWRENCE RIVERS FOR POWER DEVELOPMENT

The Special Master in his first report to the Court (November 23, 1926) made no finding that the state of New York had sustained damages under the allegations of Paragraph III of the complaint filed by New York in 1926. The Special Master properly refused to include any findings of damages to the state of New York in 1927 related to power development on the Niagara and St. Lawrence Rivers. However, the circumstances in this regard are entirely changed today.

The third paragraph of the complaint filed by the state of New York in 1926 alleged that the diversion of Lake Michigan water at Chicago would interfere with the use of the waters of the Niagara and St. Lawrence Rivers by New York and her citizens for the development of power. However, the New York complaint did not allege interference with any existing power development, the existence of any definite project for using the waters for power development or any authorization by Canada or the United States to use the waters for that purpose. In its order authorizing New York to participate in the taking of evidence in the hearing before the Special Master theretofore appointed in *Wisconsin, et al v. Illinois, et al,* this Court reserved authority to make any appropriate order with respect to the matters alleged in the third paragraph of the New York complaint (November 23, 1926, 273 U.S. 642); and Special Master Charles Evans Hughes ruled that he would not receive any evidence relating to the third paragraph of the New York complaint. (Tr. 1310-11) Subsequently the Court struck the third paragraph of the New York complaint, upon the ground that it presented only abstract questions of law, without prejudice to the litigation of such questions when and if they should arise in a concrete case. (274 U.S. 488; 274 U.S. 712)

Notwithstanding the ruling of the Special Master (Tr. 1310-12), Colonel Hugh Cooper, a witness for the complainants, after testifying as to the economic value of the use of the diverted water for power development at Chicago, testified (apparently without objection) to the economic value which the diverted water would have for power development if it flowed in its natural course through the Niagara and St. Lawrence Rivers. Colonel Cooper also testified that Wisconsin, Minnesota and Michigan would not be benefited by the development of the Niagara and St. Lawrence power; that the eastern part of Ohio, part of Pennsylvania, all of New York and all or part of certain New

England states would be benefited by the development of such power. (Tr. 1332-47)

Subsequently, the defendants moved to strike all of the testimony of Colonel Cooper appearing on pages 1329 through 1347 of the transcript. The Special Master granted the motion to strike all of this testimony upon the ground that the Supreme Court had stricken paragraph 3 of the New York complaint as speculative so that any alleged benefits to other states from such potential New York developments were equally speculative; that plainly none of the complainant states other than New York were in a position to show any damage to existing power developments in such states or even speculative damage to any potential or conjectural power developments in those states. However, the Special Master stated that if any of the states could produce evidence which showed actual or threatened damage to power developments in such states which were not speculative or conjectural, the evidence would be relevant and competent and would be received. (Tr. 5430-49)

With respect to the ground upon which certain testimony of Colonel Hugh Cooper was stricken in the original Lakes Level litigation it is clear that Special Master Charles Evans Hughes' ruling sustaining a motion to strike Colonel Cooper's testimony relating to the economic value of the diverted water was premised on the fact that the Supreme Court held that paragraph 3 of the New York complaint presented only abstract questions of law.

At the time of the hearings before Special Master Charles Evans Hughes (1926-1927), due to then existing physical conditions, the Chicago diversion could not damage any existing hydroelectric development or any potential hydroelectric development in any of the complainant lake states except the state of New York. The Amended Complaint in *Wisconsin, et al v. Illinois and Sanitary District of Chicago* alleged that the diversion of water for power development by the Chicago District had become a coordinate objective and purpose of the defendants. However, neither the complaint in *Wisconsin, et al* nor in *Michigan v. Illinois and Sanitary District of Chicago* alleged that the diversion damaged any existing or potential power developments in those states.

Today, the situation is entirely different. The damages with respect to the use of the waters of the Niagara and St. Lawrence Rivers are not speculative or hypothetical in any respect. The New York Power Authority and Canada have completed their power works on the St. Lawrence River. Canada has for many years operated a hydroelectric power plant on the Niagara River. The Niagara River power project of the New York Power Authority is under construction and will be completed in a few years. The first generator of that project will be put into operation November 1, 1960 and the seven generators will be in operation by August 1, 1961. Manifestly, today, complainant state of New York is entitled to enjoin the diversion of the domestic pumpage taken from the Great Lakes-St. Lawrence watershed at Chicago because of the enormous losses now sustained and additional losses which will be sustained in the future.

Those damages sustained by the state of New York by reason of the diversion of 1800 cubic feet per second of "domestic pumpage" at Chicago and the resultant interference with the use of the waters of the Niagara and St. Lawrence Rivers are substantial; these continuous annual losses of more than a million dollars can be halted by cessation of the diversion of the domestic pumpage at Chicago. (See Paragraph X of the Amended Application)

VI

SOLUTION OF THE DISTRICT'S SEWAGE DISPOSAL PROBLEM PROPOUNDED BY COMPLAINANT STATES

It should be recalled that in the second Master's report dated December 17, 1929 the Sanitary District of Chicago convinced Special Master Charles Evans Hughes that it should be allowed to divert into the Sanitary Canal not only the 1,500 c.f.s. needed for navigation, but also all of its "domestic pumpage." The complainant states filed objections against allowing the Sanitary District to discharge into the canal the water comprehended under the term "domestic pumpage," and they proposed that the flow of the water in the canal be reversed so that the water might be returned to Lake Michigan. This proposal by complainants may have been somewhat impractical at that time, particularly since the District in 1930 had few sewage disposal facilities. However, the Court in its opinion indicated that it would leave the matter open for further consideration, and it is on the basis of this fact that the complainants have filed the instant petition. (281 U.S. 179)

A. **What is "domestic pumpage"?**

The city of Chicago through its waterworks abstracts water from Lake Michigan and, after filtration and treatment, distributes it to all its users for residential, commercial and industrial purposes. Ultimately this water finds its way into the sewers which are operated by and under the control of the Sanitary District. Obviously, as the population of Chicago and the municipalities in its periphery grow, the area served increases, and as industrial development expands, greater quantities of water will be required to satisfy the needs of "domestic pumpage." At the present time approximately, 1,800 c.f.s. is extracted for this purpose, and it is conceivable, certainly, that with the growths that have been projected, this amount will double and treble within the next fifteen to twenty years.

Under the decree of this Court of 1930, there is no limitation on the amount of "domestic pumpage" which the city of Chicago may abstract from the waters of Lake Michigan for domestic, commercial and industrial uses, nor do the complainant states contend that there should be any such limitation. As a riparian owner on the Great Lakes, the state of Illinois has an undoubted right to abstract from Lake Michigan such water as it requires for the use of the inhabitants which reside within the basin comprising the Great Lakes. However, the people of Chicago and its surrounding municipalities should not be allowed to abstract water from Lake Michigan under the guise of "domestic pumpage," and then after having used it and purified the resulting sewage, divert it to another and different water basin.[3] We assert (and we believe this assertion cannot be contradicted) that every municipality situated on the shores of any of the Great Lakes return its so-called "domestic pumpage" to the waters of the lake from which it is taken after treatment and chlorination, when necessary. Chicago and its surrounding municipalities seem to assume that they are sacrosanct, that their case is so special that they should be allowed to divert the treated effluent into another drainage water basin through the Sanitary Canal and waterway. If the cities of Milwaukee, Cleveland, and Toronto are able to return their treated effluent to Lakes Michigan, Erie and Ontario, respectively, without being exposed to dangers of contamination, we cannot see any logical reason why Chicago should be exempted from doing likewise. If after due inquiry and consideration by this Court it should be decided that the Metropolitan Sanitary District of Greater Chicago should be compelled to return its fully treated effluent back to Lake Michigan, as is done by every municipality in the Great Lakes Basin, several salutary things will be accomplished:

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[3] It is significant that the entire state of Illinois contributes only 503 c.f.s. of water to the Great Lakes Basin while extracting more than 3300 c.f.s. of water therefrom. Only Indiana among the Great Lakes states contributes less water to the basin. See brief of State of Michigan in State of Mich. v. State of Illinois and Sanitary District of Chicago. Oct. Term 1926 p 47, citing Record before Special Master Charles Evans Hughes p 1143.

(1) The Great Lakes Basin will receive all of the water which was abstracted through "domestic pumpage," and thus levels of the Great Lakes-St. Lawrence Basin will be restored to and maintained at the level which was intended by nature.

(2) The Sanitary District will be stimulated to treat its sanitary and industrial wastes properly and adequately to the end that the source of water supply used in the Chicago area will not be endangered or contaminated. This is presently done by every other municipality on the Great Lakes.

B. The Sanitary District Has No Right to Divert Its Treated Effluent into the Sanitary Canal—It Should be Made to Return Such Effluent to the Great Lakes Basin

It is difficult for the complainant states to understand upon what legal or equitable doctrine the state of Illinois and the Sanitary District can support its insistence that it be allowed to divert "domestic pumpage" into the Chicago Drainage Canal rather than return it to the lake, except that in deference to the exigencies existing at Chicago at the time the Court entered its decree of April 21, 1930. With only partial treatment of the sewage of the Chicago area in 1930, the Court apparently feared that a return of the effluent might create a health hazard. Today, the situation is entirely different. All of the sewage of the Chicago area is treated in the Sanitary District's three large sewage treatment works. The Sanitary District affirms that the effluent of its north side treatment plant is:

> "Almost as clear as drinking water and quite as harmless as it finally leaves the plant through an outlet and into and through an artificial channel which discharges into the Chicago River." (See complainants' Ex. 233, Wisconsin, et al v. Illinois et al, 278 U.S. 367 (1929))

In a pamphlet prepared and distributed by the Sanitary District of Chicago, August 1928, it was stated: (p. 91)

> "Final settling tanks is the next step in the activated sludge process. After the process of aeration is completed, the mixture or sewage and activated sludge, passes through the mechanically cleaned tanks; * * * *the effluent as discharged from these tanks is a clear, odorless liquid * * * non-putrescible.*" (Emphasis added)

In the same pamphlet (Engineering Works of the Sanitary District of Chicago, August 1928) it was further stated that:

> "The effluent produced by the activated sludge plant appears somewhat superior at times to that produced by the sedimentation trickling filter process. It accomplishes from 85 to 95 per cent reduction of the biochemical oxygen demand, 90 to 95 per cent reduction

of suspended solids and from 92 to 98 reduction in bacteria."

The late Langdon Pearse, former chief sanitary engineer for the Sanitary District of Chicago, testified before the Rivers and Harbors Committee of the House of Representatives in 1924 and stated that:

> "The biological processes, such as sprinkling filters or activated sludge, when properly operated produce a high-grade effluent, requiring no dilution, in which fish can live. The effluent further will produce no nuisance and can be turned into a watercourse, even though dry, without fear of consequences." (H. Doc. No. 184, 73rd Congress, 2nd Sess. p. 76)

Several years later, Langdon Pearse testified before Special Master Hughes, where he reaffirmed his 1924 testimony as to the high quality of the effluent from an activated sludge plant and stated further that fish were living in the effluent in the Sanitary District's trickling filter plant, right at the filters. (Transcript of testimony, Original Hearing, pp 5423-5425, Wisconsin, et al v. Illinois et al)

Other noted sanitary engineers likewise testified before Special Master Hughes that the effluent of a modern activated sludge sewage disposal plant is stable, odorless, clear and sparkling, and that such effluent will remain stable indefinitely. (Tr. of testimony before Master on Re-reference, L. R. Howson, p. 10667; George D. Bascoigne, p. 10697; Darwin W. Townsend, p. 10720. These were complainants' witnesses.)

The Sanitary District obtained a 93.6 per cent reduction in biochemical oxygen demand in 1952 and in the same year obtained a reduction of 91.1 per cent in suspended solids.

Other cities on the Great Lakes have an even better record of efficiency in their sewage disposal plant operations. Milwaukee, for example, attains an efficiency of 95 per cent biochemical oxygen removal, and 95% reduction in solids.

In 1913 Henry L. Stimson denied the application of the Sanitary District of Chicago for diversion of 10,000 cubic feet per second. The reasoning adopted by him at that time is even more compelling today. Secretary Stimson stated, among other things:[4]

> "In a word, every drop of water taken out at Chicago necessarily tends to nullify costly improvements made under direct authority of Congress throughout the Great Lakes, and a withdrawal of the amount now applied for would nullify such expenditures to amount of many millions of dollars, as well as inflict an even *greater loss upon the navigation interests using such waters.*
>
> "*On the other hand, the demand for the diversion of this water at Chicago is based solely upon the needs of that city for sanitation.* * * *
>
> "*The evidence indicates that at bottom the issue comes down to the question of costs.* (Emphasis supplied) Other adequate systems of sewage disposal are possible and are in use throughout the world. The problem that confronts Chicago is not different in kind but simply larger and more pressing than that which confronts all of the other cities on the Great Lakes, in which nearly three millions of the people of this country are living. The urban population of those

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[4] "The Chicago Water Diversion Controversy," Marquette Law Review, Vol. 30, No. 3, pp 155, 157, December 1946.

cities, like that of Chicago, is rapidly increasing, and a method of disposition of their sewage which will not injure the potable character of the water of the Lakes must sooner or later be found for them all. The evidence before me satisfied me that it would be possible in one of several ways to at least so purify the sewage of Chicago as to require very much less water for its dilution than is now required by it in its unpurified condition. A recent report of the Engineer of the Sanitary Commission (October 12, 1911) proposes eventually to use some such method but proposes to postpone its installation for a number of years to come, relying upon the present more wasteful method in the meanwhile. *It is manifest that so long as the city is permitted to increase the amount of water which it may take from the Lakes, there will be a very strong temptation placed upon it to postpone a more scientific and possibly more expensive method of disposing of its sewage.* (Emphasis supplied) This is particularly true in view of the fact that by so doing it may still further diminish its expenses by utilizing the water diverted from the Lakes for water power at Lockport. But it must be remembered that for every unit of horsepower realized by this water at Lockport, four units of similar horsepower would be produced at Niagara, where the natural conditions are so much more favorable. Without, therefore, going into further detail in a discussion of this question, I feel clear that no such case of necessity has been presented by the evidence before me as would justify the proposed injury to the many varied interests in the great waterways of our lakes and their appurtenant rivers." (Emphasis supplied)

Many great and important events and developments have occurred in the Great Lakes-St. Lawrence Basin since 1913, and in fact since 1930, which make it even more imperative that every drop of water reaching the Great Lakes Basin should be allowed to remain therein. This Court will take judicial notice of the great increase in population in the Great Lakes area and the tremendous surge of industrial development that has taken place along the shores of the Great Lakes. The present construction of the St. Lawrence Seaway at a cost running into hundreds of millions of dollars through the joint action and efforts of Canada and the United States, the construction of the tremendous hydro-electric power works on the Niagara, and on the St. Lawrence River by the state of New York jointly with the province of Ontario, the deepening of the connecting channels between lakes Erie and Huron, and the expansion of lock facilities at Sault Ste. Marie during World War II,—these are but a few of the events which have taken place, which we believe should move this Court to a re-evaluation of the terms of the decree of 1930. If, as Secretary of War Stimson stated in 1913, and as Special Master Hughes reiterated, every drop of water extracted from and permanently lost to this Basin brings about nullification of the value of works running into hundreds of millions of dollars, then it is the height of absurdity to permit the Sanitary District of the state of Illinois to deprive the Great Lakes-St. Lawrence water basin of water which legally and equitably belongs therein, on the specious plea of the Sanitary District that it will cost money to do that which every municipality, except Chicago, on the Great Lakes has been and now is doing, namely, returning their treated effluent to the basin from which it came. Exactly what will be required to be done on the part of the Sanitary District in the rearrangement of its collection facilities and in the construction of works and tunnels to accomplish the aforesaid purpose, is a matter which undoubtedly this Court, through a Master, should inquire into and consider. However, it is the position of the complainant states that regardless of the inconvenience and cost to be borne by the state of Illinois and the Sanitary District, they should be compelled to restore to the Great Lakes Basin the water which they are presently extracting as "domestic pumpage," and the greater and increasing quantities which they will unquestionably extract in this form during the not too distant future.

VII

THIS COURT, THROUGH A SPECIAL MASTER, IF NECESSARY, SHOULD INQUIRE INTO AND FIND ANSWERS TO THE FOLLOWING QUESTIONS

The complainant states respectfully suggest to the Court that should a Special Master be appointed some of the issues which should be explored by him should be the following:

(1) To what extent are present unsatisfactory conditions in the Chicago Sanitary and Ship Canal created by uncollected and untreated sewage or industrial wastes originating in the Sanitary District?

(2) To what extent are present unsatisfactory conditions within said Canal caused by industrial effluent from industries located within the District whose use of water cannot be termed as "domestic pumpage" within the intent and meaning of the 1930 decree?

(3) To what extent can the present treatment of sewage and industrial wastes be increased so as to reduce the demand for more diverted water for dilution purposes?

(4) What means of correcting unsatisfactory conditions in the Ship Canal are available and can be made use of

other than additional diversion of water from Lake Michigan, such as:

(a) Physical removal of present sludge deposits in canals and waterways;

(b) Supplementing flow in Ship Canal from upstream storage of water in the Des Plaines River Basin;

(c) Aeration of the water in the Ship Canal;

(d) Any other alternates that might be conceived by sanitary engineers and scientists?

(5) Should a Permanent Master be appointed with full authority granted by this Court to maintain surveillance over the conduct and operation of the facilities maintained by the Sanitary District, which Master shall have authority to receive and examine periodic reports from the District, to make inquiry at all reasonable times and occasions concerning not only the accuracy of said reports but also concerning the manner and efficiency with which the Sanitary District operates and maintains its sewage disposal facilities; said Master making all of such information received by him available to the complainant states?

(6) Under what terms and conditions shall the Sanitary District of the State of Illinois be compelled to return the treated effluent of its sewage disposal plants back to the waters of Lake Michigan? Undoubtedly, this will entail the construction of expensive facilities and a time schedule should be determined after considering the exigencies that exist at the present time.

The enumeration of the foregoing issues, of course, does not preclude the consideration of and inquiry into any other pertinent issues that may arise.

VIII

THE DIVERSION OF "DOMESTIC PUMPAGE" INTO THE SHIP CANAL IS NOT NECESSARY TO MAINTAIN NAVIGATION THEREIN

In Paragraph XIII of Amended Application, the complainant states allege that it is not their intention to challenge the diversion of 1500 c.f.s. permitted by the decree of 1930 for the purpose of maintaining navigation in the Sanitary and Ship Canal, but they do challenge the diversion of any volume of water in addition thereto in the form of "domestic pumpage" under the pretext that such is necessary to maintain navigation in this Canal.

It should be noted that in the memorandum issued by Secretary of War Stimson in 1913, it is stated:[5]

> "* * * The Chief of Engineers reports that so far as the interests of navigation alone are concerned, even if we should eventually construct a deep waterway from the Great Lakes to the Mississippi over the route of the Sanitary Canal, the maximum amount of water to be diverted from Lake Michigan need actually be not over 1000 feet per second or less than a quarter of the amount already being used for sanitary purposes in the Canal. This estimate is confirmed by the report of the Special Board of Engineers on the deep waterway from Lockport, Illinois, to the mouth of the Illinois River, dated

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[5] The Chicago Water Diversion Controversy, Marquette Law Review, Vol. 30, December 1946, No. 3, pp. 155, 156.

> January 25, 1911. It is also confirmed by the practical experience of the great Manchester Ship Canal in England. *From the standpoint of navigation alone in such a waterway, too great a diversion of water would be a distinct injury rather than a benefit. It would increase the velocity of the current and increase the danger of overflow and damage to adjacent lands.*" (Emphasis supplied)

In a report made by the Division Engineer, North Central Division Corps of Engineers, United States Army, in January 1957, on the subject "Effects of an Additional Diversion of Water from Lake Michigan at Chicago," it is stated:[6]

> "184. Commerce on the Illinois Waterway has increased from a total of 1,695,120 tons in 1935 to 21,362,852 tons in 1955, the latest year for which statistics have been compiled. Recent studies of present and prospective water requirements for navigation on the Illinois Waterway show that the authorized diversion of 1,500 cubic feet per second from Lake Michigan is adequate to meet those requirements."

There is ample data contained in this report supporting the foregoing conclusion of the United States Corps of Engineers; consequently, there is no merit to the plea that additional water in the form of "domestic pumpage" should be diverted into this waterway for the purpose of maintaining navigation. Another consideration which militates against the increased diversion is that such increase raises the velocity of the water in the Canal, which makes it more difficult for barges to navigate the Canal. This fact was also mentioned by Secretary of War Stimson in his memorandum of 1913.

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[6]

85th Congress, 1st Session, Senate Document No. 28, p. 48.

In an article written by General P. D. Berrigan, formerly with the United States Corps of Engineers, which appeared in the November-December 1957 issue of the Military Engineer, under the title "Chicago Diversion from Lake Michigan," General Berrigan discusses the adverse effects of increased diversion on navigation in the Ship Canal, which were observed during the period from December 27, 1956 through February 1957 (such increase having been permitted by an order of this Court) and states as follows:

> "Increased current velocities in channels of the Illinois Waterway during the period of increased diversion were of interest because of their effects on navigation. The relatively restricted reach extending from the junction of the Calumet-Sag Channel to the lock at Lockport was of particular interest. Normal velocities of a fraction of a mile per hour were increased to about 2 miles per hour. In this reach on December 24, a motor vessel lost control of several barges while rearranging its tow."

The result is that the Sanitary District of Chicago is straddling both horns of a dilemma; it insists upon more water to be diverted into the Ship Canal to help dilute untreated or inadequately treated sewage and waste; and on the other hand, it is thereby causing an injury to navigation on the Ship Canal, which since 1933 has been a Federal navigable waterway by increasing the velocity of the current thus rendering it hazardous to vessels attempting to use the same.

IX

CONCLUSION

For the above reasons we respectfully submit that the court should grant the relief prayed for in our application, namely:

(1) That the state of Illinois and the Metropolitan Sanitary District of Greater Chicago be forthwith restrained and enjoined from discharging any of the treated effluents emanating from its sewage and industrial treatment facilities into the Sanitary and Ship Canal and that the said state of Illinois and the Metropolitan Sanitary District of Greater Chicago be required by mandatory injunction of this Court to return all of said effluent to the Great Lakes basin from which it originally came in the form of "domestic pumpage," the aforesaid injunctions to be made effective at such times and under such terms as to this Court shall seem meet and just.

(2) That if such decree is not made forthwith, a Special Master be appointed to take testimony and evidence with respect to the issues contained in this petition and to report with respect to the time, method, and manner in which the state of Illinois and the Metropolitan Sanitary District of Greater Chicago shall be required to comply with Paragraph (1) of this prayer, and with respect to whether the Court should appoint a Permanent Master invested with such authority as he may require for the purpose of maintaining surveillance over the operation of the sewers, interceptors, and other sewage and water collecting facilities and the sewage disposal and industrial treatment plants

and works operated by the Metropolitan Sanitary District of Greater Chicago.

Respectfully submitted,

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MOTION FILED DEC 31 1958

IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,*

vs.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*

No. 2 Original.

STATE OF MICHIGAN, *Complainant,*

vs.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*

No. 3 Original.

STATE OF NEW YORK, *Complainant,*

vs.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*

No. 4 Original.

MOTION FOR LEAVE TO FILE AND BRIEF OF THE CHICAGO ASSOCIATION OF COMMERCE AND INDUSTRY AS AMICUS CURIAE IN OPPOSITION TO AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 AND FOR THE GRANTING OF FURTHER RELIEF.

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STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, *Defendants.*

No. 4 Original.

MOTION OF THE CHICAGO ASSOCIATION OF COMMERCE AND INDUSTRY FOR LEAVE TO FILE A BRIEF AS AMICUS CURIAE.

To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

The Chicago Association of Commerce and Industry, an Illinois not for profit corporation, hereby respectfully moves this Court for leave to file a brief, as *amicus curiae,* in opposition to the "Amended Application of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan, and New York for a Reopening and Amendment of the Decree of April 21, 1930 and the Granting of Further Relief," filed herein on November 3, 1958. If the argument contained in this brief (which is attached hereto) is accepted by the Court, it will finally dispose of this Amended Application.

The position taken in the brief is that the diversion of water from Lake Michigan at Chicago no longer presents a justiciable issue for this Court. Congress now has authorized diversion of 1,500 c.f.s. plus domestic pumpage for the specific purpose of navigation in the Illinois waterway. The Secretary of War has also issued a permit specifically authorizing this diversion. The Court, under its decisions, must give conclusive effect to this action. It is important that this issue be faced and decided at the outset.

It is believed that the brief to be filed by the named defendants will not discuss in full this argument. This conclusion is supported by the fact that in the instant case the named defendants did not fully develop this argument in the brief filed by them early in 1958, opposing the initial Application for reopening the decree. Since it is likely that the defendants will pursue much the same course in their brief in opposition to the Amended Application, it is believed that the brief which the Association is requesting to file as *amicus curiae* will contain a more complete presentation of the law on this crucial argument which, if accepted by the Court, would be dispositive of this Amended Application.

The interest of the Chicago Association of Commerce and Industry in the instant action arises from the fact that it functions as a chamber of commerce for the Chicago Metropolitan Area. It has a membership of over 6,000 firms and 10,000 individuals, engaged in industrial, commercial and professional activities in five northeastern Illinois counties and also in the most highly industrialized county in the State of Indiana, which State is not a party to this action. Among its members are barge lines, steamship lines, terminal facility companies, and industries and businesses shipping and receiving shipments in interstate and foreign commerce by water through the inland waterways and the Great Lakes. Some of these members are neither citizens nor residents of the State of Illinois, but have an immediate practical interest in the disposition of this matter.

The members' interests are reflected in the activities of the Association. Its active divisions include the Divisions of World Trade, Industrial Development, Commercial Development, and Transportation (with its committees on Harbors and Waterways and the Calumet-Sag Channel). The Association and the industries and businesses it represents are thus vitally concerned with an immediate disposition of this matter.

A reference to a special Master as requested by complainants would produce a long period of uncertainty as to the usability of the Illinois waterway and sanitary conditions in the Port of Chicago as well as the purity of the water supply available from Lake Michigan. As to the Illinois waterway and the Port of Chicago, this is particularly critical since the St. Lawrence Seaway will open in April 1959. The Federal Government and other non-federal agencies are currently engaged in a project for improvement of navigation in the Waterway, known as the Calumet Sag Navigation Project, to be completed by 1963 at a cost exceeding two hundred million dollars. In excess of twenty-three million dollars, has also been spent by the Chicago Regional Port District to provide port facilities in Lake Calumet, located in the southern part of Chicago. Lake Calumet is now available and in use for many types of cargoes, particularly grain. It is the major terminus of the Illinois and Mississippi Waterways on the Great Lakes. It is there that inland barges now, and to a greater extent in the future, will discharge their cargoes directly into oceangoing vessels.

Plans have been made or are being made by Association members and others to use these facilities. It is essential in such planning that there be full confidence in the availability of sufficient water to operate fully under proper conditions of navigability and sanitation for the full length of the Illinois waterway. Any element of substantial uncertainty, particularly if prolonged, will have an adverse effect on the use of the port and ultimately on shipping and toll revenues in the St. Lawrence Seaway. The Association itself (in 1959 sponsoring a large International Trade Fair in Chicago) will be hindered in carrying out its function of making the Port of Chicago and the Illinois waterway known to potential users all over the world.

In addition to the interest of its members as users of the waterways and as taxpayers, the Association has always demonstrated a vital concern for the general welfare and health (including the proper disposition of human and industrial waste) of the people in the area. It therefore is vitally concerned with the outcome of this case and desires to file the attached brief *amicus curiae*.

Consent to the filing of this brief has been obtained from complainant, State of Wisconsin, and defendants, State of Illinois and The Metropolitan Sanitary District of Greater Chicago (formerly Sanitary District of Chicago). The consent of all other complaining States has been requested. The States of Minnesota, Ohio, Pennsylvania and New York have so far failed to consent. The State of Michigan has the matter under active consideration. It is necessary that this motion be now filed, so as to comply with the

Rules and allow the required period of twenty days before the defendants' briefs are due (to wit, January 19, 1959) within which the other complaining States may file objections to the filing of this brief if they see fit. The Chicago Association of Commerce and Industry will timely advise the Court in proper form of the consent of the other complaining States, if that consent shall hereafter be obtained.

It is submitted that the issues now presented to this Court involve technical considerations of a nature more appropriate to the exercise of legislative power and administrative authority than to the judicial power. The Court has in reality recognized this a long time ago in suggesting that proposals for change in diversion should properly be addressed to Congress. These circumstances particularly indicate the wisdom of adhering to the principle of judicial non-interference with waters appropriated by Congress for navigational use, and make important an inquiry at the outset as to the propriety of granting any relief on complainants' Amended Application.

Respectfully submitted,

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STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA, *Complainants,*

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BRIEF OF THE CHICAGO ASSOCIATION OF COMMERCE AND INDUSTRY AS AMICUS CURIAE IN OPPOSITION TO AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 AND FOR THE GRANTING OF FURTHER RELIEF.

To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

INTRODUCTORY STATEMENT.

The diversion of water from Lake Michigan at Chicago no longer presents a justiciable issue for this Court. The situation has changed drastically since the time of the Court's decree in 1930. Congress now has authorized the diversion of 1,500 cubic feet per second plus domestic pumpages for the specific purpose of navigation in the Illinois Waterway. This diversion has also been authorized by the Secretary of War.

The 10,000 c.f.s. diversion existing in the 1920's was not authorized by Congress and not validly authorized by the Secretary of War. This Court, therefore, undertook to exercise its full equity powers in the matter. Today the purposes of the Court have been achieved. The necessary sanitary treatment works have been completed and diversion has been reduced to the amount specified in the 1930 decree.

Subsequent to the entry of the decree, Congress, not having acted on the matter theretofore, exercised its plenary power over navigable waters to create the Illinois Waterway and to appropriate the diverted water for navigation therein. In taking this action in the Rivers and Harbors Act of 1930, Congress was necessarily acting within its powers. It is evident from the Act and from earlier opinions and decree of this Court that the diversion in question relates to navigation and navigable waters and does not violate any constitutional or other right of the complaining states.

Also subsequent to entry of the decree, the Secretary of War, pursuant to the Rivers and Harbors Act of 1899, issued a permit also authorizing the diversion of 1,500 c.f.s. and domestic pumpage.

This Court has traditionally given well-nigh conclusive effect to the action of Congress over navigation and navigable waters, whether exercised directly, or indirectly, through the Secretary of War. In such cases it limits its inquiry to whether Congressional action is related in some way to navigation and whether any constitutional prohibition is violated. In this particular situation, there is no occasion for the Court to review the congressional action even in such limited way. Not only is the diversion clearly a regulation of navigation under the Act, but also the Court has determined already in this particular case that the diversion in question is one which relates to navigation and does not violate any constitutional or other right of the complaining states. Thus, Congress having acted and its action being within its lawful authority, the Court under its decisions must give conclusive effect to the congressional action and refuse to grant any relief sought in the Amended Application. The Court cannot under its own holdings take away water which Congress has appropriated to the uses of navigation.

ARGUMENT.

I.

Congress Has Authorized the Present Diversion Including Domestic Pumpage.

A. Directly, By the Rivers and Harbors Act of 1930.

After the decree of this Court was entered on April 21, 1930, Congress exercised its plenary and paramount power over navigable waters to create the final link in and federalize a Waterway from Chicago to the Mississippi River and appropriated the diverted waters to maintain the navigable capacity thereof.

This congressional action was included in the Rivers and Harbors Act of July 3, 1930 (c. 847, 46 Stat. 929). (See Appendix A for pertinent extract.) The importance of this Act is revealed by the statement of Senator Joseph E. Ransdell of Louisiana on the floor of the Senate on June 17, 1930, a few minutes before the Act was approved:

> "It is the most important river and harbor bill ever presented to the American Congress, both in magnitude and number of projects included therein and the cost thereof . . .
>
> "When completed, these projects in the [Mississippi] valley, along with those already finished, will connect the entire Mississippi system with the Great Lakes and through the Erie Canal with the Atlantic coast, thereby joining in a connected whole practically all the rivers in the Republic east of the Rocky Mountains with the Atlantic Ocean and the innumerable waterways tributary thereto . . ." (72 Cong. Record 11182).

In appropriating the diverted water for use in this great project, Congress among other things provided in the 1930 Act:

> "That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930 . . . [Wisconsin v. Illinois] . . . according to the opinion of the court . . . is hereby authorized to be used for the navigation of said waterway." (Appendix A).

The decree referred to authorized the diversion from Lake Michigan of (a) 1,500 c.f.s., and (b) the domestic pumpage on and after December 31, 1938 (281 U.S. 696). In the opinion referred to, the Court, as a basis for this authorization, said in part:

> "The master reports that . . . the interests of navigation in the Chicago River as a part of the port of Chicago will require the diversion of an annual average of from 1,000 c.f.s. to 1,500 c.f.s. in addition to domestic pumpage after the sewage treatment program has been carried out." (281 U.S. 179, 199).

By the 1930 Act Congress expressly appropriated "for the navigation" of the Illinois Waterway the effluent from the treated domestic pumpage plus the direct diversion of 1,500 c.f.s., previously authorized by the Court. It must be kept clearly in mind that the Illinois Waterway was not authorized by Congress until after entry of the decree of April 21, 1930. The potential navigation needs of the proposed Waterway were explicitly left out of consideration throughout the case and the Court's decree related only to the Chicago River and the Port of Chicago.

The legislative history of the 1930 Act demonstrates that Congress clearly intended to and did appropriate the domestic pumpage as well as the direct diversion of 1,500 c.f.s. to the necessities of navigation in the Waterway. Senator Blaine of Wisconsin who introduced the amendment which became the final law stated as follows on the floor of the Senate on June 17, 1930:

> "On December 31, 1938 the amount of water that would be going down this waterway without any con-

> gressional action whatever would be 1,500 cubic feet seconds, in addition to the domestic pumpage; and this amendment permits identically that amount of water to flow down the canal and down this waterway.
>
> "At the end of the year 1938, assuming that the accretion to the pumpage is 100 cubic feet seconds per year, then, the total amount that will be flowing down that waterway through the sluiceways, the dams and all of the physical construction will be 4,000 cubic feet seconds, guaranteed to the State of Illinois, guaranteed to the commerce of the United States, and that will continue to flow until there is a report made by the Chief of Engineers, whereupon, under this amendment, the Congress of the United States may determine the flow to be greater or less than that, subject to certain legal limitations which I do not at this time interject into this discussion." (72 Cong. Record 11005).

Furthermore certain changes made in the 1930 Act by Congress demonstrate that it did (a) expressly appropriate the diverted waters for use in the Illinois Waterway; (b) affirmatively authorize and require the direct diversion of 1,500 c.f.s. and the indirect diversion of the domestic pumpage; and (c) assume legislative control over future increases and decreases in diversion.

The Act as initially passed by the House of Representatives provided among other things that:

> "Nothing in this Act shall be construed as authorizing any diversion of water from Lake Michigan, but the whole question of diversion from Lake Michigan shall remain and be unaffected hereby, as if this Act had not been passed." (H.R. 11,781, 71st Congress; see Appendix B).

This provision was stricken from the bill in the Senate. It substituted therefor the provision finally adopted, appropriating the water from Lake Michigan to the requirements of the Waterway. This basic change clearly demonstrates that the effect of the 1930 Act as finally passed was to authorize and require the diversion in question.

The intention of Congress is further clarified by the rejection of an amendment proposed by the Senate Commerce Committee to the effect that the Secretary of War be given power in his discretion to determine the needs of the Waterway and to authorize the diversion required. This proposed amendment also included the following proviso:

> "Nothing in this Act shall prejudice any action at law or in equity respecting the diversion of water from the Great Lakes watershed." (Senate Report No. 715, 71st Congress, 2d Session, Calendar No. 722; see Appendix C).

By rejecting this proposal Congress refused to subordinate its action to the jurisdiction reserved by the Court. It also expressed its intention to withdraw from the Secretary of War the power he otherwise would have had to permit increases or decreases in the amount diverted.

In effect the House proposal was that the matter of diversion be left solely to the jurisdiction of the Court. The proposal of the Senate Commerce Committee was that Congress in effect recognize concurrent jurisdiction in the Court and in the Secretary of War. Both proposals were rejected. Congress expressly appropriated the water for use in the Waterway, thus authorizing and requiring the diversion. Congress thereby clearly indicated its intention to assert its full constitutional power to regulate and control all changes in this diversion, something it had not theretofore done.

Further demonstrating its intention to control future changes in diversion, and being in apparent doubt as to whether the amount appropriated was sufficient, Congress in the Rivers and Harbors Act also called for a report from the Secretary of War as to the amount of water that would be required to meet the needs of a commercially useful waterway after the diversion was reduced and the works of the Sanitary District completed, "to the end that Congress may take such action as it may deem advisable."

In pursuance of that requirement the Secretary of War made the requested study and reported to Congress on December 7, 1933 (House Document No. 184, 73d Congress, 2d Session, pp. 4-7). He concluded that:

> "The report [of the Board of Engineers] conclusively shows that aside from sanitary requirements, the *minimum* annual average flow from Lake Michigan *required* to meet the needs of a commercially useful waterway in the Illinois River, is a direct diversion of 1,500 cubic feet per second in addition to domestic pumpage by the city of Chicago." (Emphasis added)

He went on further to state:

> "The River and Harbor Act of July 3, 1930 specifically authorizes the water within the limitation of the decree for the use of navigation on the Illinois Waterway."

In the light of his study he concluded:

> "Until the need is established for a greater diversion than that now provided by law, I see no reason for a modification of the present legislation."
>
> * * * * *
>
> "I therefore recommend that no change be made for the time being in the water authorized to be used for the navigation of the Illinois River under the provisions of the River and Harbor Act approved July 3, 1930 . . ."

In addition the Secretary of War advised Congress that in order to carry out its intention, expressed in the 1930 Act, to develop a commercially useful Waterway using a minimum amount of water, certain additional locks and dams not previously authorized would have to be completed prior to December 31, 1938. Thereafter Congress, relying on the availability of the 1,500 c.f.s. plus domestic pumpage, and impliedly reaffirming the appropriation of it for use in the Waterway, authorized the expenditure of millions of dollars for construction of the elaborate locks and dams required to complete its program.

Congressional consideration of this diversion and of the Waterway program has continued up to the present time. Congress has provided for a wide range of additional improvements in the Illinois Waterway system in order to complete the integration at Chicago of the Inland Waterway system in the Mississippi Valley with the Great Lakes and the St. Lawrence Seaway. Congress has also given further specific consideration to diversion. Two bills (H.R. 3300, 83d Congress and H.R. 3210, 84th Congress) were passed authorizing temporary *increases* of diversion on an experimental basis to permit the United States Engineers and the Department of Health and Welfare to study the effect of such an increase on conditions in the Waterway. Both of these bills were vetoed by the President but in the 85th Congress a similar bill was passed by the House. The Senate adjourned before action was taken.

By and through the legislative action above described Congress has established the existing rate of diversion and has assumed control over any changes to be made in its amount. An order of this Court to reduce that diversion would conflict directly with the plenary and paramount power which Congress has exercised over the subject.

There is nothing in the decision of this court in the 1933 case (reported at 289 U.S. 395) which is inconsistent with this interpretation of the Congressional action. The Court there merely held that the 1930 Rivers and Harbors Act does not determine or enact anything "in any way conflicting with the terms of the decree." The defendants had argued that they, because of the enactment of the 1930 Act, were not any longer required to comply with the decree with regard to the time schedule for completing the necessary controlling works and sewage treatment plants and reducing the direct diversion. In rejecting this argument the Court quite properly pointed out "so far as the Congress purports to authorize a diversion of water from Lake Michigan for the navigation of the waterway the authorization is explicitly limited to the amount allowed by the court's decree." (p. 403) There was in that case no issue as to the right of the Court to reduce the diversion already established as lawful by the Court and thereafter by Congress. This decision, moreover, was rendered before the Secretary of War made his 1933 report to Congress pursuant to the 1930 Act.

B. Indirectly, Through Issuance Of a Permit By The Secretary of War Under The Rivers And Harbors Act of 1899.

Not only has the Congress directly authorized this diversion through the 1930 Act, it has also indirectly authorized it through the permit issued by the Secretary of War on June 26, 1930, approximately two months after the entry of the decree and one week before the enactment of the 1930 Act. A copy of this permit is attached hereto as Appendix D.

By its terms this permit authorized the Sanitary District "to divert through its main drainage canal and auxiliary channel, waters from Lake Michigan, as specified in said decree." It thus refers only to the Chicago River and the Port of Chicago as did the decree of this Court. It is also similar to the decree in that it authorized the diversion of both the domestic pumpage and direct diversion of 1,500 c.f.s. on and after December 31, 1938.

This permit was issued by the Secretary of War under the authority delegated to him by Section 10 of the Rivers and Harbors Act of March 3, 1899. (30 Stat. 1121, 1151, 33 U.S.C.A. § 403.) This Court on a number of occasions has held that Section 10 properly authorized the Secretary of War to permit diversion of water from the navigable waters of the United States (see *Sanitary District* v. *United States,* 266 U.S. 405 (1925); *Wisconsin* v. *Illinois,* 278 U.S. 367 (1929); and also *New Jersey* v. *New York,* 283 U.S. 336 (1931)). Furthermore the opinion of this Court in this case published at 278 U.S. 367 affirmatively supports a permit by the Secretary of War limited to authorization of the diversion of domestic pumpage, plus 1,500 c.f.s. for navigation purposes.

The permit as issued imposes certain conditions not found in the Court's decree, including a declaration that the permit is "revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress." There is no reference to any power in the Court to modify the permit.

This permit constituted an independent and affirmative authority to the Sanitary District to divert 1,500 c.f.s. plus domestic pumpage from Lake Michigan into the Chicago River on and after December 31, 1938. It thereby plainly supersedes the decree in so far as the decree may have reserved jurisdiction in the Court to later reduce the diversion authorized.

II.

Congress Acted Within Its Lawful Power in Authorizing the Present Diversion Including Domestic Pumpage.

A. Congress Has Plenary Power Over Navigation and Navigable Waters.

The broad scope of Congressional power over navigable waters has been recognized by the Court since the early case of *Gilman* v. *Philadelphia,* 3 Wall. 713 decided in 1865. The historical development of the law as to congressional authority in this regard has been reviewed and the law clearly stated by the Court in *U. S.* v. *Appalachian Power Co.,* 311 U.S. 377 (1940). There forty-one states attacked the power of Congress to impose conditions unrelated to navigation in granting authority for hydro-electric power development. The Court there said:

> "The power of the United States over its waters which are capable of use as interstate highways arises from the commerce clause of the Constitution. 'The Congress shall have Power. . . . To regulate Commerce . . . among the several States.' It was held early in our history that the power to regulate commerce necessarily included power over navigation." (p. 404)

But the Court went further to emphasize the breadth of this control and to point out that it was not limited solely to regulation imposed for pure navigational purposes. The Court stated as follows:

> "In our view, it cannot properly be said that the constitutional power of the United States over its waters is limited to control for navigation. By navigation respondent means no more than operation of boats and improvement of the waterway itself. In truth the authority of the United States is the regulation of commerce on its waters. Navigability, in the sense just stated, is but a part of this whole. Flood

> protection, watershed development, recovery of the cost of improvements through utilization of power are likewise parts of commerce controls. . . . That authority [the authority of the Government over the stream] is as broad as the needs of commerce. . . . The point is that navigable waters are subject to national planning and control in the broad regulation of commerce granted the Federal Government." (pp. 426-427)

This power of Congress over navigable waters includes the power to authorize the diversion of water from one watershed to another and to benefit navigation in one area to the detriment of navigation in another area. See *First Iowa Coop.* v. *Power Commission,* 328 U.S. 152 (1946); and *U. S.* v. *Commodore Park,* 324 U.S. 386 (1945) where the Court stated at page 393: "There is power to block navigation at one place to foster it at another." To similar effect see *South Carolina* v. *Georgia,* 93 U.S. 4 (1876).

As to the plenary power of Congress over matters bearing a relationship, even remote, to navigable waters, see the following cases: *Oklahoma* v. *Atkinson Co.,* 313 U.S. 508 (1941); *United States* v. *Twin City Power Co.,* 350 U.S. 222 (1956), *reh. denied* 350 U.S. 1009 (1956); *Arizona* v. *California,* 283 U.S. 423 (1931).

Even more compelling authority is found in the early opinions in *Wisconsin* v. *Illinois* and in *Sanitary District* v. *U.S.,* 266 U.S. 405 (1925), both specifically dealing with the diversion from Lake Michigan at Chicago. Throughout both those actions this Court has recognized the authority of Congress over the diversion of water from Lake Michigan. In *Wisconsin* v. *Illinois,* 281 U.S. 179 (1930) the Court referred explicitly to the authority of Congress and said:

> "These requirements as between the parties are the constitutional right of those States, *subject to whatever modification they hereafter may be subjected to*

> *by Congress acting within its authority.*" (p. 197) (Emphasis added)
>
> "The right of the complainants to a decree is not affected by the possibility that Congress may take some action in the matter." (pp. 197-8)
>
> "All action of the parties and the Court in this case will be subject, of course, *to any order that Congress may make* in pursuance of its constitutional powers and any modifications that necessity may show should be made by this Court." (pp. 198-9) (Emphasis added)
>
> "The amount of water ultimately to be withdrawn *unless Congress may prescribe a different measure* is relatively small." (p. 200) (Emphasis added)

When the cause came before the Court upon the Master's initial Report, the Mississippi River states of Missouri, Kentucky, Tennessee, Louisiana, Mississippi and Arkansas intervened, supporting an 8,500 c.f.s. diversion as an aid to navigation and interstate commerce in the Mississippi Valley. But the Court (*Wisconsin* v. *Illinois,* 278 U.S. 367 (1929)) overruled their motions to dismiss the bills, again referring to the absence of congressional action in saying:

> "In our view of the [8,500 c.f.s.] permit of March 3, 1925, *and in the absence of direct authority from Congress for a waterway from Lake Michigan to the Mississippi,* they show no rightful interest in the maintenance of that diversion." (p. 420) (Emphasis added)

Of course, at the time of the above decision, the Illinois Waterway had not been authorized by Congress.

In the earliest of the lake level cases, *Sanitary District* v. *United States,* 266 U.S. 405 (1925), the Mississippi Valley States of Missouri, Tennessee and Louisiana filed briefs as *amici curiae* supporting a diversion in excess of the 4,167 c.f.s. then authorized by the permit of the Secretary of War. The Court refused to acknowledge their interest and suggested another approach:

> "The interest that the river states have in increasing the artificial flow from Lake Michigan is not a right, but merely a *consideration that they may address to Congress,* if they see fit, to induce a modification of the law [Act of March 3, 1899] that now forbids the increase unless approved as prescribed." (p. 431) (Emphasis added)

In 1957 the United States Attorney General rendered an opinion that a 1,000 c.f.s. temporary *increase* under H. R. 2 and S. 1123 (85th Congress) would be within the proper powers of Congress (Letter of June 13, 1957 from Deputy Attorney General Rogers to the Director of the Bureau of the Budget). Surely, if Congress has authority to temporarily increase Chicago diversion from 1,500 c.f.s. to 2,500 c.f.s, in addition to domestic pumpage, its authority to grant the existing 1,500 c.f.s plus domestic pumpage, is beyond question.

B. The Congressional Authorization of the Present Diversion Does Not Violate any Provision of the United States Constitution.

With particular force, the early decisions in *Wisconsin v. Illinois* reported in 278 U.S. 367 (1929) and 281 U.S. 179 (1930) reject any contention that there are any positive limitations in the United States Constitution, incorporated in the Fifth Amendment or elsewhere, which prohibit a diversion from Lake Michigan at Chicago of 1,500 c.f.s. plus domestic pumpage. By authorizing such diversion in its opinion and decree the Court impliedly ruled that there was no constitutional impediment to its so doing. This ruling applies with equal force to any other branch or agency of the United States Government acting within its delegated powers. As we have shown above, Congress clearly has been delegated the power to authorize this diversion. It has done so. It cannot be held thereby to have violated in any way the constitutional rights of the complainants in this action.

Complainants have argued in the Congress and before this Court that any action by it authorizing diversion would violate Clause 6 of Section 9 of Article I of the Constitution which in pertinent part reads as follows:

> "No Preference shall be given by any Regulation of Commerce or Revenue to the Ports of one State over those of another. . . ."

The Court found it unnecessary to rule on the point in *Wisconsin* v. *Illinois,* 278 U.S. 367 (1929). That there is no substance in this contention is made clear by the decisions of this Court from as early as 1856. In that year, the Court decided *Pennsylvania* v. *Wheeling and Belmont Bridge Co.,* 18 How. 421, in which the complainants charged that the construction of a particular bridge would so interrupt navigation and inhibit commerce on the river as to constitute giving a preference to one port over another. The Court rejected this contention:

> "There are many acts of congress passed in the exercise of this power to regulate commerce, providing for a special advantage to the port or ports of one State, and which very advantage may incidentally operate to the prejudice of the ports in a neighboring State, which have never been supposed to conflict with this limitation upon its power. The improvement of rivers and harbors, the erection of lighthouses, and other facilities of commerce, may be referred to as examples. It will not do to say that the exercise of an admitted power of congress conferred by the constitution is to be withheld, if it appears, or can be shown, that the effect and operation of the law may incidentally extend beyond the limitation of the power.

> Upon any such interpretation, the principal object of the framers of the instrument in conferring the power would be sacrificed to the subordinate consequences resulting from its exercise. These consequences and incidents are very proper considerations to be urged upon congress for the purpose of dissuading that body from its exercise, but afford no ground for denying the power itself, or the right to exercise it." (pp. 433-434)

This was further confirmed in *South Carolina* v. *Georgia*, 93 U.S. 4, 12-13 (1876). That case involved a diversion, carried out by the Secretary of War under the authorization of Congress, of water from the north channel of the Savannah River to the south channel, for the benefit of the port of Savannah, Georgia. South Carolina attacked this diversion as an unconstitutional preference. The Court rejected the argument on the authority of *Pennsylvania* v. *Wheeling, supra.*

More recently, in its opinion in *Alabama Great Southern Railroad Co.* v. *United States*, 340 U.S. 216, 229 (1951) the Court rejected the argument that a particular rate schedule adopted by the Interstate Commerce Commission constituted an invalid preference, although conceding that commercial interests using the Port of New Orleans would be comparatively benefited. The Court relied on *Louisiana Public Service Commission* v. *Texas & N. O. R. Co.*, 284 U.S. 125 (1931) where it stated as follows:

> "The specified limitations on the power of Congress were set to prevent preference as between States in respect of their ports or the entry and clearance of vessels. It does not forbid such discriminations as between ports. Congress, acting under the commerce clause, causes many things to be done that greatly benefit particular ports and which incidentally result to the disadvantage of other ports in the same or neighboring States." (p. 131)

Any other construction of this provision would mean that Congress could not create the St. Lawrence Seaway because that might divert traffic from New York and Baltimore to Cleveland, Milwaukee and Chicago, and that Congress could not improve the Mississippi at New Orleans because that would be a preference over other ports not simultaneously improved to the same extent. A century and a half of history demonstrates that the constitutional provision has no such meaning.

It is apparent from the discussion in Point II of this Brief that Congress has an unquestionable power to regulate diversion from Lake Michigan to the Illinois Waterway, for navigation purposes, for a combination of navigation and sanitation purposes, and for sanitation purposes having only incidental relationship to navigation. Regardless of that, by the Rivers and Harbors Act of 1930 congressional power was exercised for navigation purposes solely. There can be no question that the diversion authorized in that Act is valid. Also valid and still in force is the permit issued by the Secretary of War on June 26, 1930.

III.

This Court Has No Authority to Forbid or Alter the Diversion Which Congress Has Validly Authorized Within Its Power Over Navigable Waters.

Upon judicial determination that Congress has exercised its power in respect to navigation or navigable waters and that such action is within the constitutional authority of Congress, the Court has no further power or authority to interfere with, alter or reverse the legislative determination. As this Court has stated in *Bridge Co.* v. *United States,* 105 U.S. 470, 482 (1881): "It would be an abuse of judicial power for the courts to attempt to interfere . . ." Further in

United States v. *Chandler-Dunbar Co.*, 229 U.S. 53, 64, 66 (1913) the Court said, "So unfettered is this control of Congress . . . that its judgment . . . is conclusive . . . [there is] no room for a judicial review."

These principles of law have been clearly established by this Court and followed with consistency over the years. There is no basis, under circumstances existing today and in view of specific congressional authorization of the diversion now attacked, for departing from them in considering complainants' Amended Application.

A clear statement of the rule adopted by the Court is contained in *Oklahoma* v. *Atkinson Co.*, 313 U.S. 508 (1941). Oklahoma complained of a proposed diversion of water from the Red River in connection with the proposed Dennison dam and reservoir. Oklahoma alleged that while the work and diversion would benefit Texas, it would seriously injure Oklahoma, partially obliterating the state boundary, displacing population, interfering with oil and gas exploration, reducing tax revenues, and appropriating state-owned land. The Court refused to interfere with this congressionally sponsored project, saying:

> "Such matters raise not constitutional issues but questions of policy. They relate to the wisdom, need, and effectiveness of a particular project. *They are therefore questions for the Congress, not the courts.* For us to inquire whether this reservoir will effect a substantial reduction in the lower Mississippi floods *would be to exercise a legislative judgment* based on a complexity of engineering data. *It is for Congress alone to decide* whether a particular project, by itself or as part of a more comprehensive scheme, will have such a beneficial effect on the arteries of interstate commerce as to warrant it. *That determination is legislative in character.*" (p. 527) (Emphasis added)

More recently, in *United States* v. *Twin City Power Co.*, 350 U.S. 222 (1956), *reh. denied* 350 U.S. 1009 (1956), after observing that Congress had approved the plan "for flood control and other purposes," the Court summed up the power of Congress over navigation and the role of the Court with regard thereto in the following terms:

> "*It is not for courts, however, to substitute their judgments for congressional decisions* on what is or is not necessary for the improvement or protection of navigation. See *State of Arizona* v. *California*, 283 U.S. 423, 455-457. The role of the judiciary in reviewing the legislative judgment is a narrow one in any case. See *Berman* v. *Parker*, 348 U.S. 26, 32; *United States ex rel. Tennessee Valley Authority* v. *Welch*, 327 U.S. 546, 552. The decision of Congress that this project will serve the interests of navigation involves engineering and policy *considerations for Congress and Congress alone to evaluate.* Courts should respect that decision until and unless it is shown 'to involve an impossibility,' as Mr. Justice Holmes expressed it in *Old Dominion Co.* v. *United States*, 269 U.S. 55, 66. If the interests of navigation are served, it is constitutionally irrelevant that other purposes may also be advanced." (p. 224) (Emphasis added)

The well-known case, *Pennsylvania* v. *Wheeling and Belmont Bridge Company*, 18 How. 421 (1856), an original action, illustrates the prompt judicial recognition of action by Congress. After a decree finding that a bridge over the Ohio River was an obstruction to navigation and a nuisance, but before the decree was executed, Congress declared the bridge a lawful structure and not an obstruction. The Court refused to issue a mandate carrying into effect its own decree, saying:

> "Although it still may be an obstruction in fact, it is not so in contemplation of law." (p. 430)

Although it was argued that the Act of Congress could not annul a judgment of the Court already entered, the Court said:

> "If, in the meantime, since the decree, this right has been modified by the competent authority, so that the bridge is no longer an unlawful obstruction, it is quite plain the decree of the court no longer can be enforced." (p. 431)

Another case defining the limit of the Court's power is *Wisconsin* v. *Duluth,* 96 U.S. 379 (1877), an original action. The city of Duluth, Minnesota (with congressional approval and appropriations, and under federal supervision) had diverted the waters of the St. Louis River, forming the interstate boundary, by digging a canal across Minnesota Point for the benefit of Duluth Harbor. Wisconsin sought mandatory relief, but the Court refused to act, saying:

> "It cannot be necessary to say that when a public work of this character has been inaugurated or adopted by Congress, and its management placed under the control of its officers, *there exists no right in any other branch of the government to forbid the work, or to prescribe the manner in which it shall be conducted.*" (p. 383) (Emphasis added)

After describing the action of Congress in several rivers and harbors bills, the Court continued:

> "Nor can there be any doubt that such action is within the constitutional power of Congress. . . . If, then, Congress, in the exercise of a lawful authority, has adopted and is carrying out a system of harbor improvements at Duluth, *this court can have no lawful authority to forbid the work. . . .*
>
> "When Congress appropriates $10,000 to improve, protect and secure this canal, *this court can have no power to require it to be filled up and obstructed.* While the engineering officers of the government are, under the authority of Congress, doing all they can to make

> this canal useful to commerce, and to keep it in good condition, this court can owe no duty to a State which requires it to order the City of Duluth to destroy it." (pp. 387-388) (Emphasis added)

The rule of judicial non-interference is the same whether Congress acts directly, as above stated, or indirectly, through the Secretary of War. In *Monongahela Bridge Co.* v. *United States,* 216 U.S. 177, 195 (1910) the Court said:

> "It was not for the jury to weigh the evidence and determine, according to *their* judgment, as to what the necessities of navigation required, or whether the bridge was an unreasonable obstruction. The jury might have differed from the Secretary. That was immaterial; *for Congress intended by its legislation to give the same force and effect to the decision of the Secretary of War that would have been accorded to direct action by it on the subject.* It is for Congress, under the Constitution, to regulate the right of navigation by all appropriate means, to declare what is necessary to be done in order to free navigation from obstruction, and to prescribe the way in which the question of obstruction shall be determined. *Its action in the premises cannot be revised or ignored by the courts or by juries. . . .*" (Emphasis added)

See also *Miller* v. *Mayor of New York,* 109 U.S. 385 (1883) and *Southern Pacific Co.* v. *Olympian Co.,* 260 U.S. 205 (1922).

In *New Jersey* v. *New York,* 283 U.S. 336 (1931) the Court in entering its final decree authorizing a 440 million gallon daily diversion by New York, clearly recognized that its decision was subject to the paramount authority of Congress, delegated by statute to the Secretary of War. In its opinion it cautioned New York as follows:

> "Of course in that particular as in some others New York takes the risk of the future. If the War Depart-

> ment should in future change its present disinclination to interfere, New York would have to yield to its decision. . . . This will be provided for in the decree." (p. 344)

The decree did in fact provide for future congressional and executive action as follows:

> "This decree is without prejudice to the United States and particularly is subject to the paramount authority of Congress in respect to navigation and navigable waters of the United States, and subject to the powers of the Secretary of War and Chief of Engineers of the United States Army in respect to navigation and navigable waters of the United States." (p. 348)

Many of the above cases state emphatically that congressional regulation of navigation and its determination as to what is a proper benefit to one area as against another is well-nigh conclusive. As Justice Holmes stated, the Court will not interfere unless it "involves an impossibility". If it be argued that these cases allow the Court power to determine whether action is arbitrary and capricious and a violation of constitutional rights, it is sufficient answer to say that so far as this particular diversion case is concerned, these issues were laid to rest adversely to the complaining states by the decisions of this Court in this case in 1929 and 1930. If there was no constitutional objection to the use of 1,500 c.f.s. and domestic pumpage for navigational purposes in the Port of Chicago, *a fortiori*, there can be no constitutional objection to the use of such waters in the entire waterway including the Port of Chicago and running to the Mississippi River. By recognizing that this water was needed for navigational purposes in the Port of Chicago, the Court in effect ruled that this diversion was within the power of Congress to authorize if it should see fit to do so. This Congress has now done. There is no such legal or practical necessity as to confer on the Court the power to hear and determine judicially what has already been conclusively determined by the legislative branch.

CONCLUSION.

In conclusion The Chicago Association of Commerce and Industry, as *amicus curiae,* urges the Court to enter an order denying and dismissing the Amended Application of the states of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York for a reopening and amendment of the decree of April 21, 1930 and for the granting of further relief, on the ground that said Amended Application does not present an issue of which the Court can take judicial cognizance.

Respectfully submitted,

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APPENDIX A.

Extract from Rivers and Harbors Act of July 3, 1930
(c. 847, 46 Stat. 929)

"Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway: Provided, That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000: Provided further, That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12 Original—October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway; Provided further, That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable."

APPENDIX B.

Extract from H.R. 11781, 71st Congress.

"Illinois River, Ill., in accordance with the report of Maj. Gen. Lytle Brown, Chief of Engineers, submitted in Senate Document No. 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, except that the State of Illinois' plans of improvement are not adopted as to the volume or so as to require the volume of water contemplated in said plans, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway: *Provided,* That nothing in this act shall be construed as authorizing any diversion of water from Lake Michigan, but the whole question of diversion from Lake Michigan shall remain and be unaffected hereby, as if this act had not passed: *Provided further,* That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000."

APPENDIX C.

Extract from Senate Report No. 715, 71st Congress, 2d Session, Calendar No. 722, page 3.

"Page 31, line 16, after the word 'document,' strike out remainder of page and page 32, line 1, ending with the word 'passed,' and insert in lieu thereof a colon and the following:

"*Provided,* That the diversion of water from Lake Michigan shall be so controlled by the Secretary of War under the supervision of the Chief of Engineers, as to meet the needs of a commercially useful waterway as defined in said Senate document, from Lake Michigan to the Mississippi River and to conserve fully existing interests of navigation on the Great Lakes: *Provided,* that nothing in this act shall prejudice an action at law or any equity respecting the diversion of water from the Great Lakes watershed."

If adopted, this amendment would have resulted in the pertinent provision of the Rivers and Harbors Act of 1930 reading as follows:

"Illinois River, Ill., in accordance with the report of Maj. Gen. Lytle Brown, Chief of Engineers, submitted in Senate Document No. 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document: *Provided,* That the diversion of water from Lake Michigan shall be so controlled by the Secretary of War, under the supervision of the Chief of Engineers, as to meet the needs of a commercially useful waterway, as defined in said Senate document, from Lake Michigan to the Mississippi River and to conserve fully existing interests of navigation on the Great Lakes: *Provided,* That nothing in this act shall prejudice any action at law or in equity respecting the diversion of water from the Great Lakes watershed: *Provided further,* That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000."

APPENDIX D.

Permit issued by the Secretary of War on June 26, 1930

WAR DEPARTMENT.

NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges, and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining State assent to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See Cummings v. Chicago, 188 U.S. 410.)

PERMIT.

WHEREAS, by Section 10 of an act of Congress approved March 3, 1899, entitled "An Act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," it is provided that it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same;

AND WHEREAS, The Sanitary District of Chicago, Illinois, was granted authority by the Secretary of War by an instrument dated December 31, 1929, to divert water through its main drainage canal and auxiliary channels from Lake Michigan, the said authority if not previously revoked or specifically extended to cease and be null and void on the effective date of the decree to be entered by the Supreme Court of the United States in the case of the State of Wisconsin, et al. versus the State of Illinois and Sanitary District of Chicago;

AND WHEREAS, On April 21, 1930, the Supreme Court of the United States entered a decree enjoining the State of Illinois and the Sanitary District of Chicago from diverting any of the waters of the Great Lakes-St. Lawrence System or Watershed excepting as specified in the said decree, a copy of which is hereto attached and made a part of this instrument;

AND WHEREAS, The said Sanitary District has applied for a continuation of authority to divert water from Lake Michigan:

NOW, THEREFORE, this is to certify that upon the recommendation of the Chief of Engineers, the Secretary of War under the provisions of the aforesaid statute, and subject to the following conditions, hereby authorizes the said Sanitary District of Chicago to divert through its main drainage canal and auxiliary channels, waters from Lake Michigan, as specified in the said decree.

The conditions to which the said diversions shall be subject are as follows:

1. That there shall be no unreasonable interference with navigation by the work herein authorized.

2. That if inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.

3. That no attempt shall be made by the said permittee

to forbid the full and free use by the public of any navigable waters of the United States.

4. That action taken by the said Sanitary District for the reduction of sewage discharge into the said Chicago River shall be under the supervision of the United States District Engineer at Chicago, and the said diversion of water from Lake Michigan hereby authorized, shall also be under his supervision, and under his direct control in time of flood on the Illinois and Des Plaines rivers.

5. That this permit is revocable at the will of the Secretary of War, and is subject to such action as may be taken by Congress.

Witness my hand this 25th day of June, 1930.

LYTLE BROWN, Major General,
Chief of Engineers.

Witness my hand this 26th day of June, 1930.

PATRICK J. HURLEY,
Secretary of War.

Office-Supreme Court, U.S
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IN THE D

Supreme Court of the United States

OCTOBER TERM, 1958.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 3 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 4 Original.

BRIEF IN OPPOSITION TO THE AMENDED APPLICATION OF THE COMPLAINANTS FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930, AND FOR FURTHER RELIEF.

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THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

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STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
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BRIEF IN OPPOSITION TO THE AMENDED APPLICATION OF THE COMPLAINANTS FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930, AND FOR FURTHER RELIEF.

To the Honorable the Chief Justice and Associate Justices of the Supreme Court of the United States:

In their amended application (pp. 17-18), the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan, and New York pray for a reopening and amendment of the decree of April 21, 1930 so as to require by mandatory injunction the return to Lake Michigan of all the water taken therefrom as domestic pumpage. Alternatively, they seek the appointment of a Special Master to take evidence on the issues and also the appointment of a Permanent Master invested with authority to maintain surveillance over the operating facilities of the Sanitary District.

The defendants submit that on the basis of facts set forth in the amended application and other indisputable facts, the amended application should be denied.

QUESTIONS PRESENTED.

This Court's 1930 decree authorized defendants to divert from Lake Michigan on and after December 31, 1938 an annual average of 1500 cubic feet of water per second (c.f.s.) in addition to domestic pumpage, that is, water used for domestic and industrial purposes. Complainants now ask, as they did both in 1930 and in the original application last Term, that defendants be required to return to the Lake, in the form of sewage effluent, all the water withdrawn for domestic pumpage.

The original application and the separate motion filed by the State of New York were denied on March 3, 1958, "with leave to renew the application and motion with allegations made more definite and certain as a basis for the relief sought." *Wisconsin* v. *Illinois,* 355 U. S. 944 (1958).

The specific question presented is whether the complainants have added any material allegations, not included in the original motion and application.

In a broader sense, the question is whether it appears from the amended application that changed and unforeseen circumstances have arisen since 1930 of so serious a nature as to justify the drastic relief requested, tantamount to a reversal of a major contested portion of the 1930 decree.

A further question, discussed at greater length in the brief of the Chicago Association of Commerce and Industry, as *amicus curiae,* is whether the enactment by Congress of the Rivers and Harbors Act of July 3, 1930, shortly after the entry of the decree, precludes the granting of the relief now sought by the complainants.

No question is properly presented as to whether the Sanitary District has been efficiently disposing of Chicago sewage, although substantial portions of complainants' amended application (pp. 5-8) and brief (pp. 1-3, 6-9, 11-15, 28-29, 31-32), and five of the six subjects complainants wish a Special Master to explore (Br. pp. 31-32), seem to be concerned with that subject. Whether or not the Sanitary District has been inefficient (and we shall show that it has not been) is not germane to whether the provision in the decree permitting the diversion of domestic pumpage should be deleted.

Nor is the judicial process properly invoked to forestall contemplated congressional action with respect to the amount of diversion of water through the Illinois Waterway. Yet complainants assert in their brief (p. 3) that they "join in the filing of this amended application," fearful that "insistent * * * demands for more diverted water from the Great Lakes might cause or bring about, unless opposed by the complainant states, a situation from which complainants and defendants alike could not be rescued even by this court * * *." The repeated allegations as to the inefficiency of the District operations also suggest that the real purpose of this proceeding is to attempt to circumvent anticipated action by Congress affecting the amount of diversion from Lake Michigan. Defendants, however, are not asking this Court to increase the amount of water they can take from Lake Michigan.*

STATEMENT OF ALLEGATIONS AND FACTS.

In 1922, 1925 and 1926 the complainant States filed their complaints seeking to enjoin the diversion of water from Lake Michigan through the Chicago River and Sanitary and Ship Canal to the Illinois River. In 1926 the suits were consolidated and referred to the Honorable Charles Evans Hughes as Special Master (273 U. S. 642; Master's 1927 Report, pp. 5-7).**

Complainants argued before the Master and in this Court that not only should the direct diversion from Lake Michigan by the Sanitary District be barred, but that the amount of water withdrawn from the Lake for domestic purposes by Chicago and other Illinois municipalities should be required to be returned in the form of sewage effluent to the Lake after its use. The Special Master (1929 Report, pp. 120-22) and the Court (281 U. S., at pp. 199-200) rejected the contention that water used for domestic purposes should be returned to Lake Michigan.

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* Defendants have requested Congress to authorize them, temporarily and experimentally, to divert an additional 1,000 c.f.s. for a short period as a basis for a study of the effect of increased diversion upon the Illinois Waterway (the series of rivers and canals extending from the Chicago River to the Mississippi River). Twice Congress has passed such bills, but the President has vetoed them. H. R. 3300, 83rd Cong. (1954); H. R. 3210, 84th Cong. (1956). At the last Congress the legislation passed the House, but did not come to a vote in the Senate. H. R. 2, 85th Cong. A similar Bill, H. R. 1, was introduced on January 7, 1959 in the 86th Congress. A large part of complainants' brief is devoted irrelevantly to an attempt to prove that such additional diversion is not necessary.

** The Report of the Special Master, filed November 23, 1927, will be referred to as "Master's 1927 Report," and his Report on Re-Reference, filed December 17, 1929, will be referred to as "Master's 1929 Report".

The Court authorized the defendants to divert an annual average of 1500 c.f.s. on and after December 31, 1938, in addition to domestic pumpage.

As a result of this Court's decree, defendants spent $316 million in the construction of sewage treatment plants, intercepting sewers, and pumping stations.[*] $109 million had previously been spent to construct sewers which discharged the sewage into the Sanitary Canal instead of Lake Michigan. (Master's 1927 Report, pp. 20-21; 278 U. S. at p. 404.) If the domestic pumpage were to be put back into Lake Michigan in the form of sewage effluent, the defendants' sewage disposal facilities would have to be rearranged, and new pumping stations, works and tunnels, extending miles out into Lake Michigan, would have to be constructed at tremendous cost, estimated by competent engineers to total from 250 to 300 million dollars and to entail annual operating costs of more than 2 million, and debt service charges of more than 15 million dollars annually for a period of thirty years.

Plaintiffs now assert that the amount diverted for domestic pumpage is excessive. In 1930 the amount of domestic pumpage was 1700 c.f.s. The amended application (p. 10) itself alleges that this amount had increased only to 1805 in 1956 and 1803 in 1957.[**] The actual amount of domestic pumpage from 1930 through 1958, as shown by the official records of the U. S. Army District Engineers at Chicago, computed pursuant to the provisions of this Court's decree, is shown in the following table:

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[*] Hearing, Subcommittee of Senate Committee on Public Works, H. R. 3210, S. 1772, S. 2250, 84th Cong., 2d Sess., pp. 18-19.

[**] Complainants' amended application (p. 8) gives the total diversion only for the years 1939, 1954 and 1956 as 3110, 3205 and 3500 c.f.s., respectively. As shown by the Table, 1939 was an unusually low year, and in 1956 the amount of direct diversion was temporarily increased pursuant to order of this Court because of low water in the Mississippi River, which impaired navigation. *Wisconsin* v. *Illinois,* 352 U. S. 954 (1956). The three years selected by complainants do not provide a proper basis for comparison.

Annual Average Metropolitan Pumpage and Diversion From Lake Michigan

By

The Metropolitan Sanitary District of Greater Chicago 1930 to 1958 inclusive.

	Domestic Pumpage c.f.s.	Direct Diversion c.f.s.	Total Diversion & Pumpage from Lake Michigan c.f.s.
1930	1700	6660	8360
1931	1680	6500	8180
1932	1650	6450	8100
1933	1690	6270	7960
1934	1692	6433	8125
1935	1602	6484	8086
1936	1712	4862	6574
1937	1665	4989	6654
1938	1604	4999	6603
1939	1577	1499	3076
1940	1589	1681*	3270*
1941	1610	1496	3106
1942	1575	1528**	3103**
1943	1605	1500	3105
1944	1606	1531**	3137**
1945	1587	1498	3085
1946	1600	1495	3095
1947	1616	1500	3116
1948	1640	1500	3140
1949	1641	1493	3134
1950	1607	1499	3106
1951	1616	1490	3106
1952	1633	1497	3130
1953	1692	1499	3191
1954	1708	1497	3205
1955	1739	1500	3239
1956	1805	1699*	3504*
1957	1784	2387*	4171*
1958	1760	1498	3258

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* Increase over 1500 c.f.s. authorized by order of U. S. Supreme Court.

** Increase over 1500 c.f.s. authorized by order of War Department.

Both the original and amended applications, in Paragraph V, allege that as the population and industrial growth of the Sanitary District increases, the amount of domestic pumpage will increase beyond the limits estimated in 1930. The Special Master's Report filed in 1929 (p. 104) showed that the average domestic pumpage for 1925 was 1338 c.f.s., for 1926, 1395 c.f.s., for 1927, 1421 c.f.s., and for 1928 1565 c.f.s.. The average annual increase for the period from 1925 through 1928 was 75 c.f.s.. When the decree was entered it thus would have been estimated that the pumpage in 1930 would be 1715 c.f.s.. It actually was 1700 c.f.s.. At this rate of progression, it would have been estimated in 1930 that the domestic pumpage would have doubled by 1958. However, the rate of increase was much less than this; in 1958 domestic pumpage was only 1760 c.f.s. as compared with 1700 c.f.s. in 1930.

In 1945 Canada completed power projects north of Lake Superior which resulted in the diversion from the Albany River Basin into the Great Lakes of 5000 c.f.s. which would otherwise flow into Hudson Bay. This diversion "increases the water supply to all the Great Lakes" and has the effect of raising "the levels" of Lake Michigan and Lake Huron "by about 0.37 foot" or 4.4 inches; Lake Erie by 0.23 foot; and Lake Ontario 0.24 foot (Army Engineers 1957 Report, Pars. 10, 55, pp. 3, 16; Par. 59, p. 17; Par. 63, p. 18).*

An averment in the amended application (Par. VII, p. 9) not contained in the original application is that the use of water at Chicago for domestic purposes will double within the next 17 years,* resulting in an additional lowering of lake levels by 1975 of another two inches. Apparently complainants assume (see Par. VI) that the amount now used for domestic pumpage lowers the lake levels two inches, and that a doubling of the population will double the domestic pumpage and thus lower the lake levels another two inches.

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* Sen. Doc. No. 28, 85th Cong., 1st Sess. 1957, entitled "Effects of an Additional Diversion of Water from Lake Michigan at Chicago; Letter from the Assistant Chief of Engineers for Civil Works, Department of the Army, transmitting a Report." This report will be referred to as the "Army Engineers Report."

Complainants in their brief in support of the amended application (pp. 10, 11) state that in 1930 the Sanitary District comprised an area of 438 square miles, "with a human population of 3,710,000 plus an industrial waste equivalent population of 1,700,000", or a total of 5,410,000; that in 1955 "the Sanitary District had a total area of 920.14 square miles and a human population of 4,600,000, with an industrial waste equivalent of 3,800,000", or a total of 8,400,000. Thus, the increase in population and industrial waste equivalent population in the 25-year period was 2,990,000.

In their brief last Term (p. 25) the complainants stated that according to the Special Master's Report filed in 1929,

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* The statement on p. 11 of complainants' brief, that the Sanitary District has estimated that "the demand for water will double within 17 years," is inaccurate. The publication of the Sanitary District there cited refers to an estimated growth in population but not to the effect of population growth on the amount of domestic pumpage. Complainants' 17-year figure seems to have been based upon newspaper articles purporting to state the estimates of General Itchner of the Army Engineers and of the Illinois State Water Survey (Br., p. 2). The brief on its face shows that General Itchner's statement related to the demand for water in the United States as a whole. And the Illinois State Water Survey estimate was concerned with the use of ground water by inland communities and did not relate to the Chicago area and Lake Michigan. It is true that the Sanitary District Report estimated that the population of the Chicago area would increase to 15 or 20 million "in our lifetime." But the experience in the past 28 years demonstrates clearly that the amount of water consumed does not necessarily increase proportionately with the increase in population.

"in 1960 the then Sanitary District would be serving a population of 5,860,000 and an industrial waste equivalent population of 2,300,000", making a total of 8,160,000. It thus appears that the difference between the 1930 estimate of the population in 1960 and the actual population in 1955 was only 2.9 per cent.

As the Table on page 6, *supra,* demonstrates, this increase in population has not substantially increased the amount of domestic pumpage.

Many of the same facts upon which complainants now rely for a drastic change in the decree were contained in the record culminating in the 1930 decree, or were foreseen at that time.

As shown above, the record before the Master in 1929 included a remarkably accurate forecast of the growth of the Chicago area.

That the withdrawal of water for domestic pumpage would affect lake levels was obviously foreseen when the decree was entered. This Court's opinion recited (278 U. S. at pp. 407-8) that

> "A diversion of an additional 1500 cubic feet per second * * * would cause an additional lowering in Lakes Michigan and Huron of about one inch * * *."

The Army Engineers Report estimates (p. 26) that an additional diversion of 1000 c.f.s. would lower the levels of Lakes Michigan and Huron one inch and Lakes Erie and Ontario five-eighths of an inch. Neither figure—1500 c.f.s., as stated in the Court's opinion, nor 1000 c.f.s., as determined by the Army Engineers—supports complainants' allegation that the present amount of water taken for domestic pumpage lowers the lake levels two inches.

The passage on page 12 of the amended application with respect to the existence of 400 harbors on the Great Lakes and their connecting channels, of which 100 have been improved by the Federal Government, with the inner harbors being excavated and being maintained at local expense, is taken almost in *haec verba* from 278 U. S. at page 408.

Complainants aver that a lowering of two inches in lake levels would decrease "the carrying capacity of the large lake vessels by from 180 to 200 tons per cargo" (Amended App., p. 12). The Master in his 1927 Report noted (p. 115) that "with the loss of every inch of draft below 20 feet, the modern lake bulk freighter suffers a loss of from 90 to 100 tons in cargo capacity." The Report of the Army Engineers similarly states that "The tons of cargo per inch of immersion of the bulk carriers vary from 38 in the older, small vessels to over 100 in the modern, large vessels" (Army Engineers Report, Par. 171, p. 44). The Court in 1930 was thus aware of the possibility that the carrying capacity of lake vessels might be affected by the authorized diversion precisely as alleged by complainants.

Subparagraph (1) of Paragraph X of the amended application (pp. 12-14) alleges that the lower lake levels which have resulted from the diversion of domestic pumpage have nullified and continue to nullify the costly improvements made by Federal and local governments to lake channels and harbors, diminished the value and utility of expensive terminal facilities, and by decreasing the carrying capacity of large lake vessels, will deprive lake shippers annually of more than two and one-half million tons of carrying capacity, at a loss of $4,000,000 a year. The Army Engineers Report states that by 1985 "a permanent increase and diversion of 1000 cubic feet per second from Lake Michigan would reduce the annual average carrying capacity of the United States Great Lakes bulk-cargo fleet by about 300,000 tons," with a "resulting annual economic loss * * * estimated at $240,000" (Par. 180, p. 47). The report pointed out (Par. 182, p. 47) that even these small losses could be averted by relatively inexpensive compensating works in the St. Clair and Niagara Rivers.

The amended application realleges (Par. X, pp. 14-15) the great cost of constructing power facilities on the Niagara and the St. Lawrence, in total amounting to over a billion dollars, and alleges that (presumably when these facilities are completed) the annual revenue loss to the New York State Power Authority from the withdrawal of 1800 c.f.s. of water used for domestic pumpage at Chicago will be $1,027,841, about 80% of which will occur at the Niagara project. It is alleged that the Canadian projects will suffer a similar loss.

The Report of the Army Engineers shows that the total flow of water available for power at Niagara is 125,000 to 149,000 c.f.s. (Par. 100, p. 29; Table 11, p. 60) and at the St. Lawrence Barnhart Power Plant is 215,000 c.f.s. to 257,000 c.f.s. (Table 16, p. 65). At Niagara, 50,000 to 100,000 c.f.s. has been reserved for Niagara Falls for scenic purposes, 7000 c.f.s. has been diverted through the Welland Canal, and 1000 c.f.s. has been diverted for the New York State Barge Canal (same Report, Par. 99, p. 29; Par. 59, p. 17; Par. 57, p. 16; Table 11, p. 60).

The Report finds (Par. 144, p. 38) that the effect of a permanent increase of 1000 c.f.s. in diversion from Lake Michigan would cause a loss of dependable capacity of less than one-half of 1 per cent, and (Par. 141, p. 37; Par. 203, p. 52) a power energy loss estimated to be about 0.4% of the total potential energy production of all United States and Canadian plants.

The Report also finds (p. VII, Letter of Submittal; Par. 144, p. 38) that the "capacity loss (resulting from an additional 1000 c.f.s. diversion) is not believed of sufficient magnitude to warrant replacement''; that ''assignment of value to the changes is not warranted from a practical operational standpoint.''

The monetary value of the loss of ''energy in the United States and Ontario plants'' caused by an additional 1000 c.f.s. diversion ''is computed'' in the Report (Par. 146, p. 38) ''to be about $708,000 annually,'' evaluated ''in terms of the cost of alternative generation in modern, efficient, thermal plants.''

The amended application (p. 15) alleges that the loss to the New York Power Authority in annual capacity from a permanent diversion of 1800 c.f.s. would be 29,700 kilowatts on the Niagara and 6521.4 kilowatts on the St. Lawrence, valued at $12 per kilowatt. The Army Engineers Report (Table 10, p. 59) shows that the total United States capacity on the Niagara will be 2,380,000 kilowatts, and on the St. Lawrence 912,000 kilowatts.*

The Power Authority of the State of New York, in an Official Statement on January 5, 1959 relating to the sale of $200 million of its Series E General Revenue Bonds for the Niagara Falls project, recites (p. 3) that the total annual energy production of its Niagara Plant will be 13 billion kilowatt-hours a year in 1963, and the total annual energy production of its St. Lawrence Plant (p. 8) in 1964 will be 6½ billion kilowatt-hours a year. The amended application (p. 15) alleges that the annual energy loss of the Power Authority from a permanent diversion of 1800 c.f.s. at Chicago will be 222,166,800 kilowatt-hours a year. On the basis of these figures, the annual energy loss will be approximately 1.1% of the total production of the two plants.

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* Although complainants measure capacity in kilowatt-years and the Army Engineers in kilowatts, a comparison of their figures indicates that the terms have the same meaning. Hearings, Subcommittee of Senate Committee on Public Works, H. R. 2, S. 1123, 85th Cong. 2d Sess. on Diversion of Water from Lake Michigan, p. 255, Table II (1958).

The Official Statement of the Authority (p. 14) contains an estimate of $82,663,000 annual gross revenue from the combined Niagara and St. Lawrence projects. In their amended application (p. 15) complainants make a theoretical computation of total annual revenue loss to the New York Power Authority based on capacity and energy loss. The total annual loss is stated to be $1,027,841.15.

The Power Authority estimates the load factor at its Niagara plant to be 70 per cent, and at its St. Lawrence plant to be 85 per cent.*

The amended application alleges that the lowering of lake levels due to defendants' domestic pumpage has substantially damaged riparian properties, summer resorts and cottages (p. 14). Just how the alleged lowering of lake levels will produce this harmful effect is not explained. That such a result is not inevitable appears from the Army Engineers 1957 Report, which states (Par. 208, p. 53; Pars. 148-154, pp. 39-40): "A reduction in lake levels of up to one inch resulting from a permanent increase of 1000 cubic feet per second in diversion from Lake Michigan would be beneficial to shore property, particularly during high lake stages." It may be noted that in 1956 a representative of the lake front property owners in Michigan, Wisconsin, Illinois and Indiana appeared at the hearings before the House Subcommittee on Rivers and Harbors in support of additional diversion from the Great Lakes because of the loss to the property owners resulting from *high* lake levels.**

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* Hearings, *supra*, p. 255, Table I.

** See Hearings Before the Subcommittee on Rivers and Harbors of the House Committee on Public Works on H. R. 2, 85th Cong., First Sess. (1957), *Lake Michigan Water Diversion*, pp. 64, 147-149.

In 1954 the property owners on Lake Ontario opposed the St. Lawrence Power project on the ground that by raising the level of Lake Ontario it would injure their properties. *Lake Ontario Land Development Association* v. *Federal Power Commission,* 212 F. 2d 227 (C. A. D. C. 1954), certiorari denied, 347 U. S. 1015 (1954).

Both the original and amended applications, in Paragraph III, allege, the latter somewhat more succinctly, that the present sewage system does not treat all sewage in time of storm, when sewage is mixed with storm water, that the Sanitary District is not fully and effectively treating all sewage, but is permitting some to be discharged untreated into the drainage canal, that this condition will become aggravated as the population and industry in the area increase, and that the Sanitary District in 1929 assured this Court that its facilities would be operated in an efficient manner so as not to endanger public health. It is to be noted that the Master in his 1929 Report (p. 24) stated that complainants acquiesced in the system of sewers referred to by the complainants in their amended application (III) and original application (III) as the "combined type," which conveyed not only sewage and industrial wastes, but during times of storm such amounts of run-off as are permitted to find their way into the system. The combined type of sewer system is used in all major lake cities.

The amended application (but not the original) alleges that the efficiency of the Sanitary District's disposal plants has dropped sharply in the last six years, and sets forth (at p. 7) a table for the years 1952-57 showing that the reduction in biochemical oxygen demand (b.o.d. removal) was 93.6% in 1952 and that it gradually declined to 85.6% in

1957. The average for the first nine months of 1958 was 90.7 per cent.[*]

The amended application fails to state that this Court's opinion (281 U. S. at p. 200) recognized that the percentage of purification would vary from 85 to 90 or more. The Special Master's 1929 Report (p. 26) summarizes the supporting testimony of an expert witness on the degree of purification attainable as follows:

> "The degree of purification to be accomplished will necessarily vary according to conditions. Under certain conditions it will be very high, fully 90%, possibly as high as 95% at times. Under other conditions the degree of purification will not be as high, and will drop to 85 or 80 or possibly lower.
>
> "The conditions which affect the degree of purification are the temperature, the storm flows, the industrial wastes which are discharged into the sewers, and other conditions which affect chiefly the biological action upon which the processes employed for the most part depend. Taking all of the plants into consideration, a general average of 85% of purification is a reasonable assumption."

The Sanitary District has advised us that the temporary decline in operating efficiency between 1953 and 1957 indicated in complainants' tabulation was partially attributable

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[*] Complainants' table is based upon the Annual Reports of Operation of the Sanitary District. The same source of information shows that for the first nine months of 1958 the percentages were:

January	94.8	June	92.0
February	92.6	July	84.8
March	90.8	August	89.9
April	92.2	September	92.0
May	90.4		

The reduction in the percentage of biochemical oxygen demand is the customary test for purification.

The amended application also refers to the percentage of solids removed and states that this dropped from an average of 91.1% in 1952 to 80.6% in 1957. The same source of information shows that the percentage for the first nine months of 1958 averaged 87.4%.

to the fact that during those years it was necessary to install in successive stages an entirely new air filtering system and a completely new air distribution piping system. During the progress of this work the usual operating efficiency could not be fully maintained. In 1958 normal operations were resumed and the percentage of purification immediately rose to 90.7. It should also be noted that in 1958 there was less rainfall than in recent years, which is a factor tending to increase the efficiency of the operation.

Complainants in their amended application (p. 13) repeat an allegation contained in the original application (IX) that recent studies made by the United States Corps of Engineers have established that a diversion of 1500 c.f.s. is adequate to maintain navigation in the Port of Chicago and the Illinois Waterway.

Defendants in their 1957 brief (pp. 24-26) challenged this allegation on the ground that it appeared to be based on a misunderstanding of a report made in January 1957 by the Division Engineer, Brigadier General P. D. Berrigan, North Central Division Corps of Engineers, United States Army.* The Solicitor General, in a memorandum filed in this cause (p. 4) last Term on behalf of the United States, indicated that he was informed by the Chief of Engineers that such a determination had not been made, but that the matter required further study. The amended application does not allege any specific facts to support the allegation. Defendants have not been apprised of such a study.

The records of the United States Army District Engineers at St. Louis show that the depth of water in the Illinois Waterway at Alton, Illinois, is again at such a low point as to impair navigation.

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* Army Engineers Report, Par. 183, p. 47, *et seq.*

ARGUMENT.

I.

No Showing Has Been Made That Domestic Pumpage Is Excessive, or Will Become Excessive, or That Unforeseen Changes in Conditions Have Occurred Requiring Modification of the Decree.

In December 1957, 27 years after the entry of this Court's 1930 decree, the complainants filed their original application and motion to have the domestic pumpage provision eliminated so as to require defendants to pour back into Lake Michigan all of the Chicago area sewage effluent. This Court denied the application and motion, with leave to renew with allegations made more definite and certain as a basis for the relief sought.

It is defendants' position that the complainants have not cured the insufficiency of the motion and original application filed last Term. No facts have been presented showing that the 1930 decree should be so drastically modified as to deprive defendants of the right to withdraw over half of the water which that decree authorized them to take from Lake Michigan.

It is incumbent upon complainants to show that such a radical alteration in the decree is required by changed and unforeseen conditions. A decree should not be reversed "under the guise of readjusting. * * * Nothing less than a clear showing of grievous wrong evoked by new and unforeseen conditions should lead [the Court] to change what was decreed after years of litigation * * *" *United States v. Swift & Co.,* 286 U. S. 106, 119 (1932).

The foundation of complainants' case is that the Chicago area has grown tremendously since 1930 and will continue to do so in the future, and that this has caused and will cause a great increase in the amount of domestic pumpage. As has been pointed out (p. 9, *supra*), the growth of Chicago was foreseen quite accurately at the time of the original proceeding. Despite the great increase in population and industry, the amount of domestic pumpage for 1958 was only 60 c.f.s. more than in 1930. Thus, there is obviously no basis for complainants' claim that the present domestic pumpage is excessive, or that the growth of Chicago up to now justifies the relief sought. Indeed, the slight increase in domestic pumpage has been more than counterbalanced by the 5000 c.f.s. which Canada has brought to the Lakes from the Hudson Bay watershed, so that complainants are much better off than could have been anticipated when this Court's decree was entered.

In so far as the future is concerned, complainants can be no more definite now than they were in their original application filed and found insufficient last Term. Of course the Chicago area will continue to grow, although how rapidly is anyone's guess. But in view of the small impact upon the amount of pumpage of the large increase in population during the past 28 years, the possible or probable effect of future growth upon the amount of pumpage needed provides far too speculative and nebulous a predicate for the revision of the decree sought by complainants. *Arizona* v. *California,* 283 U. S. 423, 462-464 (1931). The Court "will not exert its extraordinary power to control the conduct of one State at the suit of another, unless the threatened invasion of rights is of serious magnitude and established by clear and convincing evidence." *Connecticut* v. *Massachusetts,* 282 U. S. 660, 669, 674 (1931). What happened in the past shows that whether or not such growth in the future will affect lake levels in a manner substantially injurious to complainants is completely conjectural.

II.

The Effect of Domestic Pumpage Withdrawal on Lake Levels Was Anticipated in 1930, and Navigation, Commercial, and Power Interests Have Adjusted Themselves to the Amount of Withdrawal Then Authorized by the Court.

The only specific allegations as to injury not contained in the application found insufficient last Term are those relating to the effect on the carrying capacity of lake vessels and the generating capacity of New York power facilities (see pp. 10-13, *supra*).

When the decree was entered in 1930 it was known that the diversion authorized—1500 c.f.s. plus domestic pumpage—would reduce lake levels by several inches. It was known that each inch that lake levels were lowered would reduce the capacity of large lake freighters by about 100 tons. It was, of course, known that there were 400 harbors and connecting channels, and that Federal, state and local governments were spending large sums of money to maintain and deepen them. It was also known that domestic pumpage in 1930 would average around 1700 c.f.s. and that this amount would increase. As has been pointed out, it would have been anticipated in 1930 that the increase would be much greater than it actually was. Senator Blaine of Wisconsin, in supporting the 1930 law in which Congress authorized the diversion permitted by this Court (see pp. 27, *infra*), assumed that "the accretion to the pumpage [would be] 100 cubic feet seconds per year" (72 Cong. Rec. 11,005).

Thus, when the 1930 decree was entered, the effects on shipping, commerce, and harbor facilities of permitting diversion of 1500 c.f.s., plus domestic pumpage in the range of 1700 c.f.s., were known. In the face of such effects, which were obviously taken into account by this Court, the diversion of domestic pumpage was authorized by the decree. Complainants should not now be permitted to relitigate the matters then decided.

Ever since the entry of the 1930 decree, anyone who constructed large lake vessels or planned and developed harbor facilities or power projects must have based his expenditures and designs on the assumption that the lake levels would be affected by and subject to the authorized diversion at Chicago. Certainly, the carefully engineered power projects on the Niagara and St. Lawrence, on which over a billion dollars will be spent, must have been tailored to the water levels authorized by this Court's decree. Those who planned and financed transactions of that magnitude would not have been so imprudent as to base their calculations on the assumption that this Court would recede from its 1930 decree and add an inch or two to the lake levels by compelling a return of sewage effluent to Lake Michigan after its use for domestic purposes in the Chicago area. Indeed, they were not. The Official Statement of the Power Authority of the State of New York (p. 30) directs attention to the diversion at Chicago and to the withdrawal of water from Lake Michigan for "sanitary and domestic use" under this Court's decree. The Power Authority's annual estimated revenues of about $82,663,000* could not have included the $1,027,841.15 additional revenue which complainants now allege will be lost because of the withdrawal of an assumed 1800 c.f.s. for domestic pumpage at Chicago.

In short, the answer to complainants is that their rights have been and are subject to the withdrawal authorized by this Court's decree, and all persons affected by the authorized withdrawal for domestic pumpage must have adjusted themselves to it many years ago. The diversion authorized had precisely the effects which were foreseen, and which shipping, port, and power interests must have taken into account. Such effects do not justify the drastic revision of the decree now sought by complainants.

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* Official Statement, Power Authority of State of New York, Jan. 5, 1959, p. 14.

III.

The Equitable Considerations Which Caused This Court in 1930 to Reject Complainants' Demand for the Return of Domestic Pumpage to Lake Michigan Are More Compelling Today.

Complainants seem to assume that they are entitled to relief if they show that the diversion of domestic pumpage causes them some injury. If that had been this Court's theory, all diversion would have been prohibited in the first place. But when this Court rejected complainants' first attempt to halt the diversion of domestic pumpage in 1930, it said (281 U. S. at p. 200):

> "* * * We think that upon the principles stated in *Missouri* v. *Illinois*, 200 U. S. 496, 520, *et seq.*, the claims of the complainants should not be pressed to a logical extreme without regard to relative suffering and the time during which the complainants have let the defendants go on without complaint."

On the basis of equitable considerations alone, the defendants submit that the amount of alleged injury to complainants does not justify a modification of the decree subjecting defendants to the great burden, at a tremendous cost, of reorientating the sewage facilities so as to pipe the sewage effluent into Lake Michigan.

The amended application alleges that the diversion of domestic pumpage "takes away more that 2,500,000 million tons of carrying capacity * * * at a loss of more than $4,000,000 in annual revenue" (p. 12). This calculation is presumably based upon the alleged two-inch lowering of lake levels resulting from a withdrawal of 1800 c.f.s., and disregards the fact that the inflow of 5000 c.f.s. from the Hudson Bay area into Lake Superior has more than offset this withdrawal. The Army Engineers Report concludes that the effect of a one-inch reduction would be a loss by 1985 of an annual carrying capacity of 300,000 tons and an economic loss of $240,000 for United States vessels (p. 47). The Canadian fleet is about 22% of the American. At this rate, the total loss of capacity for two inches would be 600,000 tons for United States carriers and 132,000 for Canadian. But even accepting complainants' figures, 2½ million tons is only a little over 1% of the total United States 1955 tonnage of 239,263,000 tons (*id.* at p. 42). And even this loss could easily be avoided (p. 11, *supra*).

The alleged loss of $1,027,000.00 to the New York Power Authority is only a minute proportion of the total anticipated annual revenue of $82,663,000. The Army Engineers' Report advises that a diversion of 1,000 c.f.s. would cause a loss in capacity of less than one-half of one per cent (par. 144, p. 38), and an energy loss of four-tenths of one per cent (par. 141, p. 37) in all of the United States and Canadian plants. For 1,800 c.f.s. the reduction in energy produced would be about .72 of 1%. Even if the complainants' figures as to loss of revenue be accepted, the percentage would be only about 1.2%. Until New York's Niagara project is finished sometime in the 1960's (Army Engineers Report, par. 103, p. 29) there will be no loss there. Furthermore, the Power Authority itself anticipates a load factor of 70% at its Niagara Plant and 85% on the St. Lawrence. (See p. 13, *supra.*) When the plants will not be operated at full capacity, it is difficult to see how a slight diminution in the flow of water in the rivers would have any measurable effect on the amount of energy produced and the resulting revenue.

Complainants make no estimate as to the amount of injury which they allege the lowering of lake levels by two inches will cause to riparian property owners. The Engineers 1957 Report suggests that such persons on the whole benefit from some lowering of lake levels (see p. 13, *supra*). The action of groups of riparian owners in supporting increased diversion at Chicago and in opposing higher lake levels on Lake Ontario (see p. 14, *supra*) supports this opinion.

These relatively inconsequential injuries, whether or not *de minimis* looked at by themselves, are not sufficient to justify termination of the withdrawal for domestic pumpage. Moreover, to look at these effects alone would be to see only one-half of the picture. If the domestic pumpage were to be put back into Lake Michigan, the defendants' sanitary facilities designed to flow in the opposite direction would have to be rearranged, and new pumping stations, works, and tunnels constructed at appalling cost. The hundreds of millions already spent by defendants would not have been utilized in the way they were, in compliance with the program submitted to the Court and required by the 1930 decree, if the defendants had been required to put the effluent back into the Lake.

In 1930 this Court considered the "relative suffering" and the time during which the complainants "let the defendants go on without complaint," and held that the Master's recommendation to permit the permanent withdrawal of the domestic pumpage from Lake Michigan was "more reasonable than the opposite demand" (281 U. S. at p. 200). The events since that time, including reliance on the decree for 28 years, make it even more inequitable to require the return of the pumpage to the Lake than it was then.

IV.

No Rule of Law Requires That Water Used for Domestic Pumpage Be Returned to Its Source.

Complainants seem to premise their argument on the theory that it is unlawful *per se* for defendants to diminish the water available for navigation and power purposes by diverting it to another watershed. New York successfully argued precisely the contrary in support of its diversion of Delaware River water to the Hudson River watershed in order to enlarge New York City's water supply in *New Jersey* v. *New York,* 283 U. S. 336 (1931). This Court there said (343):

> "In a most competent and excellent report the Master adopted the principle of equitable division which clearly results from the decisions of the last quarter of a century. Where that principle is established there is not much left to discuss. *The removal of water to a different watershed obviously must be allowed at times unless states are to be deprived of the most beneficial use on formal grounds.* In fact it has been allowed repeatedly and has been practiced by the States concerned. *Missouri* v. *Illinois,* 200 U. S. 496, 526. *Wyoming* v. *Colorado,* 259 U. S. 419, 466. *Connecticut* v. *Massachusetts,* 282 U. S. 660, 671." (Emphasis added.)

"Drinking and other domestic purposes are the highest uses of water." *Connecticut* v. *Massachusetts,* 282 U. S. 660, 673 (1931). The primacy of such use also has been recognized in both the Canadian Boundary Water Treaty of 1909 (36 Stat. 2448) and in the 1950 Treaty of Niagara between the United States and Canada (TIAS 2130). In his 1927 Report the Special Master, in commenting on the 1909 Treaty, said (55):

> "* * * With reference to the use of boundary waters,

> it was provided that the following order of precedence should be observed among the various uses enumerated in the treaty for these waters, to-wit: (1) uses for domestic and sanitary purposes; (2) uses for navigation, including the service of canals for the purposes of navigation; (3) uses for power and for irrigation purposes. These provisions were not to 'apply to or disturb any existing uses of boundary waters on either side of the boundary'."

Article III of the 1950 Treaty provided that the amount of water available "shall be the total outflow from Lake Erie to the Welland Canal and the Niagara River (including the Black Rock Canal) less the amount of water used for domestic and sanitary purposes, and for the service of canals for the purposes of navigation."

There is no rule of law whereby water taken for domestic purposes must be returned to the same watershed in the form of sewage. As the Special Master stated in his 1929 Report (p. 122):

> "If the City of Chicago is entitled to take its water supply from Lake Michigan for the ordinary and reasonable uses of its inhabitants, it cannot be said that the State or the City is subject to any established rule of law which requires it to turn into the Lake what is no longer water but sewage or the effluent of sewage treatment plants. If there were a way of destroying the sewage or sewage effluent altogether, or evaporating it, it does not appear that the State or the City would violate any right of the complainants in doing so (*Fisk* v. *Hartford*, 69 Conn. 375)."

V.

Complainants' Charges of Operating Inefficiency by the Sanitary District, Though Irrelevant, Are Unfounded.

We do not wish to leave unanswered the large part of complainants' argument as to the alleged inefficiency of the Sanitary District's operations—even though there would seem to be no rational connection between the efficiency of its operation and complainants' demand that the treated sewage be dumped back into Lake Michigan.

Exactly as was anticipated in 1929, the percentage of b.o.d. removal has fluctuated between 85% and 95%, depending upon the temperature, the storm flow and other factors (see p. 15, *supra*). This does not prove that the plants has been inefficiently operated. As has been pointed out, the low percentages (still over 85%) between 1954 and 1957 were partially attributable to interruptions in complete treatment during the installation of new equipment. The unsupported charge in complainants' brief (p. 15) that the "Sanitary District still persists in using obsolete techniques of sewage disposal" should be contrasted with the naming of the sewage disposal system in 1955 as one of the seven engineering wonders of America.* The technique used by the Sanitary District, known as the activated sludge process, has become the leading process used in sewage disposal.* The 1957 Report of the Army Engineers (Par. 185, p. 48) states that the District has provided complete treatment for all of its sewage, and that the sewage is treated in "modern efficient plants." Indeed, in last Term's application (pp. 29-30) complainants credited the District with doing "a reasonably efficient job at these works."

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* 50 Civil Engineering No. 593, Nov. 1955.

The charge (Compl. Br. p. 12) that "the Sanitary District is dragging its feet insofar as the current operation of its sewage treatment works are concerned" is wholly without factual substance. It is based entirely on the percentages for the years 1953-1957, already explained. The average rate of reduction in b.o.d. for the removal year 1958 was 90.7%.

VI.

The Injunctive Relief Requested Is in Conflict With the Action of Congress in Authorizing the Discharge of Domestic Pumpage Into the Sanitary Canal for the Illinois Waterway.

The authority to divert the domestic pumpage no longer is derived from this Court's decree. In the Rivers and Harbors Act of July 3, 1930 (46 Stat. 929) Congress expressly authorized for navigation of the Illinois Waterway the diversion permitted by this Court for the Chicago River. The pertinent portion of the Act is as follows:

> "Provided further, that the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, * * * according to the opinion of the court in the cases reported as Wisconsin against Illinois in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway;"

Although this statute does not authorize the diversion of more water than did the decree, it did adopt for the waterway the amount fixed in the decree (289 U. S. 395, 403-4).

This Court has recognized that Congress has the power to determine the amount of water to be withdrawn, if it chooses to do so. 278 U. S. 367, 417; 281 U. S. 179, 198, 200; *Sanitary District* v. *United States,* 266 U. S. 405, 426 (1925). Congress exercised that power in the 1930 statute, The statutory provision was appurtenant to an appropriation for the completion of the Illinois Waterway for navigation between Lake Michigan and the Mississippi River. This Court had only considered the navigational needs of the Chicago River as a part of the Port of Chicago, not those of the Waterway (278 U. S. 367, at 418; Master's 1929 Report, pp. 122, 126).*

The 1930 Act instructed the Secretary of War to cause a study to be made of the amount of flow needed for the Waterway and to report to "Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable."

In concurring in a report made in 1933 by Colonel Dan I. Sultan, General E. M. Markham, Chief of Engineers, stated that "the report conclusively shows that aside from sanitary requirements, the minimum average annual flow from Lake Michigan required to meet the needs of a commercially useful waterway in the Illinois River is a direct diversion of 1500 cubic feet per second *in addition to domestic pumpage* * * *. This flow will not substantially injure the existing navigation on the Great Lakes." (Italics supplied.) (H. R. Doc. No. 184, 73rd Cong., 2nd Sess., p. 6 (1933).) General Markham also concurred in a recommendation of Colonel Sultan that after the completion of the sewage treatment works, navigation conditions along the waterway should be observed in order to determine whether additional diversion would be necessary. (*Id.* at 58.) No subsequent determination has been made by the Army Engineers.

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* Complainants are in error in stating in Paragraph V of their amended application that the diversion authorized by the decree was "for the purpose of maintaining navigation in the Port of Chicago and the connecting Illinois waterway * * *." The same error was made by complainants in Paragraph V of their original application. This Court has not determined or considered in any of the cases before it the amount of water required for navigation in the Illinois Waterway.

The only subsequent indication of Congressional intention is the recent passage by both Houses of bills vetoed by the President, to authorize defendants to withdraw temporarily an additional 1000 c.f.s. (see note, p. 4, *supra*). The Congressional action taken suggests that there is no legislative disposition to *reduce* the withdrawal previously authorized.

The Illinois Waterway is, of course, a navigable waterway of the United States, subject to the dominion and control of Congress. Since the amount of diversion, including domestic pumpage, required for the waterway, is dependent on factors not considered in this Court's determination of the amount required for the Chicago River, Congress clearly intended, defendants submit, that its authorization be treated as a legislative act subject to change only by Congress itself.*

CONCLUSION.

In 1930 this Court authorized the withdrawal of the water needed for domestic pumpage and the discharge of the sewage effluent into the Sanitary Canal. All of the facts and arguments upon which complainants now rely in support of their attempt to delete this provision were fully foreseen at that time, except for the 1945 addition of 5000 c.f.s. through Lake Superior and the development of the new St. Lawrence and Niagara projects, which will be affected only to a minimal extent, and which were undoubtedly planned so as to accommodate themselves to the diversion authorized by this Court.

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*This point is treated in greater detail in the brief for the Chicago Association of Commerce and Industry, as *amicus curiae.*

The amended application does not contain any material facts of significance not stated in the application denied by the Court last Term. The increase in domestic pumpage since 1930 has been shown to be insignificant. Complainants have made no specific allegations, aside from pure speculation, concerning the amount of domestic pumpage in the future.

Defendants have spent over $300 million in reliance on this Court's decree. Approximately an equal amount would have to be spent to rearrange the Sanitary District's facilities, if the sewage effluent is to be tunneled into Lake Michigan. Regardless of the amount spent by the defendants, the risk of polluting Chicago's water supply would be ever present. (See 1950 and 1951 Reports of International Joint Commission.)

Defendants submit, therefore, that the complainants have not shown sufficient basis for granting them the injunctive or other relief they seek, and ask that the prayers of the amended application be denied and that the amended application be dismissed.

Respectfully submitted,

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FILED

JAN 31 1959

JAMES R. BROWNING, Clerk

IN THE SUPREME COURT OF THE UNITED STATES

October Term, A.D. 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al,
Defendants.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI and ARKANSAS,
Intervening Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al,
Defendants.

No. 4 Original

OBJECTIONS BY THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK, COMPLAINANTS, AND MOTION TO STRIKE FROM THE FILES A CERTAIN *"MOTION FOR LEAVE TO FILE AND BRIEF OF THE CHICAGO ASSOCIATION OF COMMERCE AND INDUSTRY AS AMICUS CURIAE IN OPPOSITION TO AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 AND FOR THE GRANTING OF FURTHER RELIEF"*.

BRIEF IN SUPPORT THEREOF

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SPEAKER-HINES AND THOMAS, INC., LANSING, MICH.—1959

IN THE SUPREME COURT OF THE UNITED STATES

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To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

The Attorneys General of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York file the following objections to the *Motion of the Chicago Association of Commerce and Industry for Leave to File a Brief as Amicus Curiae:*

1. There is no showing that the Chicago Association of Commerce and Industry has any direct interest in the subject matter of the above causes.

2. There is no showing that the legal issues presented in the motion and brief filed by counsel for said association could not be presented to this Court by the Attorney General of the State of Illinois as well as by the attorneys for the Metropolitan District of Greater Chicago.

3. The State of Illinois through its Attorney General as parens patriae represents all interests, both private and public, which the citizens as well as corporate entities of the State of Illinois may have in the subject matter of the above causes.

4. By allowing this particular association to enter this cause in the manner and form presented in its motion and brief, it would set a precedent which would enable other private corporate entities as well as private citizens to do likewise on behalf of both the complainants and the defendants in these causes and would encumber unnecessarily the records of this Court.

While the State of Wisconsin has previously indicated it had no individual objections to the filing of the brief amicus curiae by the Chicago Association of Commerce and Industry, Wisconsin agrees that in the absence of similar consent from all other parties complainant, proper grounds do not now exist for filing the brief of the Chicago Association of Commerce and Industry.

BRIEF

This is a suit between sovereign states, and for this reason private individuals should not be permitted to intervene. Any interests which they may claim in the matter may be filed through the office of the Attorney General of Illinois who is charged with the duty of representing the State of Illinois.

The movants in the instant case have failed to comply with the requirements prescribed by Rule 42(3), as follows:

> "It (the motion) shall concisely state the nature of the applicant's interest, set forth facts of questions of law that have not been, or reasons for believing that they will not adequately be, presented by the parties, and their relevancy to the desposition of the case. . . "

Movants have not shown that the Attorney General for Illinois will not adequately present the issues involved in this case. It must be assumed that the said Attorney General will present all the arguments and facts necessary to defend the interests of the State of Illinois. Movant's application and brief are therefore unnecessary.

To permit the movants to file their brief in the instant case would in effect be in contravention of the XIth Amendment to the Constitution of the United States which prohibits suits by individuals against the States.

Wherefore the Court is respectfully requested to strike from the files the Motion for Leave to File and Brief of the Chicago Association of Commerce and Industry as Amicus Curiae in Opposition to Amend Application of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York for a Reopening and Amendment of the Decree of April 21, 1930 and for the Granting of Further Relief.

Respectfully submitted,

STATE OF WISCONSIN
John W. Reynolds
Attorney General
Roy Tulane
Assistant Attorney General

STATE OF MINNESOTA
Miles Lord
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Office Supreme Court,
FILED
FEB 12 1959
JAMES R. BROWNING,

IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original.

STATE OF MICHIGAN,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al,
Defendants.

No. 4 Original

MOTION TO ALLOW AND FIX TIME FOR FILING OF REPLY BRIEF BY COMPLAINANTS TO DEFENDANTS' BRIEF.

STATE OF WISCONSIN
John W. Reynolds
Attorney General
Roy Tulane
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STATE OF NEW YORK
Louis J. Lefkowitz
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Assistant Attorneys General

SPEAKER-HINES AND THOMAS, INC., LANSING, MICH.—1959

IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
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STATE OF NEW YORK,
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v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO, et al,
Defendants.

No. 4 Original

MOTION TO ALLOW AND FIX TIME FOR FILING OF REPLY BRIEF BY COMPLAINANTS TO DEFENDANTS' BRIEF.

To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

The complainant states of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York, by their respective attorneys general, respectfully move this Honorable Court that a time be fixed and allowed for the filing of a reply brief by the complainant states in answer to the defendants' brief filed in this Court on January 19, 1959:

Complainant states show that the reasons for requiring additional time to file a reply brief are that certain important information and data needed for the benefit of the court will not be available for some time. This information relates to a further study now being made by the Corps of Engineers, U. S. Army, concerning damages to navigation and shipping suffered by the complainant Great Lakes' states by reason of diversion of domestic pumpage water at Chicago by defendants; and to data relating to the efficiency of operations of other sewage disposal plants in the Great Lakes' area which will show that (in our opinion) the operations of defendant Chicago Sanitary District Sewage Disposal Plant at Stickney are not in compliance with the recommendations of Special Master Charles Evans Hughes, nor in conformity with a judgment and decree of this court.

Wherefore complainants move this Honorable Court that the date for the filing of their reply brief be fixed as of March 31, 1959.

Respectfully submitted,

STATE OF WISCONSIN
John W. Reynolds
Attorney General
Roy Tulane
Assistant Attorney General

STATE OF MINNESOTA
Miles Lord
Attorney General
Raymond A. Haik
Special Assistant Attorney General

STATE OF OHIO
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FILED
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IN THE

Supreme Court of the United States

OCTOBER TERM, 1958.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
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No. 3 Original.

STATE OF NEW YORK,
Complainant,
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STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 4 Original.

OPPOSITION TO COMPLAINANTS' MOTION FOR EXTENSION OF TIME TO FILE REPLY BRIEF UNTIL MARCH 31, 1959.

WILLIAM C. WINES,
Assistant Attorney General,
State of Illinois,

LAWRENCE J. FENLON,
Principal Assistant Attorney,
The Metropolitan Sanitary
District of Greater Chicago,

LATHAM CASTLE,
Attorney General, State of
Illinois,

GEORGE A. LANE,
Attorney, The Metropolitan
Sanitary District of Greater
Chicago,

JOSEPH B. FLEMING, JOSEPH H. PLECK and THOMAS M. THOMAS,
of KIRKLAND, ELLIS, HODSON, CHAFFETZ & MASTERS,
Attorneys for the Defendants.

THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

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IN THE

Supreme Court of the United States

October Term, 1958.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original.

STATE OF MICHIGAN,
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STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 3 Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 4 Original.

OPPOSITION TO COMPLAINANTS' MOTION FOR EXTENSION OF TIME TO FILE REPLY BRIEF UNTIL MARCH 31, 1959.

To the Honorable the Chief Justice and Associate Justices of the Supreme Court of the United States:

Complainants' amended application was filed November 3, 1958, and their brief in support thereof was filed November 19, 1958. Defendants' brief in opposition was filed January 19, 1959. On February 6, 1959, the Clerk granted the request of the Solicitor General that he be permitted to file the brief *amicus curiae,* requested by the Court, by March 16, 1959. Complainants now request that their time for filing a reply brief be extended to March 31, 1959.

Complainants' original application, filed in December 1957, for the same relief now sought was denied by the Court last term, with leave to re-file with more definite and certain allegations. Complainants now seek to supplement the allegations in their amended application with purported new facts to be added two and one-half months after defendants have submitted their answering brief in opposition. A reply brief, we submit, is not supposed to serve the function of a supplemental pleading or to present any facts which the defendants will not have an opportunity to refute.

Complainants give as a reason for their request for an extension of time to file their reply brief to March 31, 1959, that certain information needed will not be available until that time, and, in particular, refer to "a further study now being made by the Corps of Engineers, United States Army, concerning damages to navigation and shipping" resulting from the "diversion of domestic pumpage water at Chicago," and to additional data relating to the efficiency of other sewage disposal plants in the Great Lakes area.

These are not adequate grounds for the extension of time requested. Defendants are advised that the Solicitor General has requested information from the Corps of Engineers with respect to this proceeding. Brig. Gen. J. L. Person, U. S. A., Assistant Chief of Engineers for Civil Works, advised Congressman Yates (Illinois) on February 12, 1959, orally and by letter, that the only study the Corps is now making is that requested by the Solicitor General. (A copy of said letter is attached hereto as Exhibit "A".)

Complainants' desire to utilize in a reply brief matters not embodied in their amended application and their wish to reply to the Solicitor General do not justify granting complainants additional time.

The Solicitor General, who is now seeking additional information from both sides, should be able to base his presentation on the statements of both complainants and defendants without one side alone having the privilege of a subsequent reply.

Moreover, the subject matter of the studies being made by the Corps of Engineers and the matter of the operating efficiency of sewage plants would not be pertinent to the instant application. There is no connection between the operations of other sewage disposal plants in the Great Lakes area—or the plants of the defendants, for that matter—and the decree of 1930 permitting the discharge of sewage effluent in the Sanitary Canal and the Mississippi watershed. The Court in its 1930 decree (281 U. S. 179) enjoined the defendants from diverting, after December 31, 1938, more water than an annual average of 1500 c.f.s., in addition to domestic pumpage. The injunctive decree was entered upon a showing of injury to complainants, consisting in part of damage to navigation and shipping, and characterized by this Court as "great losses" in its earlier opinion (278 U. S. 367, 409).

In allowing a diversion of 1500 c.f.s., in addition to domestic pumpage, the Court did so upon a holding that the withdrawal of water for pumpage and the discharge of effluent into the Mississippi watershed was "more reasonable than the opposite demand." (281 U. S. 179, 200.) The Court said further (*ibid.*) that "the claims of the complainants should not be pressed to a logical extreme without regard to relative suffering and the time during which complainants have let the defendants go on without complaint." The Court's decision therefore rests partially on laches, as well as upon the application of equitable considerations analogous to the common law "reasonable use" theory, or the doctrine of "equitable apportionment," or "equitable division" of waters which has been applied by this Court in controversies between States.

Since, after a consideration of all the facts, including a showing of injury to shipping and navigation and other damage, the Court held the defendants' permanent withdrawal of water from Lake Michigan for domestic pumpage to be "more reasonable than the opposite demand," the withdrawal would not become unreasonable because of the damage now alleged or the alleged operating inefficiency of the sewage treatment plants of the Sanitary District which complainants now wish further time to develop.

WHEREFORE, defendants respectfully submit that the motion to extend the time for filing of a reply brief by complainants to March 31, 1959, be denied.

Respectfully submitted,

LATHAM CASTLE,
Attorney General, State of Illinois,

WILLIAM C. WINES,
Assistant Attorney General, State of Illinois,

GEORGE A. LANE,
Attorney, The Metropolitan Sanitary District of Greater Chicago,

Attorneys for the Defendants.

EXHIBIT A.

HEADQUARTERS
DEPARTMENT OF THE ARMY
Office of the Chief of Engineers
Washington 25, D. C.

In Reply Refer to
ENGWD

12 February 1959

Honorable Sidney R. Yates
House of Representatives

DEAR MR. YATES:

On 11 February you inquired concerning studies the Corps of Engineers has made on the evaluation of navigation losses attributable to the diversion of "domestic pumpage" at Chicago. It was indicated that the only study of this matter was made in order to supply information to the Solicitor General with respect to the amended application of certain Great Lake states to the Supreme Court.

In response to your request, I wish to confirm this information.

Sincerely yours,

STANLEY G. REIFF,
Col. C. E.,

J. L. PERSON,
Brigadier General, USA,
Assistant Chief of Engineers for
Civil Works.
In the absence of Gen. Person.

Office-Supreme Court, U.S.
FILED
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In the Supreme Court of the United States

OCTOBER TERM, 1958

No. 2, Original

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, COMPLAINANTS *v.* STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS, INTERVENING DEFENDANTS

No. 3, Original

STATE OF MICHIGAN, COMPLAINANT *v.* STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO

No. 4, Original

STATE OF NEW YORK, COMPLAINANT *v.* STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO

ON AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930, AND THE GRANTING OF FURTHER RELIEF

MEMORANDUM FOR THE UNITED STATES AS AMICUS CURIAE

POSITION OF THE UNITED STATES

After the complainants filed the present application, the Court invited the Solicitor General to submit the views of the United States on the matter. In order to aid the Court, the Solicitor General has submitted the parties' papers to, and consulted with, the Department of the Army, the Public Health Service, and the Department of State. The first two agencies have submitted their views in writing and their comments are attached as Appendices A and B. The prime interest of the Department of State arises out of the possible effect of the diversion on Canadian interests and the possible involvement of treaty obligations. Although Canada has objected to legislation for increased diversion, it has expressed no views to the State Department with reference to the present application, and therefore the State Department has not felt it appropriate to take any position at this time.

In addition, in order to be fully informed on the facts in the case and the legal position of the parties, the Solicitor General consulted with the attorneys and engineers of both parties and participated in a joint conference where both sides were given full opportunity to develop the issues, both factual and legal. Written inquiries were submitted to each and both have submitted answers and Illinois has provided additional factual material. The views expressed by the Department of the Army and the Public Health Service have been made known to the parties, and the written information submitted by each has been made available to the other. The comments made in this memorandum reflect, in some measure, the information thus obtained, as well as the facts alleged in the formal papers and briefs.

The United States has a direct interest in this litigation. Since navigable waters are involved, the

United States is concerned with protecting and fostering the use of the waterways. The Department of Health, Education, and Welfare, through the Public Health Service, has obligations with respect to promoting sanitary conditions. There is a substantial federal interest in the development of the St. Lawrence Seaway and of hydroelectric power in connection therewith. And the treaty obligations of the United States with Canada are a matter of concern. However, this memorandum is not intended to reflect solely the views of the United States by reason of the federal interests involved, but rather an analysis of the issues from the point of view of the welfare of the people of the United States as a whole. Quite properly, the parties to these proceedings must represent the particular interests of particular segments of the population. It has been our attempt to look at the problems from an over-all viewpoint.

QUESTIONS PRESENTED

1. Whether the Court should reopen and modify its decree of April 21, 1930, so as to require the State of Illinois and the Sanitary District of Chicago to discharge the District's sewage effluent into Lake Michigan rather than into the Sanitary Canal as is done under the present decree.

2. Whether the Court, alternatively, should appoint a Special Master to hold hearings and make recommendations as to such modification of the decree.

3. Whether the Court should take any other action looking toward modifying or supplementing its decree, particularly with respect to meeting future developments.

STATEMENT

Most of the background facts material to the present application appear in the Court's former opinion in this case, *Wisconsin* v. *Illinois,* 278 U.S. 367, 403–407. The Chicago Sanitary and Ship Canal was built by the Sanitary District of Chicago as a means of disposing of the sewage of the Chicago area. It extends from the Chicago River to Lockport, where it discharges into the Des Plaines River in the Mississippi watershed. In addition to water pumped from Lake Michigan for domestic use and discharged into the canal as sewage, the canal carries water drawn directly from the lake through the Chicago River, the natural flow of which is thereby reversed.[1] When the canal was opened in 1900 this direct diversion amounted to 2,541 cubic feet a second. On December 5, 1901, the Secretary of War authorized diversion of 250,000 cubic feet a minute (*i.e.,* 4,167 cubic feet a second), but he steadfastly refused to permit more, except when he authorized diversion of 350,000 cubic feet a minute for ten weeks in 1903 as a means of clearing the canal of accumulated sewage deposits. Nevertheless, the direct diversion increased to 5,751 cubic feet a second in 1909 and to 7,228 c.f.s. in 1916; it was 6,888 c.f.s. in 1926. The United States sued to enjoin this unauthorized diversion, and after protracted litigation secured a judgment which was affirmed by this Court in 1925. *Sanitary District of Chicago.* v. *United States,* 266 U.S. 405. However, to prevent excessive pollution of the canal the larger diversion was needed until Chicago established a sewage purification program; accordingly the Secretary of War on March 3, 1925, authorized diversion of 8,500 c.f.s. until December 31, 1929, on condition that a sewage treatment program of specified character be immediately begun.

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[1] Sewage and lake water are also brought into the canal by the Calumet-Sag Channel, an artificial waterway opened in 1922. It extends from Sag Junction, a point on the Sanitary Canal 12.4 miles from Lockport, to the Calumet River, the flow of which has been reversed to bring water into the channel from Lake Michigan. H. Doc. No. 180, 73d Cong., 2d Sess. (Cong. Doc. Ser. No. 9832), 18.

While the Government's case was pending, Wisconsin on July 14, 1922, began the suit which is now No. 2, Original; on October 5, 1925, an amended complaint was filed in which Minnesota, Ohio and Pennsylvania joined as co-complainants. They sought to enjoin the diversion from Lake Michigan on the ground that it was not authorized by Congress and had lowered the levels of Lakes Michigan, Huron, Erie and Ontario by about six inches, to the damage of the complainant States and in derogation of their rights. Missouri, Kentucky, Tennessee and Louisiana were allowed to intervene as defendants. *Wisconsin* v. *Illinois,* 46 S. Ct. 208. Michigan on March 8, 1926, and New York on October 18, 1926, filed similar complaints against Illinois and the Sanitary District (now Nos. 3 and 4, Original, respectively). The three cases were referred to Charles Evans Hughes as Special Master, *Wisconsin* v. *Illinois,* 271 U.S. 650, 273 U.S. 642, and Arkansas and Mississippi were allowed to intervene as defendants, 273 U.S. 644. While the cases were before the Special Master, the Court ordered the third paragraph of New York's complaint, alleging possible interference with water power development, stricken without prejudice, on the ground that it showed no present or definitely planned use of power which was being interfered with. *New York* v. *Illinois,* 274 U.S. 488. The report of the Special Master was filed thereafter, on November 23, 1927. *Wisconsin* v. *Illinois,* 72 L. Ed. 1015.

On exceptions to the Report of the Special Master, this Court held that under Section 10 of the Rivers and Harbors Act of March 3, 1899, 30 Stat. 1121, 1151, the Secretary of War had no authority to permit diversion of water from a navigable waterway of the United States except in aid of navigation. The Court found that the temporary and conditional permit to divert 8,500 c.f.s. was justified as being necessary to keep the Chicago River, as part of the Port of Chicago, free from deposits of sewage until improved means of sewage disposal could be provided. It referred the case back to the Special Master to report as to what could and should be done to provide better sewage disposal and to reduce the diversion to such amount, if any, as might be needed for navigational purposes. *Wisconsin* v. *Illinois,* 278 U.S. 367.

The Special Master's report on re-reference was filed on December 17, 1929. After hearing argument on exceptions to the report, the Court concluded that the best means of disposing of Chicago's sewage was to discharge it through the canal at Lockport, that a certain amount of water directly diverted from Lake Michigan was also needed to oxidize and carry off the sewage and prevent the pollution of navigable waters, and that the amount of such direct diversion could be greatly reduced when proper measures for sewage treatment had been adopted. Requiring rapid completion of the construction program proposed by the Sanitary District, the Court set a schedule for the direct diversion to be reduced to 6,500 c.f.s. by July 1, 1930; to 5,000 c.f.s. by December 31, 1935; and to 1,500 c.f.s. by December 31, 1938. This was to be in addition to the domestic pumpage, but included surface run-off of the Chicago area, which would normally have drained into Lake Michigan. The diversion was to be measured by subtracting the amount of the domestic pumpage from the amount of the total flow at Lockport. The Court ordered the District to file semiannual reports with the Court, reporting construction progress, the extent and effects of operation of the sewage plants, and the amount of water diverted. The Court rejected the complainants' requests that direct diversion from Lake Michigan be entirely stopped and the sewage effluent returned to the lake, saying (281. U.S. 179, 200):

> But purification is not absolute. How nearly perfect it will be with the colossal works that the defendants have started is somewhat a matter of speculation. The master estimates that with efficient operation the proposed treatment should reach an average of 85 per cent purification and probably will be 90 per cent or more. Even so we are somewhat surprised that the complainants should desire the effluent returned. The withdrawal of water for domestic purposes is not assailed by the complainants and we are of opinion that the course recommended by the master is more reasonable than the opposite demand. If the amount with-

> drawn should be excessive, it will be open to complaint. Whether the right for domestic use extends to great industrial plants within the District has not been argued but may be open to consideration at some future time.

The Court retained jurisdiction to modify its decree. *Wisconsin* v. *Illinois,* 281 U.S. 179, 201–202; 281 U.S. 696.

From Lockport, on the Des Plaines River, down to Utica, on the Illinois River, was originally not navigable, but in 1921 the State of Illinois began improvement of that stretch, called the Illinois Waterway,[2] designed to provide the final navigational link between Lake Michigan and the Mississippi River. However, the State funds were not sufficient to complete it, and in the Rivers and Harbors Act of July 3, 1930, 46 Stat. 918, 929, passed a few weeks after the Court's decree, Congress provided for taking over and completing the Illinois Waterway, as follows:

> Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water

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[2] "The so-called 'Illinois Waterway' extends from the head of the Lockport Lock to the foot of Starved Rock Lock on the Illinois River, a distance of 60 miles, of which 18 lie in or adjacent to the Des Plaines River, and 42 miles in or adjacent to the Illinois River." H. Doc. No. 184, 73d Cong., 2d Sess. (Cong. Doc. Ser. No. 9832), 17. The Starved Rock Lock is one mile above Utica. S. Doc. No. 126, 71st Cong., 2d Sess. (Cong. Doc. Ser. No. 9220), 42.

with which said project can be practically accomplished, in the development of a commercially useful waterway: *Provided,* That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000: *Provided further,* That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12, Original—October term, 1929, of Wisconsin and others against Illinois, and others, and Michigan against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway: *Provided further,* That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable.

The report called for by that Act (commonly called the "Sultan Report" after Lieutenant Colonel Dan I.

Sultan, the Corps of Engineers' District Engineer, its primary author) was submitted to Congress on December 7, 1933. H. Doc. No. 184, 73d Cong., 2d Sess. (Cong. Doc. Ser. No. 9832). On the basis of findings that domestic pumpage would average about 1,700 c.f.s. for some years to come (p. 48) and that the maximum amount of water needed for navigation on the waterway would be about 1,980 or 2,000 c.f.s. (pp. 11–12, 22–24, 48–50), the Board of Engineers for Rivers and Harbors concluded that the diversion of 1,500 c.f.s. allowed by the Court would meet the direct needs of navigation (p. 14), and the Chief of Engineers concurred in that view (pp. 5–6). However, the Chief of Engineers also accepted the recommendation that, after the sewage plants were in operation and the diversion reduced to 1,500 c.f.s., there should be a study to determine whether that was enough diversion to keep the waterway in a proper sanitary condition (pp. 6, 14, 22–24, 51–52).

The direct diversion was reduced in accordance with the Court's schedule, and since 1938 it has not exceeded, on an annual average, 1,500 c.f.s. except for a few temporary increases authorized by the Court or the Corps of Engineers to meet emergency situations.[3] Although the Chicago domestic pumpage had increased rather steadily from 449 c.f.s. in 1900 to 1,395 c.f.s. in 1926 (Special Master's Report of November 23, 1927, pages 22–23), it has remained at about 1,700 c.f.s. from 1930 to the present time (defendants' Brief in Opposition to the Amended Application, p. 6), despite steady increases in the area, population, and industry served. This has been accomplished by reduction of waste and leakage; but there is little question that this program has gone about as far as it can, and that it will not be long before increases in the population or industries served must be accompanied by some increase in the domestic pumpage.

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[3] The annual average rates of diversion are set out in a table in defendants' Brief in Opposition to the Amended Application, p. 6. The Court authorized diversion of 10,000 c.f.s. for ten days, Dec. 2–12, 1940, pursuant to stipulation, to clear accumulated sewage deposits from the canal. 311 U.S. 107. It permitted up to 8,500 c.f.s., in the discretion of the Corps of Engineers, from Dec. 17, 1956, through Feb. 28, 1957, to aid navigation at the Alton Lock on the Mississippi. 352 U.S. 945; 352 U.S. 983. The Chief of Engineers permitted slightly excessive diversion in 1942 (1,528 c.f.s.) and 1944 (1,521 c.f.s.)

Congress has several times considered proposals to increase the diversion temporarily, for the purpose of studying its effect on the waterway. H.R. 3300, 83d Cong., providing for diversion of an additional 1,000 c.f.s. for three years, and study of its effects,[4] was vetoed September 3, 1954, 100 Cong. Rec. 15569. H.R. 3210, 84th Cong., a similar measure,[5] was vetoed August 9, 1956, 102 Cong. Rec. 15304. H.R. 2, 85th Cong., to the same effect, passed the House but was not acted on by the Senate.[6] H.R. 1, 86th Cong., providing for one-year diversion of an additional 1,000 c.f.s. and three-year study of its effects on the Great

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as a war emergency measure in aid of navigation. See. S. Doc. No. 28, 85th Cong., 1st Sess., 12.

[4] H.R. 3300, 83d Cong., is set out in the Senate Public Works Committee Hearings on H.R. 3300, 83d Cong., 2d Sess. (Apr. 20, 1954), p. 1.

[5] H.R. 3210, 84th Cong., is set out in 101 Cong. Rec. 10002.

[6] H.R. 2, 85th Cong., is set out in the Senate Public Works Committee Hearings on H.R. 2 and S. 1123, 85th Cong., 2d Sess. (July 28, 29, Aug. 7, 1958), p. 11.

Lakes, the canal and waterway and the Mississippi River, passed the House on March 13, 1959. 105 Cong. Rec. (daily ed.) 3666–3703.[6a]

Except for the temporary increases in diversion already referred to (*supra,* p. 10), this Court has rejected all applications to modify its decree of 1930. On January 16, 1933, it denied such a motion made by Missouri and the other intervening States. 288 U.S. 587; see 289 U.S. 395, 396, fn. On May 22, 1933, it ruled that nothing in the Rivers and Harbors Act of 1930, 46 Stat. 918, 929, or the then pending treaty for the St. Lawrence Seaway required any change in the decree. 289 U.S. 395. On May 26, 1941, it dismissed a petition by Illinois to modify the decree. 313 U.S. 547. Motions by defendants for clarification of the decree were dismissed on October 23, 1950, 340 U.S. 858, and on December 17, 1956, 352 U.S. 947. On March 3, 1958, complainants' applications to amend the decree were denied, with leave to renew them on the basis of more definite and certain allegations. 355 U.S. 944. It is on such an amended application by the complainants that the matter is now before the Court.

The amended application, like its predecessors last Term, asks that the decree be reopened and amended so as to require the defendants to discharge the effluent of their sewage treatment plants into Lake Michigan rather than into the Mississippi River Basin through the canal at Lockport, as is now done. They do not challenge the direct diversion of 1,500 c.f.s. needed for navigation on the Illinois Waterway. Alternatively to the direct granting of the relief requested, the complainants ask that a Special Master be appointed to hold hearings and make recommendations to the Court on the matter. The reason for the application is to secure a greater depth of navigable water in the Great Lakes, particularly in their harbors and connecting channels, and, in the case of New York, to secure a greater flow of water for power purposes.

[6a] Canada has objected to the increased diversion proposed by the bills in the 83d, 84th, and 86th Congresses on the ground that it would impair navigation and hydro-electric development. While not specifically objecting to the bill before the 85th Congress, Canada did reserve its rights under the Boundary Waters Treaty of 1909.

DISCUSSION

I. THE COMPLAINANTS HAVE NOT SHOWN GROUNDS FOR MODIFYING THE DECREE SO AS TO REQUIRE CHICAGO'S SEWAGE EFFLUENT TO BE RETURNED TO LAKE MICHIGAN

1. THE NATURE OF THE PROCEEDING

This application does not bring before the Court a matter to be considered *de novo.* It is an application to reopen and amend the decree entered on April 21, 1930, under which the parties have been operating, with a few temporary emergency modifications, since that time. The Court's power to make such amendment is of course unquestionable, both because such jurisdiction was retained expressly by the terms of the decree and because it would exist independently of such expression in any event. *United States* v. *Swift & Co.,* 286 U.S. 106, 114. Nevertheless, the scope of the proceeding is more limited than if it were an original application. As the Court said in the *Swift* case (286 U.S. at 119),

> There is need to keep in mind steadily the limits of inquiry proper to the case before us.

> We are not framing a decree. We are asking ourselves whether anything has happened that will justify us now in changing a decree. The injunction, whether right or wrong, is not subject to impeachment in its application to the conditions that existed at its making. We are not at liberty to reverse under the guise of readjusting. Life is never static * * *. The inquiry for us is whether the changes are so important that dangers, once substantial, have become attenuated to a shadow.

The United States believes that the complainants have not thus far shown any such substantial changes in circumstances as to require or justify the modification of the decree which they request. Indeed, except as to the question of water power at the Niagara and the St. Lawrence Rivers, discussed *infra*, pp. 19-23, they do not show that circumstances have changed in any way at all.

2. RATE OF DOMESTIC PUMPAGE

The complainants set out (Amended Application, p. 8) figures showing that the total diversion (direct diversion plus domestic pumpage) was greater in 1954 than in 1939, and was still greater in 1956; but an examination of the more complete table in the defendants' Brief in Opposition to the Amended Application, p. 6, shows that this increase was not fairly representative of a trend, but resulted largely from annual fluctuations, plus the unusual diversion which the Court allowed for navigational reasons in 1956. The domestic pumpage was 1700 c.f.s. in 1930 and 1760 c.f.s. in 1958—certainly not an excessive increase for 28 years of population and industrial growth.[7] The complainants' allegation (Amended Application, p. 8) that the domestic pumpage is excessive, does not meet their burden of showing, even *prima facie,* that it has materially changed since the decree was entered in 1930.

3. CHANGES IN LAKE LEVELS

Again, while the complainants allege (Amended Application, p. 11) that diversion of the domestic pumpage has lowered Lakes Michigan and Huron by nearly two inches and Erie and Ontario by one inch from their natural levels, they make no showing that this is a changed or unforeseen circumstance. It is, on the contrary, merely a residual fraction of the much greater lowering caused by the larger diversion which existed prior to the decree. It is part of the situation that actually existed in 1930, and offers in itself no ground for modifying the decree. In his report of November 23, 1927, the Special Master found (pp. 104–105) that each 1,500 c.f.s. of diversion caused a lowering of about one inch in Lake Michigan. The Corps of Engineers now estimates that an increase of only 1,000 c.f.s. in the present diversion would lower Lake Michigan one inch. S. Doc. No. 28, 85th Cong., 1st Sess., 26. This re-evaluation apparently indicates that the 1930 decree, decreasing the diversion by 7,000 c.f.s., from 8,500 to 1,500 c.f.s., raised the level of Lake Michigan by seven inches instead of by only 4⅔ as the Special Master would have expected. This departure from the expectation of 1930 has of course been favorable to the complainants, and affords no ground for the modification of the decree which they seek.

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[7] That represents an increase of about 3½% in the domestic pumpage, while the population, according to the figures given in the Amended Application, pp. 4–5, has increased about 18%.

4. INJURIES TO NAVIGATION

The Amended Application alleges (pp. 11–14) that the lowering of lake levels by the Chicago diversion injures navigation by reducing the loading limits of the larger vessels, necessitates additional dredging in harbors and channels, obstructs unimproved inlets used by small craft, and impairs the value of terminal facilities. It also alleges damage of a non-navigational character to riparian properties. While some losses of the sorts mentioned undoubtedly result from the lowering of the lake levels, we believe that they are substantially overstated by the complainants. For example, the Amended Application (p. 12) states the annual loss of cargo capacity at more than 2,500,000 tons, or more than $4,000,000 in revenue. The Corps of Engineers, however, estimates the annual loss to American shipping at something under 600,000 tons, with about $660,000 value.[8] In any event, it does not appear that losses of this character were unforseen in 1930, or that their amount has so exceeded what was then expected as to require revision of the decree.[9]

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[8] Memorandum of February 12, 1959, prepared by the Chief of Engineers and submitted to the Solicitor General by letter of February 27, 1959, from the Secretary of the Army. Appendix A, *infra*, pp. 39, 40–42.

[9] The allegation (Amended Application, p. 13) of reduction in the value of terminal facilities is hard to understand, unless it refers to potential values never yet realized, or to facilities built before 1901. Diversion at Chicago has been continuous since 1900; since 1901 it has been considerably greater than at

5. ADEQUACY OF SEWAGE TREATMENT

The Amended Application alleges (pp. 5–7) serious deficiencies in the Sanitary District's collection and handling of its sewage, so that its treatment plant effluent and sewage overflow cause pollution in the Sanitary Canal. Any such conditions should of course be corrected so far as possible; but it does not appear that the present complainants are in any way injured by them. Moreover, if such deficiencies do exist, they would seem to provide the strongest reason for keeping the Sanitary District's effluent and overflow sewage out of Lake Michigan, the source of Chicago's domestic water supply, rather than discharging it therein as complainants seek.

In the Government's view, the relevancy of sewage treatment to the present question is that, if treatment techniques have so improved since 1930 that a substantially higher degree of purification can be achieved now than was possible then, the improvement might properly incline the Court to re-examine its decision not to require the Sanitary District to return its effluent to Lake Michigan. But it seems that no such improvement in the science of sewage treatment has yet occurred. In 1930 the Court said, "The master estimates that with efficient operation the proposed treatment should reach an average of 85 per cent purification and probably will be 90 per cent or more." *Wisconsin* v. *Illinois,* 281 U.S. 179, 200. The Public Health Service advises us that in a large-scale operation, such as that at Chicago, an over-all average of

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present in most years, and never very substantially less. See S. Doc. No. 28, 85th Cong., 1st Sess., p. 58, and defendants' Brief in Opposition to the Amended Application, p. 6.

from 90% to 95% purification is about the best that can be achieved by modern methods, and the complainants do not question that conclusion. In response to a question put to them by the Solicitor General, the complainants have stated that at present "The activated sludge process type of treatment when properly protected and employed can produce operating efficiencies in the range of 90% to 95%" removal of biochemical oxygen demand (one of the basic measures of purification). Between the Special Master's "probable 90% or more" of 1930 and the complainants' "range of 90% to 95%" of today we find no change "so important that dangers,[10] once substantial, have become attenuated to a shadow." *United States* v. *Swift & Co.,* 286 U.S. 106, 119.

6. ANTICIPATED INCREASES IN PUMPAGE

The complainants allege (Amended Application, pp. 5, 9) that there will be substantial future increases in the population of the Chicago area, and consequently in the amount of water drawn from Lake Michigan for domestic and other uses. Such increases appear virtually inevitable, although their extent is of course uncertain, but they can hardly be considered a development that was unforeseen in 1930. Since any substantial increase in the domestic pumpage remains now, as it was then, a mere matter of expectation, it appears to give no ground for immediate entry of an order modifying the decree so as to require the sewage plant effluent to be returned to Lake Michigan.

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[10] I.e., the danger that effluent in Lake Michigan would pollute Chicago's water supply.

7. POWER LOSSES

Finally, there are the allegations (Amended Application, pp. 14–15) that the diversion of Chicago's domestic pumpage reduces the amount of water available to the Power Authority of the State of New York for power purposes at the Niagara and St. Lawrence Rivers. These are a reassertion of the claim which was dismissed without prejudice in *New York* v. *Illinois,* 274 U.S. 488, New York having in the meantime overcome, by actual or scheduled construction, the objection which led to that dismissal, *i.e.,* that no present or planned power development was yet being interfered with. We do not question that the Chicago diversion now withholds water which the Power Authority of the State of New York has or will soon have facilities for using, although the Corps of Engineers is unable to confirm the allegations as to the resulting monetary loss in capacity value.[11] We do not question that the complainants have standing to raise the issue. The value in the flow of a navigable river is a value that inheres in the navigation servitude of the Federal Government, and which the Government can grant or withhold as it chooses. *United States* v. *Twin City Power Co.,* 350 U.S. 222, 225. The plenary power of Congress over navigable waters empowers it to deny the privilege of obstructing them, or to impose terms on a grant of the privelege. *United States* v. *Appalachian Electric Power Co.,* 311 U.S. 377, 427. Unless the State of New York or its Power Authority has a federal permit to use for power purposes the water which is now being diverted at Chicago, the diversion of that water invades no right of New York and so provides no ground for relief to that State. New York has not shown that it or its instrumentality has such a permit, and we think that it cannot do so.

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[11] See Appendix A, *infra,* pp. 43–44. The Corps of Engineers considers the estimate of energy loss to be reasonable.

The International Boundary Waters Treaty of January 11, 1909, 36 Stat. 2448, between the United States and Great Britain, provided (Art. V, 36 Stat. 2450) that the United States could authorize diversion, for power purposes, of up to 20,000 c.f.s. of water of the Niagara River above the Falls; and (Art. VIII, 36 Stat. 2451) that power use of other boundary waters should be approved by an International Joint Commission, established by the treaty. The Niagara River Water Diversion Treaty with Canada, February 27, 1950, 1 U.S.T. 694, substituted new provisions as to the Niagara River: that stated quantities of water should be allowed to go over the Falls, and that each Government could license power use of half of the total remaining outflow of Lake Erie (excepting water used for domestic and sanitary purposes and for the service of canals for navigation, and certain water brought into the drainage basin by Canada and reserved to Canadian power use under a prior arrangement).

By the Act of August 21, 1957, 71 Stat. 401, Congress directed the Federal Power Commission to license the Power Authority of the State of New York to use all of the water of the Niagara River available to the United States for power purposes. There was thus authorized for the Power Authority one half of the outflow of Lake Erie, in excess of the water reserved for the falls and certain other exceptions. Water diverted at Chicago is not part of the outflow of Lake Erie; and since the Chicago diversion received federal approval long before the Act of August 21, 1957, the Power Authority's license to use a certain part of the outflow of Lake Erie cannot be understood as nullifying the prior federal license under which certain water never became part of that outflow. The Chicago diversion of 1,500 c.f.s. plus domestic pumpage was authorized by this Court's decree of April 21, 1930, *Wisconsin* v. *Illinois,* 281 U.S. 696. On June 26, 1930, the Secretary of War authorized diversion of the amount of water specified in the decree,[12] and by the Rivers and Harbors Act of July 3, 1930, 46 Stat. 918, 929 (*supra,* pp. 8–9), Congress provided that the water authorized at Lockport by the decree should be used for navigation of the Illinois Waterway. Existing federal authority for the present Chicago diversion is thus plain. While there is no doubt that that authority can be withdrawn, and that if it is, the position of the Power Authority of the State of New York will be improved, that does not give the Power Authority any basis for seeking its withdrawal. Having been licensed only as to a residuum, the Power Authority must accept that residuum as it finds it.

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[12] The permit issued by the Secretary of War is set out in the Motion for Leave to File and Brief of the Chicago Association of Commerce and Industry as *Amicus Curiae* in Opposition to the Amended Application, pp. 28–30.

The case is equally clear as to the Power Authority's rights relating to the International Rapids[13] section of the St. Lawrence River. Under the 1909 treaty, the International Joint Commission gave the United States permission for that project, to be carried out by an agency to be named by the United States. The approval was originally given on October 29, 1952, and is set out in the St. Lawrence Seaway Manual, S. Doc. No. 165, 83d Cong., 2d Sess. (Cong. Doc. Ser. No. 11760), 137–143, and in 27 State Dept. Bull. 1019–1024 (Dec. 29, 1952). On July 15, 1953, the Federal Power Commission licensed the Power Authority of the State of New York to construct and operate the project. St. Lawrence Seaway Manual, *supra,* 150–156. On November 4, 1953, the President, by Executive Order No. 10500, designated the Power Authority of the State of New York as the agency to construct the project under the approval given by the International Joint Commission. 18 Fed. Reg. 7005 (Nov. 6, 1953); St. Lawrence Seaway Manual, *supra,* 156–158.

On July 2, 1956, the approval given by the International Joint Commission was amended. 35 State Dept. Bull. 227–229 (Aug. 6, 1956). That amendment provides, among other things:

> * * * The regulated outflow from Lake Ontario from 1 April to 15 December shall be such as not to reduce the minimum level of Montreal Harbour below that which would have occurred

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[13] The International Rapids section of the St. Lawrence River extends from Chimney Point, N.Y., to St. Regis, N.Y., a distance of about 48 miles. See St. Lawrence Seaway Manual 120, and plate 2 facing page 16.

> in the past with the supplies to Lake Ontario since 1860 adjusted to a condition assuming a continuous diversion out of the Great Lakes Basin of 3,100 cubic feet per second at Chicago and a continuous diversion into the Great Lakes Basin of 5,000 cubic feet per second from the Albany River Basin (hereinafter called the "supplies of the past as adjusted"). [35 State Dept. Bull. 229.]

This makes it clear that water levels as reduced by the diversion of 3,100 c.f.s. at Chicago were taken as normal for purposes of the project, emphasizing, if emphasis be needed, that here as at Niagara the permit is to be understood as applying only to such water as remains after the previously authorized diversion.

We conclude that the Amended Application does not show facts which would justify modification of the 1930 decree at this time to require the defendants to return the Sanitary District's sewage plant effluent to Lake Michigan.

8. EFFECT OF THE RIVERS AND HARBORS ACT OF JULY 3, 1930

While we thus agree with the defendants, that a basis for modification in the way sought has not been presented, we do not agree with their further position that Congress, in the Rivers and Harbors Act of July 3, 1930, authorized the present diversion so as to prevent the Court from forbidding it now. That Act provided (*supra,* p. 9) that "the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930 * * * is hereby authorized to be used for the navigation of said [Illinois] waterway * * *."

Since in its decree the Court expressly retained a power of modification, this raises the question of whether Congress intended to authorize the amount of water provided by the decree as originally entered, or the amount of water that might be provided by the decree as modified from time to time. The defendants (Brief in Opposition to the Amended Application, pp. 27–29) and the Chicago Association of Commerce and Industry in its tendered *amicus curiae* brief contend that Congress adopted the fixed amount of the original decree. Our examination of the legislative history of the Act persuades us that Congress intended to refer to such amount as was permitted by the decree as it might be modified from time to time.

As originally introduced, the bill (H.R. 11781, 71st Cong., 2d Sess.) did not contain the quoted language; it was added by a floor amendment introduced by Senator Blaine of Wisconsin (72 Cong. Rec. 10640) although he was not the author of it (72 Cong. Rec. 11003). Senator Vandenberg of Michigan made the initial presentation of the amendment to the Senate (72 Cong. Rec. 10996–11002), emphasizing the adequacy of the flow provided by the Court's decree (72 Cong. Rec. 10998). When Senator McCulloch of Ohio asked if the decree were not subject to modification, Senator Vandenberg agreed:

> The Senator, of course, is entirely correct. * * * I believe that Illinois and Chicago can go back to that court—we, the complaining States—can go back to that court, and on a good-faith showing of legitimate facts, I have

> no doubt in my mind whatever that ample relief either way will be cheerfully granted. [72 Cong. Rec. 11000.]

Senator Glenn of Illinois then took up the questioning:

> In connection with the interrogatory propounded by the Senator from Ohio, is it not likewise true that the flow of 1,000 or 1,500 cubic feet permitted by the Supreme Court decision for the navigation of the Chicago River, as a result of improved methods of sanitation or sewage disposal, upon application of any interested party could be cut in two, could be cut to 500 or even 250 feet possibly? In other words, is it not an unstable, unfixed, indefinite amount that is stated?
>
> Mr. VANDENBERG. I think the Senator from Illinois may state a correct proposition of law * * *.
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> * * * * *
>
> Mr. GLENN. The Supreme Court has said that if there is an improvement in plans for sewage disposal, then the Lake States, Michigan or Ohio, or anybody interested, can come in, and the flow, upon a proper showing, can be cut down.
>
> Mr. VANDENBERG. That is true, as I understand it, although I hesitate to pass upon the legal phase.
>
> Mr. GLENN. If that is true, under the Blaine amendment no one knows how much water will be available for the Chicago waterway canal. We may have the 1,500 feet, we may have 1,000 feet, we may have 500 feet, we may have even

> less. It is an unstable, indefinite, unfixed amount upon which nobody can depend. * * *
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> * * * * *
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> Mr. VANDENBERG. * * * I think the Senator from Illinois is entirely justified in the point he makes that an appeal to the court can work both ways.
>
> Mr. GLENN. Or either way.
>
> Mr. VANDENBERG. I will not deny that for a moment, but I do deny that there is in that situation any such hazard as he describes. [72 Cong. Rec. 11000.]

Senator Blaine then took over the defense of the amendment. He did not deny that it provided for an amount of water that would vary with future changes in the decree, but contented himself with explaining his reasons for believing that the Court would not reduce the amount of water already provided for. His view seems to have been based on a belief that the Court, by finding a diversion of 1,500 c.f.s. to be needed for navigation in the Chicago River, had put that amount beyond its power to reduce.

> Mr. BLAINE. If the Senator will permit the suggestion, in my opinion the position of the Senator from Illinois is wholly in error *if I read the decision of the Supreme Court correctly* * * *. [72 Cong. Rec. 11000; emphasis added.]

A little later, Senator Glenn returned to his question:

> * * * Is there really any guaranty to the commerce of the United States that we shall have any specific amount of water under this decree

of the Supreme Court, which is expressly kept open for possible modification?

Mr. Blaine. Mr. President, I am very happy to answer the Senator's question.

In the first place, the Senator has a far-fetched supposition. I do not believe that the full purport and meaning and intention of the Supreme Court decree is fully understood. It is true that the court has provided that either party to the suit may petition at the foot of the judgment for a modification of the decree. That is true; but for whose protection is such a provision made in the decree? For the protection of the city of Chicago.

* * * * *

I have pointed out that the Supreme Court, in order to find a legal basis to permit 1,500 cubic feet per second, necessarily made reference to the fact that 1,500 cubic-feet seconds were useful for navigation in the port of Chicago. The Supreme Court directly declared that it would not consider the question of diversion from the standpoint of navigation; that Congress had not acted, and therefore the Supreme Court would not intervene in that matter. In other words, if 1,500 cubic feet in the port of Chicago is for navigation, the Supreme Court has no equitable jurisdiction over that. The case is one in equity.

* * * * *

If it is found that less than 1,500 cubic feet are necessary for sewage disposal, I appreciate that the Supreme Court can modify its decision accordingly. But if the showing is made that, notwithstanding the fact that less than 1,500 cubic feet are needed for sewage disposal, not-

> withstanding the fact that a showing may be made that a thousand cubic feet per second may be all that is necessary for sewage disposal, the water in the Chicago River which affects the port of Chicago for navigation purposes is 1,500 cubic feet per second. [72 Cong. Rec. 11005–11006.]

Senator Deneen of Illinois clearly expressed the view that the amendment did not adopt as fixed amounts the amounts stated in the decree as originally entered. He said:

> The decree incorporated in the Blaine amendment does not furnish a definite amount of water. It is elastic. * * * The decree provides, however, that either party, on the filing of the semiannual report, may come in and open up again the question of diversion.
>
> If, for instance, the sanitary district should be able, by the plants constructed at the cost of $176,000,000, and acting in good faith, to dispose of only 50 per cent of the sewage, the sanitary district would have the right to come into court to ask for a larger diversion; but if, in the progress of the art, the sanitary district, under the supervision of the court and the supervision of the complainants, should be able to dispose of 100 per cent of the sewage, then the court would enter a decree forbidding it to divert 1 cubic foot of water from the lake. Then what would become of your navigation? You would have a waterway without adequate water. You are trying by this amendment to place an indefinite, uncertain provision of a decree relating to sanitation into a law relating to navigation of a great waterway which con-

> nects the channels of the Mississippi system with those of the Great Lakes and the St. Lawrence systems. The decree can not be made definite, but may be altered every six months. [72 Cong. Rec. 11183.]

Senator Deneen repeated that view later (72 Cong. Rec. 11185). When the amended bill was returned to the House, Congressman Chindblom said, "in the Senate amendment, the flow of water for navigation purposes is fixed and limited by the decree of the court as to the amount of water that may hereafter be diverted for sanitation purposes alone through the Chicago Sanitary District Canal * * *." 72 Cong. Rec. 11599.

Nowhere in the legislative history have we found any suggestion that these views were incorrect, and that the Act would adopt the original decree rather than the decree as it might be amended. We conclude that the Act in no wise prevents the Court from modifying its decree.

II. THE COMPLAINANTS HAVE NOT SHOWN GROUNDS FOR APPOINTMENT OF A SPECIAL MASTER TO INQUIRE INTO THEIR ALLEGATIONS

As we have indicated, the complainants have not shown any changes in circumstances since entry of the 1930 decree of sufficient magnitude to justify reopening and modifying the decree, under the rules applicable to such proceedings. That being so, no purpose could be served by appointing a Special Master to inquire into their allegations. And since it does not appear that the complainants are in any way injured by deficiencies, if any, in the operations of the Sanitary District, there appears to be an equal lack of reason for considering the appointment of a Permanent Master to supervise those operations.

III. THE UNITED STATES SUGGESTS APPOINTMENT OF A SPECIAL MASTER TO RE-EVALUATE THE NEEDS OF ALL PARTIES AND MAKE RECOMMENDATIONS AS TO THE FUTURE PATTERN OF DEVELOPMENT OF THE SITUATION, LOOKING TOWARD ENTRY IF NECESSARY OF A SUPPLEMENTAL DECREE

For the reasons stated, we believe that the complainants have failed to sustain their burden of making sufficient allegations, and that the relief which they seek should be denied at this time. We are nevertheless extremely reluctant to see this case disposed of simply on that legal basis. We have here serious and important conflicts in the interests of communities forming a large segment of the United States, affecting their whole economies and indeed their very lives. At issue is the destiny of the Great Lakes, one of the Nation's greatest natural resources. Ordinary prudence seems to us to dictate that the problem be approached, so far as possible, on a broader basis than the mere requirements of equity procedure. We fully realize that this was done in 1930 and that, as we have just pointed out, no substantial change in circumstances has supervened; and that the equity rule that a decree in such case shall not be re-examined is a good and necessary rule. Our concern, however, is not with the present operation of the decree but rather with the course that should be taken regarding future developments. In a situation like this, changes come not suddenly but little by little—conditions develop much as a coral reef develops, and are fully as difficult to alter afterward. For example, since 1930 the Sanitary District has developed its sewage disposal system on the basis of discharging into the canal (justifiably, we believe, under the decree), and it now reasonably urges the magnitude of that development as an argument against being required to change it. If allowed to do so, it will continue in the same direction, and by the time changes have become so major as to warrant re-opening the decree, their mere size will hinder any remedial action. Perhaps no alternative exists; but we feel that if events are to move in that direction it should be the result of an informed choice and not of mere inertia. Accordingly, we suggest that the Court appoint a Special Master to review the whole situation, not to change the present decree as applied to the present facts, but to recommend whether a supplemental decree be needed, and if so, what it should be, with respect to future changes as they may come.

We think this is important not only for the practical engineering benefits that may flow from it, but also for the good it may do in eliminating what has been a long-standing source of ill-will among the States involved. We believe that until a thorough and impartial inquiry is conducted and a definite conclusion established, this unresolved dispute will continue to grow and rankle among the States of the Great Lakes Basin, like a festering sore on the body politic, poisoning the development of that entire area. A careful inquiry leading to a settled plan for future developments, if it would not content all the parties, should at least satisfy them that their problems and grievances have been duly considered and an answer settled upon, permitting them to turn their attention to other matters in a more harmonious atmosphere.

We do not mean to suggest that we can offer any efficient solution to all the problems involved. They are infinitely complex, and may even appear almost insoluble. There is no doubt that, as time passes, Chicago will need more water. So will nearby communities, whose supplies of ground water are running out—for example, the Elmhurst-Villa Park-Lombard district involved in No. 15, Original, now before the Court.[14] Certainly the needs of these communities must be met in some way, and some means must be found for disposing of their sewage effluent, which will increase correspondingly with their water use. Even the present amount of sewage and effluent discharged into the canal requires substantial dilution with water directly diverted from the lake, to prevent excessive pollution. For years, Illinois has been urging that a much larger diversion is already required (*supra,* pp. 11-12), and it seems inevitable that any substantial increase in the sewage and effluent discharged would call for still more diversion. There is a very real limit to the capacity of the canal to handle such an increased flow without the creation of a current so strong as to interfere with navigation; and quite apart from that consideration, such a twofold increase in the draft on Lake Michigan would eventually reduce lake levels, particularly during low-water cycles, to an extent that would interfere excessively with navigation and with other interests of cities and landowners situated on the lakes. Not only would American interests be affected, but serious complications with Canada can be foreseen. While such developments, of any serious magnitude, are still some distance in the future, it seems prudent to consider and prepare for them, so far as possible, before they become imminent.

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[14] *Illinois* v. *Michigan, Ohio, Pennsylvania, Minnesota, New York and Wisconsin.*

The solution urged by the complainants, of returning the Sanitary District's effluent to the lake, offers difficulties at Chicago that do not face other lake cities. Chicago's population is far larger than that of any other city on the Great Lakes.[15] At Chicago, Lake Michigan is relatively shallow; to reach a depth of 300 feet one must go out 20 or 30 miles at Chicago, as compared with less than 10 miles, for example, at Milwaukee. In the southern end of Lake Michigan, too, the currents are slight and variable, depending chiefly on the effect of surface winds; in the long run, there tends to be a counter-clockwise circulation in the whole southern end of the lake.[16] These factors would make it extremely difficult to assure that sewage effluent discharged into the lake would be adequately dispersed and diluted, and that it would not sometimes drift back to the city's water intakes. Cost, too, is a matter to be considered in weighing the desirability of various solutions to the problem On December 29, 1958, a prominent engineering firm gave the Sanitary District an estimate that the cost of constructing facilities for discharging its effluent into Lake Michigan would probably exceed $300,000,000. Of course the District should not be allowed to infringe the rights of others in the Great Lakes, merely to avoid proper expenses of its own operations; at the same time, an expenditure of that magnitude should not be imposed on it without a substantial showing that it is necessary and will be efficacious.

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[15] At the 1950 census, Chicago had a population of 3,620,962, as compared with 1,849,568 for Detroit, 914,808 for Cleveland, 637,392 for Milwaukee, 580,132 for Buffalo, 332,488 for Rochester, 130,803 for Erie and 104,511 for Duluth. *World Almanac* (1959), 274–287. In 1956 Toronto had a population of 667,706 and Hamilton had 239,625. *Ibid.*, 326.

[16] See Hough, *Geology of the Great Lakes* (1958) 9, 35–43.

It may be that some intermediate solution can be achieved, such as discharging part of the effluent into Lake Michigan, so that the total diversion can be held at the present level despite future increases in the domestic pumpage; or perhaps intensive study of sewage treatment could lead to methods that would diminish the need for direct diversion, offsetting increases in the pumpage. Along another line, it is possible that lake levels could be restored by compensating or regulating works at the lake outlets. See S. Doc. No. 28, 85th Cong., 1st Sess., 26–27. We suggest these only as illustrative of what we might hope for from a thorough study of the whole situation. The commentary on the briefs and pleadings now before the Court, furnished to the Solicitor General by the Department of Health, Education, and Welfare, attached hereto as Appendix B (*infra*, pp. 45–55), shows that at almost every point the Public

Health Service feels that further study is needed before any conclusion can be reached on the ultimate problems of water supply and sewage disposal that are involved. We believe that appointment of a Special Master to supervise such studies and to correlate the results affords the most satisfactory method for dealing with this situation.[17]

It seems to us essential that the making of such a study be under the direction of this Court. The problem is basically that of apportioning the water of an interstate body of water. As the Court explained in *Kansas* v. *Colorado,* 206 U.S. 46, in the absence of interstate agreement (and such agreement is here conspicuously absent), this Court may be the only body competent to make such apportionment. Lake Michigan is of course a navigable body of water, and so is subject to congressional control in a way that the Arkansas River in *Kansas* v. *Colorado* was not; nevertheless, it has not been decided that apportionment of its water among the riparian States is within the competence of Congress under the commerce power.

> * * * It does not follow, however, that because Congress cannot determine the rule which shall control between the two States or because neither State can enforce its own policy upon the other, that the controversy ceases to be one of a justiciable nature, or that there is no power which can take cognizance of the con-

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[17] Recently, the Solicitor General urged the parties to explore the possibility of solving their problems through cooperative studies and negotiation; but the present indications are that this approach is not likely to be fruitful.

> troversy and determine the relative rights of the two States. Indeed, the disagreement, coupled with its effect upon a stream passing through the two States, makes a matter for investigation and determination by this court. [*Kansas* v. *Colorado,* 206 U.S. 46, 95–96.]
> * * * As Congress cannot make compacts between the States, as it cannot, in respect to certain matters, by legislation compel their separate action, disputes between them must be settled either by force or else by appeal to tribunals empowered to determine the right and wrong thereof. Force under our system of Government is eliminated. The clear language of the Constitution vests in this court the power to settle those disputes. [*Id.* at 97.]
> * * * [W]henever, as in the case of *Missouri* v. *Illinois,* 180 U.S. 208, the action of one State reaches through the agency of natural laws into the territory of another State, the question of the extent and the limitations of the rights of the two States becomes a matter of justiciable dispute between them, and this court is called upon to settle that dispute in such a way as will recognize the equal rights of both and at the same time establish justice between them. In other words, through these successive disputes and decisions this court is practically building up what may not improperly be called interstate common law. [*Id.* at 98.]

Cf. *Hinderlider* v. *La Plata Co.,* 304 U.S. 92, 104–105.

Notwithstanding that the complainants have failed to make out a case for the particular relief which they now seek, we think it clear that there is a justiciable controversy before the Court so long as the Court continues, by its injunction, to control the defendants' conduct for the benefit of the complainants. There can be no doubt that the Court has continuing jurisdiction over the injunction which it entered in 1930. *United States* v. *Swift & Co.*, 286 U.S. 106, 114. We conceive that this jurisdiction is not confined to enforcing the present terms of the injunction or modifying it to meet new conditions actually experienced or imminently anticipated. We believe that the equity power of the Court necessarily includes the power to exercise reasonable foresight in planning for the future, particularly where, as here, large public interests may suffer serious injury otherwise. We suggest that after the lapse of nearly thirty years it is wholly appropriate for the Court to appoint a Special Master to re-evaluate the demands and potentialities of the situation, so far as concerns developments reasonably to be expected in the future as well as improvements that might help the present situation.

While we have not attempted to map out a procedure for such a Special Master, it is suggested that his primary function would not be to hold hearings and receive evidence. Rather, he should be instructed to conduct his own investigation using the facilities of the Department of the Army and the Public Health Service insofar as they can be made available to him. From our own experience with the parties it can be anticipated that both sides would cooperate fully in providing him with information. The Court could, of course, empower him to subpoena records and call for evidence where necessary. His report to the Court could serve as a focal point for agreement among the parties, or at least would narrow the issues by providing specific findings and proposals to which the parties could address themselves. We believe that a precedent for this sort of independent investigation by a Special Master is found (though obviously on a smaller scale) in *United States* v. *California,* 334 U.S. 855, 856, where the Court ordered appointment of a Special Master "to make inquiry into this subject and to hold hearings, *if he finds it necessary,* in order to make recommendations to this Court" (emphasis added). Plainly the Court contemplated primarily an independent inquiry by the Special Master. We believe that the nature of the present problem would make that the most effective procedure here, likewise.

CONCLUSION

For the foregoing reasons, the United States believes that the Court should not now amend the 1930 decree so as to require the discharge of the Sanitary District's sewage effluent into Lake Michigan, but that the Court should appoint a Special Master to supervise the making of studies of all the problems involved and to report to the Court what course should be followed in this situation in planning to meet the necessary requirements of the area affected.

Respectfully submitted.

J. LEE RANKIN,
Solicitor General.
JOHN F. DAVIS,
Assistant to the Solicitor General.
GEORGE S. SWARTH,
Attorney.

APRIL 1959.

APPENDIX A

Letter of February 27, 1959, from the Secretary of the Army to the Solicitor General, transmitting comments of the Chief of Engineers on matters of navigation and engineering contained in the complainants' Amended Application

Department of the Army

Washington 25, D.C., *February 27, 1959.*

Honorable J. Lee Rankin,
Solicitor General of the United States,
Department of Justice, Washington, D.C.

Dear Mr. Rankin: In your letter of 14 January to Major General Emerson C. Itschner, Chief of Engineers, you request his views as to the facts stated in the documents filed with the Supreme Court concerning Lake Michigan diversions at Chicago. The amended application now pending in the Supreme Court would require the State of Illinois and the Metropolitan Sanitary District of Greater Chicago to return the effluent from "domestic pumpage" to Lake Michigan.

Attached is an analysis prepared by Major General Itschner of the amended application.

Sincerely yours,

Wilber M. Brucker,
Wilber M. Brucker,
Secretary of the Army.

1 Incl. Analysis (in dup).

12 FEBRUARY 1959.

ANALYSIS OF AMENDED APPLICATION BY THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK TO THE U.S. SUPREME COURT FOR REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 RE LAKE MICHIGAN DIVERSIONS AT CHICAGO

The following analysis of the Amended Application to the U.S. Supreme Court has been prepared in response to request from the Solicitor General, Department of Justice, as contained in his letter of 14 January. The amended application is in further support of the original application in which it was requested that the State of Illinois and the Metropolitan Sanitary District of Greater Chicago be required to return the effluent from "domestic pumpage" to Lake Michigan. The original application was denied by court order entered on 3 March 1958.

It is stated in the first paragraph on page 12 of the amended application:

> It decreases the carrying capacity of the large lake vessels by from 180 to 200 tons per cargo. It takes away annually more than 2,500,000 tons of carrying capacity of the Great Lakes vessels at a loss of more than $4,000,000 in annual revenues.

The estimate of decrease in carrying capacity of large lake vessels of 180 to 200 tons per cargo for a decrease in draft of 1.8 inches is considered to be of the proper magnitude.

The estimate of annual tonnage loss of 2,500,000 tons with a value of $4,000,000 appears to be based on an assumption of full utilization of the United States and Canadian Great Lakes fleet with lake levels so low that all vessels would be affected. We do not have sufficient information on the composition of the

Canadian fleet to estimate the reduction in its capacity. In paragraph 172 of Senate Document 28, 85th Congress, the Corps of Engineers estimated that the reduction in capacity for the United States Great Lakes fleet under similar assumptions for a permanent increase in diversion of 1,000 cubic feet per second would be 1,000,000 tons. This reduction of capacity for a diversion of 1,800 cubic feet per second would be 1,800,000 tons on the same basis. However, as a practical matter, the assumed conditions on which the above estimates are based could never occur since some of the smaller, lighter draft vessels in the fleet would not be restricted in their loading because of limited channel depths even during periods of low lake stages.

The average annual loss to the United States Great Lakes fleet as determined in Senate Document 28 for a permanent increase in diversion of 1,000 cubic feet per second, was 300,000 tons (page 47). The results of that study are still considered to be valid based on data available at that time, but are subject to some adjustment due to more up-to-date information.

It is considered that the most reasonable estimate of average annual losses to the United States Great Lakes fleet, resulting from a lowering of lake levels due to an increase in diversions, should be based on the criteria used in the study in Senate Document 28. These criteria are as follows:

a. The anticipated United States Great Lakes Commerce and fleet as of 1985.

b. The present general pattern of traffic on the Great Lakes.

c. Waterway improvements to the connecting channels and harbors which can be expected to be accomplished.

d. The natural variation in levels of the Great Lakes.

The current analysis has been based on the fluctuation of lake levels as occurred for the 35-year period 1922–1956 in accordance with the criteria listed above. With use of data comparable to that available for the Senate Document 28 studies, it is estimated that with a permanent increase in diversion of 1,800 cubic feet per second the average annual loss would be 540,000 tons. Recent studies of future traffic in iron ore and stone indicate that estimates used in Senate Document 28 should be revised upward about 10 percent. More recent estimates are not available for prospective traffic in other commodities. It is considered appropriate to increase the estimated average annual loss in Senate Document 28 by 10 percent, from 300,000 tons to 330,000 tons, and to also increase by 10 percent the estimate of annual losses for a diversion of 1,800 cubic feet per second from 540,000 tons to 594,000 tons, say in round numbers 600,000 tons.

The ~~value~~ of $0.80 per ton as used in Senate Document 28 has been reviewed in the light of more recent information on cost of transportation as developed in connection with the Great Lakes harbor studies. In these studies, the actual cost per ton varied from $0.34 per ton for short haul coal trips to $1.80 per ton for grain from Duluth to Buffalo. The estimated composite or weighted average cost is considered to be $1.10 per ton. Accordingly, the average annual loss due to a permanent diversion of 1,800 cubic feet per second is estimated to have a value of $660,000.

In the second paragraph on page 12 of the amended application it is stated that the port development expenditures for the Great Lakes ports for the 12-year period 1946–1957 were approximately $147 million. The expenditures made by the Corps of Engineers during the indicated period for construction and maintenance of harbor channels and port facilities throughout the Great Lakes area total about $87 million. Presumably the estimate in the amended application includes all expenditures by both Federal and non-Federal interests.

On page 15 of the amended application a table is given showing loss of energy, capacity, and revenue to the New York State Power Authority at its Niagara and St. Lawrence plants resulting from permanent diversion of 1,800 cubic feet per second from Lake Michigan at Chicago. The estimates are based on an equal loss of flow to Canada and the U.S. from the diversion, that is, a loss of 900 cubic feet per second at the Power Authority's plants. The estimates also appear to be obtained by the same procedure as that shown by the Power Authority as given on page 255 of the printed hearings held on 28–29 July 1958 by the Senate Public Works Committee on HR 2 and S 1123, 85th Congress.

Detailed computations to verify the energy and capacity amounts as shown are not available for analysis. Based on comparative studies the energy values as computed appear to be the additional amount of energy that could be generated if the permanent diversion at Chicago is returned to the lake-drainage system. Substantially all of the additional energy could be generated without additional investment in power generating facilities. The monetary value of the energy presented in the amended application is considered a reasonable estimate.

Estimates of gain in capacity from the reverted waters could be determined only from a detailed analysis of many variable and complex factors. Marketing arrangements and load characteristics, now and in the future, would play an important part in determining the actual saleable capacity for various flow conditions. Accordingly, it is not possible for us to fully confirm the estimates of the capacity values.

A representative of the staff of the Federal Power Commission has been consulted in connection with the power items. He concurs in general, with the views expressed in the preceding paragraphs.

In Section XIII, page 16, of the amended application it is stated that a diversion of 1,500 cubic feet per second is adequate to maintain navigation in the Port of Chicago and the Illinois Waterway. The flow of 1,500 cubic feet per second is the authorized diversion exclusive of domestic pumpage. This rate of flow, without domestic pumpage, is adequate for operation of existing navigation facilities on the Illinois Waterway.

A survey report was transmitted to Congress on 3 September 1958 in which the authorization of duplicate navigation locks on the Illinois Waterway is recommended. This report will be published as House Document No. 31, 86th Congress, 1st Session. Studies of water requirements for operation of the recommended duplicate locks show that an average annual flow of 1,826 cubic feet per second would be required, representing an increase of 326 cubic feet per second over the amount of the presently authorized diversion.

APPENDIX B

Letter of March 10, 1959, from the Surgeon General to the Solicitor General, transmitting comments of the Public Health Service on matters of public health contained in the complainants' Amended Application and in the briefs in support thereof and in opposition thereto

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

WASHINGTON 25, D.C., *March 10, 1959.*

Re: *Wisconsin, et al.* v. *Illinois, et al.,* Sup. Ct., Original Cases Nos. 2, 3, and 4

Hon. J. LEE RANKIN,
Solicitor General,
Department of Justice, Washington 25, D.C.

DEAR MR. RANKIN: This is in response to your letter of February 17, 1959, requesting an expression of views with respect to the accuracy of facts in the copies of the briefs filed in the Supreme Court concerning diversion of water from the Great Lakes, which you forwarded to us.

We are enclosing copies of staff comments on the briefs. These comments are confined to public health and engineering problems and factual statements contained in the briefs. As these comments will indicate, the views of the Public Health Service with respect to the effectiveness of Chicago's present disposal methods, the effects of a reduction in the amount of water diverted, and, the possibility and desirability of returning effluents to Lake Michigan, can only be formed after an extensive study of the problem.

If we can be of any further assistance to you please do not hesitate to call on us.

Sincerely yours,

(S) L. E. BURNEY,
Surgeon General.

Enclosures.

PUBLIC HEALTH SERVICE COMMENTS ON AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN, AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 AND THE GRANTING OF FURTHER RELIEF

Page 5–II C

The projected population estimate for the area served by the District is given as 15 to 20 million within the next twenty years. Based on past records, this estimate appears high, but a more accurate forecast will require further detailed study. A reliable estimate of population growth is necessary to determine future waste treatment and water supply needs of the area.

Page 6–III D

It is reasonable to expect that sewage and industrial wastes from the service area of the District will increase with increasing population and industrial and commercial activity. Furthermore, if present disposal practices are continued, the pollution in the Canal will continue.

Page 7–IV

The table on page 7 indicates that the efficiency of the sewage treatment plants of the Sanitary District dropped from 93.6% in 1952 to 85.6% in 1957. On pages 15 and 16 of the brief of the defendants it is stated that the reason for this decline in efficiency was due to construction changes being made in the plant and that these construction changes are now completed. While this explanation may be a reasonable one, in the absence of an analysis of operating records, we cannot determine whether the cause of the decline in operating efficiency was entirely due to changes in construction, or whether less than optimum operating practices may have contributed to such decline in efficiency. A drop in efficiency from 93.6% to 85.6% will approximately double the waste load on the receiving watercourse.

Page 8–V

The statements that diversion from Lake Michigan for domestic pumpage will double in 17 years seems to be based on a claim made by the Chicago Sanitary District. Since 1930 the increase in domestic pumpage has been very slight. This indicates need for a detailed analysis before a reliable prediction can be made concerning future domestic pumpage by Chicago.

The last paragraph states that the amount of water withdrawn as domestic pumpage by the Sanitary District is excessive. An analysis of water supply statistics indicates that consumption by cities of over 100,000 population in 1954 was 150 gals. per capita per day. Comparable statistics on large cities in 1956 are indicated as follows:

New York City--- 125 gals. per capita per day.
Milwaukee ------- 172 gals. per capita per day.
Los Angeles------ 180 gals. per capita per day.
Cleveland -------- 213 gals. per capita per day.
Chicago --------- 231 gals. per capita per day.

It would be necessary to study and evaluate domestic, commercial, and industrial water uses to ascertain, when, or if, such usage is excessive.

Page 9–VII

We cannot substantiate statements made in this section until an analysis is made of the waste treatment and disposal practices in the Sanitary District, and an accurate prediction is made concerning future requirements. Dilution will not solve the problem of floating solids and settleable materials.

Page 10–VIII

The comments offered on Section VII above are applicable to the question of whether it will be necessary to have diversion for the disposal of sewage from the Chicago area.

It is stated that diversion is not necessary for the purpose of disposing of sewage of the Chicago Area nor is it necessary for the protection of the public water supply of the Chicago Area and the health of the people of the Chicago Area. It is further stated that other Great Lakes communities take their water supply from the Great Lakes and return such water after use to the lake from which it was obtained without any injury to the people using such water and without causing any nuisance conditions in the lake, and concludes "This is in conformity with the Standards set by the U.S. Department of Health".

The question of whether treated wastes should be discharged into the Great Lakes must be considered on an individual basis. Any study must include extensive and detailed investigations of sewage and industrial wastes, methods of collecting wastes, waste treatment operations, as well as a comprehensive evaluation of lake currents and lake dispersion characteristics. Chicago has complained periodically about taste and odor problems in their water supply allegedly caused by municipal sewage and industrial waste discharges from lake cities in nearby Indiana. Further, Cleveland beaches have been closed at times because shifting wind-induced currents have created nuisance conditions.

While the Public Health Service has established drinking water standards it has no comparable waste treatment or disposal standards.

Page 10–IX

Much of the above discussion pertains also to this section.

Page 16–XIV

It is stated that it is possible and feasible to return the effluent from the Sanitary District treatment plants to Lake Michigan without endangering the domestic water supply taken from the Lake by the City of Chicago and other municipalities because of the many advances and developments which have taken place since 1930 in the science and technology of the treatment and purification of sewage and industrial wastes. It is further alleged that all of the municipalities along the Great Lakes are receiving their domestic water supply therefrom, and after treatment, return their domestic pumpage to the waters of the lake from which it is taken (with the exception of the Chicago Area) without experiencing any danger or hazard to domestic water supply or to public health.

There is little doubt that the original decisions regarding the discharge of the District sewage to the Illinois Waterway was based on available knowledge of waste treatment and disposal practices at the time of the decision. Considerable progress in the art and science of sewage and industrial waste treatment and in water purification has taken place since that time. It may be possible that treated wastes could be returned to the lake in such condition and location as not to seriously inhibit use of lake water for public water supply purposes. However, before this is considered as a feasible alternative, the characteristics of the District's treated wastes should be studied and the ability of Lake Michigan to absorb and disperse these wastes should be investigated. All this must be accomplished before relative location of waste outfalls and water intakes can be selected. In addition, there are certain nutrient substances present in the treated sewage that may induce excessive biological growths in the lake. Such growths have been known to cause shore line nuisances, and taste and odor problems, increased operating difficulties, and additional expenses in water purification.

PUBLIC HEALTH SERVICE COMMENTS ON BRIEF IN SUPPORT OF AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930 AND FOR THE GRANTING OF FURTHER RELIEF

Page 3, Introduction

It is stated that a good beginning in solving problems of water shortage in the Great Lakes area would be to order the Chicago Sanitary District to return the Chicago domestic pumpage to the Great Lakes from which such domestic pumpage is taken. It would not be advisable at the moment to initiate such action until adequate study would be made of the various factors involved in such a program. This has been covered in detail in previous comments on the Amended Application.

Page 8, II

The brief cites the Special Master as saying in 1941 "The facts proven did not establish any menace to the health of the people of Lockport and Joliet, or elsewhere along the waterway requiring an increase in diversion in water from Lake Michigan." We believe that contamination by pathogenic organisms of the Illinois Waterway is inevitable and constitutes a continuing potential health hazard. In our opinion the statement of the Special Master recognized that the answer to pollution by pathogenic organisms of the waterway would not be forthcoming by increased dilution. Additional dilution would have a slightly reduced contamination effect on water quality.

Page 11–III

It is indicated that the Sanitary District has not filed any reports with the Court since 1939 and there is no way of knowing exactly the efficiency of the operations of the treatment plants of the Sanitary District. We have no reports on which to base an opinion on efficiency.

Page 13–III

The brief states that discharge of a sewage effluent into the Illinois Waterway, even after dilution, cannot be an effective method of waste disposal. We believe that adequate collection and treatment of all the wastes emanating from the Greater Chicago Area would improve conditions of the Illinois Waterway. Lack of data precludes agreement on this point.

Page 14–III

It is stated that the District has failed to provide and construct adequate sewage and industrial waste collection and treatment facilities to match the growth of the region. Sufficient data is not available to evaluate this matter.

Page 15

The statement is made that the Sanitary District still persists in using obsolete techniques of sewage disposal by discharging the wastes, some treated, others untreated, into the Chicago Drainage Canal where it is diluted with Lake Michigan water and adds the "mess" is flushed on down the waterway into the Mississippi Basin. It further states that the Sanitary District has treatment plants which are capable of much better performance than shown by the results of the past years.

The District apparently collects its wastes and uses the activated sludge method to treat them. There may, however, be certain amounts of untreated wastes that reach the waterway. Reliable evaluation of these factors will require considerable study, including field investigations. The reference to the "mess" being flushed to the Mississippi Basin may be misleading. The Illinois Waterway is itself a part of the Mississippi Basin. While certain constituents of Chicago sewage and industrial wastes will ultimately reach the Mississippi River, these wastes do not constitute a major pollutional factor at that point.

Page 23–VI–A

It is stated that the District abstracts water from Lake Michigan, and after filtration and treatment, distributes it for residential and commercial use.

It must be pointed out that Chicago at the present time does not filter all of the Lake water that it uses for domestic, commercial and industrial purposes. In Illinois from below Waukegan, the Central and Northern Water Districts of Chicago serve three million people about 650 mgd of unfiltered but disinfected water. However, a new water treatment plant will be in operation by 1962, to serve this area. All other domestic pumpage is treated by filtration and auxiliary processes at the Southside Filtration Plant.

Pages 24–25

It is stated by the plaintiff that every municipality situated in the Great Lakes Basin returns its domestic pumpage to the waters of the lake from which it is taken after waste treatment and chlorination, and that Chicago should be compelled to do likewise. It is noted further that the cities of Milwaukee, Cleveland, and Toronto are able to return their treated effluents to the Lake without being exposed to dangers of contamination.

It should be pointed out that Chicago is located in such a position along the Lake that normal currents and wind action might or might not permit adequate dispersion and disposal of its treated wastes so as not to contaminate its raw water intake. This further points out the need for extensive study relative to the location of any outfalls in relation to lake currents, upwellings, and wind action.

Page 27

In evaluating the statements made on pages 26 and 27, we believe the following should be borne in mind: In the light of modern experience it has been demonstrated that highly treated wastes from a large community may at times cause pollution problems when discharged to any body of water. Other problems that may be involved include contamination by pathogenic organisms, taste and odors resulting from industrial wastes and secondary growths of aquatic plants, and the necessity for increased use of chemicals, and other water purification difficulties. These problems may result even though an extremely high degree of treatment is achieved and the effluent is clear and odorless. While it may be possible to maintain fish in the plant effluent because the process provides dissolved oxygen in the effluent, decomposition of the residual constituents, which take place after a lag in time, may in certain common circumstances inhibit or kill the fish.

PUBLIC HEALTH SERVICE COMMENTS ON BRIEF IN OPPOSITION TO THE AMENDED APPLICATION OF THE COMPLAINANTS FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930, AND FOR FURTHER RELIEF

Page 6

A Table is presented showing annual average pumpage and diversion from Lake Michigan. It is extremely significant to observe that flows designated as domestic pumpage have not increased appreciably over the given 28-year period; and, that this is only one index of future domestic pumpage that should be applied to produce a reliable estimate in the light of growth changes that may result from the opening of the St. Lawrence Seaway.

Page 14

In general combined sewer systems do not permit, in their basic concept and design, treatment of all wastes in time of storm because of overflow. There are insufficient data available at the present time to evaluate fully the effects of the storm water discharges. There is evidence that storm water mixed with sewage contributes a pollution load to the waterway, particularly in the upper portion of the waterway. Major lake cities make partial use of the combined system.

Pages 14–15

The brief states that BOD removal for the District's disposal plants was 93.6% in 1952, 85.6% in 1957, and averaged 90.7% for the first nine months of 1958. These values may reasonably be expected with the type of treatment provided. Other wastes may reach the waterway, such as storm water overflow, untreated sewage, partially treated or untreated industrial wastes, and effluent from the sludge lagoons at Lawndale which exert effects upon water quality.

Page 30

The following statement is made, "Regardless of the amount spent by the defendants, the risk of polluting Chicago's water supply would be ever-present. (See 1950 and 1951 reports of International Joint Commission.)"

Sewage and industrial wastes discharged into water serving as the source of water supply presents to some degree an ever-present risk of polluting the water supply. This same situation occurs in a great number of instances where municipal water supplies are withdrawn from streams receiving upstream pollution, and does not present an unusual situation. There is risk involved but the risk can be minimized by adequate waste treatment and proper discharge of the wastes.

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IN THE SUPREME COURT OF THE UNITED STATES

October Term, A.D. 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and
THE COMMONWEALTH OF PENNSYLVANIA,
Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT
OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT
OF CHICAGO,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT
OF CHICAGO,
Defendants.

No. 4 Original

Exceptions, Objections and Comments of the States of Wisconsin, Minnesota, Ohio, Commonwealth of Pennsylvania, Michigan and New York to the Memorandum Filed on April 14, 1959 by Honorable J. Lee Rankin, Solicitor General, for the United States as Amicus Curiae, on the Amended Application of the Above Complainants.

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IN THE SUPREME COURT OF THE UNITED STATES

October Term, A.D. 1958

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To the Honorable the Chief Justice and the Associate Justices of the Supreme Court of the United States:

The complainant States of Wisconsin, Minnesota, Ohio, Commonwealth of Pennsylvania, Michigan and New York respectfully object and except to the Memorandum filed on April 14, 1959 by Honorable J. Lee Rankin, Solicitor General, for the United States as Amicus Curiae, on the Amended Application of the above complainants herein, in the following particulars and manner:

Exception Number 1: Complainants except to the failure of the Memorandum at page 5, second paragraph, to include a statement that the States of Missouri, Kentucky, Tennessee, Louisiana, Arkansas and Mississippi have no standing as intervening parties or otherwise in this litigation. Their lack of any justiciable interest was adjudicated and they were dismissed from the case by the decision of this Court in *Wisconsin et al v. Illinois et al.*, in 278 U.S. 367, and they were and are not parties to the decree of April 21, 1930 (281 U.S. 696); and said Mississippi River States were and are not parties to the decree of May 22, 1933 (289 U.S. 710), which decree amended the April 21, 1930 decree.

Exception Number 2: Complainants except to the conclusion, page 6, second paragraph, that "The Court found that the temporary and conditional permit to divert 8,500 c.f.s. was justified as being necessary to keep the Chicago River, as part of the port of Chicago, free from deposits of sewage until improved means of sewage disposal could be provided."

Exception Number 3: Complainants except to the failure of the Memorandum, page 7, 1st paragraph, to state that under the terms of the decree of April 21, 1930, the District was required to file semi-annual reports with the Court until such time as the Court, after application, enters an order relieving the District of the obligation to file such semi-annual reports but that notwithstanding such obligation of the District, no such reports have been filed with the Court since January 2, 1939.

Exception Number 4: Complainants except to the conclusion, page 10, last paragraph and footnote 3, that "The direct diversion was reduced in accordance with the Court's schedule, and since 1938 it has not been exceeded, on an annual average, 1500 c.f.s. except for a few temporary increases authorized by the Court or the Corps of Engineers to meet emergency situations." The slightly excessive diversion in 1942 (1,528 c.f.s.) and 1944 (1,531 c.f.s.) were not authorized by the Chief of Engineers or the Secretary of War, as we are advised by the Division Office, Great Lakes Division, Corps of Engineers.

Exception Number 5: Complainants except to the failure of the Memorandum to state, page 11, at the end of the 1st paragraph, that the increase in domestic pumpage at Chicago in the future will be the normal rate of increase after a 20-year period of decrease attributable to leakage elimination.

Exception Number 6: Complainants except to the conclusion, pages 13-14, that complainants have not shown grounds for modifying the decree so as to require Chicago's sewage effluent to be returned to Lake Michigan.

Exception Number 7: Complainants except to the conclusions set forth at page 16 with reference to the injuries to navigation due to diversion at Chicago of the domestic pumpage.

Exception Number 8: Complainants except to the conclusions, pages 17-18, with reference to the adequacy of the collection, handling and operation of the District's sewage treatment plants.

Exception Number 9: Complainants except to the conclusions reached, page 18, with respect to the anticipated increases in the domestic pumpage at Chicago.

Exception Number 10: Complainants except to the argument appearing on pages 19-23 with respect to the power losses sustained by the New York Power Authority by reason of the diversion of the domestic pumpage at Chicago.

Exception Number 11: Complainants except to the conclusions reached to the effect that complainants have not shown grounds for the appointment of a Special Master to inquire into their allegations, pages 29-30.

CONCLUSION

Many of the contentions made by the Solicitor General which are at variance with those made by the complainants are answered generally in the complainants' reply brief to the brief filed by the defendants. Complainants agree with the suggestion made that the Court appoint a Special Master to re-evaluate the needs of all parties, with power to conduct his own investigation and to hold hearings, and the like, and to make recommendations as to the future pattern of development of the situation, looking toward entry if necessary of a supplemental decree.

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Nos. 2, 3 and 4, Original.

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REPLY OF DEFENDANTS TO THE MEMORANDUM FOR THE UNITED STATES AS AMICUS CURIAE.

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No. 4 Original.

REPLY OF DEFENDANTS TO THE MEMORANDUM FOR THE UNITED STATES AS AMICUS CURIAE.

The Solicitor General's Memorandum agrees with defendants' contention that the complainants' "Amended Application does not show facts which would justify modification of the 1930 decree at this time to require the defendants to return the Sanitary District's sewage plant effluent to Lake Michigan" (p. 23). The Memorandum further states:

> "As we have indicated, the complainants have not shown any changes in circumstances since entry of the 1930 decree of sufficient magnitude to justify reopening and modifying the decree, under the rules applicable to such proceedings. That being so, no purpose could be served by appointing a Special Master to inquire into their allegations. And since it does not appear that the complainants are in any way injured by deficiencies, if any, in the operations of the Sanitary District, there appears to be an equal lack of reason for considering the appointment of a Permanent Master to supervise those operations." (pp. 29-30.)
>
> "For the reasons stated, we believe that the complainants have failed to sustain their burden of making sufficient allegations, and that the relief which they seek should be denied at this time." (p. 30.)

These conclusions are supported by the analysis contained on pages 13 to 23 of the Solicitor General's Memorandum. They are based not only on facts of record and judicially noticeable, but on material submitted to the Solicitor General by the parties and also by the Corps of Engineers and the Public Health Service (Solicitor General's Memorandum, p. 2).

After concluding that the complainants have not made out a case, and that no factual basis for modifying the 1930 decree has been established, the Solicitor General nevertheless suggests (p. 31) that a Special Master be appointed "to review the whole situation, not to change the present decree as applied to the present facts, but to recommend whether a supplemental decree be needed, and if so, what it should be, with respect to future changes as they may come."

It is to this suggestion that defendants now address themselves. Fully conscious of the thoroughness of the analysis of the Solicitor General and his concern for the best interests of all parties, defendants respectfully submit that the Solicitor General has not shown an adequate basis for his recommendation that such a reference be made.

1. The Solicitor General recognizes (p. 30) that no substantial change in circumstances has supervened since 1930, when the Court entered a decree "to compel the reduction of the diversion to a point where it rests on a legal basis * * *" (278 U. S. 367, 420). The decree was based on recommendations made "in accord with equitable principles * * * unfettered by technicalities * * * for the purpose of establishing substantial justice." (Master's 1929 Report, p. 139.)

The Solicitor General admits that the domestic pumpage now is about the same as in 1930 (p. 14), and that the inevitable increases "can hardly be considered a development that was unforeseen in 1930" (p. 18). Material submitted to the Solicitor General included a 1955 survey made for the City of Chicago by the engineering firm of Alvord, Burdick & Howson which indicates that by 1980 the domestic pumpage would be approximately 2200 c.f.s., as compared with 1700 c.f.s. in 1930. This is the same report as that summarized, in part inaccurately, by the complainants Michigan, Ohio and Pennsylvania in their Brief in Opposition in *Illinois* v. *Michigan, et al.*, No. 15 Original, this Term, page 19.* As was shown in defendants' brief in

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*The "Engineers' Summary and Conclusions" are accurately copied in Appendix B to this Brief in Opposition in No. 15 Original. The table showing the estimated water consumption in 1980 which these States include in the text of that brief gives a total pumpage of 1489.1 MGD (million gallons per day), which is about 2300 c.f.s. This figure includes the entire suburban area to the Fox River, about thirty miles west of Chicago. But the next paragraph of the Report shows that the complainant States are in error in stating that by 1980 this *entire* area "would receive Lake Michigan water opposition (pp. 7, 19), and as also appears from the Solicitor General's Memorandum (p. 11), data available in 1930 warranted a forecast of an increase in pumpage of about 75 c.f.s. per year. Thus, at that time it would have been thought that by 1940 the domestic pumpage would reach levels higher than those now estimated for 1980. Clearly, the Court did not expect that this fact would require modification of the decree or a comprehensive review of the case in 1940, just after the sewage treatment plants were to be completed.

The Solicitor General's Memorandum (pp. 16, 41-42) also shows that the Corps of Engineers estimates the annual loss to American shipping by 1985 to be only about $660,000, which is hardly significant.

The original decree is actually now operating much more favorably for complainants than could have been expected in 1930, for reasons set forth by the Solicitor General (pp. 10-11, 14-16) as well as by defendants in their brief in opposition, and will continue to do so for many years in the future. Since the passage of time has not impaired—but has on the contrary confirmed—the accuracy of the findings made after full inquiry in 1930, the appointment of a Special Master "to re-evaluate the demands and

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from the Chicago water department." This paragraph (Br. in Opp., No. 15 Original, p. 6b) states that many of these suburbs will continue to be independent of Lake Michigan water "for many years," and that "it is believed that these suburbs using Lake Michigan water by 1980 will require about 263 MGD or 19% *of the total requirement of 1379 MGD* for the average day"—not 373 MGD, as shown by complainants' table for the entire suburban area to the Fox River. (Emphasis supplied.) The estimated requirement for 1980 is thus 1379 MGD, or 2137 c.f.s., instead of 2300 c.f.s. To this amount should be added water consumed by a few riparian suburbs north of Chicago which do not obtain their water from Chicago and which are therefore not covered by the Report. At present these communities use about 45 c.f.s., which is included in the total domestic pumpage shown on page 6 of Defendants' Brief in Opposition in the case at bar.

potentialities of the situation" (p. 37), attempt to chart the future, and make plans for unforeseeable contingencies that may occur, appears to be altogether premature and unjustified. This Court is not acting completely at large. It has issued a decree, and that decree must stand unless "something has happened which will justify us *now* in changing it." *U. S.* v. *Swift & Company,* 286 U. S. 106, at 119. (Emphasis supplied.)

Defendants are not suggesting, of course, that the Court can look only to the present. A court of equity can consider the needs of the proximate future, but a court which is limited to the consideration of cases and controversies cannot be concerned with a period so distant that any prognostication as to what may then be needed would necessarily be almost completely conjectural, and perhaps obsolete by that time. *Arizona* v. *California,* 283 U. S. 423, 460-464. Indeed, three of the complainants, in their Brief in Opposition to the Motion for Leave to File Complaint in *Illinois* v. *Michigan, et al.,* No. 15 Original, this Term, have stated (p. 14) that "any potential threat of damage or injury, representing only a possibility for the indefinite future, is no basis for a decree * * *."[*]

2. Furthermore, defendants do not believe the Court should assume the burden of initiating and conducting the suggested inquiry. It is difficult to determine what judicial function would be served by such a study. The Solicitor General suggests (pp. 36-37) that because there is a justiciable controversy before the Court, in which the Court retains continuing jurisdiction, the Court has equity power to exercise reasonable foresight in planning for the future. Traditionally, the Court has acted in cases or

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[*] Although it is difficult to see how this principle can possibly apply to *Illinois* v. *Michigan, et al.,* No. 15 Original, the established practice of not considering the indefinite future would seem to apply to the suggestion of the Solicitor General in the instant case.

controversies on, or with respect to, adversary pleadings and issues—not for advisory purposes or as an independent investigating authority.

United States v. *California,* 334 U. S. 855, is cited by the Solicitor General (p. 38) as a precedent for the appointment of a Special Master to make an independent investigation. In that case the Court reserved jurisdiction to "determine with greater definiteness particular segments of boundary" between California and the marginal sea over which the United States had been declared to have paramount rights and power. A petition was filed by the Government praying that the precise boundary of certain segments of the California coastal area be ascertained. California then urged that there was a need for a prompt determination of the precise California boundary all the way from Oregon to Mexico. The Court expressed doubt concerning the particular segments of the boundary to be determined and (p. 856) appointed a Master "to make inquiry into the subject and hold hearings, if he finds it necessary, in order to make recommendations * * * as to what particular portions of the boundary call for precise determination and adjudication." Thus, the Government, as one of the parties, petitioned for the determination of a specific matter previously left open and which involved the demarcation of a part of a boundary. The Master's function was merely to recommend what parts of the boundary should be precisely determined and adjudicated. The Master was thus confined to making a particular recommendation to the Court. We submit this to be no precedent for a commission to supervise studies, correlate results, and report a course to be followed in planning to meet necessary requirements in the future, as recommended by the Solicitor General in the case at bar (pp. 35, 38).

3. It is not to be thought that inertia (p. 31) or inaction is the only alternative to the suggested study. The parties, complainants and defendants, are at full liberty to make their own studies and to present their recommendations to the Court and apply for appropriate relief at any time that circumstances warrant, under paragraph 7 of the decree. Informed action based upon evidence of changed circumstances, actual or impending, with due regard for matters already adjudicated, should adequately protect the interests of all.* This is the way the judicial process normally operates, and there is no reason to believe that established procedures cannot work satisfactorily here. Paragraph 7 of the decree of 1930 constitutes an adequate safeguard and provides ample opportunity for timely presentation to the Court of matters not heretofore considered. It is manifest that the Court in 1930 concluded that ordinary judicial processes would be sufficient for the administration of the decree in the future.

In addition, existing agencies under the direction of the executive branch of the government have made studies from time to time and may expand such studies relating to the diversion at Chicago and matters pertaining to the Great Lakes. The report of the Corps of Engineers, U. S. Army, made in January, 1957, entitled "Effects on Great Lakes and St. Lawrence River of an Increase of 1000 Cubic Feet per second in the Diversion at Chicago," contained in Senate Document 28, 85th Congress, First Session, 1957 (see Brief in Opposition, p. 7), was such a study. This study (p. 2) refers to "a comprehensive report now being prepared by the Corps of Engineers concerning the overall problem of controlling the levels of the Great Lakes." These agencies are empowered to make any similar or other studies that the exigencies of conditions now or hereafter may demand. They are not only empowered to make such studies, but they are eminently equipped to make them. Any new facts developed by such studies having a bearing on subject matters in controversy and warranting a reopening of the decree may be presented to the Court by complainants or defendants.

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* Defendants will make available their pertinent records and facilities and cooperate in obtaining any other relevant factual information.

4. Finally, a long-range planning program would seem to fall more appropriately within the functions of Congress. Whether the problems presented are to be viewed from the standpoint of federal interests involved and the welfare of the people of the United States as a whole (see Solicitor General's Memorandum, p. 3), or from the standpoint of the parties to this lawsuit, Congress, which represents all the states and has plenary power over navigable waters, has power to conduct studies relating to the needs of the Illinois Waterway and the Great Lakes, to determine the amount of water to be withdrawn from Lake Michigan, and to impose conditions upon which the withdrawal of water may be permitted. This power was recognized by this Court in the earlier stages of this litigation. See 278 U. S. 367, 417; 281 U. S. 179, 198, 200; *Sanitary District* v. *United States,* 266 U. S. 405, 426.

5. Last Term this Court held inadequate complainants' original application, with leave to renew the application and motion with allegations made more definite and certain as a basis for the relief sought. Despite the Solicitor General's recognition of the complainants' failure to sustain their burden of making sufficient allegations, and his admission (p. 30) that "no substantial change in circumstances has supervened," he suggests that the whole matter be restudied, on the supposition that an independent investigation could provide "specific findings and proposals to which the parties could address themselves" (p. 38).

Defendants submit that this is too amorphous and indefinite a basis for the appointment of a Special Master and all that that entails. The Solicitor General's suggestion is more indefinite than the original application of complainants which the Court found to be insufficient last Term.

Defendants submit, therefore, that no reason has been shown for the appointment of a Special Master.

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REPLY BRIEF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, COMMONWEALTH OF PENNSYLVANIA, MICHIGAN and NEW YORK IN ANSWER TO DEFENDANTS' BRIEF IN OPPOSITION TO THE AMENDED APPLICATION OF THE COMPLAINANT STATES; and MOTION TO AMEND AND ENLARGE COMPLAINANTS' PRAYER FOR RELIEF IN COMPLAINANTS' AMENDED APPLICATION.

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IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A.D. 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and THE COMMONWEALTH OF PENNSYLVANIA,

Complainants,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,

Defendants.

No. 2 Original

STATE OF MICHIGAN,

Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,

Defendants.

No. 3 Original

STATE OF NEW YORK

Complainant,

v.

STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,

Defendants.

No. 4 Original

REPLY BRIEF OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, COMMONWEALTH OF PENNSYLVANIA, MICHIGAN and NEW YORK IN ANSWER TO DEFENDANTS' BRIEF IN OPPOSITION TO THE AMENDED APPLICATION OF THE COMPLAINANT STATES; and MOTION TO AMEND AND ENLARGE COMPLAINANTS' PRAYER FOR RELIEF IN COMPLAINANTS' AMENDED APPLICATION.

To the Honorable the Chief Justices and Associate Justices of the Supreme Court of the United States:

In their brief in opposition to the amended application of the complainant states the defendants set forth certain material and arguments which should be answered.

I

Complainants' charges of operating inefficiency by the Chicago Sanitary District are relevant and well founded.

In defendants' brief in opposition to the Amended Application, Part V, pages 26-27, it is argued that complainants' charges of operating inefficiency are irrelevant and unfounded. We submit that this charge is relevant and that the District does not operate its sewage disposal works as efficiently as possible.

Special Master Charles Evans Hughes, in his Report on Re-Reference, commented:

> "That with efficient operation the proposed sewage disposal plants should attain not less than an annual average of 85% purification of the sewage treated, and that it is probable that the degree of purification will be 90% or more." (Report of Special Master on Re-Reference, Dec. 17, 1929, p. 141)

The Court, in January 1929, speaking through Mr. Chief Justice Taft, had already ruled that the Sanitary District must provide sufficient money, construct and put into operation with all reasonable expedition:

> "adequate plants for the disposition of the sewage through other means than the Lake Diversion." (*Wisconsin et al vs. Illinois, et al.*, 278 U.S. 367, 420-421)

The Court then went on to say that:

> "*Though the restoration of just rights to the complainants will be gradual instead of immediate it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project.*" (Emphasis added)

We do not think that the Court ever intended to sanction anything less than the best attainable performance in the operation of the sewage disposal works of the Sanitary

District of Chicago. In 1929 the Master thought that efficient operation of the proposed sewage disposal plant might attain an average annual purification of more than 90%. He was so right. It ill becomes the District that has been denominated one of the seven engineering wonders of America to plead that its low grade performance in 1957, for example, constitutes efficient operation of its sewage disposal plants, and of the West-Southwest plant in particular. This plant is the key plant in its operations and it proved itself capable of attaining a fair degree of efficiency, for example in 1952, when the over-all average was 93.6% of B.O.D. removal. The efficiency in the removal of suspended solids is very poor because the District during the past years has been unable to handle from 200 to 250 tons of solids per day in its plant and such solids had to be disposed of by other means, presumably by dumping them into the Canal. (See Engineering News-Record Nov. 27, 1958). H. P. Ramey, Chief Engineer for the District, has stated that:

> "The highest degree of sewage treatment, on an annual average basis, which can be expected from the sanitary district plants, or from any plant is 90 percent." (Senate Hearings, Committee on Public Works, on H.R. 2 and 1123; (1958) p. 121)

A former President of the Board of Trustees, Chicago Sanitary District, the late Anthony Olis, testified before the Senate Subcommittee on Public Works, on H.R. 3210, in 1956 as follows:

> "The fact is that since April 1950, the sewage of this entire metropolitan area has been given complete treatment to the highest degree practicable in the most modern treatment system in the country." (Senate Hearings, July 5 and 13, 1956, p. 24).

At these same 1956 hearings Casimer Griglik, Trustee, Chicago Sanitary District, testified that:

> "Our engineers tell us that the highest degree of treatment is about 90 percent." (Senate Hearings on H.R. 3210 and S. 2550, July 5 and 13, 1956, p. 28)

The foregoing testimony indicates the attitude of the officials of the Sanitary District regarding their obligation to the Court to operate adequate sewage disposal plants for the disposition of the sewage of the district *through other means than Lake Diversion*. Other communities' sewage disposal plants attain an efficiency of 95%.

Reading Special Master Hughes' conclusion in the light of the rule laid down by the Court, it is crystal clear that neither the Court nor the Master ever intended that an efficiency of 85% of purification would be satisfactory when the District could attain an efficiency of 94% or 95%. The steady drop in efficiency from 93.6% B.O.D. removal in 1952 to 85.6% B.O.D. removal in 1957 indicates inefficient operation, with the only excuse that between 1954 and 1957 the low percentages were partially attributable to interruptions in complete treatment during the installation of new equipment. The data furnished to Senator Alexander Wiley by the Chicago Sanitary District indicates that the installation of new equipment mentioned as an excuse for the sharp drop in efficiency in the operations of the District's sewage disposal plants from the year 1952 to 1957 was probably the "aeration tanks installed in 1958." (See Congressional Record, March 18, 1959) The fact is that any interruption in installation of equipment should have no appreciable effect on the efficiency of operations, if properly planned, and certainly would not drop the efficiency in B.O.D. and suspended solids reduction as sharply as it did from 1952 to 1957.

The truth of the matter is that the Sanitary District had always been, and still is, obsessed with two ideas, namely; to economize as much as possible, regardless of the fact that the efficiency of its operations might be impaired, and second, the determination that thereby more lake diversion will be obtained for sanitary purposes. This, notwithstanding the ruling of this court that adequate plants must be constructed and put in operation by the District with all reasonable expedition for the disposition of the sewage *through other means than the Lake Diversion* and that these works must include everything that is essential to an effective project. The Court also held that diversion for sanitation sewage disposal is illegal.

When the District chose the dilution method of sewage disposal the main reason was to save expense. (See pp. 1800-1820, Part 2, House Rivers and Harbors Committee Hearings, May and April, 1924.) This policy of the District was continued from the early days, as is noted in the so-called Warren Report, Report of the Board of Engineers for Rivers and Harbors, U. S. Army, Corps of Engineers:

> "115. The district can no longer fairly plead the absence or the impracticability of other safer methods of handling sewage and of protecting its people from water-borne diseases. Certainly, for the past 20 years, expert opinion has held disposal by dilution to be inferior to other methods of treating sewage, and enlightened public opinion has condemned a policy which, in effect, is the transfer of a nuisance from our own front door to that of our neighbor. Large cities on the Great Lakes cannot safely drink raw

> lake water, nor should they discharge unscreened and unfiltered sewage either into the lakes or into tributary streams. In 1915, the Chicago Real Estate Board employed three experts, of whom two were of acknowledged eminence in England, and the third a New York expert of well known authority, to investigate the sewage problem of Chicago and to present their views as to the best way of solving it. Their report entitled 'A Report to the Chicago Real Estate Board on the Disposal of the Sewage and the Protection of the Water Supply of Chicago, Illinois,' by Messrs. Soper, Watson and Martin, has been printed, and its conclusions are, therefore, well known to the public in general, and particularly to the people of Chicago whom they advised substantially in accordance with the views above expressed. *Chicago is, therefore, debarred from any claim for indulgence as to work done and expenditures incurred in recent years. If, in defiance of the opposition of the Government, and in open disregard of the law, the officials of the Chicago Sanitary District have continued to expend the money of their constituents in the prosecution of unwise and illegal plans, these officials and their constituency are to blame, and they should expect no great indulgence from the general public whose government they have ignored and whose interests they have disregarded.*" (Exhibit 3, p. 55, par. 115, filed in the 1926-27 Hearings before Special Master Charles Evans Hughes; see Joint Abstract of Record, filed January 24, 1928, pp. 1956) (Emphasis added)

Clearly, the Court never intended to approve mere mediocre or average performance in the operations of the Sanitary District. 85% reduction in B.O.D. is not enough when 94% or 95% can be obtained with top efficiency by the

Sanitary District. As a matter of fact, the North Side Plant of the Sanitary District in the years 1939 to 1946, inclusive, attained a reported average between 93.5% to 94.9% B.O.D. removal. In 1955, the District obtained a reduction in B.O.D. at the North Side Plant of 93.4%. (See printed Annual Report of the Chicago Sanitary District for 1955, p. 547). In 1958, the Sanitary District obtained the following degree of purification: Removal of B.O.D.; Entire district (weighed average) 90.4 percent; Removal of solids, 88 percent. In April, May and June 1958, the removal of solids at the West-Southwest Plant was low (83.4%) because aeration tanks were out of service for construction. See Congressional Record March 18, 1959, p. 4022. The full data on operation of the Sanitary District's works is not published in every printed annual report. In the five printed annual reports from 1951 through 1955, data only on the North Side Plant and the Calumet plant for 1955 was given.

The efficiency of sewage treatment at certain sewage disposal plants located on the Great Lakes is shown in the following tabulations:

MILWAUKEE, WISCONSIN

	Original Plant (West)		Plant Extension (East)	
Year	B.O.D. (Removal %)	Suspended Solids (Removal %)	B.O.D. (Removal %)	Suspended Solids (Removal %)
1948	94.5	92.1	95.3	94.1
1949	95.0	92.2	95.5	93.7
1950	95.2	92.8	95.9	94.4
1951	94.2	92.8	94.0	94.7
1952	94.0	92.0	94.5	94.2
1953	95.0	93.3	94.6	93.8
1954	93.9	93.4	93.9	94.4
1955	95.6	93.8	94.2	93.3
1956	96.1	94.4	95.4	93.8
1957	95.3	94.7	94.6	94.3

GARY, ILLINOIS

Year	B.O.D. (Removal %)	Suspended Solids (Removal %)
1948	95.24	98.31
1949	94.23	98.24
1950	89.01	93.87
1951	95.48	96.90
1952	93.01	92.92
1953	90.15	92.84
1954	88.47	92.78
1955	86.94	94.47
1956	92.00	91.38
1957	91.25	95.23

CLEVELAND, OHIO

(Easterly Plant)

Year	B.O.D. (Removal %)	Suspended Solids (Removal %)
1946	94.8	94.9
1947	95.5	95.0
1948	92.6	91.0
1949	95.2	90.0
1950	93.1	91.5
1951	90.1	88.4
1952	90.8	93.4
1953	92.2	94.5
1954	93.0	94.3
1955	90.2	93.0

CHICAGO SANITARY DISTRICT

(North Side Plant)

Year	B.O.D. (Removal %)	Suspended Solids (Removal %)
1939	93.5	(Information was not furnished on basis of percentage removal of suspended solids).
1940	94.6	
1941	94.9	
1942	94.5	
1943	93.5	
1944	94.9	
1945	93.5	
1946	94.7	

It is palpably evident from the facts which the complainants have been able with great difficulty to assemble — that the Sanitary District has over the years been engaged in a game of "double play". On one hand it represents to the world that it is operating one of the most efficient sewage treatment plants in the country — called the Seventh Wonder of American Engineering (despite the fact that it engages in unorthodox practices not countenanced by other major municipalities)—and then, on the other hand holds up its inefficiencies and deficiencies as the basis for insisting that it needs more fresh water diverted from Lake Michigan and for insisting that it cannot return its effluent to the Lake as is done by every single municipality on the Great Lakes.

The only inference which the complainant states can draw from this "double standard" of conduct is that the officials from Chicago and its suburbs want to reap an economic advantage over the other Lake States with which to attract more industry and population, accomplishing this by a cheaper method of sewage disposal by *dilution* instead of the more costly method of *treatment* — which entails, of course, the abstraction of more fresh water from Lake Michigan.

It has been the position of the complainant states throughout these proceedings that this Court should put a stop to this unlawful and harmful waste of water from the Great Lakes Basin by compelling the Metropolitan Sanitary District of Greater Chicago to increase its efficiency so that *no diverted water whatever need be introduced into the Canal, or so that in case it is found feasible to do so, the treated effluent be returned to Lake Michigan as is done by all other municipalities on the Great Lakes.*

II

In addition to other suitable measures, universal metering of the Chicago domestic water supply would increase the efficiency of operating the sewage disposal plants.

According to the "Report Upon Adequate Water Supply for the Chicago Metropolitan Area, 1955 to 1970", by Alvord, Burdick & Howson, only 27% of the services of the Chicago Department of Water are metered (Table IV-1). 47.5% of the total Chicago pumpage of water is metered, while 52.4% of the city of Chicago and the suburbs, (which use Chicago water) water pumpage is metered. These figures are for the year 1954. According to the 1957 Annual Report of the Chicago Department of Water and Sewers, 46.83% of the Chicago pumpage is metered.

The above figures indicate that to a large extent the domestic pumpage of the city of Chicago and the 51 suburban communities served by the Chicago Water Department either directly or indirectly, is not metered. Universal metering in the city of Chicago would reduce the amount of water consumed. This has been the experience in most of the American cities where the water services were metered.

Metering of the Chicago domestic water supply has been advocated for many years. In the so-called Soper Report, made in 1915, entitled "A Report to the Chicago Real Estate Board on the Disposal of the Sewage and the Protection of the Water Supply of Chicago, Illinois", a strong recommendation was made that the Chicago water supply be metered. And, in the permit issued by Secretary of War Weeks, dated March 3, 1925, which authorized a temporary diversion of 8500 c.f.s., plus domestic pumpage, (which permit was held null and void by this Court, 278 U.S. 367) a condition was attached that at least 90 per cent of the water services be ultimately metered at the rate of 10 per cent per year. Had this condition been complied with universal metering of the Chicago water supply would have been completed by the year 1935.

In his report dated March 31, 1941 filed in these causes, Special Master Monte M. Lemann commenting on the problem of metering of Chicago's domestic water supply stated (pp. 102-104):

> "To a large extent the domestic water consumption is not metered in Chicago. The opposing States offered in evidence a table showing that the Chicago per capita consumption was 214% above the average of 19 other American cities. Of 412,228 water services in 1940, only 115,025 were metered. *Universal metering would reduce the amount of water consumed. This in turn would reduce the volume of sewage, which would permit a longer period of detention in aeration tanks and increase the amount of sewage which could be given complete treatment.* Reduction in domestic pumpage would, it is true, reduce dilution and the total quantity of B.O.D. in the sewage would remain the same, although less diluted by water. Upon the balance, however, there would be apparently

a substantial gain in the amount of sewage which could be completely treated if the water consumption were diminished. I find no evidence in the record sufficient to enable me to appraise the extent of the benefit which would result. (Emphasis supplied)

"The desirability of limiting water consumption in Chicago has been frequently urged. The permit of the Secretary of War dated March 3, 1925 (which authorized the diversion of not exceeding 8,500 c.f.s. in addition to domestic pumpage) contained a condition that Chicago meter at least 90% of its water services at the rate of 10% per year. The PWA Board of Engineers in its report of April 30, 1934, stated that the 'great and unreasonable waste of water from the Chicago waterworks system' had 'added millions of dollars to the cost of sewage and sewage disposal work,' and recommended that every effort be made to reduce such waste and 'that the capacity of future treatment plants be predicated upon the reasonable use of water.' In August, 1938, an offer of grant from the PWA in connection with the construction of the South Side water filtration plant contained a condition that the City must satisfy the Administrator that it would install approximately 115,260 meters. In the spring of 1939, the City was permitted to defer the installation of the meters until a later date than originally specified.

"Illinois offered evidence through the City Engineer of Chicago that to provide universal metering, 300,000 meters would be required which would cost in excess of $10,000,000 and would require more than 6 years to install if 50,000 meters could be installed each year. In the 10 year period from 1930 through

1939 the City installed 41,564 meters, or an average of 4,156 meters per year. The greatest number of meters placed in any one year was 16,864 in 1931. The City Council of Chicago has made no appropriation for the purchase of meters. If such an appropriation were made, an indefinite delay would be experienced in contracting for and obtaining delivery of meters.

"Mr. Howson testified that he thought it would be practicable to put in 30,000 to 50,000 meters in one year's time. Even at this rate, it would take 6 to 10 years to accomplish the metering; and the opinion of one man is not a sufficient basis for a finding that the indicated rate of progress could be made.

"The matter of the metering of Chicago's water supply was discussed in the report of Special Master Hughes on the re-reference.[1] It was there pointed out that the City of Chicago was not a party to this proceeding and its entry as a party had been successfully resisted by the complainants; that the City had the riparian right to take water from Lake Michigan for the ordinary use of its inhabitants and that if it was sought to prevent an abuse of that right through the taking of an unreasonable amount, it would be necessary to present that issue in an appropriate manner. It is true that the point is presented here in a somewhat different aspect, because upon the re-reference the contention was that Chicago should be required to return to the Lake the water which it was withdrawing for domestic pumpage, *whereas in the present hearing it is contended that the reduction of the water consumption of Chicago by metering*

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[1] See report on re-reference (1929), p. 120.

is an ameliorative measure which is open to Illinois as a substitute for increased diversion from the Lake. The considerations referred to by Special Master Hughes would, however, appear to have force also in connection with the issues now presented."

Here again the complainant states can draw only one inference from these policies which the Chicago officials (both in the City and the Sanitary District) have pursued, and that is that they want to abstract as large a quantity of fresh water from Lake Michigan as possible. This "waste" of water so much needed to maintain depth in the shallow connecting channels of the great Lakes not only reduces the efficiency of their sewage treatment plants *but permits them to generate more electricity at their plant at Lockport.* This, in turn, unlawfully deprives the Great Lakes States, particularly New York and Canada, of the use of this "wasted water" for production of hydro-electric power at Niagara and the International Rapids.

Universal metering of the Chicago domestic water supply would reduce the amount of water consumed, and this in turn would reduce the volume of sewage which would permit a longer period of detention in the Sanitary Districts' aeration tanks and thus increase the amount of sewage which could be given full treatment. A reduction in the per capita use of Chicago water would permit a larger amount of sewage to be given complete treatment. A cut in the amount of Chicago domestic sewage flow would make available more capacity in the sewage treatment plants for storm water in the intercepting sewers and would also extend the useful life of the District's sewage disposal plants.

It is manifest that the efficiency of the Sanitary District's plants could be increased by universal metering of the Chicago domestic pumpage.

III (a)

The injunctive relief sought by complainants does not conflict with the Rivers and Harbors Act of July 3, 1930 (c847, 46 Stats. 929).

The Rivers and Harbors Act of July 3, 1930 (c847, 46 Stats. 929) provides in part as follows:

> "Illinois River, Illinois, in accordance with the report of the Chief of Engineers, submitted in Senate Document Numbered 126, Seventy-first Congress, second session, and subject to the conditions set forth in his report in said document, but the said project shall be so constructed as to require the smallest flow of water with which said project can be practically accomplished, in the development of a commercially useful waterway: Provided, That there is hereby authorized to be appropriated for this project a sum not to exceed $7,500,000: *Provided further, That the water authorized at Lockport, Illinois, by the decree of the Supreme Court of the United States, rendered April 21, 1930, and reported in volume 281, United States Reports, in Cases Numbered 7, 11, and 12 Original — October term, 1929, of Wisconsin and others against Illinois and others, and New York against Illinois and others, according to the opinion of the court in the cases reported as Wisconsin against Illinois, in volume 281, United States, page 179, is hereby authorized to be used for the navigation of said waterway:* Provided further, That as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War

> shall cause a study of the amount of water that will be required as an annual average flow to meet the needs of a commercially useful waterway as defined in said Senate document, and shall, on or before January 31, 1938, report to the Congress the results of such study with his recommendations as to the minimum amount of such flow that will be required annually to meet the needs of such waterway and that will not substantially injure the existing navigation on the Great Lakes to the end that Congress may take such action as it may deem advisable." (Emphasis added)

An analysis of the above pertinent provisions of the Act of July 3, 1930, make it plain that all that Congress did was to permit *"the water authorized by the Supreme Court of the United States"*, by its decree of April 21, 1930 *"to be used for navigation of said waterway"*. That act of Congress does not authorize any withdrawal of water from Lake Michigan whatsoever. *The Act is clear and unambiguous.* It recognizes the authority of the Court insofar as the amount of diversion is concerned. All that Congress says in the Act of July 3, 1930 is that the water, both direct diversion and domestic pumpage effluent, may be used for the navigation of said waterway. There is absolutely nothing in the Act that relates to any right or authority given by Congress to withdraw water from Lake Michigan.

Despite the fact that the State of Illinois itself has filed several petitions in this Court to secure an order permitting an *increase* in diversion, it now takes the anomalous position (under the disguise of an amicus curiae brief filed by the Chicago Association of Commerce and Industry) that this Act ousted this Court of jurisdiction to consider any phase of these cases. If anything the explicit language of this Act recognizes this Court's continuing jurisdiction by specific reference to the decree issued by the Court on April 21, 1930. All that this Act did was that upon the Sanitary Canal becoming a federal waterway, Congress *assented* to the discharging of the water into it which this Court provided for in its decree. So long as sufficient water is allowed to enter this federal waterway to sustain the navigation which it carries, neither the Federal Government nor the State of Illinois need complain. But on the other hand any amount of water introduced into this Canal beyond that which is needed to sustain its navigation is a *waste* of water from the Great Lakes Basin, where it is so sorely needed.

The Court has changed the amount of direct diversion after the enactment of the Rivers and Harbors Act of July 3, 1930 (46 Stat. 929). In the year 1940, in conformity with a stipulation signed by complainant lake states and defendants (this stipulation was agreed upon at the request of Special Master Monte M. Lemann) the Supreme Court authorized a temporary increase in diversion of 10,000 c.f.s. for a ten day period with the stipulation that this would not be used as a precedent in the future (311 U.S. 107).

In December, 1956 the Court, as an emergency measure, authorized a temporary increase in diversion from December 17, 1956 to January 31, 1957. (352 U.S. 945). In January, 1957 the Court extended the temporary increase in diversion through February 28, 1957 (352 U.S. 983).

If the Court has the power to authorize an increase in diversion, as it did in 1940, 1956 and 1957, the Court also has the right to stop or reduce the withdrawal of water from Lake Michigan, as was done in the Decree of April 21, 1930 (281 U.S. 179).

III (b)

Congress has no power to authorize the abstraction of waters of the Great Lakes to another watershed to the serious and continuing injury of the Great Lakes states and their peoples.

A. In General

The waters of the Great Lakes and their connecting waters, together with the submerged lands thereunder, are the property of the litoral states, and their title thereto, regardless of whether it be the full legal title or in trust for their people, is subject only to the paramount right of Congress to regulate commerce. Since the rights of these states in such waters and submerged lands are proprietary rights, the control of these states thereover must be final and conclusive except insofar as that title is qualified by the legitimate scope of the federal power to regulate navigation. *Illinois Central Railroad Company v. Illinois,* 146 U.S. 3387 (1892); *Shiveley v. Bowlby,* 152 U.S. 1 (1894); *Port of Seattle v. Oregon, etc.,* 255 U.S. 56 (1921).

The power of the United States over navigable streams is implied from its power to regulate interstate commerce. *Gibbons v. Ogden,* 9 Wheat 1 (1824). This implied power over navigable waters is limited to their preservation and improvement as avenues of interstate commerce. The right and duty of the United States in relation to navigable waters is a public trust for their preservation and improvement as interstate highways. The power thus granted to Congress by the Commerce Clause does not authorize it to regulate in order to create something else which it prefers to regulate or to attempt to improve the health of the people of a particular locality. *Wisconsin v. Illinois,* 278 U.S. 367 (1929).

When the United States was settled, the colonists brought to this country the common law of England. That common law prevailed in full force and effect at the time of the adoption of the constitution. The existence of that common law was taken for granted by the framers of the constitution, and the constitution was adopted and must be construed in relation to the rights, privileges and limitations which existed by virtue of the common law, and upon which common law rights the constitution, upon its adoption, was super-imposed. This has many times been recognized by the Supreme Court. In *Kansas v. Colorado,* 206 U.S. 46 (1907) at pp. 94-95 the court said:

> "It is undoubtedly true that the early settlers brought to this country the common law of England, and that the common law throws light on the meaning and scope of the Constitution of the United States, and is also in many States expressly recognized as of controlling force in the absence of express statute. As said by Mr. Justice Gray in *United States v. Wong Kim Ark,* 169 U.S. 649, 654:
>
> 'In this, as in other respects, it must be interpreted in the light of the common law, the principles and history of which were familiarly known to the farmers of the Constitution. *Minor v. Happersett,* 21 Wall. 162: *Ex parte Wilson,* 114 U.S. 417, 422; *Boyd v. United States,* 116 U.S. 616, 624, 625; *Smith v. Alabama,* 124 U.S. 465. The language of the Constitution, as has been well said, could not be understood without reference to the common law, I. Kent. Com. 336; Bradley, J., in *Moore v. United States,* 91 U.S. 270, 274.' "

When the constitution was adopted, and the express power given to Congress to regulate commerce, the right to abstract the waters of a watershed had never been claimed and much less recognized. This fact is readily determined by any study of the common law in England as it existed at the time when the constitution was adopted, or since that time. Odgers, Common Law of England, Vol. 1, pp. 590-594. The power granted to Congress under the Commerce Clause was merely the power to appropriate all the waters of a navigable waterway for an avenue of commerce along such natural highway including the natural extensions thereof, together with the right to improve that natural highway in its natural basin without regard to any incidental injury therefrom; but there was never included within the grant of power the right to destroy the natural navigable waters for the purpose of attempting to improve the health, the sanitation facilities, the disposal of sewage, or the development of power of a particular community. The states which border on the Great Lakes were settled because of the existence of these resources, and the states themselves then enlarged and enhanced the gifts of nature within their boundaries. Citizens of these states settled and established themselves within their borders because the natural resources contained therein appealed to them.

The whole industrial and commercial structure of the United States has been built about the existence of two great waterways separated by the Continental Divide, opening interstate and international communication by the St. Lawrence on the one hand and the Mississippi on the other. Each has its natural advantages. In the basin of each of these waterways, vast populations have built up their social and industrial institutions to use to the maximum these natural advantages. An intense but constitutionally restrained rivalry exists between the two sections and the dominant character of their respective civilizations has been determined, throughout the past one hundred years, as much by their respective advantages as by their common advantages. That the natural advantages of the Great Lakes region should now be sacrificed to the alleged sanitation or power needs of Chicago or to the improvement in the navigable depths of the Mississippi or to an attempt to ameliorate a simulated or grossly exaggerated health problem, would be at variance with the just expectations of the Great Lakes States and their peoples, who have settled the Great Lakes region and built it into an efficient and magnificent industrial empire. To question these just expectations would be grossly inequitable, and as has been observed, there is no express language in the Constitution which gives rise to the implication of any such power.

The citizens of the Great Lakes States settled there because of the existence of certain natural advantages, such as climate, soil, and nearness to a large body of water. Surely neither these settlers nor the framers of the Constitution ever thought for one moment that any of these natural resources might at any time be taken away from those who settled in proximity to them and developed and made use of them, for the benefit of individuals who had chosen to locate in another watershed. The founding fathers never dreamed that one day a power given to Congress by the Constitution only by implication would permit a temporary majority in Congress to take away entirely or impair the natural resources in one state for the benefit of people residing in another. Congress has no more right to take the water which is the property of the complainant states, to their damage, and give it to Illinois or the Sanitary District of Chicago for sanitation or power purposes, than Congress would have to authorize Illinois to appropriate the forests or mineral resources of Wisconsin for the benefit of Illinois or a municipal agency of that state. The theory that Congress has no power to authorize the abstraction of the waters of one watershed to another to the injury of the former does not conflict with nor challenge any of the decisions of the United States Supreme Court with reference to the power of Congress to improve navigable waters of the United States. The constitutional power of Congress over navigable waters extends only to improvement of the navigability of waterways and does not extend to their destruction or serious impairment, nor to the use of Congressional authority over navigable waters for the sanitation or power desires of Illinois or the Sanitary District. Any action by Congress under the Commerce Clause must bear some direct and reasonable relation to the ends of navigation. As the Court pointed out in *Wisconsin* v. *Illinois*, 278 U.S. 367 (1929), in speaking of the power of the Secretary of War:

> "The normal power of the Secretary of War under Section 10 of the Act of March 3, 1899, is to maintain the navigable capacity of Lake Michigan and not to restrict it or destroy it by diversion."

While Congress, as the Supreme Court has often said, may adopt any means having a direct relation to the control of navigation, not otherwise at variance with the Federal Constitution, *United States v. Chandler-Dunbar Co.*, 229 U.S. 53, 62 (1913), Congress may not arbitrarily destroy or impair the rights of riparian owners by legislation which has no real or substantial relation to the regulation of navigation. *Port of Seattle v. Oregon & Washington R.R.*, 255 U.S. 56, 63 (1921); *United States v. River Rouge Imp. Co.*, 269 U.S. 411 (1925). Thus, a diversion of water from Lake Michigan for power or sanitation purposes, even by authority of Congress, would be in violation of the rights of the Lakes States and their peoples. Congress itself would have no such power under the Commerce Clause to make a valid grant of authority to Illinois for any inadmissible purposes. In the same way, any action by Congress resulting in the destruction or serious impairment of the navigable capacity of the Great Lakes through diversion of water at Chicago to aid in the enrichment of an artificial channel in another watershed would be unconstitutional and void.

But, it may be asked, then under what authority did this Court permit a diversion of water in these cases into the Sanitary Canal and to maintain navigation in the Port of Chicago by its decree of April 21, 1930?

In answer to this hypothetical question we say that there is a vast difference between the power delegated to Congress under the Constitution to regulate commerce and the *power delegated to this Court to adjudicate cases or controversies.* When Congress passes laws it legislates, and in doing so it may not exceed the powers granted it. In fact, it cannot impair property rights without providing just compensation. Although this Court is subject to constitutional limitations it must be understood that in deciding cases it *adjudicates rights* as between the parties before it. It determines what their *rights are under the facts and the law applicable to those facts.*

In these cases, we repeat, this Court was faced with a *fait accompli,*—the Sanitary Canal had been constructed and used for many years before the Complainant States, or even the Federal Government, filed any proceedings to stop the diversion. Acting in equity this Court had to come to a decision which asserted and protected the just and legal rights of the Complainant States but which stated that the restoration of those rights had to be a gradual process. Considering the health problem facing Chicago and the enormous works that it would have to construct in order to diminish its volume of water diverted from Lake Michigan, time was necessary and was accorded to the defendants to comply with the decree. But in *adjudicating rights* between litigants this Court merely determines what they are — it does not in a legal or constitutional sense take property from one litigant and by fiat and without due process of law award them to another. But when a legislative body acts it needs no pleadings to frame the issues, it need accord no person a hearing with right of cross-examination of witnesses and in fact it acts not *juridicially at all but only politically.* This to us is the important distinction between the legislative and judicial process.

IV

Chicago is not entitled to offset its withdrawal of 1800 c.f.s. from Lake Michigan against the inflow into Lake Superior of 5,000 c.f.s. from Canada.

In defendants' brief, at page 22, the argument is made that the inflow of 5000 c.f.s. of water from the Hudson Bay area (Long Lac-Ogoki diversions) has more than offset the 1800 c.f.s. of domestic pumpage taken at Chicago from Lake Michigan. Defendants are not entitled to claim an offset for the following reasons:

1. The diversion of the waters from the Long Lac and Ogoki waterways located in the Hudson Bay area of Canada into Lake Superior is permitted pursuant to an exchange of notes between the United States and Canada in 1940, which agreement was ratified by the so-called Niagara Falls Treaty made by and between the United States and Canada, dated February 7, 1950 (ratified by the United States Senate on July 20, 1950). This Treaty divided the water at Niagara Falls equally, for power

purposes, between the United States and Canada but exempted the inflow from the Canadian Hudson Bay watershed from this division. Thus, Canada, under the notes of October 14 and 31, and November 7, 1940, and the Niagara Falls Treaty of February 7, 1950, is entitled to use all of the diverted waters from the Hudson Bay area for the generation of power at Niagara.

2. Lake Superior is now, and for more than 30 years has been regulated at the Soo. From the North Central Division Office, Corps of Engineers, we understand that the control works at the Soo are so operated as to maintain the levels of Lake Superior free of effects by the Canadian diversions of the Long Lac-Ogoki water into Lake Superior. Although the diversion into Lake Superior of about 5000 c.f.s. from Canada was brought about by agreement between the two countries, no such agreement ever has been reached between the United States and Canada with reference to the Chicago diversion. The regulation of the levels of Lake Superior by the International Joint Commission through its joint engineering board is for the purposes of maintaining stable levels and to reduce to a minimum the variations in levels, both seasonal and periodical. This means that during periods of low stages all of the Canadian diversion is maintained in Lake Superior, and thus confers no benefits to the lower lakes.

3. Because the 5000 c.f.s. inflow of Canadian water to Lake Superior is authorized by agreement between the United States and Canada the complainants have no control over this situation and certainly should not be penalized by allowing defendants to claim an offset for the 1800 c.f.s. they are diverting to the Mississippi River watershed.

4. Any improvement in navigable depths of the harbors

on the Great Lakes from the Hudson Bay area inflow was, and is (insofar as navigation is concerned), for the benefit of all the states, and not for the benefit of defendants alone. Upon admission to the union of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York, each such state became a constituent member of the United States and was admitted into the union upon an equal footing with the original thirteen states in all respects. *Pollard v. Hagan,* 44 U.S. 212 (1845); *Munn v. Illinois,* 94 U.S. 113 (1877). Whenever the Federal Government makes a Treaty under the treaty making powers of the Constitution, Art. II, Sec. 2, it is for the benefit of all the states and their peoples, and not for the benefit of only one community or state. Where a treaty provision fairly admits of two constructions, one restricting and the other enlarging, rights which may be claimed under it, the more liberal interpretation is to be preferred. The treaty making power is independent of and superior to State Laws. *Makak Indian Tribe v. McCauley,* 39 Fed. Supp. 75 & 128 Fed. (2d) 867.

Yet the State of Illinois and the Metropolitan Sanitary District of Greater Chicago claim that they, and they alone, should reap the benefit of the additional water which our Federal Government secured by this agreement and treaty with Canada, as if they occupied a favored position among the States of the Union. And the irony of it all is that they want this largess of water not to *use* but to waste— so that the Sanitary District can further indulge in a continuation of its policy of deficient and inefficient treatment of its sewage by using greater quantities of diverted fresh water from Lake Michigan.

V

Substantial and continuing damages are inflicted upon the complainant states by reason of the artificial lowering of the levels of the Great Lakes, caused by defendants' abstraction from Lake Michigan of the domestic pumpage at Chicago. (Defendant's Brief, pp. 11-14).

Discussion of analysis of amended application transmitted by Honorable Wilber M. Brucker, Secretary of the Army to Honorable J. Lee Rankin, Solicitor General.

In the "Analysis of Amended Application by the States of Wisconsin, Minnesota, Ohio, Commonwealth of Pennsylvania, Michigan and New York to the United States Supreme Court for Reopening and Amendment of the Decree of April 21, 1930 re: Lake Michigan Diversions at Chicago", transmitted by Honorable Wilber M. Brucker, Secretary of the Army, to Honorable J. Lee Rankin, Solicitor General of the United States, and appended to this brief as Appendix A, the following conclusions are reached:

> 1. "Referring to page 12 of the amended application, 'The estimate of decrease in carrying capacity of lake vessels of 180 to 200 tons per cargo for a decrease in draft of 1.8 inches is considered to be of the proper magnitude." * * *
>
> 2. "It is considered appropriate to increase the estimate average annual loss in Senate Document 28 by 10 per cent, from 300,000 tons to 330,000 tons, and to also increase by 10 per cent the estimate of annual losses for a diversion of 1,800 cubic feet per second from 540,000 tons to 594,000 tons, say in round numbers 600,000 tons. * * * the annual average loss due to a permanent diversion of 1,000 c.f.s. is estimated to have a value of $660,000."

3. "In the second paragraph on page 12 of the amended application it is stated that the port development expenditures for the Great Lakes ports for the twelve-year period 1946-1957 were approximately $147 million. The expenditures made by the Corps of Engineers during the indicated period for construction and maintenance of harbor channels and port facilities throughout the Great Lakes area total about $87 million. Presumably the estimate in the amended application includes all expenditures by both federal and non-federal interests."

4. "On page 15 of the amended application a table is given showing loss of energy, capacity, and revenue to the New York Power Authority at its Niagara and St. Lawrence plants resulting from a permanent diversion of 1800 c.f.s. from Lake Michigan at Chicago. * * *"

"Detailed computations to verify the energy and capacity amounts as shown are not available for analysis. Based on comparative studies, the energy values as computed appear to be the additional amount of energy that could be generated if a permanent diversion at Chicago is returned to the lake-drainage system. Substantially all of the additional energy could be generated without additional investment in power generating facilities. The monetary value of the energy presented in the application is considered a reasonable estimate."

"Estimates of gain in capacity from the reverted waters could be determined only from a detailed analysis of many variable and complex factors. Marketing arrangements and load characteristics, now and in the future, would play an important part in determining the actual saleable capacity for various flow conditions. Accordingly it is not possible for us to fully confirm the estimates of capacity values."

5. "In Section XIII, p. 16 of the amended application it is stated that a diversion of 1,500 c.f.s. is adequate to maintain navigation in the Port of Chicago and the Illinois Waterway. The flow of 1,500 c.f.s. is the authorized diversion exclusive of domestic pumpage. This rate of flow, *without domestic pumpage,* is adequate for operation of existing navigation facilities on the Illinois Waterway."

6. "A survey report was transmitted to Congress on September 3, 1958 in which the authorization of duplicate navigation locks on the Illinois Waterway is recommended. This report will be published as House Document 31, 86th Congress, 1st Session. Studies of water requirements for operation of the recommended duplicate locks show that an average annual flow of 1,826 c.f.s. would be required representing an increase of 326 c.f.s. over the amount of the presently authorized diversion."

Complainants agree with all of the above conclusions as above set forth in the analysis of their amended application except that complainants do not agree with the conclusions that (1) the "annual losses for a diversion of 1,000 c.f.s. * * * say in round figures 600,000 tons," and the conclusion that (2) such loss in tonnage" is estimated to have a value of $660,000".

Complainants contend that the damages and losses sustained by reason of the diversion of the Chicago domestic pumpage of 1,800 c.f.s. insofar as shipping on the Great Lakes is concerned amounts to an annual loss of more than 2,500,000 tons of carrying capacity of Great Lakes vessels (American and Canadian) with an annual revenue of more than $4,000,000.

Insofar as the conclusion relating to the amount of water needed for future navigation on the Illinois Waterway when duplicate locks are constructed of 1,836 c.f.s., and if such duplicate locks are actually constructed and in use on the Illinois Waterway, it will be time enough then to decide that point.

We wish to reiterate that the pending suits are not for the collection of money damages, but are suits to enjoin the further diversion of domestic pumpage water from the Great Lakes water system to the Mississippi valley watershed. All that is necessary is that the complainants show substantial damages caused by the action of the defendants. Complainants submit that the allegations in the amended application do show that substantial damages have been and are being inflicted upon complainants by the artificial lowering of the levels of the Great Lakes produced by the action of defendants in diverting 1,800 c.f.s. of the waters of the Great Lakes.

VI

In 1930 the Court was faced with a fait accompli. The District was discharging large quantities of raw sewage in the canal and until adequate treatment works were built, the Court had no choice but to allow the diversion to continue. Today, with drastically changed conditions, compelling reasons require the return of the domestic pumpage to Lake Michigan. (Referring to Defendants' Brief, p. 21 et seq.)

(a) In General

When the Court entered the Decree of April 21, 1930, it was faced with a *fait accompli.* The sewage of the Chicago Sanitary District (mostly untreated) was being discharged into the Chicago Drainage Canal and flushed away with water diverted from Lake Michigan. So, for humanitarian reasons and to protect the health of the people of the Chicago area, and until the District built adequate sewage treatment works, the Court had no choice but to allow the diversion of domestic pumpage to continue for the time being.

Today, conditions have changed drastically. The population of the Chicago area is increasing rapidly. More domestic pumpage will be taken from Lake Michigan. It is estimated, in a study made by a firm of engineers and reported to the Commissioner of the Department of Water and Sewers, City of Chicago, that the water which will be required in 1980 by the City of Chicago and the suburbs now served and which will be served by Chicago, will total 2300 c.f.s., as compared to the 1760 c.f.s. domestic pumpage now withdrawn by the Chicago Water Department.

Today, the Chicago Sanitary District has completed the West-Southwest Side sewage treatment works and with the addition of needed facilities in the next few years near the Stickney treatment works this new plant will dispose of sludge and solids removed from sewage by the so-called Zimmerman process. Today, about 200 to 250 tons per day of solids cannot be handled with present facilities and such solids are taken to lagoon beds located along the Chicago Drainage Canal. (Engineering News-Record, November 27, 1958). When the needed supplemental facilities are provided, and with proper operation of the sewage treatment works, the domestic pumpage can be returned to Lake Michigan with no danger whatsoever to the health of the people in the Chicago area.

(b). The Chicago domestic pumpage will increase substantially in the future.

Chicago has been able to expand in population from 1930 to date, without increasing substantially the amount of diversion of domestic pumpage from Lake Michigan at Chicago only because Chicago has materially increased its efficiency in the withdrawal, distribution, and use of its domestic pumpage. This has been accomplished by stopping the huge, wasteful leaks in its water system which have cost the City of Chicago many millions of dollars. This great and unreasonable waste of water of the Chicago Water Works system has been overcome to a great extent by repairing old or installing new pipes and facilities so that today the large leakage in the city's water system has been materially reduced.

Since Chicago has repaired or replaced the leaky mains and faulty facilities which allowed huge quantities of Lake Michigan water to be lost and thus wasted, it is certain that the Chicago water system *has reached the limit of its* *efficiency* in this respect and the future will show a big increase in water use due to increase in population. This is proven by the fact that the City of Chicago now has under construction near Navy Pier a tremendous water filtration plant to satisfy the anticipated large, future demands for water. This new north side water filtration plant will be capable of supplying sufficient water for the anticipated needs of the people of the Chicago area for the next 25 years or more. (Chicago Tribune, July 14, 1958, Section F, Part 2, p. 1; Chicago Sun Times, August 27, 1958).

According to the 1957 annual report of the Department of Public Works and Sewers, City of Chicago, the per capita consumption of the inhabitants of the city of Chicago is 240 gallons per day; for the people of the suburbs who receive Chicago water the per capita consumption is 147 gallons per day. The socalled Meissner Report (PURE WATER, Vol. VIII, No. 10, October, 1956) shows that in 1980 the total withdrawal of domestic pumpage at Chicago for Chicago and the suburbs receiving Chicago water will total 2300 c.f.s. in contrast to the 1800 c.f.s. now withdrawn from Lake Michigan.

In the "Report upon adequate water supply for the Chicago Metropolitan area 1955 to 1980" made by Alvord, Burdick and Howson, Consulting Engineers, at Part IV-14, it is said:

> "In effect the forecast assumes a normal rate of increase in the total pumpage for use by Chicago after about a 20-year period of decrease attributable to leakage elimination."

Thus, it would seem to follow that if the use of water will be materially increased in the next 17 years and every seventeen years to come, as has been forecast by the Illinois State Water Survey, and if the demand for water in the United States will be doubled in the next 17 years as forecast by Major-General Emerson C. Itschner, Chief, Corps of Engineers, United States Army (see complainants' Brief in support of amended application, page 2), certainly, with a normal rate of increase in the total pumpage for use by Chicago and the suburbs served by Chicago the amount of domestic pumpage will increase substantially from the approximately 1800 c.f.s. of domestic pumpage now being diverted from Lake Michigan. With the elimination of the leakage in Chicago's water system, the amount of domestic pumpage at Chicago will begin to climb again, after years of decrease in pumpage due to leakages which cost Chicago millions of dollars, and which leakages should have been stopped years ago.

In view of this inevitable upward trend in the diversion of water for domestic pumpage the water resources of the Great Lakes Basin are going to be subjected to a constant decrease in navigational depths and the power plants of the New York Power Authority will lose huge quantities of water for power generation. The complainant States are justifiably fearful that unless something is done now before this increase in domestic pumpage becomes a reality it may be difficult, if not impossible, for this Court twenty years from now to turn back the clock. Although the Courts have been loathe to apply the doctrine of laches to sovereign states in litigation involving a private citizen, yet the complainant states believe that their cause stands on a better footing by presenting their complaint of anticipated injury *now* before the situation becomes a *"fait accompli."*

VII

Discussion of cases cited by defendants and the De Minimis Doctrine in general.

Connecticut v. Massachusetts, 282 U.S. 660, 673, relating to priority of uses of diverted water is not in point on the facts. *Wyoming v. Colorado,* 298 U.S. 573, 579-581; *Nebraska v. Wyoming,* 325 U.S. 589, 627; all involved states having the rule of priority of appropriation or where the rule was dominant in the areas affected. In *Colorado v. Kansas,* 320 U.S. 383, the special facts governed the decision. *Connecticut v. Massachusetts,* 282 U.S. 660, 669, and *Washington v. Oregon,* 297 U.S. 517, 522, on the point that damage must be shown by the use complained of are also distinguishable on the facts.

Defendants continually attempt to belittle the complainants' claims of damages and losses sustained by reason of the artificial lowering of the levels of the Great Lakes due to the diversion of 1,800 cubic feet per second of water from Lake Michigan. It should be pointed out that the pending suits are not for the collection of money damages but are suits to enjoin the further diversion of domestic pumpage water from the Great Lakes water system to another watershed. The complainants must show only substantial damages. Complainants submit that the allegations in the amended application do show that substantial damages have been and are being inflicted upon complainants by the artificial lowering of the levels of the Great Lakes produced by the action of defendants in diverting 1,800 c.f.s. of the waters of the Great Lakes.

In Complainants' Amended Application Section X, at pages 11-12, it is alleged that the diversion at Chicago of 1,800 c.f.s. of domestic pumpage has lowered the levels of the Great Lakes and that this decreases the carrying capacity of the large lake vessels by from 180 to 200 tons per cargo and this takes away annually more than 2,500,000 tons of carrying capacity of Great Lakes vessels, causing a loss of more than $4,000,000 in annual revenue.

The Amended Application alleges further, at pages 13-16, that the artificial lowering of the Great Lakes system by the diversion of more than 1,800 c.f.s. of water from the Great Lakes-St. Lawrence as "domestic pumpage" at Chicago shows a total annual revenue loss of $1,027,841.15 to the Power Authority of the State of New York. It is also alleged that if equal loss of Canada's Niagara and St. Lawrence plants is considered, the diversion of 1,800 c.f.s. at Chicago results in an annual revenue loss to the New York Power Authority and Canada of $2,055,682.30. In fifty years this would amount to $102,785,000.

Complainants have re-examined the Amended Application with particular reference to the allegations as to the damages caused by the diversion of approximately 1800 cubic feet per second of domestic pumpage at Chicago. Complainants believe that they can prove the losses as set forth in the Amended Application and in the above paragraphs of this brief.

Certainly, substantial continuing losses as shown above are being inflicted upon complainants by the action of defendants in diverting 1,800 c.f.s. of the waters of Lake Michigan and thereby artificially lowering the levels of the Great Lakes system.

In *Reeves et al v. Jackson,* 207 Ark 1089, 184 SW 2nd 256, 258, it was held that the "de minimis" doctrine does not apply to the invasion of the property of another, citing 26 RCL 762 and annotation of "de minimis" in 44 ALR 168.

In the Delaware River case, the Court did not apply the doctrine of equitable apportionment.

The brief filed by the Attorney General of Illinois leans heavily on the Delaware River case, *New Jersey v. New York,* 283 U.S. 336 (1931) in which Pennsylvania intervened, see 280 U.S. 528 (1930). In this case the State of New York was permitted to build huge reservoirs at the head-waters of the Delaware River within its own borders, and to divert a certain portion of the dammed-up waters to the City of New York for domestic purposes. But a close study not only of the opinion but of the Master's report indicates the following:

(a) New York had to construct at its own expense not only dams but also sewage disposal works to protect this portion of the river against contamination.

(b) It was permitted to divert only the excess flood-waters which were of no use either to Pennsylvania or New Jersey, but to the contrary were harmful during flood periods.

(c) New York was required to release from the various reservoirs sufficient water at all times of the year in order to provide in the Delaware River a minimum volume of flow, even though during the summer months it could receive no water for itself. This provided the river with a flow during the summer greater than that normally prevalent when the water was naturally low.

(d) This arrangement was of great benefit to New Jersey and Pennsylvania and caused no damage whatsoever to the interests of these two states. The doctrine of equitable opportionment was mentioned in the opinions but it should be borne in mind that the diversion was allowed under the severe restrictions mentioned above.

In the instant proceedings, the State of Illinois is conferring no benefits whatsoever on the other States and is inflicting irreparable injury to their interests. The whole State of Illinois, in a state of nature, contributed only 503 c.f.s. of water to the Great Lakes basin, and the State of Illinois is now diverting about 3300 c.f.s. of water from that basin at Chicago. 1,800 c.f.s. as domestic pumpage.

It should be pointed out that the Delaware River case, supra, was not decided on the basis of equitable apportionment but on the basis of equitable principles, namely, the lack of injury to the lower riparian states and the conferring of a benefit upon them.

In *Colorado v. Kansas,* 320 U.S. 383 (1943) at 393-394, the Court in discussing the equitable apportionment of water, said:

> "* * * in determining whether one State is using, or threatening to use, more than its equitable share of the benefits of a stream, all the factors which create equities in favor of one State or the other must be weighed as of the date when the controversy is mooted."

In *Nebraska v. Wyoming,* 325 U.S. 589 (1945), at page 618, the Court referred to the above quoted remarks (in *Colorado v. Kansas,* 320 U.S. 383, 393-394 and said:

> "That case did not involve a controversy between two appropriation states. But if an allocation between appropriation states is to be just and equitable, strict adherence to the priority rule may not be possible. For example, the economy of a region may have been established on the basis of junior appropriations. So far as possible those established

> uses should be protected though strict application of the priority rule might jeopardize them. Apportionment calls for the exercise of an informed judgment on a consideration of many factors. Priority of appropriation is the guiding principle. But physical and climatic conditions, the consumptive use of water in the several sections of the river, the character and rate of return flows, the extent of established uses, the availability of storage water, the practical effect of wasteful uses on down-stream areas, the damage to upstream areas as compared to the benefits to downstream areas if a limitation is imposed on the former — these are all relevant factors. They are merely an illustrative, not an exhaustive catalogue. They indicate the nature of the problem of apportionment and the delicate adjustment of interests which must be made."

A reading of the foregoing cases shows that the doctrine of equitable apportionment is applied to states having the rule of prior appropriation and not to states (such as Illinois and the other Great Lakes States) adhering to the common law rule of reasonable use based upon riparian ownership. The Delaware River case, we submit, is clearly distinguishable from the instant case.

The gist of this Court's decision in the instant case was that by diverting water to the Mississippi watershed the defendants were doing a "wrong and they must stop". "Equitable apportionment" was never mentioned in the pleadings, during the hearings, in the Master's Reports, nor in the various opinions of this Court. This is the first time the words "equitable apportionment" have been heard in these cases. The thing that mystifies counsel for the complainant States is by what process of legal legerdemain do the defendants expect this Court to convert the "wrong" which they were and have been committing against the just rights of the complainants into a "right". For as we understand the doctrine of equitable apportionment it is nothing more than an equitable division of water among riparian states or individuals *who have the right to make use of the waters for the purposes intended by them.*

In these cases this Court held that the diversion of water by the defendants for sanitation purposes was "inadmissible"—was a "wrong" and therefore unlawful; and that the permit of the Secretary of War was illegal. It is difficult for us to see how this Court can be called upon to divide or apportion property rights which have been wrongfully used by the defendants, or how it can extend and augment that "wrong" by allowing a greater diversion. If anything, this Court should cut down the "wrong" as the complainants propose in their amended petition.

VIII

The failure of the sanitary district to stop certain bad practices by Chicago industries has resulted in placing a heavy pollutional load on the sanitary canal and the Calumet River.

The Commonwealth Company, which produces electric power in the Chicago area, has seven generating stations located on the Chicago Sanitary Canal and expects to construct two additional ones in the near future. The Company's use of canal water for cooling and condensing purposes would, it is estimated, utilize during the summer months, half the oxygen resources of water directly diverted from Lake Michigan and treated effluents of the

Sanitary District. The following table of oxygen solubility shows how the heating up of the water by use for cooling purposes reduces the dissolved oxygen in water:

°Centrigrade	*°Fahrenheit*	*Dissolved Oxygen (ppm)*
0	32	14.5
5	41	12.8
10	50	11.4
15	59	10.4
20	68	9.2
25	77	8.6
30	86	7.6

It is manifest that the use of the waters of the Chicago Sanitary Canal for cooling purposes in such large quantities by these seven plants imposes a heavy burden on the waters contained in the Canal. The return of high temperature water to the Canal reduces considerably the ability of the waters of the Canal to oxidize the sewage or the effluent emanating either from the sewers or from the sewage treatment plants. Obviously, these plants could not have located on these sites and tapped into the waters of the Canal without the permission of the Sanitary District. From the standpoint of efficiency of plant operations, the locations along the Canal are in very unfavorable positions. The steam power generating plants in Michigan and Wisconsin, for example, are located or are locating along the shores of the Great Lakes where there is an abundance of clean, fresh, oxygen laden water for cooling purposes and where no harm can be done to the receiving waters by the discharge of water of a higher temperature.

The above is just another instance where the Sanitary District has allowed an operation to develop and grow which is exactly contrary to good practice in the use of the Canal waters; for, instead of decreasing the pollutional load on the Canal the District has permitted everything possible to be done to increase the pollution of the Canal.

Another example of the District's failure to stop a bad practice came to light in the suit brought by the United States to enjoin the Republic Steel Corporation, International Harvester Company and the Interlake Iron Corporation from discharging solids into the Calumet River, a navigable watercourse located in Chicago, and to secure a mandatory injunction directing the three defendants to restore to a depth of 21 feet below low water datum for Lake Michigan the federal channel of the Calumet between certain locations. The United States District Court ruled that the Government was entitled to the relief asked for. On appeal to the United States Circuit Court of Appeals for the Seventh Circuit, the decree appealed from was reversed, on the ground that there is no legal basis, statutory or otherwise, upon which the Government is entitled to "injunctive relief". This decision was based on technical grounds.

The three defendants, in their manufacture of iron and steel ingots, pump water in vast amounts from the Calumet River. This water, after use, is returned to the river through sewers maintained by the defendants. Each of the defendants operates a tank-type settling basin designed to recover fine flue dust contained in the water after use. However, some of the dust escapes and is washed into the river. There is also some water which flows directly into the river through sewers, which has not passed through the settling basins. This dust settles into the federal channel of the Calumet River and reduces the navigable depths of said river.

Here again, the Sanitary District is allowing the waters of the Sanitary Canal (since the waters of the Calumet

River reach the Canal eventually) to be used in such a way as to increase the burden on its waters.

Likewise, the waters of the North Branch of the Chicago River, and other waters of the District, are being polluted by industries and individuals without fear of action by the District.

We submit that all these added burdens placed on the Sanitary Canal and the other watercourses in the District were not contemplated by the Court when it heard the suits filed by complainants in the 1920's and when the Court's decree of April 21, 1930 was entered.

In addition to the bad practices indulged in by industries located within the Sanitary District, the unorthodox and permanent practices of the District itself, such as the lagooning of sludge in sludge beds located along the canal, have placed an additional and unnecessary load on the waters of the Canal. This practice began in 1941, at the suggestion of the Special Master, Honorable Monte M. Lemann, as a temporary measure to relieve the pollutional load on the Canal, until the District could construct and operate additional facilities needed to dispose of the solids from the Southwest Side Treatment Plant. This practice has continued from 1941 to date, though the District now says it is making plans for the elimination of the sludge beds.

The one significant and disturbing thing is that all of the above bad practices which place a heavy pollutional load on the waters of the rivers and the Canal (located within the District) are not corrected nor are remedial steps taken until these practices are brought to public light. Then, there is a ceremonial of contrition put on by the officials of the District with a nebulous promise made to remedy them some time in the far distant future.

IX

CONCLUSION

Complainants respectfully submit that the relief prayed for in their Amended Application to the Court should be granted for the following reasons:

1. Drastically changed conditions since the entry of the Decree of April 21, 1930 provide compelling reasons for the return of Chicago's domestic pumpage to Lake Michigan.

2. Substantial and continuing damages due to the diversion of the domestic pumpage at Chicago are inflicted upon the Great Lakes States and their peoples. This damage relates to navigation and commercial interests of all the Great Lakes States, and also the damage inflicted upon the State of New York by reason of interference with the use of the waters of the Niagara and St. Lawrence rivers for power development.

3. The Injunctive Relief sought by Complainants does not conflict with the Rivers and Harbors Act of July 3, 1930 (c. 847, 46 Stats. 929).

4. The operating efficiency of the Chicago Sanitary District's sewage disposal plants is not in full compliance with the Court's orders in these suits. The efficiency of operation of these plants could be improved through means other than diversion of water from the Great Lakes.

5. The return of the domestic pumpage at Chicago to Lake Michigan could be accomplished without creating any hazard to the health of the people residing in the Chicago area.

6. That if it should be determined by this Court upon recommendations of the Special Master, upon full hearing, that measures other than the return to Lake Michigan of the Chicago domestic pumpage effluent can be put into effect so that such measures will reduce either the direct diversion, or limit or restrict the domestic pumpage so that the total amount of diversion of water from the Great Lakes at Chicago could be reduced or restricted, the Court should consider the entry of a supplemental decree, or a modified decree to that effect; and that the Court grant such other relief agreeable to and in accordance with equity and good conscience which will insure to the greatest possible degree the future integrity and development of the Great Lakes reservoir so that the maximum use and benefit of its waters be assured to the complainant States.

Respectfully submitted,

STATE OF WISCONSIN
John Reynolds
Attorney General
Roy Tulane
Assistant Attorney General

STATE OF MINNESOTA
Miles Lord
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John R. Davison
POWER AUTHORITY OF NEW YORK
New York, New York

MOTION TO AMEND AND ENLARGE COMPLAINANTS' PRAYER FOR RELIEF IN COMPLAINANTS' AMENDED APPLICATION

Now come the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York and move this Honorable Court to amend and enlarge Complainants' Prayer for Relief in Complainants' Amended Application, as follows:

(3) (a) That if it should be determined by the Court through a Special Master, upon the investigation recommended by the Solicitor General, and upon full hearings, that measures other than the return to Lake Michigan of the Chicago domestic pumpage effluent can be put into effect so that such measures will reduce either the direct diversion or limit or restrict the Chicago domestic pumpage, to the end that the total amount of diversion of water from the Great Lakes at Chicago will be reduced or restricted, the Court should enter a supplemental decree, or a modified decree, to that effect.

(b) That the Court grant such other relief agreeable to and in accordance with equity and good conscience which will insure to the greatest possible degree the future integrity and development of the Great Lakes reservoir so that the maximum use and benefit of its waters be assured to the complainant States.

Respectfully submitted,

STATE OF WISCONSIN
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John R. Davison
POWER AUTHORITY OF NEW YORK
New York, New York

DEPARTMENT OF THE ARMY

Washington, D.C.

Honorable J. Lee Rankin
Solicitor General of the United States
Department of Justice
Washington, D.C.

Dear Mr. Rankin:

In your letter of 14 January to Major General Emerson C. Itschner, Chief of Engineers, you request his views as to the facts stated in the documents filed with the Supreme Court concerning Lake Michigan diversions at Chicago. The amended application now pending in the Supreme Court would require the State of Illinois and the Metropolitan Sanitary District of Greater Chicago to return the effluent from "domestic pumpage" to Lake Michigan.

Attached is an analysis prepared by Major General Itschner of the amended application.

Sincerely yours,

/s/ WILBER M. BRUCKER
Secretary of the Army

1 Incl.
Analysis (in dup)

12 February 1959

Analysis of Amended Application by the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York to the U. S. Supreme Court for Reopening and Amendment of the Decree of April 21, 1930 re Lake Michigan Diversions at Chicago.

The following analysis of the Amended Application to the U. S. Supreme Court has been prepared in response to request from the Solicitor General, Department of Justice, as contained in his letter of 14 January. The amended application is in further support of the original application in which it was requested that the State of Illinois and the Metropolitan Sanitary District of Greater Chicago be required to return the effluent from "domestic pumpage" to Lake Michigan. The original application was denied by Court order entered on 3 March 1958.

It is stated in the first paragraph on page 12 of the amended application:

> "It decreases the carrying capacity of the large lake vessels by from 180 to 200 tons per cargo. It takes away annually more than 2,500,000 tons of carrying capacity of the Great Lakes vessels at a loss of more than $4,000,000 in annual revenues."

The estimate of decrease in carrying capacity of large lake vessels of 180 to 200 tons per cargo for a decrease in draft of 1.8 inches is considered to be of the proper magnitude.

The estimate of annual tonnage loss of 2,500,000 tons with a value of $4,000,000 appears to be based on an assumption of full utilization of the United States and Canadian Great Lakes fleet with lake levels so low that all vessels would be affected. We do not have sufficient information on the composition of the Canadian fleet to estimate the reduction in its capacity. In paragraph 172 of Senate Document 28, 85th Congress, the Corps of Engineers estimated that the reduction in capacity for the United States Great Lakes fleet under similar assumptions for a permanent increase in diversion of 1,000 cubic feet per second would be 1,000,000 tons. The reduction of capacity for a diversion of 1,800 cubic feet per second would be 1,800,000 tons on the same basis. However, as a practical matter, the assumed conditions on which the above estimates are based could never occur since some of the smaller, lighter draft vessels in the fleet would not be restricted in their loading because of limited channel depths even during periods of low lake stages.

The average annual loss to the United States Great Lakes fleet as determined in Senate Document 28 for a permanent increase in diversion of 1,000 cubic feet per second, was 300,000 tons (page 47). The results of that study are still considered to be valid based on data available at that time, but are subject to some adjustment due to more up-to-date information.

It is considered that the most reasonable estimate of average annual losses to the United States Great Lakes fleet, resulting from a lowering of lake levels due to an increase in diversions, should be based on the criteria used in the study in Senate Document 28. These criteria are as follows:

a. The anticipated United States Great Lakes Commerce and fleet as of 1985.

b. The present general pattern of traffic on the Great Lakes.

c. Waterway improvements to the connecting channels and harbors which can be expected to be accomplished.

d. The natural variation in levels of the Great Lakes.

The current analysis has been based on the fluctuation of lake levels as occurred for the 35-year period 1922-1956 in accordance with the criteria listed above. With use of data comparable to that available for the Senate Document 28 studies, it is estimated that with a permanent increase in diversion of 1,800 cubic feet per second the average annual loss would be 540,000 tons. Recent studies of future traffic in iron ore and stone indicate that estimates used in Senate Document 28 should be revised upward about 10 percent. More recent estimates are not available for prospective traffic in other commodities. It is considered appropriate to increase the estimated average annual loss in Senate Document 28 by 10 percent, from 300,000 tons to 330,000 tons, and to also increase by 10 percent the estimate of annual losses for a diversion of 1,800 cubic feet per second from 540,000 tons to 594,000 tons, say in round numbers 600,000 tons.

The value of $0.80 per ton as used in Senate Document 28 has been reviewed in the light of more recent information on cost of transportation as developed in connection with the Great Lakes Harbor studies. In these studies, the actual cost per ton varied from $0.34 per ton for short haul coal trips to $1.80 per ton for grain from Duluth to Buffalo. The estimated composite or weighted average cost is considered to be $1.10 per ton. Accordingly, the average annual loss due to a permanent diversion of 1,800 cubic feet per second is estimated to have a value of $660,000.

In the second paragraph on page 12 of the amended application it is stated that the port development expenditures for the Great Lakes ports for the 12-year period 1946-1957 were approximately $147 million. The expenditures made by the Corps of Engineers during the indicated period for construction and maintenance of harbor channels and port facilities throughout the Great Lakes area total about

$87 million. Presumably the estimate in the amended application includes all expenditures by both Federal and non-Federal interests.

On page 15 of the amended application a table is given showing loss of energy, capacity, and revenue to the New York State Power Authority at its Niagara and St. Lawrence plants resulting from permanent diversion of 1,800 cubic feet per second from Lake Michigan at Chicago. The estimates are based on an equal loss of flow to Canada and the U.S. from the diversion, that is, a loss of 900 cubic feet per second at the Power Authority's plants. The estimates also appear to be obtained by the same procedure as that shown by the Power Authority as given on page 255 of the printed hearings held on 28-29 July 1958 by the Senate Public Works Committee on HR 2 and S 1123, 85th Congress.

Detailed computations to verify the energy and capacity amounts as shown are not available for analysis. Based on comparative studies, the energy values as computed appear to be the additional amount of energy that could be generated if the permanent diversion at Chicago is returned to the lake-drainage system. Substantially all of the additional energy could be generated without additional investment in power generating facilities. The monetary value of the energy presented in the amended application is considered a reasonable estimate.

Estimates of gain in capacity from the reverted waters could be determined only from a detailed analysis of many variable and complex factors. Marketing arrangements and load characteristics, now and in the future, would play an important part in determining the actual saleable capacity for various flow conditions. Accordingly, it is not possible for us to fully confirm the estimates of the capacity values.

A representative of the staff of the Federal Power Commission has been consulted in connection with the power items. He concurs in general, with the views expressed in the preceeding paragraphs.

In Section XIII, page 16, of the amended application it is stated that a diversion of 1,500 cubic feet per second is adequate to maintain navigation in the Port of Chicago and the Illinois Waterway. The flow of 1,500 cubic feet per second is the authorized diversion exclusive of domestic pumpage. This rate of flow, without domestic pumpage, is adequate for operation of existing navigation facilities on the Illinois Waterway.

A survey report was transmitted to Congress on 3 September 1958 in which the authorization of duplicate navigation locks on the Illinois Waterway is recommended. This report will be published as House Document No. 31, 86th Congress, 1st Session. Studies of water requirements for operation of the recommended duplicate locks show that an average annual flow of 1,826 cubic feet per second would be required, representing an increase of 326 cubic feet per second over the amount of the presently authorized diversion.

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JAMES R. BROWNING, C

(239) **Nos. 2, 3 and 4, Original**

IN THE

Supreme Court of the United States

October Term, 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO.

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO.

ON AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930, AND THE GRANTING OF FURTHER RELIEF

Supplemental exceptions by the State of New York to the memorandum filed on April 14, 1959 by Honorable J. Lee Rankin, Solicitor General, for the United States, as amicus curiae, on the amended application of the above complainants.

LOUIS J. LEFKOWITZ
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The Capitol
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BATAVIA TIMES, LAW PRINTERS,
BATAVIA, N. Y.

IN THE

Supreme Court of the United States

October Term, 1958

No. 2, Original

STATES OF WISCONSIN, MINNESOTA, OHIO and PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT
OF CHICAGO,
STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA,
MISSISSIPPI, and ARKANSAS,
Intervening Defendants.

No. 3, Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT
OF CHICAGO.

No. 4, Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT
OF CHICAGO.

ON AMENDED APPLICATION OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK FOR A REOPENING AND AMENDMENT OF THE DECREE OF APRIL 21, 1930, AND THE GRANTING OF FURTHER RELIEF

Supplemental exceptions by the State of New York to the memorandum filed on April 14, 1959 by Honorable J. Lee Rankin, Solicitor General, for the United States, as amicus curiae, on the amended application of the above complainants.

To the Honorable, The Chief Justice and Associate Justices of the Supreme Court of the United States:

The State of New York joins in the exceptions and objections of the States of Wisconsin, Minnesota, Ohio, Pennsylvania and Michigan to the memorandum filed on April 14, 1959, by Honorable J. Lee Rankin, Solicitor General, for the United States, as *amicus curiae*, on the amended application of the above complainants. The State of New York also respectfully submits the following supplemental exceptions to bring to the Court's attention the State's position concerning points raised by the Solicitor General's memorandum, with particular reference to the New York State Power Authority.

Exception No. 1

The State of New York disagrees with the conclusion expressed in the Solicitor General's memorandum at pages 19 and 20 that

> "Unless the State of New York or its Power Authority has a Federal permit to use for power purposes the water which is now being diverted at Chicago, the diversion of that water invades no right of New York and so provides no ground for relief to that State."

The State of New York contends that it is entitled to the historic and natural flow of the waters of the Great Lakes and that its previous assertion of such rights was not denied by this Court but rather its right to raise the question was re-affirmed by the following language of this Court:

> "This ruling will be without prejudice, so that the plaintiff State, if later on in a position to do so, may be free to litigate the questions which the paragraph is intended to present." *New York* v. *Illinois,* 274 U. S. 488, 490.

Exception No. 2

The State of New York excepts to the conclusion in the Solicitor General's memorandum on pages 20-21 which suggests by implication that the Act of August 21, 1957, 71 Stat. 401, sanctioned the diversion at Chicago and precluded the State of New York from asserting its right to the historic and natural flow of the Great Lakes system. It is the position of the State of New York that the Act authorized the licensing by the Federal Power Commission of the Power Authority of the State of New York to use all of the United States' share of the waters, rather than the residuum after whatever amounts might be diverted at Chicago.

Exception No. 3

The State of New York excepts to the conclusion reached by the Solicitor General's memorandum on pages 21-23 that the order of the International Joint Commission, dated August 6, 1956 (35 St. Dept. Bul., 227-229) supplementing its order of approval for the construction and operation of power works jointly by entities of the United States and Canada, sanctioned a diversion of 3100 cubic feet per second at Chicago and that the amendment binds the State of New York to use only such water as remains after the Chicago diversion. It is the position of New York State that the International Joint Commission simply recognized the fact and did not otherwise deal with the diversion at Chicago, and that the State of New York is entitled to assert its right to the historic and natural flow of the Great Lakes.

Dated: April 30, 1959.

Respectfully submitted,

Louis J. Lefkowitz
Attorney General

Paxton Blair
Solicitor General

Richard H. Shepp
Assistant Attorney General

IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM A. D. 1958

STATES OF WISCONSIN, MINNESOTA, OHIO and
THE COMMONWEALTH OF PENNSYLVANIA,
Complainants,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 2 Original

STATE OF MICHIGAN,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 3 Original

STATE OF NEW YORK,
Complainant,
v.
STATE OF ILLINOIS and the SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 4 Original

ANSWER OF COMPLAINANTS TO REPLY OF DEFENDANTS TO THE MEMORANDUM FOR THE UNITED STATES AS AMICUS CURIAE

To the Honorable the Chief Justices and Associate Justices of the Supreme Court of the United States:

In the reply brief of the defendants to the memorandum of the United States as amicus curiae they disagree with the Solicitor General's recommendation that a Master be appointed, because, they say, the Solicitor General concludes "that the complainants have not made out a case, and that no factual basis for modifying the 1930 decree has been established . . ." (p. 2). The complainant states have filed exceptions to the Solicitor General's memorandum and we here want to take exception also to this unwarranted statement in the reply brief which we are presently answering.

The defendants are under the misapprehension that no substantial changes or circumstances have occurred since

1930 which would require this Court to reevaluate the situation as it exists today against the background of the facts which were developed in 1927 and 1928 before Special Master Charles Evans Hughes.

Apparently the defendants are under the delusion that the complainants should be satisfied with the present terms of the decree and that there is no basis for complainants' insistence that the amount of water which the defendants expect to divert will be increased in the future.

We here take emphatic exception to this misstatement. As further proof that this is a gross misstatement on the part of the defendants, we wish to call the Court's attention to the fact that during numerous sessions of Congress the representatives of the State of Illinois and the Sanitary District of Chicago have been before both Houses of the Congress pleading that they be allowed to divert greater quantities of water from Lake Michigan than were permitted by the decree of this Court. These efforts were outlined in detail in the original application filed for modification of the decree and the brief in support thereof filed by the complainants. They are referred to in the Solicitor General's brief on pages 11 and 12 and the footnotes thereon.

At the present time HR-1 providing for an increase in diversion of 1,000 c.f.s. for a period of one year has passed the House at this session and is now before the Senate Public Works Committee. We are attaching hereto as Appendix A a copy of HR-1. It will be observed that the ostensible purpose of HR-1 is to authorize the making of a study of the degree of improvement in the waterway which would result from an increased diversion of 1,000 c.f.s. for a period of one year. However, the real objective of the bill is to allow this increased diversion of fresh water from Lake Michigan for the purpose of determining what dilutional effect it would have on the presently sewage-laden waters of the canal. That this additional fresh water diversion from Lake Michigan is wanted to help the defendants flush the sewage which they have allowed to accumulate in the canal is evidenced from the hearings held on all these bills, particularly HR-2 in the 85th and HR-1 now pending before the Senate.

The last sentence of Bill HR-1 states:

> **"The report on such results shall contain recommendations with respect to continuing the authority to divert water from Lake Michigan into the Illinois Waterway in the amount authorized by the first section of this Act, or increasing or decreasing such amount."**

It can be seen here that one of the objectives of this bill is to establish a present need for an increase in fresh water diversion ostensibly because it is required to assist the Sanitary District to dilute the sewage which it presently discharges into the canal. It is obvious, too, that if the dilution provided by the increase of fresh Lake Michigan water results in an improvement in the condition of the sewage-laden water in the canal, then the demand will be made by representatives from the State of Illinois that the increased diversion be allowed to continue. To demonstrate to the Court that the defendants have not abided by the requirements of this Court's orders that they construct and operate a complete and efficient sewage collection and treatment system, we are enclosing herewith as Appendix B a report of a recent survey made of portions of the canal which amply proves that the defendants have allowed the canal to become a veritable cesspool. And after having brought about these conditions through their own deliberate acts, they have the temerity to repeat the demands they were making to this Court before 1930 that they be allowed to divert water from Lake Michigan to flush their sewage into the Mississippi Watershed.

Consequently we should like to ask the following questions:

(1) If the defendants are dissatisfied with the amount of direct diversion permitted by this Court's decree of April 21, 1930, why do they not come into this Court instead of going to Congress for permission to increase the direct diversion? Does Congress have authority to sanction a diversion for sanitation purposes?

(2) If conditions today are exactly as they were anticipated in 1930 by the Master, why do the defendants want to secure Congressional sanction for an increase in diversion of 1,000 c.f.s.?

(3) Did the Master and this Court anticipate in 1930 that attempts would be made to circumvent the jurisdiction of this Court by appeals addressed to Congress to sanction an increase in the diversion limited by the decree of this Court?

(4) Why do the defendants fail to disclose the changes in conditions that have occurred since entry of the decree in 1930 that make it necessary for them to appeal practically to every session in Congress for permission to increase the diversion limited by the Court's decree?

It ill behooves the defendants to insist on the one hand that nothing has occurred since 1930 which will bring about an increase in diversion of water from Lake Michigan and yet on the other hand present to the Congress persistent and excruciating cries for more water to be diverted from the Great Lakes Basin so that they might have additional fresh water for dilution of their uncollected and untreated sewage. Why, we repeat, why is more water demanded by the defendants from the Great Lakes Basin if conditions are today as they were in 1930?

To the complainants this salient fact is enough in and of itself to cast a serious cloud over the claim made by the defendants that the complainants have failed to make a sufficient showing that nothing of an untoward nature has taken place since 1930 which should require this Court to take a "new look" at what has gone amiss since 1930. We cannot believe that this Court will shut its eyes to patent and obvious facts; namely, that in disobedience to the commands of this Court, the defendants have failed to construct and operate a complete system of sewage collection and treatment so that the sewage wastes emanating from the city of Chicago and the 51 communities comprising the Sanitary District may be properly and adequately taken care of *by means other than direct diversion of water from Lake Michigan.*

This single fact alone, namely, the persistent demand for more fresh water to be diverted from Lake Michigan for dilution purposes under the color of Congressional sanction, we say, should be sufficient to convince this Court that the time is now ripe for the appointment of a Master to make an investigation of this whole complex situation so that the Court can do justice between the parties.

For we repeat that if the defendants were compelled by either a supplemental decree or an amended decree *to completely collect all the sewage and industrial wastes for which they are responsible and accord all of such* *wastes the best treatment* which is known to modern sanitary science, the defendants could be required either to return this treated effluent back to Lake Michigan or in lieu thereof to eliminate entirely or in part the present direct diversion of 1500 c.f.s. To determine how this can best be done and the measures which should be taken to accomplish this objective requires the painstaking labors of a Master under appointment by this Court.

Respectfully submitted,

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POWER AUTHORITY
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Herbert H. Naujoks
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APPENDIX A

86TH CONGRESS
1ST SESSION

H. R. 1

IN THE HOUSE OF REPRESENTATIVES

JANUARY 7, 1959

Mr. O'BRIEN of Illinois introduced the following bill; which was referred to the Committee on Public Works

---

A BILL

To require a study to be conducted of the effect of increasing the diversion of water from Lake Michigan into the Illinois Waterway for navigation, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, in order to provide the basis for the study, authorized by section 2 of this Act, of the effect of increased diversion of water from Lake Michigan, in addition to the one thousand five hundred cubic feet of water per second presently provided by the 1930 decree of the Supreme Court of the United States (281 U.S. 181-202) and subsequently authorized by the Rivers and Harbors Act of 1930 (46 Stat. 918, 929), upon the Illinois Waterway and the degree of improvement in such waterway caused thereby, and the effect of such increased diversion upon commerce among the several States and navigation on the Great Lakes and the Illinois Waterway, authority is hereby granted to the State of Illinois and the Metropolitan Sanitary District of Greater Chicago, under the supervision and direction of the Secretary of the Army, to withdraw water from Lake Michigan for the one-year period specified in paragraph (3) of subsection (b) of section 2 of this Act, in addition to all domestic pumpage, at a rate providing a total annual average of not more than two thousand five hundred cubic feet of water per second, to flow into the Illinois Waterway during such one-year period, subject to the following limitations:

(1) The Secretary of the Army shall at all times have direct control and supervision of the amounts of water directly diverted from Lake Michigan.

(2) The Secretary of the Army shall not allow any water to be directly diverted from Lake Michigan to flow into the Illinois Waterway during times of flood in the Illinois, Des Plaines, Chicago, or Calumet Rivers.

SEC. 2. (a) During the three-year period beginning on the date of enactment of this Act the Secretary of Health, Education, and Welfare, in cooperation with the Secretary of the Army (acting through the Chief of Engineers), shall cause a study to be made of the effect on Lake Michigan and on the Illinois Waterway of the increased annual diversion of one thousand cubic feet of water per second for the one-year period authorized by this Act, and the improvement in navigation conditions and other improvements along the Illinois Waterway which may result from such increased diversion.

(b) The study authorized to be made by subsection (a) of this section shall be divided into the following phases:

(1) The first period of six months shall begin on the date of enactment of this Act and shall be used to develop plans for the tests and range of studies of the Illinois Waterway, with no increase in the authorized diversion from Lake Michigan during such period.

(2) The twelve-month period immediately following the period specified in paragraph (1) shall be devoted to a stream survey of the Illinois Waterway under existing conditions, with no increase in the authorized diversion from Lake Michigan during such period.

(3) The twelve-month period immediately following the period specified in paragraph (2) shall be used to study the conditions in the Illinois Waterway with a total annual average diversion of two thousand five hundred cubic feet of water per second (comprising the authorized diversion of one thousand five hundred cubic feet of water per second and the additional one thousand cubic feet of water per second authorized by the first section of this Act) in addition to all domestic pumpage.

(4) The six-month period immediately following the period specified in paragraph (3) shall be used to prepare the final report required by subsection (c) of this section.

(c) Upon completion of the study authorized by subsection (a) of this section, the Secretary of Health, Education, and Welfare and the Secretary of the Army shall correlate the results of such study. Thereafter the Secretary of the Army shall report such results to Congress on or before June 1, 1962. The report on such results shall contain recommendations *with respect to continuing the authority to divert water from Lake Michigan into the Illinois Waterway in the amount authorized by the first section of this Act, or increasing or decreasing such amount. (italics ours)*

86TH CONGRESS
1ST SESSION

H. R. 1

A BILL

To require a study to be conducted of the effect of increasing the diversion of water from Lake Michigan into the Illinois Waterway for navigation, and for other purposes.

By Mr. O'BRIEN of Illinois

JANUARY 7, 1959

Referred to the Committee on Public Works

FILED
AUG 28 1959
JAMES R. BROWNING, Cl

Nos. 2, 3 and 4, Original.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,
Intervening Defendants.

STATE OF MICHIGAN,
Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

ANSWER OF THE DEFENDANTS STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO THE AMENDED APPLICATION OF COMPLAINANTS FOR A REOPENING OF THE DECREE OF APRIL 21, 1930.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

No. 2, Original.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,

Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,

Intervening Defendants.

No. 3, Original.

STATE OF MICHIGAN,

Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

No. 4, Original.

STATE OF NEW YORK,

Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

ANSWER OF THE DEFENDANTS STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO THE AMENDED APPLICATION OF COMPLAINANTS FOR A REOPENING OF THE DECREE OF APRIL 21, 1930.

The State of Illinois and The Metropolitan Sanitary District of Greater Chicago (formerly The Sanitary District of Chicago and referred to herein at times as "the District"), pursuant to a direction of the Honorable Albert B. Maris, Special Master, answer the Amended Application of the Complainants for a reopening of the Decree herein of April 21, 1930 as follows:

I.

The allegations of section I are admitted except the allegation that this Court in its decision of January 14, 1929 (278 U. S. 367) referred these cases back to the Special Master to determine the practical measures needed to dispose of the sewage of the Chicago area without diversion, which is denied. These defendants aver that this Court re-referred the cases for the purpose of determining "a point where it [the diversion] rests on a legal basis" (p. 420). This Court, in the said decision, stated (p. 418): "It may be that some flow from the Lake is necessary to keep up navigation in the Chicago River, which really is part of the Port of Chicago * * *." These defendants further aver that the annual average diversion of 1500 c.f.s., in addition to domestic pumpage, on and after December 31, 1938, as allowed by the decree of April 21, 1930, was found by the Special Master, Charles E. Hughes, to be necessary in the interests and protection of navigation in the Chicago River as a part of the Port of Chicago (Report of the Special Master on Re-reference, pp. 126-127); that at the time of the entry of the decree herein on April 21, 1930, the Illinois Waterway, now a navigational link between Lake Michigan and the Mississippi River, had not been completed; that Congress, on July 3, 1930, passed the Rivers and Harbors Act, 46 Stat. 918, 929, which provided for the completion of the Illinois Waterway; that the

Rivers and Harbors Act of 1930 was the culmination of a series of Acts which made the Illinois Waterway, from the Port of Chicago to the Mississippi River, a federal navigation project; that after its completion with federal funds, the Illinois Waterway was opened for navigation on March 1, 1933; that the Rivers and Harbors Act of 1930 provided that the withdrawal of water from Lake Michigan allowed by the decree of April 21, 1930 "is hereby authorized to be used for the navigation of said waterway," and that "as soon as practicable after the Illinois waterway shall have been completed in accordance with this Act, the Secretary of War shall cause a study of the amount of water that will be required as an average annual flow to meet the needs of a commercially useful waterway * * *"; and that said study authorized by said Act has not been completed.

II.

The allegations of paragraphs A and B of section II are admitted, subject to the following corrections:

At the time of the entry of the decree in 1930 the area of the District, including Chicago and adjoining municipalities, was 422 square miles. The total area of the District at the time of the filing of the Amended Application in 1958 was 877 square miles. Because of statutory disconnections, the area of the District is now 869 square miles. The District now includes the City of Chicago and 112 adjoining municipalities.

The allegation in paragraph C of section II is denied.

III.

These defendants admit the allegations of paragraphs A, B, and E and deny the allegation of paragraph C of section III. The sewer system in the City of Chicago and throughout most of the area served by the District is known as the "combined" type, in which sewage and storm water run-off are not separated. According to the United States Public Health Service, the only large cities on the Great Lakes with completely separate sewer systems *i.e.,* separate sanitary and storm sewers, are Erie, Pennsylvania, and Rochester, New York. The District now requires, and has required for many years last past, the installation of separate storm and sanitary sewers in new communities within the area of the District. Since the inception of this litigation, the complainants have never proposed or advanced any program for the construction of a separate sewer system for Chicago, but on the contrary have acquiesced at all times in the past in the continuation of the "combined" sewer system.

The sewage treatment plants of the District represent the highest standards in modern sanitary engineering. Substantial extensions and additions have been made and are being made to the plants and other sewage disposal facilities constructed pursuant to the 1930 decree. Studies for improvements and necessary expansion are carried on continuously by the District. The total amount of pollution (BOD) carried into the waterways, resulting from storm water and sanitary sewage overflowing with the storm water, does not exceed on an annual average 3 per cent of the total tributary pollution of storm run-off and sanitary sewage. Heavy rains cause raw sewage to enter the Chicago Drainage Canal between 20 to 50 times a year when the total volume of sewage and storm water exceeds the capacity of the sewage treatment plants which is approximately twice the capacity needed for dry weather flow. The capacity for the interceptor sewers leading to the treatment plants is at least twice, and in most cases several times, the average dry weather flow. Steady progress has been made and is continuing to be made by the District in reducing the amount of industrial wastes which are discharged untreated into the Canal.

As to the allegations of paragraph D, these defendants admit that as the area of the District continues to increase in population, commercial establishments and industrial plants, the quantity of sewage and industrial waste will increase, but deny that the Chicago River will become more polluted than was foreseen by this Court at the time of the entry of its decree in 1930.

IV.

These defendants admit that the table contained in section IV showing the degree of purification of sewage is substantially correct, but deny that the operating efficiency of the sewage disposal plants of the District has dropped or declined. The degree of sewage purification attained by the District in the last two years, as shown by the reduction in biochemical oxygen demand (BOD) and the amount of solids removed, was as follows:

Year	Sewage Treated Million Gallons Per Day	Per Cent BOD Removed	Solids, Tons Per Day Raw Sewage	Per Cent Solids Removal
1958	1103.0	90.6	836.2	87.6
1959 (through June)..	1227.7	90.5	881.2	85.5

The drop in reduction of BOD in the year 1957, as alleged in section IV, was due to construction interferences, unrelated to plant efficiency, which these defendants believe to be non-recurring.

The degree of purification that has been achieved by the District has met the average which the Special Master and this Court in 1930 found to be reasonably attainable. The technique developed and used by the District, known as the activated sludge process, has become the leading process used in sewage disposal. These defendants further state that witnesses of the District who appeared before the Special Master on Re-reference in 1929 outlined a program of sewage treatment works construction, but deny that the witnesses testified that the sewage would be treated to a higher degree of purification than that which has been attained. The complainants, on the re-reference in 1929, did not propose a program of treatment materially different from the one presented by the District. Except as herein admitted, the allegations of section IV are denied.

V.

These defendants deny the allegation of section V that the diversion from Lake Michigan allowed by the decree of April 21, 1930, in addition to domestic pumpage, was for the purpose of maintaining navigation in the Port of Chicago and the connecting Illinois waterway, and aver that the diversion was allowed not for maintaining navigation in the Illinois waterway, which was then non-existent, but for navigation needs of the Chicago River as a part of the Port of Chicago. These defendants also deny that the water withdrawn from Lake Michigan for domestic pumpage will double in 17 years; deny that the amount of water withdrawn from Lake Michigan is excessive; and deny that extensions of domestic pumpage to industrial plants unlawfully injures the complainants.

Further answering section V, these defendants aver that the total amounts of water withdrawn from Lake Michigan as direct diversion and domestic pumpage in the years 1939, 1954, and 1956, as alleged, do not fairly represent the rate of increase in the amount of water withdrawn from the Lake for domestic pumpage; that the amount of domestic pumpage in 1930 was 1700 c.f.s., and despite the growth in population and industry was only 1760 c.f.s. in 1958; and that according to reliable estimates, the amount of water which will be taken from Lake Michigan in 1980 by Chicago and all municipalities then to be served by it will be approximately 2137 c.f.s.

Further answering the allegations of section V, these defendants deny that as the population of greater Chicago increases and as the industrial development in the area served by the District may expand, the volume of water to be withdrawn from Lake Michigan for domestic pumpage will increase beyond the limits that were estimated at the time this Court entered its decree in 1930. On the contrary, these defendants aver that the rate of increase in water withdrawn from Lake Michigan for domestic pumpage since 1930 has been less and on the basis of experience will be less in the future than was anticipated at the time of the entry of the decree in 1930.

VI.

These defendants deny the allegations of section VI except that they admit that additional industrial plants have been established within the District as enlarged since the entry of the decree in 1930.

VII.

The allegation contained in section VII is denied.

VIII.

These defendants admit the allegations of the first paragraph of section VIII. Further answering this section, these defendants deny the allegation that the withdrawal of the water from the Great Lakes for domestic pumpage in the Chicago metropolitan area and its discharge into the Mississippi Valley watershed is in violation of the rights of the complainants; deny that the diversion of waters of the Great Lakes system is causing extensive, substantial or continuing damages to the complainants or their peoples; and further deny that such withdrawal of water and its diversion to the Mississippi watershed is not necessary for the disposal of the sewage of the Chicago area or for the protection of the water supply of the Chicago area and the health of the people of the Chicago area. These defendants further deny that other Great Lakes communities return to the lake or connecting channels, after use, water taken therefrom, without any injury to the health of the people using such water, or without causing any nuisance conditions in the lake or other watercourses.

Further answering section VIII, these defendants aver that the experience of smaller communities on the Great Lakes does not furnish a criterion for the Chicago area.

IX.

The allegation contained in section IX is denied.

X.

These defendants deny the allegations of section X that damage has been and is being caused to complainants and to harbor improvements by defendants' action in diverting the waters of the Great Lakes-St. Lawrence system as domestic pumpage through the Sanitary District Canal. The allegations relating to (1) the number of harbors on the Great Lakes and connecting channels and the extent to which the harbors have been improved, and (2) the stages of construction of hydro-electric power plants on the Niagara and St. Lawrence Rivers, are admitted. These defendants are without knowledge or information sufficiently to form a belief as to the truth of the averments with respect to (1) port development expenditures for the Great Lakes ports for the 12-year period 1946-1957, (2) the dependency of the ports of Minnesota and Wisconsin upon navigable depths of water in the channels and harbors of the lower Great Lakes, and (3) costs of the hydro-electric power projects on the Niagara and St. Lawrence Rivers. All other averments of section X are denied.

Further answering the allegations of section X, these defendants aver that the losses alleged are predicated upon theoretical computations which do not represent actual losses susceptible of proof; that any damage which has occurred or will occur because of the withdrawal and diversion of water from Lake Michigan was fully foreseen and considered by the Court at the time of the entry of the decree in 1930, except the alleged damage and losses to the State of New York in the generation of hydro-electric power at power sites on the Niagara and St. Lawrence Rivers. As to such alleged losses relating to power projects, these defendants aver that such power projects were developed and financed on the basis of existing water levels, as affected by the decree of 1930 and the Rivers and Harbors Act of July 3, 1930, 46 Stat. 918, 929; that the water levels, as reduced by the diversion at Chicago, were taken as normal for purposes of the projects: and that the licenses issued to the Power Authority of New York for the construction and operation of the projects applied only to the water remaining after the authorized withdrawal and diversion of water from Lake Michigan at Chicago.

XII.

The allegations of section XII are denied.

XIII.

These defendants deny the allegations of section XIII.

Further answering section XIII, these defendants aver that water withdrawn from Lake Michigan as domestic pumpage, in addition to the annual average 1500 c.f.s. direct diversion, has served and will continue to serve the interests of navigation in the Illinois Waterway, as well as industrial plants located on the waterway which were constructed in reliance upon a continuation of a flow of water in quantity and velocity as authorized by the decree of April 21, 1930 and the Rivers and Harbors Act of July 3, 1930.

XIV.

These defendants admit that in 1952 the District achieved up to 93.6% BOD removal in its treatment of sewage and wastes collected and that in some circumstances it is able to attain that percentage of BOD removal. These defendants deny the remaining allegations of section XIV, and in particular the allegations that it is possible to return to Lake Michigan the effluent from the District sewage treatment plants without endangering the domestic water supply of the City of Chicago and other municipalities; that it is feasible to return such effluent to the Lake; and that the municipalities lying along the Great Lakes and receiving their domestic water supply therefrom return their "domestic pumpage" to the waters of the Lake without experiencing any danger or hazard to their domestic water supply or public health.

Further answering section XIV, these defendants aver that the City of Chicago does not have the advantage of lake currents enjoyed by the other municipalities referred to by complainants for the dispersion of wastes, and that because of Chicago's location near the foot of Lake Michigan the return to the Lake of sewage effluent by the District would create a public health hazard far greater than that existing in such other municipalities.

XV.

Further answering the Amended Application, these defendants aver that no facts have been alleged showing that the decree of April 21, 1930 should be modified as prayed for by complainants; that the right to use water for drinking, sanitary, and domestic purposes has been judicially, and by treaty, declared to be the highest use of water, taking precedence over all other uses; that the right of these defendants to discharge water, so used, into the Sanitary Canal and a Congressionally established waterway has been adjudicated by this Court; that to carry out the provisions of the 1930 decree these defendants completed construction of vast sewage treatment projects, consisting of sewage treatment plants, intercepting sewers, and sewage pumping stations, at a cost in excess of 316 million dollars; that 109 million dollars had previously been spent for the construction of sewers which discharged the sewage effluent into the Sanitary Canal; that if the sewage effluent were to be discharged into Lake Michigan, the defendants' sewage disposal facilities would have to be rearranged, and new pumping stations, works and tunnels, extending miles out into Lake Michigan, would have to be constructed at a tremendous cost, estimated by competent engineers to total from 250 to 300 million dollars, and to entail annual operating costs of more than 2 million dollars and debt service charges of more than 15 million dollars annually for a period of thirty years; and that the ultimate effect of such vast and burdensome expenditures would be to pollute Chicago's water supply, endanger the public health, and destroy the recreational value of Chicago's lake front.

These defendants further aver that since 1945 water which would otherwise flow into Hudson Bay has been diverted into Lake Superior and the Great Lakes system from the Albany River Basin in Canada at the rate of 5,000 cubic feet a second in the interests of Canadian power projects; that this diversion increases the water supply to all the Great Lakes; that the net effect of the total diversion at Chicago and the diversion into Lake Superior from the Albany River Basin is to raise the levels of Lakes Michigan and Huron about 0.14 foot and Lakes Erie and Ontario about 0.09 foot; that any lowering of the levels of the Great Lakes by the diversion at Chicago is more than offset by the diversion from the Albany River Basin into Lake Superior; and that the levels of the Great Lakes are now higher than their proper and normal levels.

Wherefore, these defendants ask that the prayer of the Amended Application as amended be denied and the Amended Application be dismissed, and that this Court grant to these defendants such affirmative relief as may be warranted by the evidence to be presented and assess the costs of this proceeding against the complainants.

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JAMES R. BROWNING,

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959

No. 4 ORIGINAL

STATE OF NEW YORK
Complainant,
against
STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

BRIEF IN SUPPORT OF MOTION BY THE STATE OF NEW YORK FOR LEAVE TO FILE A SUPPLEMENTAL AND AMENDED COMPLAINT

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IN THE

Supreme Court of the United States

State of New York,
Complainant,
against
State of Illinois and Sanitary District of Chicago,
Defendants.

October Term, 1959
No. 4 Original

BRIEF IN SUPPORT OF MOTION BY THE STATE OF NEW YORK FOR LEAVE TO FILE A SUPPLEMENTAL AND AMENDED COMPLAINT

Statement

This motion by the State of New York for leave to file a supplemental and amended complaint in the above-entitled action is made pursuant to the terms of an order of this Court made in this action in 1927, and is further grounded upon the terms of the decree of this Court entered herein on April 21, 1930, upon Rule 15(d) of the Federal Rules of Civil Procedure as made applicable to Original actions by Rule 9(2) of the Supreme Court Rules, and upon the inherent powers of a court of equity to consider changes and circumstances arising following the entry of a decree by such court.

The original complaint in this action was filed by the State of New York on October 18, 1926. Such complaint contained a paragraph "III" which, among other things, alleged:

> "The residue of the water available for power belongs to the State and the citizens of the State ad-

> joining that particular part of the waterway where power may be developed. A flow of ten thousand cubic feet per second of water through the Niagara river and the international section of the St. Lawrence river is capable of developing approximately four hundred thousand horse power. The right to use this water for the development of power is a property right of the State of New York and its citizens, which property right neither the defendants nor the Congress of the United States has a right to destroy or impair by abstracting or diverting water from Lake Michigan or any other part of the Great Lakes and St. Lawrence waterway into the Mississippi waterway."

On May 31, 1927, this Court ordered such allegation stricken from the original complaint on the ground that such allegation did not

> "show that there is any present use of the waters for such purposes which is being or will be disturbed; not that there is any definite project for so using them which is being or will be affected." (274 U. S. 488, 489.)

This Court at that time, however, expressly noted that its decision was

> "without prejudice, so that the plaintiff State, if later on in a position to do so, may be free to litigate the questions which the paragraph is intended to present." (274 U. S., at p. 490.)

In its decision herein on January 14, 1929 (278 U. S. 367), this Court held that the diversion of waters by the defendants in excess of that needed to preserve navigation on the Chicago River was without legal justification and in violation of the rights of this complainant and the other Great Lakes states, but because of the danger which would ensue to the health of the people of Chicago, the Court did not order immediate cessation of such diversion, but rereferred the matter back to the Special Master to determine the necessary steps which would lead so far as possible to a restoration of the complainants' riparian rights. Following the report of the Special Master on rereference, this Court determined (281 U. S. 179) that under the then existing facts and circumstances, and in light of the limitations upon the efficiency of sanitary methods, the Court in equity should enter a decree providing for a reduction in the diversion by gradual stages, until diversion should be no more than 1,500 cubic feet per second ("cfs") plus "domestic pumpage". The Court did not at that time feel that on the record before it, it could properly enjoin such pumpage, which had not been complained of in the pleadings then in issue. The Court, however, specifically provided that the decree should contain a provision

> "That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy." (281 U. S., at p. 202.)

A decree in accordance with the decision was entered on April 21, 1930 (281 U. S. 696).

As appears from the proposed supplemental and amended complaint and the motion for leave to file such complaint, there has within the past few years been completed upon the St. Lawrence River hydroelectric works built jointly by Power Authority of the State of New York (hereinafter the "Power Authority") and The Hydro-Electric Power Commission of Ontario, and there is now under construction by the Power Authority (to deliver first power in 1961, full capacity in 1962 and to be completed in 1963), hydroelectric works on the Niagara River. As is more fully developed elsewhere, both the works on the Niagara River and the works on the St. Lawrence River are of such capacity as to be fully capable of utilizing the flow now being diverted by the defendants, if it were made available by a modification of the decree of this Court, and in addition, such works will suffer direct loss if such diversion is increased under the guise of "domestic pumpage". Accordingly, there is a present and immediate injury to complainant, State of New York, arising out of the loss of such waters for hydroelectric uses, which raises questions which New York should now be allowed to set forth in the pleadings, pursuant to the terms of this Court's ruling of May 31, 1927.

In addition to compliance with the provisions of this Court's 1927 ruling, a supplemental and amended complaint is further desirable because of other major changes which have occurred since the 1930 decree. Principal among these is the St. Lawrence Seaway Project, which opened in June of 1959. As stated in the motion and the proposed supplemental and amended complaint, the Seaway has opened the Great Lakes to ocean going vessels of 27 foot draft, and has changed the nature of commerce upon the Great Lakes and the nature as well as the extent of the damage suffered by the State of New York from the diversion by the defendants.

In addition, public recreational uses by the people of the State of New York of the shores and waters of the

Great Lakes have become a factor of sufficient importance so that the injury to such present recreational uses should be set forth with greater particularity.

Finally, this Court stated in its decision in 281 U. S. 179, at page 200, that whether domestic pumpage becomes excessive may be subject to further complaint and that the inclusion in such pumpage of the use by industrial plants "may be open to consideration at some future time." This complainant now contends that, in view of the increased damage to complainant and its citizens arising out of any diversion, and in view of the increasing domestic and industrial use of water in Chicago which aggravates such injury to the State of New York and its citizens solely in the economic interest of Illinois, the time has arrived when the propriety of permanently enjoining the diversion of such domestic and industrial use should be considered. It would be appropriate that the pleadings reflect this issue.

Argument

I

A Supplemental and Amended Complaint is a procedurally proper method to raise issues arising out of changes and events occurring since the date of a prior decree.

Rule 15(d) of the Federal Rules of Civil Procedure which is made applicable to original proceedings in this Court by Rule 9(2) of the Supreme Court Rules provides:

> "(d) Supplemental Pleadings. Upon motion of a party the court may, upon reasonable notice and upon such terms as are just, permit him to serve a supplemental pleading setting forth transactions or occurrences or events which have happened since

> the date of the pleading sought to be supplemented. If the court deems it advisable that the adverse party plead thereto, it shall so order, specifying the time therefor."

Aside from such Rule, it is a recognized equity procedure to file a supplemental pleading to bring to the Court's attention facts arising after the entry of a decree. (See Story's Equity Pleading, 10th edition, section 338.) Such procedure has been recognized as proper by this Court.

In *Independent Coal Co.* v. *U. S.*, 274 U. S. 640 (1927), the Court noted at page 647:

> "The suit is in the nature of a supplemental bill in aid of the former decree and is an appropriate method of securing the benefit of the first decree when subsequent events have made necessary some further relief in order that the plaintiff may enjoy the full fruits of the victory in the first suit. Cf. *Root* v. *Woolworth*, 150 U. S. 401; *Shields* v. *Thomas*, 18 How. 253, 262; *Thompson* v. *Maxwell*, 95 U. S. 391; Story, Equity Pleading, 10th ed., §§338, 339, 345, 351(b), 353, 429, 432. Cooper, Equity Pleading, 74, 75."

In *Osage Oil & Refining Co.* v. *Continental Oil Co.*, 34 F. 2d 585 (10th Cir., 1929), the Court stated at page 588:

> "Where, by reason of events occurring subsequently to the decree, the further aid of the court is necessary to settle the rights of the parties and carry out the decree, a supplemental bill should be filed asking for an adjudication of the new issues and a decree to enforce the original decree." (Citing *Root* v. *Woolworth*, 150 U. S. 401 (1893).)

See also, to the same effect, *Connett* v. *City of Jerseyville*, 96 F. 2d 392 (7th Cir., 1938).

As has been noted above, this Court in striking from the original complaint the allegations relating to hydroelectric uses (274 U. S. 488) specifically provided that New York would be free to litigate questions intended to be raised by the paragraph then stricken if subsequent facts left it in a position to do so. It would appear that the most orderly procedure for litigating such questions would be by restoring such allegations, brought up-to-date, to the pleadings.

The filing of the supplemental and amended complaint herein would create no delay and occasion no surprise to the defendants. The issues raised therein were mentioned in the Amended Application of the State of New York and the other Great Lakes States to reopen the April 31, 1930 decree; and such matters are in fact already in issue by virtue of the Answer and Counterclaims of the State of New York in Original No. 12, which has been referred for hearing by this Court to Special Master Albert B. Maris together with Original Nos. 2, 3 and 4. Such issues were taken notice of by Illinois in its "Reply to Counterclaims" in No. 12 and by Illinois and the Sanitary District in their "Answer to Amended Application" in Nos. 2, 3 and 4. Hearings have begun before the Special Master on October 19, 1959, but are presently limited to pre-trial procedures, opening statements and the presentation by the State of Illinois of its direct case in Original No. 12.

II

New York's Rights in the Flow of the Watershed.

One of the primary purposes of the amended and supplemental complaint is to bring before the Court and Special Master a pleading clearly presenting those issues arising out of the construction of hydroelectric facilities capable of utilizing the flow now being diverted at Chicago. It is anticipated, based upon prior proceedings, that the defendants will claim that New York has no status to raise this issue. (See Illinois' "Reply to Counterclaims" in Original No. 12 at p. 9.)

In substance, the defendants' apparent argument is that since the Federal government has a navigation servitude in the Niagara and St. Lawrence Rivers, and can and does require the obtaining of a Federal permit as a condition to the construction of any hydroelectric project upon such rivers, New York can only have a right to the extent of such permit as has been issued; and that the permits pursuant to which New York is constructing its projects allegedly only authorize it to use the flow after the diversion at Chicago has been taken into account. While the issue of law is one which could more properly be reviewed by this Court following a full development of the facts on the hearings before the Special Master, complainant feels it may be desirable at this time to outline the basis of its position.

The legal and factual premises upon which the defendants' argument is founded are erroneous. New York's rights exist independent of Federal permit; and the Federal permits which have been issued would, without further amendment, allow the use of the additional flow which would result if the Chicago diversion were terminated.

A. New York has a usufructuary property right in the flow of the St. Lawrence and Niagara Rivers, independent of Federal permit, which right is being usurped by Illinois.

The defendants' presumed position amounts to a contention that there exists no property or usufructuary rights in the flow of a navigable stream independent of Federal authorization. In fact, the law is clearly to the contrary: private property rights in the flow of a navigable stream exist, although subservient to a dominant servitude in favor of the United States for navigational purposes. In certain circumstances, such property rights may be destroyed without compensation by the United States acting in the interests of navigation; however, the United States has taken no such action here. The present controversy in no way involves the rights of the United States.

A direct refutation of the defendants' position is the Court's decision in *FPC v. Niagara Mohawk Power Corp.*, 347 U. S. 239 (1954). The Supreme Court's opinion in that case begins with the following statement:

> "The most significant issue raised by this case is whether the Federal Water Power Act of 1920 has abolished private proprietary rights, existing under state law, to use waters of a navigable stream for power purposes. We agree with the Court of Appeals that it has not." (Pp. 240-241.)

The Court went on to say at pages 248-249:

> "We conclude, as did the Court of Appeals, that, even though respondent's water rights are of a kind that is within the scope of the Government's dominant servitude, the Government has not exercised its power to abolish them.
>
> "While we recognize the dominant servitude, in favor of the United States, under which private persons hold physical properties obstructing navigable waters of the United States and all rights to use the waters of those streams, we recognize also that the exercise of that servitude, without making allowances for preexisting rights under state law, requires clear authorization."

Then, after citing *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53 (1913), as a "classic example of such a clear authorization" (347 U. S., at p. 249), the Court said:

> "That decision is not applicable here. The issue here is whether the much more general and regulatory language of the Federal Water Power Act shall be given the same drastic effect as was required there by the language of the Act of March 3, 1909. We find nothing in the Federal Water Power Act justifying such an interpretation. Neither it, nor the license issued under it, expressly abolishes any existing proprietary rights to use waters of the Niagara River. Unlike the statute in the *Chandler-Dunbar* case, the Federal Water Power Act mentions no specific properties. It makes no express assertion of the paramount right of the Government to use the flow of the Niagara or of any other navigable stream to the exclusion of existing users. On the contrary, the plan of the Act is one of reasonable regulation of the use of navigable waters, coupled with encouragement of their development as power projects by private parties." (Pp. 250-251.)

United States v. *Twin City Power Co.,* 350 U. S. 222 (1956), involved a statute containing the "clear authorization" which the Court in the *Niagara Mohawk* case held was necessary but lacking in the Federal Water Power Act. That case involved a taking of property by the United States, under Section 10 of the Flood Control Act of 1944, for navigational purposes. In holding that as against the United States exercising its "dominant servitude" for navigation pursuant to the Flood Control Act, the riparian owner had no compensable right in the value of his property for hydroelectric purposes, the Court said at page 225:

> "The legislative history and construction of particular enactments may lead to the conclusion that

> Congress exercised less than its constitutional power, fell short of appropriating the flow of the river to the public domain, and provided that private rights existing under state law should be compensable or otherwise recognized. Such were *United States* v. *Gerlach Live Stock Co., supra,* and *Federal Power Commission* v. *Niagara Mohawk Power Corp., supra.* We have a different situation here, one where the United States displaces all competing interests and appropriates the entire flow of the river for the declared public purpose.

It may be noted that in that case the issue was not whether there was a property right, but rather whether such right had to be compensated for by the Federal government in exercising its dominant navigational servitude. The issue in the present case does not involve the rights of the State of New York as against a diversion of water for navigational purposes by the Federal government. It is a suit between riparian or littoral proprietors against a diversion of water for sanitary and power purposes by the upstream proprietor, State of Illinois.

United States v. *Gerlach Live Stock Co.,* 339 U. S. 725 (1950), held that a riparian owner had a compensable right in the flow of a navigable river even as against the United States, when the United States was taking such rights for non-navigational purposes (in that case reclamation). Thus, although it is not here in issue, it would seem clear that even the United States could not divert waters for sanitary purposes without paying for downstream riparian rights. Illinois can be in no better position.

United States v. *Appalachian Electric Power Co.,* 311 U. S. 377 (1940), contains a statement that

> "there is no private property in the flow of the stream." (p. 427.)

However, the context of this quotation is in a discussion of the constitutionality of the recapture provisions of the Federal Power Act, and the quoted matter clearly referred to the Constitutional rights of private property in the stream as against the Federal navigational servitude, which is not here in issue. Any broader reading of this phrase taken out of context is precluded by the subsequent *Gerlach* and *Niagara Mohawk* decisions.

B. The existing permits allow use of the total possible flow of the Great Lakes watershed.

Even if the law were to the contrary, that Federal permits were required before New York could establish a property right as against the State of Illinois in the flow of the Great Lakes and St. Lawrence River, New York's agency, the Power Authority, holds such permits.

1. Existing permits authorized works capable of utilizing the entire flow.

The conclusion that the Power Authority has been licensed only to utilize the flow available after the diversion by Illinois could only be drawn if it is assumed that the various permits which the Power Authority has obtained for the Niagara and St. Lawrence hydroelectric works are in terms of the amount of flow which can be utilized in such works.

Actually, the permits authorize the Power Authority to construct, maintain and operate project *works,* which the Power Authority has done at St. Lawrence and is doing at Niagara. Such permits authorized the construction, maintenance and operation of works capable of utilizing the water now being diverted out of the watershed by Illinois.

With respect to the works on the St. Lawrence River, the F.P.C. license for Project No. 2000 authorizes the "construction, operation, and maintenance" of such Project: it does not authorize, restrict or mention any use of any quantity of flow. Similarly, the Order of Approval of the International Joint Commission ("I.J.C.") of October 29, 1952 approved the "construction, maintenance and operation * * * of certain works". In each case, what was authorized was, not a use of water, but construction and operation of a physical structure of a designed capacity capable of utilizing the Illinois diversion if and when this Court made it available.

It is true that the order of the I.J.C. was conditional upon the project works being operated in accordance with certain controls relating to maintenance of water levels and flows, and that the F.P.C. license requires compliance with the requirements of the I.J.C. Order of Approval. However, while these conditions permit I.J.C. regulation, they are not limitations on the scope and extent of the license and approval.

In its Order of October 29, 1952, the I.J.C. retained jurisdiction to make such further orders as it might deem necessary. Pursuant to that retention of jurisdiction, the I.J.C. on July 2, 1956 entered a "Supplemental Order to Order of Approval dated 29 October, 1952" determining that "Method of Regulation No. 5", which it had prescribed in its October 29, 1952 order, was impracticable, and amended the order by substituting "Plan of Regulation No. 12-A-9, as prepared by the International Lake Ontario Board of Engineers, dated 5 May 1955."

Pursuant to the order of July 2, 1956, the International St. Lawrence River Board of Control, which had been created by the 1952 Order of Approval, made further studies of river regulation and on May 14, 1958 recommended to the I.J.C. a new plan of regulation known as "Plan 1958-A" based upon the same criteria as Regulation 12-A-9. The I.J.C. accepted the Board of Control's recommendations, but instead of issuing instructions directly, requested that the United States State Department and the Canadian government issue orders to their respective entities putting the plan into effect. The State Department asked the Federal Power Commission to take such action as it deemed necessary to assure operation in accordance with the I.J.C. orders. In response to such request, the Federal Power Commission on April 10, 1959 issued an order requiring the Power Authority to comply with Regulation 1958-A. On rehearing, the Federal Power Commission rescinded that order and issued one which required that

> "In the maintenance and operation of the project covered by this license, the licensee shall comply with all applicable provisions and requirements of the Order of Approval (I.J.C. Docket No. 68) issued October 29, 1952, by the International Joint Commission to the Governments of the United States and Canada for the construction of certain works for the development of power in the International Rapids section of the St. Lawrence River, as amended by its Order of July 2, 1956. In complying with these requirements, the licensee shall be deemed to have accomplished such compliance if it follows Regulation Plan 1958-A or any supplementary or superseding plan of regulation approved by the International Joint Commission, under the supervision of the International Saint Lawrence River Board of Control in accordance with paragraph (h) of the October 29, 1952 Order of Approval." (Order on Rehearing, August 3, 1959.)

It is apparent from the foregoing recitation of the sequence of events and documents that neither the I.J.C.

nor the F.P.C. permits are in any way restricted in their scope or nature to the use of a limited flow of water which would exclude the Illinois diversion. The permits are absolute, providing for the construction, maintenance and operation of project works which, as appears from the motion and the supplemental and amended complaint, are fully competent to utilize one half of the total flow including that which would be available if there were no diversion at Chicago. While the right to regulate such use is retained for the protection of other interests in Lake Ontario and the St. Lawrence River, there is nothing in the license or the Order of Approval which requires that such regulation should preclude use of the waters presently diverted by Illinois if such waters are made available to the State of New York, and as is indicated below, the regulation presently in effect (1958-A) and the physical circumstances demonstrate that an assumption of such a requirement is wholly untenable.

Similarly, with respect to the project works on the Niagara River the Power Authority's license is for the "construction, operation and maintenance" of the project on the Niagara River

> "for the purpose of developing all of the waters of the Niagara River which it is permissible to divert for power purposes in the United States under the terms of the 1950 treaty * * * *"

This provision must be read in light of Public Law 85-159 (71 Stat. 401, 16 U.S.C. §836), which "expressly authorized and directed" the F.P.C. to issue a license to the Power Authority

> "for the construction and operation of a power project with capacity to utilize all of the United States share of the water of the Niagara River permitted

> to be used by international agreement." (71 Stat. 401, §1(a); 16 U.S.C., §836(a).)

The international agreement, which under Public Law 85-159 is to fix the scope of the Power Authority's license, is the 1950 "Treaty Between the United States of America and Canada Concerning Uses of the Waters of the Niagara River." Article VI of this Treaty provides that

> "The waters made available for power purposes by the provisions of this Treaty shall be divided equally between the United States of America and Canada."

Reference must then be made back to Article V, which provides that

> "All water specified in Article III of this Treaty in excess of water reserved for scenic purposes in Article IV may be diverted for power purposes."

Article IV specifies that, in order to reserve sufficient amounts of water in the Niagara River for scenic purposes, no diversions of the water specified in Article III for power purposes will be made which will reduce the flow over Niagara Falls below certain specified *minimums.* Since no *maximum* restriction is made on the flow over the Falls it is apparent that action in either nation resulting in increasing stream flows would not be in violation of the Treaty.

Article III makes available for scenic and power purposes (and, since the scenic requirement is numerically specified, Article III is the ultimate measure of what is available for power purposes),

> "the total outflow from Lake Erie to the Welland Canal and the Niagara River (including the Black

> Rock Canal) less the amount of water used and necessary for domestic and sanitary purposes and for the service of canals for the purposes of navigation."

It is further provided that this language does not govern certain waters diverted into the Great Lakes watershed by Canada through the Long Lac-Ogaki works pursuant to prior exchanges of notes, which waters are reserved for Canada's use at Niagara.

It is clear that the Treaty, in allocating the "total outflow from Lake Erie", places no maximum restriction on such outflow, but rather that the sense thereof is to allow the maximum possible use of such outflow. It could not be seriously contended that elimination of the Chicago diversion by the United States would constitute a violation of this Treaty; on the contrary, the present diversion is a violation of the Treaty in as much as it is not necessary. If the diversion were enjoined, it is apparent that the additional waters, once they reached the points of outflow of Lake Erie, would become includible in measuring "the United States share of the water of the Niagara River permitted to be used by international agreement" for power purposes within the meaning of Public Law 85-159, *supra.* Under that statute and the license for Project 2216, the Power Authority has clear authorization as well as the physical capacity to use such additional flow.

2. Under present regulation, such flow could be utilized.

Even if New York's rights as against Illinois were dependent upon a Federal license, it would be the scope of such license and not the transitory regulations thereunder which would provide the measure of such rights. As has been indicated above, the scope of the licenses contemplates construction, operation, and maintenance of project works capable of utilizing the entire flow from the Great Lakes available to the United States, including the waters which might become available upon a cessation of the Chicago diversion. Regulations thereunder, however, would have to be based upon the factual situation as it exists at the time of their promulgation, which situation presently includes a diversion at Chicago authorized by this Court's 1930 decree, and the fact of such diversion is recognized by the regulations. It may reasonably be assumed that such regulations, being subject to change, would similarly recognize the fact of the cessation of such diversion if this Court should so order. However, even measured by existing regulations, the Power Authority has authorization to utilize the additional flow which could be made available by the cessation of the Chicago diversion.

The present regulation with regard to the St. Lawrence Project works is, as has been noted, 1958-A. This plan, described more fully in 21 F.P.C. 480 (1959), provides for control of levels and flows from Lake Ontario within certain minimum and maximum limits varying with time of year and natural conditions to the extent permitted by other requirements relating to levels in the St. Lawrence River downstream from the project in Canada, and particularly at Montreal. While such limits attempt to account for, as an existing fact, a diversion from the watershed of 3100 cfs, they do not require such diversion. Further, it may be noted that the present diversion is in excess of 3100 cfs. The supplemental and amended complaint alleges complainant's information and belief that the diversion is presently 3300 cfs, rather than the 3100 cfs used as a reference point in 1958-A, and that such diversion is growing. The only restriction in 1958-A, and the only physically feasible restriction in any modification thereof, is on the timing of the flows. Whenever such flows are released, however, they must necessarily pass through the power dam, which is capable of converting them into hydroelectric power and energy.

In regard to the project works on the Niagara River, no regulations have as yet been promulgated, although the right to do so is reserved by the license provision incorporating the terms and conditions of Form L-4, entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the United States" (16 F.P.C. 1284 (1953)). Article 13 thereof makes the operations of a licensee, insofar as they affect the use, storage, and discharge from storage of waters affected by the license, subject to reasonable regulation for prescribed purposes. Such purposes include navigation, the protection of life, health and property, and the fullest practicable conservation and utilization of such waters for power purposes and other beneficial public uses, including recreation. The physical factors here also preclude any assumption that any regulation would be promulgated under this provision which would prevent utilization for power purposes at Niagara of the present Chicago diversion. None of the criteria of Article 13 could possibly require that the additional flow bypass the power project.

Conclusion

The service of the supplemental and amended complaint would be an appropriate and proper procedure for incorporating in the pleadings important changes in circumstances relating to the substantial rights of New York occurring since the April 21, 1930 decree, and such service should be allowed as contemplated by this Court's order of May 31, 1927.

Respectfully submitted,

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In the Supreme Court of the United States

OCTOBER TERM, 1959

Nos. 2, 3, and 4, Original

STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK, COMPLAINANTS

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO

No. 12, Original

STATE OF ILLINOIS

v.

STATES OF MICHIGAN, OHIO, PENNSYLVANIA, MINNESOTA, NEW YORK AND WISCONSIN

MOTION OF THE UNITED STATES OF AMERICA FOR LEAVE TO INTERVENE

The United States of America respectfully moves this Court for leave to intervene in the above-entitled causes and for leave to file the attached petitions of intervention for the reasons stated in the accompanying memorandum.

J. LEE RANKIN,
Solicitor General.

DECEMBER 1959.

In the Supreme Court of the United States

OCTOBER TERM, 1959

Nos. 2, 3, and 4, Original

STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK, COMPLAINANTS

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO

No. 12, Original

STATE OF ILLINOIS

v.

STATES OF MICHIGAN, OHIO, PENNSYLVANIA, MINNESOTA, NEW YORK AND WISCONSIN

MEMORANDUM IN SUPPORT OF MOTION OF THE UNITED STATES OF AMERICA FOR LEAVE TO INTERVENE

PRELIMINARY STATEMENT

On June 29, 1959, the Court granted the amended application of complainants for a reopening of the decree of April 21, 1930, in Nos. 2, 3, and 4, Original, and granted also the motion of the State of Illinois for leave to file a bill of complaint in No. 15 (now No. 12), Original. The Court in the same order appointed Honorable Albert B. Maris as Special Master in each of these causes. 360 U.S. 712, 714.

By their amended application in Nos. 2, 3, and 4, Original, the complainants (the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan, and New York) ask that the defendants (the State of Illinois and the Metropolitan Sanitary District of Greater Chicago) be restrained from discharging any of the treated effluents emanating from the Sanitary District's sewage and industrial treatment facilities into the Chicago Sanitary and Ship Canal and that the said defendants be required to return all of said effluent to the Great Lakes Basin from which it originally came in the form of "domestic pumpage." The complainants ask alternatively that a Permanent Master be appointed and if it should be determined by the Court that measures other than the return to Lake Michigan of the Chicago domestic pumpage effluent can be put into effect so that such measures will either reduce the direct diversion or limit the Chicago domestic pumpage, to the end that the total amount of diversion from the Great Lakes at Chicago will be reduced or restricted, the Court enter a supplemental or modified decree to that effect.

The State of Illinois, by its complaint in No. 12, Original, invoked the original jurisdiction of this Court pursuant to Article III, Section 2, of the Constitution of the United States against the States of Michigan, Ohio, Pennsylvania, Minnesota, New York, and Wisconsin and asks the Court to declare that the State of Illinois and its instrumentality, the Elmhurst-Villa Park-Lombard Water Commission, are entitled to proceed with a program for the construction of a water supply system and the withdrawal of water from Lake Michigan and further asks the Court to restrain the defendants from interfering with said construction and withdrawal.

INTERESTS OF THE UNITED STATES

The United States has numerous interests in the waters of the Great Lakes and St. Lawrence River watershed. These interests fall into the following main categories:

(1) Navigation on the Great Lakes, the St. Lawrence Seaway, and the Illinois Waterway.

(2) Maintenance of friendly relations with Canada.

(3) Hydro-electric power development on the Niagara and St. Lawrence Rivers within the United States.

(4) Protection of the property belonging to the United States in and adjacent to the Great Lakes and connecting rivers and waterways.

(5) Protection of public health and control of pollution of the Great Lakes and related interstate waters.

(6) Promoting the general welfare of all the United States in the utilization of the Great Lakes-St. Lawrence system as one of the great natural resources of the Nation.

1. The interest in and authority of the United States with respect to navigable waters makes any action which would impair navigability either of the Great Lakes, the St. Lawrence River, the Illinois Waterway or the Mississippi River a matter of federal concern.

The Great Lakes, as well as the Mississippi River, have from earliest times of our country been important navigable waterways. The first connection of those two great waterways came in 1848 with the completion of the Illinois and Michigan Canal, joining the Chicago, Des Plaines and Illinois Rivers, the construction of which was aided by land grants from Congress.[1] Portions of the Illinois and Michigan Canal were later supplanted by the Chicago Sanitary and Ship Canal built by the Sanitary District of Chicago. By the Rivers and Harbors Act of July 3, 1930,[2] Congress appropriated funds for the completion of the Illinois Waterway and authorized the diversion of water from Lake Michigan in accordance with the decree of this Court of April 21, 1930,[3] for the navigation of such waterway. Freight commerce on the waterway has increased from 1,695,000 tons in 1935 when the waterway was first opened to 23,377,000 tons in 1956.[4]

United States commerce on the Great Lakes has likewise grown, reaching a peak during 1953 of 242,700,000 tons. A large portion of this commerce passed through the connecting channels; 122,724,000 tons passed through the St. Marys River and 140,729,000 tons passed through the Detroit River.[5] These channels, as well as the Straits of Mackinac, St. Clair River and Lake St. Clair are being deepened by the United States Corps of Engineers to a minimum depth of 27 feet, with 1962 the expected time of completion of a usable channel of that depth.

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[1] 278 U.S. 367, 401–402.

[2] 46 Stat. 918, 929.

[3] 281 U.S. 179.

[4] House Doc. 31, 86th Cong., 1st Sess., p. 3.

[5] S. Doc. 28, 85th Cong., 1st Sess., p. 42.

The St. Lawrence Seaway Project, a cooperative enterprise of Canada and the United States has resulted in the deepening of the St. Lawrence River as well as the Welland Canal between Lakes Ontario and Erie to the minimum depth of 27 feet. It is estimated that such facilities, opened for deep-draft navigation in 1959, will permit entry into the Great Lakes of 80 percent of the ships now engaged in world trade.[6]

2. Joint use of the Great Lakes-St. Lawrence system by United States and Canada is governed by various treaties and other understandings[7] between the two countries. In litigation to determine the legality of certain uses of waters of the Great Lakes within the United States, it is of concern to the United States that its obligations to Canada be fully and fairly represented to the Court.

3. Pursuant to orders of the International Joint Commission and licenses issued by the Federal Power Commission, the Power Authority of the State of New York has undertaken the construction of hydroelectric power projects on the Niagara and St. Lawrence Rivers to use all of the United States share

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[6] H. Doc. 120, 86th Cong., 1st Sess., p. 25.

[7] Convention between the United States of America and Canada signed at Washington February 27, 1950, Treaties and Other International Acts, Series 2130; Treaty between the United States and Great Britain Relating to Boundary Waters, and Questions Arising between the United States and Canada, signed at Washington, January 11, 1909, 36 Stat. 2448; Agreement between the United States and Canada relating to the St. Lawrence Seaway Project for the construction of certain navigation facilities, Exchange of Notes at Ottawa, August 17, 1954, Treaties and Other International Acts, Series 3053.

of the waters of those Rivers available for power generation. The power so generated will be sold to various users within the United States. Diversions out of the Great Lakes Basin reduce the amount of Niagara and St. Lawrence River water available for power generation by the Power Authority of the State of New York.

4. There are numerous Indian and other Federal reservations and facilities adjacent to and in the Great Lakes and connecting rivers and waterways. Insofar as No. 12 may establish principles of general application relative to the use of waters of the Great Lakes, such a precedent would be of concern to the United States with respect to such properties and facilities.

5. By the Act of June 30, 1948, as amended,[8] Congress has, in connection with the exercise of jurisdiction over the waterways of the Nation and in consequence of the benefits resulting to the public health and welfare in the preservation and control of water pollution, expressed the concern of the United States for the elimination or reduction of the pollution of interstate waters and tributaries thereof and improving the sanitary condition of surface and underground waters. Among other things, the Act provides a procedure by the United States, under the direction of the Surgeon General, for the abatement of pollution of interstate waters which endangers the health or welfare of persons in a State other than that in which the pollution occurs.

6. Apart from the specific interests referred to above, the utilization of the Great Lakes as one of the great

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[8] 33 U.S.C. §§ 466–466k.

assets of the nation is of prime importance. Whatever may be the powers and rights of the individual states in these interstate waters, the people of the United States as a whole have a vital interest in the use of the Lakes and their maintenance as part of the essential geographic structure of the country.

CONCLUSION

In order to protect the foregoing interests, the United States believes that it should be permitted to intervene in these cases, and that the petitions of intervention which are attached hereto should be granted.

Respectfully submitted,

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DECEMBER 1959.

In the Supreme Court of the United States

OCTOBER TERM, 1959

Nos. 2, 3, and 4, Original

STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK, COMPLAINANTS

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO

PETITION OF INTERVENTION OF THE UNITED STATES OF AMERICA

The United States of America for its Petition of Intervention in the above-entitled causes alleges as follows:

PART ONE: INTRODUCTION AND BACKGROUND

I

On June 29, 1959, the Court granted the amended application of complainants for a reopening of the decree of April 21, 1930.[1] The Court in the same order appointed Honorable Albert B. Maris as Special Master in these causes.[2]

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[1] 281 U.S. 696.

[2] 360 U.S. 712.

II

The decree, of which modification is sought, by its terms in paragraph 3, under the circumstances then existing, enjoins the State of Illinois and the Sanitary District of Chicago from diverting, after December 31, 1938, "any of the waters of the Great Lakes-St. Lawrence system or watershed through the Chicago Drainage Canal and its auxiliary channels or otherwise in excess of the annual average of 1,500 cubic feet per second in addition to domestic pumpage."[3]

III

By their amended application, the complainants ask that the State of Illinois and the Metropolitan Sanitary District of Greater Chicago be restrained from discharging any of the treated effluents emanating from the District's sewage and industrial treatment facilities into the Sanitary and Ship Canal and be required to return all of said effluent to the Great Lakes Basin from which it originally came in the form of "domestic pumpage."

The complainants ask also that, if such decree is not made forthwith, a Special Master take evidence with respect to the issues raised by the amended application and with respect to whether the Court should appoint a Permanent Master invested with such authority as he may require for the purpose of maintaining surveillance over the operation of the sewers, interceptors and other sewage and water collecting facilities and the sewage disposal and industrial treatment plants and works operated by the Metropolitan Sanitary District of Greater Chicago.

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[3] 281 U.S. 697.

By a motion to amend and enlarge complainants' prayer for relief, complainants ask the Court alternatively to require measures other than return to Lake Michigan of the Chicago domestic pumpage effluent, which will either reduce the direct diversion or limit the Chicago domestic pumpage, to the end that the total amount of diversion of water from the Great Lakes at Chicago will be reduced or restricted.

IV

The defendants, in answer to the amended application of the complainants, deny its principal contentions and ask that it be dismissed and that the Court grant to the defendants such affirmative relief as may be warranted by the evidence to be presented.

PART TWO: DESCRIPTION OF THE GREAT LAKES-ST. LAWRENCE RIVER BASIN

V

The Great Lakes-St. Lawrence River Basin extends a distance of some 2,000 miles from the western end of the Lake Superior Basin in Minnesota, to the Gulf of St. Lawrence on the Atlantic Ocean. From east to west, the basin spans nearly one-half of the North American continent. The five Great Lakes, Superior, Michigan, Huron, Erie, and Ontario, with their connecting rivers and Lake St. Clair, have a water surface area of about 95,000 square miles above the head of the St. Lawrence River at the eastern end of Lake Ontario. The total area of the Great Lakes Basin, both land and water, above the head of the St. Lawrence River is approximately 295,000 square miles. The international boundary between Canada and the United States passes through all of the Great Lakes and their connecting channels, with the exception of Lake Michigan which is entirely within the United States, and through the St. Lawrence River to a point near Cornwall, Ontario, where the boundary turns eastward to continue along a line between the State of New York and the Province of Quebec. Downstream of this point, the St. Lawrence River is entirely within Canada.

Based on records for the period 1860–1954, inclusive, the average water surface elevation and the average rate of outflow for each of the Lakes are as follows:

	Elevation (feet above sea level)	Outflow (cubic feet per second)
Lake Superior	602	75,000
Lake Michigan	580	48,000
Lake Huron	580	189,000
Lake Erie	572	205,000
Lake Ontario	246	241,000

The St. Lawrence River is the natural outlet for the entire drainage basin of the Great Lakes. From the outlet of Lake Ontario at Cape Vincent, N.Y., to Father Point, Quebec, which marks its transition into the Gulf of St. Lawrence, the river falls 246 feet in a distance of 533 miles. From Lake Ontario downstream 64 miles to Ogdensburg, N.Y., the river is generally wide and deep so that about one foot only of the fall occurs in this 64 miles. The major portion of the fall, some 225 feet, occurs in the next 120 miles extending from Ogdensburg to Montreal, Quebec. Most of the remaining 20 feet of fall occurs in the 160 miles between Montreal and the city of Quebec.

The natural supply of water to Lake Superior has been increased by diversions of water from the Albany River Basin through the Long Lake and Ogoki projects in Canada, beginning in 1940 and 1943 respectively.[4] Since 1945, the sum of these diversions has been at an average rate of about 5,000 cubic feet per second.

VI

Diversions of water from Lake Michigan and its drainage basin into the valley of the Des Plaines River, a tributary of the Illinois River within the Mississippi River Basin, have long been made.[5] Since 1938, the diversion through the Chicago Sanitary and Ship Canal has been at an annual average rate of approximately 1,500 cubic feet per second exclusive of domestic pumpage. Since 1930 domestic pumpage, according to records of the Metropolitan Sanitary District of Greater Chicago, has varied from an annual average rate of 1,700 cubic feet per second in 1930, to 1,575 in 1942, to 1,805 in 1956, and 1,760 in 1958.[6]

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[4] Arrangement between the United States and Canada relating to the early development of certain portions of the Great Lakes-St. Lawrence Basin project (Long Lac-Ogoki Works), Exchange of Notes at Washington, October 14 and 31 and November 7, 1940, 54 Stat. 2426.

[5] 278 U.S. 367, 399-404.

[6] A table of annual average rates of direct diversion and domestic pumpage is set out in defendants' Brief in Opposition to

PART THREE: NAVIGATION ON THE GREAT LAKES AND CONNECTING WATERWAYS AND THE ST. LAWRENCE SEAWAY

VII

Commerce on the Great Lakes has been a vital factor in development of the entire Great Lakes region.[7] The area tributary to the Lakes is rich in natural resources and has extensive fertile agricultural areas. The major portion of Great Lakes commerce passes between the Lakes. Ample depths for navigation are generally available in the open lakes. In their natural state the channels connecting Lakes Superior and Huron and Lakes Huron and Erie were very shallow for long reaches. Extensive dredging has been required in about 140 miles of these connecting channels to provide adequate depths for interlake navigation. In addition, the construction of locks was required near the head of the St. Marys River for navigation to bypass the 21-foot drop through the rapids at Sault Ste. Marie. The Straits of Mackinac connecting Lakes Michigan and Huron are wide and deep but dredging of several shoals has been necessary in the

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the Amended Application, p. 6. The Court authorized direct diversion of 10,000 c.f.s. for ten days, Dec. 2–12, 1940, pursuant to stipulation, to clear accumulated sewage deposits from the canal. 311 U.S. 107. It permitted up to 8,500 c.f.s., in the discretion of the Corps of Engineers, from Dec. 17, 1956, through Feb. 28, 1957, to aid navigation at the Alton Lock on the Mississippi. 352 U.S. 945; 352 U.S. 983. The Chief of Engineers permitted slightly excessive diversion in 1942 (1,528 c.f.s.) and 1944 (1,531 c.f.s.) as a war emergency measure in aid of navigation. See S. Doc. No. 28, 85th Cong., 1st Sess., p. 12.

[7] By Section 10 of the Rivers and Harbors Act of 1899, 30 Stat. 1121, 1151, Congress has exercised its jurisdiction to control diversions of water affecting navigable capacity of the Great Lakes system. 278 U.S. 367.

approaches to the straits to provide suitable channels for navigation.

VIII

The Great Lakes possess few natural harbors. Harbor improvements by the United States on the Great Lakes commenced in 1824 and have continued since that time to accommodate the increasing needs of navigation. There are now 56 federally improved deep-draft commercial harbors on the Great Lakes with depths of 18 feet or more. In addition, there are 9 privately improved harbors with depths of 21 feet or more.

IX

The Great Lakes connecting channels include the St. Marys River between Lakes Superior and Huron, the Straits of Mackinac between Lakes Huron and Michigan, and the St. Clair River, Lake St. Clair, and the Detroit River between Lakes Huron and Erie. The connecting channels with present controlling depths of 25 feet in the downbound channels and 21 feet in the upbound channels are being deepened by the United States to provide a controlling depth of 27 feet in both downbound and upbound channels. There are five locks at Sault Ste. Marie constructed to allow navigation to pass the rapids in the St. Marys River. There are four parallel locks on the United States side and a single lock in Canada.

Navigation passes between Lake Erie and Lake Ontario through the Welland Canal. This canal, constructed by and entirely within Canada, leaves Lake Erie 18 miles west of the head of the Niagara River and enters Lake Ontario 7½ miles west of the mouth of that river. The canal has 1 guard lock and 7 lift locks with an aggregate lift of 326 feet.

X

Prior to the St. Lawrence Seaway Project undertaken by the United States and Canada, *infra*, paragraph XIV, the controlling depth of the St. Lawrence River was 14 feet from Montreal to Ogdensburg, New York. The seaway program deepened this reach of the River to 27 feet and supplanted 18 locks with 7 new locks. The St. Lawrence Seaway Project has involved also the deepening of the Welland Canal between Lakes Erie and Ontario from 25 to 27 feet.

Ocean-going vessels are thus able to enter the Great Lakes. Also, the eastern terminus of the Great Lakes vessels is extended from Ogdensburg, New York, to Seven Islands, Quebec, and to other points on the Gulf of St. Lawrence.

PART FOUR: NAVIGATION ON THE ILLINOIS WATERWAY

XI

The Illinois Waterway is a navigable waterway of the United States and provides a 9-foot depth navigation project between Lake Michigan and the Mississippi River system. It has two connections with Lake Michigan at Chicago, one at the mouth of the Chicago River and the other at the mouth of the Calumet River. Slack-water navigation is provided on the entire Illinois Waterway through a system of 8 locks and dams including the Alton lock and dam on the Mississippi River about 16 miles below the confluence of the Illinois and Mississippi Rivers. The water authorized by the decree herein of April 21, 1930, to be diverted from Lake Michigan has been authorized by Congress for navigation, on this waterway. Rivers and Harbors Act of 1930, 46 Stat. 918, 929.

PART FIVE: INTERNATIONAL AGREEMENTS RESPECTING USE OF THE WATERS OF THE GREAT LAKES-ST. LAWRENCE SYSTEM

XII

INTERNATIONAL BOUNDARY WATERS TREATY OF 1909

On January 11, 1909, the United States and Great Britain entered into a treaty relating to boundary waters and questions arising between the United States and Canada. 36 Stat. 2448. In its preliminary article the Treaty defines boundary waters as "waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers, and waterways, or waters flowing from such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary."

By Article I the parties agreed that "the navigation of all navigable boundary waters shall forever continue free and open" to the inhabitants and vessels of both countries and that "this same right of navigation shall extend to the waters of Lake Michigan." Under Article II, there was reserved to the respective parties, or to the several state governments on the one side and the Dominion or Provincial governments on the other, exclusive control over the use and diversion of all waters on its own side of the boundary line which in their natural channels would flow across the boundary or into boundary waters, but it was agreed that any interference with or diversion from their natural channel of waters on either side of the boundary "shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion or interference occurs." Article II further provides that neither party surrenders any right "which it may have, to object to any interference with or diversions of waters on the other side of the boundary the effect of which would be productive of material injury to the navigation interests on its own side of the boundary."

Article VII of the Treaty provided for the establishment of an International Joint Commission which, by Article VIII, was empowered to pass upon all cases involving "the use or obstruction or diversion of the waters with respect to which under Articles III and IV of this treaty the approval of this Commission is required." Article VIII sets forth certain rules or principles to govern the International Joint Commission including the following order of precedence of uses:

(1) Uses for domestic and sanitary purposes;

(2) Uses for navigation, including the service of canals for the purposes of navigation;

(3) Uses for power and for irrigation purposes.

As to boundary waters, it was agreed by Article III that, in addition to cases provided for by special agreement, "no further or other uses or obstructions or diversions, whether temporary or permanent" of such waters "on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority" of the two countries "within their respective jurisdictions and with the approval" of the International Joint Commission. Article III further provides that the Treaty does not limit the right of the respective governments to undertake certain governmental works for the benefit of commerce and navigation provided that such works are wholly on the respective sides of the line and do not materially affect the level or flow of the boundary waters on the other side of the line, and that the Treaty does not interfere with the ordinary use of boundary waters for domestic and sanitary purposes.

By Article IV it was agreed that, except in cases provided for by special agreement, the parties "will not permit the construction or maintenance on their respective sides of the boundary of any remedial or protective works or any dams or other obstructions in waters flowing from boundary waters or in waters at a lower level than the boundary in rivers flowing across the boundary, the effect of which is to raise the natural level of waters on the other side of the boundary unless the construction or maintenance thereof is approved by the * * * International Joint Commission." By Article IV it was further agreed that "boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other."

XIII

NIAGARA RIVER TREATY

On February 27, 1950, Canada and the United States entered into a treaty concerning the uses of the waters of the Niagara River,[8] such treaty replacing certain of the specific provisions of the Treaty of January 11, 1909, relative to the Niagara River. The 1950 Treaty established minimum rates of flow over Niagara Falls in order to preserve their scenic beauty. The treaty provided further that each Government could license power use of half of the total remaining outflow of Lake Erie, excepting the amount of water used and necessary for domestic and sanitary purposes and for the service of canals for the purposes of navigation and excepting also water brought into the Great Lakes System by the Long Lake-Ogoki diversion of Canada.

XIV

UNITED STATES-CANADIAN UNDERSTANDINGS RELATIVE TO THE ST. LAWRENCE SEAWAY

Pursuant to parallel legislation by the Congress of the United States[9] and the Parliament of Canada[10] and an agreement embodied in an exchange of notes, dated August 17, 1954,[11] the two governments have undertaken the construction of the St. Lawrence Seaway, Lake Erie to Montreal, through the St. Lawrence

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[8] Treaties and Other International Acts, Series 2130.

[9] Act of May 13, 1954; 68 Stat. 92.

[10] Act of December 21, 1951; Canadian Revised Statutes (1952), Ch. 242.

[11] Treaties and Other International Acts, Series 3053.

Seaway Development Corporation, a United States Government corporation, and a similar Canadian Government entity, the St. Lawrence Seaway Authority.

PART SIX: HYDROELECTRIC AND RELATED DEVELOPMENT OF THE NIAGARA AND ST. LAWRENCE RIVERS AND THE ILLINOIS WATERWAY

XV

Along the Niagara River in the vicinity of Niagara Falls, there are hydroelectric plants in Canada and the United States. These plants take water from the Niagara River above the falls and return it to the river below the falls.

As above noted in paragraph XIII, the treaty of February 27, 1950, between the Governments of Canada and the United States replaces certain provisions of the Treaty of 1909 respecting the Niagara River. By the Act of August 21, 1957,[15] Congress directed the Federal Power Commission to license the Power Authority of the State of New York to construct and operate a power project "with capacity to utilize all of the United States share of the water of the Niagara River permitted to be used by international agreement." The Power Authority of the State of New York has proceeded with construction under license issued by the Federal Power Commission in pursuance of that direction.

The International Joint Commission gave permission for the development of power in the International Rapids Section of the St. Lawrence River by Canada and the United States,[13] and established criteria for the operation of the project so authorized in the interest of regulating outflows from Lake Ontario and water surface levels on Lake Ontario and the St. Lawrence River. On July 15, 1953, the Federal Power Commission licensed the Power Authority of the State of New York to construct and operate the United States portion of the project.[14] On November 4, 1953, the President of the United States designated the Power Authority of the State of New York as the agency to construct the United States portion of the project under the approval given by the International Joint Commission.[15] The Power Authority of the State of New York, on the United States side, and the Hydro-Electric Power Commission of Ontario, on the Canadian side, have proceeded with the construction of power development in the International Rapids section of the St. Lawrence River.

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[15] 71 Stat. 401.

There are additional power projects on the St. Lawrence River constructed and operated by Canadian interests downstream from the International Rapids section.

On the Illinois Waterway there are hydroelectric power plants near Lockport and Marseilles, Illinois. Neither of these plants has been licensed under the Federal Power Act, and the question of the applicability of that Act to their operation has not been judicially determined.

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[13] Order of Approval of November 29, 1952 (S. Doc. No. 165, 83rd Cong., 2d Sess., pp. 137–143) as supplemented by Order of July 2, 1956 (35 State Dept. Bull., pp. 227–229).

[14] S. Doc. No. 165, 83rd Cong., 2d Sess., pp. 150–156.

[15] Executive Order No. 10500, 18 Fed. Reg. 7005.

PART SEVEN: PROPERTY INTERESTS OF THE UNITED STATES

XVI

There are numerous Indian and other Federal reservations and facilities adjacent to and in the Great Lakes and connecting rivers and waterways. Such properties of the United States require water of the Great Lakes system for navigational, domestic, industrial, sanitary and other useful purposes.

PART EIGHT: THE PUBLIC INTEREST IN POLLUTION CONTROL AND INTERESTS OF THE UNITED STATES RELATED TO THE GENERAL WELFARE OF ALL THE PEOPLE

XVII

The waters of the Great Lakes system constitute a national and international resource of great value. As such, their use is subject to national and international planning and control. Such use within the United States must of necessity be compatible with the best interests of all the people of the United States and with the interests of Canada as determined by international agreement.

XVIII

As above noted, the Treaty of 1909 between the United States and Great Britain fixes, for certain purposes, an order of precedence among various uses for domestic and sanitary purposes, navigation, power and irrigation, of the waters therein defined as boundary waters and stipulates that no use shall be permitted which tends materially to conflict with or restrain any other use which is given preference over it. That treaty also provides against the pollution of boundary waters or waters flowing across the boundary to the injury of health or property on the other side of the boundary. Additional agreements and arrangements between the United States and Canada respecting use of the waters of the system are noted in Parts Five and Six, *supra*.

XIX

By the Act of June 30, 1948, as amended,[16] Congress has, in connection with the exercise of jurisdiction over the waterways of the Nation and in consequence of the benefits resulting to the public health and welfare in the preservation and control of water pollution, expressed the concern of the United States for the elimination or reduction of the pollution of interstate waters and tributaries thereof and improving the sanitary condition of surface and underground waters. Among other things, the Act provides a procedure by the United States, under the direction of the Surgeon General, for the abatement of pollution of interstate waters which endangers the health or welfare of persons in a State other than that in which the pollution occurs.

PART NINE: THE EFFECTS OF THE DIVERSIONS FROM LAKE MICHIGAN UPON THE VARIOUS INTERESTS OF THE UNITED STATES

XX

Any diversion of water out of the Lake Michigan watershed decreases the levels of the water surface which would otherwise prevail in that lake and in Lakes Huron, Erie, and Ontario, and in the connecting waterways. The quantitative effect of any such diversion on lake levels is dependent upon the duration and quantity of the diversion. A permanent additional diversion of 1,000 cubic feet per second would have the ultimate effect of lowering the water surface level of Lakes Michigan and Huron and connecting waterways about one inch and of Lakes Erie and Ontario and connecting waterways about ⅝ inch. A permanent decrease in the present diversion by the same amount would ultimately result in a raising of the lake levels to about the same extent. The ultimate effect on lake levels of a permanent increase or decrease in the diversion in an amount more or less than 1,000 cubic feet per second would be in direct mathematical proportion to the effect of an increase or decrease in the amount of 1,000 cubic feet per second. A measurable adverse effect upon the interests of navigation on the Great Lakes system would result from a permanent increased diversion of as much as 1,000 cubic feet per second. Similar effects would result from a smaller permanent increase but, depending upon the size of the increase, the overall effect may not be capable of evaluation.

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[16] 33 U.S.C. §§ 466–466k.

On the other hand, the diversion of water out of Lake Michigan into the Illinois Waterway is necessary for the maintenance of navigation on that waterway. The flow of 1,500 cubic feet per second, exclusive of domestic pumpage, is authorized for navigation by the decree of April 21, 1930. An average annual flow of this rate, without domestic pumpage, is adequate for operation of existing navigation facilities on the Illinois Waterway.

The construction of duplicate locks on that Waterway has been recommended to Congress by the Chief of Engineers.[17] Studies of water requirements for operation of the recommended duplicate locks show that an average annual flow of 1,826 cubic feet per second would be required.

XXI

Any diversion of water from Lake Michigan, if continued permanently, reduces the outflows of Lakes Erie and Ontario in approximately the same quantity as the amount of the diversion. Thus water diverted at Chicago is not available for hydro-electric power production at the plants within the United States and Canada on the Niagara River and in the International Rapids section of the St. Lawrence River, and in Canada downstream from the International Rapids on the St. Lawrence. Any increase in the diversion at Chicago will adversely affect the production of power at those plants and any decrease will be beneficial to power production there.

XXII

There is a present practice of discharging industrial wastes, treated sewage effluents, and untreated raw sewage in times of storm runoff, into the Illinois Waterway, which results in pollution of the waterway. The interest of the United States in the control of pollution of interstate waters and waters tributary thereto is affected thereby. Likewise, without more complete purification of sewage effluents than presently achieved by the Metropolitan Sanitary District of Greater Chicago, the demand of the complainant States for the return of the sewage effluents and industrial wastes to Lake Michigan poses a possibility of pollution of the waters of Lake Michigan. That demand requires that consideration be given to factors relevant to determining the public interest in maintaining the purity of the waters of Lake Michigan *vis-a-vis* pollution of the Illinois Waterway.

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[17] H. Doc. No. 31, 86th Cong., 1st Sess.

PART TEN: THE NECESSITY FOR INTERVENTION BY THE UNITED STATES

XXIII

Because of the appropriate self-interest of the party States and the Metropolitan Sanitary District of Greater Chicago in the use of the national and international resource here involved, they are unable, either separately or collectively, fully to assert and represent the interests of all the United States in the matters in controversy. In order that such interests may be protected it is necessary that the United States intervene as a party to these cases.

PART ELEVEN: RESPONSE TO PLEADINGS OF OTHER PARTIES

XXIV

The United States does not plead specifically to the allegations of the parties as set forth in the amended application of the complainant States and the answer thereto of the defendants. However, this omission to so plead does not constitute an admission by the United States of any allegation of fact or legal conclusion contained in said application and answer.

PRAYER

WHEREFORE, the United States of America prays that the facts relevant to the issues raised by the amended application of the complainant States, the answer thereto of the defendants, and this petition in intervention be determined; that the rights of the parties in the light of those facts and in the light of the rights, interests, and obligations of the United States be determined; and that appropriate disposition of the complainants' demand for modification of the decree herein or for the entry of a supplemental decree be made, having due regard for the effect of such disposition on the rights, interests, and obligations of the United States.

J. LEE RANKIN,
Solicitor General.

DECEMBER 1959.

In the Supreme Court of the United States

OCTOBER TERM, 1959

No. 12, Original

STATE OF ILLINOIS

v.

STATES OF MICHIGAN, OHIO, PENNSYLVANIA, MINNESOTA, NEW YORK AND WISCONSIN

PETITION OF INTERVENTION OF THE UNITED STATES OF AMERICA

The United States of America, for its Petition of Intervention in the above-entitled cause, alleges as follows:

PART ONE: INTRODUCTION AND BACKGROUND

I

The State of Illinois, as complainant, has invoked the original jurisdiction of this Court pursuant to the provisions of Article III, Section 2, of the Constitution of the United States. The purpose of its action is (1) to establish by declaratory judgment the right of the State of Illinois through its instrumentality, the Elmhurst-Villa Park-Lombard Water Commission, to withdraw water from Lake Michigan for the domestic purposes of the three municipalities organizing the Commission and for the domestic purposes of other customers of said Commission located along the line of its proposed water main, and (2) to enjoin the defendants from interfering with the exercise of such rights. Illinois' motion for leave to file a bill of complaint was granted on June 29, 1959.[1]

II

The State of Wisconsin, joined by the State of Minnesota, in answer to the Bill of Complaint, denied the principal contentions of the State of Illinois and moved that said Complaint be dismissed.

III

The States of Michigan, Ohio, Pennsylvania and New York answered the Bill of Complaint, denying the principal contentions of the State of Illinois, and asserting certain affirmative defenses and counterclaims for affirmative relief. By such pleadings the issue is raised whether the enforcement of such right as Illinois may have to withdraw water from Lake Michigan for municipalities situated outside the Great Lakes watershed should be conditioned:

> (a) upon the return to Lake Michigan of the residue after use and appropriate treatment of the water, or
>
> (b) upon the institution of other measures adequate to compensate other Great Lakes states, either in money or in substitute water, for any loss by reason of the withdrawal of such water from Lake Michigan.

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[1] 360 U.S. 712, 714.

IV

The State of Illinois replied to the counterclaims of the State of New York, as well as to the counterclaims of the States of Michigan, Ohio, and Pennsylvania.

PARTS TWO THROUGH EIGHT: PARAGRAPHS V THROUGH XIX

V–XIX

Paragraphs V through XIX of the Petition in Intervention on behalf of the United States of America in *Wisconsin et al.* v. *Illinois et al.*, Nos. 2, 3, and 4, Original, are incorporated herein by reference and made a part hereof as Paragraphs V through XIX.

PART NINE: THE EFFECTS OF THE DIVERSIONS FROM LAKE MICHIGAN UPON THE VARIOUS INTERESTS OF THE UNITED STATES

XX

Any diversion of water out of the Lake Michigan watershed decreases the levels of the water surface which would otherwise prevail in that lake and in Lakes Huron, Erie, and Ontario, and in the connecting waterways. The quantitative effect of any such diversion on lake levels is dependent upon the duration and quantity of the diversion. A permanent additional diversion of 1,000 cubic feet per second would have the ultimate effect of lowering the water surface level of Lakes Michigan and Huron and connecting waterways about one inch and of Lakes Erie and Ontario and connecting waterways about ⅝ inch. The ultimate effect on lake levels of a permanent increase in the diversion in an amount more or less than 1,000 cubic feet per second would be in direct mathematical proportion to the effect of an increase in the amount of 1,000 cubic feet per second. A measurable adverse effect upon the interests of navigation on the Great Lakes system would result from a permanent increased diversion of as much as 1,000 cubic feet per second.

Although the effect on lake levels, and, in turn, on the interests of navigation and on properties adjacent to and in the Great Lakes and the connecting waterways of the diversion out of the watershed of the quantity of Lake Michigan waters contemplated by Illinois on behalf of the Elmhurst-Villa Park-Lombard Water Commission may not be capable of evaluation independently, the combined effect of it and other withdrawals from Lake Michigan in Illinois is measurable.

XXI

Any diversion of water from Lake Michigan, if continued permanently, reduces the outflows of Lakes Erie and Ontario in approximately the same quantity as the amount of the diversion. Thus water diverted by Illinois is not available for hydro-electric power production at the plants within the United States and Canada on the Niagara River and in the International Rapids section of the St. Lawrence River, and in Canada downstream from the International Rapids on the St. Lawrence. Any increase in the diversion by Illinois will adversely affect the production of power at those plants.

XXII

The demand of the defendant States for the return to Lake Michigan of the sewage effluent from water diverted by Illinois for the Elmhurst-Villa Park-Lombard Water Commission as a condition of such diversion poses the possibility, when considered with the relief demanded in Nos. 2, 3, and 4, Original, of pollution of the waters of Lake Michigan.

PART TEN: THE NECESSITY FOR INTERVENTION BY THE UNITED STATES

XXIII

Because of the appropriate self-interest of the party States in the use of the national and international resource here involved, they are unable, either separately or collectively, fully to assert and represent the interests of all the United States in the matters in controversy. In order that such interests may be protected it is necessary that the United States intervene as a party to this case.

PART ELEVEN: RESPONSE TO PLEADINGS OF OTHER PARTIES

XXIV

The United States does not plead specifically to the allegations of the parties as set forth in the complaint of the complainant, answers and counterclaims of the defendants and the reply of the complainant. However, this omission to so plead does not constitute an admission by the United States of any allegation of fact or conclusion of law contained in said complaint, answers, counterclaims and reply.

PRAYER

Wherefore, the United States of America prays that the facts relevant to the issues raised by the complaint, answers, counterclaims and reply, and this petition in intervention be determined; that the rights of the parties in the light of those facts and in the light of the rights, interests, and obligations of the United States be determined; and that appropriate disposition of the various claims herein be made, having due regard for the effect of such disposition on the rights, interests, and obligations of the United States.

J. Lee Rankin,
Solicitor General.

December 1959.

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Supreme Court of the United States

OCTOBER TERM, 1959.

No. 4 Original

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

BRIEF IN OPPOSITION TO MOTION BY THE STATE OF NEW YORK FOR LEAVE TO FILE A SUPPLEMENTAL AND AMENDED COMPLAINT.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

No. 4, Original.

STATE OF NEW YORK,

Complainant,

vs.

STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,

Defendants.

BRIEF IN OPPOSITION TO MOTION BY THE STATE OF NEW YORK FOR LEAVE TO FILE A SUPPLEMENTAL AND AMENDED COMPLAINT.

Introduction.

On the basis of proceedings jointly instituted by New York and five other complainant states in related cases, and pursuant to the recommendation of the Solicitor General, this historic and protracted litigation over water diversion from the Great Lakes dating back to 1922 was referred to a Special Master by this Court on June 29, 1959 for hearings on the issues properly tendered by the parties.[1] Notwithstanding this recent disposition and the commencement of hearings below, pursuant to the Order of Reference, New York, without comparable action by the five other complainants or the Solicitor General, appar-

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[1] ***Illinois* v. *Michigan*, 360 U. S. 712.**

ently would circumvent the Order of Reference, create new procedural complications, and in effect seek reconsideration of this matter by this Court prior to the filing of the Special Master's Report.

Question Presented.

The question presented is whether the State of New York, twenty-nine years after the entry of the 1930 decree in this and related causes, should be allowed to file a supplemental and amended complaint alleging a new cause of action and seeking to expand the relief demanded in its original complaint filed in 1926, when all issues properly raised by the proposed new pleading may be presented and determined in the hearings now being held by Special Master Albert B. Maris on a reopening of the decree pursuant to an application of New York and other Lake States. Specifically, may the State of New York file a Supplemental and Amended Complaint which contains not only allegations of additional damage but also a charge, not included in the original complaint, that the failure of The Metropolitan Sanitary District of Greater Chicago to return to Lake Michigan water used for domestic purposes by the City of Chicago and municipalities within the District is in violation of its rights?

HISTORY AND NATURE OF THE LITIGATION.

The Original Complaint Did Not Seek a Return to Lake Michigan of Water Withdrawn for Domestic Purposes, the Effluent from Which Has Been Discharged Into the Mississippi Watershed Since Prior to 1900.

The State of New York, one of thirteen states involved in this and two related proceedings, seeks to file a so-called Supplemental and Amended Complaint thirty-three years after the filing of its original complaint; twenty-nine years after this Court's entry of a decree; and six months after this Court referred this cause, together with Nos. 2, 3 and 12, Original, to Albert B. Maris, as Special Master, to take such evidence as may be introduced and as he may call for.

The amended complaints of the other Lake States,[2] alleging damage to navigation and commercial interests, to structures, to agriculture, to summer resorts, to fishing and hunting grounds, to public parks and other enterprises, and to riparian property generally, sought "an injunction against the State of Illinois and the Sanitary District of Chicago from continuing to withdraw 8500 cubic feet of water a second from Lake Michigan at Chicago." Several months after the proceedings initiated by Wisconsin and Michigan had been referred to Special Master Charles Evans Hughes, New York, on October 22, 1926, entered this lengthy litigation by filing its original complaint praying for the same relief. The amended bills of complaint and the complaint filed by New York did not demand that the water taken from Lake Michigan as domestic pumpage be returned to the lake. *Wisconsin* v. *Illinois*, 281 U. S. 179, 200.

At New York's request, this Court permitted it to participate in the taking of evidence before the Special Master appointed in the proceedings previously filed. *Wisconsin* v. *Illinois,* 273 U. S. 642. Shortly thereafter, this Court dismissed the particular portion of New York's complaint which alleged that defendants' diversion might be injurious to the future hydroelectric development of the Niagara and St. Lawrence Rivers. *New York* v. *Illinois,* 274 U. S. 488. Concluding that this paragraph presented only "abstract questions", this Court indicated that New York, "if later on in a position to do so, may be free to litigate the questions which the paragraph is intended to present." *Id.* at 490.

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[2] On July 14, 1922 Wisconsin began the suit which is now No. 2, Original; and on October 5, 1925 an Amended Application was filed in which Minnesota, Ohio and Pennsylvania joined as co-complainants. Missouri, Kentucky, Tennessee and Louisisana were permitted to intervene as defendants. *Wisconsin* v. *Illinois*, 46 S. Ct. 208. Michigan filed its Complaint in No. 3, Original on March 8, 1926. Reference of Wisconsin's case to a Special Master was directed by this Court with permission simultaneously granted to the parties in the Michigan proceeding to participate in the hearings before the Special Master, *Wisconsin* v. *Illinois*, 271 U. S. 650. Subsequently, Arkansas and Mississippi also were granted leave to intervene. *Wisconsin* v. *Illinois*, 273 U. S. 644.

The facts relating to the beginning of the diversion of water from Lake Michigan which began before 1865 are set forth in the Report of the Special Master filed on November 23, 1927 (pp. 11-14), and are summarized by the Court in *Wisconsin* v. *Illinois* in 278 U. S. 367, at pages 401-404.

On pages 22-33 of the Report of the Special Master filed on November 23, 1927, is a table showing amounts of water withdrawn from Lake Michigan for domestic use and the amounts of direct diversion between 1900 and 1926.

On March 3, 1925, the Secretary of War granted to the Sanitary District a permit "to divert from Lake Michigan, through its main drainage canal and auxiliary channels, an amount of water not to exceed 8500 cubic feet per second, * * *.[3] The complainant states contended that this permit "should be declared invalid." *Wisconsin* v. *Illinois,* 278 U. S. 367, 411.

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[3] Report of Special Master Charles E. Hughes, filed November 23, 1927 in these causes as Nos. 7, 11, and 12 Original, October Term, 1927, p. 77. The diversion was granted upon the recommendation of the District Engineer at Chicago, who explained that by "diversion" he meant "the amount of water which is actually withdrawn from Lake Michigan by the Sanitary District of Chicago, through its main drainage canal and auxiliary channels, and is not inclusive of the amount flowing in the channels which come from the sewers of the locality; * * *" *Id.* at 75. The term "diversion" as used in these causes does not include domestic pumpage, *i.e.,* water pumped from the Lake for domestic purposes. Report of Special Master Charles E. Hughes on Re-Reference, filed December 17, 1929, p. 143.

"The exact issue," said the Court, was "whether the State of Illinois and the Sanitary District of Chicago, by diverting 8500 cubic feet from the waters of Lake Michigan have so injured the riparian and other rights of the complainant States bordering the Great Lakes and connecting streams by lowering their levels as to justify an injunction to stop this diversion and thus restore the normal levels." *Wisconsin* v. *Illinois,* 278 U. S. 367, 409-10. The decree was directed toward a "reduction of the diversion to a point where it rests on a legal basis * * *." Id. at 420. Thus the "wrong" (see 281 U. S. 179, 197) which was the gravamen of the complaints was not the withdrawal of water from Lake Michigan for domestic purposes and the discharge of sewage effluent into the Sanitary and Ship Canal. The "wrong" consisted of a "failure of the Drainage District to take care of its sewage in some way other than by promoting or continuing the existing diversion." *Wisconsin* v. *Illinois,* 278 U. S. 367, 418.

In his Report on Re-Reference in these related cases (now Nos. 2, 3, and 4, Original) filed December 17, 1929, Special Master Charles E. Hughes explained (pp. 120-121) that the "8500 c. f. s. is the diversion by the Sanitary District allowed by the permit of March 3, 1925, exclusive of pumpage."

However, Special Master Hughes explained further (*ibid.*) that the complainants had asked during the hearings that "all flow at Lockport be enjoined from the date fixed for the completion of the sewage treatment works" which "would mean not only the cessation of the diversion by the Sanitary District, in the sense in which that term is used by the War Department, but also the termination of the discharge at Lockport of the pumpage, that is, of the water taken by the City of Chicago from Lake Michigan and entering the Chicago River and the Drainage Canal as sewage;'' that "So far as this pumpage is concerned the question is merely incidental to that relating to the diversion by the Sanitary District.'' He said (pp. 121-122) that "the question of the disposition of the effluent from the sewage treatment plants thus demands consideration in connection with the award of relief as to the diversion by the Sanitary District.''

This Court Has Recognized the Right of the Sanitary District to Discharge Into the Sanitary and Ship Canal and Mississippi Watershed the Effluent Emanating from Domestic Pumpage Withdrawn from Lake Michigan.

In considering the demand made during the hearings in the 1929 Re-Reference that the sewage effluent be returned to the Lake, Special Master Hughes recognized that a community has no legal obligation to return to its source water which has been used for domestic purposes. His opinion on this point was clearly stated as follows (pp. 121-122):

> Furthermore, it is not regarded as open to serious question that the City of Chicago, under authority of the State, has the riparian right to take water from Lake Michigan for the ordinary uses of its inhabitants. That would not be, *per se,* an unreasonable use. And if it were sought to prevent an abuse of that right through the taking of an unreasonable amount, it would be necessary to present that issue in an appropriate manner (*City of Canton* v. *Shock,* 66 Ohio State, 19; *Minneapolis Mill Co.* v. *Board, etc. of St. Paul,* 56 Minn. 485; *City of Philadelphia* v. *Collins,* 68 Pa. 106; *City of Auburn* v. *Union Water Power Co.,* 90 Maine, 576; *Barre Water Co.* v. *Carnes,* 65 Vt. 626; *Fisk* v. *Hartford,* 70 Conn. 720.)
>
> If the City of Chicago is entitled to take its water supply from Lake Michigan for the ordinary and reasonable uses of its inhabitants, it cannot be said that

> the State or the City is subject to any established rule of law which requires it to turn into the Lake what is no longer water but sewage or the effluent of sewage treatment plants. If there were a way of destroying the sewage or sewage effluent altogether, or evaporating it, it does not appear that the State or the City would violate any right of the complainants in doing so (*Fisk* v. *Hartford,* 69 Conn. 375). The question in these suits concerns the diversion by the Sanitary District and not the pumpage independently considered.
>
> But, as there is no means known at present of otherwise disposing of the effluent from the sewage treatment plants, when the sewage disposal program has been fully carried out, it is assumed that the effluent must be turned into the Drainage Canal and Chicago River, thence to be discharged at Lockport, the western terminus of the Canal, or be carried into Lake Michigan. The question of the disposition of the effluent from the sewage treatment plants thus demands consideration in connection with the award of relief as to the diversion by the Sanitary District.

The complainants did not at that time contend that there was any legal obligation on the part of any user of water for domestic purposes to return the water in the form of sewage or sewage effluent to its source.[4] But as so clearly appears from the Report of Special Master Hughes, the question of returning the domestic pumpage in the form of sewage effluent to Lake Michigan came up incidentally or indirectly as a possible expedient or device that could be adopted as a means of eliminating the necessity for any direct diversion of water from the Lake.

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[4] In Exceptions to the Report of the Special Master On Re-Reference, filed February 3, 1930, complainants contended (pp. 19, 21) that "domestic pumpage" was in fact an issue and challenged the findings and conclusions of law under discussion. In New York's Brief in Support of its Motion to File its Supplemental and Amended Complaint O.T. 1959 (p. 3) and in New York's Motion for a Modification of the Decree, O.T. 1957, (p. 3), it is conceded that the permanent withdrawal of water from Lake Michigan for domestic pumpage "had not been complained of in the pleadings * * *."

The Court, in confirming the conclusions of the Special Master, rejected the demands of the complainants that the sewage effluent be returned to the Lake. The Court (281 U. S. 179, 200) said, in part:

> The withdrawal of water for domestic purposes is not assailed by the complainants and we are of opinion that the course recommended by the master is more reasonable than the opposite demand. If the amount withdrawn should be excessive, it will be open to complaint. Whether the right for domestic use extends to great industrial plants within the District has not been argued but may be open to consideration at some future time.

Chicago's right to discharge sewage into the Canal was first questioned in *Missouri* v. *Illinois and The Sanitary District of Chicago,* 200 U. S. 496. In that case, Missouri filed a bill of complaint to enjoin the Sanitary District from discharging sewage through an artificial channel connecting Lake Michigan with the Des Plaines River, a tributary of the Illinois River, which empties into the Mississippi River. It was claimed that the sewage polluted the Mississippi and rendered the water unfit to drink and productive of typhoid fever and other diseases. Because the facts of pollution were not fully proved, and because it appeared that the pollution might have resulted from the discharge of sewage by other cities, the case was dismissed without prejudice. At the close of the opinion the Court passed on the point made by Missouri, that Chicago, not being in the natural watershed of the Mississippi, should not be allowed to discharge its sewage into the Mississippi watershed. In rejecting Missouri's contention, the Court said (526):

> Some stress was laid on the proposition that Chicago is not on the natural watershed of the Mississippi, because of a rise of a few feet between the Desplaines and the Chicago Rivers. We perceive no reason for a distinction on this ground. The natural features relied upon are of the smallest. And if under any circumstances they could affect the case, it is enough to say that Illinois brought Chicago into the Mississippi watershed in pursuance not only of its own statutes, but also of the acts of Congress of March 30, 1822, c. 14, 3 Stat. 659, and March 2, 1827, c. 51, 4 Stat. 234, the validity of which is not disputed. *Wisconsin* v. *Duluth,* 96 U. S. 379. Of course these acts do not grant the right to discharge sewage, but the case stands no differently in point of law from a suit because of the discharge from Peoria into the Illinois, or from any other or all the other cities on the banks of that stream.

The substance of the ruling was that Chicago was brought into the Mississippi watershed by federally sponsored navigation projects and had as much right as Peoria or any other city on the banks of the Illinois River to discharge sewage into that river.

Since the decision in *Missouri* v. *Illinois,* Chicago has expanded geographically, so that a larger part of its population and an even larger portion of the area served by the Sanitary District now lies physically in the Mississippi watershed.

The Illinois and Michigan Canal, constructed pursuant to the Congressional Acts of March 30, 1822 and March 2, 1827, referred to in the *Missouri* case, has been superseded by The Sanitary and Ship Canal and its connections which constituted a link in the Illinois Waterway, completed with federal funds appropriated by the Rivers and Harbors Act of July 3, 1930. Thus, Chicago and the area served by the Sanitary District is located on two watersheds—

Great Lakes and Mississippi—and the construction of the Sanitary and Ship Canal and the Illinois Waterway, a Federal navigation project, permits a natural discharge into the Mississippi watershed of Lake Michigan water used for domestic purposes.

The Decree of April 21, 1930, Granted Injunctive Relief Compelling Reduction of the Diversion to a Point Where It Rests on a Legal Basis.

Upon consideration of the Special Master's Report, this Court sustained in part the contentions of the complainant states concurred in by New York. *Wisconsin* v. *Illinois*, 278 U. S. 367. The Court held that the Secretary of War had authority under the Rivers and Harbors Act of 1899 to permit diversion from the Great Lakes only in aid of navigation. Because of "great losses" suffered by the complainant states, including New York, from the direct diversion of 8,500 c. f. s., this Court ordered "the reduction of the diversion to a point where it rests on a legal basis." *Id.* at 409, 420. In recognition of the potential health hazards which might result if drastic reduction were ordered immediately, the Court again referred the matter to Special Master Hughes to recommend appropriate provisions for the decree. As contemplated by this Court, after the lapse of a "reasonable practicable time" during which defendants would provide alternative means of sewage disposal, there would issue "a final, permanent operative and effective injunction." *Id.* at 419.

In accord with the recommendations of the Special Master's Report on Re-Reference, this Court's final decree in 1930 outlined the program by which the direct diversion of water from Lake Michigan would be founded on a "legal basis" by December 31, 1938. *Wisconsin* v. *Illinois*, 281

U. S. 179. Although requiring defendants to take the measures necessary to permit the gradual reduction of their diversion from Lake Michigan, the Supreme Court, as shown above, expressly rejected the further contention of the Lake States that the defendants be precluded from withdrawing "domestic pumpage" without returning the sewage effluent to Lake Michigan.

The Amended Application for a Reopening of the Decree of 1930, Which Has Been Granted, Makes Substantially the Same Charges as Those Contained in the Proposed Supplemental and Amended Complaint and Seeks Substantially the Same Relief.

On November 3, 1958, the six complainant states, including New York, by an Amended Application, combined in an effort to secure a reopening of the final decree of this Court governing the rights of all parties to these proceedings since 1930.[5] Once again alleging substantial injuries to their navigational, commercial and recreational use of the Great Lakes, the complainants in the Amended Application filed in the October term, 1958 for a reopening of the decree of April 21, 1930 (pp. 9-10), charged that abstraction of water from Lake Michigan for domestic pumpage of the metropolitan area is in violation of their rights. In the prayer of the Amended Application the complainants ask, in part, that the State of Illinois and The Metropolitan Sanitary District of Greater Chicago "be forthwith restrained and enjoined from discharging any of the treated effluents emanating from its sewage and industrial treatment facilities into the Sanitary and Ship Canal * * *."[6]

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[5] Apart from an early interpretive order, the terms of the 1930 decree have been altered upon petition of the defendants only to permit a few temporary increases in diversion of an emergency nature. The emergency increases were severally limited in both time and amount. *Wisconsin* v. *Illinois,* 311 U. S. 107; 352 U. S. 945; 352 U. S. 983.

Special allegations were presented on behalf of New York to the effect that such Chicago's domestic pumpage and its discharge to the Mississippi River was also impairing the hydroelectric development of the Niagara and St. Lawrence Rivers. Similar allegations are contained in the proposed Supplemental and Amended Complaint which New York seeks to file.

In response to such allegations, Illinois and the Sanitary District maintained that their right to withdraw "domestic pumpage" from the Great Lakes was settled by the 1930 decree, in the absence of any substantial change in circumstances, and that a final decree should not be nullified in the guise of modification.[7] Furthermore, defendants urged that any subsequent developments such as New York's power projects must be held subject to the legal rights established by the 1930 decree. In any event, it was contended that the equitable considerations which persuaded the Court to reject the complainants' contention in 1930 were even more compelling after the lapse of 28 years.

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[6] On April 30, 1959 the complainants filed a motion to amend and enlarge the prayer of the Amended Application by adding subparagraphs thereto, as follows:

> "(3) (a) That if it should be determined by the Court through a Special Master, upon the investigation recommended by the Solicitor General, and upon full hearings, that measures other than the return to Lake Michigan of the Chicago domestic pumpage effluent can be put into effect so that such measures will reduce either the direct diversion or limit or restrict the Chicago domestic pumpage, to the end that the total amount of diversion of water from the Great Lakes at Chicago will be reduced or restricted, the Court should enter a supplemental decree, or a modified decree, to that effect.
>
> "(b) That the Court grant such other relief agreeable to and in accordance with equity and good conscience which will insure to the greatest possible degree the future integrity and development of the Great Lakes reservoir so that the maximum use and benefit of its waters be assured to the complainant States."

[7] Brief in Opposition to the Amended Application of the Complainants for a Reopening and Amendment of the Decree of April 21, 1930, and For Further Relief. *Wisconsin* v. *Illinois,* Nos. 2, 3 and 4 Original, O. T. 1958.

At the request of this Court, the Solicitor General submitted the view of the United States on the matter.[8] Stressing that the scope of the proceeding was "more limited than if it were an original application", the Solicitor General concluded that the complainant states had not demonstrated "any such substantial changes in circumstances as to require or justify the modification of the decree which they request."[9] Nevertheless, the Solicitor General recommended that a Special Master be appointed, "not to change the present decree as applied to the present facts", but to determine whether future developments may require the entry of a supplemental decree.[10]

The Supreme Court on June 29, 1959, directed that the Honorable Albert B. Maris be appointed Special Master to hold hearings and to submit such reports as he considered necessary. *Illinois* v. *Michigan*, 360 U. S. 712. Hearings pursuant to the Order of this Court commenced in Chicago on October 19, 1959.

Four months after such Order of Reference, complainant New York has complicated the case by its motion for leave to file in this Court the Supplemental and Amended Complaint now at issue.

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[8] Memorandum for the United States as *Amicus Curiae*, *Wisconsin* v. *Illinois*, Nos. 2-4, Original, O.T. 1958.

[9] *Id.* at 13-14. The Solicitor General supported this general statement by analysis of the various allegations of the complainant states referring to such matters as the current rate of domestic pumpage, changes in water levels, injuries to navigation, adequacy of sewage treatment, and the anticipated increase in defendants' "domestic pumpage."

[10] *Wisconsin* v. *Illinois*, Nos. 2-4, Original, O.T. 1958, at 31.

ARGUMENT.

I.

New York Should Not Be Allowed, After More Than Half a Century Without Complaint, to File a Supplemental and Amended Complaint Charging for the First Time That the Withdrawal of Water from Lake Michigan at Chicago for Domestic Purposes Without Returning the Effluent to the Lake Is in Violation of Its Sovereign and Proprietary Rights.

Until the filing of the Applications in the 1957 and 1958 Terms, in Causes Nos. 2, 3, and 4 Original, the complainants, including the State of New York, did not charge in their pleadings that the discharge of sewage effluent into the Sanitary and Ship Canal, instead of into Lake Michigan, was in violation of their rights. Only the direct diversion of water from Lake Michigan through the channels of the Sanitary District for the purpose of taking care of the sewage was challenged.

Alleging, as New York does now in its proposed Supplemental and Amended Complaint, that the direct diversion caused damage "to navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other enterprises, and to riparian property generally" (278 U. S. 367, 408), the complainants were successful in obtaining injunctive relief compelling a reduction of the direct diversion. The purpose of the diversion was partially "to oxidize and carry off this sewage." (281 U. S. 179, 199.)

In its motion for leave to file a supplemental and amended complaint, New York asserts (pp. 6-7) that changed facts and circumstances, consisting principally of hydroelectric power development on the Niagara and St. Lawrence Rivers and the St. Lawrence Seaway Project, have enhanced the damage suffered in 1926. In paragraph 13 of the proposed Supplemental and Amended Complaint it is alleged that "present diversion [*i. e.*, direct diversion] has been determined to be in violation of the sovereign and proprietary rights of the State of New York."[11] In paragraphs 21 and 35 it is alleged that any withdrawal or diversion of waters from the Great Lakes injures New York in its sovereign and proprietary capacities.

It is clear, defendants submit, that hydroelectric power development and the St. Lawrence Seaway project has not created a new cause of action for the State of New York. An increase in damages might be thrown into the scale of "relative suffering" (see 281 U. S. 179, 200) on a reopening of the decree in determining the relief to which the complainants might now be entitled under their original complaints as amended, filed in 1925 and 1926, but it does not justify the filing of a supplemental and amended complaint which sets up a new cause of action. *General Investment Co.* v. *Lake Shore & Michigan Southern Ry. Co.*, 260 U. S. 261, 281; *Schuckman* v. *Rubenstein*, 164 F. 2d 952, 958 (6th Cir., 1947), *cert. denied*, 333 U. S. 875.

In *Wisconsin* v. *Illinois*, 281 U. S. 179, the Court (p. 200) in considering whether the defendants should be required to return the sewage effluent to the Lake to obviate the necessity of any direct diversion (which was held to be a "wrong") stated that

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[11] This allegation is incorrect. The present direct diversion of 1500 c.f.s., in addition to domestic pumpage, is fixed by the decree of April 21, 1930 and "rests on a legal basis." *Wisconsin* v. *Illinois*, 278 U. S. 367, 420. New York apparently means that direct diversion, not in the interest of navigation, is a "wrong" (281 U. S. 179, 197). But the withdrawal of water for domestic use without returning it to the Lake has not been declared a wrong. It is precisely on this issue that the proposed Supplemental and Amended Complaint departs from the original complaint filed in 1926.

> "* * * the claims of the complainants should not be pressed to a logical extreme without regard to relative suffering and the time during which the complainants have let the defendants go on without complaint."

Between 1910 and 1923, intercepting sewers were constructed, at a cost of $109,021,613, to discharge all the sewage from the area into the main drainage canal instead of partially into Lake Michigan. Special Master's Report of November 23, 1927; *Wisconsin* v. *Illinois,* 278 U. S. 367, 404.

To carry out the provisions of the 1930 decree, the Sanitary District, prior to 1954, completed construction of vast sewage treatment projects, consisting of sewage treatment plants, intercepting sewers and sewage pumping stations, at a cost of $316,935,000.[12] This construction was ordered by the Court for the purpose "of avoiding the [direct] diversion in the future" and "to restore the navigable capacity of Lake Michigan to its proper level." *Wisconsin* v. *Illinois,* 278 U. S. 367, 420.

No criticism was made by the complainants of the sites selected for the sewage treatment plants. "The construction of outfall sewers or tunnels to take the effluents from the sewage treatment plants directly into Lake Michigan would mean the construction of sewers or tunnels from the West Side plant and the Southwest Side plant several miles across the City of Chicago to points on the Lake." Special Master's Report of December 17, 1929, pp. 133-134. Undoubtedly, sites nearer the Lake would have been selected had such criticism been made.

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[12] Hearings, Subcommittee of Senate Committee on Public Works on H. R. 3210, S. 1772, 84th Cong. Second Sess., pp. 18-19.

In 1932 the complainant Lake States applied to the Supreme Court for the appointment of a commissioner or special officer to execute the decree of April 21, 1930, because of the delay in the construction of the works and facilities embraced in the program envisaged by the 1930 decree. The Court in its opinion (289 U. S. 395, 401) referred to the program as the "restoration of the just rights of the complainants" (which did not include a return of pumpage to the Lake) and ordered (p. 411) Illinois to take all necessary steps to effectuate the reduction in diversion as provided in the 1930 decree. Thus the complainants, contrary to the position now taken, renewed their demand that vast sewage treatment works and facilities designed to meet the situation *caused by discharging the sewage effluent into the Canal be completed.* If the effluent were to be discharged into the Lake, the District would have been under no compulsion, by court decree or otherwise, except in the interests of its own people in the Chicago area, to undertake such a sewage treatment program as was required by the 1930 decree. To discharge the effluent into the Lake would have called for a different location of treatment plants and a different arrangement and type of outfall sewers.

The action of the Lake States in 1932 directed toward a speedy completion of the sewage treatment program, designed to discharge the effluent into the Canal, and the compliance of the District with the Court's order of 1933, augmented the equities previously found to lie in defendants' favor in the 1930 decision.

If the domestic pumpage were to be put back into Lake Michigan in the form of sewage effluent, the defendants' sewage disposal facilities would have to be rearranged, and new pumping stations, works and tunnels, extending miles out into Lake Michigan, would have to be constructed at tremendous cost, estimated by competent engineers to exceed 300 million dollars.[13]

Water levels, as reduced by the withdrawal of water for domestic pumpage and by direct diversion, were taken as normal for the Niagara and St. Lawrence hydroelectric power projects. The licenses issued to the Power Authority by the Federal Power Commission applied only to the water remaining in the Great Lakes after the authorized withdrawal and diversion of water at Chicago.[14]

Losses to American shipping resulting from a withdrawal of 1800 c.f.s., the present amount of domestic pumpage, has been estimated by the Corps of Engineers, United States Army, to be something under 600,000 tons annually, with about $660,000 value.[15]

By its Supplemental and Amended Complaint, New York would nullify in large part enormous expenditures incurred by the defendants in compliance with the 1930 decree, and would force the defendants, at staggering cost, to undo what they have done in their compliance with the decree. Such gross inequity should not be countenanced.

The ordinary rule of laches may be applied to a state when functioning in a proprietary capacity. *United States* v. *Midway Northern Oil Co.,* 232 Fed. 619, 631 (S. D. Cal., 1916); accord, *French Republic* v. *Saratoga Vichy Co.,* 191 U. S. 427, 438. As between sister states, the doctrine of quasi-estoppel may be invoked. *Missouri* v. *Illinois,* 200 U. S. 496, 520; accord, *Michigan* v. *Wisconsin,* 270 U. S. 295, 307-308; *New Mexico* v. *Texas,* 275 U. S. 279, 302. In asserting its sovereign and proprietary rights in its original Complaint filed in 1926, New York did not demand that Chicago's domestic pumpage, after being purified, be returned to the Lake, but demanded and obtained injunctive relief based on the assumption that Chicago's domestic pumpage could and would be discharged into the Sanitary Canal rather than Lake Michigan.

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[13] Memorandum for the United States as *Amicus Curiae,* filed April 14, 1959 in *Wisconsin* v. *Illinois,* p. 34.

[14] *Id.* at 19-23.

[15] *Id.* at 16.

The injunctive relief now sought by the proposed Supplemental and Amended Complaint is inconsistent with the relief sought and obtained by the decree of 1930. Under the doctrine of quasi-estoppel New York is estopped to assume a position, to defendants' prejudice, which is inconsistent with the position taken in its complaint filed in 1926. *Davis* v. *Wakelee,* 156 U. S. 680, 689.

Where one in whose favor a judgment is rendered accepts the benefits, he is estopped from questioning the validity of the judgment in any subsequent litigation. *Burgess* v. *Nail,* 103 F. 2d 37 (10th Cir., 1939); *Wilson* v. *Union Electric Light & Power Co.,* 59 F. 2d 580 (8th Cir., 1932).

II.

All Issues Properly Raised by the Proposed Supplemental and Amended Complaint May Be Heard in the Pending Reference, and New York Should Not Be Permitted to Litigate, De Novo, Issues Which Have Been Adjudicated.

Apart from its patent impropriety, New York's Supplemental and Amended Complaint raises no new legal or factual issues warranting an initial determination by the Special Master. Admitting that the allegations of its revised Complaint "are in fact already in issue" by virtue of the pleadings previously filed in this modification proceeding (Brief, p. 7), New York has failed to establish the "extraordinary" circumstances warranting interference by this Court with the pending proceedings before the Special Master. 5 Moore, Federal Practice, 2952 (2d ed. 1948).

The Amended Application for a reopening of the 1930 decree filed in Nos. 2, 3 and 4, Original, October Term, 1958, contains allegations similar to those set forth in the proposed Supplemental and Amended Complaint, and the prayer, as amended by the Motion for Leave to Amend, filed on April 30, 1958, seeks substantially the same relief. Whether the quantity of direct diversion of water from Lake Michigan through the channels of the Sanitary District is necessary, or whether the domestic pumpage is excessive, are proper subjects of inquiry in the reference to Special Master Maris pursuant to the opening ordered on June 29, 1959.[16]

Since all legitimate factual and legal issues may be fully reviewed by this Court upon consideration of the Special Master's Report, New York cannot be prejudiced by this Court's refusal to refer such an unwarranted pleading to the Special Master.[17] The lack of legitimate justification for New York's Supplemental and Amended Complaint thus documents the conclusion that the only apparent reason for this pleading is to bolster New York's solo effort to relitigate *de novo* settled legal issues.

But New York cannot escape the provisions of the 1930 decree affirming Chicago's basic legal right to withdraw water for domestic pumpage from Lake Michigan without returning the sewage effluent to the Lake, as settled by this Court in *Missouri* v. *Illinois,* 200 U. S. 496, 526, and *Wisconsin* v. *Illinois,* 281 U. S. 179, 200. This issue is not subject to *de novo* consideration at the current stage of this protracted litigation. Whether a decree is final or interlocutory, it is conclusive as to all rights, questions or facts put in issue and actually adjudicated. *Wyoming* v. *Colorado,* 286 U. S. 494, 506-07; *Southern Pacific R. R. Co.* v. *United States,* 168 U. S. 1. As shown above, the question of returning Chicago's pumpage to Lake Michigan arose incidentally in the 1929 hearings, although not by the pleadings, and an adjudication was made that the demand was unreasonable. *Wisconsin* v. *Illinois,* 281 U. S. 179, 199-200. As emphasized by the Solicitor General but a few months ago in assessing complainants' application, the only issue in a modification proceeding is whether the complainant states can document such a substantial change in circumstances as to require or justify the modification of the decree under traditional equitable principles.[18]

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[16] Nor does this Court's 1927 opinion require any broader investigation. New York has sufficient opportunity within the meaning and intent of the 1927 opinion to "litigate" the issues raised by alleged injury to the hydroelectric development of the St. Lawrence and Niagara Rivers by presenting such facts as changed circumstances justifying modification of the 1930 decree.

[17] New York itself recognizes the impropriety of its pleading by declaring that the issue pertaining to its rights in the flow of the St. Lawrence and Niagara Rivers is one of law "which could more properly be reviewed by this Court following a full development of the facts on the hearings before the Special Master" (Brief, p. 8).

New York certainly cannot circumvent the inherent limitations of this Court's Order of Reference by the filing of a so-called Supplemental and Amended Complaint challenging afresh the settled issue of "domestic pumpage" and generally modernizing its case. For the Order of Reference has vested in the Special Master the initial responsibility for deciding whether the provisions of the 1930 decree should be modified in light of the evidentiary showing to be mustered by the complainants. Perhaps in recognition of its inability to meet the standards of proof required in the conventional modification proceeding contemplated by the Order of Reference, New York resorts to procedural legerdemain to improve its case before the

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[18] To protect the finality of prior determinations, the decisions of this Court indicate that the inherent powers of a court of equity to modify its injunctions are exercised sparingly. *United States* v. *Swift & Co.,* 286 U. S. 106, 114, 119.

Special Master.[19] For by attempting to file its Supplemental and Amended Complaint, New York solicits from this Court the very determination as to legal sufficiency which the Master was designated to make in the first instance after full consideration of complicated legal and factual issues. *Cf. Alabama* v. *Texas,* 347 U. S. 272; *Alabama* v. *Arizona,* 291 U. S. 286, 291-92.

Accordingly, New York's premature effort to influence the proceedings before the Special Master contrary to this Court's Order of Reference should be rejected.

III.

A Supplemental and Amended Complaint Cannot Serve as a Procedural Device to Reopen Legal Issues Resolved by the Entry of a Decree.

The filing of New York's Supplemental and Amended Complaint twenty-nine years after the entry of judgment is a procedural device neither authorized nor contemplated by established equity precepts or Rule 15(d) of the Federal Rules of Civil Procedure.

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[19] Such a change in strategy was perhaps stimulated by the conclusion of the United States that, apart from "the question of water power at the Niagara and St. Lawrence Rivers [the complainant states] do not show that circumstances have changed in any way at all." Memorandum for the United States as *Amicus Curiae,* p. 14, *Wisconsin* v. *Illinois,* Nos. 2-4 Original, O.T. 1958.

New York's new tactics are of a piece with its novel assertion before the Special Master that established equitable doctrines are inapplicable to the pending modification proceeding. Memorandum, Lake States' Reply to Defendants' "Statement of Fact Issues" (undated). According to New York and the other complainant states, the limitations of the *Swift* rule apply only when modification of a judicial decree is sought by "the wrongdoer or defendant party." *Id.* at 2. In light of the several unsuccessful efforts of the United States as plaintiff to secure modification of judicial decrees, this contention is clearly untenable. *Hughes* v. *United States,* 342 U. S. 353; *Ford Motor Co.* v. *United States,* 335 U. S. 303.

Supplemental complaints are traditionally utilized to facilitate consideration of all relevant matters *prior to* judicial decision rather than to impeach a decree. Thus supplemental complaints may be permitted within the discretion of the Court to introduce developments occurring subsequent to the filing of the original complaint which may justify other or further relief with respect to the subject matter pending before the Court. *General Investment Co.* v. *Lake Shore & Michigan Southern Ry. Co.*, 260 U. S. 261, 280-82; *Missouri* v. *Illinois*, 200 U. S. 496, 517. This fundamental purpose is reflected in Rule 15(d) of the Federal Rules of Civil Procedure, applicable generally to original actions in this Court.[20] 3 Moore, Federal Practice 857 (2d ed. 1948). In accord with this underlying rationale, the filing of a supplemental pleading was recently permitted by this Court in the early stages of an original action when such procedure was considered conducive to "the just, orderly, and effective determination" of the issues to be litigated. *United States* v. *Louisiana*, 354 U. S. 515, 516.

After a case culminates in a decree, the judgment rather than the original pleadings governs the rights of the parties. *Cf. Wisconsin* v. *Pelican Ins. Co. of New Orleans*, 127

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[20] Federal Rule of Civil Procedure 15(d):

> "Upon motion of a party the court may, upon reasonable notice and upon such terms as are just, permit him to serve a supplemental pleading setting forth transactions or occurrences or events which have happened since the date of the pleading sought to be supplemented. If the court deems it advisable that the adverse party plead thereto, it shall so order, specifying the time therefor."

Rule 9(2) of the Revised Rules of the Supreme Court of the United States:

> "The form of pleadings and motions in original actions shall be governed, so far as may be, by the Federal Rules of Civil Procedure, and in other respects those rules, where their application is appropriate, may be taken as a guide to procedure in original actions in this court."

U. S. 265, 293. Relief departing from the provisions of a final decree must be sought by "some form of original proceeding" setting forth a new and valid cause of action or acceptable grounds for modification of the decree as entered. *Mackall* v. *Richards,* 116 U. S. 45, 48.[21] A litigant cannot ignore prior judicial dispositions by filing a supplemental pleading stating a more attactive case. *Cf. First Nat. Bank* v. *American Surety Co.,* 148 F. 2d 654 (4th Cir. 1945). Indeed, even in the absence of a final decree, this Court more than one hundred years ago rejected as "made at too late a period" a supplemental complaint tendered after the case had been argued and taken under advisement by the court. *Snead* v. *McCoull,* 53 U. S. 407, 422.[22]

These elemental tenets of judicial administration, controverted only by New York out of fourteen litigants, bar New York from filing a supplemental complaint twenty-nine years *after* the entry of a decree in order to revive a legal issue which this Court's decree for decades has put to rest.

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[21] Seizing on the common use of the word "supplemental", New York seeks to support its extraordinary use of a supplemental complaint by reliance on authorities sustaining the unchallenged power of a court to *enforce* the provisions of a prior decree by means of a "supplemental bill" (Brief, p. 6). The irrelevance of such cases is demonstrated by the fact that New York does not and cannot allege any violation of the 1930 decree by defendants necessitating an enforcement proceeding in this Court. Yet such allegation was the *sine qua non* in the precedents cited by New York. *E. g., Independent Coal & Coke Co.* v. *United States,* 274 U. S. 640, 650; *Connett* v. *City of Jerseyville,* 96 F. 2d 392, 396-97 (7th Cir., 1938)

[22] More recently, this Court reversed a judgment of a lower court, with leave to file a supplemental pleading, indicating that such a pleading might have been appropriate below "[i]f the original decree in the trial court had not been entered." *Texarkana* v. *Arkansas Gas Co.,* 306 U. S. 188, 203. In *Virginia* v. *West Virginia,* 234 U. S. 117, this Court permitted a supplemental answer bearing on the single issue of the amount of money due Virginia from West Virginia, stressing that on two previous occasions the Court had refused motions by Virginia to proceed to a final decree. *Id.* at 119-120. Similarly, under Rule 15(d), as interpreted by the lower courts, supplemental pleadings are inappropriately presented where the court has "terminated the litigation." *Brill* v. *General Industrial Enterprises,* 234 F. 2d 465, 470 (3d Cir., 1956); *Ebel* v. *Drum,* 55 F. Supp. 186, 188-89 (D. Mass., 1944).

IV.

Reference of New York's Particularistic and Defective Pleading to the Special Master Serves No Legitimate Purpose and Can Only Impede the Expeditious Conduct of the Proceeding Below.

Actually, referral of New York's Supplemental and Amended Complaint to the Special Master can only disrupt the efficient progress of the hearings below affecting the vital interests of thirteen sovereign litigants. Pursuant to the authority entrusted to him by this Court, the Special Master has already entered an order formulating the factual and legal issues raised by the pleadings previously filed by the complainant states and defendants.[23] Any superimposition on such formulation by referral of this Supplemental and Amended Complaint can only divert the hearings below from the course charted by the Master under this Court's referral order of June 29, 1959.

Moreover, if New York's petition has merit, the other thirteen litigants in these proceedings who to date have abided by more conventional legal procedures could well follow New York's example and file similar documents to modernize their original pleadings. In turn, updated responsive pleadings would appear in order.[24] Such repeated applications to this Court during the hearings now under way before the Special Master would only "tend to defeat the very purpose of reference" and thus stultify this Court's considered disposition of these proceedings last June. 5 Moore, Federal Practice 2951 (2d ed. 1948).

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[23] Pre-Hearing Order (Oct. 20, 1959). This further demonstrates the specious nature of complainant's argument that the Supplemental and Amended Complaint is necessary to present "the issues in conformity with the rules of the Court." (Motion, p. 2.)

[24] Certainly, defendants desire to file a Supplemental and Amended Answer in response to New York's revised Complaint if this Court grants New York's motion for leave to file its Supplemental and Amended Complaint.

In short, absent any present necessity for interference by this Court with the proceedings before the Special Master prior to the filing of his Report, reference of New York's unauthorized pleading can only obstruct such proceedings and subvert this Court's recent Order of Reference.

CONCLUSION.

By filing a Supplemental and Amended Complaint twenty-nine years after the issues were merged into a decree, New York seeks to inject a new issue and overturn an adjudication made in 1930. This unorthodox procedural device, employed by one out of fourteen parties not only impeaches this Court's Order of Reference, but would complicate and confound the expeditious conduct of the pending hearings before the Special Master.

Accordingly, the State of Illinois and The Metropolitan Sanitary District of Greater Chicago respectfully submit that New York's Motion for Leave to File a Supplemental and Amended Complaint be denied.

Respectfully submitted,

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1959

No. 4 Original

STATE OF NEW YORK,
Complainant,
against

STATE OF ILLINOIS and SANITARY DISTRICT
OF CHICAGO,
Defendants.

REPLY BRIEF IN SUPPORT OF MOTION BY THE STATE OF NEW YORK FOR LEAVE TO FILE A SUPPLEMENTAL AND AMENDED COMPLAINT

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New York v. *Illinois*, 289 U. S. 395 (1933) 10

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Statement

The defendants' brief in opposition to complainant's motion for leave to file a supplemental and amended complaint makes three principal contentions:

(1) That the filing of the supplemental and amended complaint would occasion delay of the trial before the Special Master;

(2) That the supplemental and amended complaint would, *for the first time,* inject in the case the issue of the disposal of the effluent from Chicago's domestic pumpage by the Metropolitan Sanitary District of Greater Chicago, and

(3) That a supplemental and amended complaint is not procedurally proper, and that the Amended Application to reopen the decree contains all of the allegations which the State of New York seeks to present.

The foregoing arguments make this reply brief necessary to emphasize:

(1) That no delay will be occasioned by the filing of the supplemental and amended complaint;

(2) That the issue of the disposal of domestic pumpage effluent was originally raised in New York's 1926 Bill of Complaint, was again raised in the complainant's 1958 Amended Application to reopen the decree, and has already been referred to the Special Master by this Court. The defendants are now actually attacking the propriety of that referral; and

(3) That the defendants' argument as to the procedural propriety of the supplemental and amended complaint distorts the prior history of this action, the procedural cases in point previously cited by this complainant, and the complainant's purpose in filing the supplemental and amended complaint. Complainant's real purpose is to present its contentions in a single up-to-date pleading in proper form, to insure that under the present reference there may be a final and complete resolution of this serious controversy which has now been continuing for over thirty years.

I.

The supplemental and amended complaint would cause no delay in this proceeding.

Since the filing of this complainant's prior brief in support of the motion, hearings with regard to Original Nos. 2, 3, 4 and 12 have proceeded with all possible dispatch before Special Master Maris in Chicago. The State of Illinois, plaintiff in No. 12, has completed its direct case relating to No. 12, subject only to certain further cross-examination. State of New York as complainant in No. 4 and defendant in No. 12 has presented the testimony of four witnesses relevant to both cases.

Hearings are presently in recess and are scheduled to resume on February 3, 1960, at which time there will be such further cross-examination, an extensive examination, relative to all of the cases, of an official representative of the Corps of Engineers called as the Court's witness, and presentation of certain witnesses by the defendants in No. 12. The Special Master has stated that following the completion of that session sometime in February the hearings will reconvene on March 7, 1960, at which time the State of New York will offer certain evidence of the damage caused by the existing diversion at issue in Nos. 2, 3 and 4, and which would be caused by the new proposed diversion at issue in No. 12, both to hydroelectric plants on the St. Lawrence and Niagara Rivers and to recreational interests of the State of New York.

It may be noted that this complainant's proposed supplemental and amended complaint raises no issue not previously raised by the Amended Application to reopen the decree and referred to the Special Master by this Court's order of June 29, 1959, which granted such Amended Application. This fact was conceded by the defendants' brief (pages 11-13).

In contrast, the United States of America has made a motion to intervene in Nos. 2, 3, 4 and 12, and has filed, as Petitions of Intervention, two new pleadings. These new pleadings raise completely new issues, e.g., the rights of the United States with relation to Indian and other Federal reservations, the rights of the United States with relation to pollution of interstate waters and the rights of the United States with relation to maintenance of friendly relations with Canada. Nevertheless, this complainant, which will not oppose such intervention, assumes that such intervention will be granted. Nor does it appear to this complainant that injection of such new pleadings of the United States would delay the hearings.

Reference to the Special Master of the supplemental and amended complaint creating no issues not previously referred to him could not conceivably delay the proceedings. On the contrary, availability of a single document setting forth the State of New York's present contentions with regard to Original No. 4 would rather tend to expedite the hearings and other proceedings in these actions and make it unnecessary for the parties (including the new party, the United States of America), the Court, and the Special Master to refer to an outmoded Bill of Complaint together with the Amended Application to reopen.

II.

Objections to diversions of domestic pumpage have been previously presented in this proceeding and this Court has adjudicated that defendants have no lawful right to make such diversions.

Defendants make inconsistent and contradictory assertions that the issue of the right of defendants to divert the effluent from domestic pumpage out of the Great Lakes watershed had never previously been presented in this action, and also that such previously unraised issue has been decided in favor of defendants. Both assertions are baseless.

This issue was clearly raised in New York's original Bill of Complaint of 1926, and again by the complainants' Amended Application of 1958 for reopening of the decree of April 21, 1930. Paragraph III A (p. 5) of the Amended Application stated that

> "We [the complainants] do not question the right to use the water that is the so-called domestic pumpage *provided it is then returned to the Great Lakes basin.*" (Italics supplied.)

Paragraph VIII of such Amended Application, speaking specifically of the diversion of domestic pumpage, stated in part

> "Such diversion of the waters of the Great Lakes system is in violation of the rights of complainants, and is causing extensive, substantial and continuing damages to the complainant states and their peoples.
>
> "Such diversion is not necessary for the purposes of disposing of the sewage of the Chicago area. Nor is it necessary for the protection of the water supply of the Chicago area and the health of the people of the Chicago area.
>
> "Other Great Lakes communities that take their water supply from the Great Lakes or their connecting channels return such water, after use, to the lake or watercourse from which it was obtained * * *"

Paragraph IX alleges that

> "Cessation of the diversion by the defendants of the waters of the Great Lakes—St. Lawrence system, as domestic pumpage, will not injure or impair the health of the people of the Chicago area or the navigability of the Port of Chicago, or of the Chicago Drainage Canal, or of the Illinois Waterway. (See Par. XIII, infra)"

In paragraph X of the Amended Application, the complainants itemize the damage

> "caused by defendants' action in diverting the waters of the Great Lakes—St. Lawrence system as domestic pumpage through the Sanitary District Canal * * *"

In paragraph XIII of the Amended Application complainants

> "allege that no diversion as 'domestic pumpage' is necessary for navigational purposes and demand a cessation of diversion of water for 'domestic pumpage' from the Great Lakes Basin."

In paragraph XIV,

> "In further support of their allegation that no water should be diverted and permanently abstracted from the Great Lakes Basin for 'domestic pumpage', complainants allege that it is possible and feasible to return the effluent from the Sanitary District's treatment plants to Lake Michigan without endangering the domestic water supply taken from said lake by the City of Chicago and other municipalities * * * [detailing the basis for such allegation]. * * *"

Finally, in the Prayer for Relief, the complainants prayed:

> "(1) That the State of Illinois and the Metropolitan Sanitary District of Greater Chicago be forthwith restrained and enjoined from discharging any of the treated effluents emanating from its sewage and industrial treatment facilities into the Sanitary and Ship Canal, and that said State of Illinois and the Metropolitan Sanitary District of Greater Chicago be required by mandatory injunction of

> this Court to return all of said effluent to the Great Lakes Basin from which it originally came in the form of 'domestic pumpage,' the aforesaid injunctions to be made effective at such times and under such terms as to this Court shall seem meet and just.
>
> (2) That if such decree is not made forthwith, a Special Master be appointed to take testimony and evidence with respect to the issues contained in this petition and to report with respect to the time, method, and manner in which the State of Illinois and the Metropolitan Sanitary District of Greater Chicago shall comply with Paragraph (1) of this prayer, and with respect to whether the Court should appoint a Permanent Master invested with such authority as he may require for the purpose of maintaining surveillance over the operation of the sewers, interceptors, and other sewage and water collecting facilities and the sewage disposal and industrial treatment plants and works operated by the Metropolitan Sanitary District of Greater Chicago."

The defendants' refusal, at pages 14-19 of their brief, to recognize that the issue of return of domestic pumpage to Lake Michigan was encompassed by the Amended Application seems particularly odd in view of the fact that they did recognize such issue at pages 11-13 of the same brief, and also when they filed their brief in opposition to the Amended Application. Point III of that brief is entitled

> "The Equitable Considerations Which Caused this Court in 1930 to Reject Complainants' Demand for the return of Domestic Pumpage to Lake Michigan Are More Compelling Today."

Obviously the defendants are merely using the present motion to attempt to reargue contentions previously made by them and rejected by this Court when it granted the Amended Application. The complainants in the Amended Application specifically demanded return to Lake Michigan of the domestic pumpage effluent; that is one of the issues now before the Special Master, and the proposed supplemental and amended complaint could not delay the proceeding merely by pleading the same issue in a more formal document.

Furthermore, as previously noted, this issue was raised long prior to the Amended Application, and in fact was first raised by this complainant in Paragraph III of the original 1926 Bill of Complaint. Paragraph III stated in part:

> "The order of precedence in the use of the waters of this [Great Lakes] waterway is (i) domestic and sanitary purposes in the ordinary, reasonable and generally approved manner in the use of water for such purposes, *after which use water so used must be returned to the stream from which it is taken;* (2) navigation; (3) development of power and other legitimate uses. * * * The right to the use of this water for the development of power is a property right of the State of New York and its citizens, which property right neither the defendants nor the Congress of the United States has a right to destroy or impair by abstracting or diverting water from Lake Michigan or any other part of the Great Lakes and St. Lawrence waterway into the Mississippi waterway." (Italics supplied.)

The prayer for relief of such Bill of Complaint prayed for an injunction.

> "* * * restraining the defendants and each of them and each of their officers, agents or servants from taking or causing to be taken, *any water whatever* from Lake Michigan and its natural tributaries in

> such manner as to permanently divert the same from the said lake and said watershed." (Italics supplied.)

This Court at 274 U. S. 488 struck paragraph III from the complaint on the ground that the paragraph

> "apparently proceeds on the theory that the diversion may interfere with or prevent the use of the waters of the Niagara and St. Lawrence Rivers by the plaintiff State and her citizens for the development of power."

Since there was not at that time any such hydroelectric use or project for such use, the Court held the paragraph to present only abstract questions, and ordered the paragraph stricken

> "without prejudice, so that the plaintiff State, if later on in a position to do so, may be free to litigate the questions which the paragraph is intended to present."

The issues raised by old Paragraph III have now become concrete by virtue of the completion of the St. Lawrence power project and the present construction of the Niagara power project. With the realization of those projects, it is now possible to restate the issues alleged in old Paragraph III with a degree of specificity and detail not possible in 1926. This Court in striking old Paragraph III clearly intended to allow the complainant, when in a position to do so, to litigate the questions there intended to be presented under an up-to-date, complete and specific pleading.

The defendants' attempt to argue the legal merits of the domestic pumpage issue is not germane to the present motion; however it would seem desirable to correct the defendants' erroneous statements in this regard. The Court did not decide that defendants had a right to permanently divert domestic pumpage; to the contrary, it decided that such a diversion was in violation of the complainants' legal rights.

While the Court did not in 1930 enjoin the diversion of the domestic pumpage of the City of Chicago, this action of the Court was based on practical considerations of hardship, and not on any legal right of the defendants. In arguing to the contrary, defendants choose to confuse or ignore the dual aspects of an equity decision, which must deal with both right and remedy.

In deciding this case, this Court was required to determine wherein lay the *legal rights* to the use of the flow of the Great Lakes watershed, and the Court determined such *legal rights* adversely to the defendants in its decisions at 278 U. S. 367 and 281 U. S. 179. However, in providing the *equitable remedy* the Court could not give immediate and complete realization of the legal rights because of considerations of relative suffering as they existed at that time.

As was stated by this Court in *New York* v. *Illinois* at 289 U. S. 395, 405,

> "The decision was that this wrong [to the complainants] must be stopped. It was not stopped at once merely because of the plight of the residents of Chicago and the adjacent area, in whose interest time was sought to provide works and facilities for sewage disposal. The Court fittingly recognized this exigency."

This Court's opinions make clear that any diversion other than for the purposes of maintaining navigation was illegal, the Court stating:

> "And insofar as the prior diversion was not for the purposes of maintaining navigation in the Chicago River it was without any legal basis, because made for an inadmissible purpose. It therefore is the duty of this Court by an appropriate decree to compel the reduction of the diversion to a point where it rests on a legal basis, and thus to restore the navigable capacity of Lake Michigan to its proper level."
>
> (*New York* v. *Illinois,* 278 U. S. 367, 420.)

That the Court specifically recognized the lack of any legal right of the defendants to permanently divert domestic pumpage from the Great Lakes is further apparent from the terms of the decree itself (281 U. S. 696). The decree enjoins the defendants, their employees and their agents, and all persons assuming to act under the authority of either of them, from diverting any of the waters of the Great Lakes—St. Lawrence system or watershed in excess of certain prescribed quantities. The Court for the time being excepted Chicago domestic pumpage from this prohibition, but did not except any other Illinois domestic pumpage. In prohibiting the diversion of any domestic pumpage other than that of the City of Chicago, the decree recognized the fact that all permanent diversions of domestic pumpage are without legal basis.

However, as with the direct diversion which was also adjudicated to be without legal basis, the Court could not in the remedial aspect of the decree give immediate and full realization of the plaintiff's rights in view of the practical considerations as they existed at that time.

> "They [the complainant States] also argue that what is called the domestic pumpage after being purified in the sewage works be returned to the Lake. These demands seem to us excessive *upon*

> *the facts in this case.*" (281 U. S. 199) (Italics supplied.)

The Court went on to say (p. 200):

> "If the amount withdrawn should be excessive, it will be open to complaint."

The Court, moreover, specifically left the decree open and retained jurisdiction for applications "for any other or further action or relief" (281 U. S. 696, 698).

Very clearly, this decision in regard to the remedy was on the facts as they existed at the time, and was subject to modification when, as complainant now alleges is the case, the full restoration of complainant's rights is practically feasible without undue hardship to the defendants.

It may be further noted that the Court nowhere approved of Special Master Hughes' legal conclusions, so extensively quoted in defendants' brief. In this instance as in the basic decision (278 U. S. 367), the Court completely accepted Special Master Hughes' factual determinations while rejecting his legal recommendations.

III.

The supplemental and amended complaint is procedurally proper.

Contrary to the implication in defendants' Point IV, complainant is not seeking to file a supplemental and amended complaint in order to state "a more attractive case." No new issues are presented in the supplemental and amended complaint which have not been presented by the Amended Application. The supplemental and amended complaint was presented, as was pointed out in the motion and in the prior brief in support thereof, as a procedurally proper method of putting the pleadings in order pursuant to the Federal Rules of Civil Procedure, which Federal Rules the Rules of this Court make applicable to original actions. Complainant seeks thereby to avoid any claim by the defendants at some future date that the issues presented in the Amended Application were not presented by a proper pleading.

Further, defendants again confuse the legal right and the equitable remedy. A supplemental bill after a final decree might be improper if a complainant thereby sought modification of the legal rights previously adjudicated. This complainant seeks no such modification, since the legal rights have already been decided completely in its favor.

However, as pointed out in the prior brief in support, a supplemental and amended complaint (as the modern equivalent under the Federal Rules of Civil Procedure to the old supplemental bill in equity), is an approriate procedural method of presenting to the Court events which have occurred since the decree and which make further relief necessary and proper to protect the legal rights of the parties.

In the instant case, changes in circumstances occurring since the 1930 decree have changed the considerations of "relative suffering" which at that time prevented full and immediate restoration of the complainants' rights. These changes consist both in an increase of the injury to the complainants from diversion of domestic pumpage and of it now being practicable, without any undue suffering, for defendants to return treated sewage effluent to Lake Michigan. The supplemental and amended complaint points out, as did the Amended Application, that such changed circumstances require a more complete restoration of the complainants' rights than was practically possible in

1930; such procedure would be proper even if the decree had not been expressly left open to application for further relief.

Contrary to defendants' statement (brief, page 24 fn. 21), an allegation that an original decree was violated is not a *sine qua non* to a supplemental bill, and *Connett v. City of Jerseyville*, 96 F. 2d 392 (7th Cir. 1938), inexplicably cited by defendant in support of that assertion, clearly indicates the contrary. In that case the original decree ordered foreclosure and sale for the benefit of creditors of a municipal water system. No buyers having been found on the foreclosure sale, the supplemental decree following the supplemental bill required that the municipality raise its water rates. Nowhere does it appear in that case that anyone violated the original foreclosure decree. It is plain that there, as here, a supplemental bill was used where the original decree, even though it had been carried out so far as its terms went, failed to restore the rights which the Court had adjudicated resided in the plaintiffs. If the failure to restore plaintiff's rights were caused by contempt of the decree, the obvious remedy would be not a supplemental complaint, but rather a motion to punish for contempt. New York is not at this time making such motion.

CONCLUSION

The defendants have not shown any reason why this complainant should not be allowed to file a supplemental and amended complaint, which by presenting to the Court in a single, up-to-date pleading the issues raised by the Amended Application and the prior pleadings herein will expedite a final and complete disposition of this action.

Respectfully submitted,

Louis J. Lefkowitz,
Attorney General of the State of New York,

Paxton Blair,
Solicitor General of the State of New York,

Richard H. Shepp,
Assistant Attorney General of the State of New York,

Randall J. Le Boeuf, Jr.,
Special Assistant Attorney General of the State of New York.

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Nos. 2, 3 and 4, Original.

Office-Supreme Court,
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JAN 11 1960
JAMES R. BROWNING,

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,
Intervening Defendants.

STATE OF MICHIGAN,
Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.
Defendants.

SUGGESTION OF CHANGE IN NAME OF DEFENDANT SANITARY DISTRICT OF CHICAGO.

WILLIAM C. WINES,
Assistant Attorney General,
State of Illinois,

LAWRENCE J. FENLON,
Principal Assistant Attorney,
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District of Greater Chicago,

PETER G. KUH,
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THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

No. 2, Original.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,

Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,

Intervening Defendants.

No. 3, Original.

STATE OF MICHIGAN,

Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

No. 4, Original.

STATE OF NEW YORK,

Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

Defendants.

SUGGESTION OF CHANGE IN NAME OF DEFENDANT SANITARY DISTRICT OF CHICAGO.

THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO respectfully suggests to the Court that the General Assembly of the State of Illinois, by an Act approved

June 30, 1955 (L. 1955, p. 677; Ill. Rev. Stat. 1959, Chap. 42, Sec. 322), authorized the Board of Trustees of the Sanitary District of Chicago, by ordinance and public notice, to change its name without impairing the legal status of acts theretofore performed by the district.

Pursuant to said Act, the Sanitary District of Chicago, a defendant herein, by an ordinance adopted on October 13, 1955 [Journal of Proceedings, p. 677], after due public notice, changed its name from the Sanitary District of Chicago to The Metropolitan Sanitary District of Greater Chicago.

Wherefore, this defendant, formerly the Sanitary District of Chicago, suggests to the Court that hereafter it be identified in these causes as The Metropolitan Sanitary District of Greater Chicago and that henceforth it be so named as a party defendant herein.

Grenville Beardsley,
Attorney General, State of Illinois,

William C. Wines,
Assistant Attorney General,
State of Illinois,

George A. Lane,
Attorney, The Metropolitan Sanitary
District of Greater Chicago,

Lawrence J. Fenlon,
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Peter G. Kuh,
Senior Assistant Attorney, The Metropolitan Sanitary District of Greater
Chicago,

Joseph B. Fleming,
Joseph H. Pleck and
Thomas M. Thomas,
Special Assistant Attorneys General,
State of Illinois,
Attorneys for Defendants.

January, 1960.

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JAN 11 1960
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Nos. 2, 3 and 4, Original.

IN THE

Supreme Court of the United States

October Term, 1959.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA,
Complainants,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

STATES OF MISSOURI, KENTUCKY, TENNESSEE, LOUISIANA, MISSISSIPPI, AND ARKANSAS,
Intervening Defendants.

STATE OF MICHIGAN,
Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO.
Defendants.

CONSENT OF THE STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO INTERVENTION BY THE UNITED STATES OF AMERICA.

WILLIAM C. WINES,
Assistant Attorney General,
State of Illinois,

LAWRENCE J. FENLON,
Principal Assistant Attorney,
The Metropolitan Sanitary District of Greater Chicago,

PETER G. KUH,
Senior Assistant Attorney,
The Metropolitan Sanitary District of Greater Chicago,

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Chicago 1, Illinois,
Special Assistant Attorneys General,

Attorneys for Defendants.

THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

No. 2, Original.

STATES OF WISCONSIN, MINNESOTA, OHIO AND
PENNSYLVANIA,
Complainants,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF
CHICAGO.

STATES OF MISSOURI, KENTUCKY, TENNESSEE,
LOUISIANA, MISSISSIPPI, AND ARKANSAS,
Intervening Defendants.

No. 3, Original.

STATE OF MICHIGAN,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF
CHICAGO.

No. 4, Original.

STATE OF NEW YORK,
Complainant,
vs.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF
CHICAGO.
Defendants.

CONSENT OF THE STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO INTERVENTION BY THE UNITED STATES OF AMERICA.

Subject to the approval of the Court, the State of Illinois and The Metropolitan Sanitary District of Greater Chicago, defendants in the above-entitled causes, hereby consent to the intervention by the United States of America as a party to these causes and to the filing of its petition of intervention submitted with its motion for leave to intervene herein.

In consenting to such intervention, these defendants neither admit nor deny any allegation of fact or conclusion of law contained in said petition; neither do they waive any of their rights.

GRENVILLE BEARDSLEY,
Attorney General, State of Illinois,

WILLIAM C. WINES,
Assistant Attorney General,
State of Illinois,

GEORGE A. LANE,
Attorney, The Metropolitan Sanitary District of Greater Chicago,

LAWRENCE J. FENLON,
Principal Assistant Attorney, The Metropolitan Sanitary District of Greater Chicago,

PETER G. KUH,
Senior Assistant Attorney, The Metropolitan Sanitary District of Greater Chicago,

JOSEPH B. FLEMING,
JOSEPH H. PLECK and
THOMAS M. THOMAS,
Special Assistant Attorneys General,
State of Illinois,
Attorneys for Defendants.

January, 1960.

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JAMES R. BROWNING, Clerk

IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1959

Nos. 2, 3, 4 and 12, Original

STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK,

Complainants,

v.

STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,

Defendants.

STATE OF ILLINOIS

Complainant,

v

STATES OF MICHIGAN, OHIO, PENNSYLVANIA, MINNESOTA, NEW YORK AND WISCONSIN

Defendants.

CONSENT OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK TO INTERVENTION BY THE UNITED STATES OF AMERICA

STATE OF WISCONSIN
John W. Reynolds
Attorney General
Roy Tulane
Assistant Attorney General

STATE OF MINNESOTA
Miles Lord
Attorney General
Raymond A. Haik
Special Assistant Attorney General

STATE OF OHIO
Mark McElroy
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Jay Flowers
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HERBERT H. NAUJOKS
Special Assistant to the Attorneys General

COMMONWEALTH OF PENNSYLVANIA
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Paul L. Adams
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Solicitor General
Nicholas V. Olds
Assistant Attorney General

STATE OF NEW YORK
Louis J. Lefkowitz
Attorney General
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Solicitor General
Richard H. Shepp
Assistant Attorney General
Randall J. LeBoeuf, Jr.
Special Assistant Attorney General

SPEAKER-HINES AND THOMAS, INC., LANSING, MICH.—1960

IN THE SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1959

Nos. 2, 3 and 4, Original

STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK,
Complainants,
v.
STATE OF ILLINOIS AND THE SANITARY DISTRICT OF CHICAGO,
Defendants.

No. 12, Original

STATE OF ILLINOIS,
Complainant,
v.
STATES OF MICHIGAN, OHIO, PENNSYLVANIA, MINNESOTA, NEW YORK AND WISCONSIN,
Defendants.

CONSENT OF THE STATES OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK TO INTERVENTION BY THE UNITED STATES OF AMERICA

The States of Wisconsin, Minnesota, Ohio, Pennsylvania, New York and Michigan hereby state that they have no objections, subject to the approval of the Court, to the intervention by the United States of America as a party to these causes and to the filing of its petition to intervene submitted with its motion for leave to intervene herein:

and also reserve the right in due course to file their joint or individual answers to said petition.

Respectfully submitted,

STATE OF WISCONSIN
John W. Reynolds
Attorney General
Roy Tulane
Assistant Attorney General

STATE OF MINNESOTA
Miles Lord
Attorney General
Raymond A. Haik
Special Assistant Attorney General

STATE OF OHIO
Mark McElroy
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STATE OF NEW YORK
Louis J. Lefkowitz
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Richard H. Shepp
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Randall J. LeBoeuf, Jr.
Special Assistant Attorney General

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IN THE

Supreme Court of the United States

October Term, 1959

No. 4 Original

STATE OF NEW YORK

v.

STATE OF ILLINOIS AND METROPOLITAN SANITARY
DISTRICT OF GREATER CHICAGO

Report of Special Master Upon Motion of Complainant for Leave to File a Supplemental and Amended Complaint

THE LEGAL INTELLIGENCER, 10 S. 37TH ST., PHILA. 4

IN THE

Supreme Court of the United States

October Term, 1959 No. 4 Original

STATE OF NEW YORK

v.

STATE OF ILLINOIS AND METROPOLITAN SANITARY
DISTRICT OF GREATER CHICAGO

Report of Special Master Upon Motion of Complainant for Leave to File a Supplemental and Amended Complaint

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To the Chief Justice and Associate Justices of the Supreme Court of the United States:

Pursuant to the order of the Court entered January 11, 1960, your special master submits the following report with respect to the motion filed by the State of New York on October 21, 1959, for leave to file a supplemental and amended complaint.

SUMMARY OF CONCLUSIONS AND RECOMMENDATION

The matters presented in the supplemental and amended complaint which the State of New York seeks leave to file are relevant to the issues raised in its original bill of complaint, are substantially similar to allegations contained in the amended application filed November 3, 1958, by the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York for a reopening and amendment of the decree of April 21, 1930, which amended application was granted by the Court on June 29, 1959, and are also substantially similar to allegations contained in certain affirmative defenses and counterclaims set out in the answer filed by the State of New York in the declaratory judgment suit brought by the State of Illinois, No. 12, October Term, 1959, which has also been referred to me and consolidated for hearing with this and two other companion suits. These matters are appropriate to be considered by the Court in order to adjudicate the entire controversy between the parties in the light of present conditions and to do complete justice.

It is accordingly recommended that the motion of the State of New York for leave to file a supplemental and amended complaint be granted.

Discussion

The original bill of complaint in this suit was filed on October 18, 1926. Briefly summarized, it alleged that the State of Illinois through its subordinate agency the Sanitary District of Chicago diverted large amounts of water from Lake Michigan into the Mississippi watershed in violation of the rights of the State of New York and its citizens (a) in the development of electric power in the Niagara River and the international section of the St. Lawrence River; (b) in the free and unobstructed use of the Great Lakes waterway and the various ports and harbors thereof for purposes of navigation, trade and commerce; (c) in the use of the Great Lakes for fishery purposes; (d) in the enjoyment of riparian rights and shipping and commercial rights on and in the Great Lakes, and (e) in the use of the natural waters of the Great Lakes watershed for the use and maintenance of the pleasure and convenience of the people of the State of New York, all to the damage of the State of New York and its citizens. The bill of complaint sought an injunction restraining the defendants from permanently diverting any water whatever from Lake Michigan and its watershed.

By an order entered May 31, 1927, the Court struck from the bill of complaint the third paragraph thereof which alleged that the right of the State of New York to use the waters of the Niagara and St. Lawrence Rivers for the development of electric power is a property right of the State and its citizens which the defendants had no right to destroy or impair by diverting water from Lake Michigan into the Mississippi waterway. This action was taken by the Court, as appears from its opinion reported at 274 U. S. 488, because there was no allegation in the bill of complaint that there was any present use of the waters for such purposes which was being or would be disturbed and that there was then no definite project for so using them which was being or would be affected. The action of the Court was, however, expressly stated to be "without prejudice, so that the plaintiff State, if later on in a position to do so, may be free to litigate the questions which the paragraph is intended to present."

In its opinion handed down on January 14, 1929, upon the report of its special master in this suit and the two companion suits, one brought by the States of Wisconsin, Minnesota, Ohio and Pennsylvania and the other by the State of Michigan, 278 U. S. 367, the Court held that the diversion of water from Lake Michigan by the defendants in excess of that needed to preserve navigation on the Chicago River was without legal justification and in violation of the rights of the plaintiffs. However, because of the danger which might ensue to the health of the people of the Chicago area the Court did not order immediate cessation of such diversion but rereferred the matter to its special master to determine and report the necessary steps which would bring an end to the defendants' violation of the plaintiffs' riparian rights and the unwarranted part of the diversion.

Following the report of the special master on the rereference the Court determined, 281 U. S. 179, that under the then existing facts and circumstances and in the light of the limitations upon the efficiency of sewage treatment methods then in use the Court should enter a decree providing for a reduction in the diversion by gradual stages until it should be no more than 1,500 cubic feet per second plus domestic pumpage. The Court did not at that time enjoin the diversion of such domestic pumpage but stated that "If the amount withdrawn should be excessive, it will be open to complaint" (281 U. S. 179, 200), and the Court directed that the decree should contain a provision

> "That any of the parties hereto, complainants or defendants, may, irrespective of the filing of the above-described reports, apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy" (281 U. S. 179, 202).

A decree in accordance with its opinion was entered by the Court on April 21, 1930, 281 U. S. 696.

On December 23, 1957, the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York filed in this and the two companion suits an application for a reopening and amendment of the decree of April 21, 1930, and for the granting of further relief. The application and a prior motion by the State of New York to somewhat similar effect were denied by the Court without prejudice on March 3, 1958, 355 U. S. 944. Thereafter, on November 3, 1958, the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York filed an amended application for the same relief which was granted by the Court by order entered June 29, 1959, 360 U. S. 712, and this and the companion suits were referred to me as special master to take testimony and make report. Thereafter on October 21, 1959, the State of New York filed in the Court a motion for leave to file a supplemental and amended complaint to which the defendants filed a brief in opposition. By order entered January 11, 1960, the Court referred the motion and response to me for an expression of my views as to the relationship of the matters presented therein to the issues in this suit.

As has been stated, the original bill of complaint filed by the State of New York sought relief, by way of injunction, from the permanent diversion by the defendants of water from Lake Michigan which it alleged was in violation of its rights as a sovereign state bordering on the Great Lakes and which it further alleged had caused it and its citizens injury in the production of hydroelectric power, the navigation of the lakes, the fisheries in the lakes, the exercise of riparian rights on the shores of the lakes and the use of the waters of the lakes for the pleasure and convenience of its people. As has also been pointed out the allegation with respect to injury in the production of electric power was stricken from the complaint by the Court upon the ground that no such damage had then been suffered or was in prospect and without prejudice to the reassertion of that element of damage if later on the State should be in a position to do so.

The amended application for the reopening of the decree of April 21, 1930, alleged, inter alia, that the domestic pumpage of Chicago which is now permanently diverted from Lake Michigan has increased and will continue to increase beyond the limits which were estimated in 1930 and will become more and more excessive to the irreparable harm and injury of the plaintiffs. It further alleges that the cessation of the permanent diversion of water from Lake Michigan as domestic pumpage will not injure or impair the health of the people of the Chicago area or the navigability of the port and waterways in that area. The amended application further avers that substantial damage to the plaintiffs has been and is being caused by the permanent diversion of water from Lake Michigan as domestic pumpage with the resultant artificial lowering of the levels of all of the Great Lakes below Lake Superior and their connecting channels and the St. Lawrence River above Montreal. It is alleged that such damage falls into four general classes, namely, (1) damage to navigation and commercial interests; (2) damage to riparian property of a non-navigational character; (3) damage to the proprietary and quasi-sovereign rights of the plaintiff States, and (4) damage and loss caused to the State of New York and her citizens by defendants' diminution of the flow of the waters of the Niagara and St. Lawrence Rivers which are used for the generation of hydroelectric power at power sites on the Niagara River which are now under construction and which are to be in full operation in a few years and on the St. Lawrence River where the New York power project is substantially completed and in operation.

By their amended application filed November 3, 1958, and a motion to amend the prayer for relief in their amended application, which was filed on April 30, 1959, with their reply brief, the plaintiffs ask the Court to require the defendants to return the treated effluent emanating from their sewage and industrial treatment facilities to the Great Lakes basin from which it originally came in the form of domestic pumpage or, if it should be determined that measures other than the return to Lake Michigan of the Chicago domestic pumpage effluent can be put into effect so that such measures will reduce either the direct diversion or limit or restrict the Chicago domestic pumpage to the end that the total amount of diversion of water from the Great Lakes at Chicago will be reduced or restricted, the Court should enter a supplemental or modified decree to that effect. Finally they pray that the Court grant such other relief in accordance with equity and good conscience as will insure to the greatest possible degree the future integrity and development of the Great Lakes reservoir so that the maximum use and benefit of its waters may be assured to the plaintiff States.

On June 29, 1959, the Court granted leave to the State of Illinois to file a complaint against the States of Michigan, Ohio, Pennsylvania, Minnesota, New York and Wisconsin seeking a judgment declaring the right of the Elmhurst-Villa Park-Lombard Water Commission, an instrumentality of the State of Illinois, to withdraw water from Lake Michigan for domestic use (No. 12, October Term 1959), and referred the complaint to me to take testimony and report along with the present suit (No. 4, October Term, 1959), and the two other companion suits (Nos. 2 and 3, October Term, 1959), 360 U. S. 712. To that complaint the State of New York has filed an answer containing a number of affirmative defenses and counterclaims. Included in the third affirmative defense and second counterclaim in the answer filed by the State of New York are allegations of the right of the State of New York and its citizens to the natural flow of the Great Lakes for the production of hydroelectric power in the Niagara and St. Lawrence Rivers, the construction of hydroelectric power projects in the St.

Lawrence and Niagara Rivers designed to utilize the entire United States share of the natural flow of the rivers available for power purposes, and the loss in the production of such power which the diversion proposed by the Elmhurst-Villa Park-Lombard Water Commission would cause to the State of New York.

The answer and counterclaims filed by the State of New York conclude with a prayer for a judgment that neither the State of Illinois nor the Elmhurst-Villa Park-Lombard Water Commission has any right to divert any waters from the Great Lakes watershed unless the effluent, after proper purification, is returned thereto, and an injunction restraining any such diversion, or, if the Court should determine that such diversion should not be absolutely enjoined, then determining the extent of the injury to the defendant and providing compensation therefor.

It is thus alleged in the amended application for the reopening and amendment of the decree of April 21, 1930, and in the answer of the State of New York in the declaratory judgment suit brought by the State of Illinois (No. 12, October Term, 1959), that there have been at least two significant changes in the conditions which existed in 1926 when the original bill of complaint was filed, namely, (1) that the amount of water permanently withdrawn from the Great Lakes by Chicago for domestic pumpage is substantially greater than the amount then contemplated, and (2) that the State of New York is now actually engaged in the production of hydroelectric power in the St. Lawrence River and will in the very near future complete and operate works for the production of hydroelectric power on the Niagara River. In addition it is alleged that the St. Lawrence Seaway project has been completed and is now in operation, opening up the Great Lakes to navigation by ocean-going vessels having a draft up to 27 feet.

The motion of the State of New York for leave to file a supplemental and amended complaint is based upon the ground that the subject matter of the allegations with respect to injury to hydroelectric power production stricken from its original bill of complaint by this Court on May 31, 1927, as prematurely raised have now become of immediate relevance and that New York is now in position to show present injury to itself, its citizens and agencies, at its hydroelectric power plant on the St. Lawrence River and injury in the immediate future at the plant now nearing completion on the Niagara River and on the further ground that certain facts alleged in the original complaint have been altered, modified and affected by events, changes and developments occurring in the 33 years which have intervened since the filing of the original bill of complaint, including, inter alia, the opening of the St. Lawrence Seaway. The motion is made under the leave given by the order of May 31, 1927, and under the provisions of Rule 15(d) of the Federal Rules of Civil Procedure as made applicable to original actions by Rule 9(2) of the rules of the Court.

CONCLUSIONS

The new allegations of the proposed supplemental and amended complaint are substantially similar to those contained in the amended application for the reopening and amendment of the decree of April 21, 1930, and in the answer of the State of New York filed in the pending suit brought by the State of Illinois against it and the five other Great Lakes States (No. 12, October Term 1959). In my opinion the matters set out in those allegations directly bear upon the issues originally raised and now presented in this suit and are appropriate to be considered in the determination of those issues. I have ruled in the hearings now pending before me that the allegations made in the amended application and answer just referred to are before me for consideration under the reference of June 29, 1959, and I have accordingly permitted the introduction of evidence bearing upon the allegations of the State of New York of injury to its present and prospective production of hydroelectric power in the St. Lawrence and Niagara Rivers. It seems obvious to me that the Court intended, in granting the application to reopen the decree of April 21, 1930, and in permitting the filing of the complaint and answers in the declaratory judgment suit brought by the State of Illinois (No. 12, October Term 1959), to open the way for the reconsideration of the entire controversy between the parties in the light of present conditions rather than those which existed more than 30 years ago. It accordingly seems appropriate to me that the supplemental and amended complaint should be permitted to be filed by the State of New York in order that the formal pleadings in this suit may actually reflect the existing conditions and present the entire controversy between the parties. No delay in the proceedings will result from such filing since evidence is already being taken by me upon the issues raised by the amended application and the answer filed by the State of New York in the declaratory judgment suit brought by the State of Illinois (No. 12, October Term 1959), which, as has been stated, are substantially similar to those sought to be raised by the supplemental and amended complaint.

RECOMMENDATION

It is accordingly recommended that the motion of the State of New York for leave to file a supplemental and amended complaint be granted and that the defendants be directed to file their answer thereto within twenty days.

Respectfully submitted,

ALBERT B. MARIS
Special Master

SUPREME COURT. U. S.

MOTION FILED OCT 21 1959

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959

No. 4 Original

STATE OF NEW YORK
Complainant,
against

STATE OF ILLINOIS and SANITARY DISTRICT OF CHICAGO,
Defendants.

MOTION FOR LEAVE TO FILE A SUPPLEMENTAL AND AMENDED COMPLAINT

Louis J. Lefkowitz,
Attorney General of the State of New York,
State Capitol, Albany, New York,

Paxton Blair,
Solicitor General of the State of New York,

Richard H. Shepp,
Assistant Attorney General of the State of New York,

Randall J. Le Boeuf, Jr.,
Special Assistant Attorney General of the State of New York.

IN THE

Supreme Court of the United States

STATE OF NEW YORK,
Complainant,
against
STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO,
Defendants.

October Term, 1959
No. 4 Original
MOTION FOR LEAVE TO FILE A SUPPLEMENTAL AND AMENDED COMPLAINT

Complainant, State of New York, moves this Court for leave to file a supplemental and amended complaint, a copy of which is attached hereto, in accordance with this Court's decree in *New York* v. *Illinois* (274 U. S. 488) on the ground that the subject matter of certain allegations then stricken as prematurely raised, have now become of immediate relevance, and that New York is now in position to show present injury to itself, its citizens and agencies at a hydroelectric plant currently in full operation on the St. Lawrence River, and at a hydroelectric plant now under construction and to be completed in the near future on the Niagara River. These plants have been and are being constructed and operated by Power Authority of the State of New York (hereinafter, the "Power Authority"), a corporate municipal instrumentality of the State of New York, and a political subdivision of the State exercising governmental and public powers (see N. Y. Public Authorities Law, §1002).

Complainant moves on the further ground that certain facts alleged in the original complaint have been altered, modified and affected by events, changes and developments occurring in the 33 years which have intervened since the date of the original complaint, including the construction of the St. Lawrence Seaway which opened in May 1959 and which, by providing a 27 foot draft channel to the sea, made the Great Lakes a major international waterway. The Power Authority expended over $203,000,000 at the St. Lawrence project on facilities jointly necessary for Seaway and power purposes. In addition to changes resulting from the power and Seaway projects, widespread public recreational uses of the Great Lakes waters and shores have developed in such period.

The changed facts and circumstances make appropriate a supplemental and an amended complaint so that this Court and its Special Master (the Honorable Albert B. Maris, now designated to hear and to report on the issues raised by the complaint in Original No. 12 and the Amended Application to reopen the decree in Original Nos. 2, 3, and 4) may consider the effects of diversions from Lake Michigan by Illinois and its agencies on the interests of the State of New York, its agencies and its citizens, in the light of conditions as they exist today based upon a relevant pleading which presents the issues in conformity with the rules of the Court.

Complainant's original complaint in this action was filed on October 18, 1926. A decree was entered herein on April 21, 1930 (281 U. S. 696). On June 29, 1959 this Court granted the amended application of this complainant and others to reopen such decree, and appointed Hon. Albert B. Maris, Senior United States Circuit Judge for the Third Circuit, as Special Master to hear this and other cases involving diversions by Illinois from the Great Lakes.

This complainant's original complaint herein contained allegations relating to the effect of a diversion of waters from Lake Michigan on the use of the waters of the Niagara and St. Lawrence Rivers by the complainant and its citizens for the development of power. Such allegations were stricken from the original complaint on May 31, 1927 on the ground that they did not "show that there is any present use of the waters for such purposes which is being or will be disturbed; nor that there is any definite project for so using them which is being or will be affected." (274 U. S. 488, 489). Such ruling was expressly, however, "without prejudice, so that the plaintiff State [New York], if later on in a position to do so, may be free to litigate the questions which the paragraph is intended to present." (p. 490)

Since the date of said ruling and the subsequent decree of April 21, 1930, there has been extensive development of the St. Lawrence and Niagara Rivers by an agency of the State of New York, as is more fully set forth below, which makes it proper that the allegations relating to hydroelectric losses to the complainant be restored to the pleadings as contemplated by the Court's order of May 31, 1927.

The Power Authority has constructed, in conjunction with The Hydro-Electric Power Commission of Ontario, a combined hydroelectric works in the International Rapids section of the St. Lawrence River. These works were authorized, pursuant to the United States-Canadian Boundary Waters Treaty of 1909 between the United States and Great Britain (36 Stat. (Part 2) 2448) by the International Joint Commission (Order of Approval of Power Works, October 29, 1952, a copy of which is annexed as Exhibit A to the supplemental and amended complaint), which authorized such works to be constructed by The Hydro-Electric Power Commission of Ontario and a designee of the United States. Authorization for the construction of the United States portion of such works, pursuant to the Federal Power Act, was given to the Power Authority by the Federal Power Commission's grant of a license for hydroelectric Project No. 2000 on July 15, 1953 (12 FPC 172). On November 4, 1953 the Power Authority was declared the designee of the United States for the construction of the works referred to in the Order of Approval by the President of the United States in Executive Order No. 10500, a copy of which is annexed as Exhibit B to the supplemental and amended complaint. The combined works have been constructed at a total cost of approximately $665,000,000 and the Power Authority has financed its portion of said works through the sale of approximately $350,000,000 of its revenue bonds. The Power Authority receives one half of the total flow of water at the combined works, which works are physically capable of using the entire natural flow of the St. Lawrence (including the amount now diverted by the defendants), and in addition thereto a flow arising from a diversion by Canada into the Great Lakes watershed which has been authorized by international agreement. Therefore, any increase or decrease of the present diversion by the defendants and their agents directly affects the amount of power and energy available to the Power Authority and to the State of New York, its agencies and its citizens.

By the Niagara River Water Diversion Treaty of 1950 (1 U.S.T. 695), a formula is set up to apportion the total outflow from Lake Erie, which outflow passes through the Welland Canal and the Niagara River. Under this formula, the use of the above mentioned diversion by Canada into the Great Lakes watershed is reserved to Canada. The remainder of the outflow from Lake Erie, after deducting from such outflow the amount of water used and necessary for domestic and sanitary purposes, and for the service of canals for the purposes of navigation, is made available for scenic and power purposes. (It is complainant's contention that the diversion by defendants and their agents is not a proper deduction under the terms of said Treaty, both because the Treaty deducts only necessary diversions and the defendants' diversion is not necessary; and because the Treaty deducts only diversions from the outflow of Lake Erie, whereas the defendants' diversion is from Lake Michigan.) Of the remainder after the aforementioned deductions, certain specified quantities of water are reserved for the preservation of the scenic beauty of Niagara Falls; all of the rest is made available for power purposes and divided equally between the United States and Canada. By Public Law 85-159 (71 Stat. 401, 16 U.S.C. Section 836), the Federal Power Commission was authorized and directed to issue a license to the Power Authority for the construction of works to utilize all of the United States' share of the water of the Niagara River permitted to be used by international agreement. Subsequently, on January 30, 1958 the Power Authority obtained from the Federal Power Commission a license for the construction of works comprising hydroelectric Project 2216 on the Niagara River (19 F.P.C. 186, superseding 18 F.P.C. 344). Said works are now being constructed by the Power Authority, and approximately $185,000,000 have been expended on its construction as of July 31, 1959. The works will be completed in 1963 at a total estimated cost of $720,000,000. The works will first produce power in February, 1961, and will produce power at full capacity by December, 1962. Such works are capable of utilizing the entire flow available to the United States for power purposes, that is to say, one half of the remainder after deducting from the natural flow (including in said natural flow the flow presently diverted at Chicago), the amounts reserved by the Treaty for scenic purposes. Any increase or decrease of the diversion from Lake Michigan by defendants or their agents, which diversion is presently believed to be in the amount of approximately 3,300 cfs, therefore will directly affect the amount of power which can be produced by said works and will directly affect the amount of power and energy available to the State of New York, its agencies and its citizens.

While the aforementioned hydroelectric works present the chief need for a revised complaint herein, other changes have occurred in the thirty-three years which have elapsed since the filing of the original complaint, which make it desirable that a supplemental and amended complaint be substituted in this action.

The most important single intervening event other than the St. Lawrence and Niagara Power projects, is the St. Lawrence Seaway Project, which as mentioned above was completed during the year 1959. This project was built jointly by the Saint Lawrence Seaway Development Corporation, a corporation created by the Congress, and by the St. Lawrence Seaway Authority, a corporation created under the Laws of Canada, and was constructed at a combined cost of approximately $650,000,000. The locks have been designed to and do enable ocean going vessels of 27 foot draft to enter the Great Lakes system, whereas previously vessels of only 14 feet draft could navigate between the Great Lakes and the Atlantic Ocean. The fact that vessels of greater draft are now entering the Great Lakes waterway has changed the nature as well as the extent of Great Lakes commerce and makes it imperative that New York's Great Lake ports have harbor facilities capable of accommodating these deep-draft ocean-going vessels. To the extent the present diversion by defendants and their agents, particularly the city of Chicago which is an agency of the defendant State of Illinois, or any increase thereof in the guise of domestic pumpage for water supply or flushage of sewage to the Mississippi watershed, makes construction, installation and maintenance of such harbor installations more expensive or impossible by virtue of reducing the level of the Great Lakes below what they would otherwise be, New York is suffering damages of a nature and extent not demonstrable at the time of the 1930 decree.

Aside from the above mentioned hydroelectric and navigational projects, there has been in the last three decades a continuing expansion in the use of the waters of the Great Lakes watershed for recreational, municipal, and industrial purposes by the citizens and agencies of New York, all of which uses are damaged by the diversion from Lake Michigan by Illinois. Accordingly, it is now desirable to set forth such elements of damage more fully than was done in the 1926 complaint.

In addition, many of the allegations of the original complaint are now obsolete and relate to issues now moot by virtue of the 1930 decree. In light of these changed facts and circumstances, it is submitted that it is appropriate that a supplemental and amended complaint be served and referred to the Special Master in place of the original 1926 complaint.

Respectfully submitted,

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Paxton Blair,
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October 21, 1959

IN THE

Supreme Court of the United States

STATE OF NEW YORK, *Complainant,* *against* STATE OF ILLINOIS AND SANITARY DISTRICT OF CHICAGO, *Defendants.*	October Term, 1959 No. 4 Original SUPPLEMENTAL AND AMENDED COMPLAINT

Complainant State of New York, by its Attorney General, Louis J. Lefkowitz, for its supplemental and amended complaint herein, alleges as follows:

1. The jurisdiction of this Court is invoked under Article III, Section 2, of the Constitution of the United States. The State of New York is one of the sovereign states of the United States of America, and the defendant, State of Illinois, is also one of the sovereign states of the United States of America. The defendant, Metropolitan Sanitary District of Chicago (formerly named Sanitary District of Chicago, and hereinafter referred to as the "Sanitary District"), is a public corporation organized and existing under and by virtue of the Laws of the State of Illinois, and is a citizen and agency of said State.

2. In the year 1889 the legislature of the State of Illinois enacted a statute entitled "An act to create sanitary districts, and to remove obstructions in the Des Plaines and Illinois Rivers," approved May 29, 1889, and published in the laws of Illinois for the year 1889 com-

mencing at page 126; which act authorized the organization of public corporations to be known as sanitary districts, with power, among other things, to construct, maintain and operate drainage canals or channels for the disposal of drainage and sewage. By sections 23 and 24 of the said act, it was further provided as follows, to wit:

> "§23. If any channel is constructed under the provisions hereof by means of which any of the waters of Lake Michigan shall be caused to pass into the Des Plaines or Illinois rivers, such channel shall be constructed of sufficient size and capacity to produce and maintain at all times a continuous flow of not less than 300,000 cubic feet of water per minute, and to be of a depth of not less than fourteen feet, and a current not exceeding three miles per hour, and if any portion of any such channel shall be cut through a territory with a rocky stratum where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for, and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water. If the population of the district drained into such channel shall at any time exceed 1,500,000, such channel shall be made and kept of such size and in such condition that it will produce and maintain at all times a continuous flow of not less than 20,000 cubic feet of water per minute for each 100,000 of the population of such district, at a current of not more than three miles per hour, and if at any time the general government shall improve the Des Plaines or Illinois rivers, so that the same shall be capable of receiving a flow of 600,000 cubic feet of water per minute, or more, from said channel, and shall provide for the payment of all damages which any extra flow above 300,000 cubic feet of water per

minute from such channel may cause to private property so as to save harmless the said district from all liability therefrom, then such sanitary district shall within one year thereafter, enlarge the entire channel leading into said Des Plaines and Illinois rivers from said district to a sufficient size and capacity to produce and maintain a continuous flow throughout the same of not less than 600,000 cubic feet of water per minute with a current of not more than three miles per hour, and such channel shall be constructed upon such grade as to be capable of producing a depth of water not less than eighteen feet throughout said channel, and shall have a width of not less than one hundred and sixty feet at the bottom. In case a channel is constructed in the Des Plaines river as contemplated in this section it shall be carried down the slope between Lockport and Joliet to the pool commonly known as the upper basin, of sufficient width and depth to carry off the water the channel shall bring down from above. The district constructing a channel to carry water from Lake Michigan of any amount authorized by this act may correct, modify and remove obstructions in the Des Plaines and Illinois rivers wherever it shall be necessary so to do to prevent overflow or damage along said river, and shall remove the dams at Henry and Copperas Creek in the Illinois river, before any water shall be turned into the said channel.

" * * *

"§24. When such channel shall be completed, and the water turned therein, to the amount of three hundred thousand cubic feet of water per minute, the same is hereby declared a navigable stream, and whenever the general government shall improve the Des Plaines and Illinois rivers, for navigation, to connect with this channel, said general government shall have full control over the same for navigation purposes, but not to interfere with its control for sanitary or drainage purposes."

3. In November and December of the year 1889, the Sanitary District was organized as a sanitary district under the act of 1889 hereinbefore referred to, and has since continuously existed as such sanitary district under the said act of 1889 and the acts amendatory thereof and supplementary thereto. At the time of its organization said defendant district consisted of a territory about 185 square miles in area. By successive acts of the legislature of Illinois the area of the Sanitary District has been increased from time to time, and its area is now approximately 869 square miles, and comprises the entire city of Chicago together with large areas of land to the south, west and north of said city.

4. On or about the 3rd day of September, 1892, defendant Sanitary District, acting as a subordinate agency of the defendant, State of Illinois, pursuant to the act of 1889 hereinbefore referred to, commenced the construction of a canal or channel (hereinafter called the "Sanitary Canal") commencing at a point in the west fork of the south branch of the Chicago river about 6 miles above the mouth of said river, which river was a navigable stream tributary to and a part of the Great Lakes watershed, and extending in a general westerly direction for a distance of about 32 miles to a point near the city of Joliet, Illinois. At its westerly terminus said Canal was made to connect with the Des Plaines river, a stream flowing in a westerly and southwesterly direction and forming a tributary of the Illinois river, which latter river in turn flows in a westerly and southwesterly direction and forms a tributary of the Mississippi river.

5. In the construction of the Sanitary Canal it was at all times the plan of the defendant, State of Illinois, and the defendant Sanitary District that the said Canal should

be used as a passage-way for the sewage of the territory comprising the Sanitary District to the end that such sewage might be carried down the said Canal into the Des Plaines and Illinois rivers; and in order to accomplish the said purpose it was the intention of said defendants at and prior to the commencement of the construction of said Sanitary Canal to divert from Lake Michigan, and pass through the said Canal, such amounts of water as might be deemed by said defendants to be necessary for the proper dilution of the said sewage and its propulsion through the Canal and the Des Plaines and Illinois rivers. In pursuance of such intention, and prior to the completion of said Canal, the legislature of the defendant State of Illinois enacted in the year 1895 an amendment to section 20 of the act of 1889 hereinbefore referred to, which amendment is published in the Laws of Illinois for the year 1895 commencing at page 168 thereof, and provides that any sanitary district organized under the provisions of the act of 1889 and maintaining a channel which causes the discharge of sewage into or through any river beyond the limits of such district, "shall, at the time any sewage is turned into or through any such channel or channels, turn into such channel or channels not less than 20,000 cubic feet of water per minute for every 100,000 inhabitants of said district, and shall thereafter maintain the flow of such quantity of water."

6. Upon the completion of the Sanitary Canal, the defendant, Sanitary District, in compliance with section 27 of the said act of 1889, applied to the Governor of the State of Illinois for authority to commence the use of said Canal, and such authority was granted by the said governor on behalf of the defendant State of Illinois, and thereupon, on or about the second day of January,

1900, said defendant Sanitary District commenced the abstraction of water from Lake Michigan and its diversion into the Chicago river and thence into and through the said Canal, in such amounts and at such velocity as to reverse the flow of the Chicago river and create a steady and uninterrupted flow of water, from said day down to the present time, from Lake Michigan through the Chicago river to the said Canal thence through the said Canal to the Des Plaines river near Joliet, and thence down the Des Plaines and Illinois rivers to the Mississippi river.

7. The primary object and purpose of the act of 1889 hereinbefore referred to, as said act was construed by the highest court of the State of Illinois in the cases of *People* v. *Nelson,* 133 Ill. 565, 27 N.E. 217 (1890) and *Beidler* v. *Sanitary District of Chicago,* 211 Ill. 628, 71 N.E. 1118 (1904), was to provide a method of disposing of the sewage of the city of Chicago and contiguous territory, and the Sanitary Canal constructed by the defendant Sanitary District as hereinbefore described has been continuously used for such purpose since the month of January, 1900.

8. Subsequent to the opening of the said Sanitary Canal, and in the year 1903, the defendant, State of Illinois, by an act of its legislature approved May 14, 1903, and published in the Laws of Illinois for the year 1903 commencing on page 113 undertook to authorize the defendant Sanitary District to construct and operate a plant for the generation of electrical energy by hydraulic power derived from the water passing from Lake Michigan through the said Canal. The provision of said act with reference to said subject are as follows:

> "§5. That the said sanitary district of Chicago is hereby authorized to construct all such dams,

> waterwheels and other works north of the upper basin of the Illinois and Michigan Canal as may be necessary or appropriate to develop and render available the power arising from the water passing through its main channel and any auxiliary channels now, or hereafter, constructed by said district.
>
> "§6. That the power made available by the works constructed under the provisions of this act shall be converted into electrical energy, and shall be transmitted to the various cities, villages and towns within said sanitary district, or adjacent to the main channel of said sanitary district, and may be used in the lighting of said cities, villages and towns, or parts thereof, or for the operation of pumping plants or machinery used for municipal purposes or for public service, or may be disposed of to any other person or corporation, upon such terms and conditions as may be agreed to by the said sanitary district: Provided, however, that it shall be the duty of said sanitary district to utilize so much of said power as may be required for that purpose to operate the pumping stations, bridges and other machinery of said sanitary district."

9. Under and by virtue of the authority attempted to be conferred on the defendant Sanitary District by the defendant State of Illinois in said act of 1903, said Sanitary District constructed and placed in operation a hydroelectric power plant at Lockport near the western terminus of the said Canal, and has continuously operated the same since its completion in the month of November, 1907. Upon information and belief, the operations of said plant since the year 1907 have produced many millions of dollars of gross revenue to the defendant Sanitary District and have earned for the said Sanitary District many millions of dollars of profits over and above the cost of operating the said plant, including proper allowances for depreciation and a reasonable return upon investment therein.

10. Since the completion of said hydroelectric development near the western terminus of said Sanitary Canal, the object and purpose of the defendants in the operation of the said Canal and in the abstraction of water from Lake Michigan through the same has been and is now two-fold, to-wit: the disposition of the sewage of the defendant Sanitary District, and the generation and sale of electrical energy.

11. Upon complaint by the State of New York and other States bordering upon the Great Lakes, and after hearings duly held before Honorable Charles Evans Hughes, Special Master, this Court determined in *Wisconsin* v. *Illinois,* 278 U. S. 367 (October Term 1928), that the diversion of water from the Great Lakes watershed by defendants State of Illinois and the Sanitary District, or their agents except to the extent necessary to preserve navigation in the Chicago River, was "without any legal basis", and "in violation of the complainants' rights", and that the complainants "are entitled to a decree which will be effective in bringing that violation and the unwarranted part of the diversion to an end". However, "in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section" which would have resulted if such unlawful diversion had been immediately enjoined because of the then lack of adequate sewage disposal facilities, the matter was referred back to the Special Master to determine necessary steps requiring the Sanitary District "to construct and put in operation with all reasonable expedition adequate plants for the disposition of the sewage through other means than the lake diversion", the Court stating however that "Though the restoration of

just rights to the complainants will be gradual instead of immediate it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project."

12. In its decision following the report of Special Master Hughes on rereference (*Wisconsin* v. *Illinois,* 281 U. S. 179 (October Term, 1929)), this Court held that with "regard to relative suffering" and in view of the limited efficiency of the sanitary treatments then available, the decree should require the defendants and their agents to limit their diversion to an annual average of 1,500 cubic feet of water per second (hereinafter, "cfs") in addition to domestic pumpage. The decision noted, however, that whether the right for domestic use extends to industrial plants "may be open to consideration at some future time". The decision also required that the decree should provide

> "That any of the parties hereto, complainants or defendants, may * * * apply at the foot of this decree for any other or further action or relief, and this Court retains jurisdiction of the above-entitled suits for the purpose of any order or direction, or modification of this decree, or any supplemental decree, which it may deem at any time to be proper in relation to the subject matter in controversy." (p. 202.)

On April 21, 1930 this Court entered a decree (281 U. S. 696) in accordance with the above-mentioned decision.

13. Upon information and belief, the defendants and their agents, particularly the City of Chicago, currently divert as aforesaid into the Sanitary Canal and out of the Great Lakes watershed, 1500 cfs plus combined domestic and industrial pumpage averaging approximately 1800 cfs, which domestic and industrial pumpage

is expected to increase rapidly in the immediate future due to expansion of population and industry in Chicago. The present diversion has been determined to be in violation of the sovereign and proprietary rights of the State of New York. The equitable considerations of relative hardship which precluded this Court from requiring an immediate and complete termination of such diversion in 1929 and 1930 are no longer applicable, in that the damage to complainant State of New York, its agencies and its citizens, and the other complainant States, and to Canada, from the present diversion is now greatly in excess of and disproportionate to the expense or inconvenience to which the defendants might be put by a termination of such diversion, all as more fully set forth below. Further, such equitable considerations were not, either in 1929 or in 1930 or at present, applicable to diversion of water from the watershed for the use of industrial plants, but rather such diversion for industrial purposes, without return of the effluent, provides a cheap means of industrial sewage disposal which defendants offer as an inducement, in competition with this complainant and others to attract industry to the area served by the Sanitary District, and defendants thereby seek to increase said industrial diversion in violation of this complainant's rights and at this complainant's expense.

14. Under present conditions, said diversion of 1800 cfs of domestic and industrial pumpage out of the Great Lakes watershed is unnecessary and wasteful of the waters of the Great Lakes. No more than 1500 cfs is required to be diverted in order to maintain navigation, even if such diversion from the Great Lakes watershed for navigational purposes would be proper. The domestic and industrial

pumpage of 1800 cfs could be materially reduced if the defendant, State of Illinois, and its agencies took proper steps to reduce unnecessary waste of water by its citizens, residents and industries by metering said water and by other means. Further, the effluent from such pumpage as is necessary, can under existing available sanitary methods, be safely treated and returned to the Great Lakes watershed; or, alternatively, such available modern methods of sewage treatment could purify the effluent to a degree where all or part of such effluent may be used to support navigation in the Sanitary Canal and the present diversion of 1500 cfs from Lake Michigan for navigational purposes could be thereby discontinued.

15. Lake Michigan is one of the Great Lakes, and part of a single common, great natural waterway consisting of Lake Superior, Lake Michigan, Lake Huron, Lake Erie, Lake Ontario, and the Niagara and St. Lawrence Rivers, together with certain connecting straits, rivers, harbors, channels and canals. Any diversion of water from Lake Michigan, if said water is not subsequently returned to the Great Lakes-St. Lawrence system, results in a lowering of the level of each of said Lakes, the Niagara and St. Lawrence Rivers, and the aforesaid connecting straits, rivers, harbors, channels and canals.

16. The State of New York has approximately 775 miles of shoreline on Lakes Erie and Ontario, the Niagara River, and on that part of the St. Lawrence River forming the international boundary between the State of New York and Canada. The State of New York owns all of the beds of those lakes and rivers lying within its boundaries, subject only to the right of the public to navigate the same, and subject to the power of Congress to regulate interstate and international commerce thereon.

17. The State of New York, its agencies and its citizens have a right in and to the Great Lakes-St. Lawrence Waterway as a highway of commerce concurrent with the rights of the other states of the United States bordering upon said waterway, subject to the aforesaid power of the Congress and to the concurrent rights of Canada under international law and treaty, and are lawfully entitled to receive all of the waters from rivers and streams in the Great Lakes watershed without diminution by any other State, its agencies or its citizens for the purpose of keeping up and maintaining the waters in the Great Lakes-St. Lawrence Waterway.

18. In reliance upon said right to the undiminished waters of said watershed, the State of New York, its agencies, its municipalities, and its citizens have expended great sums of money in making improvements in aid of navigation (obtaining appropriate permits from the United States where necessary) including the construction of docks, wharves, and slips, and the dredging of ports and harbors. In addition, the State of New York has built and has maintained a system of barge canals connecting said waterway, at Lakes Erie and Ontario and at the St. Lawrence River (via Lake Champlain and the Richelieu River), with the Hudson River and thereby with an outlet to the Atlantic Ocean at New York City, which has provided an avenue of intrastate, interstate, and international commerce.

19. During the year 1959 there was completed the St. Lawrence Seaway Project, built jointly by the Saint Lawrence Seaway Development Corporation, a corporation created by the Congress, and the St. Lawrence Seaway Authority, a corporation created under the laws of Canada. This joint international navigational project has,

for the first time, enabled ocean going vessels of 27 foot draft to enter the Great Lakes system, and in reliance upon and in aid of said navigational project substantial expenditures have been undertaken and planned by the State of New York, its agencies, its municipalities and its citizens for navigational improvements to accommodate such vessels.

20. There exist along the shores of the Great Lakes and elsewhere in the Great Lakes watershed, or adjacent thereto, numerous large and populous municipalities in the United States and in Canada. If Illinois and the Sanitary District is permitted to divert and abstract water from the Great Lakes watershed, such other municipalities and Canada would be in a position to claim a like right of diversion. In that event, the withdrawal of water from the Great Lakes watershed for sanitary, domestic and industrial purposes, without returning it to said Great Lakes system after usage and treatment, would result in the aggregate diversion of an even larger quantity of water than is now being diverted by the Sanitary District.

21. Any withdrawal of waters from the Great Lakes results in proportionate reductions in the levels of Lake Erie and Lake Ontario, and the St. Lawrence and Niagara Rivers, as well as in the rest of the Great Lakes—St. Lawrence Waterway with the exception of Lake Superior, with the consequent reduction of navigability of the Waterway and the New York Barge Canal, a loss of commerce to the State of New York, its agencies, its municipalities and its citizens, and a loss in value of the navigational aids and facilities which have been constructed by the State of New York, its agencies, its municipalities and its citizens. Such diversion, consequently, results in injury

to the State of New York in its sovereign capacity as *parens patriae* of the rights of its agencies, its municipalities and citizens, and in its proprietary capacity as owner of substantial portions of its shore line on the Great Lakes system, and of said navigational aids and facilities.

22. The right to use the natural flow of the Great Lakes water system for the production of hydroelectric power is a property right of the State of New York, its agencies, its municipalities and of its citizens, subject to reasonable regulation by Congress but only insofar as it may affect interstate or international commerce. Such regulation has been exercised by Congress through the Federal Power Act (41 Stat. 1063, 16 U.S.C. §791a et seq.) as amended, and Public Law 85-159 (71 Stat. 401, 16 U.S.C. §836). Such right of the State of New York, its agencies, its municipalities, and its citizens is also subject to the concurrent right of Canada under international law and treaty.

23. The State of New York has declared that those parts of the Niagara and St. Lawrence Rivers within its boundaries are natural resources of the State for the use and development of commerce and navigation in the interest of the people of the State and of the United States, and, in order to provide for the most beneficial use of said natural resources and for the creation and development of hydroelectric power in the interest of the people of the State, has declared such natural resources to be inalienable (New York Public Authorities Law §1001).

24. Pursuant to said declaration, the State of New York has created the Power Authority of the State of New York (hereinafter, the "Power Authority") as a

corporate municipal instrumentality of the State of New York and a political subdivision of the State exercising governmental and public powers (New York Public Authorities Law §1002), to develop the hydroelectric resources of the State of New York existing in the Niagara and St. Lawrence Rivers.

25. In compliance with the provisions of the Federal Power Act, the Power Authority has obtained, from the Federal Power Commission, a license for the construction of a hydroelectric Project No. 2000 on the St. Lawrence River. Said Project No. 2000 has been constructed as one part of a combined hydroelectric project in cooperation with The Hydro-Electric Power Commission of Ontario. Such combined hydroelectric project was authorized, pursuant to the United States-Canadian Boundary Waters Treaty of 1909 between the United States and Great Britain (36 Stat. (Part 2) 2448) by the International Joint Commission (Order of Approval of Power Works, October 29, 1952, a copy of which is annexed hereto as Exhibit A). By Executive Order No. 10500 dated November 4, 1953 (a copy of which is annexed hereto as Exhibit B), the President of the United States declared the Power Authority the designee of the United States for the construction of the works referred to in said Order of Approval. The combined project has been constructed by the Power Authority and The Hydro-Electric Power Commission of Ontario at a total cost of approximately $665,000,000. Over $363,000,000 of such sum, including over $203,000,000 expended by the Power Authority, was expended upon the construction of facilities which were necessary for and in aid of, the aforementioned St. Lawrence Seaway Project, such expenditure having been required by the aforementioned International Joint Commission Order of Approval and by the Federal Power Commission license.

The Power Authority has financed its portion of the project through the sale of approximately $350,000,000 of its revenue bonds, including the sale of such bonds to citizens of the State of New York and others. Such bonds do not pledge the credit either of the State of New York or of the United States. The Power Authority is presently entitled to receive one-half of the total flow of water at the combined hydroelectric project.

26. The combined hydroelectric project has been constructed to utilize and can utilize the entire natural flow of the St. Lawrence River (including that flow presently being diverted by defendants), together with such additional flow as has heretofore been made available by international agreement, for conversion into hydroelectric power and energy. The Power Authority has contracted for the sale of all of its share of the entire output of hydroelectric power and energy from the combined hydroelectric project, to the United States, to municipalities and to corporations within the State of New York and to an agency of the State of Vermont. The terms of these contracts make provision for the sale of all hydroelectric power and energy to which the Power Authority would be entitled if there were available at the combined hydroelectric project, for conversion into such hydroelectric power and energy, the said entire natural flow (including that flow presently diverted by defendants), together with the additional flow which has heretofore been made available by international agreement.

27. Diversion of 1,000 cfs from Lake Michigan ultimately results in a loss of 1,000 cfs at the St. Lawrence plant. If such diversion of 1,000 cfs is of such nature that it is required to be deducted entirely from the flow otherwise available to the United States designee (the Power

Authority), such diversion results in a loss of 53,000,000 KWH of energy per year and 7,200 KW of capacity, resulting in an annual loss of revenue of $229,000 at the rates at which the Power Authority is now selling power.

28. In compliance with the provisions of the Federal Power Act and of the Public Law 85-159 (71 Stat. 401, 16 U.S.C. §836), and the Niagara River Water Diversion Treaty of 1950 (1 U.S.T. 694), the Power Authority has obtained, from the Federal Power Commission, a license for the construction of hydroelectric Project No. 2216 on the Niagara River. Said Project No. 2216 is now being constructed by the Power Authority, and approximately $185,000,000 have been expended on its construction as of July 31, 1959. It will be completed in 1963, at a total estimated cost of $720,000,000, which is being financed through the sale of Power Authority revenue bonds, including the sale of such bonds to citizens of the State of New York and others, of which $400,000,000 of such bonds have already been sold. Such bonds do not pledge the credit of the State of New York or of the United States. The works will produce first power in February, 1961, and will produce power at full capacity in December, 1962.

29. Said Project No. 2216 is being constructed to utilize the entire United States share of the natural flow of the Niagara River (including amounts now diverted by defendants), available for power purposes under the Niagara River Water Diversion Treaty of 1950. Public Law 85-159 requires the Power Authority to make a reasonable portion of the project power, subject to a specified limitation, available for use within reasonable economic transmission distance in neighboring States; the remainder will be sold to municipalities and citizens of the State of New York.

30. Diversion of 1,000 cfs of water from Lake Michigan ultimately results in a loss of 1,000 cfs from the Niagara River. If such diversion of 1,000 cfs is of such nature that it is required to be deducted entirely from the flow otherwise available to the United States, such diversion results in a loss of 198,000,000 KWH of energy per year and 32,300 KW of capacity, resulting in an annual loss of revenue of $916,000 at the rates at which the Power Authority is now selling power.

31. If the unnecessary diversion by the defendants and their agents is allowed to continue it may become a precedent for similar diversions by numerous municipalities in the United States and Canada along and adjacent to the Great Lakes. Such diversions in the aggregate could amount to even larger flows of water than are now being diverted by the defendants and their agents. Each 1,000 cfs so diverted, if under international law and treaty the resultant loss of flow at the St. Lawrence and Niagara Falls plants is required to be deducted from the flow available to the United States, would cause an annual loss to the Power Authority at the said plants of 251,000,000 KWH, 39,500 KW and $1,145,000.

32. All hydroelectric power and energy produced by the Power Authority is sold by it in such manner that the consumers pay only cost plus an amount sufficient to amortize the facilities over a reasonable period, and after such facilities have been fully amortized all power and energy will be sold by it in such manner that the consumers will pay only cost of production. Any loss of hydroelectric capacity and energy which could be produced by the two Projects Nos. 2000 and 2216 must be replaced with steam-generated capacity and with energy produced by steam-generating sources, at increased cost to the

domestic, rural, commercial and industrial consumers. The cost of replacing the hydroelectric power and energy lost to the Power Authority from each 1,000 cfs of flow lost to the Power Authority is estimated at $1,757,000 per year. The increased cost of steam-produced power and energy is prejudicial to the expansion, economic operation, or the continuation of numerous commercial and industrial establishments within the State of New York, and is thus prejudicial in the employment of the citizens of the State of New York and to the tax revenues of the State of New York, its agencies and its municipalities.

33. The right to use the flow of the Great Lakes system, without diminution by any other State, for recreational purposes is a sovereign and proprietary right of the State of New York, its agencies, its municipalities, and its citizens, subject to reasonable regulation by Congress insofar as it may affect interstate or international commerce and to the concurrent rights of Canada under international law and treaty. The State of New York, its agencies, its municipalities, its citizens, subject to said aforesaid power of Congress, are lawfully entitled to receive all of the waters from rivers and streams in the Great Lakes watershed provided by nature, for the purpose of keeping up and maintaining the level of the waters in the Great Lakes-St. Lawrence Waterway for recreational purposes.

34. In reliance upon said right to the undiminished waters of said watershed, the State of New York, its agencies, its municipalities and its citizens, including the Power Authority, have expended and are expending great sums in making recreational improvements along the shores and on the islands of Lakes Erie and Ontario, and the St. Lawrence and Niagara Rivers, including State

and municipal parks, beaches and marinas, and in addition thereto, numerous private beaches, bathing docks, marinas and docks, slips, and wharves for recreational boating and fishing.

35. Any diversion of waters from the Great Lakes watershed results in some degree in a lowering of the levels of Lakes Erie and Ontario, and of the Niagara and St. Lawrence Rivers, with consequential changes in the contours of the shore lines at the sites of the aforementioned State, municipal, and private recreational improvements, and changes in the depths of the bottoms at the sites of such recreational improvements. There is therefore a consequent reduction in the usefulness and value for recreational purposes of the shorefront property and recreational improvements. Said reduction of the usefulness and value for recreational purposes of such shorefront property and recreational improvements damages the State of New York both in its proprietary capacity as owner of much of said shorefront property and recreational improvements, and in its sovereign capacity as representative or *parens patriae* of its agencies, its municipalities and its citizens.

36. The State of New York and its citizens have a right in and to the waters of Lakes Erie and Ontario, and the Niagara and St. Lawrence Rivers for domestic, municipal, and industrial purposes, subject to the aforesaid power of Congress, and subject to the concurrent rights of Canada under international law and treaty and are lawfully entitled to receive all of the waters which would flow into said lakes and rivers from the other rivers and streams in the Great Lakes Waterway without diminution by any other State, its agencies or its citizens.

37. In reliance upon said right to the undiminished waters of said Waterway, the State of New York, its agencies, its municipalities and its citizens have expended sums of money in providing means for utilizing said waters for domestic, municipal and industrial purposes with, however, said waters being returned to the Great Lakes-St. Lawrence watershed after such uses.

38. Any diversion of waters from the Great Lakes watershed lowers the level of Lakes Erie and Ontario and the St. Lawrence and Niagara Rivers, and the present substantial diversion requires and will require extensive and expensive additional works in order to attempt to maintain an adequate supply of water to the citizens of the State of New York.

39. The present permanent diversion of water from Lake Michigan by the defendants and their agents violates international law, the United States-Canadian Boundary Waters Treaty of 1909 between the United States and Great Britain (36 Stat. (Part 2) 2448) and the Niagara River Water Diversion Treaty of 1950 (1 U. S. T. 694).

WHEREFORE, complainant State of New York demands that judgment be entered herein enjoining any diversion of waters from the Great Lakes watershed by the defendants or their agents or instrumentalities for domestic or industrial purposes, unless the effluent, after proper purification, be returned thereto or such effluent be utilized in whole or in part for navigation purposes in lieu of all or part of the 1500 cfs presently being diverted for such purposes; or, if this Court should determine that such diversion not be absolutely enjoined, then determining the extent of the injury to this complainant, its agencies, its municipalities and its citizens resulting from such diversion, in so far as said injury can be measured in monetary terms, and enjoining such diversion unless the defendants or their instrumentalities compensate this complainant, its instrumentalities and its citizens for said injury; and such other, further and different relief as may be just, equitable and proper; and that costs be assessed against the defendants.

Respectfully submitted,

Louis J. Lefkowitz,
Attorney General of the State of New York,

Paxton Blair,
Solicitor General of the State of New York,

Richard H. Shepp,
Assistant Attorney General of the State of New York,

Randall J. Le Boeuf, Jr.,
Special Assistant Attorney General of the State of New York.

October 21, 1959

EXHIBIT A

DOCKET 68

INTERNATIONAL JOINT COMMISSION

IN THE MATTER OF THE APPLICATIONS OF THE GOVERNMENT OF CANADA AND THE GOVERNMENT OF THE UNITED STATES OF AMERICA FOR AN ORDER OF APPROVAL OF THE CONSTRUCTION OF CERTAIN WORKS FOR DEVELOPMENT OF POWER IN THE INTERNATIONAL RAPIDS SECTION OF THE ST. LAWRENCE RIVER

ORDER OF APPROVAL

WHEREAS the Government of Canada and the Government of the United States of America under date of 30 June, 1952, have submitted Applications to the International Joint Commission (hereinafter referred to as the "Commission") for its approval of the construction, jointly by entities to be designated by the respective Governments, of certain works for the development of power in the International Rapids Section of the St. Lawrence River, these being boundary waters within the meaning of the Preliminary Article of the Boundary Waters Treaty of 11 January, 1909 (hereinafter referred to as the "Treaty"), and of the construction, maintenance and operation of such works subject to and under conditions specified in the Applications, and have requested that the Applications be considered by the Commission as in the nature of a joint application; and

WHEREAS pursuant to the aforementioned request of the two Governments, the Commission is considering the two applications as in the nature of a joint application; and

WHEREAS notices that the applications had been filed were published in accordance with the Rules of Procedure of the Commission; and

WHEREAS Statements in Response to the Applications and Statements in Reply thereto by both Applicants were filed in accordance with the Rules of the Commission; and

WHEREAS pursuant to published notices, hearings were held by the Commission at Toronto, Ontario, on 23 July, 1952; at Ogdensburg, New York, on 24 July, 1952; at Cornwall, Ontario, on 25 July, 1952; at Albany, New York, on 3 September, 1952; at Montreal, Quebec, on 8 September, 1952; and at Washington, D. C., on 20 October, 1952; and

WHEREAS by reason of the said notices of the said applications and hearings, all persons interested were afforded convenient opportunities of presenting evidence to and being heard before the Commission; and

WHEREAS, pursuant to the said Applications, the hearings before, the evidence given, and material filed with the Commission, the Commission is satisfied that the proposed works and uses of the waters of the International Rapids Section comply with the principles by which the Commission is governed as adopted by the High Contracting Parties in Article VIII of the Treaty; and

WHEREAS the Commission has been informed that the Government of Canada has designated The Hydro-Electric Power Commission of Ontario as the entity to construct, maintain and operate the proposed works in Canada, and that the Government of the United States intends in due course to designate the entity to construct, maintain and operate the works in the United States; and

WHEREAS the program of construction of the works, as proposed by the Applicants, includes the removal of Gut Dam from the International Rapids Section and the Government of Canada has informed the Commission that it is its intention to take steps for the early removal of Gut Dam as soon as the construction of the proposed works is approved and as soon as river conditions and the protection of down river and other interests that will be affected during its removal will permit, thereby advancing the time of removal of Gut Dam; and

WHEREAS the Commission finds that suitable and adequate provision is made by the laws in Canada and by the Constitution and laws in the United States for the protection and indemnity of all interests on either side of the International Boundary which may be injured by reason of the construction, maintenance and operation of the works; and

WHEREAS the Commission finds that it has jurisdiction to hear and dispose of the Applications by approval thereof in the manner and subject to the conditions hereinafter set out;

NOW, THEREFORE, IT IS ORDERED that the construction, maintenance and operation jointly by the Hydro-Electric Power Commission of Ontario and an entity to be designated by the Government of the United States of America of certain works (hereinafter called "the works") in accordance with the "Controlled Single Stage Project (238-242)", which was part of the joint report dated 3 January, 1941, of the Canadian Temporary Great Lakes-St. Lawrence Basin Committee and the United States St. Lawrence Advisory Committee, containing the features described in Appendix "A" to this Order and shown in

Appendix "B" to this Order, be and the same are hereby approved subject to the conditions enumerated below, namely,

(a) All interests on either side of the International Boundary which are injured by reason of the construction, maintenance and operation of the works shall be given suitable and adequate protection and indemnity in accordance with the laws in Canada or the Constitution and laws in the United States respectively, and in accordance with the requirements of Article VIII of the Treaty.

(b) The works shall be so planned, located, constructed, maintained and operated as not to conflict with or restrain uses of the waters of the St. Lawrence River for purposes given preference over uses of water for power purposes by the Treaty, namely, uses for domestic and sanitary purposes and uses for navigation, including the service of canals for the purposes of navigation, and shall be so planned, located, constructed, maintained and operated as to give effect to the provisions of this Order.

(c) The works shall be constructed, maintained and operated in such manner as to safeguard the rights and lawful interests of others engaged or to be engaged in the development of power in the St. Lawrence River below the International Rapids Section.

(d) The works shall be so designed, constructed, maintained and operated as to safeguard so far as possible the rights of all interests affected by the levels of the St. Lawrence River upstream from the Iroquois regulatory structure and by the levels of Lake Ontario and the lower Niagara River; and any change in levels resulting from the works which injuriously affects such rights shall be subject to the requirements of paragraph (a) relating to protection and indemnification.

(e) The hydro-electric plants approved by this Order shall not be subjected to operating rules and procedures more rigorous than are necessary to comply with the provisions of the foregoing paragraphs (b), (c) and (d).

(f) Before the Hydro-Electric Power Commission of Ontario commences the construction of any part of the works, it shall submit to the Government of Canada, and before the entity designated by the Government of the United States commences the construction of any part of the works, it shall submit to the Government of the United States, for approval in writing, detailed plans and specifications of that part of the works located in their respective countries and details of the program of construction thereof or such details of such plans and specifications or programs of construction relating thereto as the respective Governments may require. If after any plan, specification or program has been so approved, The Hydro-Electric Power Commission of Ontario or the entity designated by the Government of the United States wishes to make any change therein, it shall, before adopting such change, submit the changed plan, specification or program for approval in a like manner.

(g) In accordance with the Applications, the establishment by the Governments of Canada and of the United States of a Joint Board of Engineers to be known as the St. Lawrence River Joint Board of Engineers (hereinafter referred to as the "Joint Board of Engineers") consisting of an equal number of representatives of Canada and the United States to be designated by the respective Governments, is approved. The duties of the Joint Board of Engineers shall be to review and coordinate, and, if both Governments so authorize, approve the plans and specifications of the works and the programs of construction thereof submitted for the approval of the respective Governments as specified above, and to assure the construction of the works in accordance therewith as approved. The Joint Board of Engineers shall consult with and keep the Board of Control, hereinafter referred to, currently informed on all matters pertaining to the water levels of Lake Ontario and the International Rapids Section and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section, and shall give full consideration to any advice or recommendations received from the Board of Control with respect thereto.

(h) A Board of Control to be known as the International St. Lawrence River Board of Control (herein referred to as the "Board of Control") consisting of an equal number of representatives of Canada and of the United States, shall be established by this Commission. The duties of the Board of Control shall be to give effect to the instructions of the Commission as issued from time to time with respect to this Order.

During construction of the works the duties of the Board of Control shall be to keep itself currently informed of the plans of the Joint Board of Engineers insofar as these plans relate to water levels and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section, and to consult with and advise the Joint Board of Engineers thereon.

Upon completion of the works, the duties of the Board of Control shall be to ensure that the provisions of this Order relating to water levels and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section as herein set out are complied with, and The Hydro-Electric Power Commission of Ontario and the entity designated by the Government of the United States shall duly observe any direction given them by the Board of Control for the purpose of ensuring such compliance. The Board of Control shall report to the Commission at such times as the Commission may determine.

In the event of any disagreement amongst the members of the Board of Control which they are unable to resolve, the matter shall be referred by them to the Commission for decision. The Board of Control may, at any time, make representations to the Commission in regard to any matter affecting or arising out of the terms of this Order with respect to water levels and the regulation of the said discharge and flow.

(i) Upon the completion of the works, the discharge of water from Lake Ontario and the flow of water through the International Rapids Section shall be regulated to meet the requirements of paragraphs (b), (c) and (d) hereof, and, subject as hereinafter provided, shall be regulated in accordance with Method of Regulation No. 5 as prepared by the Department of Transport, Canada, dated September, 1940, and shall be based on the rule-curves forming part of that Method of Regulation. The flow of water through the International Rapids Section in any period shall equal the discharge of water from Lake Ontario as determined for that period in accordance with such Method of Regulation and shall be maintained as uniformly as possible throughout that period.

Subject to the requirements of paragraphs (b), (c) and (d) hereof, the Board of Control, after obtaining the approval of the Commission, may temporarily modify or change the restrictions as to discharge of water from Lake Ontario and the flow of water through the International Rapids Section set out in this paragraph, for the purpose of determining what modifications or changes therein may be advisable. The Board of Control shall report to the Commission the results of such experiments together with its recommendations as to any changes or modifications in said restrictions. Recommendations as to any changes or modifications which the Commission desires should be made permanent will be referred by the Commission to the two Governments, and if the two Governments thereafter agree, they shall be given effect as if contained in this Order.

(j) Subject as hereinafter provided, upon completion of the works, the works shall be operated initially for a test period of ten years, or such shorter period as may be approved by the Commission with the forebay water level at the power houses held at a maximum elevation of 238.0 feet, sea level datum. Subject to the requirements of paragraphs (b), (c) and (d) hereof, the Board of Control, after obtaining the approval of the Commission, may temporarily modify or change the said forebay water level in order to carry out experiments for the purpose of determining whether it is advisable to increase the forebay water level at the power houses to a maximum elevation exceeding 238.0 feet. If the Board of Control, as a result of these experiments, considers that operation during this test period at a maximum elevation exceeding 238.0 feet would be advisable, and so recommends, the Commission will consider authorizing operation during this test period at a maximum elevation exceeding 238.0 feet. At the end of this test period, the Commission will make such recommendations to the two Governments with respect to a permanent forebay water level as it deems advisable or it may recommend an extension of the test period. Such of these recommendations as the two Governments thereafter agree to adopt shall be given effect as if contained in this Order.

(k) The Hydro-Electric Power Commission of Ontario and the entity designated by the Government of the United States shall maintain and supply for the information of the Board of Control accurate records relating to water levels and the discharge of water through the works and the regulation of the flow of water through the International Rapids Section, as the Board of Control may determine to be suitable and necessary, and shall install such gauges, carry out such measurements, and perform such other services as the Board may deem necessary for these purposes.

(l) The Board of Control shall report to the Commission as of 31 December each year on the effect, if any, of the operation of the downstream hydro-electric power plants and related structures on the tailwater elevations at the hydro-electric power plants approved by this Order.

(m) The Government of Canada shall proceed forthwith to carry out its expressed intention to remove Gut Dam.

AND IT IS FURTHER ORDERED that the allocation set out in Appendix "c" of the costs of constructing, maintaining and operating the works approved by this Order between The Hydro-Electric Power Commission of Ontario and the entity to be designated by the Government of the United States be and the same is hereby approved but such approval shall not preclude the Applicants from submitting to the Commission for approval any variation in the said allocation that may be agreed upon between them as being appropriate or advisable.

And it is further ordered that the Commission retains jurisdiction over the subject matter of these Applications, and may, after giving such notice and opportunity to all interested parties to make representations as the Commission deems appropriate, make such further Order or Orders relating thereto as may be necessary in the judgment of the Commission.

Signed at Montreal, this 29th day of October, 1952.

Signed: A. G. L. McNaughton
A. O. Stanley
George Spence
Eugene W. Weber
J. Lucien Dansereau

Commissioner Roger McWhorter dissenting.

(Dissenting opinion to be filed and attached to this Order.)

APPENDIX A

FEATURES OF THE WORKS APPROVED BY THIS ORDER:

(A) *Channel Enlargements*

Channel Enlargements will be undertaken from above Chimney Point to below Lotus Island, designed to give a maximum mean velocity in any cross-section of the channel which will be used for navigation not exceeding four feet per second at any time, also between Lutus [sic] Island and Iroquois Point and from above Point Three Points to below Ogden Island designed to give a maximum mean velocity in any cross-section not exceeding two and one-quarter feet per second with the flow and at the stage to be permitted on the first of January of any year, under regulation of outflow and levels of Lake Ontario in accordance with Method of Regulation No. 5, as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September, 1940. Downstream from the power houses channel enlargements will be carried out for the purpose of reducing the tail water level at the power houses.

Final locations and cross-section of these channel enlargements will be determined from further studies.

(B) *Control Facilities*

Adequate control facilities will be constructed for the regulation of the outflow from Lake Ontario.

(C) *Power House Structures*

The power house structures will be constructed in the north channel extending from the lower end of Barnhart Island to the Canadian shore, and so located that one structure will be on each side of the International Boundary. Each power house structure will include the main generating units to utilize economically the river flows available to it, with provision for ice handling and discharge sluices.

(D) *Dams and Associated Structures*

A control dam will be constructed extending from Iroquois Point on the Canadian side of the river in an easterly direction to the United States mainland above Point Rockway.

A dam will be constructed in the Long Sault Rapids at the head of Barnhart Island.

Dykes and associated works will be provided as may be necessary in both the Province of Ontario and the State of New York.

All the works in the pool below the control dam will be designed to provide for full Lake Ontario level.

(E) *Highway Modifications*

In both the Province of Ontario and the State of New York provincial and state highways, and other roads, will be relocated in those portions subject to flooding, and reconstructed to standards at least equal to those now in existence.

(F) *Railway Modifications*

Such railway relocations as may be required as a result of the works herein described will be made in the Province of Ontario and the State of New York to standards at least equal to those now in existence.

(G) *Navigation Facilities*

Provision will be made for the continuance of 14-foot navigation throughout the International Rapids Section during the construction period.

(H) *Flooded Areas*

Lands and buildings in both the Province of Ontario and the State of New York will be acquired or rehabilitated as required. Inundated wooded areas will be cleared.

(Appendix B is a map.)

APPENDIX C

1. The power development works under this Application are those specified in Section 8 of the Application.

2. Total costs of the works described in Section 8 shall be based on Canadian costs and United States costs and the total shall be equally divided between the two constructing entities.

3. The costs to be divided should be based on actually experienced and audited expenses.

4. In relation to the three principles above, the three following provisions apply:

(A) The amount to be paid to Canada, as specified in the Agreement of December 3, 1951, between Canada and Ontario, in lieu of the construction by the power-developing entities of facilities required for the continuance of 14-foot navigation, shall be excluded from the total cost of the power project to be divided between the Canadian and United States power-developing entities, in consideration of the fact that actual replacement of 14-foot navigational facilities will be rendered unnecessary by reason of the concurrent construction of the deep waterway in Canada.

(B) The Authority to be established pursuant to the provisions of the St. Lawrence Seaway Authority Act, Chapter 24 of the Statutes of Canada, 1951 (Second Session), shall contribute an agreed sum of money towards the cost of the channel enlargement which the power-developing entities must undertake in the St. Lawrence River, as set out in paragraph 4 of the Annex to the Canada-Ontario Agreement of December 3, 1951, and in section 8 of the Application to the International Joint Commission, in consideration of the benefits which will accrue to navigation from such channel enlargement.

(C) All costs for construction, maintenance and operation of the project except machinery and equipment in the respective power houses shall be borne equally by the two entities. All costs for construction, maintenance and operation of machinery and equipment in their respective power houses shall be paid by the respective entities and shall be deemed to satisfy the principle of an equal division between the two entities.

• • •

EXHIBIT B

Executive Order No. 10500—Designation of the Power Authority of the State of New York and Establishment of the United States Section of the St. Lawrence River Joint Board of Engineers.

WHEREAS pursuant to the provisions of the Boundary Waters Treaty of January 11, 1909 (36 Stat. 2448), the Government of the United States of America and the Government of Canada on June 30, 1952, filed concurrent and complementary applications with the International Joint Commission for an Order of Approval of the construction, jointly by entities to be designated by the respective Governments, of certain works for the development of power in the International Rapids Section of the St. Lawrence River and of the maintenance and operation of such works; and

WHEREAS the Commission on October 29, 1952, issued an Order of Approval for the construction, maintenance, and operation of such works jointly by The Hydro-Electric Power Commission of Ontario and by an entity to be designated by the Government of the United States, subject to the terms and conditions contained in that Order of Approval; and

WHEREAS condition (g) of the Order of Approval reads in part as follows:

> In accordance with the Applications, the establishment by the Governments of Canada and of the United States of a Joint Board of Engineers to be known as the St. Lawrence River Joint Board of Engineers (hereinafter referred to as the "Joint Board of Engineers") consisting of an equal number of representatives of Canada and the United

> States to be designated by the respective Governments, is approved. The duties of the Joint Board of Engineers shall be to review and coordinate, and, if both Governments so authorize, approve the plans and specifications of the works and the programs of construction thereof submitted for the approval of the respective Governments as specified above, and to assure the construction of the works in accordance therewith as approved. * * *

and

WHEREAS the Federal Power Commission on July 15, 1953, issued a license (hereinafter referred to as the License) to the Power Authority of the State of New York for the construction, maintenance, and operation of Project No. 2000, which project represents that portion of the works for the development of power in the International Rapids Section of the St. Lawrence River located within the United States:

NOW, THEREFORE, by virtue of the authority vested in me by the Constitution and statutes, and as President of the United States, it is hereby ordered as follows:

SECTION 1. *Designation of the Power Authority of the State of New York.* The Power Authority of the State of New York is hereby declared to be the designee of the Government of the United States of America for the construction of the works referred to in the Order of Approval of the International Joint Commission of October 29, 1952.

SEC. 2. *Establishment of United States Section of St. Lawrence River Joint Board of Engineers.* There is hereby established the United States Section of the St. Lawrence River Joint Board of Engineers, composed of two members and hereinafter referred to as the United States Section. The Secretary of the Army and the Chairman of the Federal Power Commission are hereby designated members. Each may designate an alternate to act for him as a member of the United States Section.

SEC. 3. *Duties of the United States Section.* The United States Section shall represent the Government of the United States on the Joint Board of Engineers in the performance of the duties specified in condition (g) of the Order of Approval, and is authorized to act with the Canadian Section in the approval of the plans and specifications of the works and the programs of construction thereof, submitted for approval of the respective Governments as required by the Order of Approval, and to assure the construction of the works in accordance with such approval.

SEC. 4. *Assistance to the United States Section.* The Department of the Army and the Federal Power Commission are authorized to furnish such assistance, including facilities, supplies and personnel, to the United States Section as may be consonant with law and necessary for the purpose of effectuating this order.

SEC. 5. *Reports to the President.* The United States Section shall submit its final report to the President upon the completion of construction and shall submit such interim reports as may appear to be desirable.

SEC. 6. *Effective date.* This order shall be effective upon the date that the License becomes final.

DWIGHT D. EISENHOWER.

THE WHITE HOUSE, *November 4, 1953.*

LIBR
REME COURT. U.

Office-Supreme Court, U.
FILED
APR 8 1960
JAMES R. BROWNING, Cl

Nos. 2, 3 and 4, Original.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

STATES OF WISCONSIN, MINNESOTA, OHIO AND PENNSYLVANIA, *Complainants,*

vs.

STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO.

STATES OF MISSOURI, KENTUCKY, TENNESSEE LOUISIANA, MISSISSIPPI, AND ARKANSAS, *Intervening Defendants.*

STATE OF MICHIGAN, *Complainant,*

vs.

STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, *Defendants.*

STATE OF NEW YORK, *Complainant,*

vs.

STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, *Defendants.*

ANSWER OF THE STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO THE PETITION OF INTERVENTION OF THE UNITED STATES OF AMERICA.

WILLIAM C. WINES,
Assistant Attorney General,
State of Illinois,

LAWRENCE J. FENLON,
Principal Assistant Attorney,
The Metropolitan Sanitary
District of Greater Chicago,

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THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

No. 2, Original.

STATES OF WISCONSIN, MINNESOTA, OHIO AND
PENNSYLVANIA,

Complainants,

vs.

STATE OF ILLINOIS AND THE METROPOLITAN SANITARY
DISTRICT OF GREATER CHICAGO.

STATES OF MISSOURI, KENTUCKY, TENNESSEE,
LOUISIANA, MISSISSIPPI, AND ARKANSAS,

Intervening Defendants.

No. 3, Original.

STATE OF MICHIGAN,

Complainant,

vs.

STATE OF ILLINOIS AND THE METROPOLITAN SANITARY
DISTRICT OF GREATER CHICAGO,

Defendants.

No. 4, Original.

STATE OF NEW YORK,

Complainant,

vs.

STATE OF ILLINOIS AND THE METROPOLITAN SANITARY
DISTRICT OF GREATER CHICAGO,

Defendants.

ANSWER OF THE STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO THE PETITION OF INTERVENTION OF THE UNITED STATES OF AMERICA.

The State of Illinois and The Metropolitan Sanitary District of Greater Chicago, defendants, answer the Petition of Intervention of the United States of America as follows:

1. Admit the allegations and statements contained in Sections I to XI, both inclusive.

2. Admit the allegation contained in Section XII, that Article II of the Treaty of January 11, 1909 between the United States and Great Britain Relating to Boundary Waters Between the United States and Canada provides that a "diversion from their natural channel of waters on either side of the boundary, resulting in any injury on the other side of the boundary shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion occurs," but aver that Article II expressly provides that "this provision shall not apply to cases already existing." Aver that the diversion of water from Lake Michigan was a case "already existing" at the time said treaty was signed and is therefore exempt from the application of said provision of the Treaty. Admit the remaining allegations of Section XII.

3. Admit the allegations of Section XIII, but aver that Article II of the Boundary Waters Treaty of January 11, 1909 was not modified by the Treaty of February 27, 1950 between the United States and Canada.

4. Admit the allegations and statements contained in Sections XIV to XX, both inclusive.

5. Deny the allegation of Section XX that a measurable adverse effect upon the interests of navigation on the Great Lakes system would result from a permanent increased diversion out of Lake Michigan of as much as 1,000 cubic feet per second and that similar effects would result from a smaller permanent increase in such diversion.

With respect to the allegation that the decree of April 21, 1930 in these causes authorizes a flow of water out of Lake Michigan of 1,500 cubic feet per second, exclusive of domestic pumpage, aver that said decree enjoins a flow in excess of an annual average of 1,500 cubic feet per second, in addition to domestic pumpage. Admit the allegation that an average annual flow of 1,500 cubic feet per second, without domestic pumpage, is adequate for operation of existing navigation facilities on the Illinois Waterway, but deny that such a flow is sufficient for total navigation requirements of the Waterway or the Mississippi River. With respect to the allegation that studies of water requirements for operation of the recommended duplicate locks on the Illinois Waterway show that an average annual flow of 1,826 cubic feet per second would be required, aver that said studies relate only to the water supply needed for operation of the proposed duplicate lock system and do not purport to show the amount of flow required for navigation on the Waterway and the Mississippi River. On the basis of findings of the Corps of Engineers, United States Army, admit the allegations with respect to the effect of diversions of water out of Lake Michigan on the levels of Lakes Huron, Erie, and Ontario and in connecting waterways, but aver that such effect is subject to the effects of compensating or offsetting factors not referred to in Section XX.

6. Admit the allegations of Section XXI, except the allegations with respect to the effect of an increase or decrease in the diversion of water from Lake Michigan on the hydro-electric power plants therein identified, which they deny. Aver that the diversion of water from Lake Michigan at Chicago is authorized by (a) the decree of April 21, 1930 in these causes; (b) a permit of June 26, 1930 issued by the Secretary of War; and (c) the Rivers and Harbors Act of July 3, 1930, 46 Stat. 918, 929, and that the

authorities responsible for the operation of said hydroelectric power plants have no right to seek a reduction in said diversion as authorized.

Admit the allegations contained in Section XXII, but aver that in the 1929 hearings in these causes before Special Master Charles E. Hughes the complainants acquiesced in the combined type of sewer system in Chicago in which sanitary and storm sewers are not separate; that the combined type of sewer system is used in almost all major lake cities; that in times of storm a certain amount of industrial wastes and raw sewage overflow the sewage collection system and do not enter the sewage plants for treatment; that such overflow cannot be avoided; that a separation of sanitary sewers and storm sewers would be prohibitive in cost; that in dry weather more than 97% of all sewage and wastes in the area of The Metropolitan Sanitary District of Greater Chicago are collected and treated; that the sewage treatment plants of the District represent the highest standard in modern sanitary engineering; that studies for improvement of sewage treatment and disposal facilities are carried on continuously by the District; that substantial extensions and additions have been made to the treatment plants and other disposal facilities constructed by the District pursuant to the decree of this Court entered on April 21, 1930; that despite the use of the most modern sewage treatment works and techniques, 100% purification of sewage cannot be attained, and the discharge of sewage effluent and storm overflow into Lake Michigan would pollute Chicago's water supply.

7. Admit the allegations of Section XXIII, but do not waive any rights in admitting such allegations.

Wherefore, these defendants ask that the prayer of the United States of America be considered with due regard for their rights as established by the decree of April 21, 1930 herein and their compliance therewith, and the Rivers and Harbors Act of July 3, 1930.

Respectfully submitted,

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In the Supreme Court of the United States

OCTOBER TERM, 1959

No. 4 Original

STATE OF NEW YORK, COMPLAINANT
v.
STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

THE UNITED STATES OF AMERICA, INTERVENER

RESPONSE OF THE UNITED STATES OF AMERICA TO NEW YORK'S SUPPLEMENTAL AND AMENDED COMPLAINT

The United States, as intervener, does not plead specifically to the allegations in New York's supplemental and amended complaint. However, this omission does not constitute an admission by the United States of any allegation of fact or legal conclusion contained therein.

Respectfully submitted.

J. LEE RANKIN,
Solicitor General.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO,
Defendant.

UNITED STATES OF AMERICA,
Intervenor.

ANSWER OF THE STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO THE SUPPLEMENTAL AND AMENDED COMPLAINT.

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THE [illegible] PRINTING COMPANY, CHICAGO

IN THE

Supreme Court of the United States

OCTOBER TERM, 1959.

No. 4 Original.

STATE OF NEW YORK,
Complainant,

vs.

STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO,
Defendant.

UNITED STATES OF AMERICA,
Intervenor.

ANSWER OF THE STATE OF ILLINOIS AND THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO TO THE SUPPLEMENTAL AND AMENDED COMPLAINT.

The State of Illinois and The Metropolitan Sanitary District of Greater Chicago (which, with its predecessor, Sanitary District of Chicago, will be referred to as the "Sanitary District"), defendants, answer the Supplemental and Amended Complaint herein as follows:

1. Admit the allegations in paragraph 1.

2. Admit the allegations in paragraph 2, but aver that at the time of the enactment of the Statute entitled "An

Act to Create Sanitary Districts, and to Remove Obstructions in the DesPlaines and Illinois Rivers,'' approved May 29, 1889, Illinois Laws, 1889, p. 126 (hereinafter called the "Act of 1889''), the legislature of the State of Illinois passed a joint resolution, Illinois Laws, 1889, p. 376, providing as follows:

> "1. That it is the policy of the State of Illinois to procure the construction of a waterway of the greatest practicable depth and usefulness for navigation from Lake Michigan via the Des Plaines and Illinois Rivers to the Mississippi River, and to encourage the construction of feeders thereto of like proportions and usefulness.
>
> "2. That the United States is hereby requested to stop work upon the locks and dams at LaGrange and at Campsville, and to apply all funds available and future appropriations to the improvement of the channel from LaSalle to the mouth, with a view to such a depth as will be of present utility and in such manner as to develop progressively all the depth practicable, by the aid of a large water supply from Lake Michigan at Chicago.
>
> "3. That the United States is requested to aid in the construction of a channel not less than 160 feet wide and 22 feet deep, with such a grade as to give a velocity of three miles per hour from Lake Michigan at Chicago to Lake Joliet, a pool of the Des Plaines River immediately below Joliet, and to project a channel of similar capacity and not less than 14 feet deep from Lake Joliet to LaSalle, all to be designed in such manner as to permit future development to a greater capacity.''

3-6. Admit the allegations contained in paragraphs 3 to 6, both inclusive, and aver that the Chicago area was brought into the Mississippi watershed by the construction of a channel pursuant to the Act of 1889 and by Acts of Congress of March 30, 1822, c. 14, 3 Stat. 659, and March 2, 1827, c. 51, 4 Stat. 234. Further aver that by a series of Acts of Congress culminating in the Rivers and Harbors Act of July 3, 1930, c. 847, 46 Stat. 918, 929, the Illinois Waterway from the Port of Chicago to Grafton, Illinois, became a federal navigation project, and that said Rivers and Harbors Act of July 3, 1930 authorized a diversion of water by the defendants from Lake Michigan through the Chicago Sanitary and Ship Canal (referred to as the Sanitary Canal in the Supplemental and Amended Complaint, and hereinafter referred to as the "Canal") and its auxiliary channels not in excess of an annual average of 1500 cubic feet a second (hereinafter, c.f.s.), in addition to domestic pumpage, for the navigation of said waterway.

7. Admit the allegations in paragraph 7, but aver that the Act of 1889 provided that the channel constructed pursuant thereto should be of sufficient size and capacity to be navigable, and that one of the objects of the Act of 1889 was to authorize the construction of a channel which would serve as a waterway from Lake Michigan into the Illinois River for the purpose of navigation.

8. Admit the allegations in paragraph 8, but aver that the Illinois Act of 1903, Illinois Laws, 1903, p. 113, also provided that the rules of the United States Government then in force regulating the navigation of the Chicago River should govern navigation in the channels of the Sanitary District.

9. Admit that pursuant to said Act of 1903, the defendant Sanitary District constructed and placed in operation a hydroelectric power plant at Lockport, Illinois, near the western terminus of the Canal, but aver that this Court in *Wisconsin* v. *Illinois*, 278 U. S. 367 (October Term 1928), held that the use of the diverted water for power was "merely incidental." Further aver that since the reduction in diversion from Lake Michigan to an amount not to exceed an annual average of 1500 c.f.s., in addition to

domestic pumpage, the amount of power generated has been drastically reduced and the flow of water through the power plant has not been sufficient to produce enough power for the needs of the Sanitary District.

10. Deny the allegations in paragraph 10 and aver that the water diverted from Lake Michigan by the Sanitary District through its channels and water pumped from the lake in the Chicago area for domestic purposes is needed and used, and is authorized by the Rivers and Harbors Act of 1930, for the navigation of the Illinois Waterway. Further aver that the Sanitary District does not sell any electrical energy generated at its hydro-electric plant located near the western terminus of the Canal.

11. Admit the allegations in paragraph 11, but aver that the complaints of the State of New York and the other states bordering upon the Great Lakes, referred to in paragraph 11, did not assail the withdrawal of water from Lake Michigan in the Chicago area for domestic use, and did not demand that the water taken from Lake Michigan in the Chicago area for domestic use be returned to the lake. Aver that the issue presented by said original complaints, as amended, was whether a permit issued by the Secretary of War authorizing a diversion from Lake Michigan of 8500 c.f.s. by the defendants for purposes of sanitation was valid, and the Court in its decision on said complaints (*Wisconsin* v. *Illinois,* 278 U. S. 367), held the permit to be invalid and that the diversion from Lake Michigan for the purpose of diluting sewage was without legal basis, except in so far as such diversion was necessary for the purpose of maintaining navigation in the Chicago River as a part of the Port of Chicago; that this Court re-referred the causes to Special Master Hughes for the purpose of determining the extent of diversion required to maintain navigation in the Chicago River; that such re-reference contemplated a continuation of the discharge of sewage (and

sewage effluent after the completion by the Sanitary District of sewage treatment plants) into the Canal and the Chicago River; that upon recommendation of the Special Master on re-reference, this Court in *Wisconsin* v. *Illinois*, 281 U. S. 179 (October Term, 1929), held that for the purpose of maintaining conditions suitable for navigation in the Chicago River as a part of the Port of Chicago the diversion should be limited to an annual average of 1500 c.f.s., in addition to domestic pumpage, after the construction of sewage treatment plants and appurtenances outlined in a program proposed by the Sanitary District. Further aver that as found by Special Master Hughes on re-reference (Report of December 17, 1929, page 121), the right of the City of Chicago to take water from Lake Michigan for the ordinary use of its inhabitants is not "open to serious question", and that there is no "established rule of law which requires it to turn into the lake what is no longer water but sewage or the effluent of sewage treatment plants."

12. Deny the allegations in the first sentence of paragraph 12 with respect to the reasons for the decision of this Court in *Wisconsin* v. *Illinois*, 281 U. S. 179, requiring the defendants to limit their diversion after December 31, 1938 to an annual average of 1500 c.f.s., in addition to domestic pumpage. Aver that this Court held the demand for a return of domestic pumpage to Lake Michigan (as a means of obviating the necessity for any direct diversion from the lake through the channels of its Sanitary District) to be excessive and unreasonable and should not be pressed "without regard to relative suffering and the time during which the complainants have let the defendants go on without complaint;" that "the best way of preventing the pollution of navigable waters is to permit an outflow from the Drainage Canal at Lockport, and that the interests of navigation in the Chicago River as a part of the Port of Chicago

will require the diversion of an annual average of from 1000 c.f.s. to 1500 c.f.s. in addition to domestic pumpage after the sewage treatment program has been carried out."

Admit the remaining allegations in paragraph 12, and aver that in compliance with the Decree of April 21, 1930 the Sanitary District completed construction of vast sewage treatment projects, consisting of sewage treatment plants, intercepting sewers, and sewage pumping stations, at a cost in excess of 316 million dollars; that 109 million dollars had previously been spent for the construction of sewers which discharged the effluent from domestic pumpage into the Canal.

13. Deny the allegations contained in paragraph 13 except the allegation in the first sentence thereof with respect to the amount of diversion from Lake Michigan (an annual average of 1500 c.f.s.) and the present amount of domestic pumpage withdrawn from Lake Michigan in the Chicago area (approximately 1800 c.f.s.). Aver that the amount of domestic pumpage withdrawn in the Chicago area in 1930 was 1700 c.f.s.; that the average annual increase in domestic pumpage for the years 1925 through 1928, as shown by the Report of the Special Master on Re-Reference, was 75 c.f.s.; that at the rate of increase then prevailing, it would have been estimated in 1930 that the domestic pumpage in the Chicago area would have doubled by 1958, but because of measures taken by the defendants, including the City of Chicago, the per capita consumption of water in Chicago and municipalities served by the Sanitary District and the rate of increase in domestic pumpage have been greatly reduced; and that the domestic pumpage of the area of Chicago served by the Sanitary District is not excessive, and is far less than would have been estimated in 1930 on the basis of experience and facts presented before the Special Master on Re-Reference.

14. Deny the allegations in paragraph 14.

15. Admit the allegation contained in the first sentence of paragraph 15; deny the allegation that a diversion of water from Lake Michigan has an effect on the level of Lake Superior; deny the remaining allegations contained in the second sentence of paragraph 15, and aver that the effect on lake levels of a diversion of water from Lake Michigan, without return, depends not only upon the amount of the diversion but also upon the absence or presence of compensating factors.

16. Admit the allegations in paragraph 16.

17. Deny the allegation in paragraph 17 that the State of New York, its agencies or citizens, are entitled to receive all of the waters from rivers and streams in the Great Lakes watershed without diminution by any other State, its agencies or citizens.

18. Deny the allegations in paragraph 18 that the improvements in aid of navigation therein referred to were made in reliance upon a right to the undiminished waters of the Great Lakes watershed, and deny that the State of New York, its agencies, its municipalities, or its citizens have such a right. Aver that certain improvements described in paragraph 18 have resulted in diversions from Lake Erie.

19. Admit the allegations in paragraph 19.

20. Admit the allegation in the first sentence of paragraph 20, but aver that no responsive pleading is required to be made to the conclusion (a *non sequitur*) contained in the second sentence of paragraph 20 or to the argumentative allegation contained in the last sentence in this paragraph.

21. Deny the allegations in paragraph 21. Aver that the State of New York, acting in its proprietary capacity, is estopped to question the withdrawal of water from Lake

Michigan by defendants for domestic purposes, on grounds of long acquiescence in such withdrawal and the discharge of the effluent into the Canal and the acceptance of benefits under the decisions of this Court in *Wisconsin* v. *Illinois,* 278 U. S. 367 (October Term, 1928) and 281 U. S. 179 (October Term, 1929).

22. Deny that the right of the State of New York, its agencies, municipalities, or citizens to use the natural flow of the Great Lakes water system for the production of hydroelectric power is subject only to reasonable regulation by Congress and the concurrent right of Canada under international law and treaty as alleged in paragraph 22, but aver that its right to such flow is also subject to (1) the United States-Canadian Boundary Waters Treaty of 1909 between the United States and Great Britain which exempted from legal action the existing diversion from Lake Michigan at Chicago, (2) the Niagara River Water Diversion Treaty of 1950 which imposes limitations on New York's right to such flow, (3) the licenses issued to the Power Authority of the State of New York by the Federal Power Commission, and (4) the diversion from Lake Michigan at Chicago as authorized by the Court's decree of April 21, 1930 (*Wisconsin* v. *Illinois,* 281 U. S. 179, 696), and said Rivers and Harbors Act of July 3, 1930.

23. Admit the enactment of the New York Public Authorities Law as alleged in paragraph 23, but aver that the rights of the State of New York are inferior to the power of Congress over navigable waters and are subject to the doctrine of equitable apportionment of waters. Further aver that the rights of the State of New York are subject to diversion of water from Lake Michigan as specified in the decree of this Court entered herein on April 21, 1930 and the said Rivers and Harbors Act of July 3, 1930.

24. Admit the allegations in paragraph 24.

25-31. Admit the factual allegations contained in paragraphs 25 to 31, both inclusive, except the allegations with respect to losses sustained by the Power Authority of the State of New York as a result of diversion of water from Lake Michigan or the withdrawal of water from Lake Michigan for domestic use, which are denied. Aver that the power projects referred to were developed and financed on the basis of existing water levels, as affected by the decree of this Court entered on April 21, 1930 (281 U. S. 696) and the Rivers and Harbors Act of July 3, 1930, 46 Stat. 918, 929; that the water levels, as reduced by the diversion at Chicago, were taken as normal for purposes of the projects; that the licenses issued to the Power Authority of the State of New York for the construction and operation of the projects applied only to the water remaining after the authorized withdrawal and diversion of water from Lake Michigan at Chicago; that the State of New York has no right to seek a reduction in diversion of water at Chicago in the interests of the Power Authority of the State of New York; that the right to use water for drinking, sanitary, and domestic purposes has been declared judicially and by treaty to be the highest use of water, taking precedence over all other uses.

32. Deny the allegations in paragraph 32.

33. Deny the allegations in paragraph 33, and aver that the right of the State of New York, its agencies, municipalities, and citizens to use the flow of the Great Lakes system for recreational purposes, and to receive the waters from rivers and streams in the Great Lakes watershed for the purpose of keeping up and maintaining the levels of the Great Lakes-St. Lawrence Waterway for recreational purposes, are subject not only to regulation by Congress and concurrent rights of Canada under international law and treaty, but are subject also to rights of other Great Lakes

States, and their citizens. Further aver that the governments of the United States and Canada have agreed upon criteria for the regulation of the level of Lake Ontario, which are set forth in an order of the International Joint Commission under date of July 2, 1956, which is supplemental to the order of said Commission referred to in paragraph 25 of the Supplemental and Amended Complaint and attached thereto as Exhibit A; that such criteria are designed to maintain the level of Lake Ontario within certain ranges for the benefit of riparian, navigation, and power interests, after taking into account existing diversions in and out of the Great Lakes system, including the diversion from Lake Michigan at Chicago.

34. Deny the allegation in paragraph 34 that the recreational improvements therein referred to were made in reliance upon a right to the undiminished waters of the Great Lakes watershed, and deny the existence of such a right.

35. Deny the allegations in paragraph 35 and aver that the effect of the diversion of waters from the Great Lakes are dependent not only on the diversions and the amount thereof, but on other factors; and further aver that in times of high water diversions are beneficial to shore front property and recreational improvements thereon.

36. Admit the allegation in paragraph 36 that the State of New York and its citizens have a right in and to the waters of Lake Erie and Ontario and the Niagara and St. Lawrence Rivers for domestic, municipal, and industrial purposes, subject to the powers of Congress and the rights of Canada under international law and treaty, but deny that the State of New York or its citizens are entitled to receive all of the waters which would flow into said lakes and rivers from the other rivers and streams in the Great Lakes

Waterway without diminution by any other State, its agencies, or its citizens.

37. Deny the allegations in paragraph 37 that the State of New York, its agencies, municipalities or citizens have expended sums of money for domestic, municipal or industrial purposes in reliance upon a right to undiminished waters of the Great Lakes Waterway, and deny the existence of such a right. Aver that the State of New York diverts water from the Delaware River and its tributaries for domestic purposes without returning the water to the Delaware River watershed, and has successfully resisted an action in this court by the State of New Jersey seeking to enjoin such diversion. Aver that this Court, adopting contentions advanced by the State of New York in *New Jersey* v. *New York,* 283 U. S. 336 (October Term, 1931), upheld such diversion on principles of equity and right and the doctrine of equitable apportionment.

Further aver that the State of New York diverts water for domestic use from Lake Erie through the Erie Division of the New York State Barge Canal without returning such water to Lake Erie.

38-39. Deny the allegations in paragraphs 38 and 39.

Further answering the defendants aver that no facts are alleged in the Supplemental and Amended Complaint which warrant a change in the decree entered in this cause on April 21, 1930 (*Wisconsin* v. *Illinois,* 281 U. S. 696).

WHEREFORE, the defendants ask that the prayer of the State of New York for relief be denied; that the Amended and Supplemental Complaint, which purports to allege all relevant facts and changed circumstances since the entry of the decree herein in 1930, be taken to supersede the amended application for a modification of said decree heretofore filed herein; that the Supplemental and Amended Complaint be dismissed; and that the Court assess the costs of this proceeding against the complainant.

Respectfully submitted,

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